

SELF-GENERATION INCENTIVE PROGRAM: RENEWABLE FUEL USE REPORT NO. 32

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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 ₂ eq	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

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 <i>2017+ RFU requirement</i> . Depending on the year of the application, 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, that 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. Biogas is typically produced in landfills, and in digesters at wastewater treatment plants, food processing facilities, and dairies.
Biogas Baseline	The assumed treatment of biogas fuel in the absence of the SGIP generator. See <i>Flaring and Venting</i> .
Combined Heat and Power (CHP)	A system that produces both electricity and useful heat simultaneously; sometimes referred to as “cogeneration.”
CO ₂ Equivalent (CO ₂ eq)	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 ₂ eq, 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 ₂ eq 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.
Dedicated RFU Requirement	Projects equipped only with a renewable fuel supply and are not able to blend any amount of natural gas without significant re-engineering.
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: <i>Onsite Biogas</i> .
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: <i>Venting (of Biogas)</i> .
Greenhouse Gas (GHG) Emissions	For the purposes of this analysis GHG emissions refer specifically to those of CO ₂ and methane, expressed as CO ₂ eq.
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 <i>Legacy RFU Requirement</i> . These projects received higher incentives and are required to use a minimum of 75 percent 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: <i>Directed Biogas</i> .
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 <i>prior</i> 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: <i>Flaring (of Biogas)</i> .

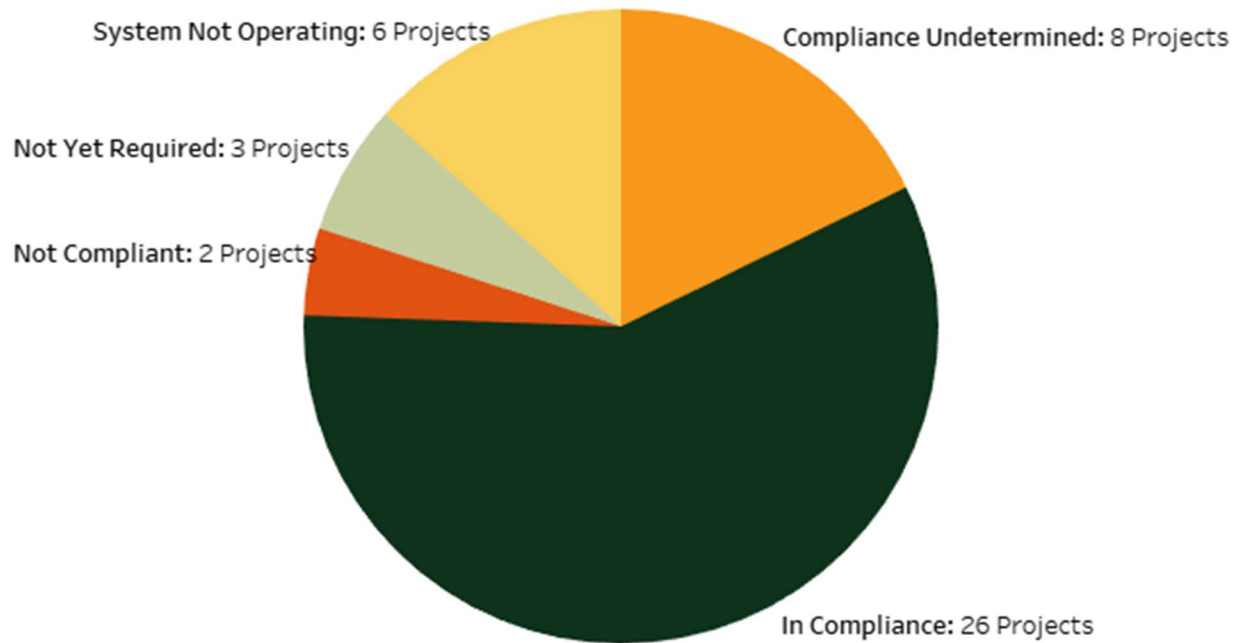


RENEWABLE FUEL USE VERIFICATION SUMMARY

Verdant’s compliance determinations for SGIP projects with minimum renewable fuel usage requirements is summarized here. Participation in the SGIP requires participants to meet their renewable fuel commitment throughout the duration of each project’s compliance period. For applications submitted after 2011, the compliance verification period is ten years. All projects with applications submitted prior to 2011 are beyond their compliance period. For applications submitted on or after 2021, D.21-06-005¹ requires renewable technology project host customers to provide an attestation stating that the project will only use 100 percent renewable fuels for the lifetime of the system. Additionally, the 2022 SGIP handbook states that the SGIP Program administrator has the right to audit and verify generator’s renewable fuel consumption over the life of the contract. Since inception of the program 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 45 completed projects either within the compliance verification window or with upcoming verification requirements (one full year of performance data is required). Figure 1 summarizes the compliance determination for each of these 45 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 26 projects that met their compliance obligations; 19 of these were renewable fuel only projects (no natural gas supply) while 7 of them were blended renewable projects (onsite biogas blended with natural gas). For eight projects, Verdant was unable to make a compliance determination for a variety of reasons. Two blended biogas projects were out of compliance with minimum renewable fuel use requirements and six projects were non-operational. Finally, three projects were not yet required to report on compliance as they had been operational for less than a year.



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 RFU facilities with SGIP renewable fuel use requirements. In addition, the reports assist the PAs and ED in making recommendations concerning modifications to the renewable project aspects of the SGIP.

This report (RFU Report No. 32) 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, 2022 through June 30, 2023.

1.1 RFU REPORT METHODOLOGY AND DATA OVERVIEW

SGIP RFU Report No. 32 provides information on the renewable fuel usage from the 45 renewable fuel projects rebated by the SGIP as of June 30, 2023 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 45 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; and syngas from food processing facilities. No projects were 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 are required to utilize at least 75 percent renewable fuel to generate electricity. Starting in 2017, all fueled generation projects were required to use 10 percent renewable fuel. Projects listed under a 2018 application were required to utilize 50 percent renewable fuel and those under 2019 application were required to utilize 75 percent renewable fuel. Additionally, some of these 2017-2019 projects have received "renewable fuel adders" receiving larger incentives for a higher percentage of

renewable fuel. Starting in 2020, all fueled generation projects are now required to utilize 100 percent renewable fuel.

Of the 45 RFU projects discussed in this report, 38 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 percent).² 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 percent renewable fuel, yet some of these projects below received additional incentives so that they would operate solely on renewable fuel.

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

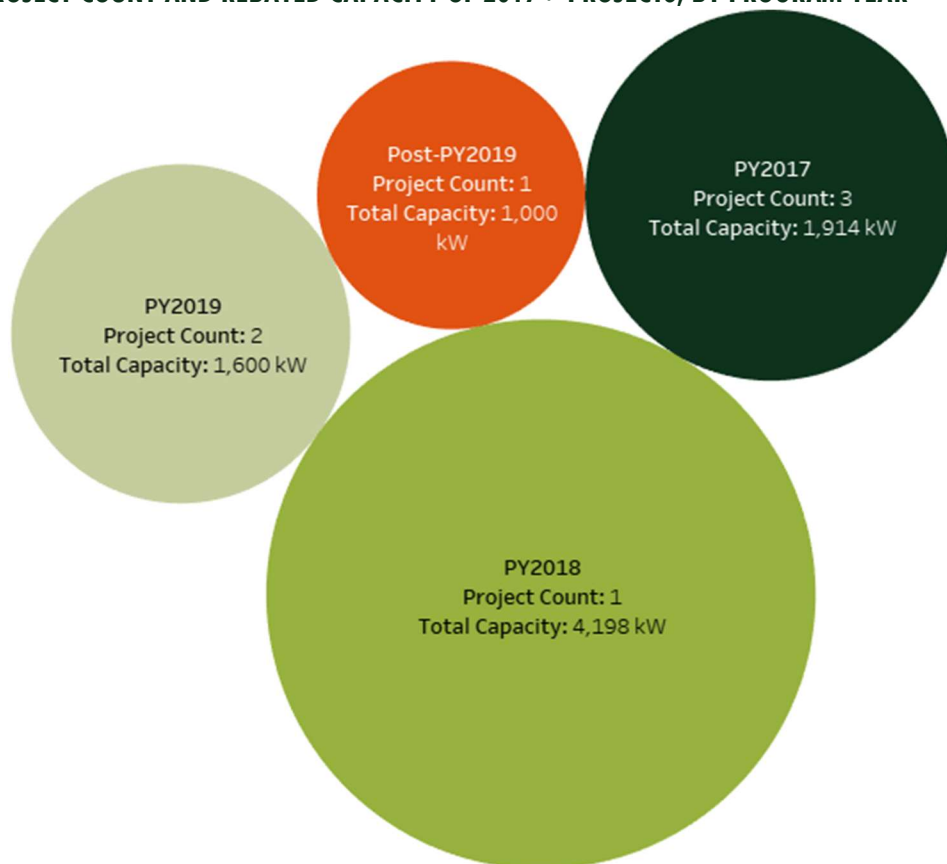


Table 1 summarizes the status of the 45 RFU projects grouped by compliance status and renewable fuel type. Further discussion is provided in subsequent sections.

² These requirements will be referred to as *legacy* RFU requirements throughout the report.

TABLE 1: RFU PROJECT DESIGNATIONS

		100% Renewable Gas	Blended Renewable/Natural Gas
In Compliance	Implied Compliance	18	
	Verified Compliance	1	7
Compliance Undetermined	Compliance Undetermined	1	2
	No Customer Contact		2
	No Fuel Breakout		3
System Not Operating	Decommissioned		4
	System Not Operating	1	1
Not Compliant	Not Compliant		2
Not Yet Required	Not Yet Required	2	1

1.2 SUMMARY OF RFU REPORT NO. 32 FINDINGS

As of June 30, 2023, there are a total of 45 RFU projects within their compliance requirement period. Just under half of the active projects (22) are blended onsite biogas projects with the remaining project being onsite biogas only (23).

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

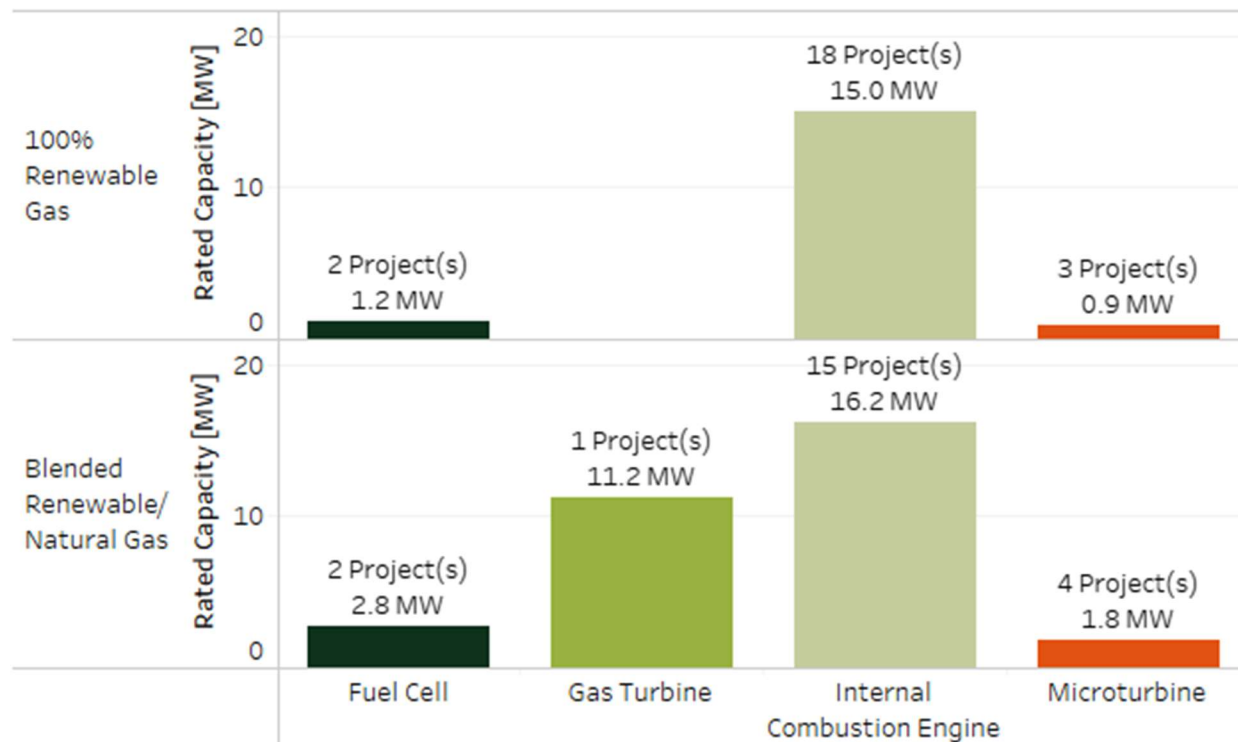
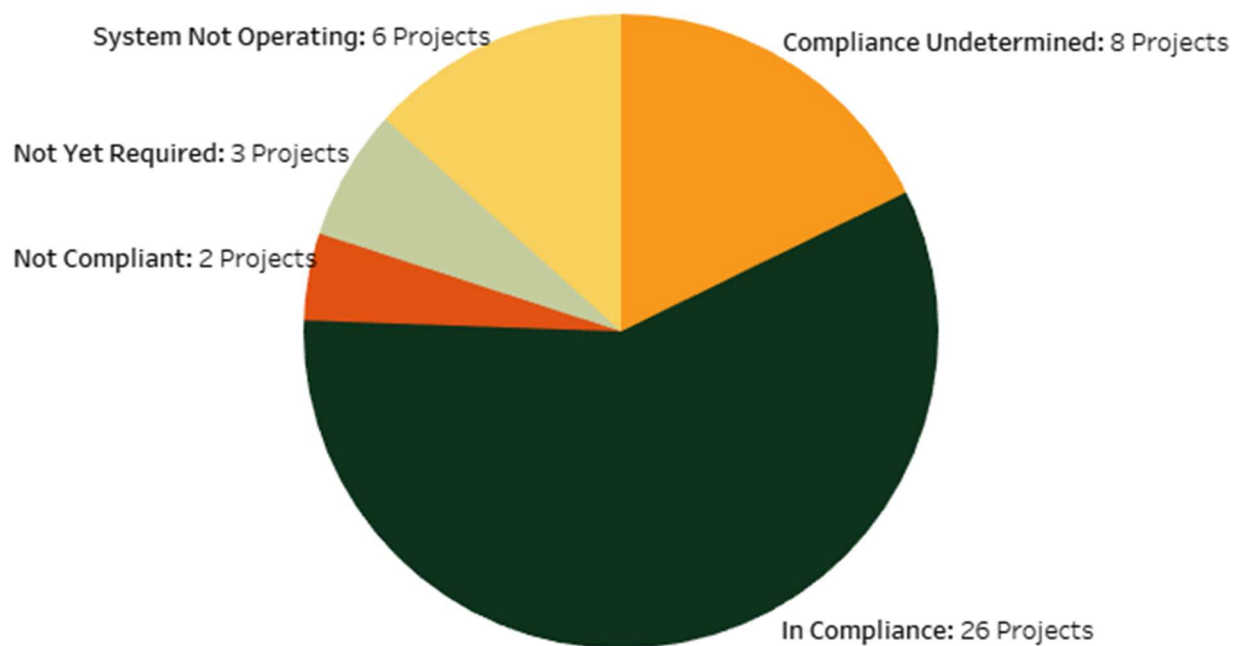


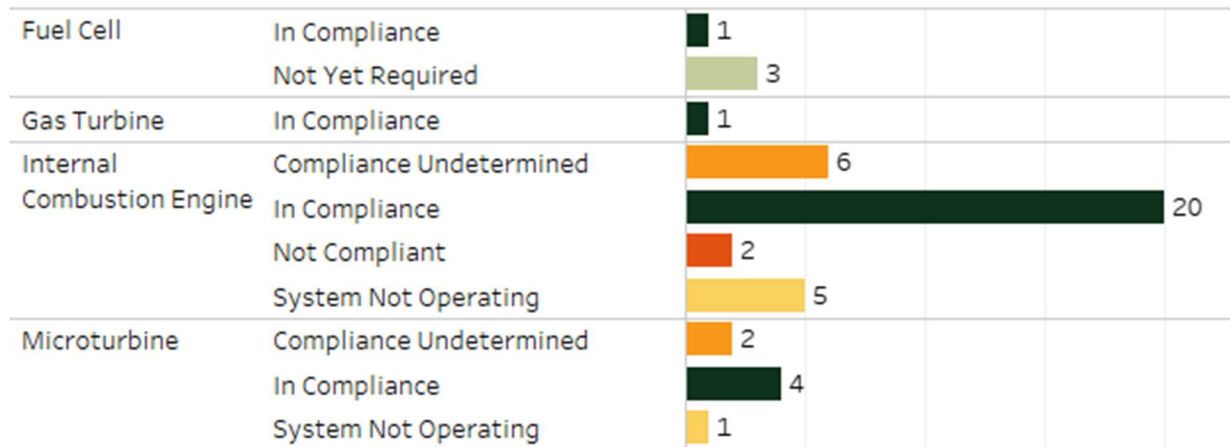
Figure 4 below shows the share of active projects by their compliance determination. Verdant found that of the 45 projects within their compliance period, three projects had not been operating for a full year and therefore did not require a compliance determination during this reporting period. Out of the remaining 42 projects, 26 were either verified to be compliant or assumed to be compliant (onsite biogas only projects). Verdant was unable to determine compliance for eight projects, mostly due to insufficient or unreliable data. Two projects were not compliant with SGIP minimum renewable fuel use requirements and the remaining six were either decommissioned, no longer participating in the program, or semi-permanently non-operational.

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 five 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 Table 2. 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. The figure represents an increase in projects from prior years. Previously, the team only attempted to determine compliance for projects utilizing blended natural gas and biogas fuel. However, moving forward, as discussed further in the next section, we will attempt to determine compliance for all projects still within their compliance period.

TABLE 2: FORECASTED RFU PROJECTS REQUIRING COMPLIANCE VERIFICATION BY RFU REPORT NUMBER

RFU Report #	Report Year	Quantity of Projects
33	2024	45
34	2025	42
35	2026	34
36	2027	25
37	2028	19
38	2029	14
39	2030	8
40	2031	6
41	2032	5
42	2033	3

There are also eight fueled generation pipeline projects in the SGIP tracking data. These projects are all in various stages (and none of them are guaranteed to be finalized and incentivized), and all of them—except one—are PY2020 or beyond projects that require 100 percent renewable fuel. The one pre-PY2020

project, an almost 3 MW internal combustion engine, is from PY2018 and will be required to operate on at least 50 percent renewable fuel if the project is completed and incentivized.

1.3 CONCLUSIONS AND RECOMMENDATIONS

In accordance with CPUC Decision 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.

There are three noteworthy aspects in this report that distinguish it from previous reports:

- This is the first year that no directed biogas projects require evaluation. All directed biogas projects have fulfilled their renewable fuel use requirements, and no new projects have been incentivized since 2011.
- Prior reporting periods revealed that older projects operating on 100 percent biofuel lacked connections to natural gas lines, leading to the assumption that they were effectively meeting their renewable fuel obligations and therefore compliance has historically been “implied” for renewable-only fueled projects. However, for this reporting period the team evaluated compliance for all projects with an application date of 2017 or later, as details on renewable fuel connections have not yet been verified for these newer projects.

Looking ahead, the team intends to assess compliance for all projects in future RFU reports, regardless of their fuel mixture. Several reasons support this decision:

- The team has identified an increase in projects considered “non-operational”, whether due to major maintenance issues, systems being decommissioned, or other factors. The evaluation team has considered a project “non-operational” if it is operating less than 10 percent throughout the renewable fuel use reporting period. Given that many renewable-only projects are aging, confirming operational status through the compliance period is becoming more important.
- We have observed several projects that are listed in the tracking data as renewable-only projects but are reducing their capacity (for incentive purposes) based on biofuel availability, while still maintaining connections to natural gas lines. This setup allows these systems to operate partially on natural gas, exceeding the incentivized capacity. For incentive purposes, these are renewable-only projects because only the renewable-fueled capacity is incentivized, but for evaluation purposes these are blended fuel projects. These scenarios create unique challenges for evaluation purposes, underscoring the need to analyze newer renewable-only projects.

- Finally, this report identifies 26 out of the 42 active projects³ (62 percent) meeting their renewable fuel usage compliance requirements. The percentage of projects that are verified to be complying has decreased slightly over the last several reports.

For the remaining projects, two were found to be out of compliance, six were not operating, and eight could not have their compliance status determined due to insufficient data. For four of these unverified projects, we requested the assistance of the PA in prior evaluation years, and we were told no additional contact information was available. For another project, the renewable fuel breakout was not provided. For the remaining three projects, the evaluation team deemed the data provided to be unreliable, and therefore no compliance determination could be made.

The data necessary to complete this report is not included in the Application Interval Files submitted to the SGIP database. Verdant Associates had to work with individual PDPs as well as directly with the customers themselves to gather the data needed to make compliance determinations. In some cases, the additional data was not sufficient to make compliance determinations.

Decision 21-06-005, issued in 2021, dictates that customers must submit “at minimum, monthly reporting of directed and on-site biogas fuel reports, attestations, supporting documentation, nomination records, procurement invoices, and meter data...” to provide evidence that a project meets SGIP’s renewable fuel requirements. To support the requirements of this decision, the PAs and their consultants should continue working with PDPs and host customers to ensure that metering equipment is installed, operational, communicating and that the data should be made available in a format that can be used to determine compliance.

Lastly, this RFU report includes a compliance determination for one project that was partially rebated by the SGIP. This project discussion for SCG-SGIP-2015-0237 has been included in the last two RFU reports, #30 and #31. The project represents a unique case where the customer applied for the maximum 3 MW SGIP incentive on one 11 MW gas turbine but ultimately installed two large gas turbines, each approximately 11 MW for a total of 22.3 MW. The fuel supply is combined for both systems, meaning that while renewable fuel use is separated from natural gas, fuel use is not separated between the two distinct gas turbines. Further discussion about this project can be found in RFU Reports #30 and #31.

³ This does not include the three projects that have been operational for less than a year, and whose compliance we have not yet analyzed.

2 FUEL USE AT RFU REQUIREMENT PROJECTS – COMPLIANCE DETERMINATION

Legacy RFU requirement projects are allowed to use a maximum of 25 percent non-renewable fuel; the remaining 75-100 percent 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 PY01 - PY10 applications, microturbine and IC engine systems must be covered by a warranty of not less than three years. Fuel cell systems must be covered by a minimum five-year warranty. For PY11 - PY19 projects, all generation systems must have a minimum ten-year warranty. Therefore, the fuel use requirement period is three, five, or ten years, depending on the technology type and program year. 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:

- “Dedicated” RFU requirement facilities 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
- “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. This evaluation is the first year that all directed biogas projects have completed their biogas requirements and are no longer required to procure directed biogas.

Fuel supply and contract status for RFU requirement projects are summarized in Table 3. Forty-two RFU requirement projects had active status during this reporting period. Along with these 42 active RFU requirement projects, there were three projects that had not yet completed one year of operation. Twenty-one of the active projects operated solely on renewable fuel.



TABLE 3: SUMMARY OF FUEL SUPPLIES AND PROJECT COMPLIANCE STATUS FOR RFU REQUIREMENT PROJECTS

	Active		Expired		Grand Total	
	Count of Projects	Incentivized Capacity [kW]	Count of Projects	Incentivized Capacity [kW]	Count of Projects	Incentivized Capacity [kW]
100% Renewable Gas	23	17,053	42	16,458	65	33,511
Blended Renewable/ Natural Gas	22	32,014	25	16,170	47	48,184
Directed Biogas (RNG)			64	31,480	64	31,480
Grand Total	45	49,067	131	64,108	176	113,175

* Only active projects that have been operational for one full year are required to comply with SGIP renewable fuel use requirements. Three projects that are listed as ‘active’ in the table above have not completed one full year of operation.

** Four of these ‘active’ projects are no longer participating in the program and have had their systems removed or facilities shut down, and two additional systems were confirmed to be non-operational at this time. More details are provided in Section 2.2.3

Legacy RFU projects are required to consume a minimum of 75 percent 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 517 to 587 BTU/SCF. As referenced in the Biomass CHP catalog⁴, 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

⁴ 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



BTU/SCF is used to determine the compliance. For natural gas energy density, an LHV of 930⁵ BTU/SCF is assumed. There are currently 24 active on-site RFU projects requiring a compliance determination. Twenty-one of these are blended renewable and natural gas projects. The remaining three are incentivized as renewable-only fueled projects. Figure 6 below highlights the historical compliance determination for these projects, as well as the compliance determination for this year's reporting (RFU Report 32).

⁵ 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 6: HISTORY OF COMPLIANCE DETERMINATION

Application Code	RFU Report Number								
	24	25	26	27	28	29	30	31	32
PGE-SGIP-2012-2061	UTD	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SCE-SGIP-2011-0348		UTD	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PGE-SGIP-2011-1966			Yes	Yes	Yes	Yes	Yes	Yes	Yes
PGE-SGIP-2011-1987			Yes	Yes	Yes	Yes	Yes	Yes	Yes
PGE-SGIP-2012-2112			UTD	UTD	UTD	UTD	Non-Op	Non-Op	Non-Op
PGE-SGIP-2012-2206			UTD	UTD	UTD	UTD	Yes	Yes	UTD
PGE-SGIP-2012-2212			UTD	UTD	UTD	Non-Op	Non-Op	Non-Op	Non-Op
SCE-SGIP-2012-0450			UTD	Yes	UTD	UTD	UTD	UTD	UTD
SCG-SGIP-2012-0156			UTD	Yes	UTD	UTD	UTD	Non-Op	Non-Op
PGE-SGIP-2013-2484				UTD	UTD	UTD	UTD	Non-Op	Non-Op
SCG-SGIP-2014-0205				Yes	UTD	Yes	Yes	Yes	Yes
SCG-SGIP-2015-0237					UTD	UTD	Yes	Yes	Yes
PGE-SGIP-2014-2788						UTD	UTD	UTD	UTD
PGE-SGIP-2014-2813						UTD	UTD	Non-Op	Non-Op
PGE-SGIP-2014-2843						UTD	UTD	UTD	UTD
SCE-SGIP-2014-0986						No	No	UTD	UTD
SCE-SGIP-2014-1006						UTD	UTD	UTD	UTD
SD-SGIP-2014-0747						Yes	No	No	No
SD-SGIP-2017-1119						Yes	Yes	UTD	UTD
PGE-SGIP-2017-3340							UTD	Yes	Yes
SCE-SGIP-2014-0970								Yes	Yes
PGE-SGIP-2016-3004								Yes	No
SCE-SGIP-2018-4966									UTD
SCE-SGIP-2017-2621									Non-Op*

UTD = Unable to Determine. There are several explanations for Verdant’s inability to determine the compliance for projects, and these are explained in further detail below. **Non-Op = Non-Operational.** There are various reasons why a project is non-operational, which includes reasons like the system being decommissioned, facility shut down, cost of operating too high, among others.

***SCE-SGIP-2017-2621** was operational for part of the first month but was completely non-operational the remaining 11 months. More information is explained further below.

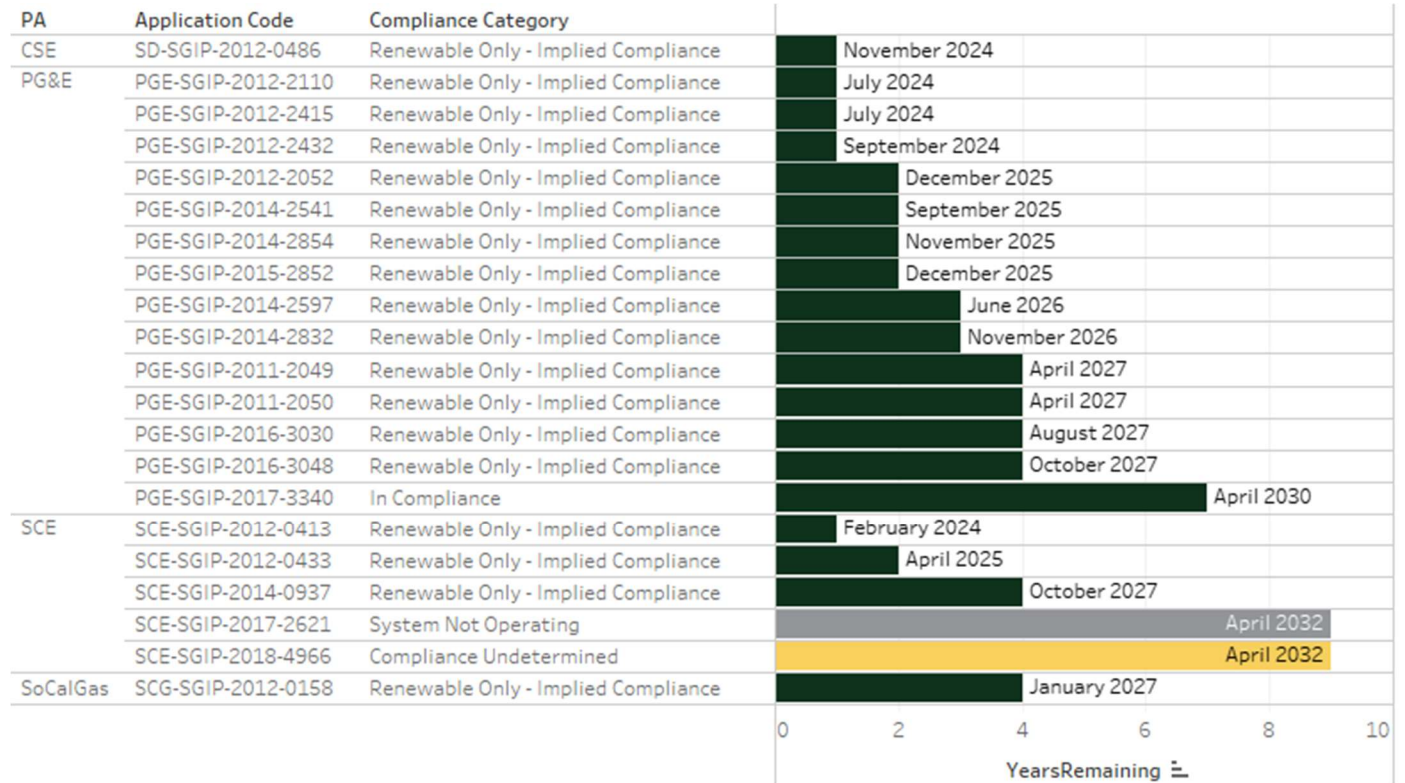
2.1 FUEL USE AT DEDICATED ON-SITE RFU REQUIREMENT PROJECTS

Figure 7 on the following page summarizes compliance determinations for dedicated RFU requirement projects. Dedicated RFU requirement projects are equipped with only a renewable fuel supply, they are not able to blend any amount of natural gas without significant re-engineering. All dedicated RFU requirement projects with application dates before 2017 are assumed to be compliant with SGIP fuel use requirements since they are not physically able to consume other non-renewable fuels, however, starting with PY2017 projects, renewable fuel projects are evaluated to ensure that they are meeting their renewable fuel requirements.

Three projects fell into the PY2017 and later dedicated renewable fuel category. One of them was found in compliance, one was classified as non-operational, and the final could not have the compliance determined:

- **PGE-SGIP-2017-3340:** This project was found in compliance with the renewable fuel requirements, but it also only operated about a third of the year due to maintenance and repair issues.
- **SCE-SGIP-2017-2621:** This project came online in May 2022, and the data for this project showed some operation through July 2022. However, the system was completely off for the rest of the year, and PDP stopped receiving data starting in 2023. No data was able to be gathered for 2023. The owner of the system informed the evaluation team that maintenance was being performed on the digester, and the system should be back up and running in September 2023.
- **SCE-SGIP-2018-4966:** This project claims to be a 100% renewable project. 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. 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 data itself is 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 project has also filed for Chapter 11 bankruptcy and the facility has acknowledged it is struggling to bring in sufficient feedstock.

FIGURE 7: FUEL USE COMPLIANCE OF DEDICATED RFU REQUIREMENT PROJECTS



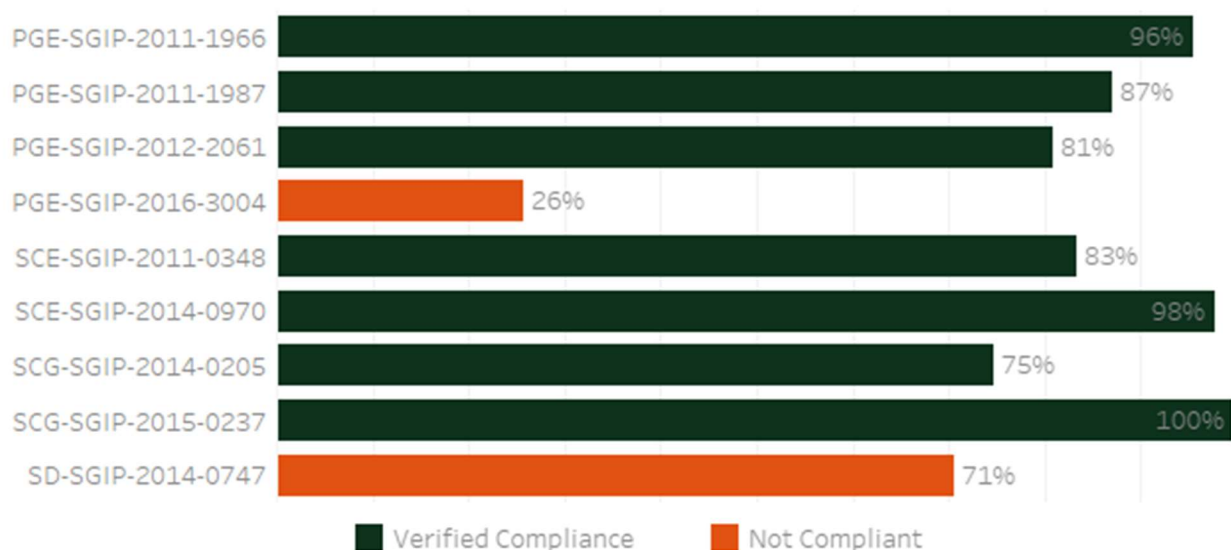
Note: Because assignment of a project’s operational date is subject to individual judgment, the incentive payment date as reported by the PAs is used as a proxy for the operational date for reporting purposes.

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

FIGURE 8: PERCENT BIOGAS FOR BLENDED BIOGAS PROJECTS



* SCG-SGIP-2015-0237 represents a unique case where the customer applied for the maximum 3 MW SGIP incentive on one 11 MW gas turbine but ultimately installed two large gas turbines, each approximately 11 MW for a total of 22.3 MW. The fuel supply is combined for both systems, meaning that while renewable fuel use is separated from natural gas, fuel use is not separated between the two distinct gas turbines. Our renewable fuel percentage and compliance determination is based on our estimate of the maximum amount of renewable fuel that could potentially be flowing into the entire partially rebated gas turbine.

2.2.1 Blended On-Site RFU Requirement Projects out of Compliance

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

- PGE-SGIP-2016-3004.** This 477 kW IC engine utilizes digester gas and natural gas. During RFU Reporting period #31, 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 between February 2022 and August 2022, and again between September 2022 and March 2023. The system was only operating about 20 percent of the reporting period, and for about half of the period if was operating, it was only utilizing about 30-50 percent renewable fuel, while operating entirely on natural gas the remaining time.
- SD-SGIP-2014-0747.** This 472 kW IC engine utilizes wastewater digester gas and natural gas. The system was tracked as operational in May 2019 and is therefore required to comply with SGIP renewable fuel use requirements. Based on metered electrical generation and natural gas consumption data, renewable fuel use during the current reporting period made up about 72 percent of the total fuel input, and therefore it is not compliant with the SGIP renewable fuel use



provisions for this reporting period. In the absence of actual heating values, an LHV of 600 BTU/SCF was assumed for this project.

2.2.2 Blended On-Site RFU Requirement Project Compliance Status Inconclusive

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

For three 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 three projects:

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

For the remaining projects, a description of the data issues are highlighted below:

- **PGE-SGIP-2012-2206.** Collecting data for this 977 kW IC engine has been difficult in the past. The last two cycles we have been able to gather monthly data directly from the site contact or from the PDP, but prior to that we have been unable to gather the data required. This time around, we were not able to get ahold of the site contact to receive the data. The contact has also been unwilling to provide any more granular data than monthly, which makes quality control of the data difficult.
- **SCE-SGIP-2014-1006.** The PDP for this 2800 kW IC engine has informed us in the past that they do not have a breakout of renewable and natural gas fuel. We have attempted to contact this facility directly in the past, but the contact on record is no longer at the facility. Without further confirmation, we are unable to make a compliance determination for this project.
- **SCE-SGIP-2014-0986.** This 846 kW IC engine utilizes wastewater digester gas and natural gas. The system was noted as operational in March 2019 and is therefore required to comply with SGIP renewable fuel use requirements. However, data submitted to, and provided by Energy Solutions only shows one set of fuel data, and it isn't clear if the data is natural gas or biofuel or a combination of both. The system efficiency, based on this data, is routinely over 1000 percent, so we suspect that we are missing some fuel data, but we have not been able to gather any additional data for this facility.
- **SD-SGIP-2017-1119:** This 1,200 kW IC engine system utilizes a blend of digester gas from a wastewater treatment plant and natural gas. The system came online in December 2019 and is

therefore required to comply with SGIP renewable fuel use requirements. Since this is a PY2017 project, it needs to utilize at least 10 percent renewable fuel of the total fuel usage (energy basis). Additionally, this project received a renewable fuel adder, which increased the renewable fuel requirement to 97 percent. The project has had ongoing data quality issues that they are working to iron out with CSE. Until these data quality issues are resolved, Verdant will be unable to determine the compliance for this project. If data quality issues can be resolved, compliance for the missing periods (July 2021 to June 2022 [RFU #31] and July 2022 to June 2023 [RFU #32]) will be reviewed and included in a future RFU report.

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

There were five projects in this list that 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. Previously, the customer advised the PDP that “the engine was down and will be offline for some time due to relocating caused from the High-Speed Rail right of way.”
- **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 in 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



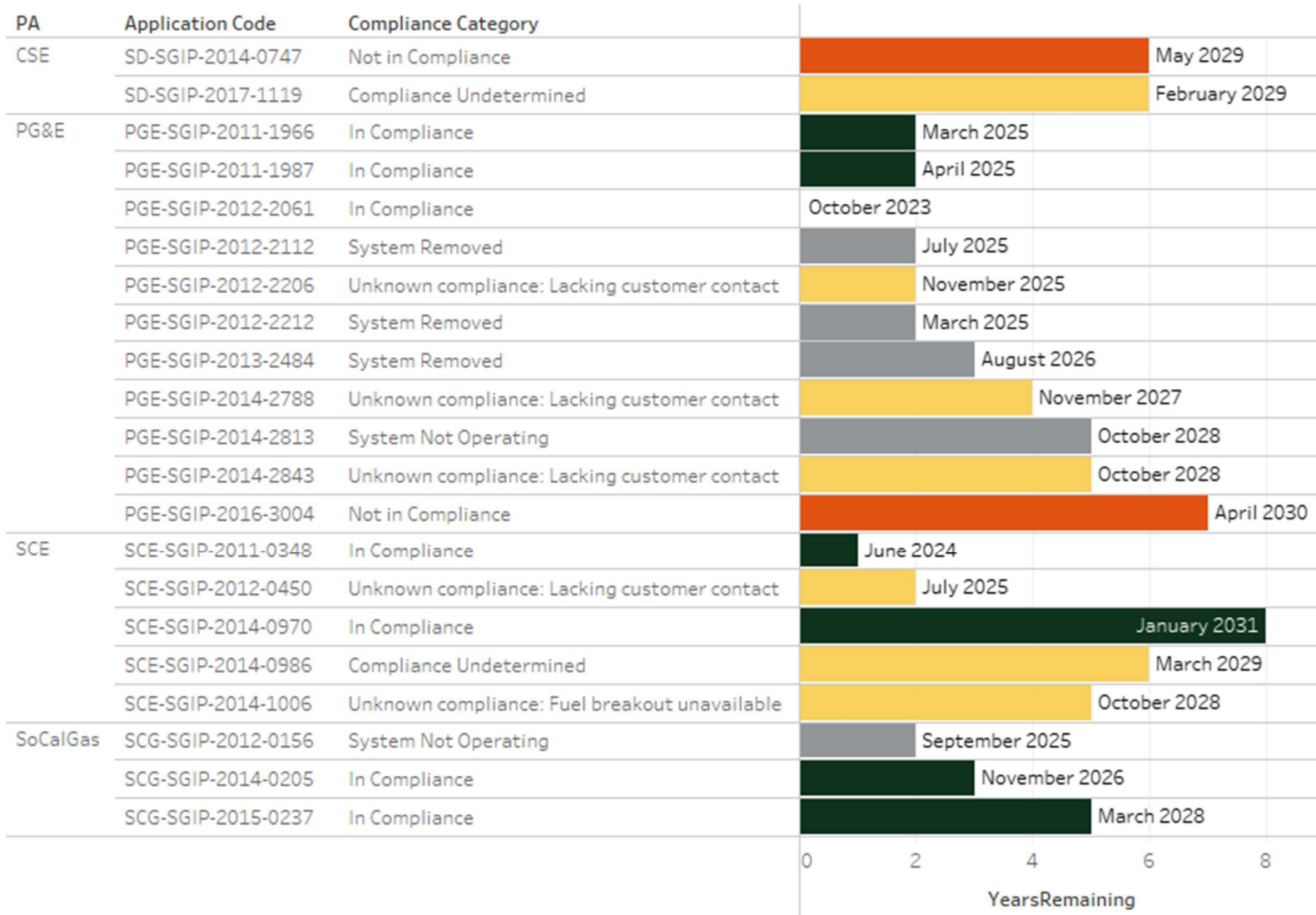
customer informed PG&E that they are no longer participating in the SGIP due to the high maintenance cost in operating the microturbine using the renewable fuel, and that the microturbine has been removed.

- **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 they will be selling 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 21 active blended RFU requirement projects during this reporting period is presented in Figure 9. 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.



FIGURE 9: FUEL USE COMPLIANCE OF BLENDED ON-SITE RFU REQUIREMENT PROJECTS



3 GREENHOUSE GAS EMISSIONS

This section presents information regarding GHG emission impacts. The GHG emission information was calculated based on 11 projects where data was received.

Table 4 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/cooling loads in some cases. All but one of the 11 projects were found to reduce emissions.

TABLE 4: SUMMARY OF GHG EMISSION IMPACTS FROM SGIP RENEWABLY FUELED PROJECTS

Application Code	Fuel	SGIP Emissions	Electric Power Plant Emissions	Heating Services	Biogas Treatment	Total Avoided Emissions	Emissions Impact
PGE-SGIP-2011-1966	Blended	0.48	0.39	0.00	0.46	0.85	-0.36
PGE-SGIP-2011-1987	Blended	0.27	0.37	0.00	0.23	0.40	-0.13
PGE-SGIP-2012-2061	Blended	0.58	0.40	0.26	0.47	1.12	-0.54
PGE-SGIP-2016-3004	Blended	0.80	0.28	0.00	0.20	0.48	0.31
PGE-SGIP-2017-3340	Renewable Only	0.91	0.31	0.00	8.25	8.56	-7.65
SCE-SGIP-2011-0348	Blended	0.75	0.34	0.00	0.62	0.97	-0.22
SCE-SGIP-2014-0970	Blended	1.14	0.26	0.00	1.11	1.37	-0.24
SCE-SGIP-2017-2621	Renewable Only	0.65	0.38	0.00	5.89	6.27	-5.62
SCG-SGIP-2014-0205	Blended	0.51	0.34	0.03	0.38	0.68	-0.18
SCG-SGIP-2015-0237	Blended	0.58	0.34	0.00	0.58	0.92	-0.34
SD-SGIP-2014-0747	Blended	0.60	0.34	0.00	0.42	0.76	-0.16

Note: For purposes of RFU compliance, SCE-SGIP-2017-2621 isn't considered operating, because it's operating less than 10 percent of the year. However, if it were to be operating as expected, based on the first half month of operation, it would have a significant emissions reduction.

The greenhouse gas emissions are based on several factors:

- SGIP Emissions:** The operation of distributed generation projects emit CO₂ as a result of combustion and conversion of the fuel powering the project. Hour-by-hour emissions of CO₂ 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.⁶ As a result, SGIP projects displace the accompanying CO₂ emissions that these central station power plants would have released to the atmosphere. The avoided CO₂ emissions for these baseline conventional power plants are estimated on an hour-by-hour basis over all 8,760 hours of the year.⁷ The estimates of electric power plant CO₂ marginal emissions were accessed from WattTime.⁸

- **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 CO₂ emissions from the boiler's combustion process. Only one project provided heat recovery data. A second project did utilize 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 CH₄ that otherwise may have been emitted to the atmosphere (vented), or captured and burned, producing CO₂ (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.⁹ At the state level, the California Air Resources Board (CARB) provides guidelines for control of methane and other volatile organic compounds from biogas facilities.¹⁰ At the federal level, New Source Performance Standards and Emission Guidelines regulate methane capture and use.¹¹

⁶ 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.

⁷ Consequently, during those hours when an SGIP project is idle, displacement of CO₂ emissions from central station power plants is equal to zero.

⁸ WattTime developed real-time and forecasted marginal GHG emissions data for SGIP. <https://sgipsignal.com/>

⁹ An overview of California's air quality districts is available at: <http://www.capcoa.org>

¹⁰ In June of 2007, CARB approved the Landfill Methane Capture Strategy. See <http://www.arb.ca.gov/cc/landfills/landfills.htm> for additional information.

¹¹ 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.