# SELF-GENERATION INCENTIVE PROGRAM: RENEWABLE FUEL USE REPORT NO. 34

**Final**

Submitted to:
Pacific Gas and Electric Company
SGIP Working Group

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# GLOSSARY

## Abbreviations and Acronyms

| Term | Definition |
|---|---|
| CHP | Combined Heat and Power |
| CSE | Center for Sustainable Energy |
| $CO_2$ | Carbon dioxide |
| $CO_2eq$ | Carbon dioxide equivalent |
| CPUC | California Public Utilities Commission |
| DBG | Directed Biogas |
| DG | Digester Gas |
| ED | Energy Division |
| FC | Fuel Cell |
| GHG | Greenhouse Gas |
| GT | Gas Turbine |
| GWP | Global Warming Potential |
| ICE | Internal Combustion (IC) Engine |
| MT | Microturbine |
| PA | Program Administrator |
| PBI | Performance Based Incentive |
| PDP | Performance Data Provider |
| PG&E | Pacific Gas and Electric Company |
| PY | Program Year |
| RFU | Renewable Fuel Use |
| SCE | Southern California Edison Company |
| SCG | Southern California Gas Company |
| SDG&E | San Diego Gas and Electric Company |
| SGIP | Self-Generation Incentive Program |
| WWTP | Wastewater Treatment Plant |

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## Key Terms

| Term | Definition |
|---|---|
| 2017+ RFU Requirement | For reporting purposes, projects with RFU requirements with application dates in 2017 or later are referred to as *2017+ RFU requirement*. Depending on the application year, all SGIP projects are required to use a certain percentage of renewable fuel. |
| Applicant | The entity, either the Host Customer, System Owner, or third party designated by the Host Customer, which is responsible for the development and submission of the SGIP application materials and is the main contact for the SGIP Program Administrator for a specific SGIP application. |
| Biogas | A gas composed primarily of methane and carbon dioxide produced by the anaerobic digestion of organic matter. This is a renewable fuel. Typically, biogas is produced in landfills, in digesters at wastewater treatment plants, food processing facilities, or dairies. |
| Biogas Baseline | The assumed treatment of biogas fuel in the absence of the SGIP generator. See *Flaring and Venting*. |
| Combined Heat and Power (CHP) | A system that produces both electricity and useful heat simultaneously; sometimes referred to as "cogeneration." |
| $CO_2$ Equivalent ($CO_2eq$) | When reporting emission impacts from different types of greenhouse gases, total GHG emissions are reported in terms of tons of $CO_2$ equivalent so that direct comparisons can be made. To calculate $CO_{2eq}$, the global warming potential of a gas as compared to that of $CO_2$ is used as the conversion factor (e.g., the global warming potential (GWP) of methane is 21 times that of $CO_2$). Thus, the $CO_{2eq}$ of a given amount of methane is calculated as the product of the GWP factor (21) and the amount of methane. |
| Completed | Projects that have been installed and begun operating, have passed their SGIP eligibility inspection, and were issued an incentive payment. |
| Directed Biogas | Biogas delivered through a natural gas pipeline system and its nominal equivalent used at a distant customer's site. Within the SGIP, this is classified as a renewable fuel. See also: *Onsite Biogas*. |
| Electrical Conversion Efficiency | The ratio of electrical energy produced to the fuel energy used (lower heating value). |
| Flaring (of Biogas) | A flaring baseline means that there is ***prior*** legal code, law or regulation requiring capture and flaring of the biogas. In this event an SGIP project ***cannot*** be credited with GHG emission reductions due to capture of **methane** in the biogas. A project cannot take credit for a prior action required by legal code, law, or regulation. See also: *Venting (of Biogas*). |
| Greenhouse Gas (GHG) Emissions | For the purposes of this analysis GHG emissions refer specifically to those of $CO_2$ and methane, expressed as $CO_2eq$. |
| Incentivized Capacity | The capacity rating associated with the rebate (incentive) provided to the program participant. The incentivized capacity may be lower than the manufacturer's nominal "nameplate" system size rating. |
| Legacy RFU Requirement | For reporting purposes, projects with RFU requirements with application dates prior to 2017 are referred to as *Legacy RFU Requirement*. These projects received higher incentives and are required to use a minimum of 75% renewable fuel. |

| Term | Definition |
|---|---|
| Lower Heating Value (LHV) | The amount of heat released from combustion of fuel assuming that the water produced during the combustion process remains in a vapor state at the end of combustion. Units of LHV are typically Btu/SCF of fuel. |
| Metric Ton | Common international measurement for the quantity of greenhouse gas emissions. A metric ton is equal to 2,205 pounds. |
| Onsite Biogas | Biogas projects where the biogas source is located directly at the host site where the SGIP system is located. See also: *Directed Biogas*. |
| Prime Mover | A device or system that imparts power or motion to another device such as an electrical generator. Examples of prime movers in the SGIP include gas turbines, IC engines, and wind turbines. |
| Renewable Natural Gas | A more common term for Directed Biogas. |
| Venting (of biogas) | A venting baseline means that there is no ***prior*** legal code, law or regulation requiring capture and flaring of the biogas. Only in this event can an SGIP project be credited with GHG emission reductions due to capture of **methane** in the biogas. A project cannot take credit for a prior action required by legal code, law, or regulation. See also: *Flaring (of Biogas).* |

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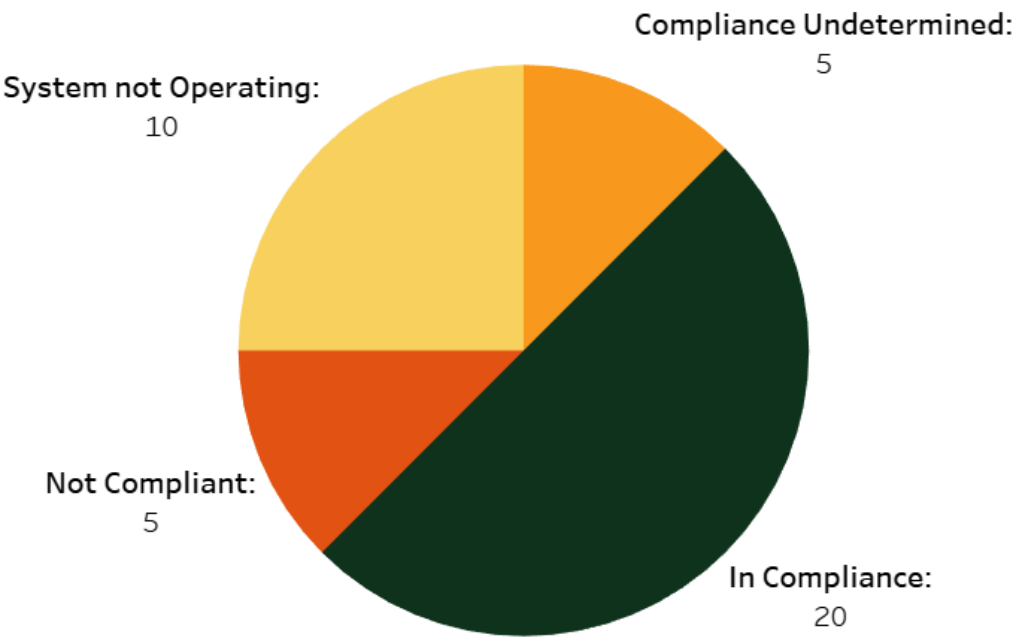
# RENEWABLE FUEL USE VERIFICATION SUMMARY

Verdant's compliance determinations for SGIP projects with minimum renewable fuel usage requirements are summarized here. Participation in the SGIP requires participants to meet a specific renewable fuel commitment throughout the duration of each project's compliance period. The compliance verification period for all renewably fueled projects currently being evaluated is ten years. For projects still within their compliance verification period, the oldest project submitted an SGIP application in 2011, meaning the project is required to meet the program requirements in the PY2011 handbook. For applications submitted on or after 2021, CPUC Decision (D.) 21-06-005[1] requires renewable technology project host customers to provide an attestation stating that the project will use 100% renewable fuels for the lifetime of the system. Additionally, the SGIP handbook includes a clause that states that the SGIP Program administrator has the right to audit and verify generator's renewable fuel consumption over the duration of the SGIP contract. Since the SGIP's inception there have been 176 incentivized generation projects fueled entirely or partially by renewable fuel. These projects have had varying levels of renewable fuel requirements, based on the program year regulations and the level of incentives received. There are currently a total of 40 completed projects within the compliance verification window. Figure 1 summarizes the compliance determination for each of these 40 projects, grouped by the compliance outcome.

[1] CPUC Decision 21-06-005. Decision Revising Self-Generation Incentive Program Renewable Generation Technology Program Requirements and Other Matters. Issued 06/04/2021. https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M387/K064/387064243.PDF

**FIGURE 1: PROJECT COMPLIANCE SUMMARY**




There are a total of 20 projects that met their compliance obligations; 15 of these were renewable fuel only projects (either no natural gas supply, or only incentivized only based on the availability of biofuel to the facility) while five of them were blended onsite renewable projects (onsite biogas blended with natural gas). For five projects, Verdant was unable to make a compliance determination due to lack of contact with the customer. Five biogas projects were out of compliance with minimum renewable fuel use requirements, and ten projects were non-operational.

# 1 INTRODUCTION AND EXECUTIVE SUMMARY

The purpose of renewable fuel use (RFU) reports is to provide the Energy Division (ED) of the California Public Utilities Commission (CPUC) and the Program Administrators (PA) with Self-Generation Incentive Program (SGIP) project renewable fuel use information. The report specifically contains compliance determinations of projects with SGIP renewable fuel use requirements. In addition, the reports assist the PAs and ED in making recommendations concerning modifications to the renewable fuel generation project requirements of the SGIP.

This report (RFU Report No. 34) includes detailed summaries produced for RFU projects that are still within their compliance period. Results of analysis of renewable fuel use compliance presented in this RFU Report are based on the 12 months of operation from July 1, 2024, through June 30, 2025. Some projects completed their compliance requirements during this period, so their compliance determination is only made up until the time their compliance requirements expired.

## 1.1 RFU REPORT METHODOLOGY AND DATA OVERVIEW

SGIP RFU Report No. 34 provides information on the renewable fuel usage from the 40 renewable fuel projects which were still within their SGIP compliance requirement period as of July 1st, 2024 that are still required to comply with minimum renewable fuel usage requirements. The report leverages information found in the SGIP Statewide Project Database, the Inspection Reports prepared by third-party consultants, metered data (electrical generation, fuel consumption, and other biogas usage documentation) provided to Verdant through data requests to each project's Performance Data Provider (PDP), and discussions with host customers.

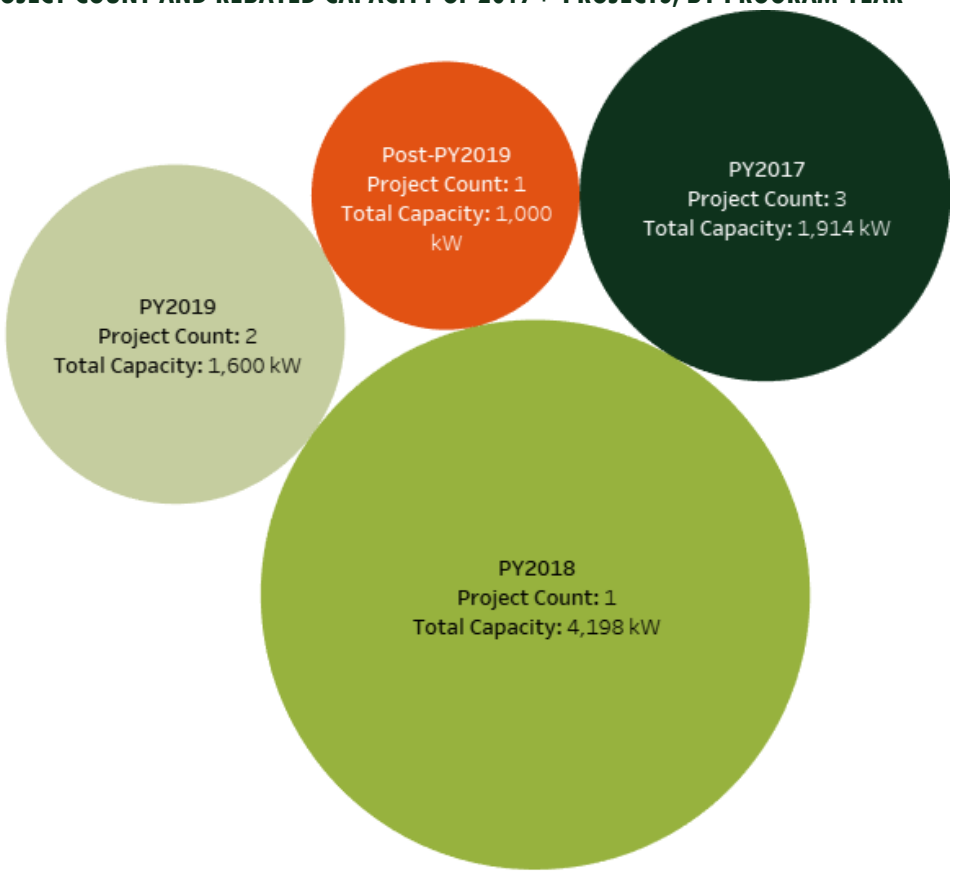
SGIP RFU projects are fueled by a variety of renewable sources. These renewable sources can be either located onsite (onsite biogas) or at a location other than the SGIP generator (directed biogas). All 40 SGIP generation projects within their compliance period are at least partially fueled by on-site biogas. Sources of on-site biogas include landfills; digester gas (DG) from wastewater treatment plants (WWTPs), dairies, and food processing facilities. No projects still within their SGIP permanency period are currently fueled by directed biogas.

The SGIP changed the fuel requirements in 2017, requiring a certain level of renewable fuel for all fueled generation projects. Pre-2017, renewably fueled generation projects that received an additional renewable fuel incentive were required to utilize at least 75% renewable fuel to generate electricity. Starting in 2017, all fueled generation projects were required to use 10% renewable fuel. Projects listed under a 2018 application were required to utilize 25% renewable fuel and those under 2019 application

were required to utilize 50% renewable fuel.[2] Additionally, some of these 2017-2019 projects have received "renewable fuel adders" receiving larger incentives for a higher percentage of renewable fuel. As of 2020, all fueled generation projects are now required to utilize 100% renewable fuel.

Of the 40 RFU projects discussed in this report, 33 received incentives at a pre-PY 2017 renewable level and are therefore required to comply with the SGIP's legacy minimum renewable fuel use requirements (75%).[3] The 2017+ projects are highlighted below in Figure 2. There are seven total projects required under the newer SGIP regulations to have some percentage of renewable fuel. Only one project so far has been installed under the post-2019 rules, requiring 100% renewable fuel, yet some of these projects below received additional incentives so that they would operate solely or mostly on renewable fuel.

**FIGURE 2: PROJECT COUNT AND REBATED CAPACITY OF 2017+ PROJECTS, BY PROGRAM YEAR**




[2] A typographical error was found in prior reports which stated that 2018 projects required 50% renewable fuel and 2019 projects required 75% renewable fuel. This has been corrected here.

[3] These requirements will be referred to as *legacy* RFU requirements throughout the report.

Table 1 summarizes the status of the 40 RFU projects grouped by compliance status and renewable fuel type. Further discussion is provided in subsequent sections.

**TABLE 1: RFU PROJECT DESIGNATIONS**

| | | 100% Renewable Gas | Blended Renewable/Natural Gas |
|---|---|---|---|
| In Compliance | Verified Compliance | | 6 |
| | Implied Compliance, Unknown Operation | 6 | |
| | Implied Compliance, Verified Operation | 8 | |
| Compliance Undetermined | No Customer Contact | | 4 |
| | No Data Available | | 1 |
| System not Operating | Decommissioned | 4 | 3 |
| | System not Operating | 1 | 2 |
| Not Compliant | Not Compliant | 1 | 4 |

## 1.2 SUMMARY OF RFU REPORT NO. 34 FINDINGS

As of July 1st, 2024, there are a total of 40 RFU projects within their compliance requirement period. Half of these projects (20) are blended onsite biogas projects with the other half being onsite biogas only (20).

**FIGURE 3: PROJECTS WITHIN COMPLIANCE REQUIREMENT PERIOD BY TECHNOLOGY AND FUEL TYPE**

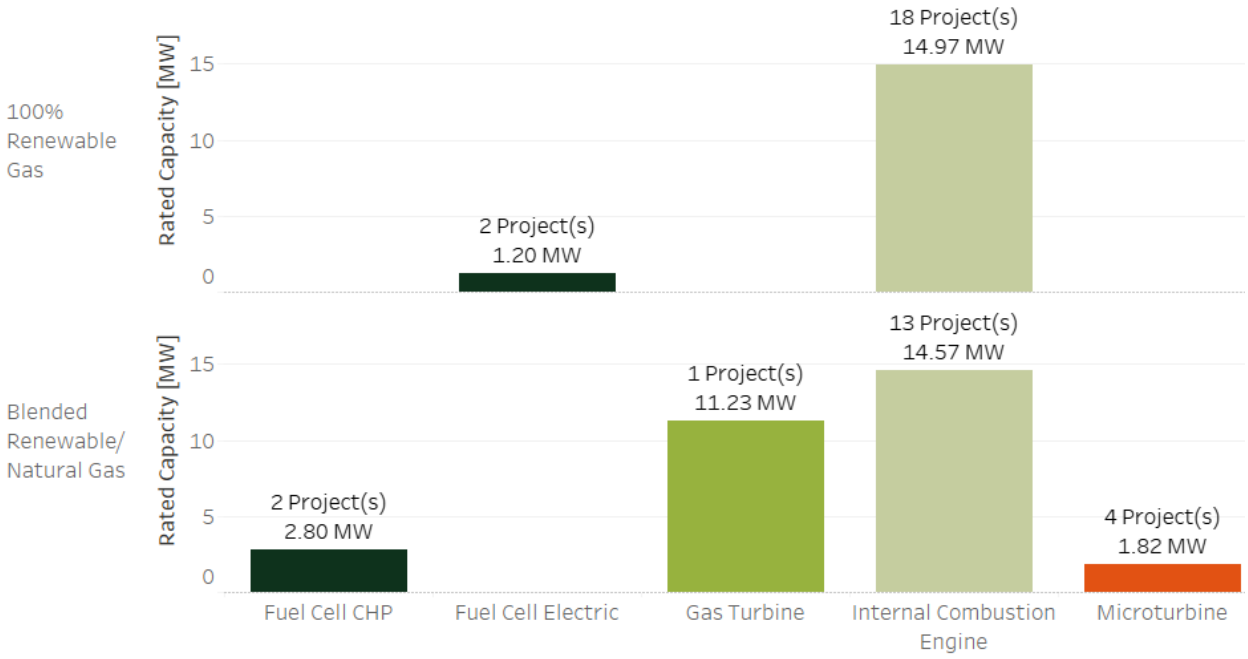
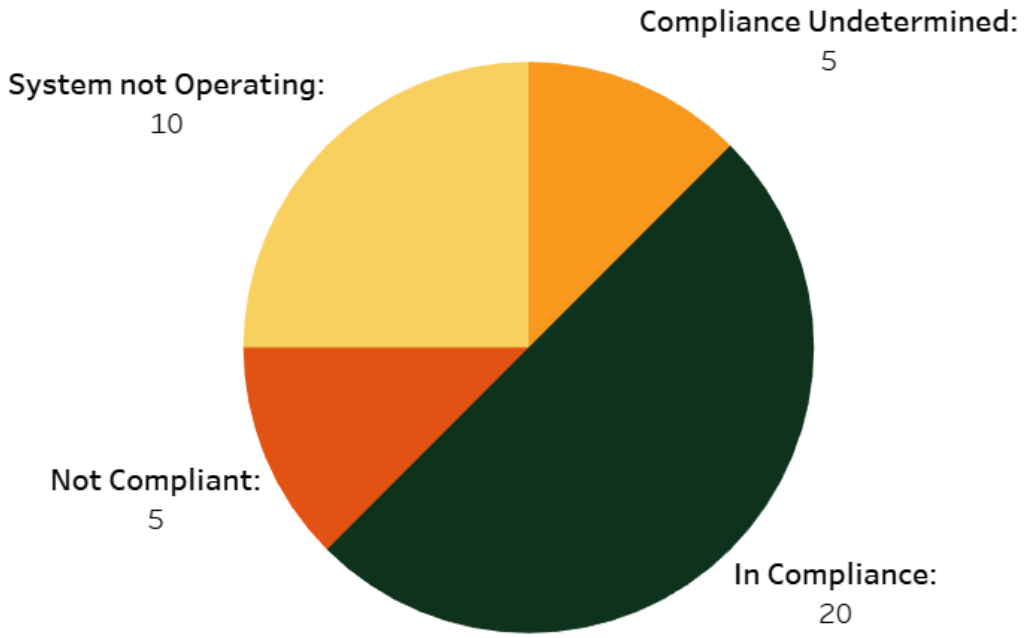



Figure 4 below shows the share of projects by their compliance determination. Verdant found that of the 40 projects, 20 were either verified to be compliant or assumed to be compliant (pre-2017 onsite biogas

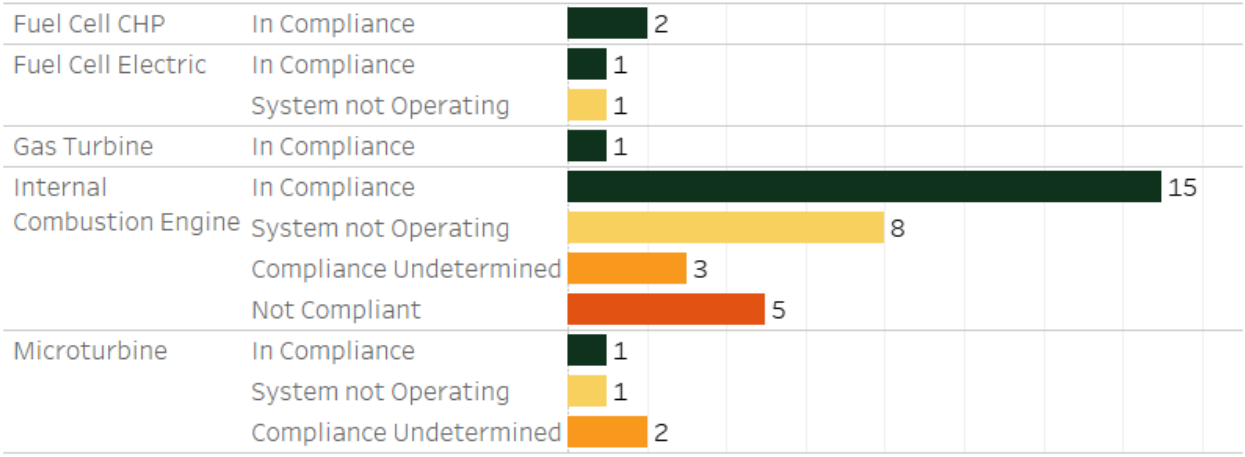
only projects). Verdant was unable to determine compliance for five projects, primarily because we were unsuccessful at reaching the contact. Five projects were not compliant with SGIP minimum renewable fuel use requirements and the remaining ten were either decommissioned, no longer participating in the program, or non-operational and not expected to come back online.

**FIGURE 4: SHARE OF PROJECTS BY COMPLIANCE DETERMINATION**




The compliance determination is also shown below in Figure 5 by equipment type. Most renewably- or partially-renewably fueled systems are internal combustion engines. While most of these are in-compliance, there are eight projects that were either not in compliance or where compliance was undetermined, and another eight where the system was not operational or decommissioned.

**FIGURE 5: COUNT OF PROJECTS BY EQUIPMENT TYPE AND COMPLIANCE DETERMINATION**




The number of potential RFU projects requiring compliance going forward is shown in Figure 6. The table reflects projects which are "completed" and have received their upfront payment only. This table shows the number of projects that will be required to demonstrate compliance if no new fueled generation projects are incentivized through the program.

**FIGURE 6: FORECASTED RFU PROJECTS REQUIRING COMPLIANCE VERIFICATION BY RFU REPORT NUMBER**

| RFU Report # | Report Year | Quantity of Projects |
|---|---|---|
| 35 | 2026 | 28 |
| 36 | 2027 | 25 |
| 37 | 2028 | 21 |
| 38 | 2029 | 14 |
| 39 | 2030 | 7 |
| 40 | 2031 | 6 |
| 41 | 2032 | 4 |

There are also six fueled generation pipeline projects in the SGIP application queue, including three linear generators. These projects are all in various stages (and none of them are guaranteed to be finalized and incentivized), and all of them are PY 2020 or later projects that require 100% renewable fuel.

## 1.3 CONCLUSIONS AND RECOMMENDATIONS

In accordance with CPUC Decision (D.) 02-09-051, the overall purpose of the RFU reports is to help ensure that renewably fueled projects are in fact meeting SGIP renewable fuel use requirements. Prior Renewable Fuel Use Reports have documented consecutive occurrences of non-compliance with renewable fuel use requirements.

This report identifies 20 out of the 40 projects (50%) meeting, or assumed to be meeting, their renewable fuel usage compliance requirements. The percentage of projects that are verified to be in compliance has decreased slightly over the last several reports, often due to the increase in projects ending their operation prior to the end of their 10-year warranty period. This report also observes a larger percentage of projects that did not meet their renewable fuel requirements than have been observed in prior years.

As recommended in prior RFU reports, we have proposed that future renewable fuel use reporting (after RFU #35) will take the form of short memos, highlighting project compliance. Additionally, these memos will follow the calendar year rather than a mid-year process, which will streamline data collection with the impact reporting and reduce the reporting burden on the Performance Data Providers and customers.[4] RFU #35 will still be a full report, but it will only cover the last half of 2025 (July-December).

# 2 FUEL USE AT RFU REQUIREMENT PROJECTS – COMPLIANCE DETERMINATION

Legacy RFU requirement projects are allowed to use a maximum of 25% non-renewable fuel; the remaining 75%-100% must be renewable fuel to receive the renewable fuel adder. Beginning in PY 2017, 2017+ RFU requirements dictate that *all* fuel consuming SGIP projects must use a minimum percentage of renewable fuel, making all projects subject to RFU Requirements. The period during which legacy RFU requirement projects are obliged to comply with this requirement is specified in the SGIP contracts between the host customer, the system owner, and the PAs. Specifically, this compliance period is the same as the equipment warranty requirement. For PY11 - PY19 projects, all generation systems must have a minimum ten-year warranty. Therefore, the fuel use requirement period for all projects within their requirement period is ten years. The SGIP applicant must provide warranty (and/or maintenance contract) start and end dates in the Reservation Confirmation and Incentive Claim Form. From PY20 on, renewable fuel projects must use renewable fuel for the life of the SGIP generator.

Facilities are grouped into three categories in assessing renewable fuel use compliance:

- "100% biogas" projects located where biogas is produced (e.g., wastewater treatment facilities, landfill gas recovery operations) and the biogas is the only source for the prime mover.
- "Blended" on-site RFU requirement facilities located where biogas is produced that use a blend of biogas and non-renewable fuel (e.g., natural gas); and

[4] This approach has been discussed but the M&E plan is still pending, so this approach has not been finalized.

- "Directed" RFU requirement facilities located somewhere other than where biogas is produced and injected into the common carrier pipeline and are not necessarily directly receiving the biogas. Currently, there are no directed biogas projects still requiring compliance.

Fuel supply for RFU requirement projects are summarized in Table 2. Forty RFU requirement projects are still required to procure renewable fuel during this reporting period. Twenty of these projects operate solely on renewable fuel.

**TABLE 2: SUMMARY OF FUEL SUPPLIES AND PROJECT COMPLIANCE STATUS FOR RFU REQUIREMENT PROJECTS**

| | Count of Projects | Incentivized Capacity [kW] |
|---|---|---|
| 100% Renewable Gas | 20 | 16,173 |
| Blended Renewable/Natural Gas | 20 | 30,414 |
| Grand Total | 40 | 46,587 |

Legacy RFU projects are required to consume a minimum of 75% of their energy input on an annual energy basis from renewable sources, and the energy input of the renewable fuel is dependent on the heating content of the renewable fuel used at the facility. As part of the data collection, we attempt to collect the Lower Heating Value (LHV) of the renewable fuel from the host customer or the PDP. For this reporting period, the LHV values we were able to collect ranged from 543 to 587 BTU/SCF. As referenced in the Biomass CHP catalog[5], wastewater treatment biogas heating value ranges between 550 to 650 BTU/SCF. In the absence of site-specific heating value for the renewable fuel, a conservative value of 600 BTU/SCF is used to determine the compliance. For natural gas energy density, an LHV of 930[6] BTU/SCF is assumed. Figure 7 below highlights the historical compliance determination for all blended fuel projects, as well as the compliance determination for this year's reporting (RFU Report 34).

[5] EPA Combined Heat and Power Partnership. Chapter 3, Biomass Resources. September 2007. https://www.epa.gov/sites/default/files/2015-07/documents/biomass_combined_heat_and_power_catalog_of_technologies_3._biomass_resources.pdf

[6] Per the SGIP Handbook, the higher heating value (1,033 BTU/SCF) is multiplied by 0.9 to estimate the LHV of the natural gas.

**FIGURE 7: HISTORY OF COMPLIANCE DETERMINATION**

| Application Code | RFU Report Number 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 |
|---|---|---|---|---|---|---|---|---|---|
| PGE-SGIP-2011-1966 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No |
| PGE-SGIP-2011-1987 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| PGE-SGIP-2012-2112 | UTD | UTD | UTD | Non-Op | Non-Op | Non-Op | Non-Op | Non-Op | Non-Op |
| PGE-SGIP-2012-2206 | UTD | UTD | UTD | UTD | Yes | Yes | UTD | Yes | No |
| PGE-SGIP-2012-2212 | UTD | UTD | UTD | Non-Op | Non-Op | Non-Op | Non-Op | Non-Op | Non-Op |
| PGE-SGIP-2013-2484 | | UTD | UTD | UTD | UTD | Non-Op | Non-Op | Non-Op | Non-Op |
| PGE-SGIP-2014-2788 | | | | UTD | UTD | UTD | UTD | UTD | UTD |
| PGE-SGIP-2014-2813 | | | | UTD | UTD | Non-Op | Non-Op | Non-Op | Non-Op |
| PGE-SGIP-2014-2843 | UTD | UTD | UTD | UTD | UTD | UTD | UTD | UTD | UTD |
| PGE-SGIP-2016-3004 | | | | | | Yes | No | No | No |
| SCE-SGIP-2012-0450 | UTD | Yes | UTD | UTD | UTD | UTD | UTD | UTD | UTD |
| SCE-SGIP-2014-0970 | | | | | | Yes | Yes | Yes | Yes |
| SCE-SGIP-2014-0986 | | | | No | No | UTD | UTD | No | UTD |
| SCE-SGIP-2014-1006 | | | | UTD | UTD | UTD | UTD | UTD | UTD |
| SCG-SGIP-2012-0156 | UTD | Yes | UTD | UTD | UTD | Non-Op | Non-Op | Non-Op | Non-Op |
| SCG-SGIP-2014-0205 | | Yes | UTD | Yes | Yes | Yes | Yes | Yes | Yes |
| SCG-SGIP-2015-0237 | | | UTD | UTD | Yes | Yes | Yes | Yes | Yes |
| SCG-SGIP-2019-1594 | | | | | | | | Yes | Yes |
| SD-SGIP-2014-0747 | | | | Yes | No | No | No | Yes | No |
| SD-SGIP-2017-1119 | | | | Yes | Yes | Yes | Yes | Yes | Yes |

**UTD = Unable to Determine**. Explanations for why compliance was undetermined are explained in further detail below. **Non-Op = Non-Operational.** Reasons why a project is non-operational include the system being decommissioned, facility shut down, and cost of operating too high, among others.

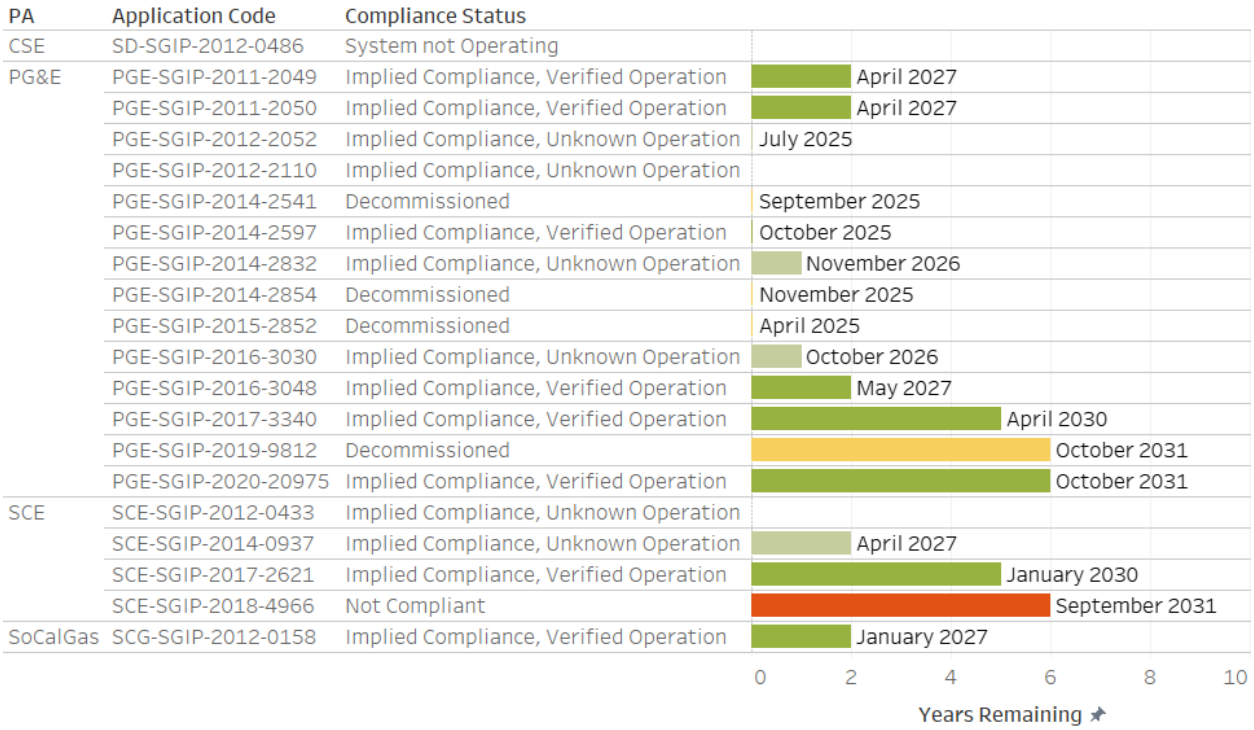
## 2.1 FUEL USE AT 100% BIOGAS PROJECTS

Figure 8 on the following page summarizes compliance determinations for 100% biogas projects. In some cases, these projects are equipped with only a renewable fuel supply and they are not able to blend any amount of natural gas without significant re-engineering. However, as systems are getting older, we have identified several systems that are now decommissioned or no longer operating. Therefore, Verdant has been attempting to, at a minimum, verify operation of these systems.

Of the 20 renewable-only projects, 8 projects had their operation verified and were found to be in compliance. An additional 6 projects were assumed to be in compliance, given that they are renewable only projects, even though we were unable to confirm operation. Five projects have either been decommissioned or are no longer operating. A single project was found to no longer be in compliance, as discussed below:

- **SCE-SGIP-2018-4966:** This project is made up of 4 separate internal combustion engines operating on 100% renewable fuel. The overall incentivized capacity of the system was derated to account for the total potential biofuel available to the system. However, the inspection report confirms that fuel is supplemented by natural gas. Previously, renewable fuel compliance could not be determined as the data was deemed unreliable. There were many unrealistic data spikes in all data streams, very little biogas usage reported, and many records of data with zero electric data and non-zero fuel and heat data, and vice versa. While the prior data was unreliable enough to confidently provide a compliance determination, the PDP has provided anecdotal evidence that the project is not meeting its biogas requirements, including confirming with the customer that there was indeed little to no biogas usage. As of May 2023, the company filed for Chapter 11 bankruptcy and sold this facility. Verdant was unable to get ahold of the new owners to gather new metered data, however, they did hold email discussions with the previous owners, who are still operating the facility and informed us that this system is now operating solely on natural gas.

**FIGURE 8: FUEL USE COMPLIANCE OF 100% BIOGAS RFU REQUIREMENT PROJECTS**




**Note:** When a project's operational date is not provided in the inspection reports, the incentive payment date as reported by the PAs is used as a proxy for the operational date for reporting purposes.

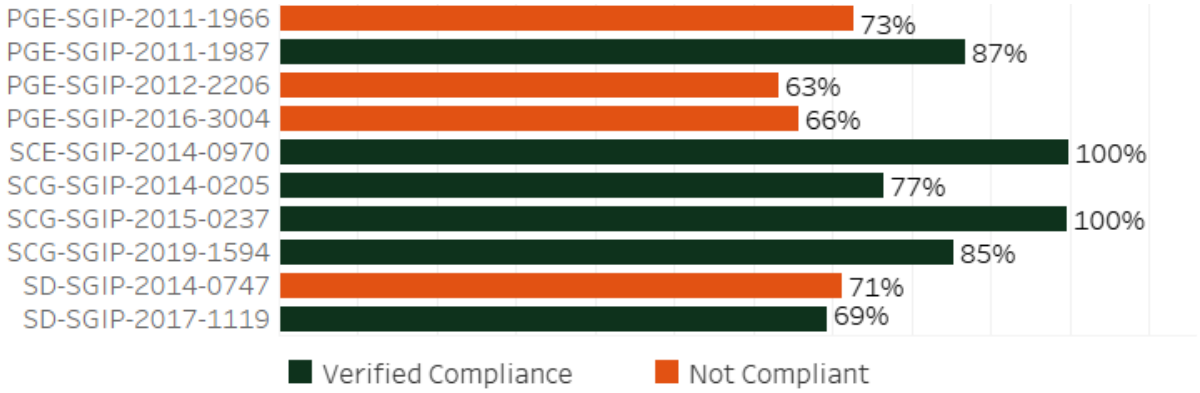
Projects without an end date have completed their permanency requirements during the RFU #34 reporting period.

## 2.2 FUEL USE AT BLENDED ON-SITE RFU REQUIREMENT PROJECTS

For blended facilities using both on-site renewable and non-renewable fuel, assessing compliance requires information on the amount of biogas consumed relative to the amount of non-renewable fuel consumed on-site. Some blended RFU requirement projects are equipped with a dedicated meter that measures the amount of non-renewable fuel being consumed by the project. Meters indicating the amount of renewable fuel being consumed by the SGIP project are owned and maintained by other program participants like system owners or host customers.

Figure 9 below highlights the biogas percentage for each of the 10 blended biogas projects where Verdant was able to make an independent compliance determination.

**FIGURE 9: PERCENT BIOGAS FOR BLENDED BIOGAS PROJECTS**




### 2.2.1 Blended On-Site RFU Requirement Projects out of Compliance

During this reporting period, four blended RFU requirement projects were determined to be out of compliance with SGIP renewable fuel use requirements.

- **PGE-SGIP-2011-1966**. This is a 1132 kW IC engine, utilizing both digester and natural gas. While this system previously met its renewable fuel usage of at least 75% in all prior reporting periods, it only utilized 73% biogas during RFU reporting period #34. This system completed its permanency requirements in November of 2024, and the renewable fuel percentage reflects only the time between July 2024 to November 2024.
- **PGE-SGIP-2012-2206**. This is a 977 kW IC engine, utilizing both digester and natural gas. This system has met its renewable fuel usage in many of the prior years, but it only utilized 63% renewable fuel during RFU reporting period #34. This system completed its permanency requirements as of July 1st, 2025.
- **PGE-SGIP-2016-3004**. This 477 kW IC engine utilizes digester gas and natural gas. During RFU Reporting period #34, the system was found to be operating for most of the reporting period, and met its renewable fuel requirements, but the system was found to be shut down during December 2024 and April 2025. Of the remaining period, the system was only utilizing 66% renewable fuel.
- **SD-SGIP-2014-0747**. This is a 571 kW IC engine, derated to 472 kW to account for the available renewable fuel. Data could only be collected through the end of 2024 as the site contact was unable to provide 2025 data. However, during this period, the system only utilized 71% renewable fuel.

### 2.2.2 Blended On-Site RFU Requirement Project Compliance Status Inconclusive

Five blended biogas projects could not have their compliance status determined during this reporting period.

For four of these projects, Verdant was not able to get ahold of a customer contact at these facilities, even after requesting assistance from the PA. Given the history of these projects (and the fact that we have not been able to get ahold of the customers in the past) and unless Verdant receives any new information for these customers regarding updated contact information, Verdant does not plan to continue attempting to verify compliance for these four projects:

- **PGE-SGIP-2014-2788**
- **PGE-SGIP-2014-2843**
- **SCE-SGIP-2012-0450**
- **SCE-SGIP-2014-1006**

For the remaining project, SCE-SGIP-2014-0986, the original site contact had left. The new contact informed us they no longer had access to the metering data. We also do not plan to pursue this data in future years, as the meter data is no longer available.

### 2.2.3 Blended On-Site RFU Requirement Project Compliance Status – Non-Operational or No Longer Participating in the Program.

Five projects in this list do not fall into one of the above categories during the reporting period. Technically, these projects are not considered out of compliance.

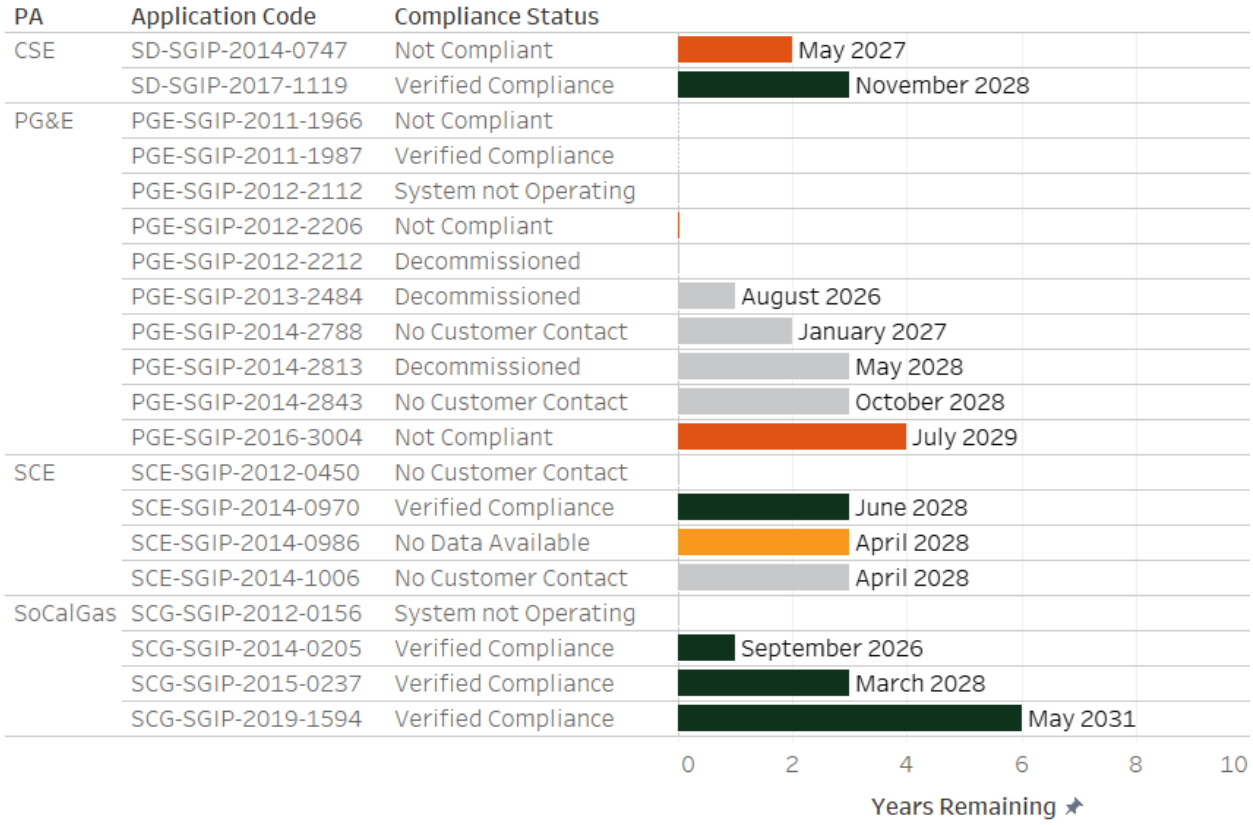
- **PGE-SGIP-2012-2212.** This 1,000 kW IC engine utilizes a combination of dairy digester gas and natural gas. The system became operational in March 2015 and therefore the project is required to comply with SGIP renewable fuel use requirements. The PDP indicated that the system is offline, and they did not have any communications from the site since 2018. As of June 2023, the PDP confirmed that the system was decommissioned.
- **PGE-SGIP-2012-2112.** This 190 kW IC engine utilizes wastewater digester gas and natural gas. This system became operational in July 2015 and is therefore required to comply with the SGIP fuel use requirements. However, according to the PA and the customer, this project is no longer enrolled in the SGIP program and has forfeited its remaining performance-based incentive.
- **SCG-SGIP-2012-0156.** This 1,500 kW IC engine utilizes a combination of digester gas and natural gas. This system became operational in September 2015 and is therefore required to comply with the SGIP fuel use requirements. Originally, the PDP noted that their metering equipment no longer

communicates with the facility. The host customer has confirmed that the project had to be taken offline to be refurbished to meet recently revised SCAQMD air quality requirements. The host customer is coordinating the refurbishing work with a plant expansion and expects the system to be brought back online after 2025.

- **PGE-SGIP-2013-2484:** This 800 kW microturbine project utilizes a variety of biogas sources as well as natural gas. The system became operational in August 2016 and is therefore required to comply with SGIP renewable fuel use requirements. The PBI PDP indicated that they have had an outstanding communication issue with this site beginning from 2018. However, this year the host customer informed PG&E that the microturbine has been removed due to the high maintenance cost in operating the microturbine using the renewable fuel.
- **PGE-SGIP-2014-2813:** This 602 kW IC Engine utilizes wastewater digester gas and natural gas. The system was noted as operational in October 2018 and is therefore required to comply with SGIP renewable fuel use requirements. However, the customer informed the PA that the system has not been performing and has sold the system. The customer stated it was due to not wanting to spend over $2M on electrical upgrades to export to the grid.

A summary of the 20 blended RFU requirement projects during this reporting period is presented in Figure 10. The table also displays the number of years remaining that each project is considered within their compliance period and therefore required to meet the renewable fuel requirements. Seven projects have met their permanency requirements during this reporting cycle.

**FIGURE 10: FUEL USE COMPLIANCE OF BLENDED ON-SITE RFU REQUIREMENT PROJECTS**




*Projects without an end date have completed their permanency requirements during the RFU #34 reporting period.

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# 3 GREENHOUSE GAS EMISSIONS

This section presents information regarding GHG emission impacts. The GHG emission information was calculated based on 13 projects where data was received.

Table 3 presents the GHG emissions results for the blended renewable and natural gas projects and renewable-only PBI projects where data was available. Hourly GHG impacts are calculated for each SGIP generation project as the difference between the GHG emissions produced by the incentivized distributed generation project and baseline GHG emissions. Baseline GHG emissions are those that would have occurred in the absence of the SGIP project. SGIP projects displace baseline GHG emissions by satisfying site electric loads as well as heating or cooling loads in some cases. All projects were found to reduce emissions.

**TABLE 3: SUMMARY OF GHG EMISSION IMPACTS FROM SGIP RENEWABLY FUELED PROJECTS [METRIC TONS OF $CO_{2EQ}$ PER MWH]**

| Application Code | Fuel | SGIP Emissions | Electric Power Plant Emissions | Heating Services | Biogas Treatment | Total Avoided Emissions | Emissions Impact |
|---|---|---|---|---|---|---|---|
| PGE-SGIP-2011-1966 | Blended | 0.50 | 0.42 | 0.00 | 0.36 | 0.79 | -0.29 |
| PGE-SGIP-2011-1987 | Blended | 0.53 | 0.42 | 0.00 | 0.46 | 0.88 | -0.35 |
| PGE-SGIP-2011-2050 | 100% Renewable | 0.78 | 0.42 | 0.03 | 0.78 | 1.22 | -0.44 |
| PGE-SGIP-2012-2206 | Blended | 1.00 | 0.40 | 0.00 | 0.63 | 1.03 | -0.03 |
| PGE-SGIP-2016-3004 | Blended | 0.98 | 0.41 | 0.00 | 0.65 | 1.05 | -0.07 |
| PGE-SGIP-2017-3340 | 100% Renewable | 1.49 | 0.41 | 0.00 | 13.76 | 14.17 | -12.68 |
| PGE-SGIP-2020-20975 | 100% Renewable | 0.37 | 0.42 | 0.00 | 3.35 | 3.77 | -3.41 |
| SCE-SGIP-2014-0970 | Blended | 0.58 | 0.27 | 0.00 | 0.58 | 0.85 | -0.27 |
| SCG-SGIP-2012-0158 | 100% Renewable | 0.69 | 0.42 | 0.33 | 0.69 | 1.44 | -0.75 |
| SCG-SGIP-2014-0205 | Blended | 0.65 | 0.36 | 0.01 | 0.50 | 0.87 | -0.22 |
| SCG-SGIP-2015-0237 | Blended | 0.54 | 0.36 | 0.00 | 0.54 | 0.90 | -0.36 |
| SCG-SGIP-2019-1594 | Blended | 0.52 | 0.36 | 0.05 | 0.44 | 0.85 | -0.33 |
| SD-SGIP-2014-0747 | Blended | 0.60 | 0.42 | 0.00 | 0.43 | 0.85 | -0.25 |

Greenhouse gas emissions are based on several factors:

- **SGIP Emissions:** Distributed generation projects emit $CO_2$ as a result of combustion and conversion of the fuel powering the project. Hour-by-hour emissions of $CO_2$ from SGIP projects are estimated based on their electricity generation and fuel consumption throughout the year.
- **Electric Power Plant Emissions:** When in operation, power generated by all SGIP projects directly displaces electricity that in the absence of the SGIP would have been generated by a central station

power plant to satisfy the site's electrical loads.[7] As a result, SGIP projects displace the accompanying $CO_2$ emissions that these central station power plants would have released to the atmosphere. The avoided $CO_2$ emissions for these baseline conventional power plants are estimated on an hour-by-hour basis over all 8,760 hours of the year.[8] The estimates of electric power plant $CO_2$ marginal emissions were accessed from WattTime.[9]

- **Heating Services Emissions:** Recovered useful heat may displace natural gas that would have been used in the absence of the SGIP to fuel boilers to satisfy site heating loads. This displaces accompanying $CO_2$ emissions from the boiler's combustion process. Only one project provided heat recovery data. A second project utilized a heat exchange to recover useful heat, but no heat data was available for the project.
- **Biogas Treatment:** Biogas-powered SGIP projects capture and use $CH_4$ that otherwise may have been emitted to the atmosphere (vented), or captured and burned, producing $CO_2$ (flared). A flaring baseline was assumed for all facilities except dairies. Flaring was assumed to have the same degree of combustion as SGIP prime movers. All current RFU projects where data was available were identified as having flared baselines.

Requirements regarding venting and flaring of biogas projects are governed by a variety of regulations in California. At the local level, venting and flaring at the different types of biogas facilities is regulated by California's 35 air quality agencies.[10] At the state level, the California Air Resources Board (CARB) provides guidelines for control of methane and other volatile organic compounds from biogas facilities.[11] At the federal level, New Source Performance Standards and Emission Guidelines regulate methane capture and use.[12]

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[7] In this analysis, GHG emissions from SGIP projects are compared only to GHG emissions from utility power generation that could be subject to economic dispatch (i.e., central station natural gas-fired combined cycle facilities and simple cycle gas turbine peaking plants). It is assumed that operation of SGIP projects has no impact on electricity generated from utility facilities not subject to economic dispatch. Consequently, comparison of SGIP projects to nuclear or hydroelectric facilities is not made as neither of these technologies is subject to dispatch.

[8] Consequently, during those hours when an SGIP project is idle, displacement of $CO_2$ emissions from central station power plants is equal to zero.

[9] WattTime developed real-time and forecasted marginal GHG emissions data for SGIP. https://sgipsignal.com/

[10] An overview of California's air quality districts is available at: http://www.capcoa.org

[11] In June of 2007, CARB approved the Landfill Methane Capture Strategy. See http://www.arb.ca.gov/cc/landfills/landfills.htm for additional information.

[12] EPA's Landfill Methane Outreach Program provides background information on control of methane at the federal level. See: http://www.epa.gov/lmop/

The baseline assumption (i.e., flaring versus venting) made for biogas used in SGIP systems is the factor exerting the greatest influence overestimates of GHG impacts. Biogas projects with a vented baseline achieve significantly greater GHG reductions per unit of electricity generated than those with a flared baseline.