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Loudat, Thomas A.; Kasturi, Prahlad

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This Version is available at:
http://hdl.handle.net/11159/1158

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# The Economic and Fiscal Impacts of Hawaii's Solar Tax Credit

## Thomas A. Loudat[1], Prahlad Kasturi[2]*

[1]President, Tal Associates, 46-281 Auna Street, Kaneohe, HI 96744, USA, [2]Department of Economics, Radford University, Radford, Virginia, USA. *Email: pkasturi@radford.edu

**ABSTRACT**

This research paper assesses the economic and fiscal impacts of Hawaii's solar tax credit-stimulated solar installations. The method entails estimating the economic effects created by (i) the purchase of a solar system as well as, (ii) of the alternatives foregone. Our study shows that the State receives full repayment of its solar credit investment in 9-15 years. For each solar credit dollar spent, the State receives $1.97-$2.67 dollars in additional tax revenues. The fiscal results of the tax credit reported by this research have been replicated in a federal solar tax credit study published by the US Partnership for Renewable Finance USPRF (2012) that estimates an internal rate of return (IRR) of 10% for the government's tax credit "investment" in residential solar systems. The findings of the federal study comports closely with our Hawaii's estimate of an IRR of 9.5% for residential and 11.1% for commercial solar systems.

**Keywords:** Solar Energy, Solar Tax Credit, Internal Rate of Return
**JEL Classification:** O4

## 1. INTRODUCTION

Solar system technologies typically use renewable energy in the form of sunlight to generate electricity (e.g., photovoltaic panels, abbreviated as "PV"), or to heat water (solar hot water or abbreviated as "SHW"). These technologies can be installed at residential or commercial locations as a form of distributed energy generating systems to reduce the demand for electricity from centralized, utility-based generating systems. The installation and use of solar systems decrease Hawai'i's reliance on imported oil, gas, coal, and other fossil fuels used to generate electricity or heat water. As such, installing a solar system has an economic benefit for both the system purchasers (in the form of lower electric bills) and the broader Hawai'i community (in the form of reduced reliance on imported fossil fuels).

The state of Hawai'i enacted a tax credit in 1976 to stimulate installation of solar technologies[1]. Since its inception, the solar credit has been expanded to include other renewable technologies

and increased from its original level of 10% of a system's cost to the current 35% level with a cap on the amount of the credit claimed[2]. The tax credit for commercial systems is capped at $500,000 for PV and $250,000 for SHW. Single-family residential solar systems have caps of $5,000 for PV and $2,250 for SHW. Multi-family residential solar systems have a cap of $350 per residential unit.

A federal solar tax credit was introduced in the late 1970s, and has generally varied between 30% and 40% of system cost. The federal credit is currently 30%, with no cap on the amount that can be claimed. Through various programs, rebates for SHW systems have also been offered in Hawai'i, varying between islands.

Using available data, we calculate the cost of total credit refunds for SHW systems, which is roughly $126 million (in 2005$) over the life of the Hawai'i solar credit through 2011. Adding solar credit refunds for other renewable energy systems would increase this amount. While the cost to the state is readily tractable, the potential benefits of the solar credit are less transparent. Relying solely on the credit cost without also considering the economic,

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1   State of Hawaii Department of Taxation ("DoT"), Tax Credits Claimed by Hawaii Residents (various years), Available from: http://www.state.hi.us/tax/a5_4credits.htm.

2   Haw. Rev. Stat. § 235-12.

fiscal, and other benefits, would inevitably lead to non-optimal policy choices regarding solar credit.

This research paper provides a more complete picture of the economic and fiscal performance of Hawaii's solar credit, showing that their benefits outweigh their costs. Moreover, data utilized in the study and our analyses suggest that that solar installations have not detrimentally impacted the utility nor revenues the State derives therefrom. This study shows that the solar tax credit is increasingly making solar power a viable option for Hawai'i ratepayers across the income distribution spectrum.

The objective of this research is to assess the economic and fiscal impacts of Hawaii's solar credit-stimulated solar system installations. It entails estimating the economic effects created by the purchase of a solar system, and also of those foregone due to its purchase. The net impact is the difference between the economic effects and derivative fiscal effects created, and those foregone. The net impact of the solar tax credit is the operative measure required for policy makers to assess the economic and more importantly fiscal performance, of Hawaii's solar tax credit.

## 2. METHODOLOGY

The Hawai'i solar credit affects both the purchase decision, the economic outcome to the purchaser, and State finances. That is, it has behavioral as well as economic and fiscal impacts. Behavioral impacts are measured via observing the relationship between annual systems installed and the overall credit level for the corresponding year. Economic and fiscal impacts are the sum of total annual net impacts, measured as benefits less costs (i.e., what is foregone) over a system's life. A solar system is a capital item with a life greater than 1 year. Thus, its energy saving capacity and its consequent economic and fiscal impacts extend over a multi-year life cycle. As capital items with consequent returns greater than the capital cost, solar systems transform the State's credit related expenditure into an investment, not an expense, with a consequent return that is measured in this research report.

In this study, cost and benefit cash flows for both users and the state are formulated for the solar systems analyzed. Owners use electricity generated from the PV system or export the surplus to the utility. The consumer retail cost of electricity equals the value per solar system kW electricity generated. Cash flows extend for 30 years (the assumed life of a PV solar system) or 25 years (the assumed life for a SHW system). The analysis assumes systems are cash purchased.

Costs and benefits for the respective entities are the following:
- For user or system purchaser:
  - Stimulated by a solar system purchase:
    - Costs include system purchase and installation costs, and required maintenance costs over a system's life.
    - Benefits are the value of fossil fuel-free energy generated using sunlight, any tax savings from depreciation deductions and solar tax credits received.

- Foregone by a solar system purchase:
  - The cost of purchasing the utility-generated equivalent amount of electricity a solar system generates over its life after installation.
  - The benefit of using solar system purchase dollars for alternative expenditures.
- For the State:
  - Stimulated by a solar system purchase:
    - Costs are the solar credit refunds the year the credit is taken and lower tax revenues due to any depreciation expenses (commercial systems only) that reduce a purchaser's tax liability in subsequent years until a solar system is fully depreciated.
    - Benefits are the increased level of tax revenues by virtue of increased local economic activity from consumer expenditures generated from the substitution of local sunlight for imported fossil fuels for energy.
  - Foregone by a solar system purchase:
    - The cost is the loss of the stream of tax revenues generated by a solar system's substitution of local sunlight for imported fossil fuel for energy.
    - Benefits are the use of credit monies for alternative to credit refund expenditures the year credit is taken and any tax decreases due to depreciation deductions in subsequent years.

Based on these cash flows, the economic and fiscal performance of the solar credit is measured[3] for each system type.

Cost and benefit cash flows allow determination of final demand amounts over the life of a system. Multiplier effects are estimated from final demand using the 2007 Hawai'i State input/output model. The analysis does not account for changes in consumer expenditure when a solar system is purchased that could lead to economic leakages from Hawaii's economy. On the benefit side of the solar credit impact accounting, it is assumed that all expenditures on solar systems are for Hawaii-based products and services. On the cost side of the solar credit impact accounting we assume equivalent monies expended on consumer goods in the year of installation offset the investment in the solar system. These assumptions posit that the percentage of a system cost represented by monies to the solar manufacturers is no more than the percentage of monies to consumer goods manufacturers. Due to the large local labor component required for a solar system installation, it seems reasonable to posit that the portion of expenditure going to mainland-based companies for a solar system installation is less than that for consumer goods assumed foregone. It is important to note that leakages for any reason not accounted for in this analysis reduce the net economic and fiscal impacts of credit-simulated solar system installations.

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3   Economic and fiscal performance measures are deterministic once variable values are specified. A change in any variable value could result in changes in the value of performance measures reported herein. Thus, issues about any performance measure reported herein should refer back to the variable values. It is noteworthy that the performance measures are not the measure of the true impact of policy. The policy context of the solar credit program over its existence relates to State energy goals, not performance measures per se, which are incidental to solar credit policy.

Analysis economic impact variables measured in this study include:
- Indirect and induced output (sales);
- Employment or jobs; and
- Labor income.

General excise tax revenues generated by the purchase decision are measured on economic output (i.e., direct + indirect + induced output) and income tax revenues on labor and corporate income over the life of a system. These amounts, together with the solar credit cost plus the depreciation cost for commercial PV systems to the state, allow the determination of the net fiscal impact to the state of the solar credit program.

Systems analyzed include:
- Residential SHW (234 kWh per month energy savings);
- Residential PV (5.27 kW nameplate capacity); and
- Commercial PV (118 kW nameplate capacity).

Detailed information regarding system parameters, assumptions, and other variables are presented in Appendix 1. Results are generally reported on per kW and/or per system basis for PV systems, and per system basis for SHW systems.

## 3. RESULTS

### 3.1. The Relationship between Tax Credits in Hawai'i and SHW Installations

Figure 1 shows the relationship between the solar credit and the number of SHW system installations. Data is available from 1977 to 2011. Figure 1 shows a clear, statistically significant relationship between the credit level and the number of systems installed - the higher the credit, the more systems installed. This relationship is due not only to the fact that the credit lowers the net cost of a solar system leading to more sales, but also due to other market signals sent by the State by virtue of a substantial credit[4].

Given the relationship between the solar credit level and the number of systems installed, it is noteworthy that for each solar system installed in Hawai'i, there is a potential Federal tax reduction to the purchaser of 30% of the cost of a solar system. If a reduction or elimination of the State tax credit reduces the number of system installs, this will lead to a reduction of these Federal dollars circulating in Hawai'i's economy with direct and multiplier economic and fiscal consequences.

The relationship between the solar credit and SHW system installations reported above has persisted over the long term (i.e. the past 35 years). The analysis thus assumes that this will be

Figure 1: Solar hot water systems installed as a function of total credit level[5]



$$y = 316.09e^{0.0513x}$$
$$R^2 = 0.84688$$
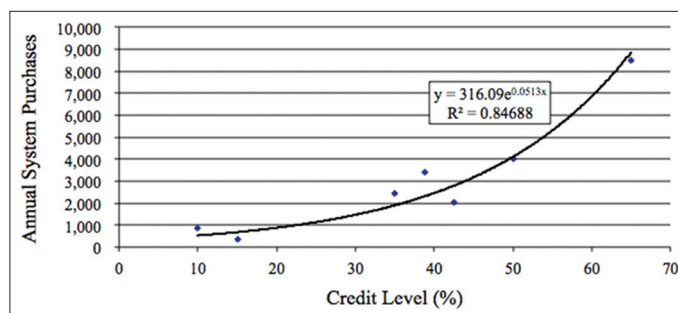
the case at least over the near-term. It seems reasonable to posit that the significance of the impact of the solar credit would be less for solar electric then SHW because of significant price declines in solar electric technology that have not occurred for SHW systems. An equivalent data set for solar electric installations (as is available for SHW systems) do not exist to investigate this relationship. Nonetheless, the analysis assumes that the relationship between the credit level and the number of installations holds for solar electric systems as well as SHW systems for purposes of this analysis.

While tractable, this analysis makes no attempt to determine the optimal credit level. For any such determination it would be necessary to specify the objective function and its related constraints from a policy maker's perspective. Determination of an optimal credit level is not necessary to assess any net benefits of the solar credit at its current level.

### 3.2. Tax Credit-stimulated Solar System Cash Flow Determination

- Tables 1-3 show the variables and variable values used to project cash flows from solar systems for each type of solar system.
- Estimated cash flows with the solar credit stimulated purchases, those forgone due to solar credit stimulated purchases, and the net overall cash flow situation due to solar credit stimulated solar system purchases for commercial PV systems are shown in:
  - Tables 4-6 for residential SHW systems
  - Tables 7-9 for residential PV systems
  - Tables 10-12 for commercial PV systems.

The analysis results below are derived from these tables.

### 3.3. Parameters of Solar Systems Analyzed

Table 1 presents the solar system parameters underlying the cash flow analysis. The data in Table 1 is self-explanatory descriptive data noting the difference in the types of solar systems analyzed - SHW and PV. It merits reiteration that SHW system results are presented on a per-system basis while PV system results are presented on a per-system as well as per-kW generating capacity basis.

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4    Inclusion into the analysis of a time variable measuring awareness of the technology with simultaneous system price decreases leading to uptake over time, proved statistically insignificant. Inclusion of average residential electricity prices into the analysis while statistically significant in one specification was not in others. More importantly, inclusion of either of these variables did not change the coefficient of the credit variable, which remained statistically significant in all specifications. The credit level at least for SWH systems is the most significant factor impacting the uptake of these technologies.

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5    Data from DoT, Tax Credits Claimed by Hawaii Residents (various years), Available from: http://www.state.hi.us/tax/a5_4credits.htm; and HECO Demand Side Management Information System Reports. The "Total Credit Level" includes State and Federal tax credits.

**Table 1: Solar system parameters[6]**

| Solar system | System | | | Cost per system or per installed kW | Annual savings per system or per installed kW |
|---|---|---|---|---|---|
| | Size (kW) | Cost | Life | | |
| SHW (system) | Average HI | $6,615 | 25 | $6,615 | $1,018 |
| Residential PV (kW) | 5.27 | $29,000 | 30 | $5,503 | $554 |
| Commercial PV (kW) | 118 | $442,500 | 30 | $3,750 | $554 |

Source: Internal calculations. SHW: Solar hot water, PV: Photovoltaic

**Table 2: Solar credit economic performance**

| Solar system | Credit cost per system or per kW | Output (sales) generated | | Output per system over life |
|---|---|---|---|---|
| | | Per system or per kW per year | Per credit $ per system or kW | |
| SHW (system) | $2,315 | $4,105 | $44.32 | $102,622 |
| Residential PV (kW) | $1,926 | $2,227 | $34.69 | $66,810 |
| Commercial PV (kW) | $1,313 | $2,407 | $55.03 | $8,522,259 |

| | Labor income generated | | |
|---|---|---|---|
| | Per system or per kW per year | Per credit $ per system or kW | Labor income per system over life |
| SHW (system) | $1,245 | $13.45 | $31,131 |
| Residential PV (kW) | $672 | $10.46 | $106,189 |
| Commercial PV (kW) | $736 | $16.82 | $2,604,386 |

| | Jobs generated | | |
|---|---|---|---|
| | Per system or per kW per year | Per credit $ per system or kW | Jobs per system over life |
| SHW (system) | 0.038 | 0.00041 | 0.95 |
| Residential PV (kW) | 0.020 | 0.00032 | 3.24 |
| Commercial PV (kW) | 0.023 | 0.00052 | 81 |

Source: Internal calculations. SHW: Solar hot water, PV: Photovoltaic

**Table 3: Fiscal impacts and investment performance of the solar tax credit**

| Solar system | State expenditure per system | State revenues | | | State IRR (%) | Break-even (years) |
|---|---|---|---|---|---|---|
| | | Revenues over life | Total per system or per kW | State revenues per $ credit | | |
| SHW (system) | $2,315 | $5,832 | | 2.52 | 9.9 | 9 |
| Residential PV (kW) | $10,150 | $20,010 | $3,797 | 1.97 | 5.4 | 15 |
| Commercial PV (kW) | $181,468 | $484,955 | $4,110 | 2.67 | 10.3 | 10 |

Source: Internal calculations. IRR: Internal rate of return, SHW: Solar hot water, PV: Photovoltaic

### 3.4. The Economic Performance of the Solar Tax Credit

Table 2 presents economic performance data of the solar tax credit. Of the various results presented in Table 2, a measure of potential interest to policy makers is the performance of the solar credit with respect to specific economic outcomes. These include the following.

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6    International Energy Agency PV Power Systems Programme, Methodology Guidelines on Life Cycle Assessment of PV Electricity, notes "The degradation of the modules results in a reduction of efficiency over the life time. The degradation rate recommended: For mature module technologies is 80% of the initial efficiency at the end of the 30 years lifetime. Assume linear degradation during these 30 years." Since the modules have 80% capacity remaining after 30-years they can remain in service or be sold for their salvage value. To account for this fact, the analysis makes no accounting of annual degradation to the modules. Consistent with this assumption, the analysis makes no accounting of module salvage value at the end of their assumed 30-year life.

- Solar tax credits stimulate additional sales in Hawai'i, spurred by money not sent out of the State to pay for imported fossil fuels. These additional in-State sales range from $34.69 for residential solar PV systems to $55.03 for commercial PV systems, for each dollar spent by the State on tax credits.
- Each dollar spent on tax credits also stimulates additional in-State labor income (i.e., earnings). These additional earnings range from $10.46 for residential solar PV systems to $16.82 for commercial PV systems, for each dollar spent by the State on tax credits.
- By sending less money out of the State to pay for oil, Hawai'i's economy can support more local jobs. For example, each commercial PV system analyzed generates 81 new full-time equivalent jobs over the life of the system.

A noteworthy result for Hawai'i's labor market, most particularly for the construction sector, is that for each solar system type

investigated, dollar credit expenditure leads to a dollar return with respect to labor income greater than the credit amount expended. The solar credit expenditure is generating more in labor income than its dollar cost.

## 3.5. Fiscal Impact and Investment Return to the State of the Solar Credit

Table 3 shows the fiscal impacts of the Hawai'i's solar tax credit and the performance of the credit when viewed as an investment by the State. The State receives full repayment of its solar credit investment in 9-15 years. This is due to the economic stimulative effects of solar systems substituting sunlight for imported fossil fuel, and the additional tax revenues earned by the State because money continues to cycle through Hawai'i's economy, rather than being sent out of the State to pay for imported fossil fuel.

- For each solar credit dollar spent, over the life of a solar system, the State receives $1.97 to $2.67 dollars in additional tax revenues.
- When viewed as an investment by the State, solar systems provide a internal rate of return (IRR) ranging from 5.4% to 10.3% over the system's life.

These results indicate that the solar credit, far from being an annual expenditure with no subsequent fiscal consequence, is more accurately viewed as an investment by the State yielding a significant positive return. That is, over the life of a solar system, the State gets back in revenues more than it spends in the form of solar credit refunds. This significant positive fiscal outcome, as well as the economic outcomes resulting from credit-stimulated solar system installations, is the result of solar systems substituting free local sunlight for imported fossil fuel for the entire life of each system. A solar system's life extends upwards of 30 years beyond the year the credit is taken by a solar system installer.

Notably, the fiscal results of the tax credit reported in Table 3 have been replicated at the national level. A study recently published by the US Partnership for Renewable Finance (USPRF, 2012) reported the following[7]:

- The federal solar tax credit can deliver a 10% IRR to taxpayers on the government's initial tax credit "investment" in residential and commercial solar systems. This result comports with the Hawai'i IRRs presented above (9.5% residential and 11.1% commercial).
- A $10,500 tax credit for a residential system can provide a $22,882 nominal benefit to the government over the life of the solar asset, and a $300,000 commercial solar credit can create a $677,627 nominal benefit in a similar time period. The ratio of tax dollars spent to tax revenue generated, based on USRPF's analysis, is approximately 2.2. This is similar to the Hawai'i ratio presented above (2.0-2.7). Hawai'i's payback ratio is more favorable due to Hawai'i's high-energy costs.
- The credit has encouraged a significant increase in job and installation growth in the U.S. solar industry. "Approximately 90% of the nearly 5,000 megawatts of solar capacity in the

U.S. today has been installed since the (federal tax credit) was increased at the beginning of 2006." Figure 1 presented above shows that solar tax credits have the same impact on solar installations in Hawai'i.

## 3.6. The Impact of Rising Oil Prices and Decreasing Solar Costs

The results presented in Tables 2 and 3 are based on the assumptions and parameters noted. Results would vary with changes in those underlying parameters. The impact of such changes is as follows:

### 3.6.1. Decreasing solar costs improve the performance of the tax credit

Historically, solar system cost changes have either moved with inflation or decreased with time. Since 2002, solar PV costs have decreased at an average annual rate of −4.62%. SHW system costs have increased at an average annual rate (3.83%)[8], paralleling the Honolulu consumer price index ("CPI") (3.34%) over the same time period. More recently (i.e., from 2008 to 2011), SHW system costs have decreased (−0.79%), lagging the Honolulu CPI (2.1%).

Decreasing costs mean lower dollar credit expenditure per installed kW. In 2001, the credit cost to install a solar PV system per kW was $5,150 (2012 dollars). Currently, the credit cost to stimulate the installation of a kW of solar PV system capacity for an equivalent-sized system is $1,348. In other words, in order to get the same benefit of renewable energy generating capacity per dollar of credit expenditure, it currently costs the State approximately 25% as much as 10 years ago due to decreasing solar system costs[9].

Solar system cost decreases are the result of the increased diffusion of this technology, which leads to technological advances as well as production efficiencies due to higher production levels. Hawai'i's historic progressive policy with respect to the credit has played a part in the diffusion of these technologies and their consequent cost decreases.

It appears unlikely that solar PV costs will continue to decline at the same rate as the recent historic past. A recent report[10] found that U.S. producers have been injured due to dumped and subsidized imports from China. If significant duties are ultimately imposed, U.S. production could become more competitive with imports, but this may also contribute to stalling the decline in solar PV costs[11]. Those trends could also be impacted by other Federal policies. Hawaii lawmakers cannot control these global forces

7    US Partnership for Renewable Finances, Paid in Full: An analysis of the Return to the Federal Taxpayer for Internal Revenue Code Section 48 Solar Energy Investment Tax Credit (July 12, 2012), Available from: http://www. uspref.org/images/docs/SC_ITC-Payback_July_12_2012.pdf.

8    Loudat, PhD, The Economic and Fiscal Impacts of the Hawaii Solar Water Heating Energy Conservation Credit, prepared for the Hawaii Energy Efficiency Policy Task Force (March 8, 2002).

9    The authors acknowledge that while rising oil prices and decreasing solar costs will improve the performance of the tax credit as described, such changes would likely simultaneously increase non-credit-driven solar uptake. Preliminary analyses performed as part of this research process indicate that while this is the case, the solar credit yet remains the most significant factor stimulating the uptake of solar systems.

10   Michaela D. Platzer, U.S. Solar PV Manufacturing: Industry Trends, Global Competition, Federal Support, Specialist in Industrial Organization and Business (June 13, 2012).

11   The 10/11/12 Honolulu Star Advertiser, page B5, reported "U.S. affirms steep tariffs on Chinese solar panels."

that may put an end to the solar PV decreasing cost trend. They can, however, positively react to this changing trend by instituting or maintaining policy measures to best achieve Hawaii's unique energy goals given its high dependence on imported fossil fuels for electricity generation.

### 3.6.2. Rising oil prices improve the performance of the tax credit

Oil price changes will significantly impact analysis results presented herein due to Hawai'i's continued significant dependence on imported oil for electricity generation. Oil price changes lead to changes in energy cost savings from a solar system, which directly impact the economic and fiscal performance of the solar tax credit. For example, with respect to the commercial solar PV system investigated, an increase in benchmark oil prices to their previous high of approximately $150 per barrel increases the State revenue per dollar credit from $2.67 to $3.19, a 20% increase. The State's return on investment increases from 10.3% to 13.2%. Conversely, lower benchmark oil prices would have the opposite effect.

The Hawai'i solar tax credit stimulates the installation of solar systems. These systems buffer the economic and fiscal impacts of any oil supply disruption. Supply disruptions can lead to abrupt and significant price changes to which Hawai'i is especially sensitive given its high dependence on imported oil. Other than as noted, this analysis makes no further accounting of the economic and fiscal benefit of the value of the solar credit mitigating negative impacts of oil supply disruptions.

### 3.6.3. Tax credit level changes and the effective credit level taken

A higher solar tax credit decreases the State's fiscal benefit for each system. However, a higher credit also increases the number of installed systems (Figure 1). This relationship is such that a higher solar credit would reduce average fiscal benefits on a per system basis, but increase the total fiscal benefit because of the installation of more systems. The reverse would also be true; a lower credit would increase fiscal benefits on a per system basis, but decrease the overall fiscal benefit because of the installation of fewer systems.

Solar tax credits stimulated 115,000 residential SHW system installations from 1977 through 2011[12]. The number of commercial SHW systems, both commercial and residential PV solar systems and other renewable energy systems is unknown. The most recent year for which data are available is 2005, with an average credit amount refunded of approximately $1,100 per residential system for individual solar and PV systems[13]. The average SHW system installation cost is approximately $6,500 for SHW systems. This solar credit cost data translates into an effective credit refund rate of 17%, or roughly half of the gross solar credit percentage of

35%[14]. If the analysis used the effective credit rate as opposed to the gross credit rate, fiscal results reported herein would be even more positive. In other words, fiscal results reported herein may be conservative and the true cost of the credit could be considerably less than reported[15].

### 3.6.4. Impact on utilities and the hypothetical "stranded" utility customer

The analysis does not measure any impact, positive or negative, on the local electric utilities or on ratepayers due to credit-induced solar installations. Reasons include:

- While a solar system user may purchase less electricity directly from the utility, that decrease may be offset by indirect purchases by solar system users of electricity required to produce the goods and services purchased with dollars that would otherwise have been exported from the State and from self-generated electricity savings.
- Some net-metered solar systems are oversized, producing more electricity than consumed by the user. This provides a direct subsidy to the utility and an indirect subsidy to ratepayers in the form of free electricity exported to the utility grid. While it is known that some installed solar systems are oversized, the extent and degree that this occurs is unknown.
- Without past as well as future solar system installations, electricity demand would have to be met by utility-generated electricity greater than what has occurred and what is expected to occur. If such an increased electricity demand could not be met by existing utility generating capacity, additional capacity would have to be added. Such an eventuality would spur the need to spend more money to operate, maintain, update, or install fossil generating units. It seems reasonable to posit that these costs would lead to ratepayer impacts. Any such costs have not been accounted for in this analysis.
- Negative economic and fiscal impacts due to reduced utility electricity sales caused by solar system are so insignificant that they can be ignored for this analysis.

Blue planet foundation has analyzed trends in recent solar installations. These trends show that residential households at all income levels increasingly utilize solar power. This suggests that it is incorrect to assume that solar installations by one subset of utility customers will detrimentally leave another subset of (non-solar) customers "stranded" on the utility grid without access to the benefits of solar power. In addition empirical data suggests that solar installations have not detrimentally impacted the utility.

## 3.7. Other Impacts of the Solar Tax Credit

The economic and fiscal impacts reported in this study are based on traditional measures of energy savings. But the solar systems stimulated by solar tax credits can also impact the economy in broader ways. This is highlighted by the USPRF report on federal tax credits wherein they note:

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12　DoT, Tax Credits Claimed by Hawaii Residents (various years), Available from: http://www.state.hi.us/tax/a5_4credits.htm; and HECO Demand Side Management Information System Reports.

13　DoT, Tax Credits Claimed by Hawai'i Taxpayers 2005 (December 2007), Available from: http://www.state.hi.us/tax/pubs/credits/2005credit.pdf.

14　This result may be due to the fact that not all credit claimants take the full credit amount because they lack sufficient tax liability or do not take the credit at all.

15　The Hawaii Counsel on Revenues (9/10/12) reported via a DBEDT study that estimated the solar tax credit amount for 2012 will be $174 million. Appendix 3 provides critical commentary about this estimate.

"Moreover, this fiscal return [on solar tax credits] is independent of, and additive to the numerous other benefits of solar projects, including job creation, energy independence, the preservation of natural resources and the health benefits of cleaner air"[16].

These beneficial impacts are even more critical in Hawai'i and include the following.

1. Each purchase or lease of a solar system represents a long-term private investment in Hawaii's energy infrastructure. These distributed generation assets benefit all Hawai'i ratepayers, by (i) potentially reducing day time peak demand, (ii) reducing the need to invest in new utility generating assets, and (iii) delivering power at (or near) the demand site, thus reducing transmission losses and relieving stress on grid infrastructure.

2. The fiscal benefits of solar tax credits are "particularly significant given the increasing popularity of lease and power purchase agreement (PPA) financing models in the solar industry"[17]. Around the country, and in Hawai'i, the PPA and lease models are accounting for the majority of new residential PV installations, allowing households at every income level to benefit from solar cost savings[18].

3. Every state tax credit is matched essentially 1:1 by the federal tax credit. That federal credit represents additional money flowing into, and cycling through, Hawai'i's economy. The inverse is also true; for every State tax credit not issued, Hawaii loses the benefit of that "matching" credit because the money flows out of the State in the form of Federal taxes.

4. Department of Business Economic Development & Tourism reports that the solar industry accounts for "15% of all construction expenditures in the State"[19]. A sudden elimination of the solar credit would likely burden the State and private sector with immediate and significant economic and fiscal costs associated with unemployment and other costs related to retraining displaced workers. Moreover, the solar industry is becoming a backbone of Hawai'i's broader energy service industry. This industry is a key player in developing and sustaining Hawai'i's technology sector.

5. Renewable energy systems reduce Hawai'i's emissions of greenhouse gases, mercury, and other pollutants from fossil fuel plants. These benefits extend to ratepayers in the form of reducing the utility's environmental compliance costs for fossil-fuel generation. The same benefits extend to the entire community in the form of reduced environmental impact.

6. Distributed solar enhances Hawai'i's energy security, by providing a hedge against volatile fossil fuel prices.

Intangible solar credit economic and fiscal impacts arise due to positive externalities (spillovers) from reduced oil consumption brought about by the credit. These are reduced air, land and water pollution and attendant problems including global warming and acid rain. If the cost of these negative consequences of burning

16   USPRF Federal Tax Credit Study, supra n. 5.
17   i.d.
18   i.d. (noting that "63% of California residential installations, and more than 80% of Colorado residential installations in the first quarter of 2012" were based on lease/PPA models).
19   DBEDT Energy Update (March 2012), Available from: http://energy. hawaii.gov/wp-content/uploads/2011/08/DBEDT-Energy-Update-Edition-2-March-2012.pdf.

fossil fuels were incorporated into the price of oil, the energy cost savings estimated in this analysis would be significantly larger. Those larger energy cost savings would further increase the beneficial economic and fiscal impacts of the solar credit.

## 4. CONCLUSION

Solar credit stimulated solar system purchases have positive economic and fiscal impacts to the State of Hawai'i when one analyzes the impacts of these systems over their entire life, not just the year of system installation when the credit is taken. Life cycle impacts are the following:

- Solar system use results in annual electricity cost savings of $554 per installed kW of solar PV systems and $1,018 on average for SHW systems. This annual savings persists for the system's life and is foregone by not installing a solar system. This annual electricity cost savings is the significant factor resulting in the positive economic and fiscal created by solar credit stimulated system installations.
- Average annual life cycle economic impacts of solar credit stimulated system installations include:
  - Labor income per dollar credit expended of:
    • 13.45 for the average SHW system
    • 10.46 per kW capacity for residential PV systems
    • 16.82 per kW capacity for commercial PV systems.
  - Jobs created over solar system's life of:
    • 0.95 for the average SHW system
    • 3.24 for a 5.27 kW residential PV system
    • 81 for a 118 kW commercial PV system.
- Fiscal impacts of solar credit stimulated system purchases are the following:
  - The State breaks even on the solar credit investment in:
    • 9 years for the average SHW system
    • 15 years for a 5.27 kW residential PV system
    • 10 years for a 118 kW commercial PV system.
  - A rate of return on the solar credit investment of:
    • 9.9% for the average SHW system
    • 5.4% for a 5.27 kW residential PV system
    • 10.3% for a 118 kW commercial PV system.
  - Total revenue generated per dollar credit expenditure over solar system's life of:
    • 2.52 for the average SHW system
    • 1.97 for a 5.27 kW residential PV system
    • 2.67 for a 118 kW commercial PV system.

These solar credit fiscal performance results comport with those from a national study. They also change with changes in: System costs improving with cost decreases and vice versa, oil price changes improving with oil price increases and vice versa, and credit level changes.

While the cost of the solar credit is tractable and a justifiable concern of policymakers, assessing this cost without consideration of the life cycle impacts of a solar system is a gross oversight. Policymakers and most particularly analysts advising these policymakers about the fiscal performance of the solar tax credit need to consider all economic and fiscal impacts of the credit, not just those occurring the year of installation. Not doing so results in

conclusions about the solar credit far removed from their economic and fiscal reality.

# REFERENCES

Hawaii Department of Business and Economic Development and Tourism. (2011), State of Hawaii Data Book. Available from: http://www.hawaii.gov/dbedt/info/economic/databook/db2011/.

Hawaii Department of Taxation, Tax Credits Claimed by Hawaii Taxpayers 2005. (2007), Available from: http://www.state.hi.us/tax/pubs/credits/2005credit.pdf.

Hawaiian Electric Company, Inc. Demand-Side Management Programs, Annual Program Modification and Evaluation (M&E) Report Filed Annually in November, Various Years (2007 to 2013).

Hawaiian Electric Industries, Inc. Earnings Reports (Various Years).

HECO. (2011), Annual NEM Reports 2011. New Delhi: Hawaii Electric Light Co., Maui Electric Co.

Loudat, T.A. (2002), PhD, The Economic and Fiscal Impacts of the Hawaii Solar Water Heating Energy Conservation Credit, Prepared for the Hawaii Energy Efficiency Policy Task Force.

State of Hawai'i Department of Business Economic Development & Tourism ("DBEDT"), 2007 Hawai'i Input-Output Model.

State of Hawaii Department of Taxation ("DoT"), Tax Credits Claimed by Hawaii Residents. Available from: http://www.state.hi.us/tax/a5_4credits.htm.

US Partnership for Renewable Finances, Paid in Full: An Analysis of the Return to the Federal Taxpayer for Internal Revenue Code Section 48 Solar Energy Investment Tax Credit (USPRF Federal Tax Credit Study) (July 12, 2012). Available from: http://www.uspref.org/images/docs/SC_ITC-Payback_July_12_2012.pdf.

# APPENDIX 1

**TABLE 1: ASSUMPTIONS FOR ESTIMATION OF FISCAL AND ECONOMIC IMPACTS**
**OF SOLAR CREDIT STIMULATED SOLAR HOT WATER SYSTEM PURCHASES**

| Descriptor | Derivative Value | Model Value | Source |
|---|---|---|---|
| ***System Variables*** | | | |
| *Assumed system life (years)* | | 25 | Hawaii Solar Industry Association |
| *Average System Cost* | $6,615 | $6,615 | HECO data, average of HECO, HELCO and MECO installed systems in 2010 |
| *Maintenance Costs* | | | |
| Year 5 - periodic maintenance | $306 | | O&M Schedule (12/12/01 Rolf Christ), current costs (Ron Richmond) |
| Year 12 - Pump Replacement | $273 | | O&M Schedule (12/12/01 Rolf Christ), current costs (Ron Richmond) |
| Year 15 - tank & controller replacement | $1,747 | | O&M Schedule (12/12/01 Rolf Christ), current costs (Ron Richmond) |
| Year 20 | $306 | | O&M Schedule (12/12/01 Rolf Christ), current costs (Ron Richmond) |
| *Purchase Costs over System Life* | | | |
| Equity % of purchase | 100% | 100% | assumed cash purchase |
| | | | |
| ***Average Annual GrossDollar Imported Oil Savings per Unit*** | | | |
| Retail price per kWh | $0.363 | | 4/13/12 Star-Advertiser, p. B3, average Hawaii electricty rate |
| Benchmark Price per Barrel Oil | $107.00 | | West Texas Intermediate Cost day of analysis |
| | | | HEI, Energy Tips & Choices, |
| Annual kWh savings per installed solar system | 2,808 | | http://www.heco.com/vcmcontent/StaticFiles/pdf/2010_HECO_ETC-web.pdf; pp. 77; assumes a family of four |
| Annual Savings | $1,018 | $1,018 | calculated |
| Savings at Alternative Benchmark Oil Price Levels | Estimated | % Change | |
| Bench mark $/barrel (for HECO $/barrel multiply by 1.27) | Oahu kWh | from Now | Savings |
| $59 | $0.2189 | -39.6% | $615 |
| $79 | $0.2669 | -26.4% | $749 |
| **$107** | $0.3625 | 0.0% | $1,018 |
| $118 | $0.3773 | 4.1% | $1,059 |
| $157 | $0.4373 | 20.6% | $1,228 |
| $200 | $0.5573 | 53.7% | $1,565 |
| | | | |
| ***Credit & Taxes*** | | | |
| *Effective Tax Credit with Cap* | 65% | 65% | calculated |
| Hawaii State tax credit on purchase w/o cap | 35% | 35% | State |
| Federal tax credit | 30% | 30% | Federal |
| Effective Federal tax credit | 30.0% | 30.0% | Mark Duda |
| State Credit Amount Cap | 5,000 | 5,000 | Mark Duda |
| per system | $5,000 | $5,000 | calculated |
| | | | |
| *Taxes* | | | |
| Taxes on Final Demand or Labor Income (Direct Effects) | | | |
| GET on Final Demand (% of final demand) | | 4.55% | DoT, 2009-2010 Annnual Report, based on p. 45 used to weight Oahu GET Rate (0.04712) and the neighbor islands (0.0416) |
| State Income Taxes on Labor Income | | 5.14% | DoT, HI Individual Income Patterns - 2005, Table A1 |
| Ratio of Corporate Income Tax to Labor Income Tax | | 3.87% | DoT Annual Report |
| Taxes on Induced and Indirect Output | | | |

Note: It is impossible to determine the mix of transactions from indirect and induced output effects from $1 of final demand. For example, for retail transactions the GET is 4%. If the transactions are at the intermediate or wholesale level, they are taxed at 0.5%. To account for such tax effects from induced and indirect sales (output), an aggregated approach is used. Specifically, it is estimated that general excise and income taxes on indirect and induced transactions from $1 of final demand are the % indicated of total indirect plus induced output

| | | | |
|---|---|---|---|
| Total Taxes as a % of Indirect & Induced Output | | 3.5% | calculated |
| Ratio of GSP to Output | 60.7% | | 2007 Hawaii State I/O model (value added ÷ interindustry output) |
| Total Taxes as a % of GSP | 5.85% | | DoT Annual Report |
| Tax on Income | | | |
| Individual | | | |
| State | | 5.14% | DoT, HI Individual Income Patterns - 2005, Table A1 |
| Federal | | 12.78% | http://www.irs.gov/pub/irs-soi/09in34tr.xls |
| Corporate | | | |
| State | | 6.01% | http://www6.hawaii.gov/tax/pubs/businc/02businc.pdf |
| Federal | | 23.80% | http://www.irs.gov/pub/irs-soi/08coccr.pdf |
| | | | |
| ***Multipliers (Type II)*** | | | |
| *on system installation and maintenance* | | | |
| output (sales) | | 2.17 | 2007 Hawaii State I/O model ($ economy output per $ construction final demand) |
| employment | | 13.86 | 2007 Hawaii State I/O model (jobs per million $ construction final demand) |
| labor income | | 0.65 | 2007 Hawaii State I/O model (earnings per $ construction final demand) |
| *from annual loan amortization* | | | |
| output (sales) | | 2.13 | 2007 HI I/O model ($ economy output per Credit intermediation and related activities final demand) |
| employment | | 14.51 | 2007 HII/O model (total jobs per million $ Credit intermediation and related activities final D) |
| labor income | | 0.539 | 2007 Hawaii State I/O model ($ labor income per Credit intermediation and related activities final D) |
| *from annual system savings* | | | weighted average across all personal consumption expenditure industries |
| output (sales) | | 2.05 | 2007 Hawaii State I/O model ($ output per $ final demand pers. Consump. |
| total jobs | | 20.42 | 2007 Hawaii State I/O model (total jobs per $ mil. final demand pers. Consump. |
| labor income | | 0.639 | 2007 Hawaii State I/O model ($ labor income per $ final demand pers. Consump. |
| *from State Expenditures* | | | |
| output (sales) | | 2.02 | 2007 HI I/O model ($ economy output per $ state & local gov. final demand) |
| total jobs | | 21.97 | 2007 HII/O model (total jobs per $ mil. Final demand state & local gov.) |
| labor income | | 0.894 | 2007 Hawaii State I/O model ($ labor per $ state & local gov. final demand) |
| | | | |
| system savings assumed to remain in-state | | 100% | assumed % of equity owned within State |

**TABLE 2: ASSUMPTIONS FOR ESTIMATION OF FISCAL AND ECONOMIC IMPACTS
OF SOLAR CREDIT STIMULATED RESIDENTIAL PV SYSTEM PURCHASES**

| Descriptor | Derivative Value | Model Value | Source |
|---|---|---|---|
| **_System Variables_** | | | |
| _Assumed system life (years)_ | | 30 | INTERNATIONAL ENERGY AGENCY PHOTOVOLTAIC POWER SYSTEMS PROGRAMME, Methodology Guidelines on Life Cycle Assessment of Photovoltaic Electricity, 10/01, posits 30 years for all system components except the inverter |
| _Estimated Annual kWh Output per Installed kW System_ | 1,528 | 1,528 | Calculated. Uses Sun zone estimate of 450 (DBEDT) and de-rating factor of .8. (Formula = (475/86)*kW*.8*365) |
| Days per Year | 365 | 365 | given |
| kW Size | 5.27 | 5.27 | |
| _Average Installed Cost (2012 $) per kW_ | $5,503 | $5,503 | calculated |
| Total system cost | $29,000 | $29,000 | Residential is mean from 2012 C&C building permit data. Commercial is calcualted from NEM size cap and cost/watt. |
| Delivered system capacity (kW) | 5.27 | 5.27 | given system capacity for specific cost |
| _Purchase Costs over System Life_ | | | |
| Equity % of purchase | 100% | 100% | assumed cash purchase |
| _Typical Annual Operations & Maintenance Cost per kW_ | | | |
| _Assumed Year Maintenance Required_ | 16 | 16 | assumed |
| Year 15 inverter replacement cost | | $3,915 | An inverter equipment cost is 13.5% of a solar PV system total equipment cost (Source:  actual system costs).  This percentage is multiplied by the total system cost to account for the inverter cost in year 15. The source for this requirement is the same noted for system life. |
| Analysis Value per kWh | $743 | | calculated (replacement cost/system size) |
| Notes | | | |
| The only other anticipated maintenance is to wash the panels if there has been no rain to maintain efficiency. | | | |
| **_Average Annual Gross Imported Oil Savings per Unit_** | | | |
| _Retail price per kWh_ | $0.363 | | 4/13/12 Star-Advertiser, p. B3, average Hawaii electricty rate |
| Note:  This per kWh cost corresponds to a per barrel of West Texas Intermediate cost of $100 to $110 per barrel. | | | |
| Benchmark Price per Barrel Oil | $107.00 | | West Texas Intermediate Cost day of analysis |
| Annual Savings | $554 | $554 | calculated |
| Savings at Alternative Oil Price Levels | Estimated | % Change | |
| $/barrel (for HECO cost multiply by 1.27) | Oahu kWh | from Now | Savings |
| $59 | $0.2189 | -39.6% | $334 |
| $79 | $0.2669 | -26.4% | $408 |
| **$107** | $0.3625 | 0.0% | $554 |
| $118 | $0.3773 | 4.1% | $576 |
| $157 | $0.4373 | 20.6% | $668 |
| $200 | $0.5573 | 53.7% | $852 |
| **_Credit & Taxes_** | | | |
| _Effective Tax Credit with Cap_ | 55% | 55% | calculated |
| Hawaii State tax credit on purchase w/o cap | 25% | 25% | State |
| Federal tax credit | 30% | 30% | Federal |
| Effective Federal tax credit | 30.0% | 30.0% | Mark Duda |
| State Credit Amount Cap | 5,000 | 5,000 | Mark Duda |
| per kW installed | $949 | $949 | calculated |
| _Taxes_ | | | |
| Taxes on Final Demand or Labor Income (Direct Effects) | | | |
| GET on Final Demand (% of final demand) | | 4.55% | DoT, 2009-2010 Annnual Report, based on p. 45 used to weight Oahu GET Rate (0.04712) and the neighbor islands (0.0416) |
| State Income Taxes on Labor Income | | 5.14% | DoT, HI Individual Income Patterns - 2005, Table A1 |
| Ratio of Corporate Income Tax to Labor Income Tax | | 3.87% | see Table _ |
| Taxes on Induced and Indirect Output | | | |
| Note:  It is impossible to determine the mix of transactions from indirect and induced output effects from $1 of final demand.  For example, for retail transactions the GET is 4%.  If the transactions are at the intermediate or wholesale level, they are taxed at 0.5%. To account for such tax effects from induced and indirect sales (output), an aggregated approach is used.  Specifically, it is estimated that general excise and income taxes on indirect and induced transactions from $1 of final demand are  the % indicated of total indirect plus induced output | | | |
| Total Taxes as a % of Indirect & Induced Output | | 3.5% | calculated |
| Ratio of GSP to Output | 60.7% | | 20072 Hawaii State I/O model (value added ÷ interindustry output) |
| Total Taxes as a % of GSP | 5.8% | | see Table _ |
| Tax on Income | | | |
| Individual | | | |
| State | | 5.14% | DoT, HI Individual Income Patterns - 2005, Table A1 |
| Federal | | 12.78% | http://www.irs.gov/pub/irs-soi/09in34tr.xls |
| Corporate | | | |
| State | | 6.01% | http://www6.hawaii.gov/tax/pubs/businc/02businc.pdf |
| Federal | | 23.80% | http://www.irs.gov/pub/irs-soi/08coccr.pdf |
| **_Multipliers (Type II)_** | | | |
| _on system installation and maintenance_ | | | |
| output (sales) | | 2.17 | 2007 Hawaii State I/O model ($ economy output per $ construction final demand) |
| employment | | 13.90 | 2007 Hawaii State I/O model (jobs per million $ construction final demand) |
| labor income | | 0.65 | 2007 Hawaii State I/O model (earnings per $ construction final demand) |
| _from annual loan amortization_ | | | |
| output (sales) | | 2.13 | 2007 HI I/O model ($ economy output per Credit intermediation and related activities final demand) |
| employment | | 14.51 | 2007 HII/O model (total jobs per million $ Credit intermediation and related activities final D) |
| labor income | | 0.539 | 2007 Hawaii State I/O model ($ labor income per Credit intermediation and related activities final D) |
| _from annual system savings_ | | | weighted average across all personal consumption expenditure industries |
| output (sales) | | 2.05 | 2007 Hawaii State I/O model ($ output per $ final demand pers. Consump. |
| total jobs | | 20.42 | 2007 Hawaii State I/O model (total jobs per $ mil. final demand pers. Consump. |
| labor income | | 0.639 | 2007 Hawaii State I/O model ($ labor income per $ final demand pers. Consump. |
| _from State Expenditures_ | | | |
| output (sales) | | 2.02 | 2007 HI I/O model ($ economy output per $ state & local gov. final demand) |
| total jobs | | 21.97 | 2007 HII/O model (total jobs per $ mil. Final demand state & local gov.) |
| labor income | | 0.894 | 2007 Hawaii State I/O model ($ labor per $ state & local gov. final demand) |
| system savings assumed to remain in-state | | 100% | assumed % of equity owned within State |

**TABLE 3: ASSUMPTIONS FOR ESTIMATION OF FISCAL AND ECONOMIC IMPACTS
OF SOLAR CREDIT STIMULATED COMMERCIAL PV SYSTEM PURCHASES**

| Descriptor | Derivative Value | Model Value | Source |
|---|---|---|---|
| **_System Variables_** | | | |
| | | | INTERNATIONAL ENERGY AGENCY PHOTOVOLTAIC POWER SYSTEMS |
| | | | PROGRAMME, Methodology Guidelines on Life Cycle Assessment of Photovoltaic |
| _Assumed system life (years)_ | | 30 | Electricity, 10/01, posits 30 years for all system components except the inverter |
| _Estimated Annual kWh Output per Installed kW System_ | 1,528 | 1,528 | Calculated. Uses Sun zone estimate of 450 (DBEDT) and de-rating factor of .8. (Formula = (475/86)*kW*.8*365) |
| kW Size | 118 | 118 | |
| _Average Installed Cost (2001 $) per kW_ | $3,750 | $3,750 | calculated |
| Total system cost | $442,500 | $442,500 | Residential is mean from 2012 C&C building permit data. Commercial is calcualted from NEM size cap and cost/watt. |
| Delivered system capacity (kW) | 118 | 118 | given system capacity for specific cost |
| _Purchase Costs over System Life_ | | | |
| _Typical Annual Operations & Maintenance Cost per kW_ | | | |
| _Assumed Year Maintenance Required_ | 16 | 16 | assumed |
| Inverter at Mid-Point of System Life | $33,000 | $33,000 | Mark Duda (Estimated cost to contractor without margin.) |
| Cost per kW | $280 | $280 | calculated |
| Analysis Value | $280 | | model calculator |
| Notes | | | |
| The only other anticipated maintenance is to wash the panels if there has been no rain to maintenance efficiency. | | | |
| **_Average Annual Gross Imported Oil Savings per Unit_** | | | |
| _Retail price per kWh_ | $0.363 | | 4/13/12 Star-Advertiser, p. B3, average Hawaii electricty rate |
| Note: This per kWh cost corresponds to a per barrel of West Texas Intermediate cost of $100 to $110 per barrel. | | | |
| Benchmark Price per Barrel Oil | $107.00 | | West Texas Intermediate Cost day of analysis |
| Sensitivity Chanage Variable ($/bbl) | | | 34.81 |
| Annual Savings | $554 | $554 | calculated |
| Savings at Alternative Benchmark Oil Price Levels | Estimated | % Change | |
| $/barrel (for corresponding HECO cost multiply by 1.27) | Oahu kWh | from Now | Savings |
| $59 | $0.2189 | -39.6% | $334 |
| $79 | $0.2669 | -26.4% | $408 |
| **$107** | $0.3625 | 0.0% | $554 |
| $118 | $0.3773 | 4.1% | $576 |
| $157 | $0.4373 | 20.6% | $668 |
| $200 | $0.5573 | 53.7% | $852 |
| **_Credit & Taxes_** | | | |
| _Effective Tax Credit with Cap_ | 65% | 65% | calculated |
| Hawaii State tax credit on purchase w/o cap | 35% | 35% | State |
| Federal tax credit | 30% | 30% | Federal |
| Effective Federal tax credit | 30.0% | 30.0% | Mark Duda |
| State Credit Amount Cap | 500,000 | 500,000 | Mark Duda |
| per kW installed | $4,237 | $4,237 | calculated |
| _Taxes_ | | | |
| Taxes on Final Demand or Labor Income (Direct Effects) | | | |
| | | | DoT, 2009-2010 Annnual Report, based on p. 45 used to weight Oahu GET Rate (0.04712) and the |
| GET on Final Demand (% of final demand) | | 4.55% | neighbor islands (0.0416) |
| State Income Taxes on Labor Income | | 5.14% | DoT, HI Individual Income Patterns - 2005, Table A1 |
| Ratio of Corporate Income Tax to Labor Income Tax | | 3.87% | see Table |
| Taxes on Induced and Indirect Output | | | |
| Note: It is impossible to determine the mix of transactions from indirect and induced output effects from $1 of final demand. For example, for retail transactions | | | |
| the GET is 4%. If the transactions are at the intermediate or wholesale level, they are taxed at 0.5%. To account for such tax effects from induced and | | | |
| indirect sales (output), an aggregated approach is used. Specifically, it is estimated that general excise and income taxes on indirect and induced transactions from | | | |
| $1 of final demand are the % indicated of total indirect plus induced output | | | |
| Total Taxes as a % of Indirect & Induced Output | | 3.5% | calculated |
| Ratio of GSP to Output | 60.7% | | 20072 Hawaii State I/O model (value added ÷ interindustry output) |
| Total Taxes as a % of GSP | 5.8% | | see Table |
| Tax on Income | | | |
| Individual | | | |
| State | | 5.14% | DoT, HI Individual Income Patterns - 2005, Table A1 |
| Federal | | 12.78% | http://www.irs.gov/pub/irs-soi/09in34tr.xls |
| Corporate | | | |
| State | | 6.01% | http://www6.hawaii.gov/tax/pubs/businc/02businc.pdf |
| Federal | | 23.80% | http://www.irs.gov/pub/irs-soi/08coccr.pdf |
| **_Multipliers (Type II)_** | | | |
| _on system installation and maintenance_ | | | |
| output (sales) | | 2.17 | 2007 Hawaii State I/O model ($ economy output per $ construction final demand) |
| employment | | 13.9 | 2007 Hawaii State I/O model (jobs per million $ construction final demand) |
| labor income | | 0.65 | 2007 Hawaii State I/O model (earnings per $ construction final demand) |
| _from annual loan amortization_ | | | |
| output (sales) | | 2.13 | 2007 HI I/O model ($ economy output per Credit intermediation and related activities final demand) |
| employment | | 14.51 | 2007 HII/O model (total jobs per million $ Credit intermediation and related activities final D) |
| labor income | | 0.539 | 2007 Hawaii State I/O model ($ labor income per Credit intermediation and related activities final D) |
| _from annual system savings_ | | | weighted average across all personal consumption expenditure industries |
| output (sales) | | 2.05 | 2007 Hawaii State I/O model ($ output per $ final demand pers. Consump. |
| total jobs | | 20.42 | 2007 Hawaii State I/O model (total jobs per $ mil. final demand pers. Consump. |
| labor income | | 0.639 | 2007 Hawaii State I/O model ($ labor income per $ final demand pers. Consump. |
| _from State Expenditures_ | | | |
| output (sales) | | 2.02 | 2007 HI I/O model ($ economy output per $ state & local gov. final demand) |
| total jobs | | 21.97 | 2007 HII/O model (total jobs per $ mil. Final demand state & local gov.) |
| labor income | | 0.894 | 2007 Hawaii State I/O model ($ labor per $ state & local gov. final demand) |
| system savings assumed to remain in-state | | 100% | assumed % of equity owned within State |

**Table 4 Worksheet Showing Cost & Multiplier Accounting for Solar Credit Stimulated Residential SHW System Purchases (per system)**

| | | | | | | | | | | | | | Year and Period Number | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
| Item | Install | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| **PV Purchaser Account** | | | | | | | | | | | | | | | |
| *Costs* | | | | | | | | | | | | | | | |
| System cash purchase | $6,615 | | | | | | | | | | | | | | |
| Amortization costs (cost borrowed) | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| interest payment | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| principal payment | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Annual system maintenance costs | | $0.0 | $0.0 | $0.0 | $0.0 | $305.5 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $273.3 | $0 | $0.0 |
| Annual Costs | $6,615 | $0 | $0 | $0 | $0 | $306 | $0 | $0 | $0 | $0 | $0 | $0 | $273 | $0 | $0 |
| *Benefits* | | | | | | | | | | | | | | | |
| ECITC Refund | $2,315 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Federal Tax Credit | $1,985 | $0 | $0 | $0 | $0 | $92 | $0 | $0 | $0 | $0 | $0 | $0 | $82 | $0 | $0 |
| System Depreciation | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Depreciation & and Interest Tax Deductions | | | | | | | | | | | | | | | |
| State | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Federal | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Annual cost savings | | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 |
| Annual Benefits | $4,300 | $1,018 | $1,018 | $1,018 | $1,018 | $1,110 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $1,100 | $1,018 | $1,018 |
| | | | | | | | | | | | | | | | |
| BENEFITS - COSTS | ($2,315) | $1,018 | $1,018 | $1,018 | $1,018 | $804 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $827 | $1,018 | $1,018 |
| (assumed spent on personal consumption expenditures) | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| **Multiplier Effects of Expenditure** | | | | | | | | | | | | | | | |
| *System Purchase Cost & Maintenance Effects* | | | | | | | | | | | | | | | |
| Final Demand | $6,615 | $0 | $0 | $0 | $0 | $306 | $0 | $0 | $0 | $0 | $0 | $0 | $273 | $0 | $0 |
| Multiplier Effects | | | | | | | | | | | | | | | |
| Indirect & Induced Output | $7,755 | $0 | $0 | $0 | $0 | $358 | $0 | $0 | $0 | $0 | $0 | $0 | $320 | $0 | $0 |
| Labor | 0.092 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0042 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0038 | 0.0000 | 0.0000 |
| Labor income | $4,278 | $0 | $0 | $0 | $0 | $198 | $0 | $0 | $0 | $0 | $0 | $0 | $177 | $0 | $0 |
| *Due to User Benefits - Costs* | | | | | | | | | | | | | | | |
| % of Benefits Staying In-State | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Final Demand | ($2,315) | $1,018 | $1,018 | $1,018 | $1,018 | $804 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $827 | $1,018 | $1,018 |
| Multiplier Effects | | | | | | | | | | | | | | | |
| Indirect & Induced Output | ($2,427) | $1,067 | $1,067 | $1,067 | $1,067 | $843 | $1,067 | $1,067 | $1,067 | $1,067 | $1,067 | $1,067 | $866 | $1,067 | $1,067 |
| Labor | (0.047) | 0.021 | 0.021 | 0.021 | 0.021 | 0.016 | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 | 0.017 | 0.021 | 0.021 |
| Labor income | ($1,480) | $651 | $651 | $651 | $651 | $514 | $651 | $651 | $651 | $651 | $651 | $651 | $528 | $651 | $651 |
| *Foregone to State* | | | | | | | | | | | | | | | |
| Final Demand | ($2,315) | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Multiplier Effects | | | | | | | | | | | | | | | |
| Indirect & Induced Output | ($2,357) | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Labor | (0.05) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Labor income | ($2,070) | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| *TOTAL MULTIPLIER EFFECTS* | | | | | | | | | | | | | | | |
| Final Demand | $1,985 | $1,018 | $1,018 | $1,018 | $1,018 | $1,110 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $1,100 | $1,018 | $1,018 |
| Multiplier Effects | | | | | | | | | | | | | | | |
| Indirect & Induced Output | $2,971 | $1,067 | $1,067 | $1,067 | $1,067 | $1,201 | $1,067 | $1,067 | $1,067 | $1,067 | $1,067 | $1,067 | $1,187 | $1,067 | $1,067 |
| Labor | (0.006) | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 |
| Labor income | $727 | $651 | $651 | $651 | $651 | $712 | $651 | $651 | $651 | $651 | $651 | $651 | $705 | $651 | $651 |
| | | | | | | | | | | | | | | | |
| **State Fiscal Account** | | | | | | | | | | | | | | | |
| *Costs* | | | | | | | | | | | | | | | |
| State interest + depreciation deduction refund | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| ECITC cost | $2,315 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| TOTAL COST | $2,315 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| *Revenues* | | | | | | | | | | | | | | | |
| Taxes on Final Demand & Labor Income | | | | | | | | | | | | | | | |
| GET (% of GSP) | $90 | $46 | $46 | $46 | $46 | $50 | $46 | $46 | $46 | $46 | $46 | $46 | $50 | $46 | $46 |
| Individual income (x labor income) | $37 | 33.43 | 33.43 | 33.43 | 33.43 | 36.55 | 33.43 | 33.4 | 33.4 | 33.4 | 33.4 | 33.4 | 36.2 | 33.4 | 33.4 |
| Corporate income (% of GSP) | $1 | 1.29 | 1.29 | 1.29 | 1.29 | 1.42 | 1.29 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.4 | 1.3 | 1.3 |
| Taxes on Indirect & Induced Output | $105 | 37.84 | 37.84 | 37.84 | 37.84 | 42.60 | 37.84 | 37.8 | 37.8 | 37.8 | 37.8 | 37.8 | 42.1 | 37.8 | 37.8 |
| TOTAL BENEFIT | $234 | 118.85 | 118.85 | 118.85 | 118.85 | 131.02 | 118.85 | 118.8 | 118.8 | 118.8 | 118.8 | 118.8 | 129.7 | 118.8 | 118.8 |
| | | | | | | | | | | | | | | | |
| NET BENEFIT TO STATE GOVERNMENT | ($2,081) | $119 | $119 | $119 | $119 | $131 | $119 | $119 | $119 | $119 | $119 | $119 | $130 | $119 | $119 |

**Table 4 Worksheet Showing Cost & Multiplier Accounting for Solar Credit Stimulated Residential SHW System Purchases (per system)**

| Year and Period Number / Item | 2015 15 | 2016 16 | 2017 17 | 2018 18 | 2019 19 | 2020 20 | 2021 21 | 2022 22 | 2023 23 | 2024 24 | 2025 25 | TOTALS | Present Value @ Discount 0.0% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PV Purchaser Account** | | | | | | | | | | | | | |
| *Costs* | | | | | | | | | | | | | |
| System cash purchase | | | | | | | | | | | | | |
| Amortization costs (cost borrowed) | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| interest payment | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| principal payment | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Annual system maintenance costs | $1,747 | $0.0 | $0.0 | $0.0 | $0.0 | $305.5 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $2,631 | $2,631 |
| Annual Costs | $1,747 | $0 | $0 | $0 | $0 | $306 | $0 | $0 | $0 | $0 | $0 | $9,246 | $9,246 |
| *Benefits* | | | | | | | | | | | | | |
| ECITC Refund | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $2,315 | $2,315 |
| Federal Tax Credit | $524 | $0 | $0 | $0 | $0 | $92 | $0 | $0 | $0 | $0 | $0 | $2,774 | $2,774 |
| System Depreciation | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Depreciation & and Interest Tax Deductions | | | | | | | | | | | | | |
| State | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Federal | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Annual cost savings | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $25,448 | $25,448 |
| Annual Benefits | $1,542 | $1,018 | $1,018 | $1,018 | $1,018 | $1,110 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $30,537 | $30,537 |
| *BENEFITS - COSTS* (assumed spent on personal consumption expenditures) | ($205) | $1,018 | $1,018 | $1,018 | $1,018 | $804 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $21,291 | $21,291 |
| **Multiplier Effects of Expenditure** | | | | | | | | | | | | | |
| *System Purchase Cost & Maintenance Effects* | | | | | | | | | | | | | |
| Final Demand | $1,747 | $0 | $0 | $0 | $0 | $306 | $0 | $0 | $0 | $0 | $0 | | |
| Multiplier Effects | | | | | | | | | | | | | |
| Indirect & Induced Output | $2,048 | $0 | $0 | $0 | $0 | $358 | $0 | $0 | $0 | $0 | $0 | $10,840 | $10,840 |
| Labor | 0.0242 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0042 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.128 | |
| Labor income | $1,130 | $0 | $0 | $0 | $0 | $198 | $0 | $0 | $0 | $0 | $0 | $5,979 | $5,979 |
| *Due to User Benefits - Costs* | | | | | | | | | | | | | |
| % of Benefits Staying In-State | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | | |
| Final Demand | ($205) | $1,018 | $1,018 | $1,018 | $1,018 | $804 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $21,291 | $21,291 |
| Multiplier Effects | | | | | | | | | | | | | |
| Indirect & Induced Output | ($215) | $1,067 | $1,067 | $1,067 | $1,067 | $843 | $1,067 | $1,067 | $1,067 | $1,067 | $1,067 | $22,314 | $22,314 |
| Labor | (0.004) | 0.021 | 0.021 | 0.021 | 0.021 | 0.016 | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 | 0.435 | |
| Labor income | ($131) | $651 | $651 | $651 | $651 | $514 | $651 | $651 | $651 | $651 | $651 | $13,611 | $13,611 |
| *Foregone to State* | | | | | | | | | | | | | |
| Final Demand | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | ($2,315) | ($2,315) |
| Multiplier Effects | | | | | | | | | | | | | |
| Indirect & Induced Output | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | ($2,357) | ($2,357) |
| Labor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (0.051) | |
| Labor income | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | ($2,070) | ($2,070) |
| *TOTAL MULTIPLIER EFFECTS* | | | | | | | | | | | | | |
| Final Demand | $1,542 | $1,018 | $1,018 | $1,018 | $1,018 | $1,110 | $1,018 | $1,018 | $1,018 | $1,018 | $1,018 | $28,221 | $28,221 |
| Multiplier Effects | | | | | | | | | | | | | |
| Indirect & Induced Output | $1,833 | $1,067 | $1,067 | $1,067 | $1,067 | $1,201 | $1,067 | $1,067 | $1,067 | $1,067 | $1,067 | $30,796 | $30,796 |
| Labor | 0.020 | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 | 0.021 | 0.512 | |
| Labor income | $999 | $651 | $651 | $651 | $651 | $712 | $651 | $651 | $651 | $651 | $651 | $17,520 | $17,520 |
| **State Fiscal Account** | | | | | | | | | | | | | |
| *Costs* | | | | | | | | | | | | | |
| State interest + depreciation deduction refund | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| ECITC cost | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $2,315 | $2,315 |
| TOTAL COST | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $2,315 | $2,315 |
| *Revenues* | | | | | | | | | | | | | |
| Taxes on Final Demand & Labor Income | | | | | | | | | | | | | |
| GET (% of GSP) | $70 | $46 | $46 | $46 | $46 | $50 | $46 | $46 | $46 | $46 | $46 | $1,283 | $1,283 |
| Individual income (x labor income) | 51.3 | $33.43 | $33.43 | $33.43 | $33.43 | $36.55 | $33.43 | $33.43 | $33.43 | $33.43 | $33.43 | $900 | $900 |
| Corporate income (% of GSP) | 2.0 | $1.29 | $1.29 | $1.29 | $1.29 | $1.42 | $1.29 | $1.29 | $1.29 | $1.29 | $1.29 | $35 | $35 |
| Taxes on Indirect & Induced Output | 65.0 | $37.84 | $37.84 | $37.84 | $37.84 | $42.60 | $37.84 | $37.84 | $37.84 | $37.84 | $37.84 | $1,092 | $1,092 |
| TOTAL BENEFIT | 188.4 | $119 | $119 | $119 | $119 | $131 | $119 | $119 | $119 | $119 | $119 | $3,310 | $3,310 |
| *NET BENEFIT TO STATE GOVERNMENT* | $188 | $119 | $119 | $119 | $119 | $131 | $119 | $119 | $119 | $119 | $119 | $995 | $995 |

**Table 5: Worksheet Showing Cost & Multiplier Accounting for Fiscal and Economic Impacts Foregone Due to SHW SystemPurchases**

| Item | Install | 2001 / 1 | 2002 / 2 | 2003 / 3 | 2004 / 4 | 2005 / 5 | 2006 / 6 | 2007 / 7 | 2008 / 8 | 2009 / 9 | 2010 / 10 | 2011 / 11 | 2012 / 12 | 2013 / 13 | 2014 / 14 | 2015 / 15 | 2016 / 16 | 2017 / 17 | 2018 / 18 | 2019 / 19 | 2020 / 20 | 2021 / 21 | 2022 / 22 | 2023 / 23 | 2024 / 24 | 2025 / 25 | TOTALS | Present Value @ Discount 0.0% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Purchaser Account** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *BENEFITS - COSTS* (assumed spent on personal consumption expenditures) | $2,315 | ($1,018) | ($1,018) | ($1,018) | ($1,018) | ($804) | ($1,018) | ($1,018) | ($1,018) | ($1,018) | ($1,018) | ($1,018) | ($827) | ($1,018) | ($1,018) | $205 | ($1,018) | ($1,018) | ($1,018) | ($1,018) | ($804) | ($1,018) | ($1,018) | ($1,018) | ($1,018) | ($1,018) | ($21,291) | ($21,291) |
| **Multiplier Effects of Expenditure** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Due to User Benefits - Costs* | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| % of Benefits Staying In-State | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | | |
| Final Demand | $2,315 | ($1,018) | ($1,018) | ($1,018) | ($1,018) | ($804) | ($1,018) | ($1,018) | ($1,018) | ($1,018) | ($1,018) | ($1,018) | ($827) | ($1,018) | ($1,018) | $205 | ($1,018) | ($1,018) | ($1,018) | ($1,018) | ($804) | ($1,018) | ($1,018) | ($1,018) | ($1,018) | ($1,018) | ($21,291) | ($21,291) |
| Multiplier Effects | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Indirect & Induced Output | $2,427 | ($1,067) | ($1,067) | ($1,067) | ($1,067) | ($843) | ($1,067) | ($1,067) | ($1,067) | ($1,067) | ($1,067) | ($1,067) | ($866) | ($1,067) | ($1,067) | $215 | ($1,067) | ($1,067) | ($1,067) | ($1,067) | ($843) | ($1,067) | ($1,067) | ($1,067) | ($1,067) | ($1,067) | ($22,314) | ($22,314) |
| Labor | 0.047 | (0.021) | (0.021) | (0.021) | (0.021) | (0.016) | (0.021) | (0.021) | (0.021) | (0.021) | (0.021) | (0.021) | (0.017) | (0.021) | (0.021) | 0.004 | (0.021) | (0.021) | (0.021) | (0.021) | (0.016) | (0.021) | (0.021) | (0.021) | (0.021) | (0.021) | (0.435) | |
| Labor income | $1,480 | ($651) | ($651) | ($651) | ($651) | ($514) | ($651) | ($651) | ($651) | ($651) | ($651) | ($651) | ($528) | ($651) | ($651) | $131 | ($651) | ($651) | ($651) | ($651) | ($514) | ($651) | ($651) | ($651) | ($651) | ($651) | ($13,611) | ($13,611) |
| *TOTAL MULTIPLIER EFFECTS* | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Final Demand | 2,315 | (1,018) | (1,018) | (1,018) | (1,018) | 804 | (1,018) | (1,018) | (1,018) | (1,018) | (1,018) | (1,018) | 827 | (1,018) | (1,018) | 205 | (1,018) | (1,018) | (1,018) | (1,018) | 804 | (1,018) | (1,018) | (1,018) | (1,018) | (1,018) | (21,291) | (21,291) |
| Multiplier Effects | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Indirect & Induced Output | 2,427 | (1,067) | (1,067) | (1,067) | (1,067) | 843 | (1,067) | (1,067) | (1,067) | (1,067) | (1,067) | (1,067) | 866 | (1,067) | (1,067) | 215 | (1,067) | (1,067) | (1,067) | (1,067) | 843 | (1,067) | (1,067) | (1,067) | (1,067) | (1,067) | (22,314) | (22,314) |
| Labor | 0.04728 | (0.021) | (0.021) | (0.021) | (0.021) | 0.016 | (0.021) | (0.021) | (0.021) | (0.021) | (0.021) | (0.021) | 0.017 | (0.021) | (0.021) | 0.004 | (0.021) | (0.021) | (0.021) | (0.021) | (0.016) | (0.021) | (0.021) | (0.021) | (0.021) | (0.021) | (0.435) | |
| Labor income | 1,480 | (651) | (651) | (651) | (651) | 514 | (651) | (651) | (651) | (651) | (651) | (651) | 528 | (651) | (651) | 131 | (651) | (651) | (651) | (651) | 514 | (651) | (651) | (651) | (651) | (651) | (13,611) | (13,611) |
| **State Fiscal Account** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Revenues* | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Taxes on Final Demand & Labor Income | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GET (% of GSP) | 105 | (46) | (46) | (46) | (46) | (37) | (46) | (46) | (46) | (46) | (46) | (46) | (38) | (46) | (46) | 9 | (46) | (46) | (46) | (46) | (37) | (46) | (46) | (46) | (46) | (46) | (968) | (968) |
| Individual income (x labor income) | 76 | (33) | (33) | (33) | (33) | (26) | (33) | (33) | (33) | (33) | (33) | (33) | (27) | (33) | (33) | 7 | (33) | (33) | (33) | (33) | (26) | (33) | (33) | (33) | (33) | (33) | (699) | (699) |
| Corporate income (% of GSP) | 3 | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | 0 | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (27) | (27) |
| Lease Rents | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Taxes on Indirect & Induced Output | 86 | (38) | (38) | (38) | (38) | (30) | (38) | (38) | (38) | (38) | (38) | (38) | (31) | (38) | (38) | 8 | (38) | (38) | (38) | (38) | (30) | (38) | (38) | (38) | (38) | (38) | | |
| TOTAL BENEFIT | 270 | (119) | (119) | (119) | (119) | (94) | (119) | (119) | (119) | (119) | (119) | (119) | (97) | (119) | (119) | 24 | (119) | (119) | (119) | (119) | (94) | (119) | (119) | (119) | (119) | (119) | (2,486) | (2,486) |
| *NET BENEFIT TO STATE GOVERNMENT* | $270 | ($119) | ($119) | ($119) | ($119) | ($94) | ($119) | ($119) | ($119) | ($119) | ($119) | ($119) | ($97) | ($119) | ($119) | $24 | ($119) | ($119) | ($119) | ($119) | ($94) | ($119) | ($119) | ($119) | ($119) | ($119) | ($2,486) | ($2,486) |

**TABLE 6: NET ECONOMIC AND FISCAL IMPACT STIMULATED BY THE SOLAR CREDIT PER SHW SYSTEM**

| Item | Install | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | Period Number 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Net Benefits*** | | | | | | | | | | | | | | |
| PV System Purchaser | ($4,631) | $2,036 | $2,036 | $2,036 | $2,036 | $1,608 | $2,036 | $2,036 | $2,036 | $2,036 | $2,036 | $2,036 | $1,653 | $2,036 |
| State Fiscal Account | ($2,351) | $238 | $238 | $238 | $238 | $225 | $238 | $238 | $238 | $238 | $238 | $238 | $226 | $238 |
| ***Net Economic Impacts*** | | | | | | | | | | | | | | |
| Final Demand | ($331) | $2,036 | $2,036 | $2,036 | $2,036 | $1,914 | $2,036 | $2,036 | $2,036 | $2,036 | $2,036 | $2,036 | $1,926 | $2,036 |
| Multiplier Effects | | | | | | | | | | | | | | |
| Indirect & Induced Output | $545 | $2,134 | $2,134 | $2,134 | $2,134 | $2,044 | $2,134 | $2,134 | $2,134 | $2,134 | $2,134 | $2,134 | $2,053 | $2,134 |
| Employment | (0.0537) | 0.0416 | 0.0416 | 0.0416 | 0.0416 | 0.0371 | 0.0416 | 0.0416 | 0.0416 | 0.0416 | 0.0416 | 0.0416 | 0.0375 | 0.0416 |
| Labor Income | ($753) | $1,302 | $1,302 | $1,302 | $1,302 | $1,226 | $1,302 | $1,302 | $1,302 | $1,302 | $1,302 | $1,302 | $1,234 | $1,302 |

**TABLE 6: NET ECONOMIC AND FISCAL IMPACT STIMULATED BY THE SOLAR CREDIT PER SHW SYSTEM**

| Item | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | Period Number TOTALS | Present Value @ Discount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | 0.0% |
| ***Net Benefits*** | | | | | | | | | | | | | | |
| PV System Purchaser | $2,036 | ($410) | $2,036 | $2,036 | $2,036 | $2,036 | $1,608 | $2,036 | $2,036 | $2,036 | $2,036 | $2,036 | $42,581 | $42,581 |
| State Fiscal Account | $238 | $165 | $238 | $238 | $238 | $238 | $225 | $238 | $238 | $238 | $238 | $238 | $3,481 | $3,481 |
| ***Net Economic Impacts*** | | | | | | | | | | | | | | |
| Final Demand | $2,036 | $1,337 | $2,036 | $2,036 | $2,036 | $2,036 | $1,914 | $2,036 | $2,036 | $2,036 | $2,036 | $2,036 | $49,512 | $49,512 |
| Multiplier Effects | | | | | | | | | | | | | | |
| Indirect & Induced Output | $2,134 | $1,619 | $2,134 | $2,134 | $2,134 | $2,134 | $2,044 | $2,134 | $2,134 | $2,134 | $2,134 | $2,134 | $53,110 | $53,110 |
| Employment | 0.0416 | 0.0159 | 0.0416 | 0.0416 | 0.0416 | 0.0416 | 0.0371 | 0.0416 | 0.0416 | 0.0416 | 0.0416 | 0.0416 | 0.9468 | |
| Labor Income | $1,302 | $868 | $1,302 | $1,302 | $1,302 | $1,302 | $1,226 | $1,302 | $1,302 | $1,302 | $1,302 | $1,302 | $31,131 | $31,131 |

**Table 7: Worksheet Showing Cost & Multiplier Accounting for Solar Credit Stimulated Residential PV System Purchases (per installed kW)**

| Item | Install | 2001 1 | 2002 2 | 2003 3 | 2004 4 | 2005 5 | 2006 6 | 2007 7 | 2008 8 | 2009 9 | 2010 10 | 2011 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PV Purchaser Account** | | | | | | | | | | | | |
| *Costs* | | | | | | | | | | | | |
| System cash purchase | $5,503 | | | | | | | | | | | |
| Amortization costs (cost borrowed) | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| interest payment | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| principal payment | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Annual system maintenance costs | | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 |
| Annual Costs | $5,503 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| *Benefits* | | | | | | | | | | | | |
| ECITC Refund | $1,926 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Federal Tax Credit | π | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| System Depreciation | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Depreciation & and Interest Tax Deductions | | | | | | | | | | | | |
| State | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Federal | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Annual cost savings | | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 |
| Annual Benefits | $1,926 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 |
| | | | | | | | | | | | | |
| BENEFITS - COSTS | ($3,577) | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 |
| (assumed spent on personal consumption expenditures) | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| **Multiplier Effects of Expenditure** | | | | | | | | | | | | |
| *System Purchase Cost & Maintenance Effects* | | | | | | | | | | | | |
| Final Demand | $5,503 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Multiplier Effects | | | | | | | | | | | | |
| Indirect & Induced Output | $6,451 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Labor | 0.076 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Labor income | $3,559 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| *Due to User Benefits - Costs* | | | | | | | | | | | | |
| % of Benefits Staying In-State | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Final Demand | ($3,577) | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 |
| Multiplier Effects | | | | | | | | | | | | |
| Indirect & Induced Output | ($3,749) | $580 | $580 | $580 | $580 | $580 | $580 | $580 | $580 | $580 | $580 | $580 |
| Labor | (0.073) | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 |
| Labor income | ($2,287) | $354 | $354 | $354 | $354 | $354 | $354 | $354 | $354 | $354 | $354 | $354 |
| *Foregone to State* | | | | | | | | | | | | |
| Final Demand | ($1,926) | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Multiplier Effects | | | | | | | | | | | | |
| Indirect & Induced Output | ($1,961) | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Labor | (0.04) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Labor income | ($1,722) | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| *TOTAL MULTIPLIER EFFECTS* | | | | | | | | | | | | |
| Final Demand | $0 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 |
| Multiplier Effects | | | | | | | | | | | | |
| Indirect & Induced Output | $742 | $580 | $580 | $580 | $580 | $580 | $580 | $580 | $580 | $580 | $580 | $580 |
| Labor | (0.039) | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 |
| Labor income | ($450) | $354 | $354 | $354 | $354 | $354 | $354 | $354 | $354 | $354 | $354 | $354 |
| | | | | | | | | | | | | |
| **State Fiscal Account** | | | | | | | | | | | | |
| *Costs* | | | | | | | | | | | | |
| State interest + depreciation deduction refund | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| ECITC cost | $1,926 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| TOTAL COST | $1,926 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| *Revenues* | | | | | | | | | | | | |
| Taxes on Final Demand & Labor Income | | | | | | | | | | | | |
| GET (% of GSP) | $0 | $25 | $25 | $25 | $25 | $25 | $25 | $25 | $25 | $25 | $25 | $25 |
| Individual income (x labor income) | ($23) | 18.19 | 18.19 | 18.19 | 18.19 | 18.19 | 18.19 | 18.2 | 18.2 | 18.2 | 18.2 | 18.2 |
| Corporate income (% of GSP) | ($1) | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 |
| Taxes on Indirect & Induced Output | $26 | 20.59 | 20.59 | 20.59 | 20.59 | 20.59 | 20.59 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 |
| TOTAL BENEFIT | $2 | 64.67 | 64.67 | 64.67 | 64.67 | 64.67 | 64.67 | 64.7 | 64.7 | 64.7 | 64.7 | 64.7 |
| | | | | | | | | | | | | |
| NET BENEFIT TO STATE GOVERNMENT | ($1,924) | $65 | $65 | $65 | $65 | $65 | $65 | $65 | $65 | $65 | $65 | $65 |

**Table 7: Worksheet Showing Cost & Multiplier Accounting for Solar Credit Stimulated Residential PV System Purchases (per installed kW)**

| Item | 2012<br>12 | 2013<br>13 | 2014<br>14 | 2015<br>15 | 2016<br>16 | 2017<br>17 | 2018<br>18 | 2019<br>19 | 2020<br>20 | 2021<br>21 | 2022<br>22 | 2023<br>23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PV Purchaser Account** | | | | | | | | | | | | |
| *Costs* | | | | | | | | | | | | |
| System cash purchase | | | | | | | | | | | | |
| Amortization costs (cost borrowed) | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| interest payment | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| principal payment | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Annual system maintenance costs | $0.0 | $0 | $0.0 | $0.0 | $742.9 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 |
| Annual Costs | $0 | $0 | $0 | $0 | $743 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| *Benefits* | | | | | | | | | | | | |
| ECITC Refund | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Federal Tax Credit | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| System Depreciation | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Depreciation & and Interest Tax Deductions | | | | | | | | | | | | |
| State | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Federal | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Annual cost savings | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 |
| Annual Benefits | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 |
| | | | | | | | | | | | | |
| *BENEFITS - COSTS* | $554 | $554 | $554 | $554 | ($189) | $554 | $554 | $554 | $554 | $554 | $554 | $554 |
| (assumed spent on personal consumption expenditures) | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| **Multiplier Effects of Expenditure** | | | | | | | | | | | | |
| *System Purchase Cost & Maintenance Effects* | | | | | | | | | | | | |
| Final Demand | $0 | $0 | $0 | $0 | $743 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Multiplier Effects | | | | | | | | | | | | |
| Indirect & Induced Output | $0 | $0 | $0 | $0 | $871 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Labor | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0103 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Labor income | $0 | $0 | $0 | $0 | $480 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| *Due to User Benefits - Costs* | | | | | | | | | | | | |
| % of Benefits Staying In-State | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Final Demand | $554 | $554 | $554 | $554 | ($189) | $554 | $554 | $554 | $554 | $554 | $554 | $554 |
| Multiplier Effects | | | | | | | | | | | | |
| Indirect & Induced Output | $580 | $580 | $580 | $580 | ($198) | $580 | $580 | $580 | $580 | $580 | $580 | $580 |
| Labor | 0.011 | 0.011 | 0.011 | 0.011 | (0.004) | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 |
| Labor income | $354 | $354 | $354 | $354 | ($121) | $354 | $354 | $354 | $354 | $354 | $354 | $354 |
| *Foregone to State* | | | | | | | | | | | | |
| Final Demand | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Multiplier Effects | | | | | | | | | | | | |
| Indirect & Induced Output | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Labor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Labor income | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| *TOTAL MULTIPLIER EFFECTS* | | | | | | | | | | | | |
| Final Demand | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 |
| Multiplier Effects | | | | | | | | | | | | |
| Indirect & Induced Output | $580 | $580 | $580 | $580 | $673 | $580 | $580 | $580 | $580 | $580 | $580 | $580 |
| Labor | 0.011 | 0.011 | 0.011 | 0.011 | 0.006 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 |
| Labor income | $354 | $354 | $354 | $354 | $360 | $354 | $354 | $354 | $354 | $354 | $354 | $354 |
| | | | | | | | | | | | | |
| **State Fiscal Account** | | | | | | | | | | | | |
| *Costs* | | | | | | | | | | | | |
| State interest + depreciation deduction refund | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| ECITC cost | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| TOTAL COST | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| *Revenues* | | | | | | | | | | | | |
| Taxes on Final Demand & Labor Income | | | | | | | | | | | | |
| GET (% of GSP) | $25 | $25 | $25 | $25 | $25 | $25 | $25 | $25 | $25 | $25 | $25 | $25 |
| Individual income (x labor income) | 18.2 | 18.2 | 18.2 | 18.2 | $18.47 | $18.19 | $18.19 | $18.19 | $18.19 | $18.19 | $18.19 | $18.19 |
| Corporate income (% of GSP) | 0.7 | 0.7 | 0.7 | 0.7 | $0.72 | $0.70 | $0.70 | $0.70 | $0.70 | $0.70 | $0.70 | $0.70 |
| Taxes on Indirect & Induced Output | 20.6 | 20.6 | 20.6 | 20.6 | $23.87 | $20.59 | $20.59 | $20.59 | $20.59 | $20.59 | $20.59 | $20.59 |
| TOTAL BENEFIT | 64.7 | 64.7 | 64.7 | 64.7 | $68 | $65 | $65 | $65 | $65 | $65 | $65 | $65 |
| | | | | | | | | | | | | |
| *NET BENEFIT TO STATE GOVERNMENT* | $65 | $65 | $65 | $65 | $68 | $65 | $65 | $65 | $65 | $65 | $65 | $65 |

**Table 7: Worksheet Showing Cost & Multiplier Accounting for Solar Credit Stimulated Residential PV System Purchases (per installed kW)**

| Item | 2024 24 | 2025 25 | 2026 26 | 2027 27 | 2028 28 | 2029 29 | 2030 30 | TOTALS | Present Value @ Discount |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 0.0% |
| **PV Purchaser Account** | | | | | | | | | |
| *Costs* | | | | | | | | | |
| System cash purchase | | | | | | | | | |
| Amortization costs (cost borrowed) | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| interest payment | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| principal payment | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Annual system maintenance costs | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $743 | $743 |
| Annual Costs | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $6,246 | $6,246 |
| *Benefits* | | | | | | | | | |
| ECITC Refund | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $1,926 | $1,926 |
| Federal Tax Credit | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | #VALUE! |
| System Depreciation | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Depreciation & and Interest Tax Deductions | | | | | | | | | |
| State | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Federal | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Annual cost savings | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $16,616 | $16,616 |
| Annual Benefits | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $18,542 | $18,542 |
| | | | | | | | | | |
| *BENEFITS - COSTS* | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $12,296 | $12,296 |
| (assumed spent on personal consumption expenditures) | | | | | | | | | |
| | | | | | | | | | |
| **Multiplier Effects of Expenditure** | | | | | | | | | |
| *System Purchase Cost & Maintenance Effects* | | | | | | | | | |
| Final Demand | $0 | $0 | $0 | $0 | $0 | $0 | $0 | | |
| Multiplier Effects | | | | | | | | | |
| Indirect & Induced Output | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $7,322 | $7,322 |
| Labor | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.087 | |
| Labor income | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $4,039 | $4,039 |
| *Due to User Benefits - Costs* | | | | | | | | | |
| % of Benefits Staying In-State | 100% | 100% | 100% | 100% | 100% | 100% | 100% | | |
| Final Demand | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $12,296 | $12,296 |
| Multiplier Effects | | | | | | | | | |
| Indirect & Induced Output | $580 | $580 | $580 | $580 | $580 | $580 | $580 | $12,887 | $12,887 |
| Labor | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.251 | |
| Labor income | $354 | $354 | $354 | $354 | $354 | $354 | $354 | $7,861 | $7,861 |
| *Foregone to State* | | | | | | | | | |
| Final Demand | $0 | $0 | $0 | $0 | $0 | $0 | $0 | ($1,926) | ($1,926) |
| Multiplier Effects | | | | | | | | | |
| Indirect & Induced Output | $0 | $0 | $0 | $0 | $0 | $0 | $0 | ($1,961) | ($1,961) |
| Labor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (0.042) | |
| Labor income | $0 | $0 | $0 | $0 | $0 | $0 | $0 | ($1,722) | ($1,722) |
| *TOTAL MULTIPLIER EFFECTS* | | | | | | | | | |
| Final Demand | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $16,616 | $16,616 |
| Multiplier Effects | | | | | | | | | |
| Indirect & Induced Output | $580 | $580 | $580 | $580 | $580 | $580 | $580 | $18,248 | $18,248 |
| Labor | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.296 | |
| Labor income | $354 | $354 | $354 | $354 | $354 | $354 | $354 | $10,178 | $10,178 |
| | | | | | | | | | |
| **State Fiscal Account** | | | | | | | | | |
| *Costs* | | | | | | | | | |
| State interest + depreciation deduction refund | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| ECITC cost | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $1,926 | $1,926 |
| TOTAL COST | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $1,926 | $1,926 |
| *Revenues* | | | | | | | | | |
| Taxes on Final Demand & Labor Income | | | | | | | | | |
| GET (% of GSP) | $25 | $25 | $25 | $25 | $25 | $25 | $25 | $756 | $756 |
| Individual income (x labor income) | $18.19 | $18.19 | $18.19 | $18.19 | $18.19 | $18.19 | $18.19 | $523 | $523 |
| Corporate income (% of GSP) | $0.70 | $0.70 | $0.70 | $0.70 | $0.70 | $0.70 | $0.70 | $20 | $20 |
| Taxes on Indirect & Induced Output | $20.59 | $20.59 | $20.59 | $20.59 | $20.59 | $20.59 | $20.59 | $647 | $647 |
| TOTAL BENEFIT | $65 | $65 | $65 | $65 | $65 | $65 | $65 | $1,946 | $1,946 |
| | | | | | | | | | |
| *NET BENEFIT TO STATE GOVERNMENT* | $65 | $65 | $65 | $65 | $65 | $65 | $65 | $20 | $20 |

**Table 8: Worksheet Showing Cost & Multiplier Accounting for Fiscal and Economic Impacts Foregone Due to Residential PV Systems Purchases**

| Item | Install | 2001 1 | 2002 2 | 2003 3 | 2004 4 | 2005 5 | 2006 6 | 2007 7 | 2008 8 | 2009 9 | 2010 10 | 2011 11 | 2012 12 | 2013 13 | 2014 14 | 2015 15 | 2016 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Purchaser Account** | | | | | | | | | | | | | | | | | |
| *BENEFITS - COSTS* (assumed spent on personal consumption expenditures) | $1,926 | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | $189 |
| **Multiplier Effects of Expenditure** | | | | | | | | | | | | | | | | | |
| *Due to User Benefits - Costs* | | | | | | | | | | | | | | | | | |
| % of Benefits Staying In-State | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Final Demand | $1,926 | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | $189 |
| Multiplier Effects | | | | | | | | | | | | | | | | | |
| Indirect & Induced Output | $2,019 | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | $198 |
| Labor | 0.039 | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | 0.004 |
| Labor income | $1,231 | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | $121 |
| *TOTAL MULTIPLIER EFFECTS* | | | | | | | | | | | | | | | | | |
| Final Demand | 1,926 | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | 189 |
| Multiplier Effects | | | | | | | | | | | | | | | | | |
| Indirect & Induced Output | 2,019 | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | 198 |
| Labor | 0.03933 | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | 0.004 |
| Labor income | 1,231 | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | 121 |
| **State Fiscal Account** | | | | | | | | | | | | | | | | | |
| *Revenues* | | | | | | | | | | | | | | | | | |
| *Taxes on Final Demand & Labor Income* | | | | | | | | | | | | | | | | | |
| GET (% of GSP) | 88 | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | 9 |
| Individual income (x labor income) | 63 | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | 6 |
| Corporate income (% of GSP) | 2 | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | 0 |
| Lease Rents | | | | | | | | | | | | | | | | | |
| Taxes on Indirect & Induced Output | 72 | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | 7 |
| TOTAL BENEFIT | 225 | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | 22 |
| *NET BENEFIT TO STATE GOVERNMENT* | $225 | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | $22 |

**Table 8: Worksheet Showing Cost & Multiplier Accounting for Fiscal and Economic Impacts Foregone Due to Residential PV Systems Purchases**

| Item | 2017 17 | 2018 18 | 2019 19 | 2020 20 | 2021 21 | 2022 22 | 2023 23 | 2024 24 | 2025 25 | 2026 26 | 2027 27 | 2028 28 | 2029 29 | 2030 30 | TOTALS | Present Value @ Discount 0.0% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Purchaser Account** | | | | | | | | | | | | | | | | |
| *BENEFITS - COSTS* (assumed spent on personal consumption expenditures) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($13,947) | ($13,947) |
| **Multiplier Effects of Expenditure** | | | | | | | | | | | | | | | | |
| *Due to User Benefits - Costs* | | | | | | | | | | | | | | | | |
| % of Benefits Staying In-State | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | | |
| Final Demand | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($13,947) | ($13,947) |
| Multiplier Effects | | | | | | | | | | | | | | | | |
| Indirect & Induced Output | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($14,617) | ($14,617) |
| Labor | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.285) | |
| Labor income | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($8,916) | ($8,916) |
| *TOTAL MULTIPLIER EFFECTS* | | | | | | | | | | | | | | | | |
| Final Demand | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (13,947) | (13,947) |
| Multiplier Effects | | | | | | | | | | | | | | | | |
| Indirect & Induced Output | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (14,617) | (14,617) |
| Labor | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.285) | |
| Labor income | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (8,916) | (8,916) |
| **State Fiscal Account** | | | | | | | | | | | | | | | | |
| *Revenues* | | | | | | | | | | | | | | | | |
| *Taxes on Final Demand & Labor Income* | | | | | | | | | | | | | | | | |
| GET (% of GSP) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (634) | (634) |
| Individual income (x labor income) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (458) | (458) |
| Corporate income (% of GSP) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (18) | (18) |
| Lease Rents | | | | | | | | | | | | | | | | |
| Taxes on Indirect & Induced Output | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | | |
| TOTAL BENEFIT | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (1,628) | (1,628) |
| *NET BENEFIT TO STATE GOVERNMENT* | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($1,628) | ($1,628) |

**TABLE 9: NET ECONOMIC AND FISCAL IMPACT STIMULATED BY THE SOLAR CREDIT PER KW INSTALLED FOR RESIDENTIAL PV SYSTEMS**

| Item | Install | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Net Benefits*** | | | | | | | | | | | | | | | | | |
| PV System Purchaser | ($3,852) | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | ($378) |
| State Fiscal Account | ($1,956) | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $46 |
| | | | | | | | | | | | | | | | | | |
| ***Net Economic Impacts*** | | | | | | | | | | | | | | | | | |
| Final Demand Multiplier Effects | ($275) | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $365 |
| Indirect & Induced Output | $453 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $475 |
| Employment | (0.0445) | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0026 |
| Labor Income | ($626) | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $239 |

**TABLE 9: NET ECONOMIC AND FISCAL IMPACT STIMULATED BY THE SOLAR CREDIT PER KW INSTALLED FOR RESIDENTIAL PV SYSTEMS**

| Item | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | TOTALS | Present Value @ Discount 0.0% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Net Benefits*** | | | | | | | | | | | | | | | | |
| PV System Purchaser | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $27,894 | $27,894 |
| State Fiscal Account | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $1,841 | $1,841 |
| | | | | | | | | | | | | | | | | |
| ***Net Economic Impacts*** | | | | | | | | | | | | | | | | |
| Final Demand Multiplier Effects | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $32,214 | $32,214 |
| Indirect & Induced Output | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $34,596 | $34,596 |
| Employment | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.6141 | |
| Labor Income | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $20,150 | $20,150 |

**Table 10: Worksheet Showing Cost & Multiplier Accounting for Solar Credit Stimulated Commercial PV System Purchases (per installed kW)**

| Item | Install | 2001 1 | 2002 2 | 2003 3 | 2004 4 | 2005 5 | 2006 6 | 2007 7 | 2008 8 | 2009 9 | 2010 10 | 2011 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PV Purchaser Account** | | | | | | | | | | | | |
| *Costs* | | | | | | | | | | | | |
| System cash purchase | $3,750 | | | | | | | | | | | |
| Amortization costs (cost borrowed) | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| interest payment | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| principal payment | | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Annual system maintenance costs | | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 |
| Annual Costs | $3,750 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| *Benefits* | | | | | | | | | | | | |
| ECITC Refund | $1,313 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Federal Tax Credit | $1,125 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| System Depreciation | | $750 | $750 | $750 | $750 | $750 | $0 | $0 | $0 | $0 | $0 | $0 |
| Depreciation & and Interest Tax Deductions | | | | | | | | | | | | |
| State | | $45 | $45 | $45 | $45 | $45 | $0 | $0 | $0 | $0 | $0 | $0 |
| Federal | | $178 | $178 | $178 | $178 | $178 | $0 | $0 | $0 | $0 | $0 | $0 |
| Annual cost savings | | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 |
| Annual Benefits | $2,438 | $777 | $777 | $777 | $777 | $777 | $554 | $554 | $554 | $554 | $554 | $554 |
| | | | | | | | | | | | | |
| *BENEFITS - COSTS* | ($1,313) | $777 | $777 | $777 | $777 | $777 | $554 | $554 | $554 | $554 | $554 | $554 |
| (assumed spent on personal consumption expenditures) | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| **Multiplier Effects of Expenditure** | | | | | | | | | | | | |
| *System Purchase Cost & Maintenance Effects* | | | | | | | | | | | | |
| Final Demand | $3,750 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Multiplier Effects | | | | | | | | | | | | |
| Indirect & Induced Output | $4,396 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Labor | 0.052 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Labor income | $2,425 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| *Due to User Benefits - Costs* | | | | | | | | | | | | |
| % of Benefits Staying In-State | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Final Demand | ($1,313) | $777 | $777 | $777 | $777 | $777 | $554 | $554 | $554 | $554 | $554 | $554 |
| Multiplier Effects | | | | | | | | | | | | |
| Indirect & Induced Output | ($1,376) | $815 | $815 | $815 | $815 | $815 | $580 | $580 | $580 | $580 | $580 | $580 |
| Labor | (0.027) | 0.016 | 0.016 | 0.016 | 0.016 | 0.016 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 |
| Labor income | ($839) | $497 | $497 | $497 | $497 | $497 | $354 | $354 | $354 | $354 | $354 | $354 |
| *Foregone to State* | | | | | | | | | | | | |
| Final Demand | ($1,313) | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Multiplier Effects | | | | | | | | | | | | |
| Indirect & Induced Output | ($1,336) | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Labor | (0.03) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Labor income | ($1,174) | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| *TOTAL MULTIPLIER EFFECTS* | | | | | | | | | | | | |
| Final Demand | $1,125 | $777 | $777 | $777 | $777 | $777 | $554 | $554 | $554 | $554 | $554 | $554 |
| Multiplier Effects | | | | | | | | | | | | |
| Indirect & Induced Output | $1,684 | $815 | $815 | $815 | $815 | $815 | $580 | $580 | $580 | $580 | $580 | $580 |
| Labor | (0.004) | 0.016 | 0.016 | 0.016 | 0.016 | 0.016 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 |
| Labor income | $412 | $497 | $497 | $497 | $497 | $497 | $354 | $354 | $354 | $354 | $354 | $354 |
| | | | | | | | | | | | | |
| **State Fiscal Account** | | | | | | | | | | | | |
| *Costs* | | | | | | | | | | | | |
| State interest + depreciation deduction refund | $0 | $45 | $45 | $45 | $45 | $45 | $0 | $0 | $0 | $0 | $0 | $0 |
| ECITC cost | $1,313 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| TOTAL COST | $1,313 | $45 | $45 | $45 | $45 | $45 | $0 | $0 | $0 | $0 | $0 | $0 |
| *Revenues* | | | | | | | | | | | | |
| Taxes on Final Demand & Labor Income | | | | | | | | | | | | |
| GET (% of GSP) | $51 | $35 | $35 | $35 | $35 | $35 | $25 | $25 | $25 | $25 | $25 | $25 |
| Individual income (x labor income) | $21 | 25.53 | 25.53 | 25.53 | 25.53 | 25.53 | 18.19 | 18.2 | 18.2 | 18.2 | 18.2 | 18.2 |
| Corporate income (% of GSP) | $1 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.70 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 |
| Taxes on Indirect & Induced Output | $60 | 28.90 | 28.90 | 28.90 | 28.90 | 28.90 | 20.59 | 20.6 | 20.6 | 20.6 | 20.6 | 20.6 |
| TOTAL BENEFIT | $133 | 90.77 | 90.77 | 90.77 | 90.77 | 90.77 | 64.67 | 64.7 | 64.7 | 64.7 | 64.7 | 64.7 |
| | | | | | | | | | | | | |
| *NET BENEFIT TO STATE GOVERNMENT* | ($1,180) | $46 | $46 | $46 | $46 | $46 | $65 | $65 | $65 | $65 | $65 | $65 |

**Table 10: Worksheet Showing Cost & Multiplier Accounting for Solar Credit Stimulated Commercial PV System Purchases (per installed kW)**

| | | | | | Year and Period Number | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Item | 2012 12 | 2013 13 | 2014 14 | 2015 15 | 2016 16 | 2017 17 | 2018 18 | 2019 19 | 2020 20 | 2021 21 | 2022 22 |
| **PV Purchaser Account** | | | | | | | | | | | |
| *Costs* | | | | | | | | | | | |
| System cash purchase | | | | | | | | | | | |
| Amortization costs (cost borrowed) | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| interest payment | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| principal payment | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Annual system maintenance costs | $0.0 | $0 | $0.0 | $0.0 | $279.7 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 |
| Annual Costs | $0 | $0 | $0 | $0 | $280 | $0 | $0 | $0 | $0 | $0 | $0 |
| *Benefits* | | | | | | | | | | | |
| ECITC Refund | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Federal Tax Credit | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| System Depreciation | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Depreciation & and Interest Tax Deductions | | | | | | | | | | | |
| State | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Federal | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Annual cost savings | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 |
| Annual Benefits | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 |
| | | | | | | | | | | | |
| *BENEFITS - COSTS* | $554 | $554 | $554 | $554 | $274 | $554 | $554 | $554 | $554 | $554 | $554 |
| (assumed spent on personal consumption expenditures) | | | | | | | | | | | |
| | | | | | | | | | | | |
| **Multiplier Effects of Expenditure** | | | | | | | | | | | |
| *System Purchase Cost & Maintenance Effects* | | | | | | | | | | | |
| Final Demand | $0 | $0 | $0 | $0 | $280 | $0 | $0 | $0 | $0 | $0 | $0 |
| Multiplier Effects | | | | | | | | | | | |
| Indirect & Induced Output | $0 | $0 | $0 | $0 | $328 | $0 | $0 | $0 | $0 | $0 | $0 |
| Labor | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0039 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Labor income | $0 | $0 | $0 | $0 | $181 | $0 | $0 | $0 | $0 | $0 | $0 |
| *Due to User Benefits - Costs* | | | | | | | | | | | |
| % of Benefits Staying In-State | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Final Demand | $554 | $554 | $554 | $554 | $274 | $554 | $554 | $554 | $554 | $554 | $554 |
| Multiplier Effects | | | | | | | | | | | |
| Indirect & Induced Output | $580 | $580 | $580 | $580 | $287 | $580 | $580 | $580 | $580 | $580 | $580 |
| Labor | 0.011 | 0.011 | 0.011 | 0.011 | 0.006 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 |
| Labor income | $354 | $354 | $354 | $354 | $175 | $354 | $354 | $354 | $354 | $354 | $354 |
| *Foregone to State* | | | | | | | | | | | |
| Final Demand | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Multiplier Effects | | | | | | | | | | | |
| Indirect & Induced Output | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Labor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Labor income | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| *TOTAL MULTIPLIER EFFECTS* | | | | | | | | | | | |
| Final Demand | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 |
| Multiplier Effects | | | | | | | | | | | |
| Indirect & Induced Output | $580 | $580 | $580 | $580 | $615 | $580 | $580 | $580 | $580 | $580 | $580 |
| Labor | 0.011 | 0.011 | 0.011 | 0.011 | 0.009 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 |
| Labor income | $354 | $354 | $354 | $354 | $356 | $354 | $354 | $354 | $354 | $354 | $354 |
| | | | | | | | | | | | |
| **State Fiscal Account** | | | | | | | | | | | |
| *Costs* | | | | | | | | | | | |
| State interest + depreciation deduction refund | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| ECITC cost | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| TOTAL COST | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| *Revenues* | | | | | | | | | | | |
| Taxes on Final Demand & Labor Income | | | | | | | | | | | |
| GET (% of GSP) | $25 | $25 | $25 | $25 | $25 | $25 | $25 | $25 | $25 | $25 | $25 |
| Individual income (x labor income) | 18.2 | 18.2 | 18.2 | 18.2 | $18.29 | $18.19 | $18.19 | $18.19 | $18.19 | $18.19 | $18.19 |
| Corporate income (% of GSP) | 0.7 | 0.7 | 0.7 | 0.7 | $0.71 | $0.70 | $0.70 | $0.70 | $0.70 | $0.70 | $0.70 |
| Taxes on Indirect & Induced Output | 20.6 | 20.6 | 20.6 | 20.6 | $21.82 | $20.59 | $20.59 | $20.59 | $20.59 | $20.59 | $20.59 |
| TOTAL BENEFIT | 64.7 | 64.7 | 64.7 | 64.7 | $66 | $65 | $65 | $65 | $65 | $65 | $65 |
| | | | | | | | | | | | |
| *NET BENEFIT TO STATE GOVERNMENT* | $65 | $65 | $65 | $65 | $66 | $65 | $65 | $65 | $65 | $65 | $65 |

**Table 10: Worksheet Showing Cost & Multiplier Accounting for Solar Credit Stimulated Commercial PV System Purchases (per installed kW)**

| Item | 2023 / 23 | 2024 / 24 | 2025 / 25 | 2026 / 26 | 2027 / 27 | 2028 / 28 | 2029 / 29 | 2030 / 30 | TOTALS | Present Value @ Discount 0.0% |
|---|---|---|---|---|---|---|---|---|---|---|
| **PV Purchaser Account** | | | | | | | | | | |
| *Costs* | | | | | | | | | | |
| System cash purchase | | | | | | | | | | |
| Amortization costs (cost borrowed) | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| interest payment | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| principal payment | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 |
| Annual system maintenance costs | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $0.0 | $280 | $280 |
| Annual Costs | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $4,030 | $4,030 |
| *Benefits* | | | | | | | | | | |
| ECITC Refund | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $1,313 | $1,313 |
| Federal Tax Credit | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $1,125 | $1,125 |
| System Depreciation | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $3,750 | $3,750 |
| Depreciation & and Interest Tax Deductions | | | | | | | | | | |
| State | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $225 | $225 |
| Federal | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $892 | $892 |
| Annual cost savings | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $16,616 | $16,616 |
| Annual Benefits | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $20,171 | $20,171 |
| | | | | | | | | | | |
| *BENEFITS - COSTS* | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $16,142 | $16,142 |
| (assumed spent on personal consumption expenditures) | | | | | | | | | | |
| | | | | | | | | | | |
| **Multiplier Effects of Expenditure** | | | | | | | | | | |
| *System Purchase Cost & Maintenance Effects* | | | | | | | | | | |
| Final Demand | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | | |
| Multiplier Effects | | | | | | | | | | |
| Indirect & Induced Output | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $4,724 | $4,724 |
| Labor | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.056 | |
| Labor income | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $2,606 | $2,606 |
| *Due to User Benefits - Costs* | | | | | | | | | | |
| % of Benefits Staying In-State | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | | |
| Final Demand | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $16,142 | $16,142 |
| Multiplier Effects | | | | | | | | | | |
| Indirect & Induced Output | $580 | $580 | $580 | $580 | $580 | $580 | $580 | $580 | $16,917 | $16,917 |
| Labor | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.330 | |
| Labor income | $354 | $354 | $354 | $354 | $354 | $354 | $354 | $354 | $10,319 | $10,319 |
| *Foregone to State* | | | | | | | | | | |
| Final Demand | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | ($1,313) | ($1,313) |
| Multiplier Effects | | | | | | | | | | |
| Indirect & Induced Output | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | ($1,336) | ($1,336) |
| Labor | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (0.029) | |
| Labor income | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | ($1,174) | ($1,174) |
| *TOTAL MULTIPLIER EFFECTS* | | | | | | | | | | |
| Final Demand | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $554 | $18,859 | $18,859 |
| Multiplier Effects | | | | | | | | | | |
| Indirect & Induced Output | $580 | $580 | $580 | $580 | $580 | $580 | $580 | $580 | $20,305 | $20,305 |
| Labor | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.011 | 0.357 | |
| Labor income | $354 | $354 | $354 | $354 | $354 | $354 | $354 | $354 | $11,752 | $11,752 |
| | | | | | | | | | | |
| **State Fiscal Account** | | | | | | | | | | |
| *Costs* | | | | | | | | | | |
| State interest + depreciation deduction refund | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $225 | $225 |
| ECITC cost | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $1,313 | $1,313 |
| TOTAL COST | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $1,538 | $1,538 |
| *Revenues* | | | | | | | | | | |
| Taxes on Final Demand & Labor Income | | | | | | | | | | |
| GET (% of GSP) | $25 | $25 | $25 | $25 | $25 | $25 | $25 | $25 | $858 | $858 |
| Individual income (x labor income) | $18.19 | $18.19 | $18.19 | $18.19 | $18.19 | $18.19 | $18.19 | $18.19 | $604 | $604 |
| Corporate income (% of GSP) | $0.70 | $0.70 | $0.70 | $0.70 | $0.70 | $0.70 | $0.70 | $0.70 | $23 | $23 |
| Taxes on Indirect & Induced Output | $20.59 | $20.59 | $20.59 | $20.59 | $20.59 | $20.59 | $20.59 | $20.59 | $720 | $720 |
| TOTAL BENEFIT | $65 | $65 | $65 | $65 | $65 | $65 | $65 | $65 | $2,205 | $2,205 |
| | | | | | | | | | | |
| *NET BENEFIT TO STATE GOVERNMENT* | $65 | $65 | $65 | $65 | $65 | $65 | $65 | $65 | $667 | $667 |

**Table 11: Worksheet Showing Cost & Multiplier Accounting for Fiscal and Economic Impacts Foregone Due to Commercial PV Systems Purchases**

| | | | | | | | | | | | | | | | | Year and Period Number | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| Item | Install | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| **Purchaser Account** | | | | | | | | | | | | | | | | | |
| *BENEFITS - COSTS* (assumed spent on personal consumption expenditures) | $1,313 | ($777) | ($777) | ($777) | ($777) | ($777) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($274) |
| **Multiplier Effects of Expenditure** *Due to User Benefits - Costs* | | | | | | | | | | | | | | | | | |
| % of Benefits Staying In-State | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Final Demand | $1,313 | ($777) | ($777) | ($777) | ($777) | ($777) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($274) |
| Multiplier Effects | | | | | | | | | | | | | | | | | |
| Indirect & Induced Output | $1,376 | ($815) | ($815) | ($815) | ($815) | ($815) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($287) |
| Labor | 0.027 | (0.016) | (0.016) | (0.016) | (0.016) | (0.016) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.006) |
| Labor income | $839 | ($497) | ($497) | ($497) | ($497) | ($497) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($175) |
| *TOTAL MULTIPLIER EFFECTS* | | | | | | | | | | | | | | | | | |
| Final Demand | 1,313 | (777) | (777) | (777) | (777) | (777) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (274) |
| Multiplier Effects | | | | | | | | | | | | | | | | | |
| Indirect & Induced Output | 1,376 | (815) | (815) | (815) | (815) | (815) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (287) |
| Labor | 0.02680 | (0.016) | (0.016) | (0.016) | (0.016) | (0.016) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.006) |
| Labor income | 839 | (497) | (497) | (497) | (497) | (497) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (175) |
| **State Fiscal Account** *Revenues* Taxes on Final Demand & Labor Income | | | | | | | | | | | | | | | | | |
| GET (% of GSP) | 60 | (35) | (35) | (35) | (35) | (35) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (12) |
| Individual income (x labor income) | 43 | (26) | (26) | (26) | (26) | (26) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (9) |
| Corporate income (% of GSP) | 2 | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (0) |
| Lease Rents | | | | | | | | | | | | | | | | | |
| Taxes on Indirect & Induced Output | 49 | (29) | (29) | (29) | (29) | (29) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (10) |
| TOTAL BENEFIT | 153 | (91) | (91) | (91) | (91) | (91) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (32) |
| *NET BENEFIT TO STATE GOVERNMENT* | $153 | ($91) | ($91) | ($91) | ($91) | ($91) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($32) |

**Table 11: Worksheet Showing Cost & Multiplier Accounting for Fiscal and Economic Impacts Foregone Due to Commercial PV Systems Purchases**

| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | | Present Value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Item | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | TOTALS | @ Discount |
| | | | | | | | | | | | | | | | | 0.0% |
| **Purchaser Account** | | | | | | | | | | | | | | | | |
| *BENEFITS - COSTS* (assumed spent on personal consumption expenditures) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($16,142) | ($16,142) |
| **Multiplier Effects of Expenditure** *Due to User Benefits - Costs* | | | | | | | | | | | | | | | | |
| % of Benefits Staying In-State | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | | |
| Final Demand | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($554) | ($16,142) | ($16,142) |
| Multiplier Effects | | | | | | | | | | | | | | | | |
| Indirect & Induced Output | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($580) | ($16,917) | ($16,917) |
| Labor | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.330) | |
| Labor income | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($354) | ($10,319) | ($10,319) |
| *TOTAL MULTIPLIER EFFECTS* | | | | | | | | | | | | | | | | |
| Final Demand | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (554) | (16,142) | (16,142) |
| Multiplier Effects | | | | | | | | | | | | | | | | |
| Indirect & Induced Output | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (580) | (16,917) | (16,917) |
| Labor | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.330) | |
| Labor income | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (354) | (10,319) | (10,319) |
| **State Fiscal Account** *Revenues* Taxes on Final Demand & Labor Income | | | | | | | | | | | | | | | | |
| GET (% of GSP) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (25) | (734) | (734) |
| Individual income (x labor income) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (18) | (530) | (530) |
| Corporate income (% of GSP) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (1) | (21) | (21) |
| Lease Rents | | | | | | | | | | | | | | | | |
| Taxes on Indirect & Induced Output | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | (21) | | |
| TOTAL BENEFIT | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (65) | (1,885) | (1,885) |
| *NET BENEFIT TO STATE GOVERNMENT* | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($65) | ($1,885) | ($1,885) |

**TABLE 12: NET ECONOMIC AND FISCAL IMPACT STIMULATED BY THE SOLAR CREDIT PER KW INSTALLED FOR COMMERCIAL PV SYSTEMS**

| | | | | | | | | | | | | | | | | Period Number | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Item | Install | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| *Net Benefits* | | | | | | | | | | | | | | | | | |
| PV System Purchaser | ($2,625) | $1,555 | $1,555 | $1,555 | $1,555 | $1,555 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $548 |
| State Fiscal Account | ($1,333) | $136 | $136 | $136 | $136 | $136 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $98 |
| *Net Economic Impacts* | | | | | | | | | | | | | | | | | |
| Final Demand | ($188) | $1,555 | $1,555 | $1,555 | $1,555 | $1,555 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $828 |
| Multiplier Effects | | | | | | | | | | | | | | | | | |
| Indirect & Induced Output | $309 | $1,630 | $1,630 | $1,630 | $1,630 | $1,630 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $903 |
| Employment | (0.0304) | 0.0317 | 0.0317 | 0.0317 | 0.0317 | 0.0317 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0151 |
| Labor Income | ($427) | $994 | $994 | $994 | $994 | $994 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $531 |

**TABLE 12: NET ECONOMIC AND FISCAL IMPACT STIMULATED BY THE SOLAR CREDIT PER KW INSTALLED FOR COMMERCIAL PV SYSTEMS**

| Item | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | Period Number TOTALS | Present Value @ Discount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | 0.0% |
| *Net Benefits* | | | | | | | | | | | | | | | | |
| PV System Purchaser | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $32,283 | $32,283 |
| State Fiscal Account | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $129 | $2,552 | $2,552 |
| | | | | | | | | | | | | | | | | |
| *Net Economic Impacts* | | | | | | | | | | | | | | | | |
| Final Demand | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $1,108 | $35,000 | $35,000 |
| Multiplier Effects | | | | | | | | | | | | | | | | |
| Indirect & Induced Output | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $1,161 | $37,222 | $37,222 |
| Employment | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.0226 | 0.6863 | |
| Labor Income | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $708 | $22,071 | $22,071 |

## APPENDIX 2

# Analysis of Residential Photovoltaic Adoption on Oʻahu

*January 2013*

### Summary

The adoption of photovoltaic (PV) energy on Oʻahu—particularly residential systems—has grown exponentially between 2007 and 2012. Uptake of PV systems is accelerating most quickly (by percentage) in zip codes with lower median incomes, owing largely to a decrease in system cost and new third-party ownership models.

### Methodology

Blue Planet Foundation analyzed eleven years of Oʻahu building permit data to better understand the rate of adoption of residential PV and how adoption was changing regionally. Daily building permit data from January 1, 2002 through December 31, 2012 was compiled from the Honolulu Department of Planning and Permitting website[1]. Permits that were issued for PV in the occupancy category "R-3 Dwelling" were included in the analysis[2]. Some residences had multiple building permits for PV work; duplicate permits were removed only if they contained the same building owner name, the same tax map key (TMK), and the same solar contractor. After



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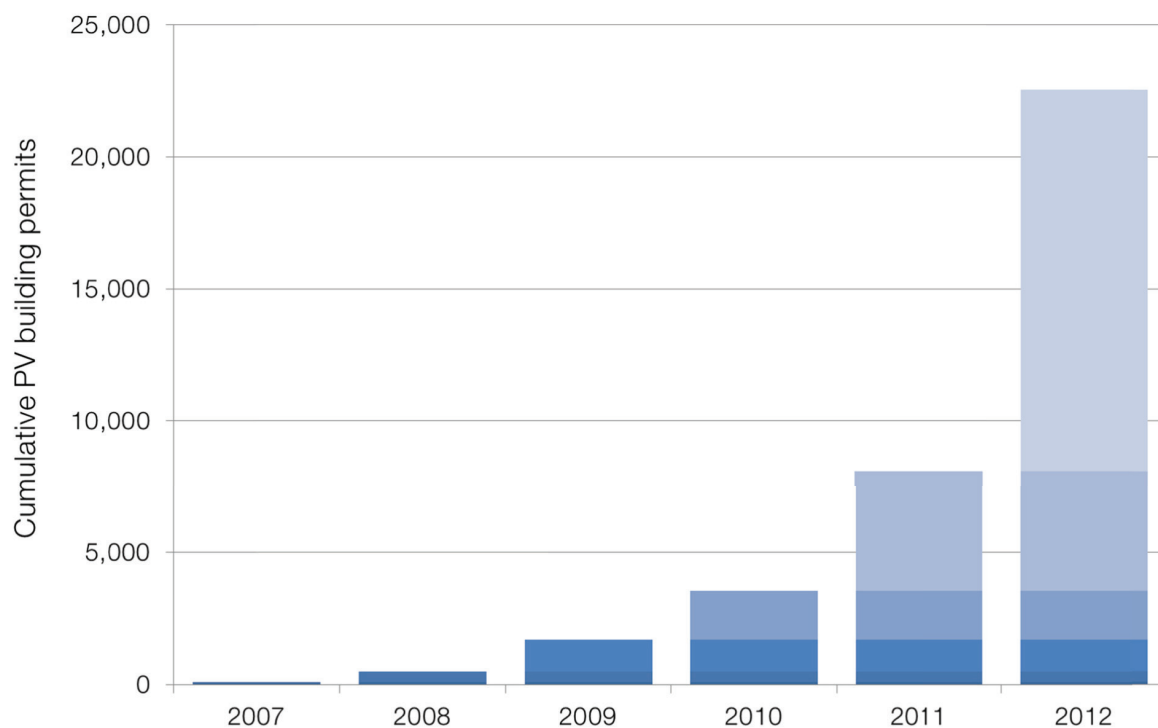
[1] http://www.honoluludpp.org/ReportsNotices/DailyBulletins.aspx
[2] Due to challenges in converting the numerous permits to an accessible format, some data was lost. It is estimated that this loss is less than 2% of the overall photovoltaic permit information.

reducing the list based on the above selection, a total of 22,062 permits were examined[3]. Each permit contained the date of issuance, job address[4], TMK, type of work, accepted value of the work, type of occupancy, and the contractor.

**Residential photovoltaic adoption on Oʻahu**
The building permit history shows the surge in adoption of PV on Oʻahu, particularly in 2011 and 2012 (Figure 1). This trend is attributable to a number of factors, including the availability of state and federal tax credits, the availability of net energy metering, the decrease in PV equipment cost, increased competition in the Hawaiʻi solar industry, new financing tools, and third-party owned systems, among other drivers. While exact price data is challenging to compile, nationwide prices for installed residential PV dropped nearly 40% between 2007 and 2012[5]. Companies such as SolarCity and Sunrun offer third party owned residential PV programs that enable homeowners to pay no money upfront and enter into a contract to purchase electricity from the third-party provider on a monthly basis, similar to utility payments. Such programs have made residential PV more accessible to homeowners with less discretionary income and limited access to more traditional financing products.



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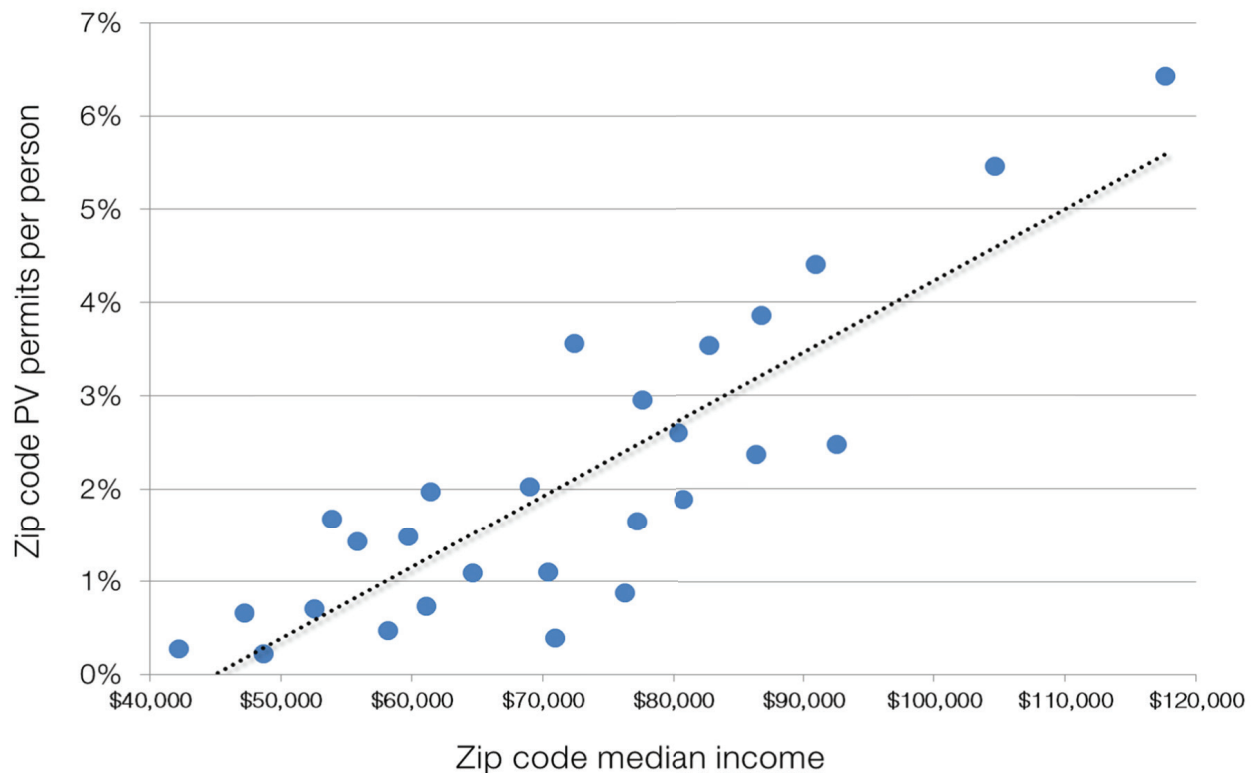
[3] This figure may include permits that were issued but the work was not completed. There are anecdotal reports that recently some solar contractors will seek permits for homes before the job has been sold. Given the effort involved in applying for a permit, it is likely that this is a relatively small percentage of the overall permits for photovoltaic. Further, this number obviously does not include photovoltaic installations which flout the building permit law.
[4] Most permits contained street addresses only. Blue Planet used a variety of means to complete the address with the correct city and zip code information.
[5] Barbose, Galen, N. Darghouth, R. Wiser. *Tracking the Sun V*. Lawrence Berkeley National Laboratory. November 2012 (LBNL-5919E).
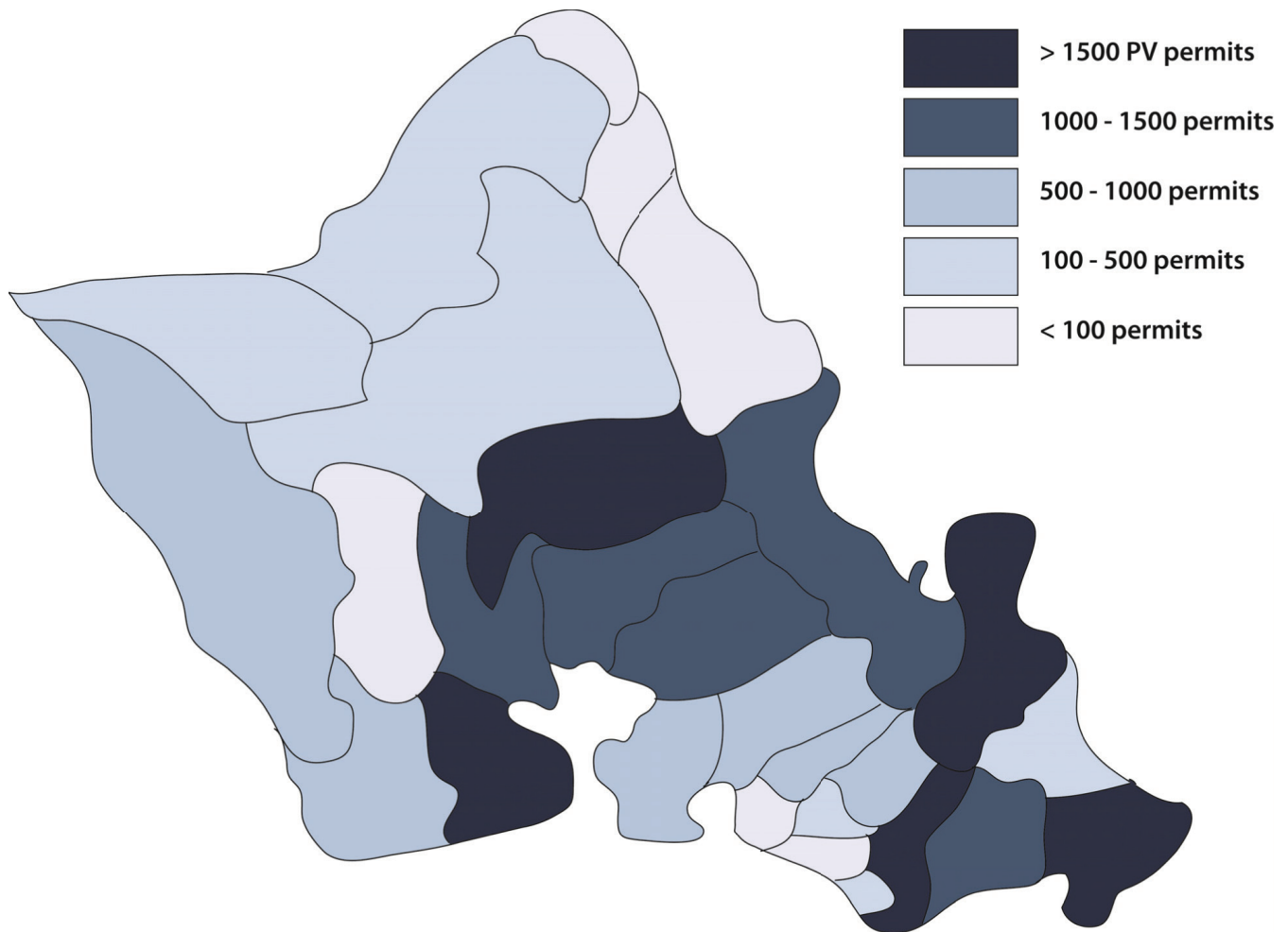
Figure 3. Total number of residential PV permits by zip code, 2002 - 2012

**Shifting photovoltaic adoption demographic**

While early adoption of residential PV is more prevalent in wealthier neighborhoods, data suggests that the trend is shifting somewhat. Neighborhoods with lower median incomes have been installing PV at a greater pace in the past year. Figure 2 shows the relationship between the approximate residential PV density by zip code median household income. Residential PV density is estimated by calculating the number of PV building permits (for the 2002 through 2012 period) as a percentage of the 2010 population[6] for each zip code. Zip codes with the highest median income (Hawai'i Kai, Kahala, Mililani, Kailua) have the greatest number of total residential PV permits, as illustrated in Figure 3.

The rate of change of PV adoption by zip code was analyzed by examining the 2012 permits versus the previous ten years. While the wealthier zip codes are still adopting more residential PV in terms of total number of installations, less wealthy zip codes (Wai'anae, Hau'ula, Waimānalo, Lā'ie, Waialua) are adopting PV at a higher rate in terms of percentage change. While this is due in part to the smaller overall number of PV permits in these zip codes from the
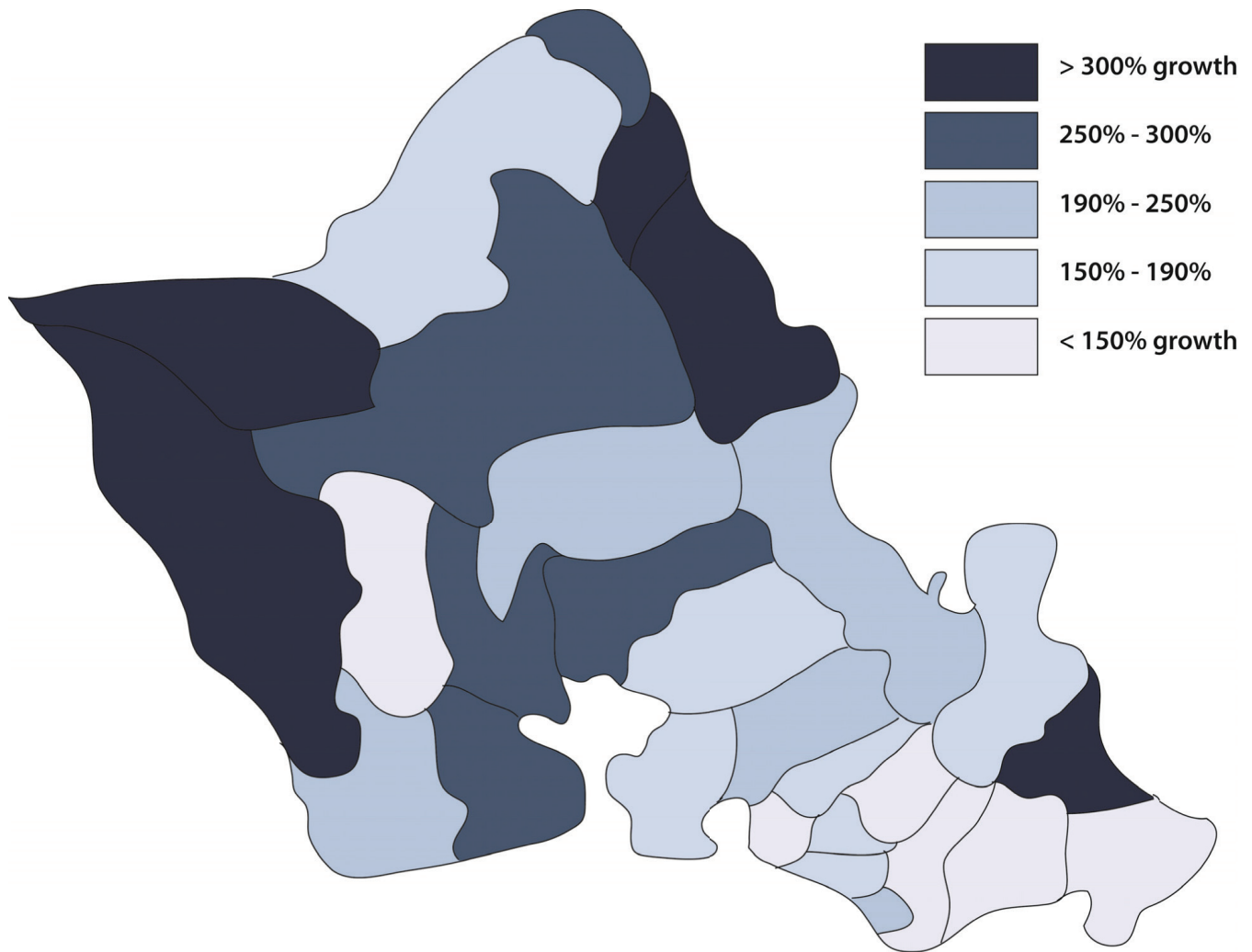
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[6] U.S. Census Bureau, 2010 data.

Figure 4. Percent change in number of residential PV permits in 2012 versus 2002 - 2011 by zip code

2002 to 2011 time period, the consistency of increased uptake across these zip codes suggests that PV is becoming more accessible in regions with lower median household incomes. For example, Waiʻanae (with a median household income of $55,836) saw a 300% increase in PV permits in 2012 compared with the previous decade (173 total permits between 2002 and 2011; 521 permits in 2012 alone).

The adoption of residential PV on Oʻahu has seen astounding growth in the past few years. While wealthier neighborhoods have been leading in the overall uptake of PV systems, adoption of PV is growing fastest in neighborhoods with less wealth. Hawaiʻi's renewable energy tax credit—coupled with new third party owned PV programs—have enabled an broadening range of Oʻahu homeowners to reduce energy costs and participate in a clean energy solution.