



*Northwest Solar
Communities*

FINANCING SCENARIOS FOR SOLAR

Comparative Financing Models of Solar Energy Systems in
Washington State

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Introduction

The solar energy marketplace is rapidly evolving, and a number of national trends have the potential to impact the Washington State landscape. A variety of financing and ownership tools exist in most successful solar markets that allow for participation of customers who choose not to invest their own capital in solar equipment. Solar leases, Power Purchase Agreements (PPAs), property assessed clean energy financing, and loans offer a range of options for potential customers. While much of the attention to date has been on how leasing could impact the residential sector, there is also great potential for change in the commercial and governmental sector. Leasing has captured much of the market nationally, though there are an increasing number of firms that are offering both leases and solar loans as part of their business model. The relative attractiveness of these options is largely determined by the incentives, energy prices and capital structures available in each market. This paper seeks to evaluate different ownership and financing models in the Washington State market from the customer perspective, based on a number of variables currently identified. There is currently a lot of uncertainty in the marketplace, with potential expiration of key Federal incentives and pending Washington State regulation regarding the Cost Recovery Program.

The following is a table of the major incentives available for entities that make investments in solar energy equipment, as well as the relative value. Hyperlinks to relevant details of Federal and State incentives are provided. Much of the variability of the value of net-metered bill credit amounts is dependent on electric rates and solar resource, which is approximately 20% higher on the east side of the state. A WA State sales tax exemption and rebate is available for solar energy equipment, but is not listed below as it applies equally to all categories, and pending legislation may change its applicability. Additionally, some utilities provide additional incentives which are not captured.

FIGURE 1

| Incentive | Incentive Type | Value over 15 years | Expiration | System Owner Eligibility | | | |
|---|----------------|------------------------|------------|--------------------------|------------|------------|------------|
| | | | | Residential | Commercial | Government | Lease /PPA |
| Business Energy Investment Tax Credit (ITC) | Federal | 30% of capital cost | Dec-16 | | X | | X |
| Residential Renewable Energy Tax Credit | Federal | 30% of capital cost | Dec-16 | X | | | |
| Modified Accelerated Cost-Recovery System (MACRS) | Federal | 10-20% of capital cost | N/A | | X | | X |
| WA Cost Recovery Program (CRP) | State | Pending Legislation | ? | X | X | X | ? |
| Net-metering bill credits | Utility | 20-30% of capital cost | N/A | X | X | X | |

Direct Ownership and Loan Financing by Sector

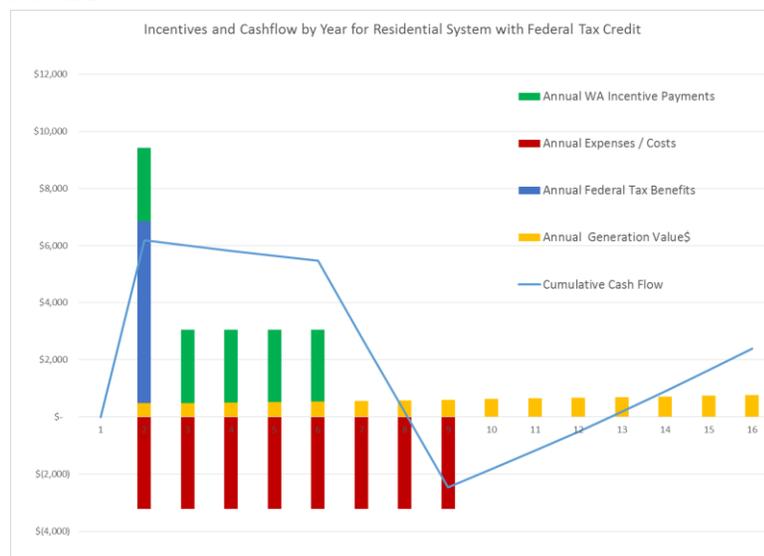
Customers choosing to own solar equipment directly can capture the full value of many available incentives, and may have the opportunity to finance part or all of the costs. To compare the relative value of some of the benefits, it is helpful to break the markets into their respective sectors, as they vary greatly based on the taxable basis of the ownership entity. Due to the larger market on the west side of the Cascades in WA State, all examples will be modelled on generation in Seattle, WA.

Residential

In WA State, the residential market has seen the greatest amount of growth and development, due largely to the structure of the CRP incentive as well as limits to system size imposed by net-metering rules. While solar costs continue to decline, the Washington State market has seen slightly higher installed costs than some of the more competitive solar markets. Average total installed costs for a typical 5 kilowatt residential installation total approximately \$21,000 in 2014. This up-front cost presents a barrier for many homeowners interested in solar, as they must have good access to cash or credit. A number of financial institutions are now providing loans to customers investing in energy efficiency and solar energy for their property. These are provided to qualified customers with terms up to 15 years and interest rates starting at 4.25%. For the purposes of example, we will use slightly shorter periods for repayment. New entrants to the financing market may also provide solar loans that include additional services such as production monitoring or maintenance.

For residential customers, the Federal Residential Renewable Energy tax credit and the WA CRP incentive program have historically provided the bulk of the investment value returned. Net energy metering allows the customer to utilize the energy generated on-site, and offsets energy purchased from the utility. While important, it

FIGURE 2



comprises a relatively smaller portion of the financial return. The current rules of the CRP provide fixed payments per kWh of electricity annually until 2020 and are a valuable policy tool. Without an additional incentive, the low electricity rates in Washington do not provide a financial return within an attractive period. The generous rates of incentives paid, especially for Made-in-Washington equipment, has spurred significant development in the past three years as the window closes to receive the incentive. Figure 2 reflects the relative

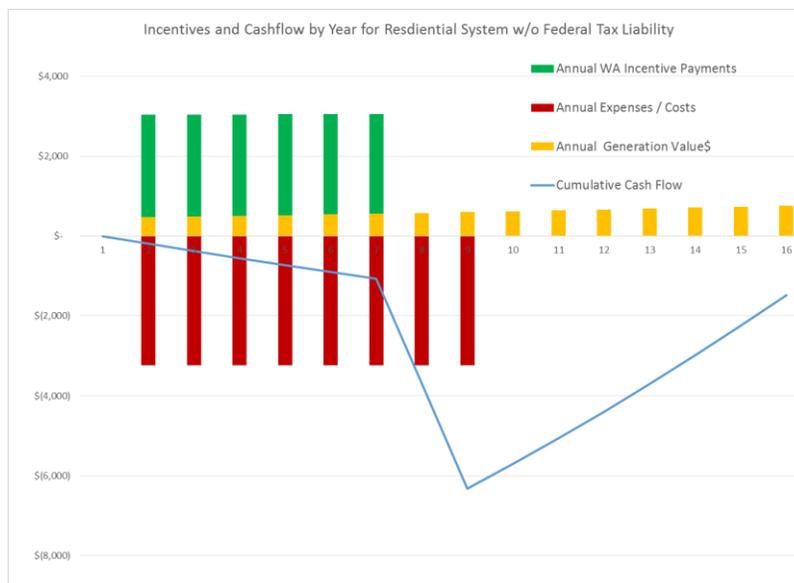
cash flow streams and cumulative savings anticipated for solar energy system installed under the current incentive structure for a customer able to utilize the Federal tax credit. The equipment pricing and incentive rates are reflective of Made-In-Washington standards. In this example, the customer does realize a financial return after the loan is paid off, though there are a number of years where the loan payments significantly exceed the value of energy savings. It also important to note that this 15-year

window does not capture the entire value of solar generation in the system's lifespan, nor does it account for potential maintenance costs.

A scenario where the customer is unable to monetize the tax credit is shown in scenario where the customer is unable to monetize the tax credit is shown in Figure 3. This might include retirees or other homeowners with low taxable income. Without this benefit, the horizon of financial benefit to the customer is significantly extended beyond the 15 year window.

It is important to note that the Federal residential tax credit is slated to expire at the end of 2016, which may have significant impact on the residential market. Additionally, pending legislation in Washington State is likely to alter the incentive payment levels, and generally are likely to provide lower payments over a longer duration.

FIGURE 3



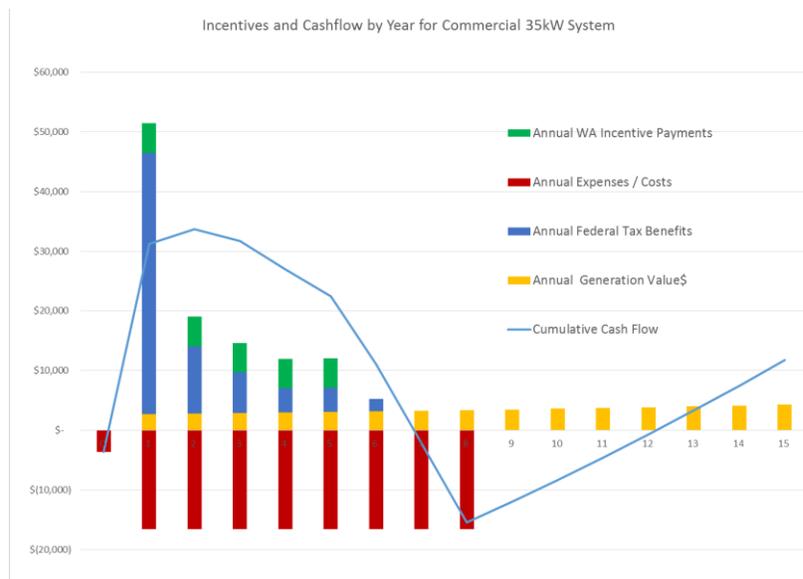
Commercial

The commercial market in WA State has progressed relatively slowly. The CRP incentive limits payment to \$5,000 annually, which in turn discourages larger system sizes. A statewide 100kW cap on system size that are eligible for net-metering is a further barrier to widespread commercial solar adoptions. Unlike other markets where economies of scale can significantly reduce costs for commercial systems, the WA market has seen commercial solar costs relatively close to that of residential. Additionally, relatively few commercial properties are owner-occupied, disconnecting the financial motivation between the owner of the property and the potential benefits of a solar energy system. The current CRP rules also prevent incentives from flowing to systems where the utility customer is different than the property owner.

Commercial entities generally have a greater range of federal tax incentives available, including MACRS accelerated depreciation that can be taken over a period of five years. The value of net-metering is marginally lower for most commercial customers, as they generally have lower electric rates than residential customers. While there are economies of scale as larger solar arrays are constructed, the relatively low 100kW limit does not approach the size necessary to realize significant savings. The current limits to the CRP program make it more likely that a commercial customer would opt to use more competitively-priced equipment, forgoing the Made-In-Washington adder to the incentive. Commercial customers are likely to be concerned about up-front costs of investment, especially as the projects costs

run into the hundreds of thousands of dollars. However, commercial entities are also more likely to have cash on hand for capital projects, and access to credit at better terms than a residential customer. Commercial loans are available from local financial institutions at rates around 4% for a term of eight years. Figure 4 reflects the cash flow and incentives over a 15 year period, assuming that the business finances the system and is able to fully capture the value of tax credits and depreciation. There is net benefit realized throughout most of the 15-year evaluation window, though a number of years where loan service payment costs exceed the value of solar benefits.

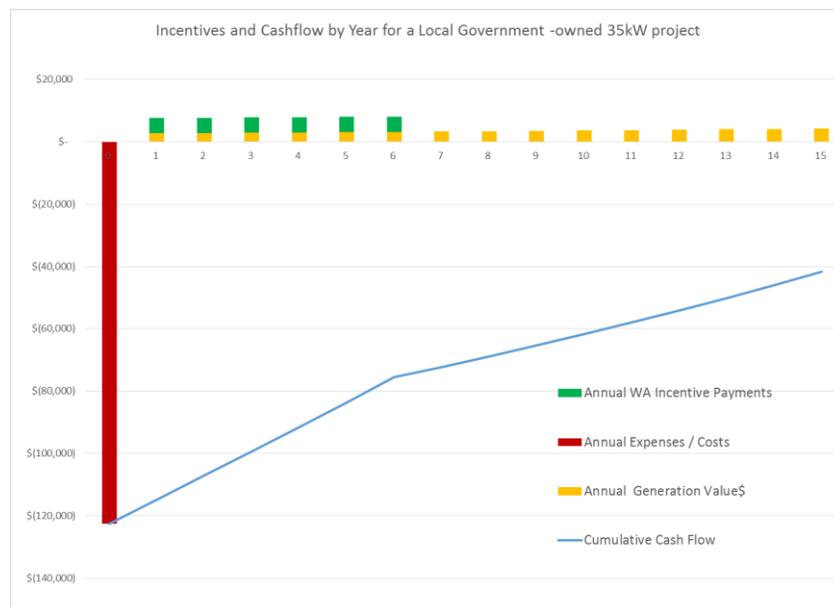
FIGURE 4



Governmental

Due to the heavy reliance on tax benefits, it has been traditionally difficult for governmental entities to engage in the solar marketplace. A competitive Clean Energy Fund grant is available for qualified local governmental entities in WA State, but cannot be counted on as an incentive for a specific project. Additionally, many governmental entities are classified as industrial customers, and pay some of the lowest electricity rates. This creates a disincentive for solar investment, as the energy savings take a long time to accrue to justify the initial investment. Figure 5 illustrates the cash flow from net-metered energy

FIGURE 5



savings, which can be seen as extending beyond the potential life of the system. While Community Solar offers a potential solution to this issue through additional incentives to participants and eventual transfer of the system to governmental ownership, we will not consider it as a component of this report. However, government entities may have also additional energy independence and sustainability goals that are of greater importance than strict financial payback.

Despite the challenges, governmental customers represent a large untapped potential market. With stable electrical needs, long-term planning horizons, and access to financing tools such as public bonding authority, there could be a great opportunity for projects on local and state government property. Some of the tools available for alternative ownership could play a valuable role in this market.

Third Party Ownership: Leasing and Power Purchase Agreements

Customers with low taxable liability or limited access to capital may choose to enter into a contractual arrangement to purchase the benefits of solar energy without owning the system. Generically called Third-Part Ownership (TPO), over a dozen companies operate nationally providing these solar financing

FIGURE 6 : SOURCE GREENTECH MEDIA

| | Financier | Lead Generation | Sales | Financing Offered | | Installation | Active Markets | Acquisitions Since 2013 | Customer Acquisition Partnerships |
|----------------------------------|-----------|--------------------------------------|---|-------------------|----|--------------------|----------------|--|-------------------------------------|
| | | | Lease/PPA | Loan | | | | | |
| Vertically Integrated Financiers | | | | X | | | | Paramount Solar, Zep Solar, Common Assets, Sievo | Vindian, Honda, Home Depot, Groupon |
| | | | | X | | | | Solmetric | |
| | | Partners | Partners | X | X | Partners | | | North American Power |
| | | and Partners | Partners | X | X* | Partners | | | Niscon, Ford |
| Partner Model Financiers | | and Partners | Partners (often different from installation partners) | X | X* | Partners | | | Choose Energy |
| | | Partners | Partners | X | | Partners | | | |
| | | Partners through Clean Power Finance | Partners through Clean Power Finance | X | O | Partners | | | |
| | | Partners | Partners | | X | Partners | | | |
| | | Partners | Partners | | X | Partners | | | |
| | | Partners | Partners | | X | Partners | | | |
| | | Partners | Partners | | X | Partners | | | |
| Semi-Integrated Financier | | and Partners | and Partners | X | | and Partners | | Re: Solar (residential), AEE Solar, SnapIRack | Nest |
| | | and Partners | and Partners | X | | and Partners | | Roof Diagnostics Solar | Home Depot, Reliant Energy |
| Semi-Integrated Installer | | and TPO Partners | | X | X* | Via Subcontractors | | | Lowell's, Sierra Club |
| | | and TPO Partners | | O | X* | | | Mercury Solar, Syndicated Solar, Sunetric | Green America |
| | | and TPO Partners | | X | X* | | | | Ethical Electric |

X = Currently Offered | O = In Development | * = through partnerships with third-party loan providers such as commercial banks

services. They vary somewhat in their exact business models offered in a given marketplace, and it is hard to predict which would be most successful in Washington State. Some companies are structured as vertically integrated businesses, providing sales, installation, financing, monitoring, and maintenance. Others provide just the financing resources, and partner with local installers for the installation and operation and maintenance services. Figure 6 provides an overview of the offerings and business models of some of the larger industry players, current as of 2014.

In general, TPO companies have been successful in capturing market share where they can provide a compelling value proposition to their customers. Usually this entails offering a rate for their services which is 5-10 percent less than the equivalent payments made to the utility company. In most markets, this is enabled by allowing the value of state and federal incentives to be passed on to the TPO company, either directly or through contract. In WA State, there has been a specific prohibition of systems owned by TPO companies to receiving the CRP incentive, though that may change with pending legislation. Solar Leases and PPA's allow for less up-front cost and ownership risk for the customer, in exchange for a long-term payment contract to the TPO provider.

Leasing vs. Power Purchase Agreements

The difference between leases and PPAs is largely a function of the contractual terms of the financing tool. In a solar lease, a customer generally agrees to pay a fixed monthly payment for the usage of a solar asset connected to their property. The lease rate is typically structured to be lower than the utility energy

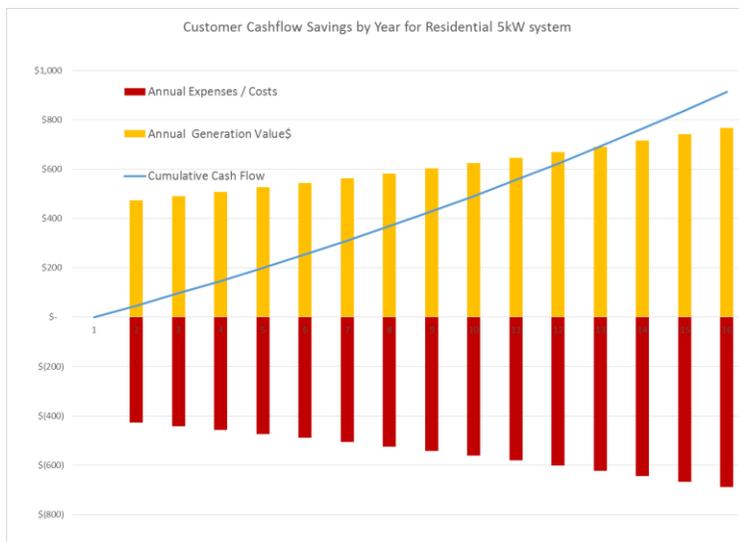
savings, and is highly dependent on utility policies of net-energy metering using valuation close to or equal to retail rates. These lease payments are also usually subject to an annual escalator calculated to account for anticipated electricity rate increases. Typically a production guarantee provided by the TPO company ensures that the benefits of the solar generation are realized by the customer without additional payments. Most residential TPO systems are offered under a lease arrangement.

In a Power Purchase Agreement, the customer agrees to pay a fixed rate for the electrical output of a solar array owned, operated, and maintained by a TPO. The rate structure is generally a point of negotiation, with rates either indexed below retail electricity rates with a fixed escalator, or a flat rate over the life of the contract at a price slightly higher than current retail rates. This structure allows a customer to have a fixed, predictable amount of annual generation provided over the life of the contract, and may provide lower risk than a lease arrangement. The majority of commercial and governmental solar installed in the United States has been installed under a PPA structure, though it has not been effectively utilized in WA State yet. Due to the prohibition of TPO systems from receiving the incentive and regulatory uncertainty around the status of an entity selling electricity to an end user, one can only evaluate a hypothetical market state, where a similar value proposition is offered to customers.

Incentive flow and value proposition

Under a TPO structure, the value of the federal tax credits and accelerated depreciation are monetized through tax-equity partnerships or directly by the third-party entity. Due to their installation volume and market position, many of these TPO companies can also leverage lower equipment prices, efficiencies in the sales process, and overall lower soft costs associated with the installation. It is difficult to model

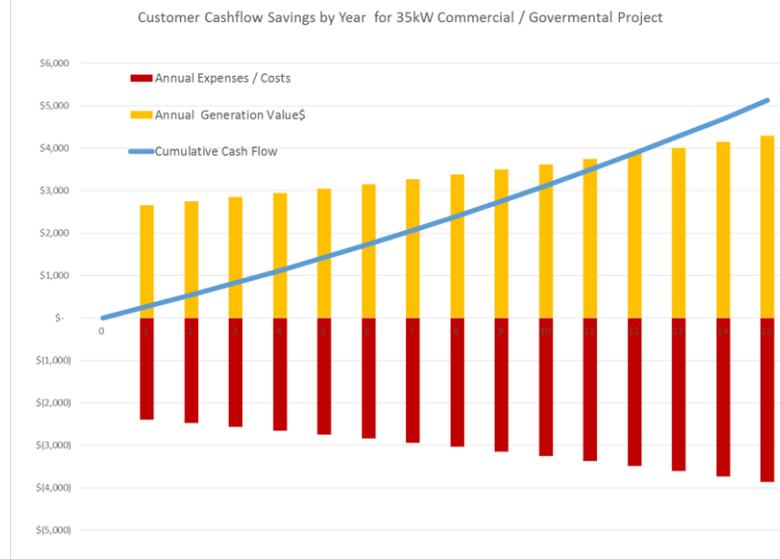
FIGURE 7



exactly the returns and capital cost to the TPO, though generally their proposition would be similar to that of a commercial entity owning a solar array directly, as those are the Federal incentives they are eligible to receive.. For the purposes of this report, we will assume that any state incentives available would flow to the TPO, and indeed may be necessary to attract TPO customers to the market due to WA State's low power rates. Figure 7 provides a relative comparison of the flow of benefits and payments relative to savings for a typical residential customer with a 4kW system installed.

Depending on the exact contract structure, the customer may be qualified for a zero-down arrangement, whereby all the costs paid to the TPO company take place over the term of the lease, with no funds due upon signing. Other arrangements are structured with an up-front payment resulting in lower monthly payments. This shows that while there are lower up-front costs and debt-service with a TPO arrangement, fewer benefits accrue to the residential customer in comparison to ownership over the life of the system. At the end of the lease, there may be additional contractual terms allowing the customer to own the system for a depreciated value, but it is difficult to predict these contract terms.

For governmental customers, the value proposition is considerably better, and Figure 8 represents the cash flow, represented as energy savings, from a PPA arrangement. The exact terms and values are difficult to predict, but the relative scale of benefits is relevant. As can be seen, the proposition is similar as that for residential customers, only the absolute numbers are different. Regardless of the choice of lease or PPA, an important distinction lies in the assignment of risk. In a lease, the customer is usually obligated to pay for the use of the system with a production guarantee protecting the quantity of the electrical output. In a PPA, only the kWhs generated are paid for, providing somewhat lower risk for the participant.

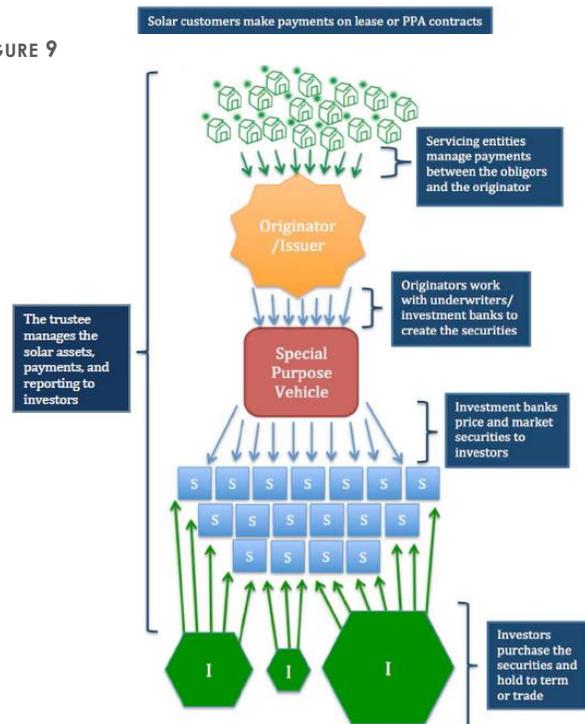


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Securitization

Many of the providers of leases and PPAs have found additional ways to leverage the capital available in the market by securitizing the revenue streams and reselling to interested investors. A [2013 NREL study](#) provides an analysis of the value of securitization in the industry, illustrating how the creation of Special Purpose Vehicles (SPVs) allows the realization of multiple revenue streams. These Collateralized Loan Obligation (CLOs) allow a TPO to generate many more installations with a faster recirculation of capital. Revenue streams are split among investors in the SPV in a way that distributes risk from any individual solar array or customer not performing as expected. The TPO company generally retains responsibility to servicing the customer account and providing any required data monitoring, billing, and system maintenance. Figure 9 provides a visual representation of the securitization model.

FIGURE 9



Conclusion

The preceding analysis shows that for some customer types, the availability of TPO models in a marketplace provides an economically attractive path for solar installation. This is especially true for governmental customers and residential customers who may not have tax appetite for federal incentives, but it is also true for commercial customers who may not be in a position to take debt onto a balance sheet or experience any negative cash flow, even when the overall benefit is positive.

Figure 10 shows the cumulative benefit flow over 15 years, for the residential, commercial and government hosted systems. (The cumulative benefit flow is energy savings plus applicable incentives and/or tax benefits minus lease payments and/or loan payments). This assumes a State Cost Recovery Program incentive that offers \$0.54/kWh for made in Washington and \$0.15/kWh for out of state equipment, and an expiration of June 30, 2020.

FIGURE 10

| System Description | Condition | Fed Tax Credit | Depreciation | CRP Incentive | 15 year benefit |
|---|--|----------------|--------------|---------------|-----------------|
| 5 kW Residential Purchase w/Loan 5 kW Residential Purchase w/Loan 5 kW Residential PPA | Tax appetite | Yes | No | In State | \$2,398 |
| | No tax appetite | No | No | In State | (\$3,977) |
| | Purchase electricity 10% below retail rate | No. To TPO | No. To TPO | To TPO | \$915 |
| 35 kW Commercial Purchase w/Loan 35 kW Government Purchase 35 kW Commercial or Governmental PPA | Tax appetite | Yes | Yes | Out of State | \$11,755 |
| | No tax appetite | No | No | Out of State | (\$46,560) |
| | Purchase electricity 10% below retail rate | No. To TPO | No. To TPO | To TPO | \$5,125 |

Clearly, different entities have different motivations and financial needs, which drive them to select one model or another. The current Washington solar market is over 90% single family (residential) systems, purchased by homeowners who currently have tax appetite to take the Federal Tax Credit. Availability of TPO models in Washington State would provide limited short term benefit for this market segment. Currently customers see slightly more benefits for owning than for leasing. However, if Washington policy makers want to expand the market to include residents without tax appetite, or government properties, then TPO models offer a path.

Regardless of whether Washington chooses to make cost recovery program incentives available to TPO systems, the cost recovery program is nearing the end of its effectiveness unless the program is extended beyond 2020. Installation costs have fallen dramatically since the program was started in 2005, and residential installation costs have fallen quickly enough to provide a consistently short payback, even as the incentive window has shortened. Going forward, it will be difficult to for falling costs to keep pace with falling production incentives. In addition to extending the incentive, there are some structural limits

that must change in order to open up the governmental and commercial market: Removing the cap of \$5,000 per year is a prerequisite for encouraging any installation over 35 kW and achieving economies of scale.

As policy makers seek to increase solar deployment in Washington State, it is useful to recognize that different entities have different decision drivers. The tax income that the state foregoes in order to fund the Cost Recovery Program should be considered in light of the benefits of broadening Washington's solar landscape: skilled jobs, distributed clean energy, and a solar market that could include many more actors than it does today.