Closing the Funding Gap: Evaluating Solar-Readiness Costs in California's Disadvantaged Communities - Single Family Affordable Homes (DAC-SASH) Program

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List of Acronyms

AB	Assembly Bill
CEC	California Energy Commission
CPUC	California Public Utility Commission
DAC	Disadvantaged Community
DAC-SASH	Disadvantaged Communities – Single-Family Affordable Homes
GRID	GRID Alternatives
EPC	Engineering, Procurement & Construction
ESO	Electric Services Other
ESU	Electric Service Upgrade
IOU	Investor-Owned Utility
IRA	Inflation Reduction Act
ITC	Investment Tax Credit
KW	Kilowatt
MACRS	Modified Accelerated Cost Recovery System
M&O	Marketing & Outreach
MW	Megawatt
PA	Program Administrator
PEng	Professional Engineer
PG&E	Pacific Gas and Electric Company
PPA	Power Purchase Agreement
PS	Professional Service
PV System	Photovoltaic System
SCE	Southern California Edison Company
SDG&E	San Diego Gas & Electric Company
SREC	Solar Renewable Energy Credit
TPO	Third-Party Ownership

Executive Summary

The Disadvantaged Communities - Single Family Affordable Homes (DAC-SASH) program assists eligible low-income residential homeowners in overcoming the costs of installing rooftop solar to enable monthly energy usage reductions and significant bill savings. DAC-SASH has averaged a 94% reduction in annual bill costs–approximately $990 per year among the more than 2,300 projects completed since 2019[1]. Despite DAC-SASH's significant value proposition, **annual project output has been limited to half of its total potential due to a large program funding gap[2].**

DAC-SASH Funding Gap

Eligible DAC-SASH applicants can receive up to three forms of funding to offset the costs of installing rooftop solar:

1. The DAC-SASH program incentive
2. Third-party ownership payment (TPO), and
3. Philanthropic funding

The program incentive is $3 per installed Watt and can be applied to standard project costs, including design, equipment, installation, and material costs. This means that if a customer installs a solar system with a capacity of 1,000 watts, they will receive $3,000 as a rebate to help cover costs. This incentive can be applied to typical expenses like design, equipment, installation, and materials. However, the program incentive cannot be applied to solar-readiness costs, such as re-roofing and electrical service upgrades.

To address outstanding project costs, including solar-readiness costs, 90% of applicants choose third-party ownership for their solar systems. In this arrangement, applicants exchange the PV system's tax benefits and rebates for payment, along with maintenance and monitoring services from SunRun. Any further outstanding costs result in a project funding gap.

In response, GRID Alternatives--DAC-SASH's program administrator and implementer--makes a good faith effort to source and distribute philanthropic funding to as many projects as possible. In the case of solar-ready homes, which average a funding gap of $0.78/W, GRID has always managed to adequately source the necessary philanthropic funding to complete these projects. However, among applicants facing solar-readiness costs, the average funding gap increases to

[1] Decision D.18-06-027, Pg. 2.

[2] At an average system size of 3.9 kW, DAC-SASH could have awarded the program incentive to 937 projects annually (assuming equal spending of past incentive budget spillover across remaining program years–$2.4 million per year). Between 2019 and 2023, GRID completed on average 443 projects, thus only amounting to approximately 50% of the full program potential.

levels beyond $2/W. The large funding gap results in 40% of projects–approximately 670 projects–facing solar-readiness costs being suspended.

Due to solar-readiness expenses among applicants, a significant funding gap prevents many eligible households from participating in the DAC-SASH program

Due to a funding gap for solar-readiness expenses, a surplus of approximately $17 million in the incentive budget accumulated from 2019 to 2023, as non-solar-ready projects couldn't progress to eligibility and receive the program incentive. **As a result, over 1,440 projects that could have utilized the incentive were left incomplete, resulting in a missed opportunity for approximately $1.5 million in annual energy savings for potential DAC-SASH participants.**

Research Methodology

The research methodology involved a comprehensive policy analysis conducted through a multi-step process. I compiled data for all completed and inactive DAC-SASH projects and analyzed them to identify trends and challenges. Subsequently, I considered two main policy alternatives:

1. Increasing the program incentive, with variations in whether the increased incentive applied to solar-readiness costs, and
2. Adjusting TPO payment amounts to reflect additional investment tax credit (ITC) benefits for low-income solar projects introduced in the Inflation Reduction Act (IRA)

I applied each alternative retroactively to all projects, holding other project and program characteristics constant. This method allowed for a comprehensive evaluation of the potential program outcomes and implications of each policy if it had been in place since program inception.

Key Findings & Recommendations

Raising the incentive level to $3.75/W had the most significant impact on program performance, with total project output nearly doubling compared to the current rate of $3/W.. Furthermore, an additional 30% of all projects with solar-readiness costs reduced their funding gap to within $0.78/W, mirroring the average funding gap of solar-ready projects that GRID has historically covered

Increasing the TPO payment amount to reflect the additional ITC adders—supplemental incentives designed to support low-income solar projects—resulted in only a 10% increase in overall project output compared to the current rate, showing a marginal impact on program performance.

The CPUC should launch a regulatory proceeding in pursuit of increasing DAC-SASH's incentive level to $3.75/W–excluding solar-readiness costs–as a primary response. Currently, no CPUC solar program permits its incentive to be used for solar-readiness costs, and there will likely be opposition to using ratepayer funds for non-electrical infrastructure. The analysis concludes that there is virtually no difference in total project output whether the program incentive applies to solar-readiness costs. Therefore, taking procedural risks related to spending ratepayer funds on non-electrical infrastructure is unnecessary. **As a secondary response, GRID should aim to renegotiate its TPO agreement with SunRun to reflect the additional benefit of the IRA low-income adder.**

Future Considerations & Program Benefits

Although the implementation of NEM 3.0—a regulatory framework that reduces export rates for excess solar energy fed back into the grid—lowers compensation rates by 75%, participating in DAC-SASH still provides substantial benefits to eligible low-income households.Unlike most rooftop solar consumers, DAC-SASH participants almost always receive full subsidies for their PV system via a combination of the program incentive, TPO payment, and philanthropic funding. This allows them to start saving on their energy bills immediately without any payback period.

NEM3.0 also encourages pairing rooftop solar with energy storage to maximize export value during peak hours. Participating in DAC-SASH unlocks further energy savings in that the CPUC's "Equity" and "Equity Resiliency" SGIP (Self-Generation Incentive Program) rebates enable DAC-SASH participants to install energy storage at virtually no cost[3]. **By exporting excess energy during peak periods, DAC-SASH households can earn approximately $200 per week during the peak season or $1,000 annually[4].**

Despite challenges with the funding gap and solar-readiness costs, increasing the DAC-SASH program incentive to $3.75/W could nearly double the program's impact. By also adjusting the TPO payment to reflect new IRA benefits, the DAC-SASH program can provide immediate energy savings to low-income households, help them navigate NEM 3.0 changes, and offer substantial long-term financial relief through renewable energy.he resulting benefits will contribute to the overall goals of reducing energy inequity, promoting sustainable practices, and improving financial stability for disadvantaged communities.

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[3] California Public Utilities Commission, "Participating in Self-Generation Incentive Program (SGIP)".
[4] Solar.com, "NEM 3.0 Proposal and Impacts for California Homeowners".

1. Background

1.1 Program Summary

The Disadvantaged Communities - Single Family Affordable Homes (DAC-SASH) program was created in 2018 following the adoption of California Public Utilities Commission (CPUC) Decision D.18-06-027, as instituted by Assembly Bill (AB) 327 (Perea, 2013). AB 327 directed the CPUC to "ensure that the standard contract or tariff made available to eligible customer-generators ensures that customer-sited renewable distributed generation continues to grow sustainably and include specific alternatives designed for growth among residential customers in disadvantaged communities"[5].

DAC-SASH aims to provide eligible low-income homeowners with energy usage and bill savings via rooftop solar without increasing monthly household expenses[6]. the program's principal objective is to assist low-income residential homeowners in overcoming known barriers to installing home solar generating systems in disadvantaged communities (DACs), such as up-front capital and credit ratings.

GRID Alternatives, the sole program administrator (PA) and program implementer selected by the CPUC, oversees DAC-SASH and is subject to the following annual budget allocation ($10 million): Administration - 10%, Marketing & Outreach (M&O) - 4%, Evaluation - 1%, Incentives - 85%. DAC-SASH program funds have been collected annually since 2019 and will reach $120 million cumulatively when the program sunsets in 2030.

Program funds are primarily sourced through each participating utility's greenhouse gas (GHG) allowance proceeds. Public purpose program funds are available should GHG allowance proceeds be exhausted. However, GRID also sources additional funding through philanthropic sources to help bridge project funding gaps whenever possible. As program administrator, GRID primarily "manages statewide general administrative functions; all marketing, education, and outreach activities; oversees DAC-SASH's job training requirement; and delivers design, contracting, and installation for all solar electric systems funded through the program"[7].

To qualify as an eligible customer, applicants must meet all of the following criteria: (i) total household income must not be more than CARE or FERA program limits[8], (ii) the household

[5] Public Utilities Code, Section 2827.1.
[6] Decision D.18-06-027, Appendix A.
[7] DAC-SASH Program Handbook, Pg. 1.
[8] The CARE program extends a 30-35 percent discount on the electric bill and a 20 percent discount on the natural gas bill of eligible low-income customers. Income eligibility will vary based on household size. For reference, a household of four faces income eligibility upper limit of $60,000. Households with income slightly greater than CARE allowances will qualify to receive FERA discounts, which applies a 18%

must be located in a DAC identified by the CalEnviroScreen 4.0 map[9], (iii) applicant must own and occupy a single-family home as a primary residence and (iv) household must receive electrical service from either Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), or San Diego Gas & Electric Company (SDG&E)[10].

As of February 1, 2024, DAC-SASH has achieved roughly 2,341 project completions (9.1 MW of cumulative installed capacity) via $27,250,000 in direct incentives (of a possible $51 million, paid out at $3/W installed). Program participants have reported an average annual bill savings of $990 per year (94% reduction in annual bill costs)[11]. Notably, neither state legislation nor the CPUC has quantified targets for cumulative installed capacity, installed projects, or savings under DAC-SASH.

1.2 Program Funding Structure

Decision D.18-06-027 states that individual project benefits need not outweigh project costs since DAC-SASH serves multiple state policy goals. Instead, the Commission establishes that the program incentive structure adopted should ameliorate specific barriers to solar adoption in DACs. In practice, GRID has applied the Commission's ruling by administering the program with the intention that participating households incur no project cost.

Following the directive of AB 327, the CPUC deemed that DAC-SASH's predecessor, SASH (active from 2009 to 2022), "provides a proven and successful model for expanding access to solar among low-income homeowners and for providing additional, non-energy benefits, such as job training"[12]. As a result, DAC-SASH is primarily modeled after SASH and addresses project costs through an (i) $3/W installation incentive, (ii) optional third-party system ownership (TPO), and (iii) philanthropic funding[13]. Figure 1 presents a visualization of a DAC-SASH project's potential cash flow.

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discount on their electricity bill. For reference, a household of four is subject to a $75,000 income threshold to be FERA eligible.

[9] As per the program handbook, DACs are identified as "the top 25 percent CalEnviroScreen (CES) census tracts statewide, as well as the 22 census tracts in the highest five percent of the CES Pollution Burden index, but that do not have an overall CES score because of unreliable socioeconomic or health data"; also, all California Indian Country of tribal lands are also identified as DACs (DAC-SASH Program Handbook, Pg. 3).

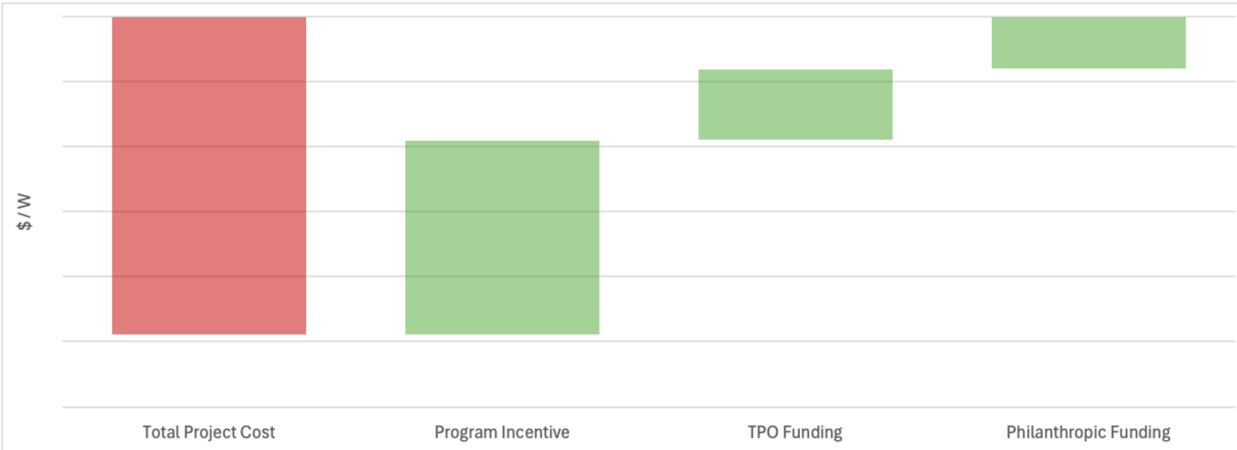
[10] DAC-SASH Program Handbook, Pg. 3.

[11] Decision D.18-06-027, Pg. 2.

[12] Decision D.18-06-027, Pg. 28.

[13] The order in which costs and incentives are realized varies, although TPO funding is always received last. Nevertheless, TPO funding can be forecasted at earlier stages to help GRID predict its net philanthropic contribution to a project.

Figure 1: Example of DAC-SASH Project Cash Flow



Successful applicants receive an incentive of $3/W so long as their solar generating system is between 1 and 5 kW CEC-AC (certified through the California Energy Commission's PV system certification program). This ratepayer-funded incentive can apply to several approved project costs overseen by GRID such as design, equipment, installation, and interconnection costs. However, the program incentive cannot be applied to any solar-readiness costs incurred in making an applicant's home project eligible. These solar-readiness costs are also referred to as professional service costs and can include re-roofing, electrical service upgrades, and tree trimming, among other services (see Appendix B). For reference, DAC-SASH's predecessor (SASH) also extended a $3/W program incentive following an incentive reduction in 2015 (Decision D.15-01-027)[14]. The Commission ruled to reduce the program incentive from $7/W to $3/W, citing that "SASH projects could be installed with lower incentives due to lower panel prices and benefits of a third-party ownership (TPO) financing structure"[15].

Under the optional TPO model (exclusive for systems greater than 2 kW CEC-AC), the TPO company provides an additional funding stream to the participating project in exchange for the project's rebates and tax benefits (ITC, MACRS, SRECs, etc) GRID first uses the TPO funding to pre-pay the participating household's 25-year power purchase agreement (PPA) with the TPO company and uses the remaining funds to pay installation and professional service costs. For all TPO projects, customer billing remains via the corresponding investor-owned utility (IOU, either PG&E, SCE, or SDG&E) and is equivalent to the customer's purchased energy less the PV system's generation amount across a billing period. Once the 25-year PPA expires, the TPO

[14] For reference, SASH realized a total installed capacity of roughly 15 MW between 2015 and 2022 using a $3/W ratepayer-funded incentive. Prior to 2015, SASH offered a $7/W incentive for CARE-households and $5.75/W for non-CARE households which resulted in a total installed capacity of approximately 16 MW across a 7-year period.
[15] Rulemaking R.12-11-005, Pg. 27.

company will either (i) uninstall the system at no cost to the customer, (ii) sell the system to the customer at its depreciated value, or (iii) sell a new PPA to the customer.

Finally, the CPUC ordered in Decision D.18-06-027 that the selected DAC-SASH program administrator (PA) must be able to create partnerships with private sector and government agencies to explore other funding options. This mandate derives from the SASH program, which relied on PA-sourced philanthropic fundraising to balance costs following a decrease in the program's installation incentive (from $7/W to $3/W). GRID, who also served as the SASH PA, was ultimately selected as the DAC-SASH PA through a competitive solicitation.

For reference, the SASH program installed approximately 1000 annual projects via the program's $3/W incentive, TPO contributions and philanthropic funding (negating any financial contributions from participating households). It was estimated that GRID contributed $4-5 million/year to the SASH program using philanthropic funds, TPO proceeds, equipment donations, and other resources (which received $7-9 million/year in program incentive funds compared to $8.5 million/year for DAC-SASH)[16].

[16] Decision D.18-06-027, Pg. 21.

2. Introduction

2.1 Primary Barrier to Program Participation

The CPUC requires a measurement and verification study to be conducted every three years "to evaluate the effectiveness and efficiency of both the PA and the DAC-SASH program overall"[17]. In 2023, Evergreen Economics (an independent evaluation consultant contracted to conduct the study) released the program's first evaluation report, which documented program performance through March 2022. The report found that many eligible households were unable to participate in DAC-SASH due to various professional services needed to make their homes solar-ready.

Professional services costs are associated with solar-readiness expenses extending beyond standard installation and materials costs, such as re-roofing, electrical service upgrades, and tree trimming (see Appendix B). The program incentive ($3/W) does not apply to professional service costs, and whenever possible, GRID covers solar readiness expenses using TPO funding and sourced philanthropic funding (if available). GRID reserves judgment over home solar readiness and typically does not reserve applications for homes with solar shading, incompatible electrical panels, or roofs with less than ten years of roof life remaining to ensure the maximum benefit to applicants across the system's lifetime[18]. In cases of solar-readiness issues, project costs are typically much higher than the combination of project funds (program incentive, TPO, philanthropic funding), thus creating large funding gaps.

$$Funding\ Gap/W \ = \ System\ Cost/W \ + \ PS/W - \ Program\ Incentive/W \ - \ TPO/W$$

To effectively serve projects with large funding gaps resulting from professional services, GRID makes a good faith effort to source additional external funding resources for the necessary applicant. The applicant is also informed of the funding gap and given the opportunity to cover the outstanding costs out-of-pocket. Program data suggests that households requiring professional services either fully or partially covered their project's funding gap on only 30 occasions (i.e., GRID pays the funding gap in almost all completed projects)[19]. GRID assesses that "virtually 100 percent of all completed projects require additional funding to ensure that customers have no costs"[20]. In cases where GRID cannot source additional funding and the applicant is unable to cover the cost overhang, the project status is set to "inactive" until the

[17] Decision D.18-06-027, Pg. 38.
[18] DAC-SASH Handbook, Pg. 11.
[19] This finding is corroborated by the analysis conducted in Evergreen's 2023 Program Evaluation. Discussions with GRID indicate that households paid for professional services on more occasions. For instance, these 30 cases are projects for which professional services were identified post application filing. There are likely several projects that were not solar ready prior to filing an application and received professional services through a lateral municipal program (e.g., City of Richmond's roofing program). However, current data collection does not capture this information and it cannot be accurately quantified (see 'Note C' and 'Professional Service Tracker' sections found in Appendix A).
[20] DAC-SASH Evaluation Final Report, Pg. 20.

required professional services are completed. If a project remains inactive indefinitely, it will not progress to the milestone necessary to receive the program incentive. Table 1 (sourced from Evergreen's 2023 Program Evaluation report) displays the prevalence of solar readiness barriers among applications reported as "inactive" in DAC-SASH compared to SASH.

Table 1: Recorded Reasons for Inactivity[21]

		DAC-SASH (n=508)	SASH (n=1,728)
Inactive Reason	Detailed Reason	Percent of All Inactive homeowners	Percent of All Inactive homeowners
Home not solar ready	Roof issues (unsafe, repairs needed, or too small)	43%	44%
	Code barriers	13%	13%
	Solar shading	8%	12%
	Other professional services needed	4%	6%
Not interested	Not interested in the program	20%	18%
	GRID lost contact with the customer	10%	5%
Eligibility	Not eligible	6%	9%
	Energy usage is too low	3%	4%
	Other eligible	3%	4%

**Data includes projects leading up to March 2022.*

Evergreen's findings are corroborated using program data leading up to February 2024. Of the approximately 1043 inactive projects currently listed, 676 require professional services to achieve solar readiness (55% of which are roof-related, for comparison)[22]. As for completed projects, 959 of 2341 projects have undergone professional services (roughly 14% of which were roof-related, for comparison).

Considering that DAC-SASH mirrors the inactivity reasons of its preceding program (in which projects could pre-date DAC-SASH by up to 10 years), it is evident that the participation barriers

[21] Adapted directly from Evergreen Economics' (i) DAC-SASH Evaluation Final Report, Pg. 55 and (ii) SASH Evaluation Final Report, Pg. 42.

[22] See Appendix A: Inactive Projects Activity Tracker to see the range of reasons for which a project may be listed as inactive.

associated with solar readiness among low-income adopters are longstanding and not isolated to DAC-SASH. In fact, prior to the inception of DAC-SASH, the CEC reported in a 2016 study that low-income homeowners living in DACs are more likely to live in older buildings with structural issues, thus making energy retrofits unviable without prior upfront investment[23]. The CEC also reiterated the findings of previous studies regarding the limited disposable income and poor credit of low-income homeowners, which restricts their ability to pay upfront costs for energy-saving programs.

The DAC-SASH program is constrained by limited philanthropic funds, which GRID aims to distribute across as many projects as possible. Typically, these funds are sufficient to fill the smaller funding gaps encountered by solar-ready projects, ensuring that practically all can participate. However, homes requiring extensive professional services to become solar-ready often face significant upfront costs, which neither GRID nor the household can afford. This results in approximately 65% of inactive projects being unable to participate in the DAC-SASH program. Inadvertently, the frequency at which homes are unable to participate in DAC-SASH has also resulted in an incentive budget surplus, in that inactive homes cannot receive the program incentive until they have progressed to eligibility (i.e., achieving home solar-readiness). The decision not to cover these homes with philanthropic funds stems from the need to optimize resource allocation across a larger number of projects, even though this means some homes cannot be included. This funding strategy is a deliberate choice by GRID to stretch its limited philanthropic resources, ensuring the broadest possible impact within the constraints of the program's funding structure. Considering that many low-income DAC homeowners live in aging buildings, it is evident that a substantial portion of DAC-SASH's intended beneficiaries are unable to participate in the program due to funding gaps resulting from upfront, professional service costs that neither GRID nor the interested household can bear.

2.2 Rationalizing Program Intervention

Evergreen Economics' estimates suggest that there are approximately 176,000 DAC-SASH-eligible households (8% of all DAC households)[24]. With only 2,341 projects completed, program penetration is roughly 1%. Since non-participant data suggests that solar adoption among the eligible population could be as high as 11%, DAC-SASH trails market trends significantly[25]. GRID concludes that DAC-SASH enrollment is well below their regional level projections by also citing several additional barriers to participation–(i) higher material costs and limited program outreach during COVID and (ii) challenges in finding solar-ready households[26]. As discussed in this section, the CPUC should intervene and address the program's large funding gap as opposed to relying on the added benefits of other program barriers being addressed.

[23] SB 350 Low-Income Barriers Study, Part A - Commission Final Report, Pg. 2.
[24] DAC-SASH Evaluation Final Report, Pg. 34.
[25] DAC-SASH Evaluation Final Report, Pg. 39.
[26] DAC-SASH Evaluation Final Report, Pg. 18-19.

Regarding the negative impacts of COVID on project costs raised by GRID, current trends suggest that the inflationary pressures that previously raised fuel and building material prices are trending towards pre-COVID levels[27] [28]. Under these circumstances, DAC-SASH installation costs should retract to levels originally accounted for during the program launch. As for the effects of COVID on program outreach, GRID currently receives leads from both a predictive marketing tool (Faraday) and IOUs (as mandated in Decision D.20-12-003 in 2021) to streamline their marketing efforts. The leads effectively identify eligible households, however, limited information concerning the home's solar readiness can be collected without a site visit. In some municipalities, GRID staff have concluded that roughly 50% of vetted leads are not solar-ready following a site visit (thus requiring professional services)[29]. Given this challenge, GRID could increase annual project output by filtering predicted solar-ready leads by municipalities with significantly higher percentages of completed projects featuring solar-ready homes (e.g., inStockton, Manteca, Los Banos, Bishop)[30].

Alternatively, GRID could also focus on sourcing leads in municipalities with existing home weatherization programs (e.g.,, City of Stockton) to offset the expected costs of common professional services (e.g., roof-related professional services). In either of these cases, program enablement is not reliant on program intervention by the CPUC. Although expanding efforts in DACs with higher trends of solar-ready applicants or in municipalities with existing home weatherization programs are prudent strategies if measured, they neither comprehensively achieve the intent of DAC-SASH nor reflect the circumstances of a significant portion of the eligible population (aging homes that are not solar ready in municipalities without home weatherization programs). In contrast, addressing the program's large funding gap will increase program performance meaningfully in that GRID could presumably pursue all eligible and interested candidates, regardless of solar-readiness status or inflationary pressures on project costs. Unlike the other barriers cited, funding reform requires the CPUC's intervention in that program changes can likely only be enabled via a regulatory proceeding leading to a formal decision.

In terms of the CPUC's obligations to the program, the Commission is responsible for creating alternatives designed for rooftop solar growth among residential homeowners in DACs and enabling energy usage and bill savings comparable to the general market without increasing monthly household expenses (as ordained originally in AB 327 and subsequently in Decision D.18-06-027). Although participating households rarely incur direct costs from the program, it is essential to assert that even in the absence of DAC-SASH, households that are not solar-ready

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[27] U.S. Energy Information Administration. "Average Retail Price of Electricity to Ultimate Customers by End-Use Sector, by State."

[28] National Association of Home Builders. "Building Materials Prices Plummet in 2023."

[29] DAC-SASH Evaluation Final Report, Pg. 42.

[30] See Section 4.1 for more county specific findings. In general, focusing on high uptake counties as a strategy could be further complemented by participant word-of-mouth marketing, which was reported as the most effective stream of program marketing in Evergreen's 2023 Program Evaluation report.

are still subject to the proposed costs. That is, aside from select solar-readiness expenses like tree-trimming, most pertain to professional services that a corresponding household already requires (such as re-roofing to address home leaks)[31]. Albeit, the CPUC would still be in pursuit of its mandate by addressing professional service costs since these costs frequently inhibit program participation among the target population, thereby limiting rooftop solar growth in DACs. Without the CPUC's intervention, widespread adoption of the program's intended benefits will continue to fall short and potentially omit households who are most in need[32].

2.3 Problem Definition & Research Objectives

Too many eligible households are unable to participate in DAC-SASH due to a large program funding gap resulting from frequent home solar readiness expenses among applicants.

As of February 2024, approximately 676 projects remain inactive due to unsupported professional service costs for solar readiness. This represents roughly 65% of all inactive projects or 20% of all projects (project status either "completed" or "inactive"). The program funding gap has limited projects requiring professional services to only 41% of the total completed project composition, which is presumed to be the upper bound under the current incentive structure.

Table 2: Frequency of Professional Services Among Completed and Inactive Projects

Project Status	Total	Projects Requiring Professional Services	Percent Total of Projects Requiring Professional Services
Completed	2341	959	41%
Inactive	1043	676*	65%
Active (ongoing)	638	250	39%

**Note*: Regarding inactive projects, Project IDs with inactivity reasons related to professional services were considered in Table 2 (excluding inactivity reasons such as not interested, solar pitch, or lost contact, for instance). In Section 4, only inactive applications with system size details are considered (n=582), of which 65% require professional services.*

This study aims to thoroughly investigate the program's funding gap under status quo conditions and analyze policy alternatives that can sustainably reduce the deterrence that solar readiness and subsequent professional service expenses have on project completion. More specifically, this study will:

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31 It is also worth reiterating that the CPUC had foresight of this when it originally selected GRID as program administrator because of its ability to leverage third party funds as a non-profit to help offset professional services costs that are typically not covered by ratepayer funds.

32 Recall that participating households have historically reduced their net electric bills by 94% (approximately $990 annually).

1. Report on program performance and funding shortfall as of February 2024.
2. Investigate professional service costs and quantify their impact on the program's funding gap.
3. Evaluate the effect of program incentive and TPO alternatives on annual project output and the accommodation of projects requiring professional service.
4. Weigh tradeoffs and make final recommendations.

2.4 Policy Alternatives & Evaluation Criteria

Policy alternatives were determined after reviewing the program's most recent evaluation report, GRID's semi-annual program reports, stakeholder comments from tangential regulatory proceedings (e.g., SGIP), and other low-income solar programs (e.g., San Diego Solar Equity Program). Insights from both GRID and CPUC staff were also considered when selecting policy alternatives for analysis and evaluation. Policy alternatives centered on reducing the program's funding gap were considered as long as they were presumed sustainable across the remaining program years and applicable to most applicants. For this reason, alternatives such as concurrently pursuing other municipal programs (e.g., municipal roof repair programs) or rebalancing DAC-SASH's other budgets to free up funding were excluded from further consideration[33].

The resources mainly referenced expressed interest in making professional service expenses covered by the program incentive. However, since a program funding gap already exists, this alternative would not be viable unless the incentive level also increased. For this reason, increased incentive levels were considered for analysis for the case in which professional services are not covered by the incentive (referenced as Case 1 in Section 5) and the case in which they are (referenced as Case 2 in Section 5).

Initial research indicated that although the program's TPO agreement underwent several iterations, the average amount received per installed watt remained relatively constant year over year (approximately $[redacted]/W). The passing of the Inflation Reduction Act (IRA), however, presents an opportunity for the TPO amount received to be increased in that the IRA extends a 10% incentive adder to rooftop solar installations in low-income communities. The program's sole TPO company (SunRun) has not reflected the low-income adder in its contracted TPO rate

[33] Various municipalities (e.g., City of Richmond) have weatherization or home renovation programs which subsidize professional services, such as roofing or electrical service upgrades. Although effective, most municipalities do not offer these programs, making it an alternative viable to only select participants (the CPUC also does not have the regulatory authority to enforce municipalities or programs outside of the Commission and IOUs). As for DAC-SASH's other program budgets (e.g., administrative, marketing, etc.), this report does not suggest that an opportunity does not exist to rebalance the current program budget or optimize spending. However, considering that 85% of the program's annual budget is dedicated to project incentives and has been historically underspent, allocating more ratepayer funds to cover a limited scope of costs did not seem effective. Furthermore, taking funding away from other necessary cost centers (e.g., administration and marketing) did not seem sustainable in the long term.

with GRID; however, other firms have[34]. As a result, increasing the TPO rate was selected as a policy alternative to discern its effect on the program's funding gap (referenced as Case 3 in Section 5).

Finally, operating the program under status quo conditions is a possible outcome, therefore, the status quo was thoroughly explored to establish a baseline that Case 1 through 3 could be compared against. Three criteria were selected to compare policy alternatives against the status quo–(i) administrative feasibility, (ii) rate of program participation among non-solar-ready homes, and (iii) total annual program output. Administrative feasibility weighs the practicality of each alternative's implementation by factoring in regulatory precedent, procedural challenges, and the extent of the CPUC's authority. The program participation rate among non-solar-ready homes considers the proportion of non-solar-ready homes facing no funding gap under each policy alternative and uses the determined metric as a probability indicator of project completion among non-solar-ready homes (which would otherwise become inactive projects under the status quo). The total annual program output criteria measures the total number of projects that each policy alternative can produce each year, thus incorporating AB 327's order for the sustainable growth of customer-sited renewable distributed generation in disadvantaged communities.

[34] [redacted] is a firm that participated in a pilot program as a TPO provider for GRID. Following the passing of IRA, [redacted] increased the TPO Amount paid to GRID to roughly equate to the net benefit received from SunRun (source: Pilot Evaluation issued September 2019 to GRID).

3. Research Methodology

To quantify the program's funding gap and test various policy alternatives, I first consulted and compiled several data sources to create a comprehensive, population-level data set. Section 3.1 offers an overview of these datasets, with detailed descriptions in Appendices A and B. Section 3.2 summarizes the estimation methods I selected, with extensive details provided in Appendices C through E:

- Appendix A: Data Summary
- Appendix B: Professional Services Definitions
- Appendix C: Funding Gap Estimation Methodology for Completed Projects (Status Quo)
- Appendix D: Funding Gap Estimation Methodology for Inactive Projects (Status Quo)
- Appendix E: Funding Gap Estimation Methodology for Policy Alternatives

3.1 Data Collection

Over the duration of DAC-SASH and its preceding program, SASH, both GRID and independent evaluators have frequently stipulated the effects of professional service costs on general program output. Although Evergreen's 2023 Evaluation Report previously quantified the size and frequency of professional service costs, these findings have not been used with other project characteristics to determine the program's funding gap. Moreover, research on inactive projects has been limited. As a result, various program interventions and policy alternatives have been suggested without quantifying their specific effects on the uptake of projects requiring professional services or general program performance. From a data collection perspective, the challenge in quantifying the funding gap and subsequently quantifying its effects on program performance is a consequence of project characteristics scattered across various datasets. Table 3 introduces the four datasets that were referenced and combined to conduct the analysis of this study (See Appendix A for further detail). The combined data set features all project characteristics specified in Appendix A per Project ID.

Table 3: Data Extracted From Various Program Datasets

	Low-Income PV Data Set	Professional Services Report	TPO Funding Report	Inactive Project Activity Tracker
Source	CalDGStats[35]	GRID	GRID	GRID
Publicly Available	⚫			
Program Incentive	⚫			

[35] Although the Low-Income Solar PV Data Set is provided by CalDGStats for public consumption, it is sourced directly from GRID.

Amount				
Installation & Equipment Cost	●			
Professional Service Type		●		O
Professional Service Cost		●		
TPO Recipient	●		●	
TPO Amount			●	
Funding Gap	O			
Inactive Project ID				●
Reason for Inactivity				●

Legend: ● – Yes   **O** – Partially

3.2 Methodology

3.2.1 Preliminary Findings

The methodology used to quantify the funding gap and its effects on program performance was applied to all complete and inactive projects for the status quo scenario in addition to the selected policy alternatives–increasing the program incentive and increasing TPO funding. Inactive projects were included in the analysis since preliminary data analysis suggested that inactive projects varied both in frequency and type of professional services required when compared to complete projects. Since inactive projects are those that the program could not support, their inclusion in the analysis is vital to discerning the additional funding needed to complete projects that were previously omitted. Inactive projects, however, neither feature any cost nor incentive data (since the projects were never undertaken); therefore, project characteristics that determine the funding gap–system costs, incentive received, TPO funding, and professional service costs–require estimation using available data. As detailed in Appendix D, installation and equipment costs, program incentive amount, and professional service costs were estimated by matching inactive projects with completed projects by system size categories (1 to 5 kW, incrementing by 0.25 kW)[36]. System size was selected as the matching

[36] Of the 1043 inactive projects, 461 projects were excluded from this analysis since no system size data was available. 386 of the excluded projects had professional service-related inactivity reasons.

variable in that it is independent of all other project characteristics and highly correlates to project costs and incentives incurred[37]. Required professional services were typically unreported for inactive projects, in which case the type of professional service was inferred using project inactivity reasons.

TPO funding was randomly assigned to 90% of inactive projects (assuming the same TPO uptake of completed projects) and estimated by also using system size as the matching variable[38]. The central assumption under this approach is that each professional service is limited to an expected cost range (see Section 4.2.1), and the critical difference between inactive and completed projects is the frequency and type of professional services required[39]. Ultimately, this methodology enabled preliminary findings surrounding completed and inactive projects with respect to general program performance, professional services, and program funding gap under the status quo (Section 4).

3.2.2 Policy Alternatives

To estimate the funding gap and program performance under each policy alternative, each policy alternative was applied retroactively to every completed and inactive project[40]. For example, if an increased incentive level of $4/W was being tested, the incentive level would be applied to each completed and inactive project to simulate the funding gap and corresponding program metrics in retrospect[41]. For each policy alternative, annual project output was calculated by assessing the revised program funding gap against GRID's funding contributions (TPO and philanthropic funding) and the program's incentive budget (Appendix E, Table E1). Concerning professional services, the funding gap of projects requiring professional services was used as a proxy for determining the intensity of non-solar-ready homes participation in the program (Appendix E, Table E2). For instance, if an additional 40% of all projects requiring professional services experienced no funding gap under a particular policy alternative when compared to the status quo, this would indicate greater program participation among households requiring professional services in that an additional 40% of projects would emulate the funding conditions of solar-ready homes. Ultimately, applying this methodology enabled the

[37] Program incentive is awarded per watt installed. The amount of material and labor hours (in addition to professional services costs, like roofing) correlate to the size of the system. Even in cases where costs do not depend on system size, such as electrical service panel upgrades, the cost reported per watt is relatively homogenous between two projects of the same size.
[38] Although TPO funding amount is also determined using additional factors, matching TPO amounts by system size proved to be inconsequential since negligible variation was observed in TPO amount received per watt across system size categories (see Table D6 in Appendix D).
[39] In other words, a roof repair for an inactive project should fall within the cost range predicted by completed projects, however, the frequency of roof repairs among inactive projects can drastically differ from that of completed projects.
[40] Project characteristics of Inactive projects use the estimates determined in Section 3.2.1.
[41] Applying policy alternatives retroactively suggests what program performance would have been had the policy alternative existed since program inception and been applied to the entire program population (all completed and inactive projects).

comparison of policy alternatives against their implied effects on program participation among projects requiring professional services as well as total annual project output.

4. Preliminary Findings

This section overviews DAC-SASH's performance using data from projects listed as either completed or inactive through January 2024. The key takeaways from the status quo scenario are:

General Program Performance

1. The program has experienced uptake in 54% of eligible counties, with an average of 76 projects completed per county. San Joaquin County has completed roughly 680 projects, more than double that of the next leading county.
2. Annual project output has grown by 15% year over year (YoY), while the number of applications inactivated (for reasons including solar-readiness costs) has increased by 40% YoY.
3. Approximately $16.8 million in unused program incentive budget from programs years 2019 through 2023 has spilled over to the program's remaining years (2024-2030), resulting in an average annual program incentive budget of $10.9 million.
4. GRID, on average, contributes $2.1 million in TPO funding and $2.1 million in philanthropic funding in each program year.

Professional Services

1. 41% of projects completed required professional services compared to 65% of inactive projects.
2. Electric Service Upgrades are the most frequent professional service required among completed projects (42%) as opposed to re-roofing for inactive projects (48%).
3. 179 previously inactive projects have reached completion, of which 153 required professional services.

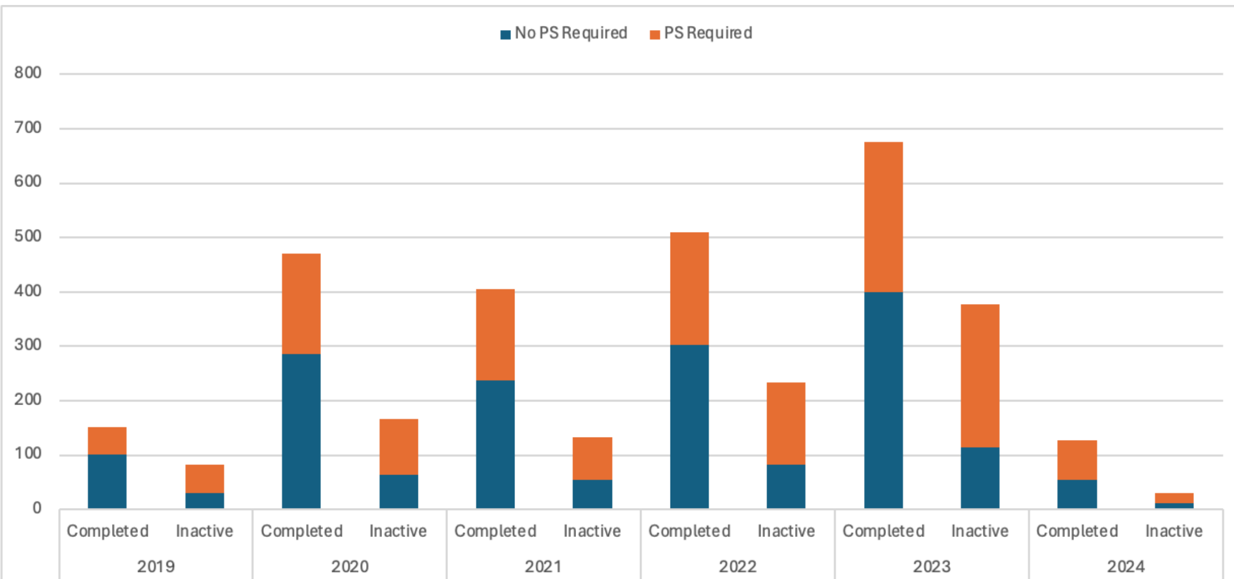
Funding Gap

1. Completed projects faced a funding shortfall of $2.04/W when professional services were required and $0.78/W when they were not (as compared to $2.64/W and $0.81/W for inactive projects, respectively).
2. Project costs usually exceeded the program incentive ($3/W) by a minimum of $1.86/W. That is, installation and equipment costs (i.e., system costs) amounted to $5.15/W when professional services were required and $4.86/W when they were not (as compared to $4.97/W and $4.90/W for inactive projects, respectively).
3. 90% of completed projects are third-party owned (TPO), which resulted in an additional $[redacted]/W in positive cash flow.

4.1 General Program Performance

DAC-SASH has experienced significant growth in participation since program inception in 2019. 2019 understandably experienced lower participation, considering that the program did not have a pre-existing pipeline of informed and interested applicants. GRID's operational capacity was also limited since SASH projects were still being completed. However, between 2020 and 2023, DAC-SASH experienced, on average, a 15% increase in completed projects YoY (Figure 2). Over the same period, the program, on average, inactivated an additional 40% of projects YoY, in which roughly 65% of inactive projects required professional services[42]. In other words, increasingly, more applicants are unable to participate in DAC-SASH due to professional service costs. The inactive project facing professional service costs would have presumably been completed had there been sufficient funds to cover their professional services[43].

Figure 2: Annual Program Activity Versus Projects Status & Professional Services Required



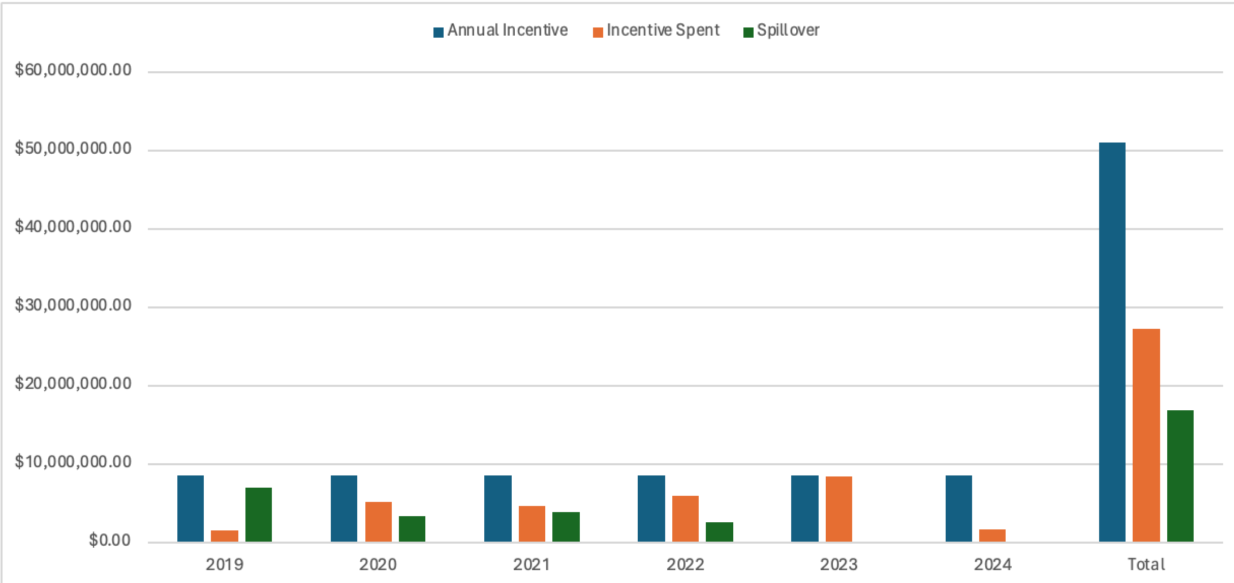
Although DAC-SASH does not specify an installed capacity goal, the program is significantly underutilized, considering the ongoing annual surplus of incentive funding. Recalling that DAC-SASH allocates $8.5 million annually to provide a $3/W incentive to completed projects (applicable to installation, material, and equipment costs, not professional service costs), only $6 million was spent on average between 2020 and 2023. Across all program years (excluding the current program year, 2024), the sum of incentive underspending equates to approximately $16.8 million, which spillover to program years 2024 through 2030 (Figure 3). If the total

[42] Program year indicates the year of completion for completed projects. As for inactive projects, program year indicates the year in which project status changed to inactive. Note that the year in which a project's status changes is not correlated to its application year. For instance, of the 377 projects that changed project status to inactive in 2023, 107 have an application year prior to 2023.

[43] Refer to Appendix E for methodology used to estimate professional service requirements among inactive projects.

spillover is annualized over the remaining program years, the annual incentive budget jumps from $8.5 million to roughly $10.9 million.

Figure 3: Annual Program Spending & Spillover[44]

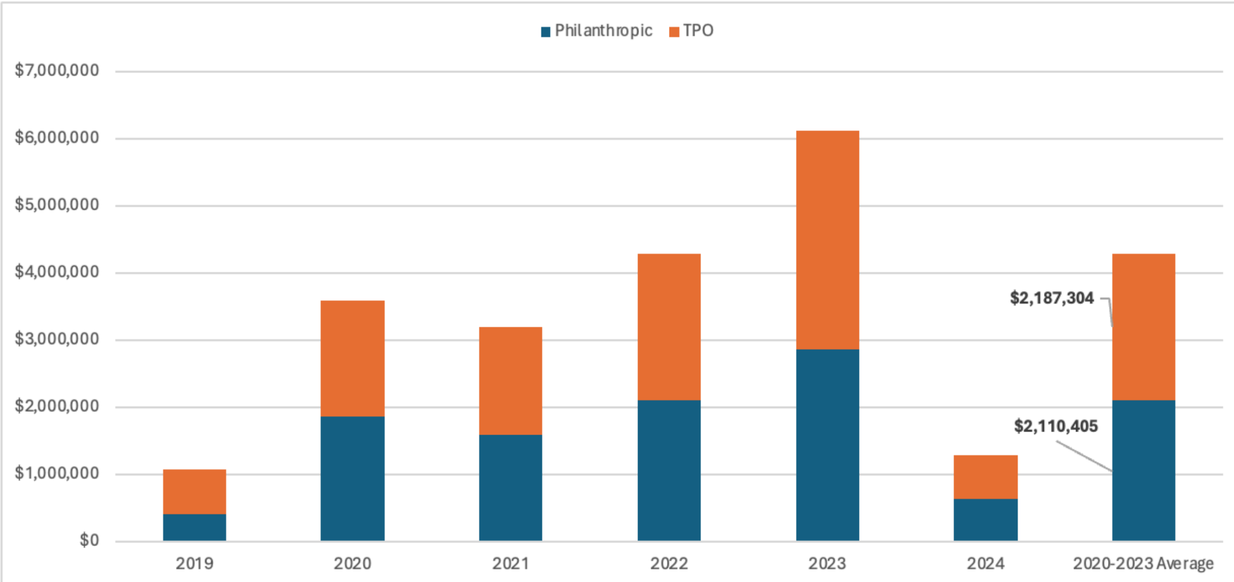


In addition to the annual incentive budget, GRID also makes annual program contributions to close the funding gap between a project's received incentive and its total system costs (including professional service costs). Although a required annual contribution has not been set, GRID is required to source external funds and explore funding options in light of a lower incentive rate (see Section 1.2). Between 2020 and 2023, GRID, on average, contributed $2.1 million in TPO funding and $2.1 million in philanthropic funding annually (Figure 4)[45].

[44] Program year 2023 saw approximately $8.4 million in incentive spending, resulting in 676 projects completed.

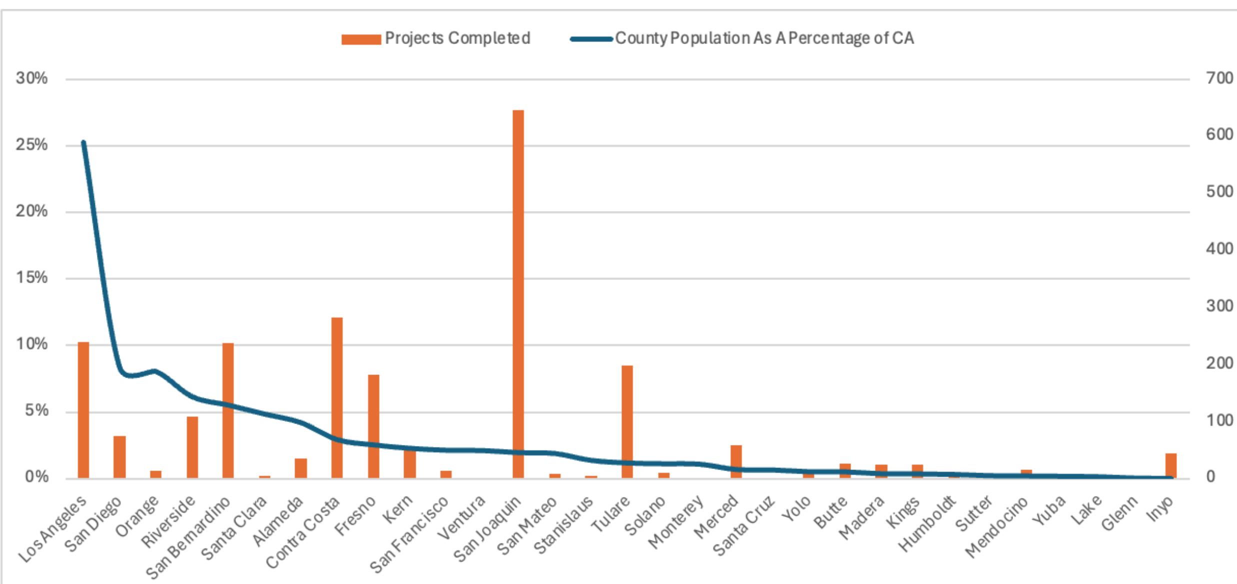
[45] For reference, GRID contributed $4-5 million/year to the SASH program (DAC-SASH's predecessor) using philanthropic funds, TPO proceeds, equipment donations and other resources (Decision D.18-06-027, Pg. 21). Although DAC-SASH and SASH have key differences, GRID's past program contributions were placed into the record and therefore considered when the current DAC-SASH incentive level was being set.

Figure 4: Annual GRID Contributions to Program Budget



Concerning program uptake per county, no correlation was observed between the number of projects completed and the county population (Figure 5). In total, 31 counties (54% of eligible counties) participated in DAC-SASH, while only six counties experienced more than 100 installations.

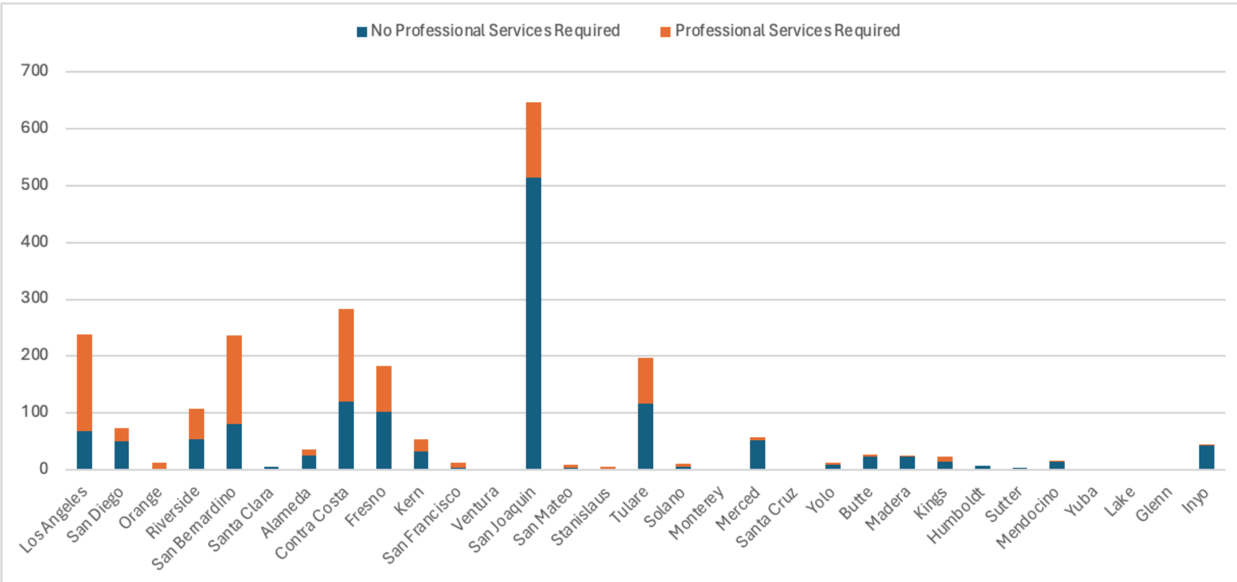
Figure 5: Program Uptake by County Versus County Population



Among the counties that experienced the highest levels of program uptake, San Joaquin Valley (SJV) experienced the most installations, most of which did not require professional services (Figure 6). GRID assesses that a large portion of SJV program participants (specifically in

Stockton) resided in new affordable housing units, thus avoiding professional service costs. For municipalities that offered fully expensed professional services to eligible applicants through a lateral program (e.g., Richmond), above-average program uptake was observed among applicants requiring professional services[46].

Figure 6: Program Uptake by County Versus Professional Services Requirement



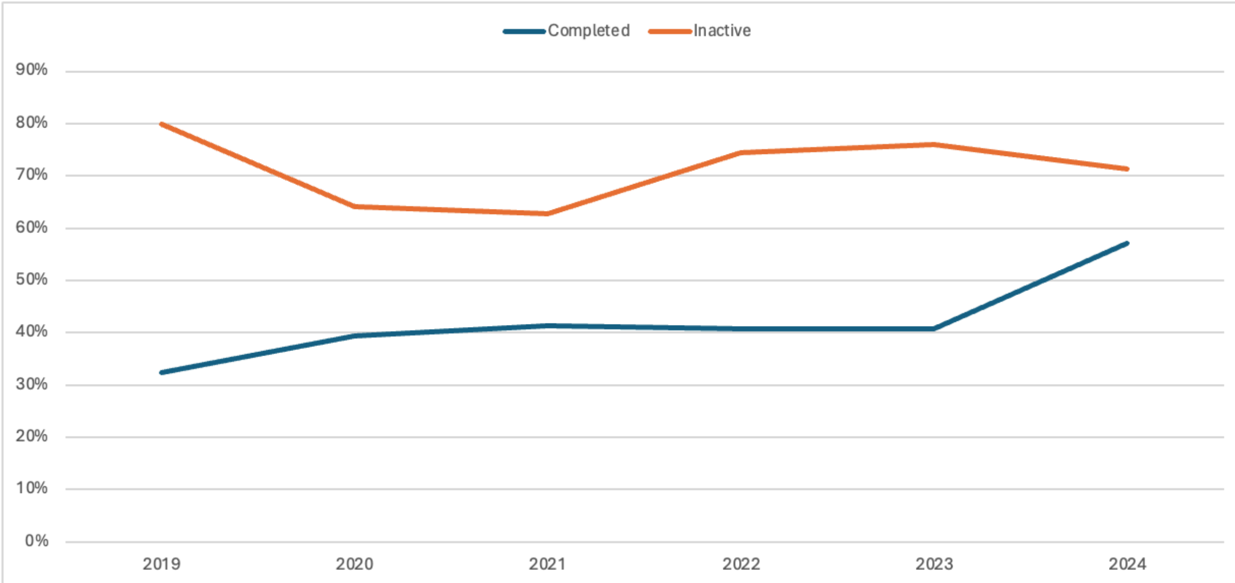
4.2 Professional Services

Professional service reporting varies greatly between completed and inactive projects. Inactive projects occasionally feature a direct record of the professional service(s) required; however, in most cases, the professional service requirement was inferred from a project's inactivity reason (see Appendix D). Since inactive projects do not actually take-up any professional services, the extrapolated data indicates the frequency, cost, and type of professional services that inactive projects would experience had sufficient funding been available. In contrast, professional service records for completed projects are exact, reflecting the actual services contracted.

Between 2020 and 2023, inactive projects required professional services 30% more often than completed projects (Figure 7). Although a converging trend can be observed in 2024, it is worth noting that 2024 only features one month of data and is, therefore, not representative.

[46] GRID has partnerships with the cities of San Francisco and Richmond to provide funding for roof repair or replacement, and has a philanthropic fund devoted to re-roofing for qualifying veterans in Los Angeles (DAC-SASH Semi-Annual Report (July 2023), Pg. 39).

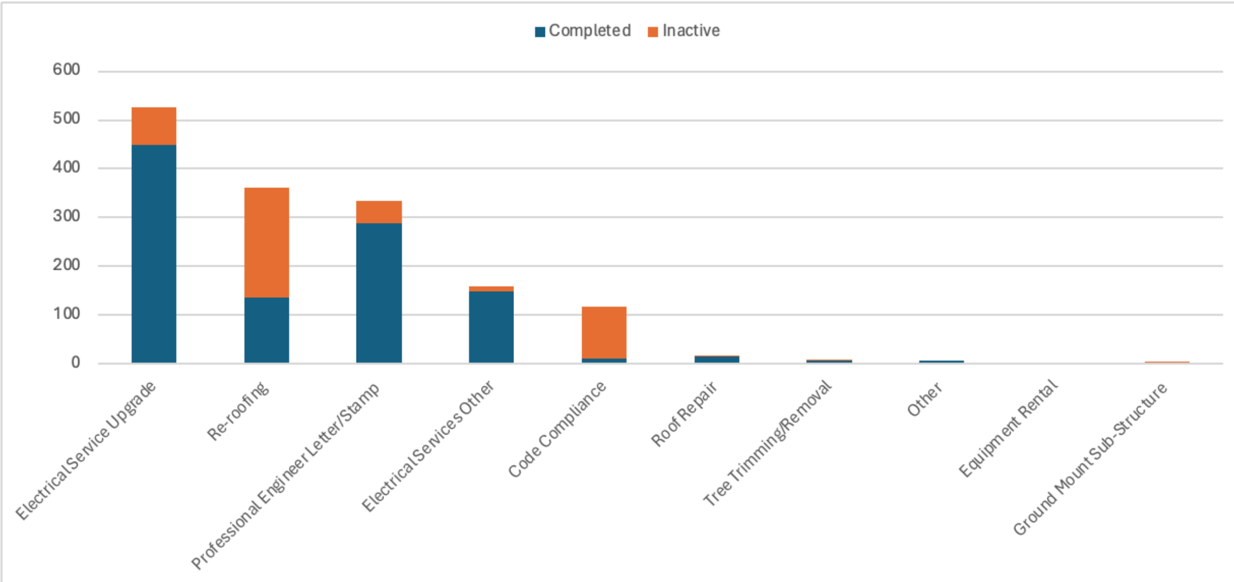
Figure 7: The Percentage of Completed & Inactive Projects That Require Professional Services



Furthermore, almost 50% of inactive projects requiring professional services were in need of re-roofing, as opposed to electrical service upgrades (ESU) being most common among completed projects[47] (Figure 8). On average, the re-roofing costs are $7,000 more expensive than ESU services. Sections 4.2.1 and 4.2.2 delve deeper into professional service requirements among completed and inactive project status groups.

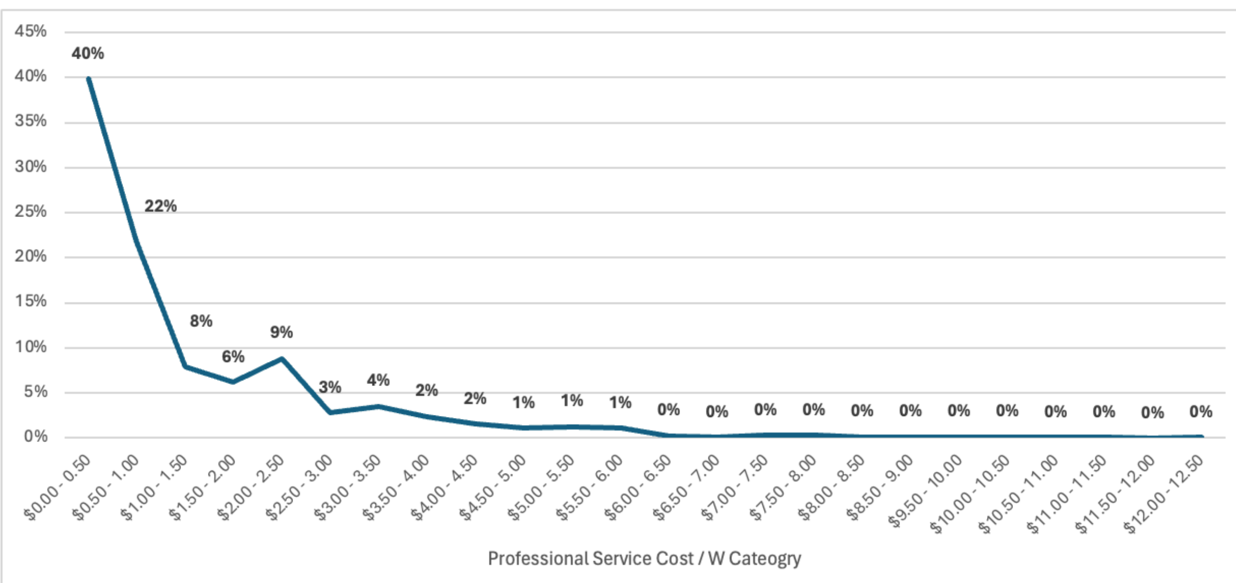
[47] As explained in Appendix D, roof-related inactivity reasons were presumed to infer 're-roofing' services because (i) roof repair (the only other roof-related professional service) was an infrequently registered professional service compared to re-roofing among completed projects and (ii) re-roofing is far more expensive than roof-repair (see section 4.2.1), leading to more conservative estimates of the funding gap among inactive projects (comparing Figure 19 to Figure 25).

Figure 8: Professional Services by Type & Project Status



Finally, the average professional service cost per watt for completed projects is $0.99/W and $1.78/W for inactive projects (detailed in Section 4.3). As displayed in Figure 9, approximately 62% of all projects (completed and inactive) requiring professional services faced costs of $1/W or less.

Figure 9: Percentage of All Projects Requiring Professional Services Distributed By Professional Service Cost Range



4.2.1 Completed Projects

As Figure 8 shows, completed projects requiring professional services predominantly featured professional engineering work, electrical service upgrades, or other electrical services. These costs (both per watt and as a sum total) are displayed in Figures 10 and 11.

Figure 10: Cost Range of Professional Services ($/W)

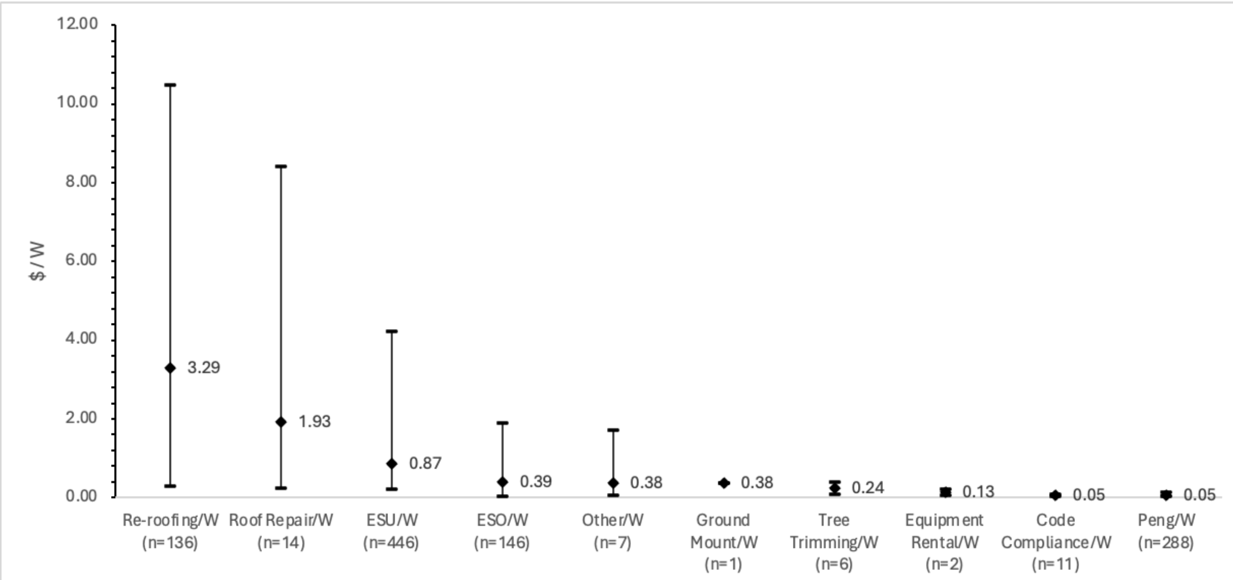
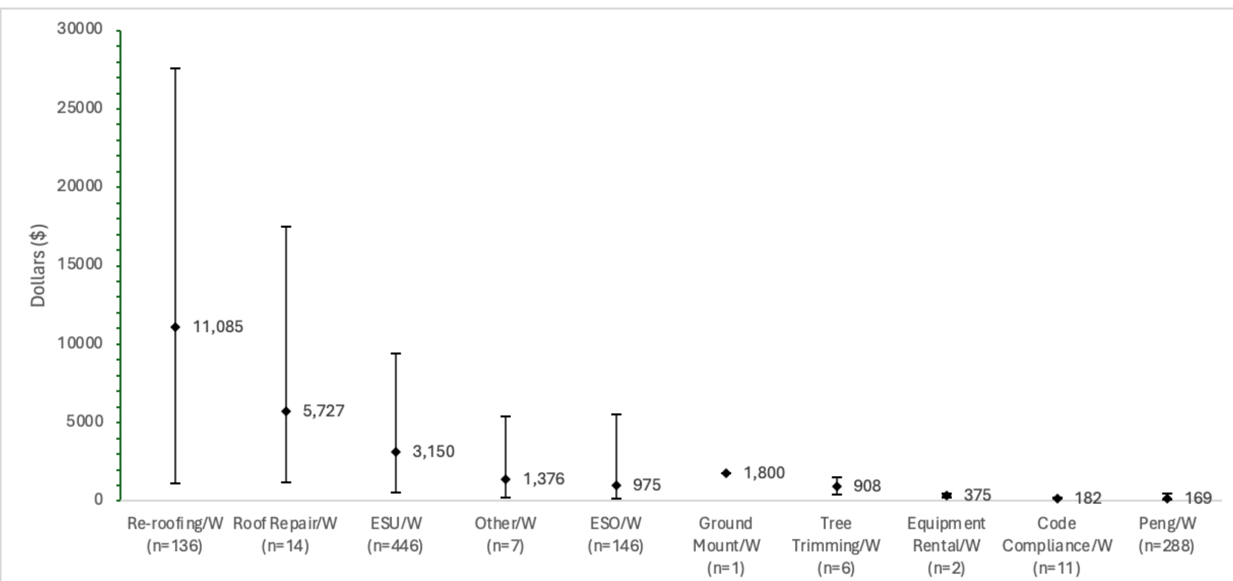
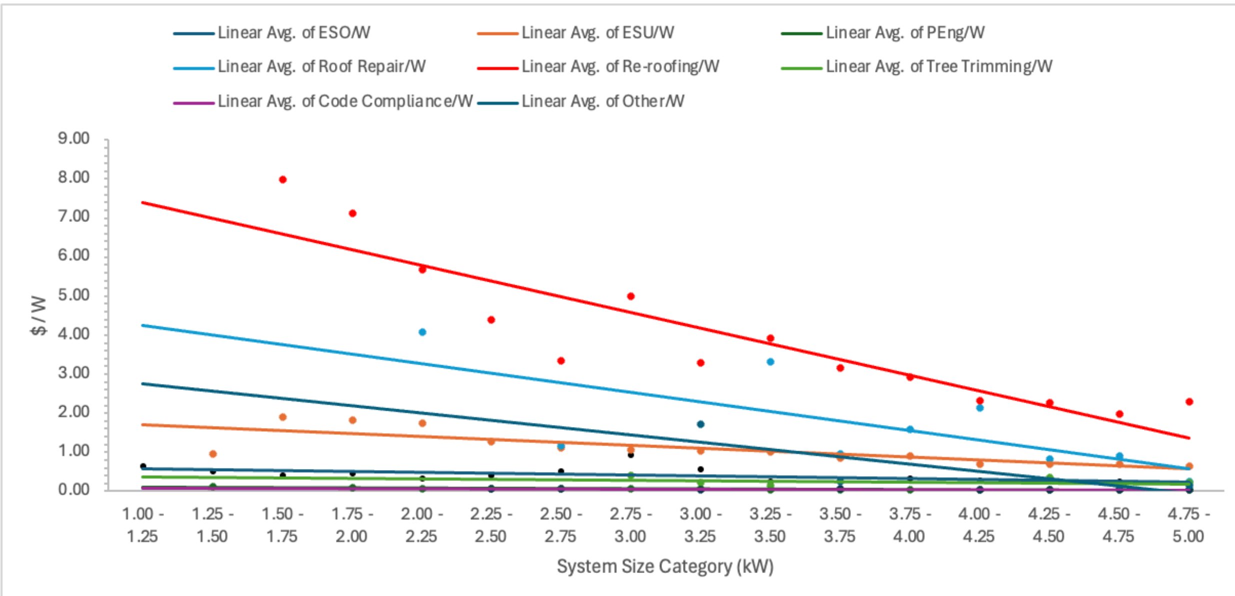


Figure 11: Cost Range of Professional Services ($ Amount)



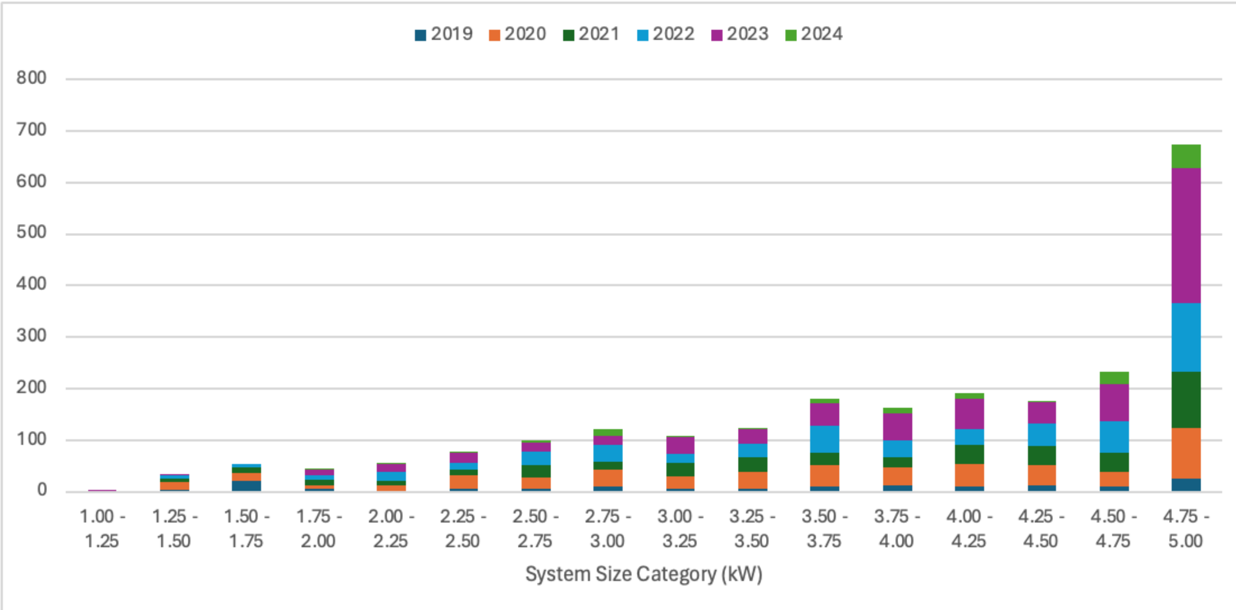
As displayed in Figure 10 and 11, there is a high variation in the cost per project among the highest-costing professional services. Some of the variation can be attributed to an applicant's home profile as the referenced professional services are unique to each home's circumstances (e.g., roof size and degree of damage, state of current panel, and level of re-routing required). However, variation in professional service costs can also be explained largely by system size (Figure 12). As system size increases, the cost per watt of the highest-costing professional services trends downwards, suggesting that some of the data outliers may be projects with smaller system sizes (less than 3 kW).

Figure 12: Professional Service Cost Per Watt Versus System Size



For reference, the average completed project features a system size of approximately 3.9 kW, while systems ranging between 4.75 and 5 kW are the mode for the dataset (Figure 13). Hence, the average professional service costs reported in Figure 10 correspond to a system found in the '3.75 - 4 kW' category of Figure 12.

Figure 13: Annual Projects Completed Versus System Size



4.2.2 Inactive Projects

As previously mentioned, professional service requirements among inactive projects were inferred from project inactivity reasons and also referenced professional service data when available[48]. Among the projects that directly recorded the type of professional service needed, electrical service and professional engineering work were among the most frequently required services (Figure 14). In contrast, the professional service requirements extrapolated from project inactivity reasons suggest roof-related and code compliance services would be in far greater demand among inactive projects (Figure 15).

[48] Direct professional service data was only available for 130 out of 676 inactive projects estimated to require professional services.

Figure 14: Registered Professional Services Among Inactive Projects

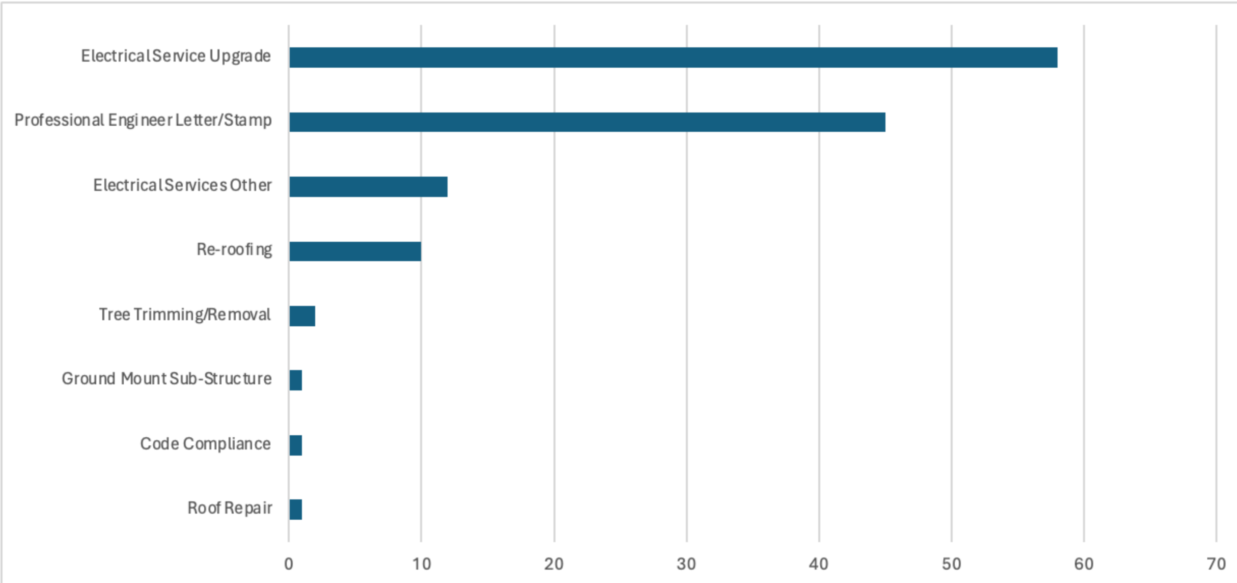
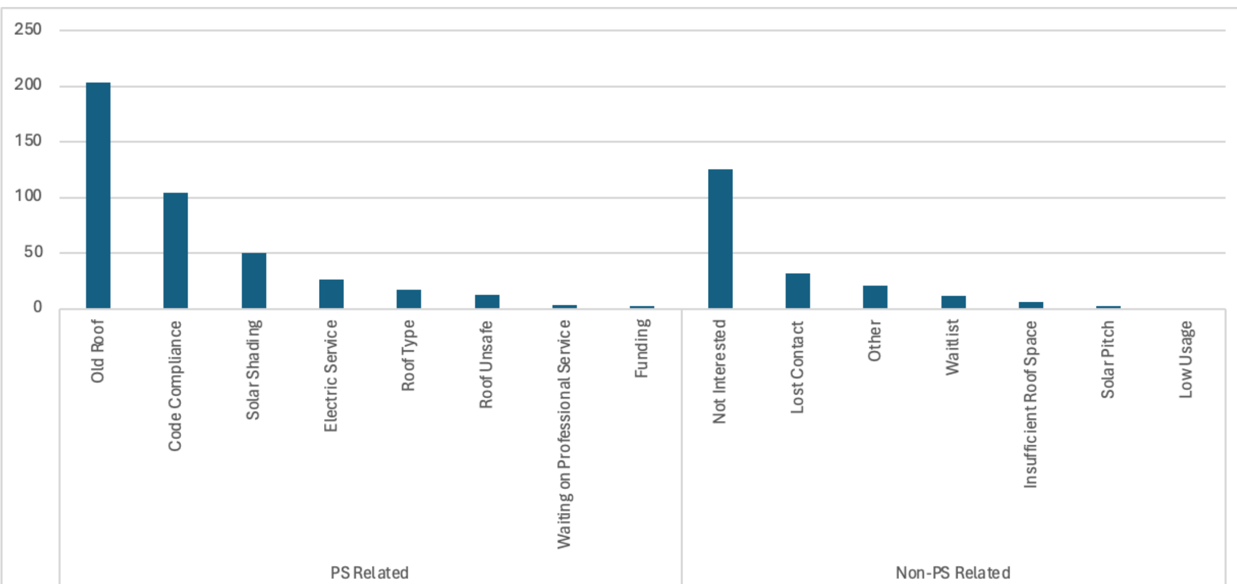
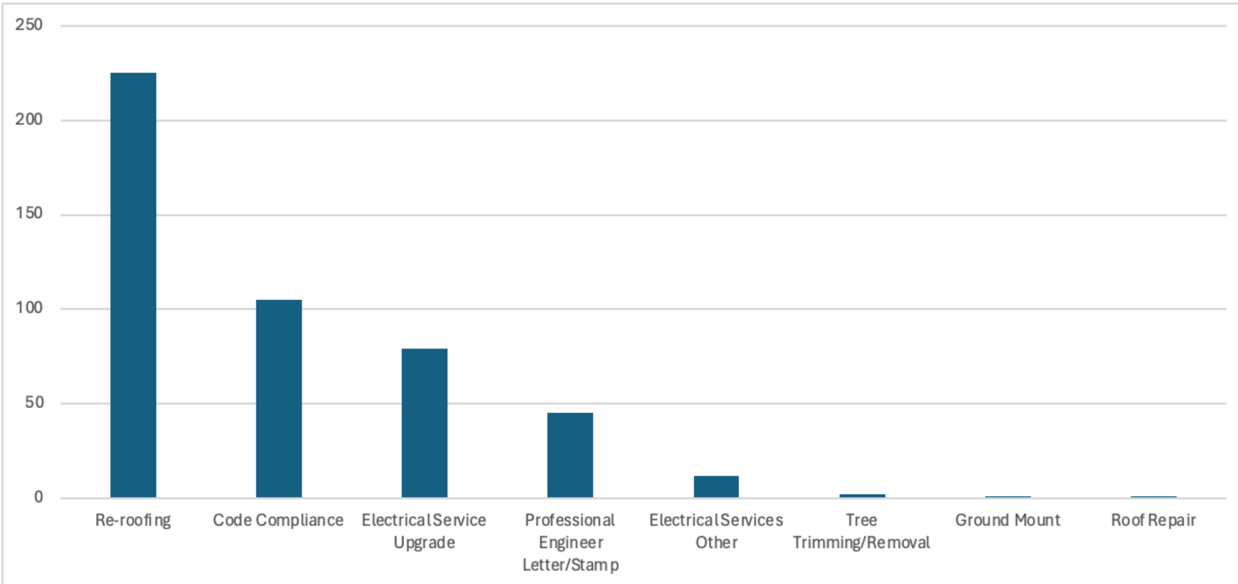


Figure 15: Inactivity Reasons for Inactive Projects



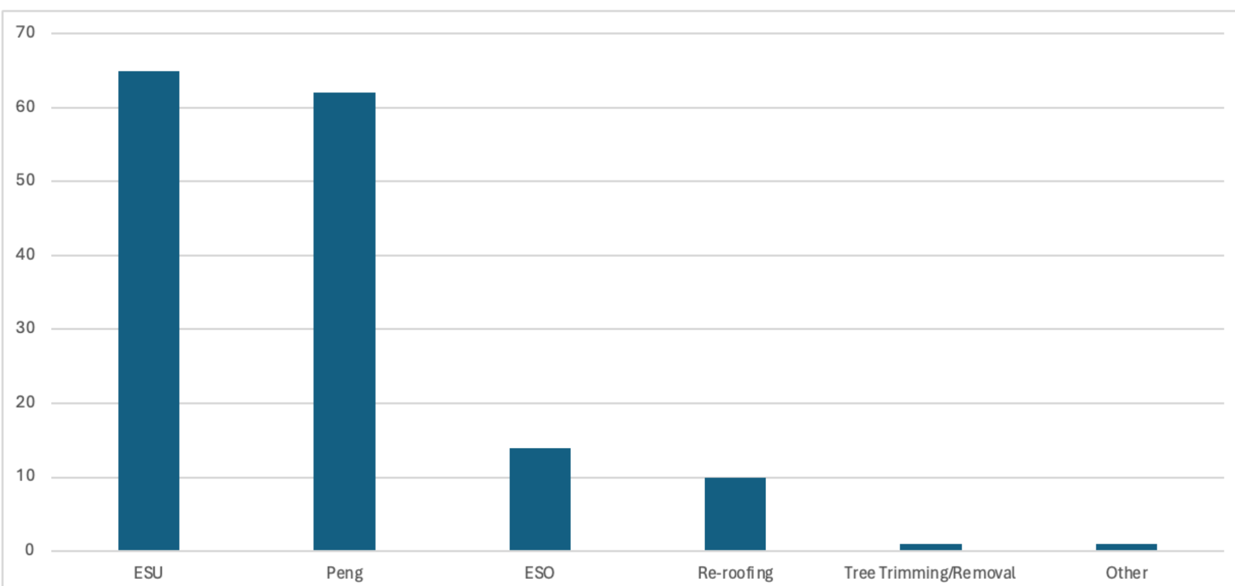
By combining the record of professional services required among inactive projects to those suggested by their inactivity reasons (see Appendix D), the results show that inactive projects require re-roofing and code compliance far more frequently than completed projects (Figure 16). As Section 4.3 will show, a higher demand for roof-related professional services implies a larger funding gap among inactive projects versus completed projects.

Figure 16: Estimated Professional Services Required Among Inactive Projects



Finally, the available data suggests that inactive projects rarely reach completion. In fact, only 179 inactive projects eventually became completed projects, of which 153 projects required professional services. Although re-roofing is in greatest demand among inactive projects, only 10 of the 153 projects featured re-roofing due to the high costs of the service Figure 17).

Figure 17: Previously Inactive Projects Versus Professional Service Type



4.3 Funding Gap

The funding gap is quantified as the amount of philanthropic funding that GRID must supply to fully cover a project's costs. The funding gap equation can be expressed as:

$$Funding\ Gap/W \ = \ System\ Cost/W \ + \ PS/W - \ Program\ Incentive/W \ - \ TPO/W$$

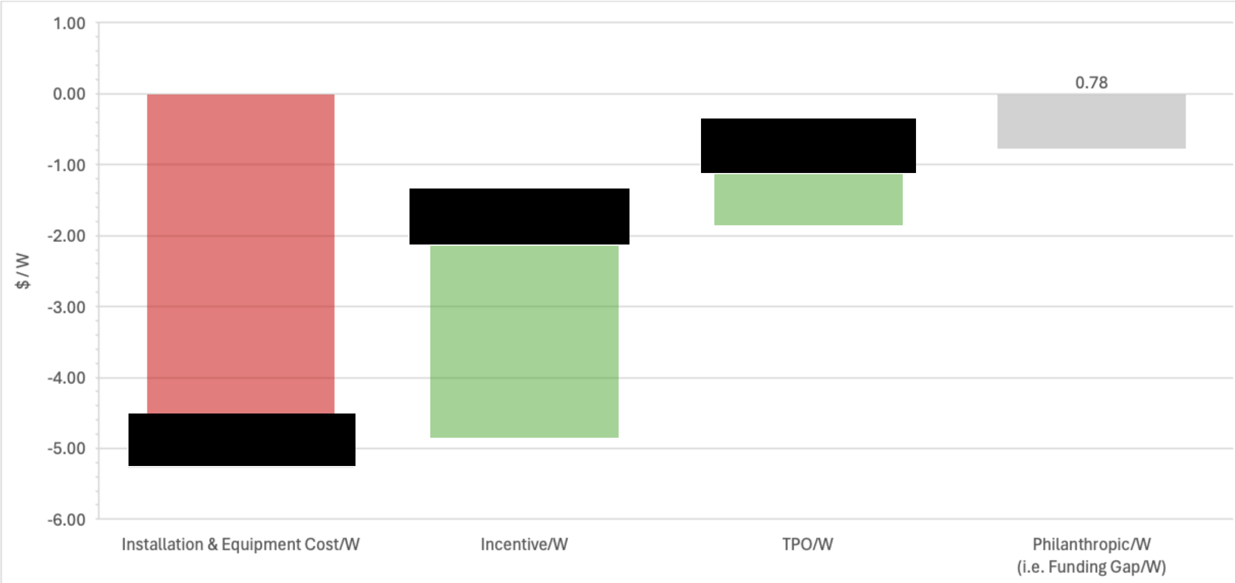
The presumed sequence in which these costs and payments are realized is as follows: (i) system expense (installation, materials, and equipment), (ii) professional service (PS) expense (if needed), (iii) program incentive payment and (iv) TPO payment (if opted for). As previously mentioned, this sequence can vary based on IOU territory (such that the program incentive may be immediately available).

The computed funding gap is reported in Sections 4.3.1 (completed projects) and Section 4.3.2 (inactive projects). In the case of inactive projects, the funding gap is an estimation as these projects did not actually incur any costs or receive any incentives. The methodology used to quantify the funding gap of both completed and inactive projects is detailed in Appendix C (completed projects) and Appendix D (inactive projects). The findings ultimately suggest a substantial funding gap exists even when no professional services are required, as system costs (installation, materials, and equipment costs) alone are $4.90/W. When professional services were required, the average funding shortfall was more than $[redacted]/W higher than solar-ready projects (thus avoiding professional service costs).

4.3.1 Completed Projects

Among completed, solar-ready projects, the average project system costs (installation, material, and equipment costs) surpass the program incentive by almost $2/W, leading to a funding shortfall of $0.78/W (Figure 18).

Figure 18: Average Cash Flow For Completed Projects Not Requiring Professional Services



When professional services were required, the funding shortfall grew significantly to $2.04/W (Figure 19).

Figure 19: Average Cash Flow For Completed Projects Requiring Professional Services

TPO uptake occurred at a rate of 90%, which is reflected in the average TPO/W reported in Figures 18 and 19[49]. Figures 20 and 21 display the range of each funding gap parameter.

[49] Figures 20 and 21 display the true average of TPO/W, whereas Figures 18 and 19 show a reduced value that is representative of 90% uptake (90% of True Average of TPO/W).

Figure 20: Range of Incentives and Expenses For Completed Projects Not Requiring Professional Services

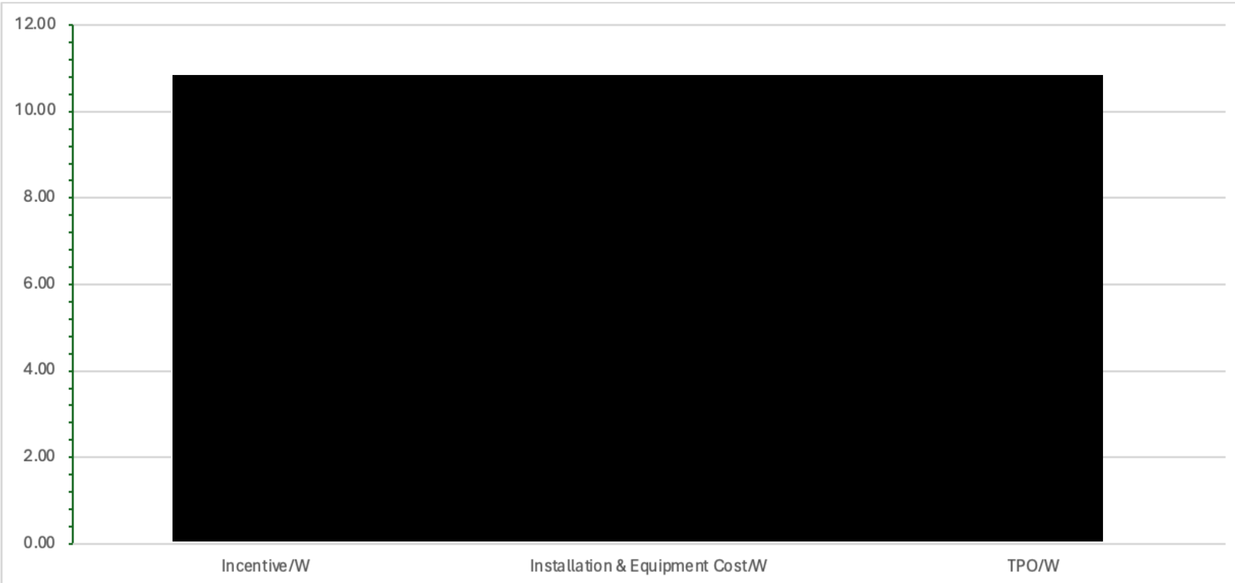
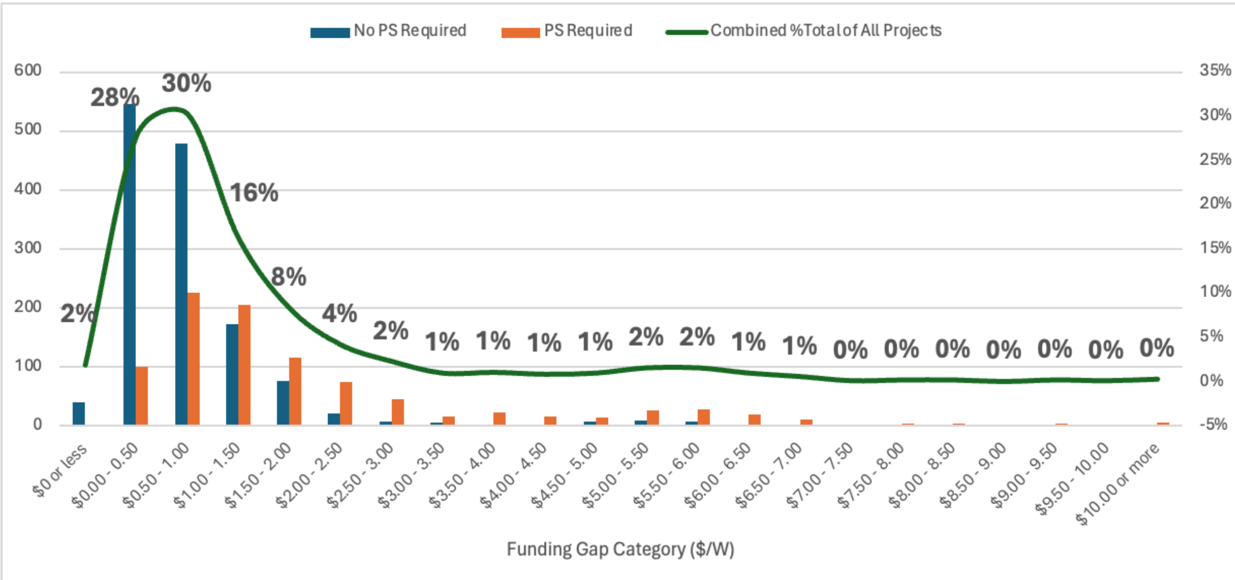


Figure 21: Range of Incentives and Expenses For Completed Projects Requiring Professional[50] Services

[50] Note that Project ID 50048 received $3/W despite installation & equipment costs only amounting to $0.90/W. When factoring in 50048 professional service costs, the project cost amounts to $5.07/W. In this case, it is presumed that program incentive funding was applied to professional service costs.

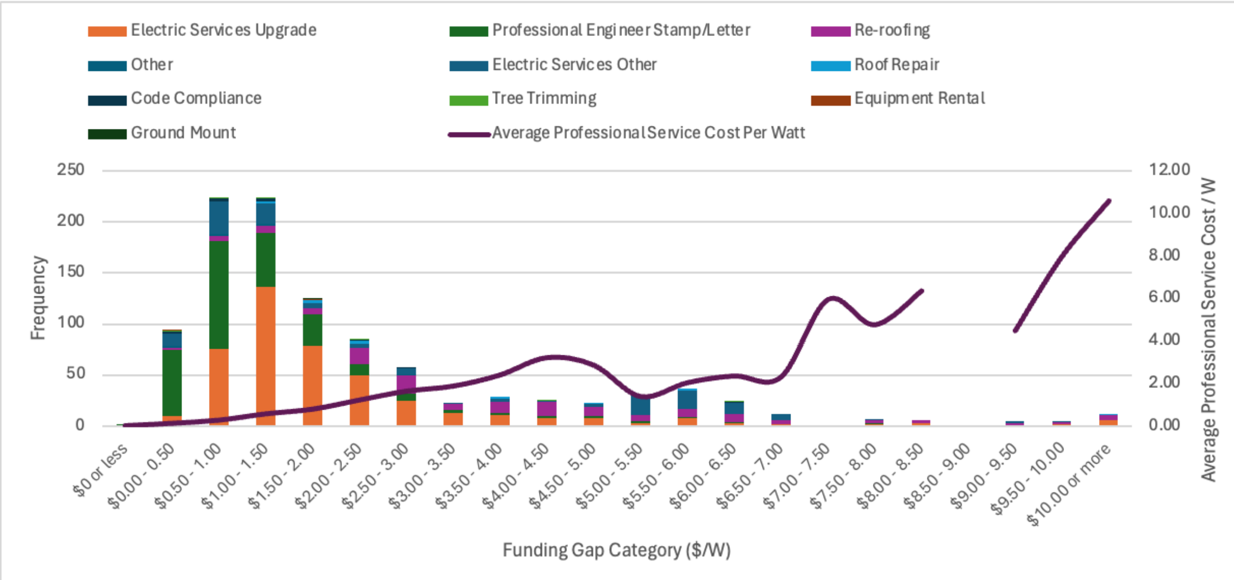
By grouping each completed project into a funding gap category ranging from $0/W to greater than $10/W (increasing by $0.50/W increments), it is observed that projects requiring professional services always experienced a funding gap. In fact, only 2% of all projects were completed without facing a funding shortfall (Figure 22).

Figure 22: Completed Projects Grouped By Funding Gap Category



For completed projects requiring professional services, Figure 23 indicates that electric service upgrades and professional engineering work make up the vast majority of professional service needs among projects that either met or were below the average funding gap ($2.04/W, Figure 19). Furthermore, professional service costs comprise a higher proportion of total costs for projects in higher funding gap categories (Figure 23).

Figure 23: Type of Professional Service Required Versus Funding Gap Category (Completed Projects)



**Note that Figure 23's primary vertical axis counts the frequency of professional services for projects found in each funding gap category. In other words, projects can be double-counted in this figure if they require more than one professional service.*

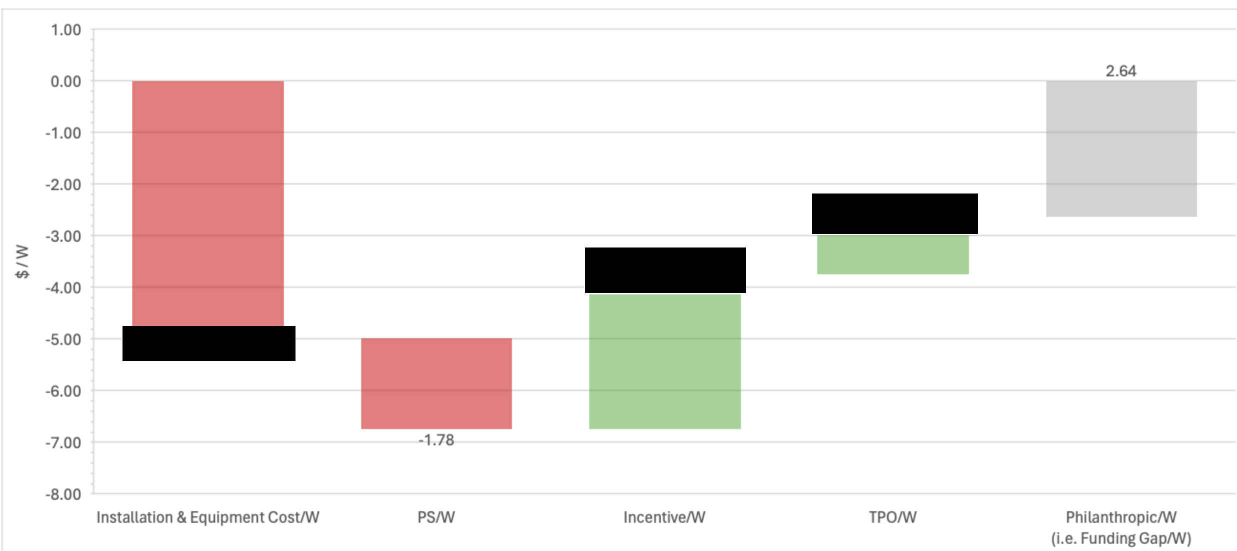
4.3.2 Inactive Projects

The average funding gap among inactive projects remains relatively unchanged when compared to completed projects not requiring professional services (Figure 24). This increase is primarily explained by the higher demand for roof-related professional services among inactive projects, which on average cost $3.29/W (Figure 10).

Figure 24: Estimated Average Cash Flow For Inactive Projects Not Requiring Professional Services

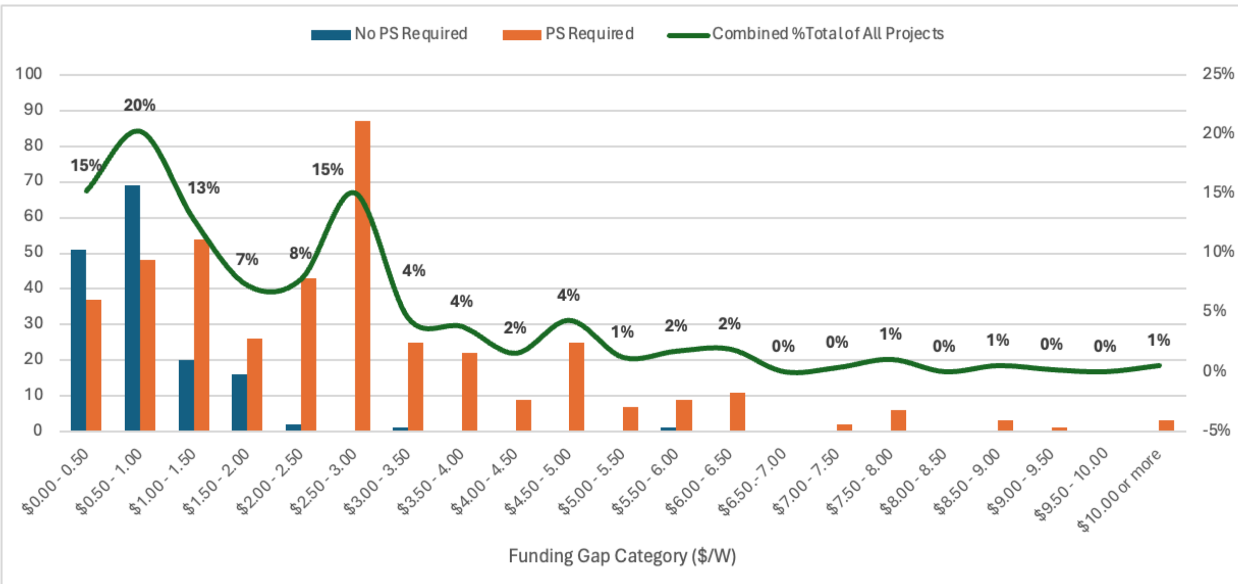
However, the funding gap is almost 30% larger between completed and inactive projects when professional services are required (Figure 25).

Figure 25: Estimated Average Cash Flow For Inactive Projects Requiring Professional Services



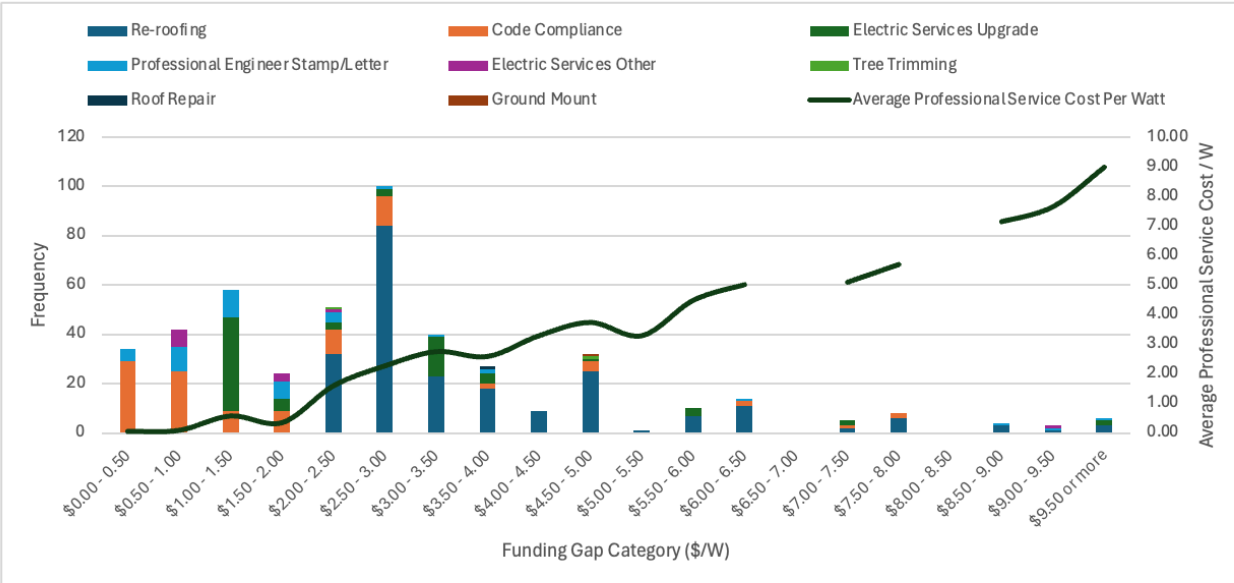
There are 51 inactive projects estimated to have a funding gap between $0/W and $0.50/W (Figure 26). This metric suggests that these projects should have likely been completed as they fall well below the average funding gap of completed projects not requiring professional services ($0.78/W). Nevertheless, of the 51 projects, there were 29 instances where the inactivity reason was listed as “not interested,” 5 instances where contact was lost with the applicant, and another eight instances where no inactivity reason was provided. It is unclear why these applicants lost interest or contact was lost. As for inactive projects that required professional services, far more than expected were found within the $0/W to $1/W range (85 projects).

Figure 26: Inactive Projects Grouped By Estimated Funding Gap Category



Looking more closely at these funding gap groups, code compliance and professional engineering services make up the vast majority of services needed (Figure 27). Professional engineering and code compliance services are the lowest-cost professional services at $0.05/W (n=288 for PEng and n=11 for code compliance, see Figure 10). Of these 85 projects, only ten featured ‘not interested’ or ‘lost contact’ inactivity reasons. Although it is not clear why these projects did not move forward if their funding gap largely fell below the average among completed projects, it is agreeable that these 85 projects have a funding gap below $1/W so long as the professional services needed are the lowest costing services either professional engineering work or code compliance).

Figure 27: Type of Professional Service Required Versus Funding Gap Category (Inactive Projects)



**Note that Figure 27's primary vertical axis counts the frequency of professional services for projects found in each funding gap category. In other words, projects can be double-counted in this figure if they require more than one professional service.*

5. Policy Alternatives

Under current DAC-SASH program guidance, the burden of professional service costs is placed entirely on GRID. Since GRID is unable to meet the demand of all households requiring professional services through its annual program contributions, program output is restricted, and the program incentive budget is underspent (Section 4)[51]. Furthermore, even when professional services are not required, total system costs, on average, exceed the program incentive by $1.86/W. To reduce the outstanding funding gap, TPO was taken-up in 90% of completed projects, resulting in a 35% funding gap reduction when professional services were required and 58% when not (Section 4.3.1).

This section explores two major program alternatives for improving general program uptake and program participation among households facing professional service costs–increasing the program incentive and increasing TPO funding. These alternatives were applied independently and retroactively to the entire DAC-SASH dataset (completed and inactive projects with system-size data available). A full explanation of the methodology used to conduct this analysis is found in Appendix E.

The key takeaways from the analysis of the policy alternatives are:

Increasing Program Incentive

1. Under the status quo, approximately 1% of projects (approximately 43 projects) studied have no funding gap.
2. At incentive levels leading up to $5/W, there is little to no difference in performance between program incentive configurations where professional services are covered by the incentive versus when they are not.
3. Total annual project output peaks at 786 when incentive levels equal $3.75/W and $4/W.
4. At incentive levels greater than $4/W, philanthropic funding from GRID is no longer required to complete projects.

Increasing TPO Amount by 10%

1. A 10% increase in TPO funding eliminates the funding gap in 5% of all projects.

[51] Although program output is restricted, it could be increased under status quo conditions if GRID prioritized projects that do not require professional services (hence, facing a much smaller funding gap). GRID has raised concerns over their ability to identify marketing leads that are truly solar-ready (Section 2.2). Furthermore, granted the projected number of homes that require professional services among the eligible population, this approach would likely raise equity concerns over the exclusion of homes that are not solar ready.

2. A 10% increase in TPO funding enables the completion of an additional 40 projects annually when the incentive level is $3/W and 20 additional projects when the incentive level is $3.75/W and $4/W.
3. Concerning projects requiring professional services, a 10% increase in TPO funding does not lead to more projects with no funding gap at the current incentive level.
4. Following a 10% increase in TPO funding, an additional 5% of projects requiring professional services have no funding gap at $3.75/W and $4/W.

5.1 Increasing the Program Incentive

Incentive levels ranging from $3.25/W to $6/W were considered and evaluated for their effect on total program uptake and uptake among households requiring professional services. In addition, the analysis considers cases where the increased incentive applies to professional service costs versus when they do not. In Case 1, the program incentive cannot be applied to professional service costs (Case 1 corresponds to Section 5.1.1), whereas in Case 2, the program incentive does apply professional service costs (Section 5.1.2)[52]. In either case, the tested incentive level reflects the maximum incentive that can be received if total eligible costs are larger than the incentive itself. In other words, if a maximum incentive of up to $3.75/W is being tested for a project with total eligible costs of $3.45/W, the project is presumed to receive an incentive of $3.45/W instead of $3.75/W.

5.1.1 Case 1: Program Incentive Does Not Cover Professional Service Costs

Under status quo conditions, completed projects are awarded $3/W, and all professional service costs are excluded from the incentive. Figure 28 displays that approximately 1% of all projects studied have no funding gap in Case 1 ('$0 or less' category) under status quo conditions (in agreement with the preliminary findings reported in Section 4). As the incentive level increases, the distribution of projects across funding gap categories increases in positive skewness. Figure 29 reports that all completed and inactive projects requiring professional services have a funding gap under status quo conditions. As previously observed, the distribution of projects requiring professional services across funding gap categories increases in positive skewness as the incentive level rises. At the highest incentive level tested ($6/W), it is estimated that 80% of all projects studied would have no funding gap (Figure 28), and 60% of projects requiring professional services would have no funding gap (Figure 29). It is important to note that as the incentive per project increases, the number of projects that can be completed annually with a fixed program incentive budget decreases (estimates provided in Section 5.1.3).

[52] In either of the following two cases, only the incentive level was varied while all other project characteristics (TPO amount, system size, type of professional service, professional service cost, etc.) remained fixed.

Figure 28: Percentage of Total Projects Per Funding Gap Category Across Various Incentive Levels

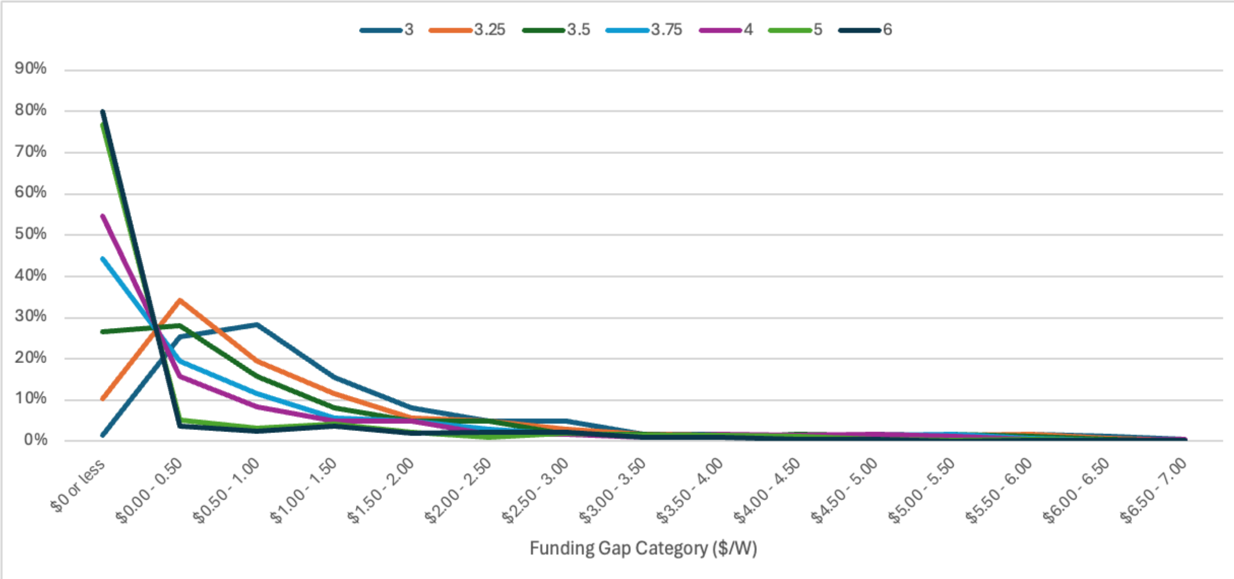
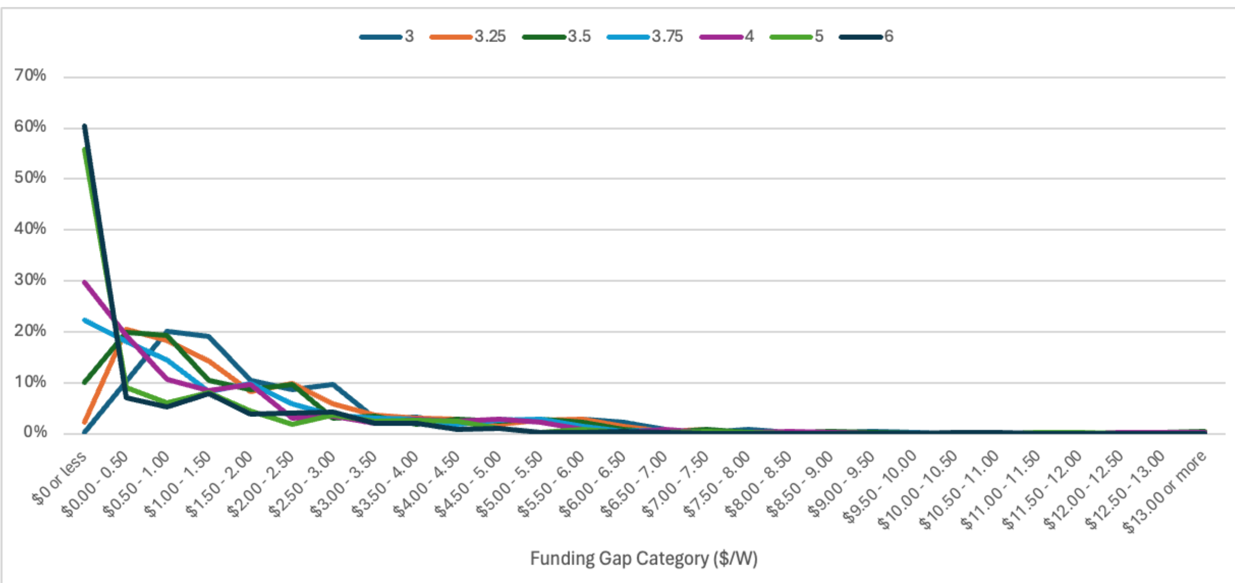


Figure 29: Percentage of Projects Requiring Professional Services Per Funding Gap Category Across Various Incentive Levels



5.1.2 Case 2: Program Incentive Covers Professional Service Costs

When the program incentive applies to professional service costs (Case 2), there is surprisingly little to no difference to the results found in Case 1 for incentive levels of $4/W or less (expounded upon in Section 5.1.3). Marginal increases are observed at $5/W when compared to Case 1, while $6/W estimates show that an additional 20% of projects requiring professional services and an additional 10% of projects in total experience no funding gap when the program incentive covers professional services.

Figure 30: Percentage of Total Projects Per Funding Gap Category Across Various Incentive Levels.

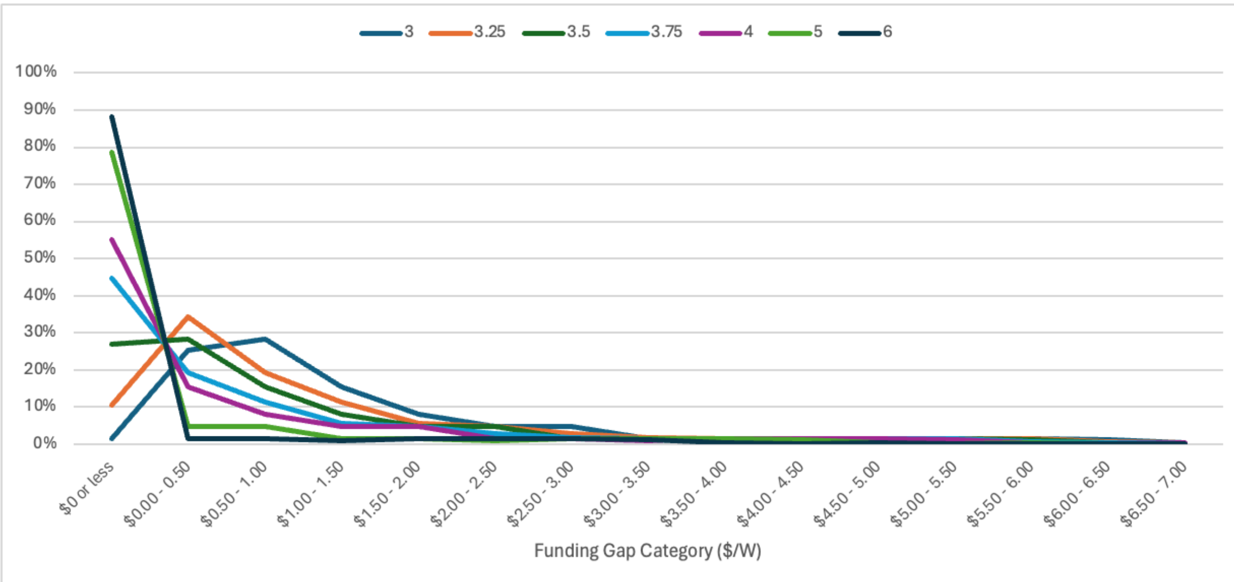
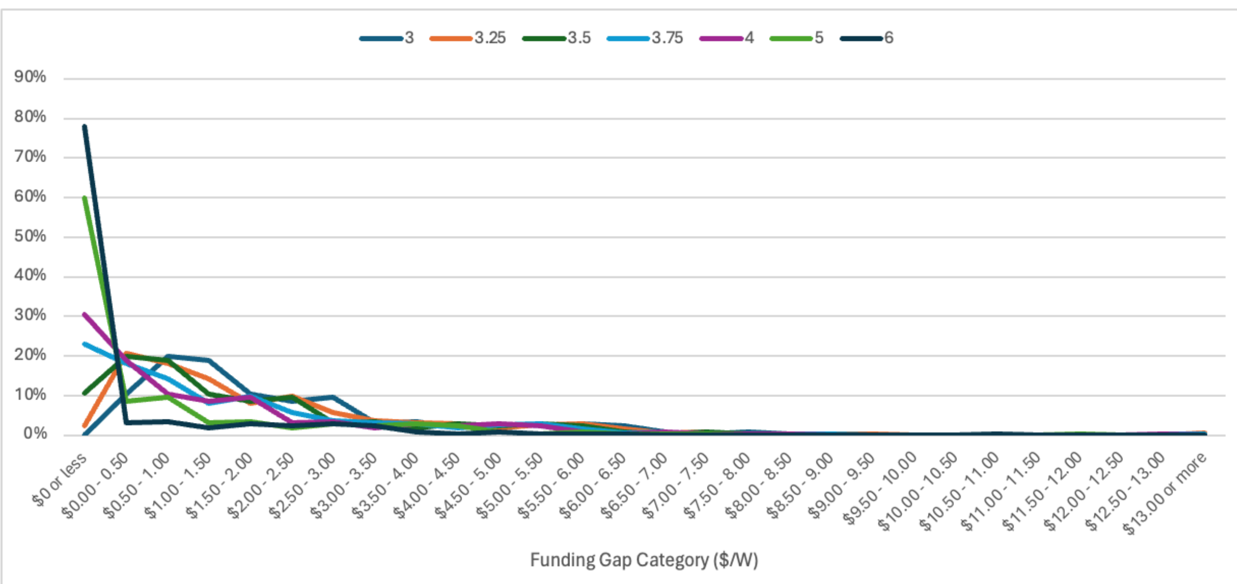


Figure 31: Percentage of Projects Requiring Professional Services Per Funding Gap Category Across Various Incentive Levels

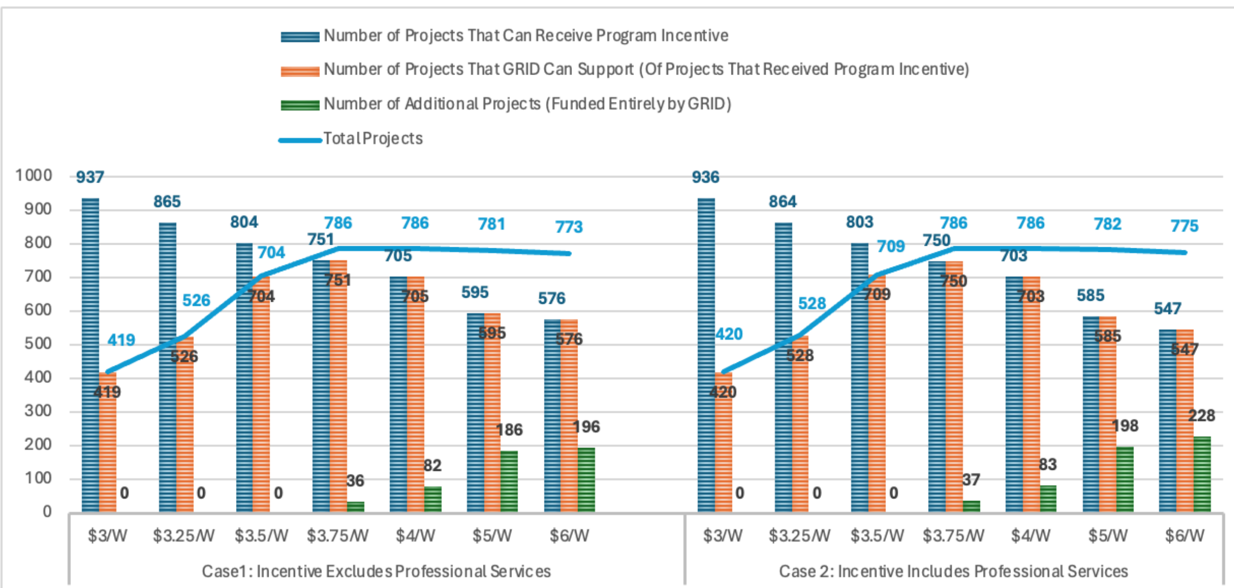


5.1.3 Findings

Figure 32 quantifies the total annual projects that can be completed at each tested incentive level for both Case 1 and 2. As detailed in Appendix E, the model developed for estimating total annual projects assumes that GRID:

1. Maintains an annual philanthropic contribution of $2 million.
2. Spillover of program incentive budget from prior years is apportioned equally across 2024-2030 program years.
3. TPO take-up continues at 90%.
4. All TPO revenue generated within the program is contributed towards completing additional projects[53].
5. All other project characteristics remain fixed, and only the incentive level and its configuration are varied.

Figure 32: Total Projects Completed Annually Across Various Incentive Levels



[53] Profit per project completed (averaged across all projects) is only observed at incentive levels of $3.75/W or higher. The profit is realized from TPO funding overhang once all project costs are covered. Excess TPO funding is available under these circumstances as the increased program incentive covers a larger portion of total costs.
Note A: TPO funding is negotiated independently between GRID and SunRun outside of the program and the program incentive level has no bearing on the negotiated terms. Under circumstances where profit is generated within the program, GRID's total annual contribution would exceed $4 million because of the reinvestment of net TPO funding (after all costs are expensed).
Note B: Additional projects are those completed once the annual program incentive budget is exhausted. Any additional project that is completed is funded entirely by GRID, meaning that GRID would presumably cover all project costs (not just the funding gap as in the case when the program incentive was still available). This methodology is detailed at length in Appendix E.

Under status quo conditions (Case 1: $3/W, Figure 32), the program incentive budget permits 937 to be completed annually. However, GRID's annual funding contribution is exhausted in clearing the average funding gap of 419 projects. If GRID's marketing efforts resulted in 937 applicants, presumably, 518 would be designated as inactive due to lack of funding.

In Case 1 (Figure 32), total annual project output peaks at 786 when incentive levels reach $3.75/W and $4/W. At these similar incentive levels, reinvesting leftover TPO funds enables GRID to produce additional projects once the annual incentive budget is exhausted. At incentive levels surpassing $4/W, the additional projects completed using leftover TPO revenue no longer offset the lower output of incentive-funded project output (due to higher incentive spend per project)[54]. Since higher incentive levels result in a lower incentive-funded project base, GRID receives less TPO funding and must independently face the full project cost of each additional project that it completes (approximately $16,000)[55]. As a result, there is diminishing growth in GRID's additional project output at increasingly higher incentive levels, leading to a collective total decrease in annual project output.

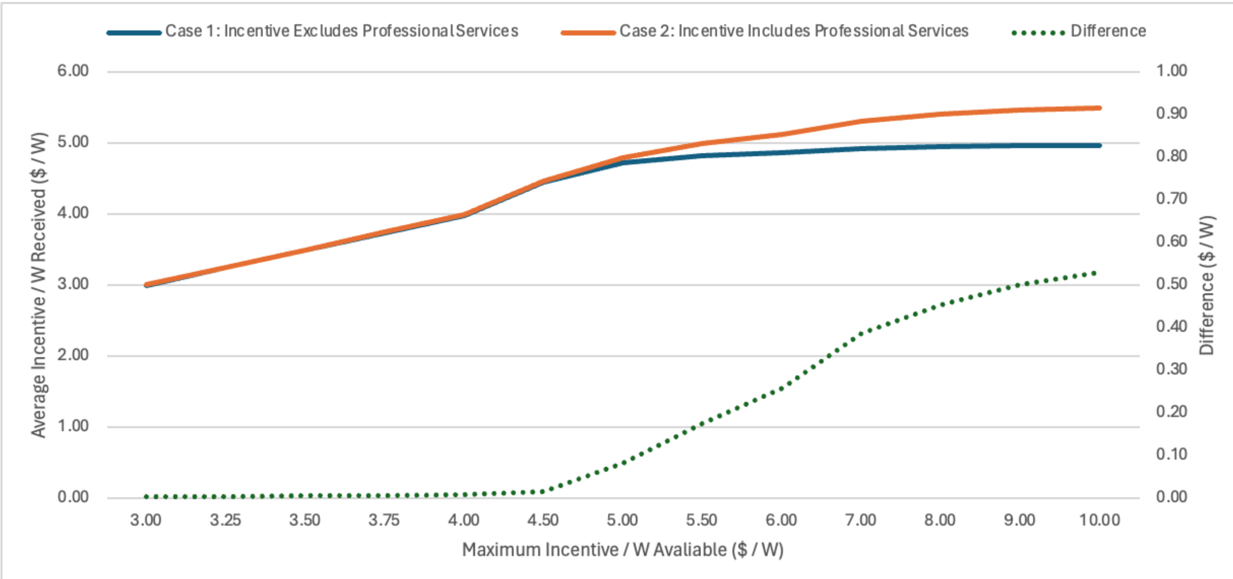
In Case 2 (Figure 32), approximately the same number of projects is achieved annually as in Case 1 (the proportion of projects that received program incentive funding decreased, although those that GRID additionally funded increased compared to Case 1). The homogeneity in total project output for incentive levels leading up to $4/W can be partly explained by the fact that the average incentive received per project equals the maximum incentive at levels below $4.5/W regardless of professional service requirements (Figure 33). Intuitively, this homogeneity is expected since system costs (excluding professional services) alone are $4.90/W on average (see Section 4.3). Beyond $5/W, however, a divergence in the average incentive received and the maximum incentive available begins to be observed between Case 1 and Case 2, specifically among projects requiring professional services. Nevertheless, even at a maximum incentive

[54] Referencing Figure 32 (Case 1), note that at $5/W there are 595 projects being developed using program incentives. This is 110 projects less than $4/W, which only saw a 46 project decline from $3.75/W (751). Also note that the amount of additional projects funded by GRID increased by 46 when moving from $3.75/W to $4/W. This is the net transfer discussed. However, moving from $4/W to $5/W only generates 104 additional projects funded by GRID. There is no longer a net transfer of projects and loss in overall output begins to be observed (which accelerates from $5/W to $6/W and would continue to do so beyond $6/W).

[55] Although GRID keeps a larger share of the lower TPO amount received (because of a reduced program funding gap), GRID must clear the full cost of each additional project (approximately $16,000) since the program's annual incentive budget has already been exhausted. Because of the high cost nature of each additional project, there is an increasingly lower marginal output of additional projects between higher incentive levels.

level of \$6/W, the difference in average incentive received between Case 1 and Case 2 is only \$0.25/W[56].

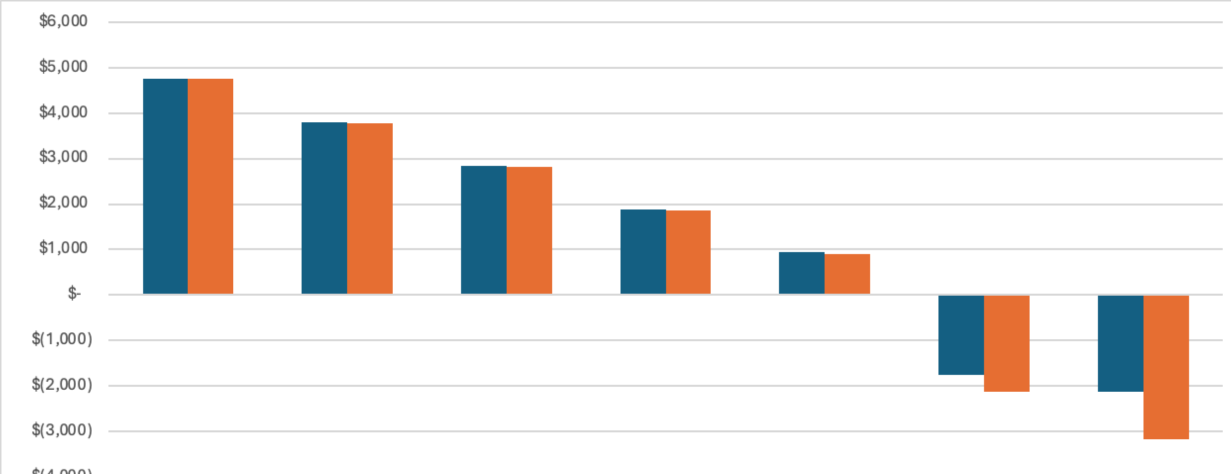
Figure 33: Comparison of Average Incentive Received Between Cases 1 & 2



Moreover, the net transfer of projects lost from an increased incentive level to those gained from GRID reinvesting TPO funds into additional projects appears sustainable at higher incentive levels when the program incentive applies to professional service (Case 2). Compared to Case 1, GRID will deplete less of its annual program contribution on clearing the funding gap of program-funded projects (i.e., projects that received the program incentive) and retain a larger share of TPO funding per completed project, enabling greater reinvestment in additional projects (Figure 34).

[56] Note that the average incentive received in Case 2 (when professional services are covered by the incentive) takes the average of all completed and inactive projects for the specified incentive level. In total, there are 1542 projects that require professional services and 1381 that do not. At a maximum incentive level of \$6/W, for instance, projects not requiring professional services received on average \$4.81/W versus \$5.49/W for projects that required professional services. The weighted average of these groups results in an average incentive received of \$5.13/W for Case 2, which corresponds to approximately \$0.25/W more than Case 1 (as shown in Figure 33).

Figure 34: Comparison of GRID's Estimated Net Spend Per Project (Of Projects That Received Program Incentive)



	$3/W	$3.25/W	$3.50/W	$3.75/W	$4/W	$5/W	$6/W
Case 1	$4,769	$3,803	$2,842	$1,887	$938	$(1,762)	$(2,119)
Case 2	$4,757	$3,787	$2,821	$1,861	$904	$(2,120)	$(3,171)

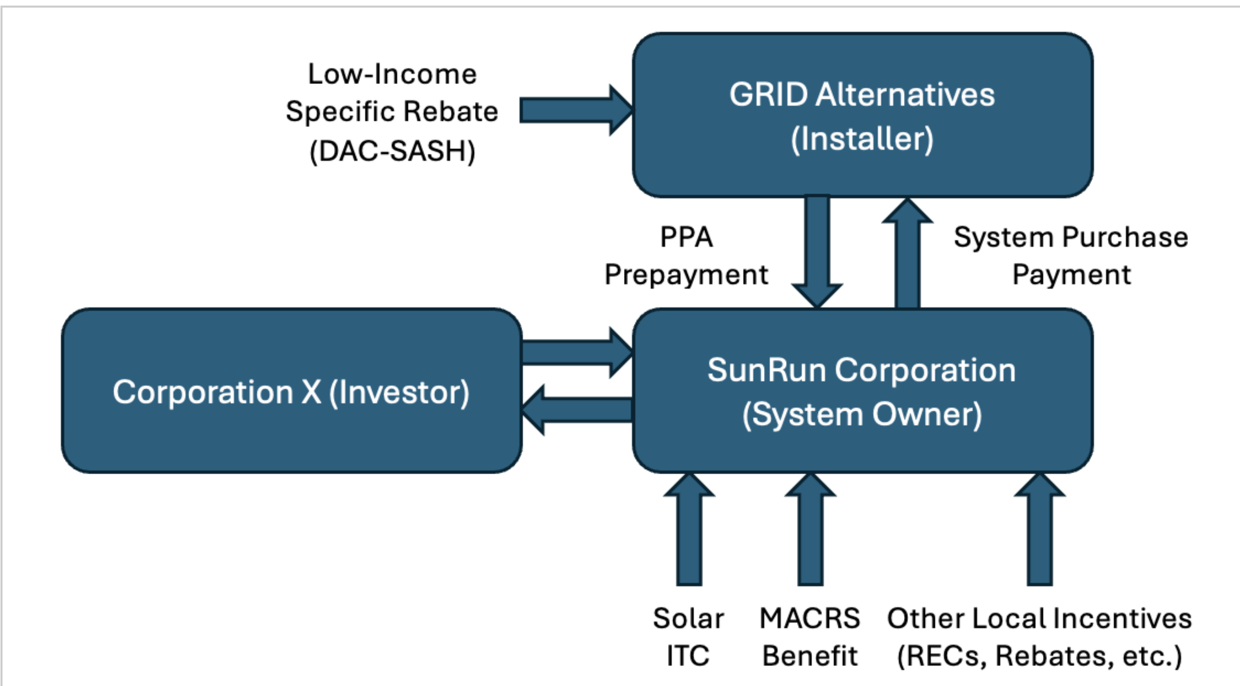
**Note: In cases where GRID incurs a positive net spend, the reported amount reflects the philanthropic funding required per project (i.e., the funding gap). In cases of negative net spend, the reported amount reflects any unspent philanthropic funding per project and/or the outstanding TPO funding after project costs have been paid.*

5.2 Increasing TPO Amount

5.2.1 Case 3: TPO Amount Increases By 10%

Currently, GRID's TPO agreement with SunRun (DAC-SASH's only TPO provider) is such that GRID's net benefit per project is equivalent to approximately [redacted]% of the EPC (Engineering, Procurement, and Construction) price[57]. Put differently, the amount that GRID receives per project on behalf of a TPO-participating applicant is equivalent to the contracted price of the project's rebates and tax benefits (ITC, MACRS, SRECs, etc.) less the PPA prepayment made by GRID (the difference approximately nets to [redacted]% of the EPC price)[58]. TPO pricing will vary between projects as pricing is determined by system size, production, and system cost. Figure 35 displays the transfers of payments and project financing under the GRID-SunRun TPO model.

Figure 35: Transfers of Payments and Project Financing in TPO Model[59]



Although GRID's TPO agreement with SunRun has been renegotiated on several occasions, the average TPO amount received per watt has incurred relatively no change year over year. Furthermore, the average amount received per project is roughly equivalent to that received in DAC-SASH's predecessor, SASH[60]. However, recent enhancements to the ITC via the Inflation

[57] GRID Alternatives [redacted] Pilot Evaluation (September, 2019), Pg. 2.
[58] Although a project's installation cost is also recouped by GRID via SunRun's TPO payment, the net benefit to GRID is zero.
[59] Adapted from Chart 1 of GRID Alternatives Advice Letter 9 (Pg. 11).
[60] GRID Alternatives Advice Letter Advice Letter 9, Appendix C - Table 4 Assumptions.
Note that SASH introduced TPO in 2015 in Decision D.15-01-027

Reduction Act (IRA) may provide an opportunity for GRID to secure higher pricing for a project's incentives and tax benefits. In addition to the standard 30% base credit, the IRA introduces various adders, including a 10% adder for projects that are sited in low-income communities[61]. SunRun currently receives the entirety of this adder, and no additional funding is passed through to GRID. This section explores the effects of a 10% increase in TPO funding per project on program performance[62]. The methodology used (see Appendix E) is similar to that of Section 5.1 (Increasing the Program Incentive) in that TPO funding was altered per project while keeping all other project characteristics constant (such as system size, system cost, and professional service costs). Therefore, the results show what program performance would have been (for all completed and inactive projects for which system size data was available) if TPO funding per watt had been 10% greater.

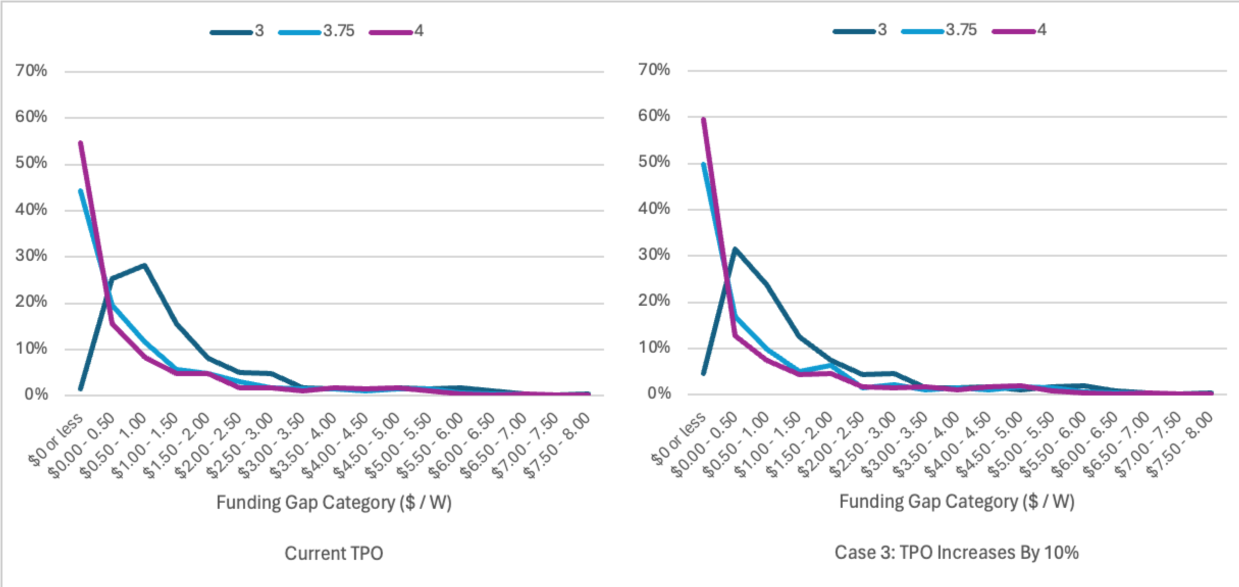
5.2.2 Findings

Figure 36 suggests that a 10% increase in TPO funding would result in 5% of all projects having no funding gap under the current incentive level ($3/W). Furthermore, the additional number of projects with no funding gap resulting from a 10% increase in TPO funding is fixed at approximately 5% when the incentive level is raised to $3.75/W and $4/W.

Figure 36: Percentage of Total Projects Per Funding Gap Category For Select Incentive Levels

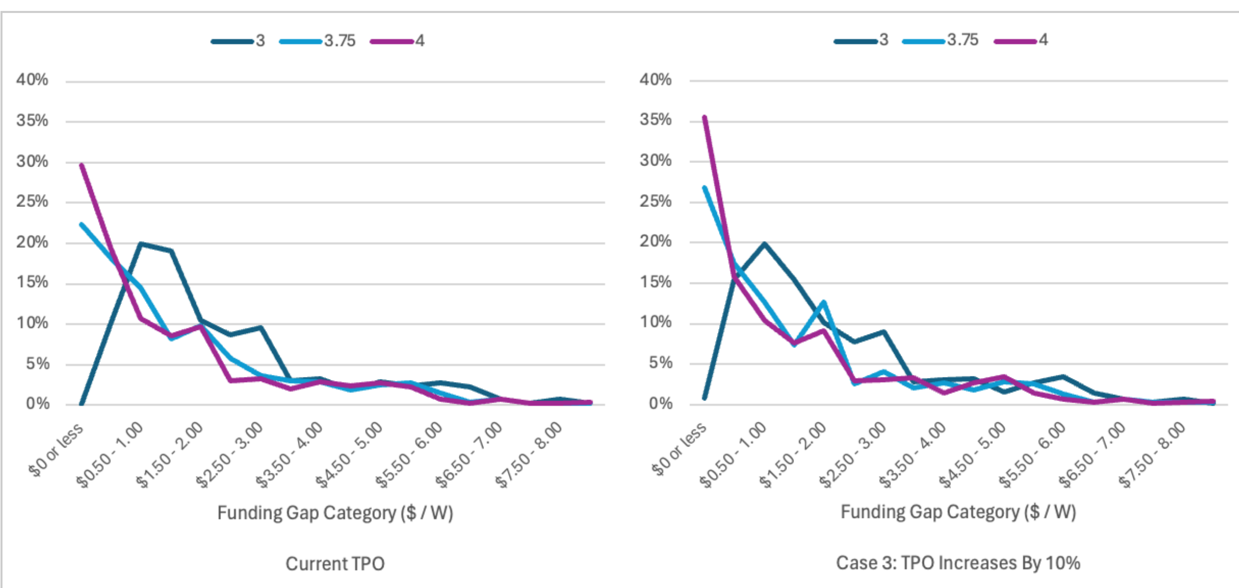
[61] U.S. Department of Energy. "Overview of the Inflation Reduction Act Incentives for Federal Decarbonization."

[62] Note that a 10% increase in TPO/W is likely greater than the 10% ITC adder since TPO is a factor of MACRS and SRECs in addition to the ITC. In other words, if SunRun passed the 10% adder to GRID, the net change in TPO/W would likely be less than 10%. Limited information was available at the time of reporting concerning the EPC price and its breakdown of ITC, MACRS and SRECs compensation. 10% was arbitrarily selected in preliminary testing to establish a baseline of additional project output under this policy alternative. Had significant effects been observed at a 10% increase, smaller incremental increases in TPO/W would have been explored to more accurately emulate a TPO/W rate that only features the 10% adder pass through to GRID.



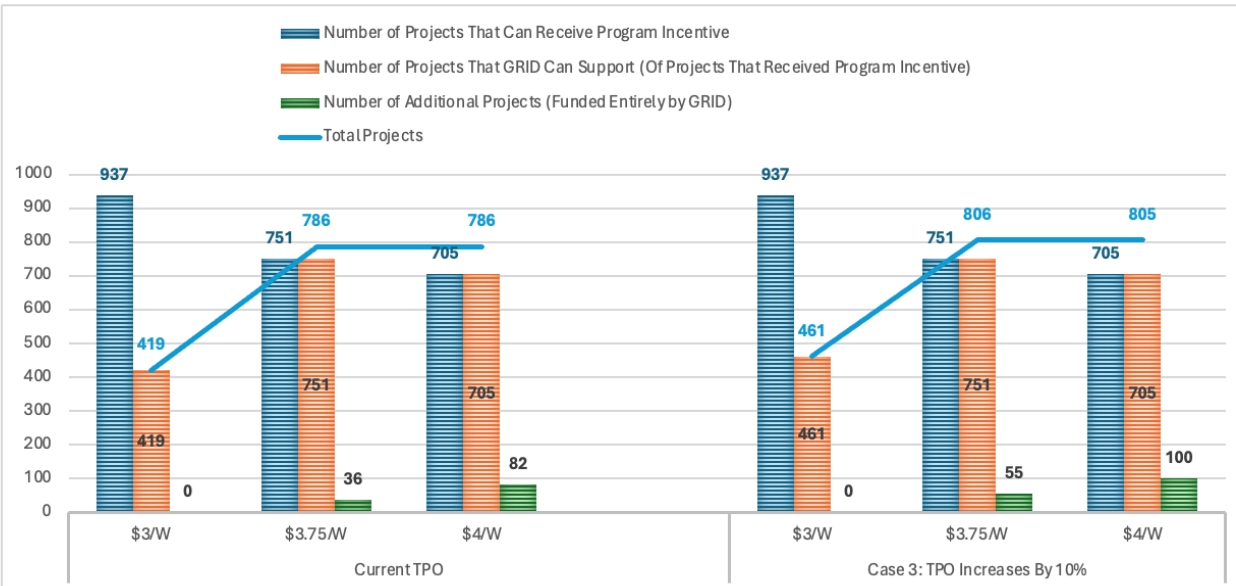
Regarding projects requiring professional services, a 10% increase in TPO funding does not lead to more projects with no funding gap at the current incentive level (Figure 37). This can be explained by the fact that a 10% increase in TPO funding approximates to $[redacted]/W ($[redacted] versus approximately $[redacted]/W in status quo), which on average would reduce the funding gap to $1.90/W for completed projects and $2.50/W for inactive projects requiring professional services (refer to Figures 19 and 25 in Section 4.3). At $3.75/W and $4/W, an additional 5% of projects requiring professional services have no funding gap following a 10% increase in TPO funding.

Figure 37: Percentage of Projects Requiring Professional Services Per Funding Gap Category Across Select Incentive Levels



Ultimately, an additional 5% of all projects with no funding gap translates into an additional 42 projects completed annually under the current incentive level (Figure 38). The number of additional projects reduces to 20 at the higher incentive levels tested. This reduction can be explained by the fact that in the absence of the TPO funding increase, GRID was already positioned to match the funding gap of all projects that received a program incentive (inframarginal projects). Therefore, the increase in TPO funding is less likely to be spent on clearing a project's funding gap but rather used to fund additional projects, each of which GRID would solely fund (average installation, material, equipment, and professional service costs ~ $16,401.91). In other words, a 10% increase in TPO funding has a greater effect on total project output when used to fill the program's funding gap than funding additional projects (projects pursued after the program's annual incentive budget has been exhausted).

Figure 38: Total Projects Completed Annually With TPO Increase



6. Discussion

After discovering preliminary findings (Section 4) and analyzing each policy alternative (Section 5), we can see that the current incentive level will continue to restrict total project output and program participation among households needing professional services. More specifically, under the modeling assumptions of this analysis, GRID can only fill the funding gap for approximately 419 projects, all of which, on average, face a funding gap. Section 6 assesses and ranks (on a scale of 3) the three cases explored against the selected evaluation criteria–total project output, administrative feasibility, and inclusion of projects requiring professional services. Table 4 summarizes the key takeaways detailed in this section.

Table 4: Policy Alternatives Versus Analysis Criteria

	Total Project Output	Inclusion of Projects Requiring Professional Services	Administrative Feasibility	Rank
Status Quo	**Low**	**Low**	**High**	**3**
Increasing Incentives (Case 1)	**High**	**High**	**Mid**	**1**
Increasing Incentives (Case 2)	**High**	**High**	**Low**	**–**
Increasing TPO (Case 3)	**Mid**	**Mid**	**Mid**	**2**

Legend: **Low = 1 pt** **Mid = 2 pt** **High = 3 pt**

**Note: Case 1 & 2 are variants of the same policy alternative, thus only one can be ranked.*

6.1 Impact on Total Project Output

Increasing the incentive level to \$3.75/W or \$4/W (Case 1 & 2) has the most profound effect on total project output, resulting in an 88% increase in either case. At these incentive levels, the incentive increase from \$3/W absorbs the funding gap of the average solar-ready project (approximately \$0.80/W), allowing GRID to focus its philanthropic funding primarily on projects requiring professional services. Ultimately, incentive levels of \$3.75/W and \$4/W will result in 45% and 55% of all projects to experience no funding gap, respectively. GRID must partially use its philanthropic funding to clear the funding gap of solar-ready projects at lower incentive levels (less than \$3.75/W), leaving less funding available to address the larger funding gaps of projects requiring professional services. In contrast, at incentive levels surpassing $4/W, there is higher incentive expenditure per project, resulting in fewer completed projects receiving the program incentive. Although projects that receive the program's higher incentive (when greater than $4/W) would typically expect leftover TPO funding from, GRID could only fund a limited number of additional projects using the surplus due to the full cost of each additional project (approximately $16,000) incurred once the incentive budget is exhausted. This highlights that TPO funding is most effective when used to fill a project's funding gap rather than being reinvested into additional projects.

If every project received an additional 10% in TPO funding (Case 3) at the current incentive level, only a 10% increase in total project output would be observed. A 10% increase in TPO funding roughly amounts to $[redacted]/W, which is substantially smaller than the average funding gap of the lowest-costing projects (i.e., solar-ready projects). At $3.75/W or $4/W incentive levels, the net increase in projects resulting from greater TPO funding diminishes to only 2.5% since the extra funding is largely used to fund additional projects (i.e., those that didn't receive program incentive funding). As mentioned earlier, this is a less efficient utilization of TPO funding.

6.2 Inclusion of Projects Requiring Professional Services

If projects requiring professional services have a funding gap of less than $0.80/W, they virtually resemble the solar-ready projects that GRID rarely failed to complete in DAC-SASH. Therefore, the propensity at which projects requiring professional services feature a funding gap of less than $0.80/W was used to indicate the likelihood of program inclusion. Under the status quo, approximately 10% of projects requiring professional services resemble the funding gap of a solar-ready project[63].

Between the three cases studied, increasing the program's incentive level (Case 1 & 2) has a greater impact on projects requiring professional services than increasing the program's TPO funding by 10% (Case 3). Case 3 only enables an additional 5% of projects requiring professional services to have a funding gap below $0.80/W (at each incentive level studied). In contrast, incentive levels of $3.75/W and $4/W result in approximately 40% and 60% of projects requiring professional services to have a funding gap below $0.80/W, respectively. At higher incentive levels, more than 67% of projects requiring professional services resemble the funding gap of solar-ready projects. It is important to note, however, that as the incentive per project increases, the number of projects that can be completed annually with a fixed program incentive budget decreases.

[63] These are projects that feature the lowest-costing professional services, like that of professional engineering letters/stamps.

6.3 Administrative Feasibility

Recall that administrative feasibility weighs the practicality of each alternative's implementation by factoring in regulatory precedent, procedural challenges, and the extent of the CPUC's authority. An incentive increase (Case 1 & 2) is generally considered administratively feasible since the CPUC previously approved preceding solar programs (e.g., SASH) to offer incentive levels greater than $3/W. In addition, a recent solar program launched in the state, SDG&E's shareholder-funded San Diego Solar Equity Program (SDSEP), set its incentive level at $4/W to reflect trends of higher system costs. GRID also advocates for increasing the program's incentive. Between Case 1 (incentive does not apply to professional service costs) and Case 2 (incentive applies to professional service costs), however, Case 1 exceeds Case 2 in administrative feasibility. Currently, no CPUC solar program allows for its incentive to apply to professional service costs, and it is also probable that opposition will be met for funding non-electrical infrastructure using ratepayer funds. Although Case 1 and 2 vary in administrative feasibility, the decision to pursue Case 1 over Case 2 is inconsequential because both result in the same total project output and similar inclusion of projects requiring professional services[64].

As for increasing the TPO amount received (Case 3), the CPUC's regulatory authority does not preside over the matter since the TPO agreement is privately negotiated between GRID and SunRun. For this reason, GRID is expected to face some challenges in negotiating for a higher TPO payment from SunRun since SunRun is the program's only TPO provider and neither faces any strong market competition nor regulatory directives. Nevertheless, since the IRA establishes an additional 10% ITC adder for the category of projects completed in DAC-SASH, it is presumably likely that GRID could renegotiate for a mutually beneficial split of the adder since SunRun would still be better off than pre-IRA conditions. Furthermore, through the direct pay option and additional adders enabled by the IRA, establishing more TPO providers and competition among providers is possible and may reflect in higher TPO offerings to GRID.

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[64] As Section 5.1.3 reports, all projects on average receive the maximum incentive up to the $4.5/W level since the lowest-costing projects alone (i.e., solar-ready projects) face installation and material costs that average $4.90/W. At incentive levels greater than $4.5/W, the incentive expenditure per project in Case 2 will exceed Case 1, but only for projects requiring professional services (since solar-ready projects receive an incentive that only reflects installation and material costs). However, even at the maximum incentive level tested ($6/W) for all projects (solar-ready and those requiring professional services), the difference in average incentive received between Case 1 and Case 2 is only $0.25/W. This means that there will be marginally less projects completed in Case 2 at an incentive level of $6/W compared to Case 1 due to an additional $0.25/W expenditure per project. However, a higher incentive expenditure per project also means that less TPO funding will be required to clear the funding gap of each project requiring professional services. Therefore, the surplus of remaining TPO funds would be reinvested into completing additional projects once the incentive budget is exhausted, which would roughly amount to the number of projects that didn't receive a program incentive in Case 2 when compared to Case 1. Thus, through the reinvestment of surplus TPO funds in Case 2, the same total output could be achieved as Case 1. Only at much higher incentive levels (presumably greater than $8/W) would there be a larger difference in total project output between Case 1 and 2. This is because as the additional expenditure per project substantially increases, the inefficiency of using TPO surplus to fund additional projects is more prevalent.

7. Recommendations

According to current trends, the program's funding gap will limit DAC-SASH project output. Solar-ready projects currently require GRID to pay $0.80/W on average using its philanthropic funds, leaving less capital for cost-intensive projects (i.e., projects requiring professional services).

As a primary response, the CPUC should launch a regulatory proceeding to increase DAC-SASH's incentive level to $3.75/W (excluding professional service costs, Case 1). As the analysis concludes, there is virtually no difference in total project output between Case 1 and Case 2; therefore, engaging in procedural risks surrounding the expenditure of ratepayer funds on non-electrical infrastructure is unnecessary. At $3.75/W, DAC-SASH reaches its peak annual project output, in which 40% of projects requiring professional services emulate the average funding gap of solar-ready projects ($0.80/W).

Although $4/W enables an additional 20% of projects requiring professional services to face a funding gap of less than $0.80/W, program performance at $4/W relies more heavily on the reinvestment of TPO surplus funding into additional projects when compared to the $3.75/W level. Managing the TPO surplus and its expenditure would not only place an additional administrative burden on both the CPUC and GRID but TPO funding is less effective when used to reinvest into additional projects as opposed to filling a project's funding gap.

As a secondary response, GRID should work towards renegotiating its TPO agreement with SunRun to reflect the additional benefit of the IRA low-income adder. However, as the analysis concludes, a 10% in TPO funding only leads to marginal improvements in program performance. Onboarding more TPO providers is also recommended since competition among TPO providers will lead to increasingly better terms for GRID while ensuring higher service quality.

Although the passing of NEM3.0 in 2023 reduces export rates by 75% (the value of excess electricity pushed onto the grid by solar systems), participating in DAC-SASH still provides significant benefits to eligible low-income households. Unlike most rooftop solar consumers, DAC-SASH participants almost always receive full subsidies for their PV system via a combination of the program incentive, TPO payment, and philanthropic funding. This allows them to start saving on their energy bills immediately without any payback period.

NEM3.0 also encourages pairing rooftop solar with energy storage to maximize export value during peak hours. Participating in DAC-SASH unlocks further energy savings in that the CPUC's "Equity" and "Equity Resiliency" SGIP (Self-Generation Incentive Program) rebates enable DAC-SASH participants to install energy storage at virtually no cost[65]**.** By exporting excess

[65] California Public Utilities Commission, "Participating in Self-Generation Incentive Program (SGIP)".

energy during peak periods, DAC-SASH households can earn approximately $200 per week during the peak season[66].

In conclusion, increasing the DAC-SASH program incentive to $3.75/W promises to nearly double the program's impact. By implementing this change and adjusting the TPO payment to reflect new IRA benefits, the DAC-SASH program can deliver immediate energy savings to low-income households, help them navigate the changes introduced by NEM3.0, and provide them with substantial long-term financial relief through renewable energy. The resulting benefits will contribute to the overall goals of reducing energy inequity, promoting sustainable practices, and improving financial stability for disadvantaged communities.

[66] Solar.com, "NEM 3.0 Proposal and Impacts for California Homeowners”.

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Appendix

Appendix A: Data Summary

The analysis conducted in this study uses population-level data sourced from four data sources: (i) Low-Income Solar PV Data Set, (ii) Professional Services Report, (iii) TPO Funding Report, and (iv) Inactive Project Activity Tracker.

1. Low-Income Solar PV Data Set

The Low-Income Solar PV Data Set was obtained from CalDGStats and is publicly available (sourced on February 1, 2024). This data set reports project details for submitted applications that have filed a reservation request review at a minimum. The vast majority of reported projects are completed, however, the data set also features active projects in the process of completion. The Low-Income Solar PV Data Set was used to source the following project details:

i) Application ID	ii) Project Status	iii) Completion Date	iv) Total System Cost
v) System Size	vi) County	vii) TPO Status	

The Low-Income Solar PV Data Set does not provide the following details:

- Professional Services:
    - Whether professional services were required for each completed project.
    - The type of required professional services and their cost for each completed project.
- TPO:
    - The amount of TPO funding received by completed TPO projects.
- Inactive Projects:
    - The data set does not feature Application IDs for projects with an 'inactive' status. For reference, the data set only features 15 Application IDs that received their last update prior to 2023 and have yet to be completed.

Referenced Data: California Distribution Generation Statistics Low-Income Solar PV Data Set

2. Professional Services Report

The Professional Services Report was sourced from GRID directly and features the following professional service details per Application ID (reported prior to February 1, 2024):

- The type of professional services needed and their respective costs.
- Description of professional services necessary (submitted notes).
- Whether GRID was funding the required professional services*.
- Whether the project is inactive.

Correspondence with GRID clarified that if the "GRID Not Coordinating" field is checked, GRID did not pay for the professional services (<30 cases). If GRID did not pay for the professional services (i.e., household paid), the costs associated with that record are not included in the total system cost. If GRID paid for the professional services, the associated costs were included in the total system cost. For the purposes of analysis, the costs associated with professional services were separated from the total system cost if previously included (see Appendix C).

Referenced Data: See Appendix A in the CPUC Sharepoint Folder

3. TPO Funding Report

The TPO Funding Report features the amount received per Application ID for projects completed before February 1, 2024. This report was sourced directly from GRID.

Data Source (CPUC Only): See Appendix A in the CPUC Sharepoint Folder

4. Inactive Project Activity Tracker

The Inactive Project Activity Tracker was sourced directly from GRID and reports on projects listed as inactive prior to February 1, 2024. The following project details were extracted from the Inactive Project Activity Tracker:

- The current project status.
- Reason for inactivity (see Note A below).
- Required professional services (see Note B, below).
- The overall count and dates that a project's status switched from active to inactive or vice versa (see Note C below)

Note A: Reasons for inactivity do not have to be professional service-related. The following are the Tracker's possible reasons for inactivity:

Professional Service Related:

i) Old Roof ii) Roof Unsafe iii) Roof Type iv) Code Compliance v) Funding

vi) Waitlist vii) Electric Service viii) Waiting on Professional Service

Non-Professional Service Related:

i) Not Interested ii) Lost Contact iii) Other iv) Solar Shading v) Solar Pitch

vi) Low Unsafe vii) Insufficient Roof Space

Note B: Regarding professional services, the Inactive Project Activity Tracker only features conclusive entries for completed projects that required professional services and were previously inactive (this information is already captured in the Professional Services Report). Occasionally, entries were made for incomplete projects (i.e., currently inactive projects) that either detailed the type of professional service needed or provided a service update (e.g., GRID seeking a quote, referred to the contractor, client seeking assessment).

Note C: To estimate the number of households that paid for their professional services, GRID suggested to observe Application IDs in the Inactive Project Activity Tracker that mutually satisfied the following criteria: i) had an inactivity reason that was professional service related, ii) was no longer inactive and iii) were not featured in the Professional Service Tracker. Only 14 Application IDs satisfy this criteria. Furthermore, data collection does not capture households who may have received professional services from a lateral municipal program (e.g., City of Richmond's roofing program) prior to submitting a DAC-SASH application.

Referenced Data: See Appendix A in the CPUC Sharepoint Folder

Appendix B: Professional Services Definitions

For detailed examples of each professional service type, please refer to the 'Detailed Service Description' column found in GRID's Professional Services Report (see Appendix A in CPUC Sharepoint Folder).

Electrical Service Upgrade (ESU)	Either a replacement or upgrade of the home's main panel.
Electrical Services Other (ESO)	Services include installing load centers, rerouting subfeeds, repairing the main service panel, and electrical grounding (among other less frequent services).
Professional Engineer Letter/Stamp (PEng)	A professional engineer stamp certifying the structural design of the PV system (as required by particular cities). This service includes structural load calculations conducted by the contracted engineer.
Roof Repair	Services include replacing missing shingles, install edge metals, install flashings, and roof ridge repair (among other less frequent services).
Re-roofing	Major roof repair (hole, water damage) or the need for an entirely new roof.
Tree Trimming/Removal	Tree trimming or removal to resolve solar shading concerns.
Code Compliance	Limited details are available. Code compliance largely refers to missing dead front in the panel.
Equipment Rental	Limited details are available. Equipment rental can include trenching equipment.
Ground Mount Sub-Structure	The installation of a ground mount to address roof or solar shading issues.
Other	Services include trenching or roofing.

Note A: Code compliance can feature many reasons and types of service required. However, in the context of DAC-SASH, code compliance has primarily been used in cases where the panel was missing the dead front (9 of 11 cases that provided detailed service descriptions for code compliance).

Note B: It would have been more suitable for the roofing related services registered to 'Other' to have been registered to 'Re-roofing' or 'Roof Repair' instead.

Appendix C: Funding Gap Estimation Methodology for Completed Projects (Status Quo)

DAC-SASH's funding gap is defined as the additional funds that GRID is required to source beyond the program's incentive ($3/W) and Third Party Ownership (TPO) funds. Although TPO funds are technically additional funds that GRID contributes to DAC-SASH, they are funds generated by the program that counterfactually would not exist. Therefore, DAC-SASH's funding gap refers to the funds GRID contributes from its philanthropic or operating fund to the DAC-SASH program to pay for outstanding costs for any individual project. The funding gap equation can be expressed as:

$$Funding\ Gap/W\ =\ System\ Cost/W\ +\ PS/W -\ Program\ Incentive/W\ -\ TPO/W$$

The sequence in which these costs are made and payments received is as follows: (i) system expense (installation, materials, and equipment), (ii) professional service (PS) expense (if needed), (iii) program incentive payment and (iv) TPO payment (if opted for).

To conduct funding gap analysis at the project level, a master sheet was created which combined project details from each of the four data sources per Application ID (see Referenced Data below). Please refer to the notes below for additional considerations made when determining the funding gap for completed projects.

Note A: Among projects requiring professional services, only projects where GRID paid for the professional service(s) are considered. The rationale for this is two-fold: (i) there are less than 30 projects where households were required to make partial or full payment for professional services (as compared to approximately 950 completed projects where GRID paid for professional services) and (ii) professional service cost data was available only in 6 instances when paid for by households (within professional service cost range established by completed projects in all 6 cases).

Note B: The professional service cost was inherently included in the reported total system cost for all projects that required professional services (and were paid for by GRID). Thus, the total system cost for projects requiring professional services includes installation, material, equipment, and professional service costs. In contrast, projects that did not require professional services only included installation, material, and equipment costs. To accurately evaluate the impact of professional services on the funding gap at the project level, professional service costs were separated from total system costs so that total system costs only included installation, material, and equipment for all projects. Therefore, projects requiring professional services face an additional cost (professional services per watt) to the standard system costs incurred (installation, material, and equipment costs per watt).

Referenced Data: See Appendix C in the CPUC Sharepoint Folder

Appendix D: Funding Gap Estimation Methodology for Inactive Projects (Status Quo)

In contrast to completed projects, inactive projects do not have any cost or funding data associated with them. Since inactive projects vary from completed projects in frequency and type of professional services required, the funding gap would almost certainly differ between inactive and completed projects. Modeling the estimated funding gap for inactive projects provides valuable insight in that it approximates the additional funding required (beyond that of the funding gap observed in completed projects) to complete all submitted applications with professional service-related inactivity reasons (i.e., projects unable to progress due to additional costs for which matching funds were unavailable).
The methodology for estimating the funding gap of inactive projects consists of 3 parts:

- Estimating system costs (installation, materials, and equipment).
- Estimating professional service costs.
- Estimating TPO funds received.

1. Estimating system costs (installation, materials, and equipment)

System costs for inactive projects were estimated using averages of completed projects at similar system sizes (see Table D1 below). To achieve reasonable accuracy and granularity, completed projects were grouped into system-size bins ranging from 1 to 5 kW in 0.25 kW increments. The system cost data for completed projects was also differentiated by whether professional services were required. The average for each of these bins was calculated for completed projects and assigned to inactive projects with matching system-size bins.

Table D1: System Cost/W for Completed Projects

	System Cost/W for Completed Projects	
System Size Bin (kW)	Projects Requiring Professional Services	Projects Not Requiring Professional Services
1.00 - 1.25	10.80	
1.25 - 1.50	8.79	8.69
1.50 - 1.75	8.04	7.98
1.75 - 2.00	6.03	6.13
2.00 - 2.25	6.27	5.66
2.25 - 2.50	5.62	5.65
2.50 - 2.75	5.55	5.36
2.75 - 3.00	5.30	5.22
3.00 - 3.25	5.15	5.10

3.25 - 3.50	4.90	4.93
3.50 - 3.75	4.85	4.77
3.75 - 4.00	4.80	4.82
4.00 - 4.25	4.65	4.70
4.25 - 4.50	4.70	4.59
4.50 - 4.75	4.65	4.54
4.75 - 5.00	4.57	4.53
Weighted Average	5.15	4.86

Please refer to the notes below for additional considerations when estimating system costs for inactive projects.

Note A: System size was selected as a determinant for system costs as it has a predictable relationship to the amount of material, equipment, and installation labor required. Since professional service costs are separated from system costs in all modeling done in this study, it is assumed that system costs, on average, strictly reflect how much material is used and the corresponding levels of equipment and installation labor needed for any project. Therefore, under this assumption, an inactive project should have approximately the same system cost as an equally-sized complete project (e.g., a 2 kW complete project should require the same degree of material, equipment, and installation labor as a 2kW inactive project, excluding any professional service costs). However, as a caution to overly rely on this assumption, system costs for completed projects were also differentiated by whether professional services were required and were assigned to match inactive projects accordingly.

Note B: Of the 1043 inactive projects, only 582 contained system size data. Therefore, only this sample of 582 projects is used to estimate the funding gap for inactive projects. Although the 461 inactive projects being excluded from the model are not negligible, only 247 of these projects were inactive because of unavailable funding (i.e., the reason for inactivity was professional service related as opposed to low usage, solar pitch, etc.).

2. Estimating professional service costs

The Inactive Project Activity Tracker does not consistently indicate whether a project requires professional services (see Appendix A, Inactive Project Activity Tracker). Thus, several presumptions were made regarding a project's required professional services using the Tracker's inactivity reason data as an indicator (see Appendix A). Table D2 summarizes the presumed professional services required based on select inactivity reasons.

Table D2: Professional Services Indicated by Inactivity Reason

Inactivity Reason (Professional Service Related	Required Professional Service
Old Roof, Roof Unsafe, Roof Type	Re-roofing
Electric Service	Electrical Service Upgrade
Code Compliance	Code Compliance

As with estimating the system cost of inactive projects, the system size of completed projects was used as a determinant for estimating professional service costs. More specifically, the average professional service cost for each system size bin (0.25 kW increments) was used to estimate the professional service cost of a matching inactive project (see Table D3 below).

Table D3: Average Professional Service Cost Per System Size Bin (Completed Projects)

System Size Bin (kW)	ESO/W	ESU/W	PEng/W	Roof Repair/W	Re-roofing/W	Tree Trimming/W	Code Compliance/W	Equipment Rental/W	Ground Mount/W	Other/W
1.00 - 1.25	0.64	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
1.25 - 1.50	0.51	0.97	0.12	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
1.50 - 1.75	0.42	1.89	#DIV/0!	#DIV/0!	7.99	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
1.75 - 2.00	0.45	1.83	0.08	#DIV/0!	7.12	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
2.00 - 2.25	0.33	1.74	0.07	4.07	5.67	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
2.25 - 2.50	0.41	1.28	0.07	#DIV/0!	4.39	#DIV/0!	0.06	0.21	#DIV/0!	#DIV/0!
2.50 - 2.75	0.51	1.12	0.06	1.16	3.34	#DIV/0!	0.08	#DIV/0!	#DIV/0!	#DIV/0!
2.75 - 3.00	0.93	1.06	0.06	#DIV/0!	5.00	0.40	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
3.00 - 3.25	0.57	1.04	0.05	#DIV/0!	3.29	0.23	0.05	#DIV/0!	#DIV/0!	1.70
3.25 - 3.50	0.24	1.00	0.05	3.31	3.92	0.13	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
3.50 - 3.75	0.30	0.84	0.04	0.97	3.17	#DIV/0!	0.05	#DIV/0!	#DIV/0!	0.26
3.75 - 4.00	0.32	0.91	0.04	1.58	2.91	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
4.00 - 4.25	0.28	0.69	0.04	2.12	2.33	#DIV/0!	0.04	#DIV/0!	#DIV/0!	#DIV/0!

4.25 - 4.50	0.26	0.70	0.04	0.82	2.27	0.36	0.04	#DIV/0!	#DIV/0!	#DIV/0!
4.50 - 4.75	0.26	0.68	0.04	0.91	1.97	0.08	0.04	0.05	#DIV/0!	0.14
4.75 - 5.00	0.18	0.65	0.04	0.24	2.28	0.23	0.04	#DIV/0!	0.38	0.13
Weighted Average	0.39	0.87	0.05	1.93	3.29	0.24	0.05	0.13	0.38	0.38

In cases where professional service cost data was unavailable (displayed as #DIV/0!) for a particular system size bin, the total average cost of each respective professional service was used as an estimate (see Tables D4 and D5 below). For example, re-roofing cost data is unavailable for the 1.00 - 1.25 kW system size bin. In this case, Table D4 indicates that the average re-roofing cost is $11,084.81, which equates to $8.87/W for a 1.25 kW system (as shown in Table D5).

Table D4: Average Professional Service Cost For Completed Projects

Type of Professional Service	Cost ($)	Count
Electrical Services Other (ESO)	975.34	146
Electrical Service Upgrade (ESU)	3150.26	446
Professional Engineer Letter/Stamp (PEng)	169.25	288
Roof Repair	5726.93	14
Re-roofing	11084.81	136
Tree Trimming/Removal	908.33	6
Code Compliance	181.82	11
Equipment Rental	375.00	2
Ground Mount Sub-Structure	1800.00	1
Other	1375.60	7

Table D5: Average Professional Service Cost Per System Size Bin (Using Table D4 Estimates)

System Size Bin (kW)	ESO/W	ESU/W	PEng/W	Roof Repair/W	Re-roofing/W	Tree Trimming/W	Code Compliance/W	Equipment Rental/W	Ground Mount/W	Other/W
1.00 - 1.25	0.64	0.87	0.14	5.09	8.87	0.81	0.16	0.33	1.60	1.22
1.25 - 1.50	0.51	0.97	0.12	4.17	8.06	0.66	0.13	0.27	1.31	1.00
1.50 - 1.75	0.42	1.89	0.10	3.52	7.99	0.56	0.11	0.23	1.11	0.85
1.75 - 2.00	0.45	1.83	0.08	3.05	7.12	0.48	0.10	0.20	0.96	0.73
2.00 - 2.25	0.33	1.74	0.07	4.07	5.67	0.43	0.09	0.18	0.85	0.65
2.25 - 2.50	0.41	1.28	0.07	2.41	4.39	0.38	0.06	0.21	0.76	0.58
2.50 - 2.75	0.51	1.12	0.06	1.16	3.34	0.35	0.08	0.14	0.69	0.52
2.75 - 3.00	0.93	1.06	0.06	1.99	5.00	0.40	0.06	0.13	0.63	0.48
3.00 - 3.25	0.57	1.04	0.05	1.83	3.29	0.23	0.05	0.12	0.58	1.70
3.25 - 3.50	0.24	1.00	0.05	3.31	3.92	0.13	0.05	0.11	0.53	0.41
3.50 - 3.75	0.30	0.84	0.04	0.97	3.17	0.25	0.05	0.10	0.50	0.26
3.75 - 4.00	0.32	0.91	0.04	1.58	2.91	0.23	0.05	0.10	0.46	0.35
4.00 - 4.25	0.28	0.69	0.04	2.12	2.33	0.22	0.04	0.09	0.44	0.33
4.25 - 4.50	0.26	0.70	0.04	0.82	2.27	0.36	0.04	0.09	0.41	0.31
4.50 - 4.75	0.26	0.68	0.04	0.91	1.97	0.08	0.04	0.05	0.39	0.14
4.75 - 5.00	0.18	0.65	0.04	0.24	2.28	0.23	0.04	0.08	0.38	0.13
Weighted Average	0.39	0.87	0.05	1.93	3.29	0.24	0.05	0.13	0.38	0.38

Please refer to the notes below for additional considerations when estimating professional service costs for inactive projects.

Note A: Although the reasons for inactivity used in the Inactive Project Activity Tracker do not capture the full range of professional services, the Tracker also features required professional services in a separate column. Both the inactivity reason and required professional service data found in the Tracker were used to estimate which professional services were required for each Application ID.

Note B: Certain reasons for inactivity (funding, waitlist, waiting on professional service) indicate professional service requirements; however, they do not specify any particular professional service. For this reason, these reasons for inactivity were excluded when estimating the professional service costs of inactive projects.

Note C: All roof-related inactivity reasons were assumed to be re-roofing professional services. The rationale for this assumption is twofold: (i) almost all roof-related inactivity reasons were 'old roof' (which indicates a likely roof replacement), and (ii) re-roofing is the most expensive professional service, thus resulting in a more conservative funding gap estimate for inactive projects.

3. Estimating TPO Funds Received

90% of the 582 inactive projects being studied were randomly assigned TPO to reflect TPO uptake among completed projects (See 'Inactive Project Randomizer' in Appendix D's referenced data below).

Inactive Application IDs that were randomly assigned TPO were matched using system size with average TPO Amount/W derived from completed projects for each system size bin (see Table D6 below)

Table D6: TPO Amount/W for Completed Projects

	TPO Amount/W for Completed Projects	
System Size Bin (kW)	Projects Requiring Professional Services	Projects Not Requiring Professional Services
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Note A: Systems must be at least 2 kW in size to be eligible for TPO. Although selected Application IDs were assigned a TPO Amount/W that also corresponded to their professional service requirement, this proved inconsequential as there is negligible variance observed in TPO Amount across system size bins for projects that required and did not require professional services.

Referenced Data: See Appendix D in the CPUC Sharepoint Folder

Appendix E: Funding Gap Estimation Methodology for Policy Alternatives

To model the effect of each policy alternative on the program's funding gap, each respective policy alternative was applied retroactively to all complete and inactive projects. Since the model uses population-level data, the proposed findings suggest what the funding gap would have been had each respective policy alternative existed since program inception. Subsequent observations were made into the total number of projects (as well as the total number of projects requiring professional services) that could have been completed under each policy alternative. Each policy alternative was explored independently of the other.

1. Estimating the Effect of An Increased Program Incentive on the Funding Gap

Program incentive levels ranging from $3/W to $6/W were tested for cases where professional service costs were both covered and not covered by the program incentive (for reference, professional service costs are not covered by the program incentive under status quo conditions). In each case, and for every incentive level, the incentive itself covers up to the specified cost (installation and material costs when professional service costs are not covered and installation, material, and professional service costs when the incentive covers professional services). For example, if a project's total eligible costs amount to $3.5/W but the program incentive is set up to $4/W, the project would only receive an incentive of $3.5/W. In the case where the incentive does not cover professional services, the order of payments made and received are as follows: (i) installation and material expenses, (ii) program incentive received, and (iii) TPO payment received (if opted for). In the case where the incentive covers professional services, the order of payments made and received are as follows: (i) installation and material expenses, (ii) professional service expenses, (iii) program incentive received, and (iv) TPO payment received (if opted for).

An Excel calculator was created to facilitate modeling. It can be accessed below in Appendix E's referenced data. Table E1 displays the calculator's various fields, followed by a guide explaining each field.

Table E1: Funding Gap and Annual Project Potential Calculator for Increased Incentives

Row#	A	B	C
1	2024 - 2030 Annual Calculator		
2	Incentive Level ($/W) Displayed:	3	
3			
4	Average Incentive/W (Excludes PS)	3	
5	Average Incentive/W (Includes PS)	3	
6			
7		1. Incentive Excludes PS (up to)	2. Incentive Includes PS (up to)
8	Max Projects (CPUC)	936.83	935.91
9	GRID Funds Required Per Project (Philanthropic)	**4,768.73**	**4,756.54**
10	Total Philanthropic Amount Required	4,467,474.03	4,451,694.00
11	Projects Matched (GRID)	419.40	420.47
12	Total Funding Gap	2,467,474.03	2,451,694.00
13	Net GRID Balance	-	-
14	GRID Funds Required Per Additional Project	4,768.73	4,756.54
15	Additional Projects (Funded by GRID)	-	-
16	Total Projects	**419.40**	**420.47**

Field	Description
B2	The incentive level is an input into the calculator. This field is linked to the entire data set and adjusts the funding gap for each Application ID to reflect the incentive level input.
B4	This field takes a weighted average of the incentive level actually received by all Application IDs with either ‘complete’ or ‘inactive’ project status if the incentive does not cover professional services. Recall that Application IDs can receive up to the incentive level offered if the eligible costs exceed the incentive level (refer to paragraph previous to Table E1).

B5 Similar to field B4, this field takes a weighted average of the incentive level actually received by all Application IDs with either 'complete' or 'inactive' project status if the incentive covers professional services.

B7 Subsequent fields in column B all reflect an incentive level that does <u>not</u> cover professional service costs.

C7 Subsequent fields in column C all reflect an incentive level that does cover professional service costs.

Row 8 These fields calculate how many projects the CPUC could fund annually at the incentive level input in B2, where Average Incentive/W corresponds to B4 or B5.

Row 9 These fields compute the average funding gap from all Application IDs with either 'complete' or 'inactive' project status. In other words, these fields depict the average amount of philanthropic funding that GRID must supply on average to complete a project (under the input incentive level). The associated data set contains a column that tracks the funding gap for each Application ID for both scenarios (when professional services are/aren't covered by the program incentive).

When either B9 or C9 produces a negative number, GRID receives a net positive amount from each project. This scenario is only possible if the incentive level exceeds $4/W and TPO take-up is maintained at 90% of all projects.

Row 10 These fields compute the annual philanthropic funding required to complete all projects suggested in field A8. This is calculated by taking the product of B8 and B9 (or C8 and C9).

A negative number in these fields corresponds to GRID receiving a net positive amount annually from completing the projects stipulated in either B8 or C8.

Row 11 These fields compute how many projects from Row 8 that GRID can match annually, reflecting their annual contributions to the program (approximately $2 million in TPO funding and $2 million in philanthropic funding).

If Row 9 or Row 10 produces negative numbers, then GRID can support the maximum number of projects stipulated in Row 8 (basically, all the projects the program has incentive funding for that year).

If a funding gap exists (i.e., Row 9 or Row 10 are positive), then GRID will be unable to support the maximum project count. The formula for calculating how many projects GRID can match in this case is as follows:

$$Projects\ Matched\ (GRID) = \frac{Total\ Annual\ Philanthropic\ Funding\ Available}{Funding\ Gap\ Per\ Project}$$

Where the Total Amount of Annual Philanthropic Funding available is set at $2 million, and the Funding Gap per Project is reflected in Row 9. Note that Philanthropic funding is an input to the calculator and can be modified (for future reference).

Since TPO funding is already being considered per Application ID (and is reflected in the funding gap calculation, Row 9), it is not included in the numerator of the equation as these funds would be double-counted.

Row 12 If GRID cannot match all projects for which the program has available incentive funding annually, Row 12 is the difference between B10 (or C10) and \$2 million (GRID's estimated annual philanthropic contribution).

Row 13- 15 These rows only apply to incentive levels where no funding gap is observed (>\$4/W). These rows stipulate the additional projects that could be completed if solely funded by GRID (after the annual program incentive amount is exhausted). The critical assumption is that GRID would use the net positive funds received (largely from remaining TPO funding) to complete more DAC-SASH projects and that GRID further maintains its \$2 million average annual cash contribution.

Row 13 In the event that there is no funding gap and GRID receives a net positive amount on average from each completed project, Row 13 is the sum of GRID's standard \$2 million annual philanthropic contribution and the net positive amount reported in either B13 or C13. This amount stipulates how much funding GRID has to complete additional projects, surpassing the amount reported in Row 8.

Row 14 In the event of a funding gap, Row 14 simply displays the average funding gap amount per project. In other words, the program's annual incentive budget has not been exhausted, and should additional projects (beyond those GRID has the capacity to match) be completed, GRID would only require funds amounting to the funding gap for each additional project (as the available program incentive would cover the outstanding balance).

In the event that there is no funding gap and the program's annual incentive budget is exhausted (i.e., max projects stipulated in Row 8 have been matched by GRID), every additional project requires approximately \$16,402 in funding from GRID (because GRID has to not only cover the funding gap but also provide funding for what the program's incentive would have covered had their been available budget). This figure was calculated by taking the average sum of installation, material, and professional service costs of each Application ID.

Row 15 These fields capture the amount of additional projects that could be completed annually after the program's annual incentive budget has been exhausted (i.e., completing projects beyond those stipulated in Row 8).

$$Additional\ Projects\ (Funded\ by\ GRID)\ =\ \frac{Net\ GRID\ Balance}{GRID\ Funds\ Required\ Per\ Additional\ Project}$$

Where Net GRID Balance is reflected in Row 13 and GRID Funds Required Per Additional Project is reflected in Row 14.

Row 16	These fields stipulate the number of projects that can be completed annually. In the event of a funding gap, Row 16 is equal to the projects GRID can match (Row 11). If there is no funding gap, Row 16 is the sum of Row 8, and GRID can independently fund additional projects (Row 15).

2. Estimating the Effect of Increased TPO Funding on the Funding Gap

The methodology used to estimate the program's funding gap under increased TPO funding is identical to that used for increased incentive levels (Table E1). In other words, the same Excel calculator (see referenced data below) independently reports on the funding gap and annual project potential for Increased TPO Funding. This policy alternative increases TPO funding by 10% for all Application IDs that are third-party owned (or those that were randomly assigned TPO in the case of inactive projects) and tests various incentive levels (all of which do not cover professional service costs, as is the case in the status quo).

3. Estimating the Distribution of Projects Requiring Professional Services Across the Funding Gap Bin For Each Policy Alternative

This section is in reference to the following tabs of Appendix E (Excel file) found in the referenced CPUC Sharepoint folder below:

- Case 1: Incentive Level Excludes Professional Services ($3/W through to $6/W)
- Case 2: Incentive Level Includes Professional Services ($3/W through to $6/W)
- Case 3: Incentive Level Fixed at $3/W (Excluding Professional Services) and TPO Funding is Increased by 10%

This section aims to discern how the quantity of projects requiring professional services is distributed across funding gap bins for each policy alternative. If projects requiring professional services are increasingly skewed towards lower funding gap bins under specific policy alternatives, this would indicate a greater output of projects featuring professional services (since less additional funding would be required to complete these projects). By way of summary, the following methodology was used (see also Table E2 below):

i. All Application IDs with 'completed' (n=2341) and 'inactive' (n=582) project status were grouped into their corresponding funding gap bins (from $0/W to $13/W in $0.5/W increments). 'Case 1' through 'Case 3' depicts the distribution of all Application IDs by funding gap while also distinguishing between complete versus inactive projects and those that required professional services versus those that didn't.
ii. The total number of projects for each funding gap bin was recorded (Table E2, Row 6), as well as the percentage of total projects (%Total) that each funding gap bin represents (Table E2, Row 7).

iii. The number of projects requiring professional services as a proportion of all projects (Table E2, Row 10) was determined for each funding gap bin using the following formula. Refer to Note A below for additional details.

$$Proportion\ of\ Projects\ Requiring\ PS\ of\ \%Total\ (per\ funding\ gap\ bin) = \frac{Number\ of\ Projects\ Requiring\ PS}{Total\ Projects\ in\ Bin} \times \%Total$$

Table E2: 'Case 1' Example for Estimating Distribution of Projects Requiring Professional Services Across Funding Gap Bins

Row#	A	B	C	D	E	F	G	H	I	J	...
1	**Incentive ($/W)**	**Possible Projects**	**Status**	**Professional Service (PS)**	**$0 or less**	**$0.00 - 0.50**	**$0.50 - 1.00**	**$1.00 - 1.50**	**$1.50 - 2.00**	**$2.00 - 2.50**	...
2	3	419	Complete	No PS	41	546	479	172	77	22	...
3				Required PS	2	104	227	209	118	75	...
4			Inactive	No PS		51	69	20	16	2	...
5				Required PS		37	49	54	26	45	...
6				Total	43	738	824	455	237	144	...
7				% Total	1%	25%	28%	16%	8%	5%	...
8				Proportion No PS of %Total	1%	20%	19%	7%	3%	1%	...
9		221		How Many No PS Projects?	6	86	79	28	13	3	...
10				Proportion Required PS of %Total	0%	5%	9%	9%	5%	4%	...
11		198		How Many PS Projects?	0	20	40	38	21	17	...

Note A: The proportion of projects requiring professional services (sum of Row 10) remains fixed across all policy alternatives, reflecting the total population dataset (approximately 47% of all Application IDs require professional services). In other words, this simulation recognizes that 47% of registered Application IDs require professional services and rather focuses on the distribution of these Application IDs across funding gap bins to approximate the likelihood of projects featuring professional services being completed.

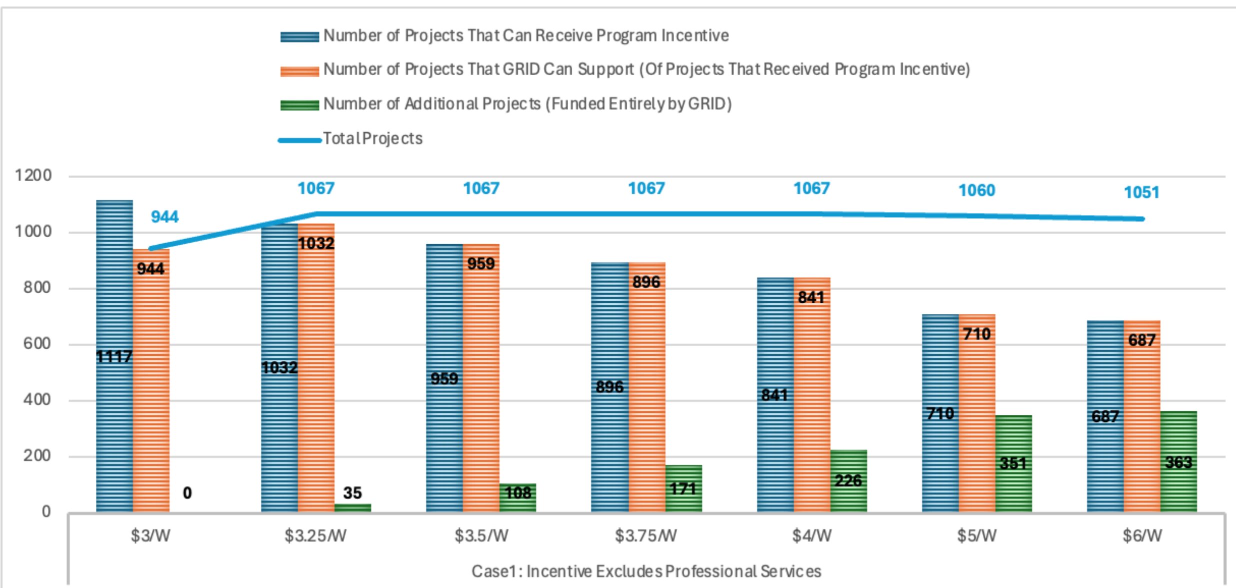
Note B: The 'additional projects funded by GRID' (see Table E1) assume that 90% of additional projects receive TPO, reflected in the net total cost GRID would assume for all additional projects (approximately $16,400 per project).

Referenced Data: See Appendix E in the [CPUC Sharepoint Folder]

Appendix F: Response to GRID's 2024 M&O Plan

The recommendations made rely on the assumptions that–(i) the program's incentive budget spillover is equally spent across remaining program years–enhancing the standard $8.5 million annual incentive budget by an additional $2.5 million–, (ii) GRID continues to contribute $2 million annually in philanthropic funding across all remaining program years, and (iii) all TPO revenue generated within the program is used to either clear project funding gaps or is reinvested into completing additional DAC-SASH projects. Recent correspondence, however, suggests that GRID could deviate from historical trends in 2024 and contribute close to $4.5 million in philanthropic funding while also spending approximately $13 million in incentives (that is, the annual $8.5 million incentive budget plus roughly $3.5 million from the program's $16.8 million budget spillover from previous years)[67]. At a $3/W incentive level, modeling data forecasts total project output to be 944 if $4.5 million in philanthropic funding is contributed (Figure 39). The combination of greater philanthropic funding and a larger project base taking-up TPO enables a TPO funding surplus to be realized as early as the $3.25/W level, where 35 additional projects can be completed completely funded by GRID. Under these circumstances, maximum project output and the most efficient use of TPO funds (i.e., filling project funding gaps) is achieved at $3.25/W, representing a marginal incentive level increase.

Figure 39: Projection of Total Projects Completed in 2024 Across Various Incentive Levels



[67] GRID's 2024 ME&O plan indicates that GRID aims to complete 1038 projects in 2024. If we assume that 2024 projects will require the same philanthropic expenditure per project as 2023, it'll amount to roughly $4,250/project. Thus, 1038 projects would require roughly $4.5 million in philanthropic funding to supplement the projected funding gap. Similarly, if the average 2024 project emulates the average system size of 2023 projects (4.14 kW), then 1038 projects will roughly require $13 million in incentives at an incentive level of $3/W.