

SELF-GENERATION INCENTIVE PROGRAM: RENEWABLE FUEL USE REPORT NO. 33

Submitted to:
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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 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.
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 <i>prior</i> legal code, law or regulation requiring capture and flaring of the biogas. In this event an SGIP project <i>cannot</i> 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% 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> .

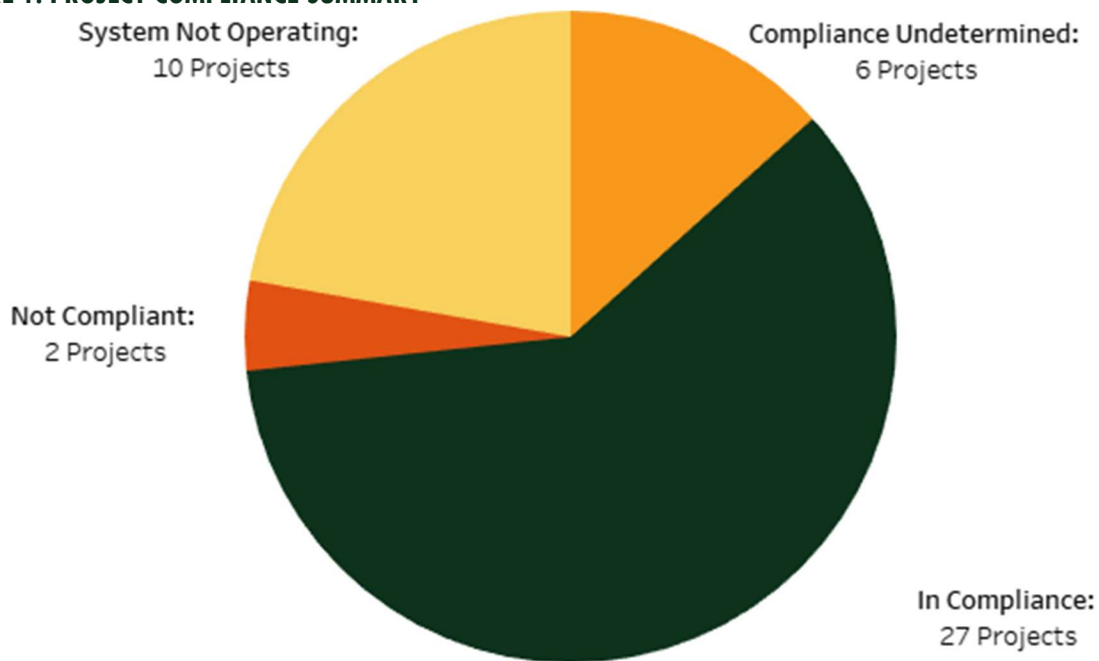


RENEWABLE FUEL USE VERIFICATION SUMMARY

Verdant's compliance determinations for SGIP projects with minimum renewable fuel usage requirements 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.) 21-06-005¹ 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 45 completed projects within the compliance verification window. 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 27 projects that met their compliance obligations; 17 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 10 of them were blended onsite renewable projects (onsite biogas blended with natural gas). For six 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 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 project aspects of the SGIP.

This report (RFU Report No. 33) 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, 2023 through June 30, 2024.

1.1 RFU REPORT METHODOLOGY AND DATA OVERVIEW

SGIP RFU Report No. 33 provides information on the renewable fuel usage from the 45 renewable fuel projects rebated by the SGIP as of June 30, 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 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. 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 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 50% renewable fuel and those under 2019 application were required to utilize 75% 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% 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%).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% 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

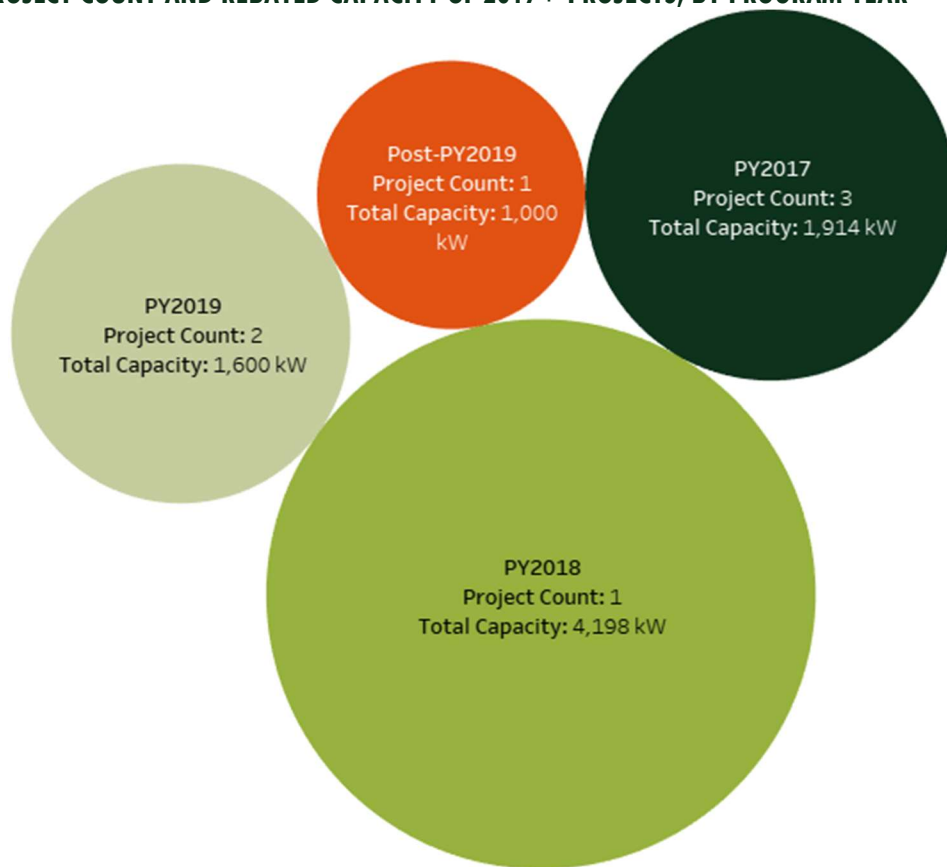


Table 1 summarizes the status of the 45 RFU projects grouped by compliance status and renewable fuel type. Further discussion is provided in subsequent sections.

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	Verified Compliance	3	10
	Implied Compliance, Verified Operation	9	
	Implied Compliance, Unknown Operation	5	
Compliance Undetermined	Compliance Undetermined	1	
	No Customer Contact		2
	No Fuel Breakout		3
System Not Operating	Decommissioned	1	4
	System Not Operating	4	1
Not Compliant	Not Compliant		2

1.2 SUMMARY OF RFU REPORT NO. 33 FINDINGS

As of June 30, 2024, there are a total of 45 RFU projects within their compliance requirement period. Just under half of these projects (22) are blended onsite biogas projects with the remaining projects being onsite biogas only (23).

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

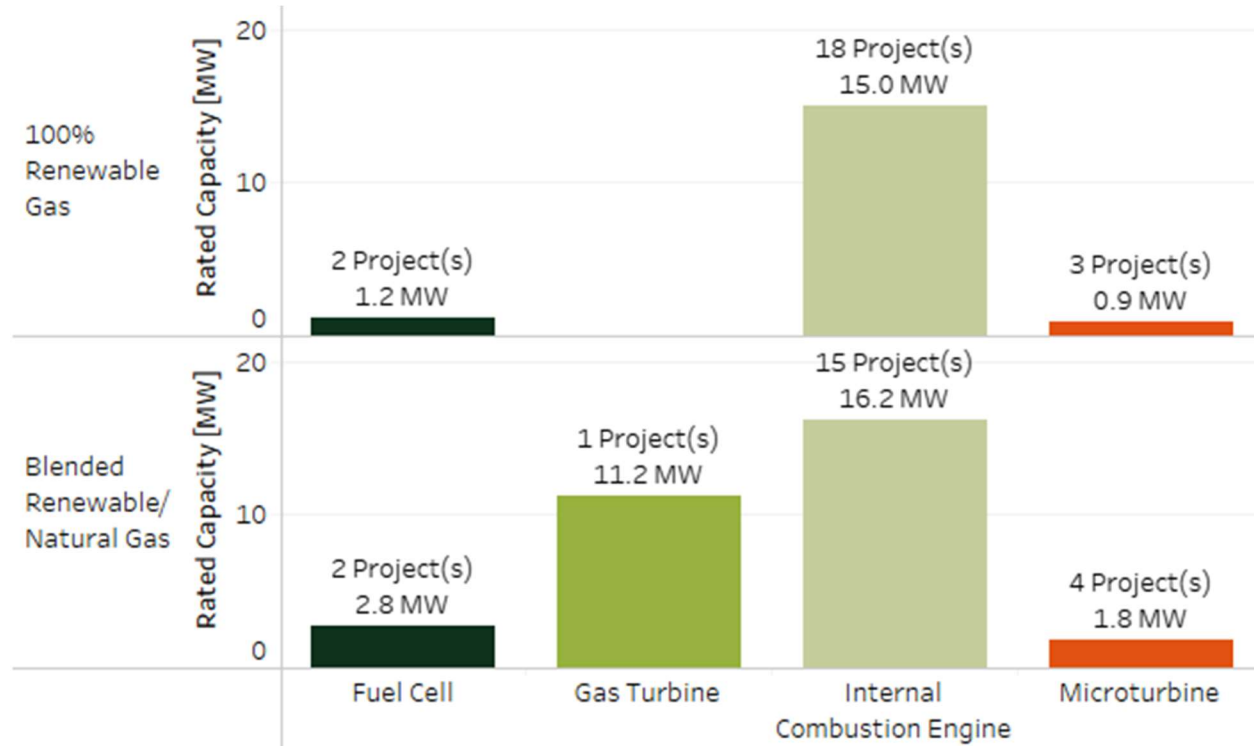
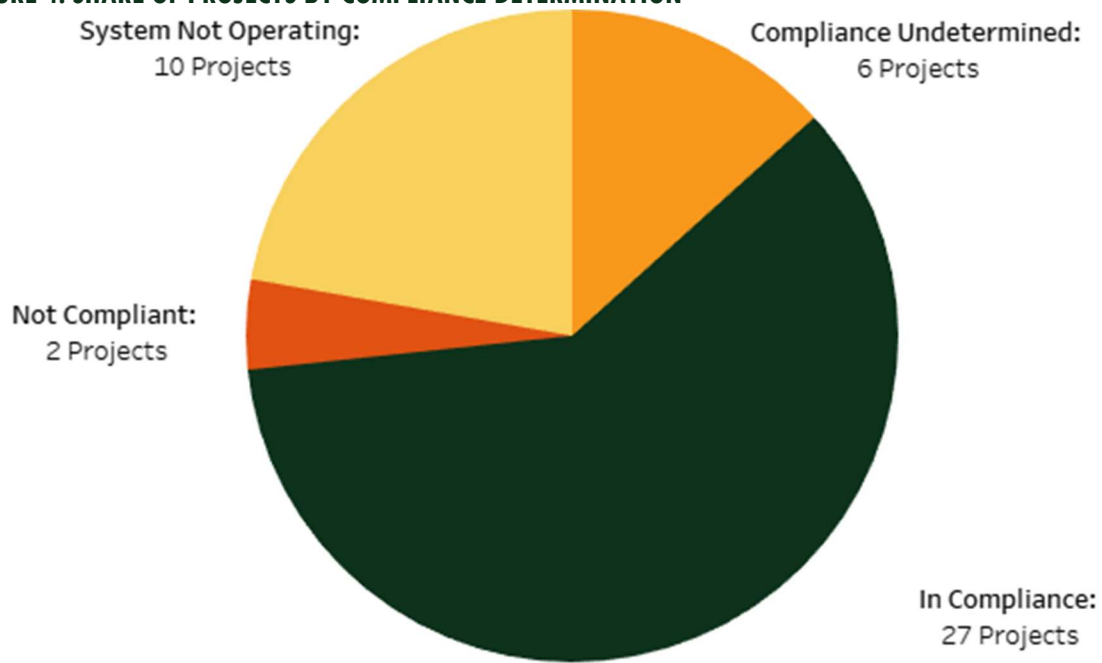


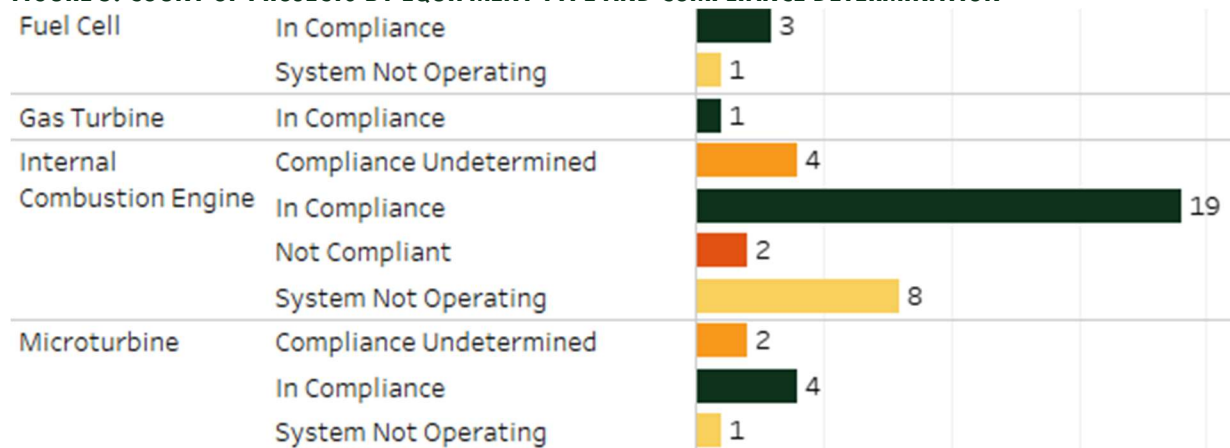
Figure 4 below shows the share of projects by their compliance determination. Verdant found that of the 45 projects, 27 were either verified to be compliant or assumed to be compliant (pre-2017 onsite biogas only projects). Verdant was unable to determine compliance for six projects, mostly due to insufficient or unreliable data. Two 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 six 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 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.

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

RFU Report #	Report Year	Quantity of Projects
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 nine fueled generation pipeline projects in the SGIP application queue, including one linear generator. 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 PY 2020 or later projects that require 100% renewable fuel. The one pre-PY 2020 project, an almost 3 MW internal combustion engine, is from PY 2018 and will be required to operate on at least 50% renewable fuel if the project is completed and incentivized.

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 27 out of the 45 projects (60%) meeting, or assumed to be 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, mostly due to the increase in projects ending their operation prior to the end of their 10-year warranty period.

For the remaining projects, two were found to be out of compliance, ten were not operating, and six 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 final projects, the prior contacts have left the company, and while we have been in contact with other personnel, we have not yet received data or been able to make a compliance determination.

The data necessary to complete this report is not included in the Application Interval Files submitted to the SGIP database as part of their Performance Based Incentive (PBI) reporting, and many of these projects have completed their PBI reporting periods. 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.

D. 21-06-005 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. While some older projects no longer have metering equipment installed, or initial personnel have moved on and host facilities are no longer responsive, the PAs have supported the requirements of this decision for newer projects and where they can, through communication with PDPs and host customers to ensure that metering equipment is installed, operational, communicating and that the data is available in a format that can be used to determine compliance.

We propose two considerations for future RFU reporting:

- **Streamlined Reporting:** Much of the data presented in the RFU reports overlaps with the information in the annual impact report. To avoid redundancy, we suggest that future RFU reports focus solely on analyzing renewable fuel percentages and compliance determinations,

summarized by project, fuel type, and equipment type. After RFU #35, a short memo highlighting project compliance could suffice instead of a full report.

- **Adjusting the Reporting Cycle:** The current RFU reporting cycle spans mid-year to mid-year (July through June), which misaligns with the annual impact report's timing. This requires host customers and PDPs to provide data in two cycles just months apart, as data collection begins around May or earlier for the impact reporting and then starting July 1st for the RFU reporting. We recommend aligning the RFU reporting cycle with the calendar year. This shift would reduce the reporting burden on those delivering data.

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 still 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
- “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 3. Forty-five RFU requirement projects are still required to procure renewable fuel during this reporting period. Twenty-three of these projects operate solely on renewable fuel.

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

	Count of Projects	Incentivized Capacity [kW]
100% Renewable Gas	23	17,053
Blended Renewable/Natural Gas	22	32,014
Grand Total	45	49,067



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 534 to 599 BTU/SCF. As referenced in the Biomass CHP catalog³, 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 930⁴ BTU/SCF is assumed. For the projects where we verified compliance, there are currently twenty-two blended on-site RFU projects and an additional five PY2017+ renewable only 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 33).

³ 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

⁴ 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	33
PGE-SGIP-2012-2061	UTD	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	UTD
SCE-SGIP-2011-0348		UTD	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PGE-SGIP-2011-1966			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PGE-SGIP-2011-1987			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PGE-SGIP-2012-2112			UTD	UTD	UTD	UTD	Non-Op	Non-Op	Non-Op	Non-Op
PGE-SGIP-2012-2206			UTD	UTD	UTD	UTD	Yes	Yes	UTD	Yes
PGE-SGIP-2012-2212			UTD	UTD	UTD	Non-Op	Non-Op	Non-Op	Non-Op	Non-Op
SCE-SGIP-2012-0450			UTD	Yes	UTD	UTD	UTD	UTD	UTD	UTD
SCG-SGIP-2012-0156			UTD	Yes	UTD	UTD	UTD	Non-Op	Non-Op	Non-Op
PGE-SGIP-2013-2484				UTD	UTD	UTD	UTD	Non-Op	Non-Op	Non-Op
SCG-SGIP-2014-0205				Yes	UTD	Yes	Yes	Yes	Yes	Yes
SCG-SGIP-2015-0237					UTD	UTD	Yes	Yes	Yes	Yes
PGE-SGIP-2014-2788						UTD	UTD	UTD	UTD	UTD
PGE-SGIP-2014-2813						UTD	UTD	Non-Op	Non-Op	Non-Op
PGE-SGIP-2014-2843						UTD	UTD	UTD	UTD	UTD
SCE-SGIP-2014-0986						No	No	UTD	UTD	No
SCE-SGIP-2014-1006						UTD	UTD	UTD	UTD	UTD
SD-SGIP-2014-0747						Yes	No	No	No	Yes
SD-SGIP-2017-1119						Yes	Yes	Yes	Yes	Yes
PGE-SGIP-2017-3340							UTD	Yes	Yes	Yes
SCE-SGIP-2014-0970								Yes	Yes	Yes
PGE-SGIP-2016-3004								Yes	No	No
SCE-SGIP-2017-2621									Non-Op	Yes
SCE-SGIP-2018-4966									UTD	UTD
PGE-SGIP-2019-9812										Non-Op
SCG-SGIP-2019-1594										Yes
PGE-SGIP-2020-20975										Yes

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.

SD-SGIP-2017-1119: The last two RFU Reports (#31 & #32) list this project’s RFU compliance as being ‘unable to determine’. Verdant previously had concerns with the biogas data provided. The final decision was to calculate the biogas fuel usage based on the metered generation output, metered natural gas usage, and the manufacturer’s rated efficiency of the units. Based on this analysis, this project was found in compliance with renewable fuel usage requirements.

2.1 FUEL USE AT 100% BIOGAS PROJECTS

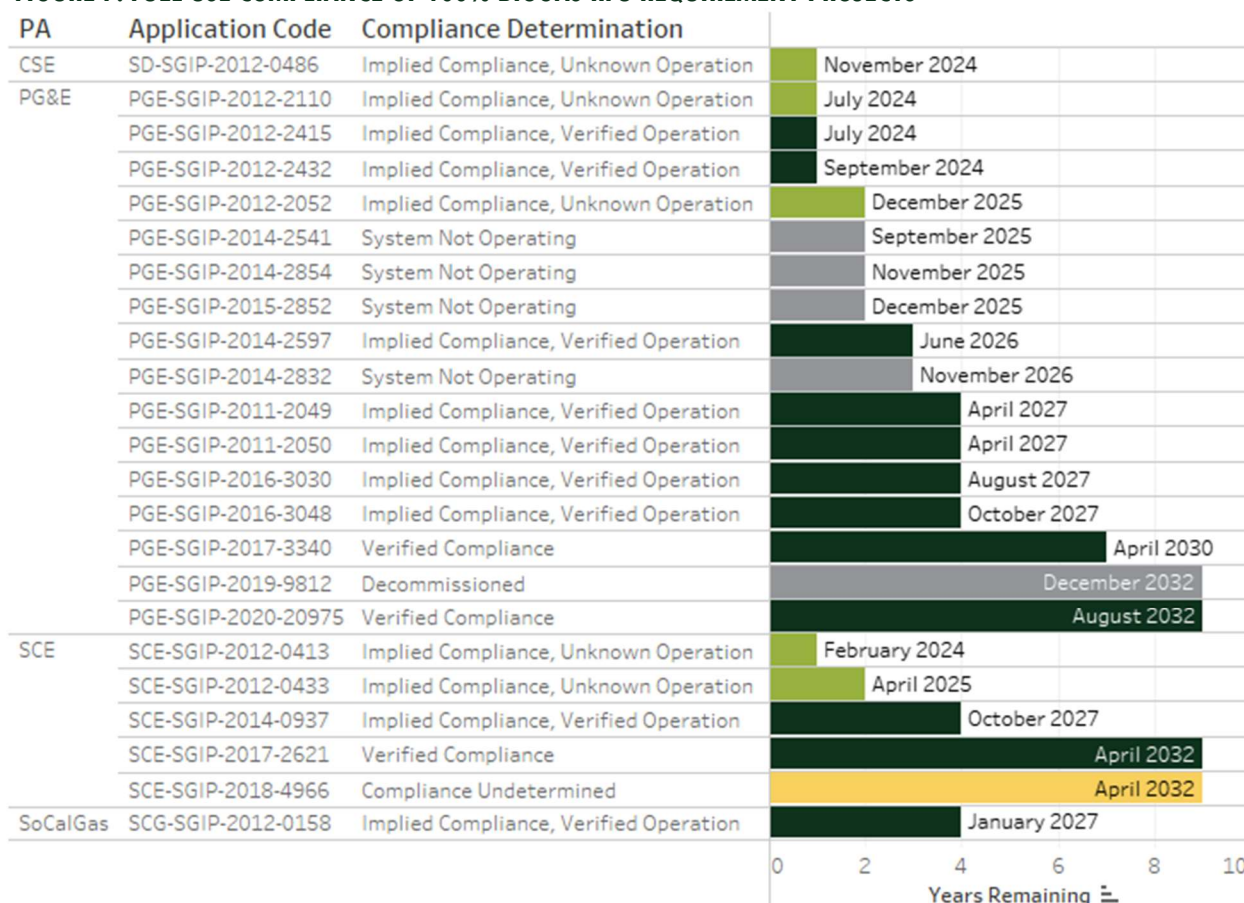
Figure 7 on the following page summarizes compliance determinations for 100% biogas projects. In some cases, these projects are equipped with only a renewable fuel supply and they are not able to blend any amount of natural gas without significant re-engineering. All of these 100% biogas projects with 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. Additionally, for those 100% biogas projects pre-2017, Verdant attempted to confirm whether the systems were still operational.

Five projects fell into the PY2017+ 100% biogas category. Three of them were found in compliance, one was found to have already been removed, and the final could not have the compliance determined:

- **PGE-SGIP-2017-3340:** This project was found to be in compliance.
- **PGE-SGIP-2020-20975:** This project was found to be in compliance.
- **SCE-SGIP-2017-2621:** This project was found to be in compliance.
- **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. 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 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.
- **PGE-SGIP-2018-9812:** This project is believed to have been incentivized at the end of 2022, but the host customer confirmed that it was decommissioned in 2023. No further information can be provided as to why it had already been decommissioned.

There were also five additional pre-2016 100% biogas projects where our team was not able to confirm whether the system was still operating. We attempted to contact these sites, but never heard back from anyone at the facility. Because these projects are 100% biogas, we consider them to meet their compliance, unless we know for certain that they are no longer operating.

FIGURE 7: FUEL USE COMPLIANCE OF 100% BIOGAS 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 12 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, two 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% of the reporting period, and for about half of the period if was operating, it was only utilizing about 30%-50% renewable fuel, while operating entirely on natural gas the remaining time.
- SCE-SGIP-2014-0986.** This 846 kW IC engine utilizes digester gas and natural gas. During system inspection, it was determined that the facility can produce 96% of the biogas needed to reach its power output and supplemented with 4% natural gas. However, over the last 5 evaluation cycles,



the system has consistently not been meeting its renewable fuel use requirements, or Verdant has not been able to gather the data needed to make the determination.

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 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:

- **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 worked with Energy Solutions and the PA to obtain meter interval files, between July and October 2023. However, the digester fuel data would drop at irregular intervals without showing a drop in power output, resulting in impossible spikes in efficiencies. Ultimately, Verdant decided the data could not be verified and was unable to make a determination for this site. We have had difficulties gathering data for this project in the past as well, as the PDP has reported that they did not have a valid breakout of digester gas and natural gas.
- **PGE-SGIP-2012-2061:** Verdant has consistently found that this project met its compliance requirements. However, both contacts that have previously provided data left the facility. Verdant has been working with another contact to obtain the data for this last year of the project's compliance, but we were unable to gather the data.

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

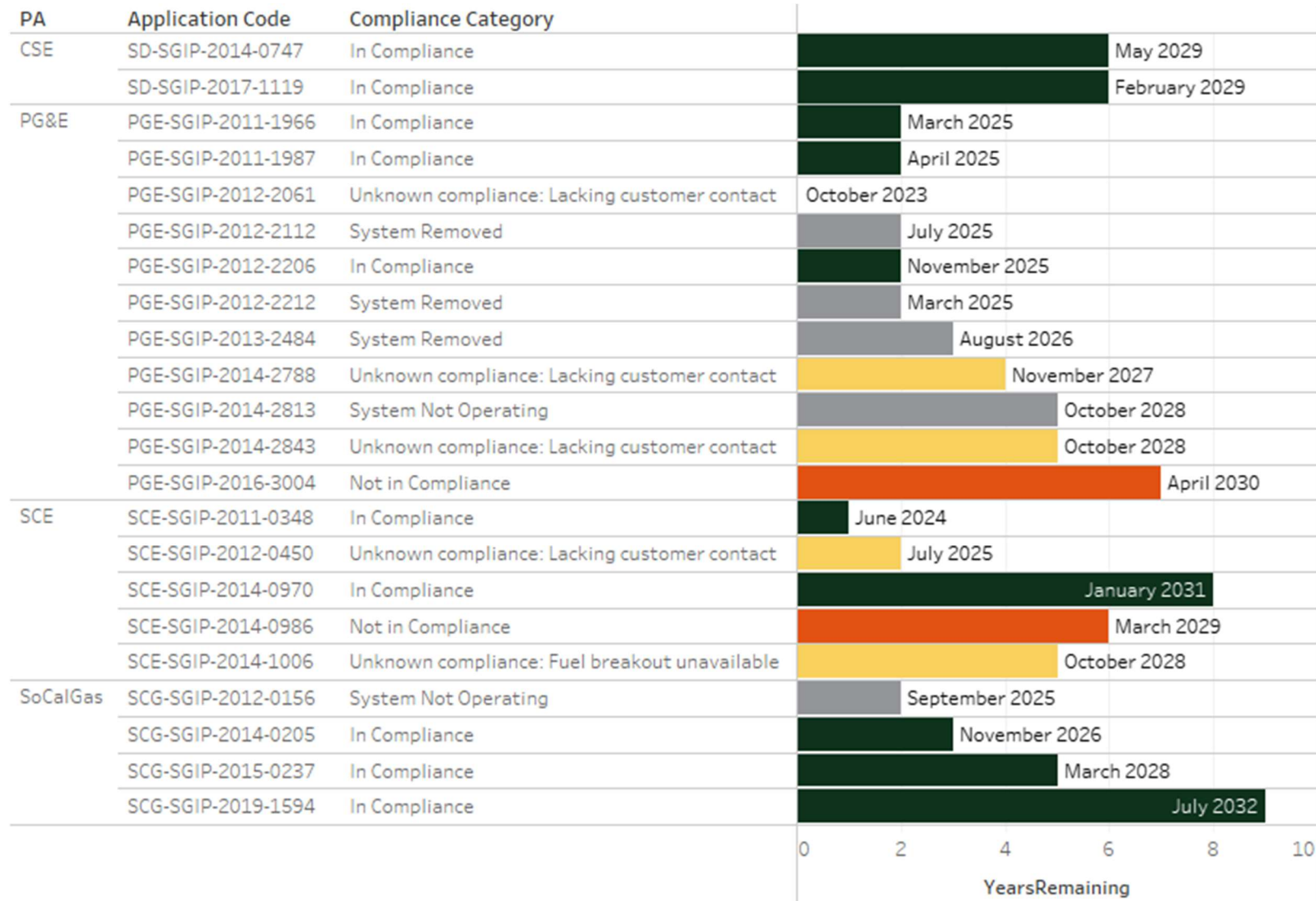
There were five projects in this list that do not fall into one of the above categories during the reporting period. Technically, these projects are not considered out of compliance.

- **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 22 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 20 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 projects were found to reduce emissions.

TABLE 4: 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	0.49	0.38	0.00	0.46	0.84	-0.35
PGE-SGIP-2011-1987	Blended	0.54	0.37	0.00	0.47	0.84	-0.30
PGE-SGIP-2011-2049	Renewable Only	0.62	0.39	0.06	0.62	1.08	-0.45
PGE-SGIP-2011-2050	Renewable Only	0.62	0.40	0.05	0.62	0.93	-0.39
PGE-SGIP-2012-2206	Blended	0.66	0.36	0.00	0.62	0.98	-0.32
PGE-SGIP-2012-2415	Renewable Only	0.65	0.39	0.00	0.65	1.04	-0.39
PGE-SGIP-2012-2432	Renewable Only	0.65	0.38	0.00	0.65	1.03	-0.38
PGE-SGIP-2016-3004	Blended	0.56	0.37	0.00	0.33	0.70	-0.14
PGE-SGIP-2017-3340	Renewable Only	0.62	0.43	0.00	5.67	6.09	-5.47
PGE-SGIP-2019-9812	Renewable Only	0.41	0.40	0.00	0.41	0.82	-0.40
PGE-SGIP-2020-20975	Renewable Only	0.41	0.40	0.00	3.76	4.16	-3.75
SCE-SGIP-2011-0348	Blended	0.71	0.33	0.00	0.61	0.94	-0.23
SCE-SGIP-2014-0970	Blended	0.75	0.33	0.00	0.75	1.08	-0.33
SCE-SGIP-2014-0986	Blended	0.68	0.33	0.00	0.47	0.81	-0.13
SCG-SGIP-2012-0158	Renewable Only	0.62	0.36	0.39	0.62	1.37	-0.75
SCG-SGIP-2014-0205	Blended	0.66	0.33	0.08	0.51	0.92	-0.26
SCG-SGIP-2015-0237	Blended	0.61	0.32	0.00	0.61	0.93	-0.32
SCG-SGIP-2019-1594	Blended	0.52	0.33	0.04	0.49	0.87	-0.35
SD-SGIP-2014-0747	Blended	0.54	0.34	0.00	0.40	0.75	-0.20
SD-SGIP-2017-1119	Blended	0.47	0.34	0.00	0.36	0.70	-0.22

Notes: SCE-SGIP-2014-0937 was also verified to be operating, but the data we received was not considered to be useable and therefore we cannot calculate GHG emissions impacts for this project.

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.⁵ 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.⁶ The estimates of electric power plant CO₂ marginal emissions were accessed from WattTime.⁷
- **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.⁸ At the state level, the California Air Resources Board (CARB) provides

⁵ 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.

⁶ Consequently, during those hours when an SGIP project is idle, displacement of CO₂ emissions from central station power plants is equal to zero.

⁷ WattTime developed real-time and forecasted marginal GHG emissions data for SGIP. <https://sgipsignal.com/>

⁸ An overview of California's air quality districts is available at: <http://www.capcoa.org>



guidelines for control of methane and other volatile organic compounds from biogas facilities.⁹ At the federal level, New Source Performance Standards and Emission Guidelines regulate methane capture and use.¹⁰

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.

⁹ In June of 2007, CARB approved the Landfill Methane Capture Strategy. See <http://www.arb.ca.gov/cc/landfills/landfills.htm> for additional information.

¹⁰ EPA's Landfill Methane Outreach Program provides background information on control of methane at the federal level. See: <http://www.epa.gov/lmop/>