

Solar Photovoltaic Volumetric Incentive Program

Report to the Legislative Assembly

Prepared by:

Oregon Public Utility Commission

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Executive Summary

The 2009 Legislature enacted House Bill 3039 (HB 3039) to direct the Oregon Public Utility Commission (Commission) to establish a pilot program to demonstrate the use and effectiveness of “volumetric incentive rates” and payments for electricity delivered from solar photovoltaic (PV) energy systems within Portland General Electric (PGE), PacifiCorp, and Idaho Power service territories.¹

Volumetric incentive rates (VIR) are production-based incentives in which participants receive payments based on the actual output generated from the solar PV systems. HB 3039 capped the total nameplate capacity of all systems installed under the pilot at 25 megawatts (MW) and limited eligibility to systems under 500 kilowatts. Pilot program participants cannot take advantage of any state tax credit or Energy Trust of Oregon incentives.

HB 3039 directed the Commission to submit a report to the Legislature every two years starting January 1, 2011. In the report, the Commission shall:

- Evaluate the relative effectiveness of volumetric incentive rates versus the existing regime of state tax credits and Energy Trust incentives in promoting the development of solar PV systems and in reducing system costs.
- Estimate the cost of the pilot program on utility customers.
- Offer legislative recommendations and pilot program adjustments to improve implementation of the pilot.
- Discuss other regulatory policies to increase the use of solar PV systems, make solar PV systems more affordable, reduce the cost of incentive programs to utility customers, and promote development of incentive

Pilot Program Design and Results to Date

After an extensive six month process, the Commission adopted rules to implement a pilot program starting July 1, 2010. Since that time, the Commission has monitored the program results and refined the program design when needed.

- The Commission allocated the 25 MW total program capacity to the three electric companies: PGE 14.9 MW; PacifiCorp 9.8 MW, and Idaho Power 0.4 MW.

¹ HB 3039 is codified in ORS 757.365 (2009), as amended by House Bill 3690 (2010).

- The Commission established eight capacity allocation windows over the four-year pilot period for small-scale systems (under 10 kilowatts) and medium-scale systems (between 10 kilowatts and 100 kilowatts). The capacity for large-scale systems (between 100 kilowatts and 500 kilowatts) is allocated once a year over the four-year period.
- The Commission sets the rates for small-scale and medium-scale systems using an automatic rate adjustment mechanism that adjusts the rates based on program participation and the speed of uptake of the eligible capacity. Rates for small-scale systems have steadily declined from \$0.65 per kWh in July 2010 to \$0.41 per kWh in October 2012. Rates for medium-scale systems were set at \$0.285 per kWh in October 2012.
- The Commission uses competitive bidding to set the rates for large-scale systems and has started to test this method for medium-scale systems. The highest winning bid for PGE dropped from nearly \$0.40 per kWh in the first enrollment window to just over \$0.20 per kWh in the 2012 enrollment window.

As of July 2012, the pilot program had resulted in over 11 MW of installed solar capacity in Oregon. Participants installed 7.4 MW of solar capacity in PGE's service territory; 3.5 MW in PacifiCorp's service territory; and 0.2 MW in Idaho Power's service territory. The pilot program is on target to achieve the goal of 25 MW of installed capacity prior to March 2015.

Estimated Rate Impacts

The estimated rate impact is highest in the early years of the pilot due to start-up costs in establishing the program processes and procedures. Rate impact declines over time, resulting in an average of about 0.25 percent of revenue requirements. The estimated average annual rate impact from the entire 15-year pilot program is 0.26 percent of revenue requirement for PGE customers; 0.24 percent of revenue requirement for PacifiCorp customers and 1.37 percent of revenue requirement for Idaho Power customers.

Comparative Effectiveness of Alternative Incentive Options

The pilot program and its production based incentives have not diminished the popularity of the use of state tax credits and Energy Trust incentives in promoting the development of Solar PV systems in Oregon. Since July 2010, 21 MW of solar capacity has been installed in Oregon with the help of state tax credits and Energy Trust incentives. Both the pilot program and the state tax credit/incentive program are effective at promoting the development of Solar PV systems in Oregon. Different individuals are likely to find the different incentive programs to be more advantageous to their decision to install a solar PV system. The

Commission concludes neither incentive regime will prove superior in all situations. The body of this report sets forth some of the considerations in those individual decisions.

It is still too early in the pilot program for the Commission to draw conclusions about the relative effectiveness of the VIR versus the combination of tax credits and Energy Trust incentives in reducing the cost of systems. The Commission continues to test the automatic rate adjustment mechanism and competitive bidding as means to reducing the installed cost of solar PV systems.

Program Design Recommendations and Legislative Recommendations

The Commission does not recommend changes to the legislation at this time.

Regulatory Policy Considerations and Recommendations

The Commission does not recommend changes to regulatory policies at this time.

The Commission will continue to consider potential legislative or regulatory changes to further facilitate solar photovoltaic energy generation as additional information is obtained from the pilot program.

I. Background

The 2009 Legislature adopted House Bill 3039 to establish a pilot program to examine the effectiveness of a production-based incentive in developing solar photovoltaic (PV) systems. The bill allows customers in the PGE, PacifiCorp and Idaho Power service territories to be paid directly for energy produced from their solar systems at a rate defined by the Commission.

HB 3039 directed the Commission to establish solar pilot programs to demonstrate the use and effectiveness of “volumetric incentive rates (VIR)” (i.e., a performance-based incentive based on kilowatt-hours produced), and to authorize direct payments to customers for electricity delivered from their PV systems. HB 3039 specified that the pilot program have the following key features:

- The cumulative nameplate capacity of all installed PV systems may not exceed 25 megawatts of alternating current, and eligible PV systems cannot exceed 500 kW.
- The systems must be “permanently installed” and become operational after the pilot program begins.
- Commission approved rate schedules showing the rates offered for the output from eligible systems as well as any other relevant program implementation information.
- VIR payments offered for system output generated for 15 years after the PV system begins generating electricity, at rates established at the time of enrollment. After 15 years of operation, payments offered at a rate equal to “resource value” for the output generated.
- Rates to encourage development of the “most efficient systems” and limits on total generator nameplate capacity so that the rate impact of the pilot program does not exceed .25 percent for any customer class.
- Biennial Commission reports to the Legislature evaluating the effectiveness of the incentive rates for promoting the use of solar PV energy systems.

The 2010 Legislature adopted House Bill 3690 to clarify key terms in HB 3039 and to grant the Commission authority to adjust the goal that 75% of the installed capacity in the pilot programs comes from residential or small commercial systems based on cost, feasibility or other factors.

The pilot program was established and refined with three significant Commission Orders.² The primary elements of the solar program as it currently stands are:

- **System Sizes:** The Commission established three size classes for PV systems. Small-scale systems are defined as those less than 10 kilowatts (kW). Medium-scale systems are those from 10 kW to 100 kW, and large-scale systems are those from 100 kW up to 500 kW.
- **Capacity Allocation by Utility:** The Commission allocated the pilot program's total capacity of 25 MW to each of the three investor-owned utilities. PGE received 14.8 MW, PacifiCorp 9.8 MW, and Idaho Power 0.4 MW. Each utility's capacity allocation was further divided by system size classes and capacity enrollment windows.
- **Enrollment Windows:** The Commission established eight enrollment windows over four years for small-scale and medium-scale systems, and annual enrollment windows for large-scale systems.
- **FERC Compliance:** The Commission implemented two design elements to ensure the pilot program did not infringe on the exclusive authority of the Federal Energy Regulatory Commission ("FERC") to determine rates for the wholesale sale of energy for resale in interstate commerce. The Commission used a net-metering construct for small-scale and medium-scale PV systems and a competitive bidding construct for large-scale PV systems. Both of these approaches comply with FERC authority.
- **VIR Rates:** The Commission set the initial incentive rates based on system size and geographic location. The Commission used four different geographic zones. Having different zones helps ensure consistent financial viability of projects across Oregon so that projects are not limited to only the sunniest parts of the state.
- **Rate Updates:** The Commission established an automatic rate adjustment mechanism (ARAM) to update rates prior to each enrollment window. The ARAM is based on participation level and the speed of uptake of the eligible capacity in the prior enrollment window. Any party can challenge a rebuttable presumption prescribed by the ARAM. The Commission considers any challenges to the presumptive rate and sets the rates for the subsequent enrollment window two months in advance of the window.

² See Commission Orders 10-198, 10-260, and 11-089.

The following figures show the VIR rate history for small-scale and medium-scale systems.

VIR Rate for Small systems (<10kW) -- \$/kWh

| Enrollment Period | Rate Class 1 | Rate Class 2 | Rate Class 3 | Rate Class 4 |
|--------------------------|---------------------|---------------------|---------------------|---------------------|
| Jul 2010 | \$0.65 | \$0.60 | \$0.60 | \$0.55 |
| Oct 2010 | \$0.585 | \$0.54 | \$0.54 | \$0.495 |
| Apr 2011 | \$0.468 | \$0.432 | \$0.432 | \$0.396 |
| Oct 2011 | \$0.374 | \$0.346 | \$0.346 | \$0.317 |
| Apr 2012 | \$0.411 | \$0.346 | \$0.346 | \$0.317 |
| Oct 2012 | \$0.411 | \$0.346 | \$0.346 | \$0.317 |

VIR Rate for Medium systems (>10kw and <100kW) -- \$/kWh

| Enrollment Period | Rate Class 1 | Rate Class 2 | Rate Class 3 | Rate Class 4 |
|--------------------------|---------------------|---------------------|---------------------|---------------------|
| Jul 2010 | \$0.55 | \$0.55 | \$0.55 | \$0.55 |
| Oct 2010 | \$0.495 | \$0.495 | \$0.495 | \$0.495 |
| Apr 2011 | \$0.396 | \$0.396 | \$0.396 | \$0.396 |
| Oct 2011 | \$0.317 | \$0.317 | \$0.317 | \$0.317 |
| Apr 2012 | \$0.285 | \$0.25 | \$0.25 | \$0.25 |
| Oct 2012 | \$0.285 | \$0.25 | \$0.25 | \$0.25 |

II. Program Results to Date

Project Highlights

There have been six enrollment seasons for the program to date, beginning with July of 2010, and then continuing each April and October since then.

As of July 2012, the three utilities have completed 806 small-scale systems (under 10 kW) and 49 medium- and large-scale systems (between 10 kW and 500 kW). The total installed capacity is 5,334 kW for small-scale systems, and 5,719 for medium- and large-scale systems, for a total of over 11MW installed capacity (DC).

The program was designed with an automatic rate adjustment mechanism (ARAM) which allows the incentive rate to rise or fall from one enrollment season to the next. The ARAM provides a flexible means to balance demand with

available capacity by adjusting the payments to participants. If demand far outstrips available capacity, the ARAM allows the rate to fall. If demand falls low enough so that some capacity remains unallocated, the ARAM allows the rate to rise to again increase demand.

The demand for enrollment in the VIR program has generally followed the rise and fall of the VIR rate as one might expect (see Figure 6); at the highest VIR rates the application rate was high and the full capacity was reserved in under an hour. When the VIR was adjusted to its lowest point in October, 2011, the application rate slowed considerably and the full capacity was not allocated. Subsequently, the rate was raised for the next enrollment window and capacity again was fully reserved. These trends tend to validate the ARAM concept for balancing demand and capacity.

A major goal of the pilot program is to gather cost data in order to estimate the cost-effectiveness of providing a performance-based incentive such as the VIR. Cost data has been collected both for participants (i.e., the cost to the participant to install the solar hardware) and for the utilities to administer the program. At the time of this report, actual cost data is available for the first two years of the program and costs have been estimated for the duration of the pilot program.

As can be seen from Figures 1 & 2³, there are three general cost trends for participants. First, the overall cost of installation has dropped slightly over the 5 enrollment seasons for which complete data exists. In spring of 2010 the average installed cost for small-scale systems was about \$6.65/Watt, and by spring 2012 that cost had dropped to \$6.50/Watt. Systems over 10kW have been about \$1/W less expensive than the smaller systems, and have trended lower faster. For example, in PGE's program medium-scale systems started the program at an average of \$5.70/Watt and have fallen to an average of \$4.88/Watt at the time of this report. The drop in price for PacifiCorp's program was not as dramatic, beginning at \$6.39/W and falling to an average of \$5.98/Watt.

The second trend to notice is that the cost for the balance of system (including labor, mounting hardware, inverters and other incidental equipment) has increased slightly (from about \$3/Watt to over \$4/Watt) throughout the program period.

These two trends infer the third trend, namely that the price of photovoltaic panels themselves have fallen dramatically over this time, from about \$3 per watt to under \$1 per watt, which has been the primary cause for the total installed price to trend downward over the two years.

As far as administrative costs are concerned, the actual cost data collected to date shows a rate impact of about 0.15 percent relative to the 2012 revenue

³ Figures are found at the end of the report

requirements (see Figure 10). However, with only 2 years of actual data this figure does not reflect the costs of the fully subscribed pilot program. Preliminary estimates of the full rate impact are discussed in Section IV of this report.

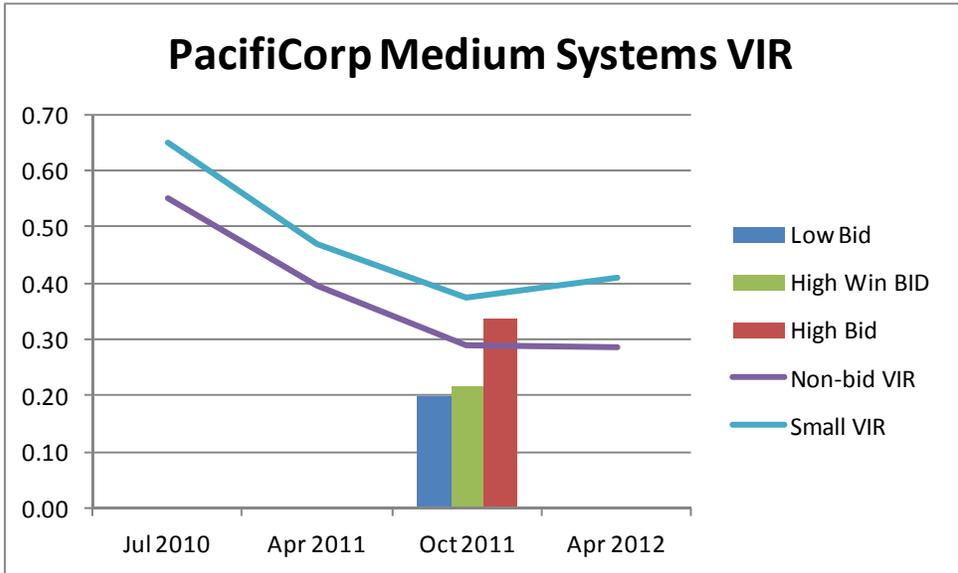
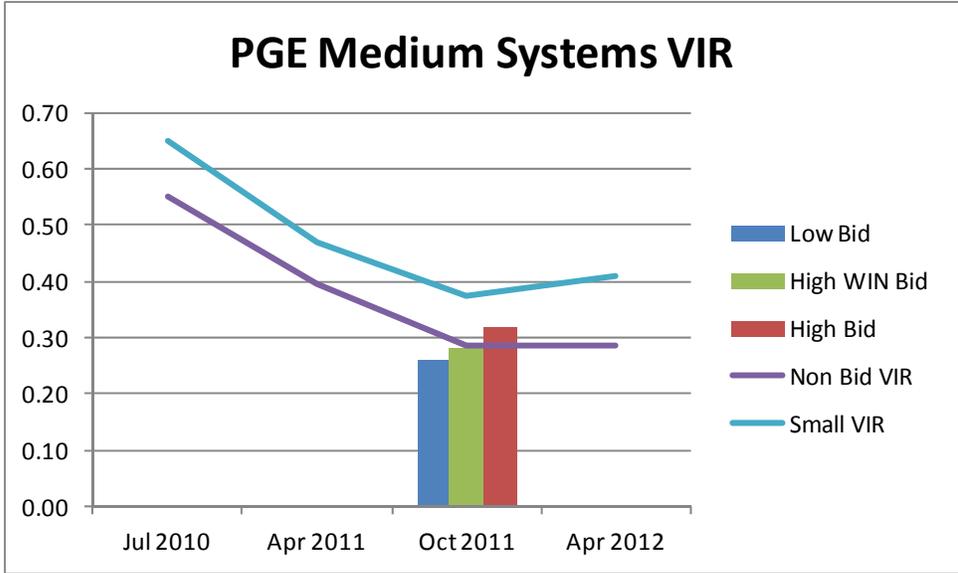
The average years-to-payback is calculated by dividing the net cost to the participant after incentives by the anticipated annual VIR payments. The average years-to-payback is around 10 years, but with a large variance between the minimum and the maximum. This fact reflects the wide variance of costs between individual projects and the resulting range of returns. The rate of return and the resulting years-to-payback are also affected by the VIR rate. Over time the rate has ranged from \$0.16/kWh to \$0.65/kWh. The projects with high VIR payments and low installation costs are able to recover the costs of the project within as little as 3 years, with the higher cost projects taking as long as 21 years to recoup their costs. There is not nearly as much variability in the years-to-payback for medium and large systems. This likely reflects the fact that larger systems are considered commercial ventures, and costs are more closely scrutinized by participants. Commercial projects with high costs and poor payback periods are probably not pursued.

The average return on investment (defined for this analysis as the internal rate of return) is about 4.5% for small-scale projects, and about 8% for medium- and large-scale projects with a range from a low of zero to a high of 15%. The highest returns on investment are for large-scale systems and this may reflect the ability of these participants to better negotiate terms due to economies of scale.

For more complete statistical tables, see Figures 3 and 4 the end of this report. The tables provide summary results for each enrollment period except for October 2012, for which complete data is not yet available.

Bid Results for Medium Systems

In October 2011 capacity for medium-scale systems was reserved by bid. The following chart compares the bid results with the standard VIR rate-setting of the previous enrollment seasons.

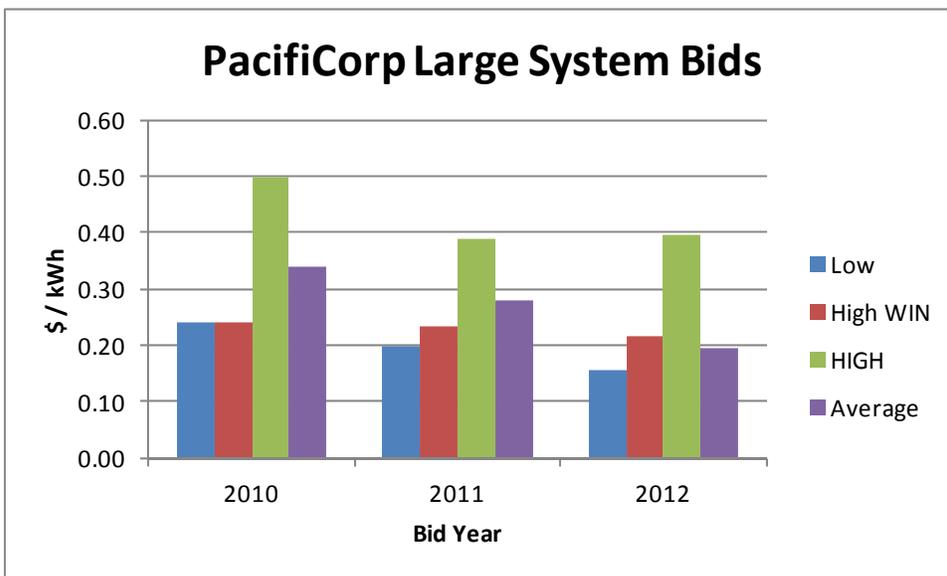
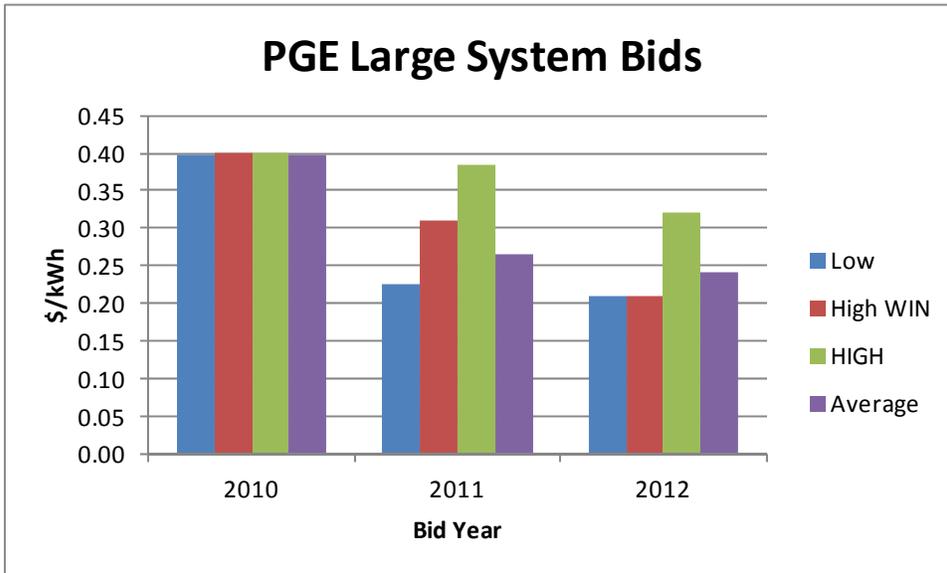


The results of the bid window for PGE show that the bids submitted varied little from the Commission-set VIR rate; however, the bids in PacifiCorp territory show significantly lower bids than the Commission-set VIR rate. One possible explanation for this difference is that PacifiCorp service territory encompasses parts of Eastern Oregon which receive more direct solar radiation and offer larger tracts of undeveloped land for solar development. These two factors would act to drive the overall project cost down and allow bidders to accept a smaller rate and remain profitable.

Bid Results for Large Systems

Payment rates for large-scale systems are determined by reverse-auction bidding; the lowest accepted bids are awarded capacity first until capacity is

completely reserved. This results in a number of winning bids – those who bid the lowest payment rates – and the remainder of unawarded bids.



The bids for large systems have steadily declined over the three enrollment periods for both utility programs. The highest winning bid for PGE dropped from nearly \$0.40/kWh in the first enrollment to nearly half, just over \$0.20/kWh two years later. The change in highest winning bids in PacifiCorp service area was not nearly as dramatic, dropping only a few cents after starting out low. However, the range of bids was wider for PacifiCorp than for PGE: the lowest bid received for PacifiCorp was \$0.165/kWh and the highest was \$0.50/kWh, a range of nearly 33 cents, while the high bid for PGE was \$0.40/kWh and the low bid about \$0.20/kWh, a range of 20 cents.

The downward trend in bid prices is more than likely due to the dramatic worldwide drop in PV panel costs over the last several years. The reduction in PV panel costs translates to a smaller installed project cost, and thus a developer can achieve a similar return on investment with a smaller rate payment.

III. Administrative Program Costs and Estimated Rate Impacts

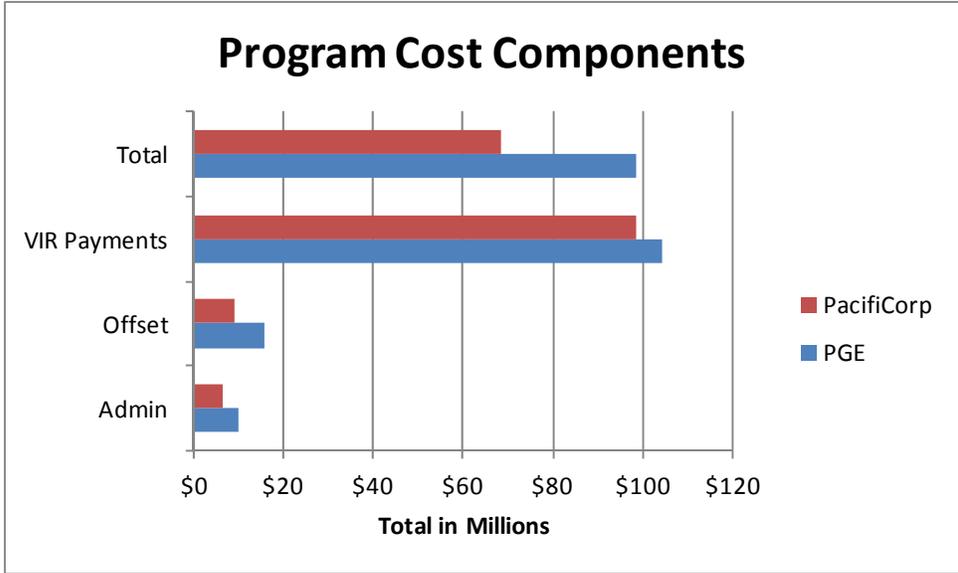
The electric companies, with Commission review, have estimated the yearly rate impacts of the pilot program. Pilot program costs include both the cost of the incentive payments and the utility cost to administer the program.

To estimate the rate impacts of the pilot, the electric companies and Commission assumed the following:

- Full capacity reservation in each allocation window.
- Immediate installation of all winning solar systems after the enrollment window.
- Immediate incorporation of all costs into electricity rates. The estimates do not consider regulatory lag or deferred accounting treatment.
- The utility benefit of not having to purchase power on the open market in an amount equivalent to the output from participating solar systems.
- Because they are net-metered, the VIR for the small and medium-sized projects is reduced by the retail rate which represents the bill savings the customer receives. Without this reduction in the VIR the electric companies, and its customers, would be effectively paying the retail rate plus the VIR per kWh.

“Rate impact” as used in this report generally refers to the ratio of program cost to total annual revenue requirement of each utility. The program cost consists of three parts – the VIR payment itself, the administrative cost for running the program, and an offset due to revenues from meter charges, energy value, and general operational system benefits (such as line loss savings). Of these components, the largest by far is the VIR payment to participants.

In fact, as can be seen in Figure 10 and the graph below, for the PGE and PacifiCorp programs, the amount estimated to be recovered by the offset costs are greater than the estimated administrative costs for the programs, and the total cost for the program is estimated to be less than the sum of the VIR payments.



In other words, the administration of the program is estimated to be essentially revenue neutral and the rate impact of the program is overwhelmingly due to the direct incentive payments.

(Detailed rate impact figures are not available for Idaho Power at this time.)

It should be noted that all of these cost figures are based on estimates and projections at this point in time, and they may be subject to revision as the program progresses and new actual data is received.

Below are the overall total rate impact estimated for the 15-year pilot program by each utility.⁴

| UTILITY | PGE | PAC | IPCO |
|--------------------------|-------|-------|--------------------|
| % of Revenue Requirement | 0.26% | 0.24% | 1.37% ⁵ |

⁴ See Figure 7 at the end of this report for more detailed rate impact statistics.

⁵ Idaho's rate impact based on a 1.5% revenue rider and not on actual costs

IV. Comparative Effectiveness of the VIR and Rebate/tax-credit Incentives

Comparison of Rebate/tax-credit and VIR incentives

Electric utility customers who plan to install solar generation currently have two Oregon incentive programs to choose from – the “rebate/tax-credit” program offered through the Energy Trust of Oregon and the Oregon Department of Energy, and the VIR offered through the utilities. Both programs offer cash incentives to the program participant, but the two programs vary greatly in the way these incentives are determined and paid out.

The primary difference between the two incentive programs is in the way the cash incentives are paid out. The rebate/tax-credit program incentive is paid out in two ways. First, the ETO offers a cash rebate based on the size of the system installed (that is, on a “per-kilowatt” basis). Second, participants in the program are eligible for a state income-tax credit (also based on system size) for the tax year that the system is installed. Because the incentive amount is based on how large the solar system is, it is referred to as a “capacity” payment.

In contrast, under the pilot VIR program a participant receives an incentive based on the amount of energy generated (that is, on a “per kilowatt-hour” basis). The incentive is paid monthly at a rate determined when the project is accepted into the program. Since the incentive amount depends on actual energy generation, this type of incentive is referred to as a “production” payment. Participants in VIR pilot program are not eligible for state renewable tax credits.

The relative risks of the two different types of incentives vary. Because recipients of volumetric incentive rates only get paid when their systems operate, they bear the risks associated with reduced generation due to system damage and degradation in the panel efficiency, among other factors. In addition, owners may not be able to take advantage of the payments for a sufficiently long period to justify the investment. Further, the solar pilot program participant must bear the full upfront cost of the system (minus the federal tax credit), and incur greater carrying costs or realize greater opportunity costs, depending on the individual’s financing arrangements, as compared to a lump sum upfront payment.

Some customers will prefer the up-front payments of the Energy Trust incentive coupled with the BETC or RETC. Others will prefer the volumetric incentive rates and payments offered in the pilot program. Obviously, the higher the VIR rates, the more customers that will favor the VIR approach. Still, even at high VIR rate levels, some individuals would still prefer incentives to reduce the upfront cost of a system.

A fundamental element in the determination of which incentive regime is preferred is an individual’s “discount rate.” A personal discount rate reflects the value of a dollar today versus a dollar tomorrow. The greater the value placed on

having a dollar today, the higher the discount rate. The discount rate also reflects the risk appetite an individual may have towards a specific investment. For example, if individuals believe an investment is inherently risky, they will require a higher rate of return to compensate them for that risk.

Nevertheless, the relative effectiveness of the two incentive programs can be compared using several metrics. Below we discuss three of these: Demand, Costs to Participants, and Payback Time.

Demand

In the first three enrollment periods of the VIR pilot the total capacity allocation was reserved within minutes of opening the window. Upon subsequent lowering of the VIR, the fourth enrollment window was the only one in which all available capacity was not reserved. When the VIR was raised 10% in the subsequent enrollment, once again all available capacity was reserved.

During the same time period, the number of applications for the existing rebate/tax-credit program did not diminish. In fact, there was an increase in demand for the ETO solar rebates over previous years.

It appears that the demand for both programs has remained strong over the last two years. The existence of the pilot program has done nothing to diminish the demand for rebates and solar tax credits.

Costs to Participants

One goal of both programs is to help reduce costs for installed solar PV systems. Statistics gathered for the VIR program has shown that the installed cost for PV systems has fallen over the course of the program so far. PV panel costs have fallen dramatically, from \$3 per watt in 2010 to under \$1 per watt at the time of this report. This trend holds true for systems of all sizes. However, the balance-of-system costs have remained steady and even increased over time, with an average cost of about \$3-4 per watt. This cost represents installation hardware, labor and inverter costs, among others.

A similar trend can be seen in PV costs of ETO projects. As can be seen in Figures 6, 7 and 8 at the end of this report, ETO projects reflect a similar drop in the overall installed cost per watt of solar projects. The ETO data does not split out the costs between panel cost and balance-of-system cost; however, there is no reason not to conclude that the downward trend in overall cost is primarily driven by falling PV prices.

Under the rebate/tax-credit incentive system, not only can the participant recover 30% of installed cost from the federal incentive, but they are also eligible for state tax credits under the RETC or BETC. Until the recent revision of the BETC rules, the state of Oregon offered an extremely generous tax credit worth 50% of the

total installed cost of a commercial project (through the BETC), reducing the installed cost to the participant in half.

VIR participants incur three costs not borne by those in the rebate/tax-credit incentive program. First, VIR participants must pay for a second meter installation to correctly measure actual solar generation. Second, the program rules require the participant to carry additional “umbrella” insurance against liability. Finally, solar panels will degrade over time, generating slightly less energy each year. Since the VIR payment is directly proportional to energy produced, the participants in the program will realize smaller revenues each year since their panels will produce less energy.

In aggregate, the total system installed cost is essentially the same for participants independent of which incentive program is chosen. There is one exception, however. For commercial systems that utilize the BETC, the 50% cost reduction represented by the tax incentive has a great impact in lowering the overall costs. These projects can have a cost as much as \$3/Watt lower than a similar project utilizing the VIR, depending on the specific project.

Payback Time and Rate of Return

The payback period is determined by the number of years it takes for the project to recover its initial cost, either through collection of the VIR or the energy value of net metering. Under the assumption that tax credits can be fully utilized, the time to recover costs is about 10 years, on average, for the VIR-incentive systems. By comparison, a commercial solar project owner utilizing the rebate/tax-credit approach and the federal tax credit can sometimes recover nearly all of the installed cost of the system within 5 years, making it a better financial vehicle than the VIR. However, in 2012 the BETC was significantly restructured and it remains to be seen what effect this will have on future project payback times.

Rate of return (calculated in this analysis as the Internal Rate of Return) on VIR projects varies a great deal between projects. Some projects earn essentially zero return while other projects have a return as high as 15%. This gap in return rates is due to two factors. The primary factor is the VIR rate that the project has been assigned. The VIR has ranged from \$0.16/kWh (for a large scale bid system) to \$0.65/kWh (the original VIR). This range in rate has a great effect on the revenue stream for the project, and thus on the net cost. The second factor driving the return is the installed cost of the project. The installed cost, as mentioned previously, is dependent on the price of the photovoltaic panels themselves which have fallen in price by a factor of three over the last 3 years. The price paid for panels will directly drive the total cost of the project and thus directly affect the rate of return (higher cost means lower rate of return).

Returns on projects utilizing the rebate/tax-credit incentive are lower than those with the VIR for most projects. However, because of the generous cost

reductions represented by the BETC, those commercial projects that can utilize tax incentives are able to produce returns equal to, or better than, similar projects under the VIR incentive.

Overall, it appears that the offering of the VIR program has not significantly diminished the popularity of the rebate/tax-credit program. About 3 times as many projects have been completed under the ETO program as under the VIR since July 2010, amounting to about 3 times as much capacity. Of course, it must be recognized that both programs impose limits on the number and capacity of projects so it cannot be said that the ETO program reflects greater interest than the VIR program. However, it is fair to conclude that the existence of the VIR has not noticeably diminished the demand for the rebate/tax-credit incentive.

Under both incentive systems the installed cost per watt has fallen dramatically. However, as shown previously, this cost reduction is primarily due to the fall in PV panel prices from \$3/watt in mid 2010 to under \$1/watt at the time of this report. This price drop is one seen worldwide and cannot be attributed to localized effects of Oregon's incentive programs. On the other hand, it can be noted that both programs have experienced similar reductions in installed cost over time and there is no evidence that one program has a cost advantage over the other.

From the participants view, the capacity-rebate incentive has the benefit of reducing the upfront capital cost of the project, which is considered a sizable amount for many participants. The ability to limit immediate out-of-pocket costs is often cited as a primary consideration in a participant choosing the rebate option over the VIR. On the other hand, if initial installation costs do not pose an obstacle to the participant, residential participants may find that the VIR program offers a better return on their investment than the rebate/tax-credit rebate approach, resulting in a greater amount of revenue over the course of the contract, and over the lifetime of the solar installation. However, at least in the past several years of generous BETC incentives, commercial system owners could realize a 5 year payback on their investment (compared to 10 years for the VIR). The choice of incentive program in any particular case is highly dependent on the financial characteristics of that project and participant.

It appears at this time that both the rebate/tax-credit program and the pilot VIR program have been well-received and utilized by those wishing to install solar generation. The two incentive programs offer different types of assistance to the projects, either in the form of cash payments, tax relief or cash flow revenue. Each individual project will find one or the other incentive approach to be more favorable from a financial perspective. It is clear that both incentive programs succeed in promoting greater use of solar in the community and reducing the cost of these projects.

At this point, the Commission cannot speculate on the relative superiority of one incentive approach over the other. Instead, it can be stated that both incentive

programs have proven successful in their ability to promote the installation and use of solar distributed generation, and that both programs exhibit a high level of support and acceptance in the community.

V. Regulatory Policy Considerations and Recommendations

In establishing this pilot program, the Oregon Legislature directed the Commission to consider regulatory policies designed to increase the use of solar photovoltaic energy systems, make them more affordable, reduce the cost of incentive programs to utility customers and promote the development of the solar industry in Oregon. The Commission broadly interprets this as a directive to consider what measures the Legislature, the Commission, or other agencies could implement to attain the listed goals. The information gained from the pilot to date has not yet offered the Commission insight on regulatory policies that may be adopted to further facilitate solar photovoltaic energy generation. The Commission will continue to consider the issue as additional information is obtained from the pilot programs.

Figures

Figure 1 - Small System Cost Breakdown

| Cost per Watt | | | |
|-------------------|----------------------------|---------|------------------------|
| Enrollment Season | Total Cost of Installation | PV Cost | Balance of System Cost |
| S2010 | \$6.54 | \$2.99 | \$3.55 |
| F2010 | \$6.74 | \$2.69 | \$4.04 |
| S2011 | \$6.21 | \$1.92 | \$4.29 |
| F2011 | \$6.38 | \$0.87 | \$5.51 |
| S2012 | \$6.41 | \$0.82 | \$5.59 |
| Total | \$6.46 | \$2.04 | \$4.42 |

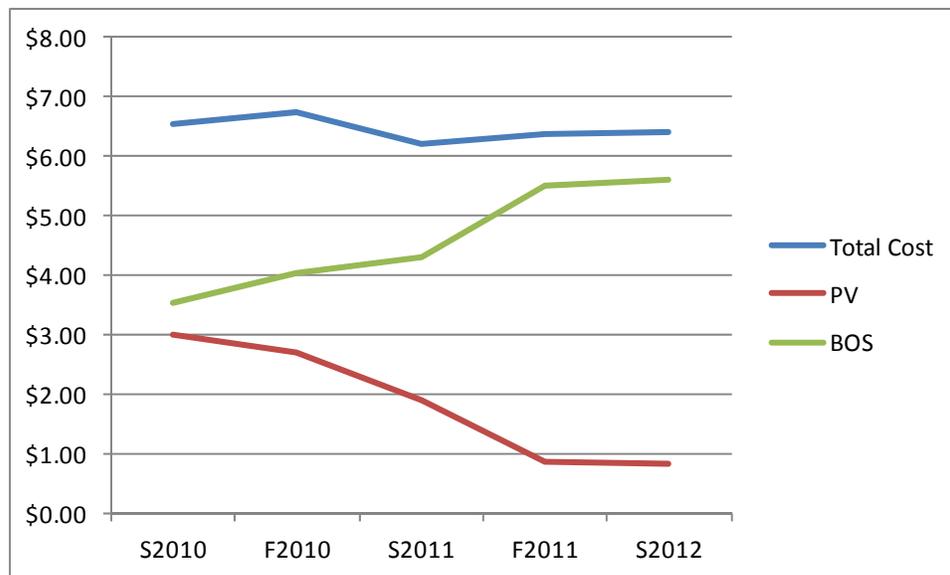


Figure 2 - Medium and Large System Cost Breakdown

| Cost per Watt | | | |
|-------------------|----------------------------|---------------|------------------------|
| Enrollment Season | Total Cost of Installation | PV Cost | Balance of System Cost |
| S2010 | \$4.96 | \$2.00 | \$2.96 |
| F2010 | \$4.86 | \$2.11 | \$2.75 |
| S2011 | \$4.81 | \$1.22 | \$3.59 |
| F2011 | \$5.01 | \$0.76 | \$4.26 |
| S2012 | NA | NA | NA |
| Total | \$4.79 | \$1.61 | \$3.18 |

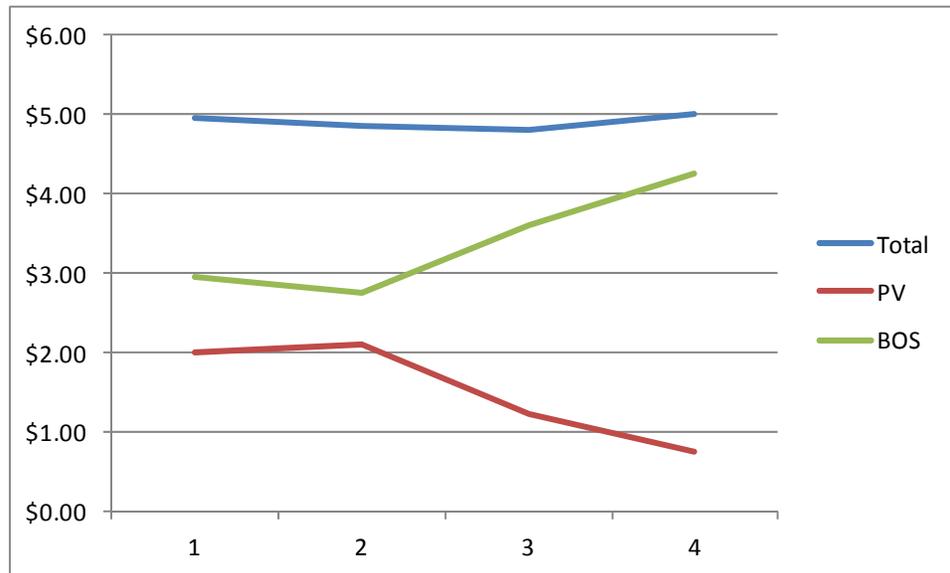


Figure 3 – PGE Summary Statistics

PORTLAND GENERAL ELECTRIC

SMALL SYSTEMS (Residential and Non-residential, < 10kW DC Capacity)

COMPLETED SYSTEMS

| Enrollment Season | No. Projects | DC (kw) Capacity | Installed Cost Total | PV Total Cost | Avg \$/Watt (dc) | Max \$/Watt (dc) | Min \$/Watt (dc) | Expected Actual kwh | Min Years To PB | Max Years To PB | Avg Years To PB | Avg IRR |
|-------------------|--------------|------------------|----------------------|--------------------|------------------|------------------|------------------|---------------------|-----------------|-----------------|-----------------|--------------|
| S2010 | 84 | 552.7 | \$3,604,034 | \$1,596,649 | \$6.70 | \$9.20 | \$4.94 | 527,224.8 | 5.3 | 10.3 | 7.1 | 7.43% |
| F2010 | 159 | 915.3 | \$6,286,865 | \$2,481,790 | \$7.08 | \$13.69 | \$3.00 | 867,649.4 | 4.3 | 14.7 | 8.3 | 4.48% |
| S2011 | 100 | 706.3 | \$4,420,172 | \$1,227,882 | \$6.36 | \$10.26 | \$0.66 | 677,584.5 | 1.2 | 16.3 | 9.0 | 3.75% |
| F2011 | 52 | 330.9 | \$2,116,890 | \$257,726 | \$6.53 | \$7.98 | \$3.00 | 314,540.5 | 5.8 | 14.4 | 11.1 | -0.84% |
| S2012 | 138 | 835.8 | \$5,354,349 | \$686,888 | \$6.49 | \$9.58 | \$1.74 | 790,832.0 | 3.5 | 14.4 | 10.4 | 0.40% |
| Total | 533 | 3,340.9 | \$21,782,309 | \$6,250,935 | \$6.52 | \$13.69 | \$0.66 | 3,177,831 | 1.2 | 16.3 | 10.0 | 3.04% |

APPROVED (RESERVED + PENDING)

| Enrollment Season | No. Projects | DC (kw) Capacity |
|-------------------|--------------|------------------|
| S2010 | 3 | 19.95 |
| F2011 | 56 | 448.25 |
| S2012 | 29 | 146.7 |
| Total | 88 | 614.9 |

CANCELED + REJECTED

| Enrollment Season | No. Projects | DC (kw) Capacity |
|-------------------|--------------|------------------|
| S2010 | 25 | 35.69 |
| F2010 | 65 | 197.97 |
| S2011 | 65 | 214.85 |
| F2011 | 108 | 158.05 |
| S2012 | 36 | 256.96 |
| Total | 299 | 863.52 |

MEDIUM and LARGE SYSTEMS (Non-residential, > 10 kW DC Capacity)

COMPLETED SYSTEMS

| Enrollment Season | No. Projects | DC (kw) Capacity | Installed Cost Total | PV Total Cost | Avg \$/Watt (dc) | Max \$/Watt (dc) | Min \$/Watt (dc) | Expected Actual kwh | Min Years To PB | Max Years To PB | Avg Years To PB | Avg IRR |
|-------------------|--------------|------------------|----------------------|--------------------|------------------|------------------|------------------|---------------------|-----------------|-----------------|-----------------|--------------|
| S2010 | 7 | 479.16 | \$2,704,449 | \$1,044,767 | \$5.70 | \$6.63 | \$4.62 | 459,413 | 5.7 | 7.6 | 6.6 | 8.69% |
| F2010 | 12 | 1608.94 | \$7,401,200 | \$3,382,048 | \$5.27 | \$7.09 | \$3.61 | 1,528,436 | 5.9 | 8.3 | 6.9 | 7.88% |
| S2011 | 12 | 1617.25 | \$7,917,086 | \$1,656,557 | \$5.79 | \$7.10 | \$2.37 | 1,569,301 | 4.9 | 10.6 | 8.9 | 3.17% |
| F2011 | 2 | 198.56 | \$995,000 | \$150,000 | \$5.00 | \$6.45 | \$3.55 | 195,504 | 7.8 | 11.7 | 9.7 | 1.75% |
| S2012 | 2 | 177.28 | \$917,480 | \$75,696 | \$4.99 | \$6.47 | \$3.50 | 167,826 | 7.6 | 11.9 | 9.8 | 1.80% |
| Total | 35 | 4081.19 | \$19,935,215 | \$6,309,068 | \$4.88 | \$7.10 | \$2.37 | 3,920,480 | 5 | 11.9 | 8.4 | 4.66% |

APPROVED (RESERVED + PENDING)

| Enrollment Season | No. Projects | DC (kw) Capacity |
|-------------------|--------------|------------------|
| S2012 | 5 | 300 |

CANCELED + REJECTED

| Enrollment Season | No. Projects | DC (kw) Capacity |
|-------------------|--------------|------------------|
| S2010 | 1 | 25.1 |
| F2010 | 1 | 88.3 |
| S2011 | 2 | 135.2 |
| Total | 4 | 248.6 |

Figure 4 – PacifiCorp Summary Statistics

PacifiCorp

SMALL SYSTEMS (Residential and Non-residential, < 10kW DC Capacity)

| COMPLETED SYSTEMS | | | | | | | | | | | | |
|-------------------|--------------|------------------|----------------------|--------------------|----------------------|------------------|------------------|---------------------|------------|-----------------|-----------------|-----------------|
| Enrollment Season | No. Projects | DC (kw) Capacity | Installed Cost Total | PV Total | Average \$/Watt (dc) | Max \$/Watt (dc) | Min \$/Watt (dc) | Expected Actual kwh | Exp VIR \$ | Min Years to PB | Max Years to PB | Avg Years to PB |
| S2010 | 59 | 376.5 | \$2,495,785 | \$1,171,558 | \$6.57 | \$10.06 | \$3.35 | 468,214 | | 4.7 | 22.9 | 9.9 |
| F2010 | 63 | 456.7 | \$2,955,842 | \$1,211,892 | \$6.61 | \$12.62 | \$4.17 | 713,308 | | 8.9 | 28.0 | 13.1 |
| S2011 | 89 | 715.6 | \$4,540,190 | \$1,484,396 | \$6.37 | \$8.12 | \$1.75 | 953,408 | | 4.3 | 28.9 | 14.1 |
| F2011 | 21 | 121.5 | \$769,888 | \$135,911 | \$6.47 | \$7.98 | \$4.40 | 137,258 | | 11.8 | 31.1 | 21.7 |
| S2012 | 16 | 97.4 | \$631,954 | \$81,024 | \$6.75 | \$7.98 | \$4.36 | 111,943 | | 11.7 | 31.3 | 21.8 |
| Total | 248 | 1,767.7 | \$11,393,660 | \$4,084,780 | \$6.45 | \$12.62 | \$1.75 | 2,384,131 | | 4.3 | 31.3 | 13.9 |

| APPROVED (RESERVED + PENDING) | | |
|-------------------------------|--------------|------------------|
| Enrollment Season | No. Projects | DC (kw) Capacity |
| S2012 | 52 | 422.2 |
| F2012 | 102 | 855.8 |
| Total | 167 | 2,250.1 |

| CANCELED + REJECTED | | |
|---------------------|--------------|------------------|
| Enrollment Season | No. Projects | DC (kw) Capacity |
| S2010 | 16 | 59.42 |
| F2010 | 57 | 343.39 |
| S2011 | 24 | 161.61 |
| F2011 | 27 | 219.92 |
| S2012 | 4 | 27.52 |
| Total | 128 | 811.85 |

MEDIUM SYSTEMS (Non-residential, 10 - 100 kW DC Capacity)

| COMPLETED SYSTEMS | | | | | | | | | | | | |
|----------------------|--------------|------------------|----------------------|--------------------|----------------------|------------------|------------------|---------------------|-----------------|-----------------|-----------------|-------------|
| Enrollment Season | No. Projects | DC (kw) Capacity | Installed Cost Total | PV Total | Average \$/Watt (dc) | Max \$/Watt (dc) | Min \$/Watt (dc) | Expected Actual kwh | Min Years to PB | Max Years to PB | Avg Years to PB | Avg IRR |
| S2010 | 2 | 124.58 | \$799,739 | \$104,720 | \$6.39 | \$6.45 | \$6.33 | 150,411 | 9.7 | 9.9 | 9.8 | 5.7% |
| F2010 | 6 | 402.27 | \$2,378,497 | \$868,214 | \$5.78 | \$8.18 | \$4.96 | 641,130 | 8.7 | 14.6 | 10.5 | 5.1% |
| S2011 | 4 | 253.57 | \$1,486,538 | \$571,714 | \$5.62 | \$7.68 | \$4.47 | 430,500 | 9.6 | 15.4 | 11.3 | 4.1% |
| F2011 | - | - | - | - | - | - | - | - | - | - | - | - |
| S2012 | 1 | 99.82 | N/A | N/A | N/A | N/A | N/A | 126,500 | N/A | N/A | N/A | N/A |
| Total (10-11) | 12 | 780.422 | \$4,664,774 | \$1,544,648 | \$5.98 | \$8.18 | \$4.47 | 1,222,041 | 8.7 | 15.4 | 10.7 | 5.0% |

| APPROVED (RESERVED + PENDING) | | |
|-------------------------------|--------------|------------------|
| Enrollment Season | No. Projects | DC (kw) Capacity |
| F2011 | 4 | 388.799 |
| S2012 | 9 | 583.29 |
| Total | 13 | 972.089 |

| CANCELED + REJECTED | | |
|---------------------|--------------|------------------|
| Enrollment Season | No. Projects | DC (kw) Capacity |
| S2010 | 3 | 249.54 |
| F2010 | 1 | 96.00 |
| S2011 | 3 | 286.67 |
| F2011 | 1 | 41.60 |
| Total | 8 | 673.81 |

LARGE SYSTEMS (Non-residential, > 100 kW DC Capacity)

| COMPLETED SYSTEMS | | | | | | | | | | | | |
|-------------------|--------------|------------------|----------------------|--------------------|----------------------|------------------|------------------|---------------------|-----------------|-----------------|-----------------|-------------|
| Enrollment Season | No. Projects | DC (kw) Capacity | Installed Cost Total | PV Total | Average \$/Watt (dc) | Max \$/Watt (dc) | Min \$/Watt (dc) | Expected Actual kwh | Min Years to PB | Max Years to PB | Avg Years to PB | Avg IRR |
| S2010 | 1 | 497.50 | \$1,960,000 | \$1,050,000 | \$3.94 | \$3.94 | \$3.94 | 790,000 | 8.41 | 8.41 | 8.41 | 8.0% |
| S2011 | 1 | 360.64 | \$1,338,877 | \$494,077 | \$3.71 | \$3.71 | \$3.71 | 456,850 | 7.68 | 7.68 | 7.68 | 9.5% |
| Total | 2 | 858.14 | \$3,298,877 | \$1,544,077 | \$3.84 | \$3.94 | \$3.71 | 1,246,850 | 7.68 | 8.41 | 8.05 | 8.8% |

| APPROVED (RESERVED + PENDING) | | |
|-------------------------------|--------------|------------------|
| Enrollment Season | No. Projects | DC (kw) Capacity |
| | 0 | 0 |
| Total | 0 | 0 |

| CANCELED + REJECTED | | |
|---------------------|--------------|------------------|
| Enrollment Season | No. Projects | DC (kw) Capacity |
| S2011 | 1 | 300 |
| Total | 1 | 300 |

Figure 5 – Idaho Power Summary Statistics

Idaho Power

SMALL SYSTEMS (Residential and Non-residential, < 10kW DC Capacity)

COMPLETED SYSTEMS

| Enrollmer Season | No. Projects | DC (kw) Capacity | Installed Cost Total | PV Total | Average \$/Watt (dc) | Max \$/Watt (dc) | Min \$/Watt (dc) | Expected Actual kwh | Min Years to PB | Max Years to PB | Avg Years to PB | Avg IRR |
|------------------|--------------|------------------|----------------------|------------------|----------------------|------------------|------------------|---------------------|-----------------|-----------------|-----------------|--------------|
| 2010 | 9 | 87.73 | \$551,450 | \$275,465 | \$6.30 | \$8.82 | \$4.08 | 128,963 | 3.5 | 7.6 | 5.5 | 16.3% |
| 2011 | 16 | 137.7 | \$723,002 | \$275,221 | \$5.15 | \$5.56 | \$4.00 | 202,419 | 6.0 | 8.3 | 7.7 | 9.3% |
| Total | 25 | 225.43 | \$1,274,452 | \$550,686 | \$5.65 | \$8.82 | \$4.00* | 331,382 | 3.5 | 8.3 | 6.9 | 11.8% |

APPROVED (RESERVED + PENDING)

| Enrollmer Season | No. Projects | DC (kw) Capacity |
|------------------|--------------|------------------|
| 2010 | 15 | 149.2 |
| 2011 | 25 | 239.47 |
| Total | 40 | 388.67* |

Denied

| Enrollment Season | No. Projects | DC (kw) Capacity |
|-------------------|--------------|------------------|
| 2010 | 0 | NA |
| 2011 | 7 | NA |
| Total | 7 | NA |

*Includes projects reserved but not completed

Data from PacifiCorp, PGE and Idaho bi-annual compliance filings raw data tables, required by Orders 860-084-0420 and 860-084-0430, and submitted to the OPUC August 2012. See docket-associated working papers for data files.

Figure 6 – Cumulative Statistics for ETO and VIR Projects

| Cumulative Statistics from July 2010 - April 2012 VIR Season <i>Residential & Small (<kW) Commercial</i> | | | | |
|--|--------------|--------------|--------------|--------------|
| | ETOPGE | ETOPAC | VIRPGE | VIRPAC |
| Number of Completed Projects | 1971 | 1059 | 533 | 248 |
| Percentage of Successful Installations* | 96.5% | 98.1% | 67.5% | 76.4% |
| Total Capacity Installed (kW) | 7,282 | 3,569 | 3,341 | 1,768 |
| Total ETO Incentive Spent | \$12,241,540 | \$5,003,018 | \$0 | \$0 |
| Total Spent - all parties | \$47,133,705 | \$22,189,607 | \$21,782,309 | \$11,393,660 |
| Estimated OR Tax Credits | \$11,062,908 | \$5,823,333 | \$0 | \$0 |
| Estimated Federal Tax Credits | \$14,140,111 | \$6,656,882 | \$6,534,693 | \$3,418,098 |
| Average Estimated Energy Output(kWh) | 6,772,626 | 3,839,074 | 3,177,831 | 2,384,131 |
| Average Years to Payback | 14.3 | 12.3 | 10.0 | 11.0 |

(Assumption - @ 10 cents per kwh net metering value)

(Assumption of maximum tax credits, OR and FED)

**VIR numbers reflect a sum of oversubscription of feasible projects, rejected projects and drop-outs*

| Cumulative Statistics from July 2010 - April 2012 VIR Season <i>Commercial (>10kW)</i> | | | | |
|--|--------------|--------------|--------------|--------------|
| | ETOPGE | ETOPAC | VIRPGE | VIRPAC |
| Number of Completed Projects | 128 | 202 | 35 | 15 |
| Percentage of Successful Installations* | 88.3% | 91.3% | 84.7% | 63.8% |
| Total Capacity Installed (kW) | 13,649 | 3,826 | 4,081 | 1,751 |
| Total ETO Incentive Spent | \$14,962,157 | \$3,976,437 | \$0 | \$0 |
| Total Spent - all parties | \$83,507,420 | \$23,331,648 | \$19,935,215 | \$13,037,537 |
| Estimated OR Tax Credits | \$41,753,710 | \$11,665,824 | \$0 | 0 |
| Estimated Federal Tax Credits | \$25,052,226 | \$6,999,494 | \$5,980,565 | \$3,911,261 |
| Average Estimated Energy Output(kWh) | 14,608,797 | 4,296,181 | 3,920,480 | 3,646,777 |
| Estimated Annual VIR payout | n/a | n/a | \$1,542,011 | \$993,207 |
| Average Years to Payback | 4.8 | 5.3 | 9.6 | 9.8 |

(Assumption - @ 8 cents per kwh net metering value)

(Assumption of maximum tax credits, OR and FED)

**VIR numbers reflect a sum of oversubscription of feasible projects, rejected projects and drop-outs*

Figure 7 – Overall Statistics for Residential & Small Systems (<10kW)

RESIDENTIAL TRENDS

| | ETO | | VIR | |
|--|---------|---------|---------|--------|
| | PGE | PAC | PGE | PAC |
| Number of Completed Projects | | | | |
| S2010 | 169 | 144 | 84 | 59 |
| F2010 | 445 | 310 | 159 | 63 |
| 2010 | 614 | 454 | 243 | 122 |
| S2011 | 206 | 103 | 100 | 89 |
| F2011 | 617 | 275 | 52 | 21 |
| 2011 | 823 | 378 | 152 | 110 |
| S2012 | 405 | 191 | 138 | 16 |
| Installed Capacity (kW) | | | | |
| S2010 | 521.7 | 399.0 | 552.7 | 376.5 |
| F2010 | 1,357.2 | 882.4 | 915.3 | 456.7 |
| 2010 | 1,878.8 | 1,281.4 | 1,468.0 | 833.2 |
| S2011 | 699.9 | 406.9 | 706.3 | 715.6 |
| F2011 | 2,386.7 | 1,060.9 | 330.9 | 121.5 |
| 2011 | 3,086.6 | 1,467.8 | 1,037.1 | 837.2 |
| S2012 | 1,735.7 | 681.5 | 835.8 | 97.4 |
| Installed Average Cost Over Time (\$/W) | | | | |
| S2010 | \$6.77 | \$6.88 | \$6.70 | \$6.57 |
| F2010 | \$6.12 | \$6.49 | \$7.08 | \$6.61 |
| S2011 | \$6.79 | \$6.52 | \$6.36 | \$6.37 |
| F2011 | \$6.85 | \$6.30 | \$6.53 | \$6.47 |
| S2012 | \$5.47 | \$5.32 | \$6.49 | \$6.75 |
| Success Rate Over Time | | | | |
| S2010 | 95.5% | 96.6% | 77.7% | 87.4% |
| F2010 | 94.9% | 97.8% | 76.8% | 74.3% |
| S2011 | 97.2% | 99.0% | 66.5% | 91.4% |
| F2011 | 98.1% | 98.6% | 32.5% | 43.8% |

NOTE
Reflects lottery

Figure 8 – Overall Statistics for Medium and Large Systems (>10kW)

COMMERCIAL TRENDS

| | ETO | | VIR | |
|--|----------------|----------------|----------------|----------------|
| | PGE | PAC | PGE | PAC |
| Number of Completed Projects | | | | |
| S2010 | 29 | 35 | 7 | 3 |
| F2010 | 29 | 37 | 12 | 6 |
| 2010 | 58 | 72 | 19 | 9 |
| S2011 | 19 | 20 | 12 | 5 |
| F2011 | 22 | 67 | 2 | 0 |
| 2011 | 41 | 87 | 14 | 5 |
| S2012 | 29 | 43 | 2 | 1 |
| Installed Capacity (kW) | | | | |
| S2010 | 2,159.0 | 659.7 | 479.2 | 623.8 |
| F2010 | 3,072.1 | 734.4 | 1,608.9 | 410.4 |
| 2010 | 5,231.2 | 1,394.1 | 2,088.1 | 1,034.2 |
| S2011 | 1,387.4 | 477.6 | 1,617.3 | 617.3 |
| F2011 | 3,767.3 | 927.4 | 198.6 | 0.0 |
| 2011 | 5,154.7 | 1,405.0 | 1,815.8 | 617.3 |
| S2012 | 3,263.0 | 1,026.4 | 177.3 | 99.8 |
| Installed Average Cost Over Time (\$/W) | | | | |
| S2010 | \$6.70 | \$6.53 | \$5.70 | \$5.58 |
| F2010 | \$6.62 | \$6.33 | \$5.27 | \$5.78 |
| S2011 | \$5.66 | \$5.71 | \$5.79 | \$5.24 |
| F2011 | \$5.37 | \$5.75 | \$5.00 | n/a |
| S2012 | \$5.35 | \$5.18 | \$4.99 | \$7.41 |
| Success Rate over time | | | | |
| S2010 | 80.6% | 89.7% | 87.5% | 50.0% |
| F2010 | 90.6% | 90.2% | 92.3% | 85.7% |
| S2011 | 86.4% | 90.9% | 92.3% | 55.6% |
| F2011 | 95.7% | 94.4% | 66.7% | n/a |

Figure 9 - Applications and VIR by Enrollment Period

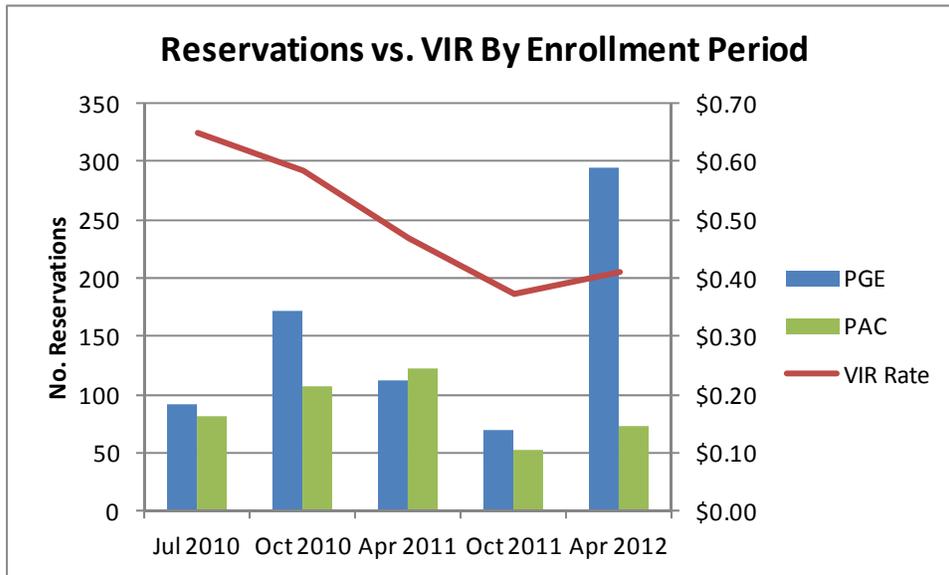
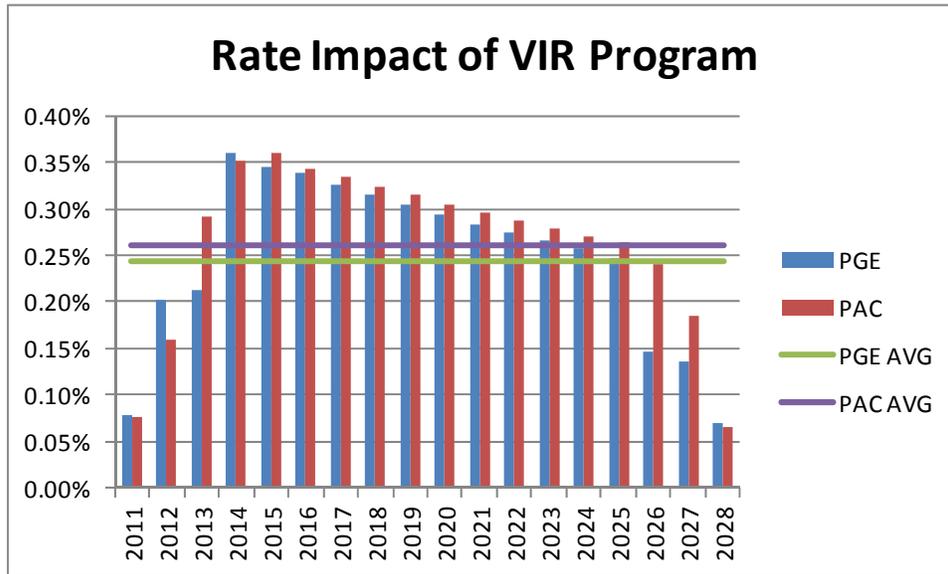


Figure 10 – Total Estimated Program Costs and Rate Impact

| Estimated Rate Impact By Year | | | | | | | |
|-------------------------------|---|----------------------|--|----------------------|---------------------|---------------------|--------------|
| PGE | Estimated | VIR | Admin | Gross | Offsets to | Net | Rate |
| | Revenue | Payments | Costs | SPO Costs | Costs | Costs | Impact |
| 2011 | \$1,734,017,686 | \$1,270,738 | \$218,460 | \$1,489,198 | \$115,919 | \$1,373,279 | 0.08% |
| 2012 | \$1,786,038,217 | \$3,644,538 | \$306,831 | \$3,951,369 | \$337,158 | \$3,614,211 | 0.20% |
| 2013 | \$1,839,619,363 | \$4,127,922 | \$278,641 | \$4,406,563 | \$496,359 | \$3,910,204 | 0.21% |
| 2014 | \$1,894,807,944 | \$6,953,341 | \$606,593 | \$7,559,934 | \$723,610 | \$6,836,324 | 0.36% |
| 2015 | \$1,951,652,182 | \$6,953,341 | \$548,309 | \$7,501,650 | \$758,671 | \$6,742,979 | 0.35% |
| 2016 | \$2,010,201,748 | \$6,953,341 | \$657,243 | \$7,610,584 | \$798,688 | \$6,811,896 | 0.34% |
| 2017 | \$2,070,507,800 | \$6,953,341 | \$657,243 | \$7,610,584 | \$860,879 | \$6,749,705 | 0.33% |
| 2018 | \$2,132,623,034 | \$6,953,341 | \$657,243 | \$7,610,584 | \$914,214 | \$6,696,370 | 0.31% |
| 2019 | \$2,196,601,725 | \$6,953,341 | \$657,243 | \$7,610,584 | \$940,016 | \$6,670,568 | 0.30% |
| 2020 | \$2,262,499,777 | \$6,953,341 | \$657,243 | \$7,610,584 | \$966,593 | \$6,643,991 | 0.29% |
| 2021 | \$2,330,374,770 | \$6,953,341 | \$657,243 | \$7,610,584 | \$993,966 | \$6,616,618 | 0.28% |
| 2022 | \$2,400,286,013 | \$6,953,341 | \$657,243 | \$7,610,584 | \$1,022,162 | \$6,588,422 | 0.27% |
| 2023 | \$2,472,294,594 | \$6,953,341 | \$657,243 | \$7,610,584 | \$1,051,202 | \$6,559,382 | 0.27% |
| 2024 | \$2,546,463,432 | \$6,953,341 | \$657,243 | \$7,610,584 | \$1,081,115 | \$6,529,469 | 0.26% |
| 2025 | \$2,622,857,335 | \$6,953,341 | \$657,243 | \$7,610,584 | \$1,111,924 | \$6,498,660 | 0.25% |
| 2026 | \$2,701,543,055 | \$4,489,682 | \$542,896 | \$5,032,578 | \$1,089,526 | \$3,943,052 | 0.15% |
| 2027 | \$2,782,589,346 | \$4,489,682 | \$425,549 | \$4,915,231 | \$1,122,212 | \$3,793,019 | 0.14% |
| 2028 | \$2,866,067,027 | \$2,825,419 | \$309,203 | \$3,134,622 | \$1,155,878 | \$1,978,744 | 0.07% |
| TOTAL | \$40,601,045,047 | \$104,288,073 | \$9,808,912 | \$114,096,985 | \$15,540,092 | \$98,556,893 | 0.24% |
| | Revenue growth estimated at 3% annually | | These values issued by PGE in Attachment B of 2012 compliance report for UM 1452 | | | | |
| PAC | Estimated | VIR | Admin | Gross | Offsets to | Net | Rate |
| | Revenue | Payments | Costs | SPO Costs | Costs | Costs | Impact |
| \$1,121,442,750 | \$423,296 | \$472,431 | \$895,727 | \$49,258 | \$846,469 | 0.08% | |
| \$1,155,086,033 | \$1,641,824 | \$379,562 | \$2,021,386 | \$186,724 | \$1,834,662 | 0.16% | |
| \$1,189,738,613 | \$3,442,455 | \$475,000 | \$3,917,455 | \$438,957 | \$3,478,498 | 0.29% | |
| \$1,225,430,772 | \$4,399,142 | \$475,000 | \$4,874,142 | \$565,935 | \$4,308,207 | 0.35% | |
| \$1,262,193,695 | \$4,725,787 | \$425,000 | \$5,150,787 | \$599,047 | \$4,551,740 | 0.36% | |
| \$1,300,059,506 | \$4,725,787 | \$335,000 | \$5,060,787 | \$599,047 | \$4,461,740 | 0.34% | |
| \$1,339,061,291 | \$4,725,787 | \$335,000 | \$5,060,787 | \$599,047 | \$4,461,740 | 0.33% | |
| \$1,379,233,130 | \$4,725,787 | \$335,000 | \$5,060,787 | \$599,047 | \$4,461,740 | 0.32% | |
| \$1,420,610,124 | \$4,725,787 | \$335,000 | \$5,060,787 | \$599,047 | \$4,461,740 | 0.31% | |
| \$1,463,228,427 | \$4,725,787 | \$335,000 | \$5,060,787 | \$599,047 | \$4,461,740 | 0.30% | |
| \$1,507,125,280 | \$4,725,787 | \$335,000 | \$5,060,787 | \$599,047 | \$4,461,740 | 0.30% | |
| \$1,552,339,039 | \$4,725,787 | \$335,000 | \$5,060,787 | \$599,047 | \$4,461,740 | 0.29% | |
| \$1,598,909,210 | \$4,725,787 | \$335,000 | \$5,060,787 | \$599,047 | \$4,461,740 | 0.28% | |
| \$1,646,876,486 | \$4,725,787 | \$335,000 | \$5,060,787 | \$599,047 | \$4,461,740 | 0.27% | |
| \$1,696,282,781 | \$4,725,787 | \$335,000 | \$5,060,787 | \$599,047 | \$4,461,740 | 0.26% | |
| \$1,747,171,264 | \$4,423,339 | \$335,000 | \$4,758,339 | \$568,388 | \$4,189,951 | 0.24% | |
| \$1,799,586,402 | \$3,420,100 | \$335,000 | \$3,755,100 | \$436,691 | \$3,318,409 | 0.18% | |
| \$1,853,573,994 | \$1,283,331 | \$135,000 | \$1,418,331 | \$190,090 | \$1,228,241 | 0.07% | |
| TOTAL | \$26,257,948,796 | \$71,017,144 | \$6,381,993 | \$77,399,137 | \$9,025,559 | \$68,373,578 | 0.26% |
| | Revenue growth estimated at 3% annually | | | | | | |

Figure 11 – Estimated Rate Impact by Year



Attachments

Attachment A - Survey Results

Both PacifiCorp and PGE have collected survey results from participants in the Solar Pilot program. Below some of the highlights of the surveys are presented. The complete survey results can be found in the Appendix.

PacifiCorp Survey Highlights

Participants

(The complete survey results can be found on the PUC website)

There were 101 respondents active in the VIR program and having received at least 2 payments. Below is a summary of the survey answers from the respondents:

- Overall, 73% responded they were very satisfied and only 1 reported “dissatisfied”.
- When asked their primary reasons (multiple answers okay) for choosing the VIR program, 78 responded with a financial-based reason (incentives, income or ROI), and 53 for environmental or social reasons.
- When asked about their initial reasons for investigating the program, 58 indicated a financial related reason while 37 stated environmental or social reasons.
- 71 respondents had made energy efficiency improvements before installing their solar system.
- Indicating as to how they first became aware of the VIR program, 58 attributed this to a solar contractor and 18 to the newspaper – the top two answers.
- The top three solar contractors mentioned in raising awareness – Sunlight Solar (17) SolarCity (8) Eco Solar (6).
- Respondents indicated their sources of information about the program as solar contractor (88), ETO website (46), utility website (41), other online resources (38); phoned ETO (28), talked to friends (27), phoned the utility (26), and from the newspaper (17).
- 76 respondents knew of the ETO/net metering program before investigating the VIR

In questions regarding the participants' knowledge and understanding of Oregon's solar incentives, there were some interesting results:

- Only 60% understood that ETO incentives were not included in the VIR program.
- Only 60% understood the same about state tax credits.
- Most (86%) knew federal tax credits were possible with the VIR.
- Nearly all (90%) understood they would receive monthly payments.
- 74% claimed that they chose the VIR over ETO based on better financials.
- All but 18% compared the two incentive programs before deciding.
- Only 27 % were aware of insurance requirements before hand, and 32% still did not know after installation.
- Only 26% knew of the metering fee beforehand; 19% still did not know after the install.
- 57% knew about the need for "right sizing" before signing on; 29% learned of this during the process; and still 13% are unaware afterwards.
- 75% knew of the income stream before joining the program; 22% learned of this during the application.

In questions related to their perception of the program:

- When asked about perceived barriers to participating, 18 indicated insurance requirements, 17 indicated the additional meter fee and 45 the initial cash outlay required.
- When asked if they would still participate if the VIR was less, the results were:

| ANSWER | New VIR | | | |
|--------------|---------|--------|--------|--------|
| | \$0.10 | \$0.20 | \$0.30 | \$0.40 |
| Def YES | 5 | 7 | 8 | 13 |
| Maybe YES | 8 | 15 | 28 | 54 |
| Neutral | 12 | 14 | 11 | 12 |
| Probably not | 21 | 16 | 29 | 11 |
| Def NOT | 55 | 49 | 25 | 11 |

- Responding to questions about filling out the forms, the majority (78) had the contractor fill out the form, Of 23 who filled it out themselves 10 found it somewhat to unreasonably difficult

Responding to questions regarding the solar installation itself:

- As far as the physical installation of the solar system was concerned, 50% installed the size system they wanted; 36% installed a smaller size than they had wanted due to program restrictions.
- 49 respondents were involved in choosing components. The most important factors in their choice of hardware were: efficiency (47), quality (48), price (43), delivery (38), and “Made in Oregon” (30).
- Generally, participants are very happy with the knowledge and performance of the contractors.
- In reference to interconnection, the majority of participants were somewhat to very satisfied with the time and cost to complete the interconnection. For those that knew (86), 72 took 10 days or less to have the meter installed.
- Respondents were generally pleased with the payment amounts they were receiving so far. However, of those dissatisfied, 3 indicated this was because the payment is redirected to Solar City; 3 have problems with generation and 8 receive an amount less than expected.

Demographics:

- Residential demographics tend to be older with 56 of 74 respondents aged 41-70 yrs.
- Income level tends to be medium with 44 respondents in the \$40,000-120,000 income range.
- Commercial installations are small with 17 of 27 businesses having less than 20 employees from and a wide range of annual revenue (<250K to \$50million) with fairly even distribution.

Drop -Outs

There were 16 respondents who were surveyed after leaving the PacifiCorp VIR program. Of these 16:

- 15 did NOT complete a solar installation.

- 11 have decided against putting on solar, 2 are still considering, 2 unsure.
- 12 opted out after acceptance, 4 were rejected by PacifiCorp.

There is no one unifying reason for choosing to opt out. Of the 12 opt-outs, when asked to state the overriding reason for leaving the program:

- Half claimed that the high upfront cost was important.
- 25% claimed the upfront incentives of net metering were important.
- Contractor interactions, difficulty of application process, insurance requirements, and availability of financing were generally of little or no importance in the decision

Three out of four of those who were cancelled by the utility felt that the process was fair.

Other factors and attributes of those who did not participate include the following:

Out of 16 respondents -

- 11 made no energy efficiency improvements before looking at solar.
- 8 heard about the program through contractor; 7 from PAC phone or website (multiple choices allowed).
- As to their decision to enroll –10 claimed financial/income factor; 7 based it on contractor recommendation.
- Financing availability was important to 8.
- The insurance requirement was almost a deal breaker for 6 and initial cash outlay nearly a deal breaker for 5.
- 9 did *not* know about the ETO/RETC option; of the 7 that did 5 chose the VIR based on financial reasons.
- Only 1 of 7 that were aware of ETO decided to net meter.
- Generally, those that opted out and worked with a contractor had a positive experience.
- 11 had the contractor fill out the online form. None of the remaining 5 had major issues with the process.

- 14 were disappointed about not being in the program, 10 are likely to enroll in the future, and 12 would recommend to others

PGE Survey Highlights

(The complete survey results can be found on the PUC website)

PGE offered online surveys to solar program participants and prepared a comprehensive report on the findings⁶. Below are some of the highlights from PGE's data analysis, quoted from the report:

Participants

Residential

- Most respondents report hearing about the SPO program through contractors (31%), the media (27%) and lenders (described in the open-ended responses).
- Respondents show a moderate level of previous ownership of solar systems.
- Respondents are making the decision to invest in a solar system relatively rapidly; 24% considered the decision for less than three months and nearly half considered for less than one year.
- Overall, respondents are satisfied with program processes and communications. Satisfaction is mixed regarding time it took to get the system installed and connected.
- Installation contractors play an important role in the respondents' experiences; they are an influential source of information on the program, are submitting the majority of applications and assist participants to complete forms. In addition, most respondents (80%) are satisfied with the service they received from their contractor.
- About 80% of participants estimated the system payback period, with estimates ranging from one to 16 years, with most payback estimates between seven and 10 years. Respondents had a low tolerance for additional extension to their payback period.
- Just over half of respondents (56%) considered net metering for this project, typically for a system the same size or smaller than the one they installed in the SPO program. Most chose the program because they found the incentives more attractive.

⁶ Consultant memorandum from Marti Frank and Jane S. Peters, *Research Into Action, Inc* to Linda Evens, PGE Senior Research Analyst & Project Manager, dated Sept. 8, 2011.

- Nearly half of respondents (44%) had unresolved issues when they decided to participate.

Commercial

- Nearly half of respondents (47%) report hearing about the SPO program through contractors and word-of-mouth (32%).
- Only one respondent reported previous ownership of solar systems.
- Respondents are making the decision to invest in a solar system relatively rapidly; 32% considered the decision for less than three months and 64% considered for less than one year.
- Overall, respondents are satisfied with program processes and communications. Satisfaction is mixed regarding time it took to get the system installed and connected.
- Installation contractors play an important role in the respondents' experiences; they are an influential source of information on the program, are submitting the majority of applications and assist participants to complete forms. In addition, nine-out-of-ten respondents (89%) are satisfied with the service they received from their contractor.
- *All* respondents estimated the system payback period, with estimates ranging from one to 15 years. Respondents had a low tolerance for additional extension to their payback period.
- Just under half of respondents (47%) considered net metering for this project, typically for a system the same size or larger than the one they installed in the SPO program. Most (70%) chose the program because they found the incentives more attractive.

Drop-Outs

Residential

- Five of six drop-outs chose to terminate their participation in the program (as opposed to having their participation terminated by PGE).
- One of six drop-outs installed a solar PV system, and did so in the net metering program.
- Total system cost and availability of upfront capital were important barriers to participation.

Commercial

- There was only one completed commercial drop-out survey.
- The respondent withdrew because he/she did not receive as large an allocation as was desired.