

# SELF-GENERATION INCENTIVE PROGRAM: RENEWABLE FUEL USE REPORT NO. 31

Submitted to:  
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## GLOSSARY

### Abbreviations and Acronyms

<b>Term</b>	<b>Definition</b>
CHP	Combined Heat and Power
CSE	Center for Sustainable Energy
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> 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 <sub>2</sub> Equivalent (CO <sub>2</sub> eq)	When reporting emission impacts from different types of greenhouse gases, total GHG emissions are reported in terms of tons of CO <sub>2</sub> equivalent so that direct comparisons can be made. To calculate CO <sub>2</sub> eq, the global warming potential of a gas as compared to that of CO <sub>2</sub> is used as the conversion factor (e.g., the global warming potential (GWP) of methane is 21 times that of CO <sub>2</sub> ). Thus, the CO <sub>2</sub> 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 <b>prior</b> legal code, law or regulation requiring capture and flaring of the biogas. In this event an SGIP project <b>cannot</b> be credited with GHG emission reductions due to capture of <b>methane</b> 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 <sub>2</sub> and methane, expressed as CO <sub>2</sub> 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 <b>methane</b> 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> .



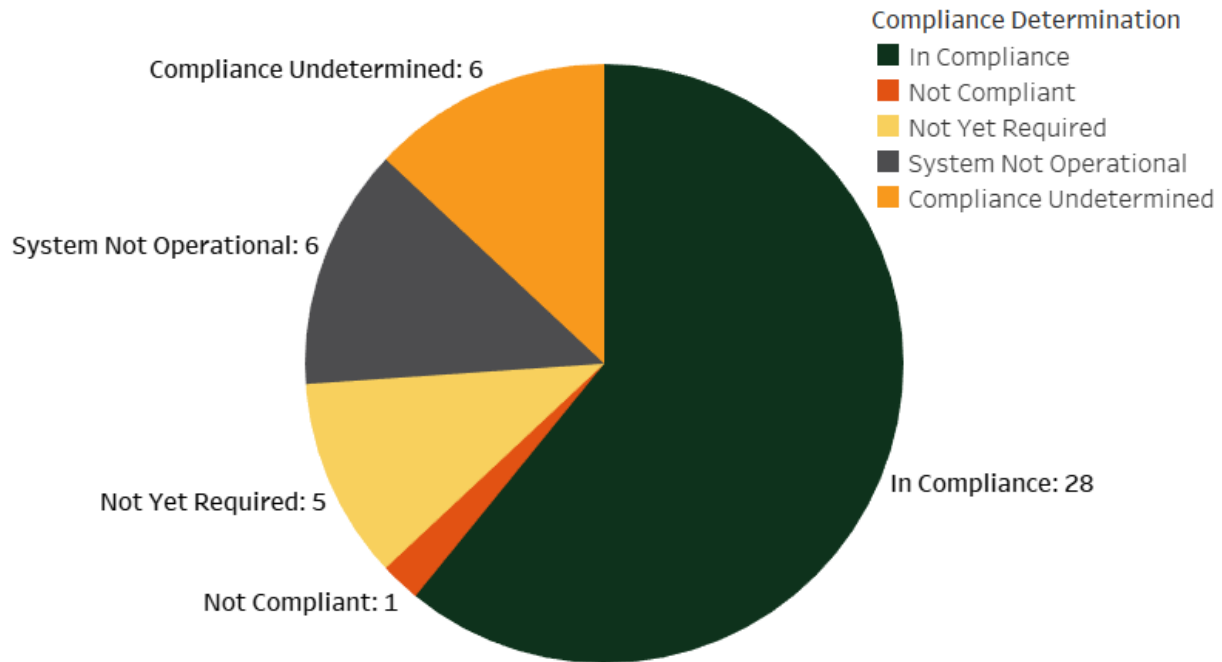
## RENEWABLE FUEL USE VERIFICATION SUMMARY

This section summarizes Verdant’s compliance determinations for SGIP projects with minimum renewable fuel usage requirements. Participation in the SGIP requires participants to meet their renewable fuel commitment throughout the duration of each project’s compliance period. For applications submitted between 2011 and 2019, 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.21-06-005<sup>1</sup> 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 is currently a total of 46 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 46 projects, grouped by the compliance outcome.

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<sup>1</sup> 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 28 projects that met their compliance obligations; 18 of these were renewable fuel only projects (no natural gas supply) while 10 of them were blended renewable projects (onsite biogas blended with natural gas). For six additional projects, Verdant was unable to make a compliance determination due to a lack of data. One additional blended biogas project was out of compliance with minimum renewable fuel use requirements, and six projects were non-operational for a variety of reasons. Finally, five 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. 31) 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, 2021, through June 30, 2022.

## 1.1 RFU REPORT METHODOLOGY AND DATA OVERVIEW

SGIP RFU Report No. 31 provides information on the renewable fuel usage from the 46 renewable fuel projects rebated by the SGIP as of June 30, 2022, 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). There are 45 SGIP generation projects within their compliance period that 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. One single project was fueled by directed biogas which is procured off-site, cleaned up, and injected into the natural gas distribution system. Sources of directed biogas include landfills and wastewater treatment plants.

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 46 RFU projects discussed in this report, 39 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).<sup>2</sup> 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.

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

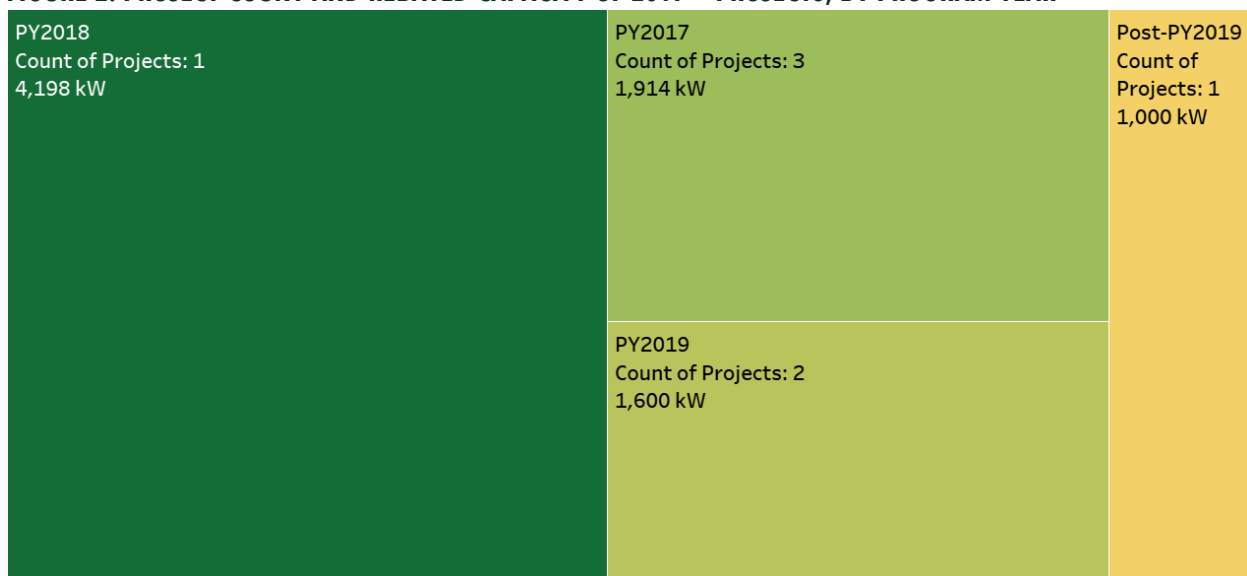


Table 1 summarizes the status of the 46 RFU projects grouped by compliance status and renewable fuel type. Further discussion is provided in subsequent sections.

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<sup>2</sup> 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	Renewable Natural Gas (Directed BioGas)
In Compliance	Implied Compliance	18		
	Verified Compliance		10	
Compliance Undetermined	Compliance Undetermined		2	
	No Customer Contact		4	
System Not Operational	System Decommissioned		3	1
	System Not Operational		2	
Not Compliant	Not Compliant		1	
Not Yet Required	Not Yet Required	4	1	

## 1.2 SUMMARY OF RFU REPORT NO. 31 FINDINGS

As of June 30, 2022, there are a total of 46 RFU projects within their compliance requirement period. Only one directed biogas project exists which is subject to compliance determination. Just over half of the active projects are blended onsite biogas projects with the remaining project being onsite biogas only.

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

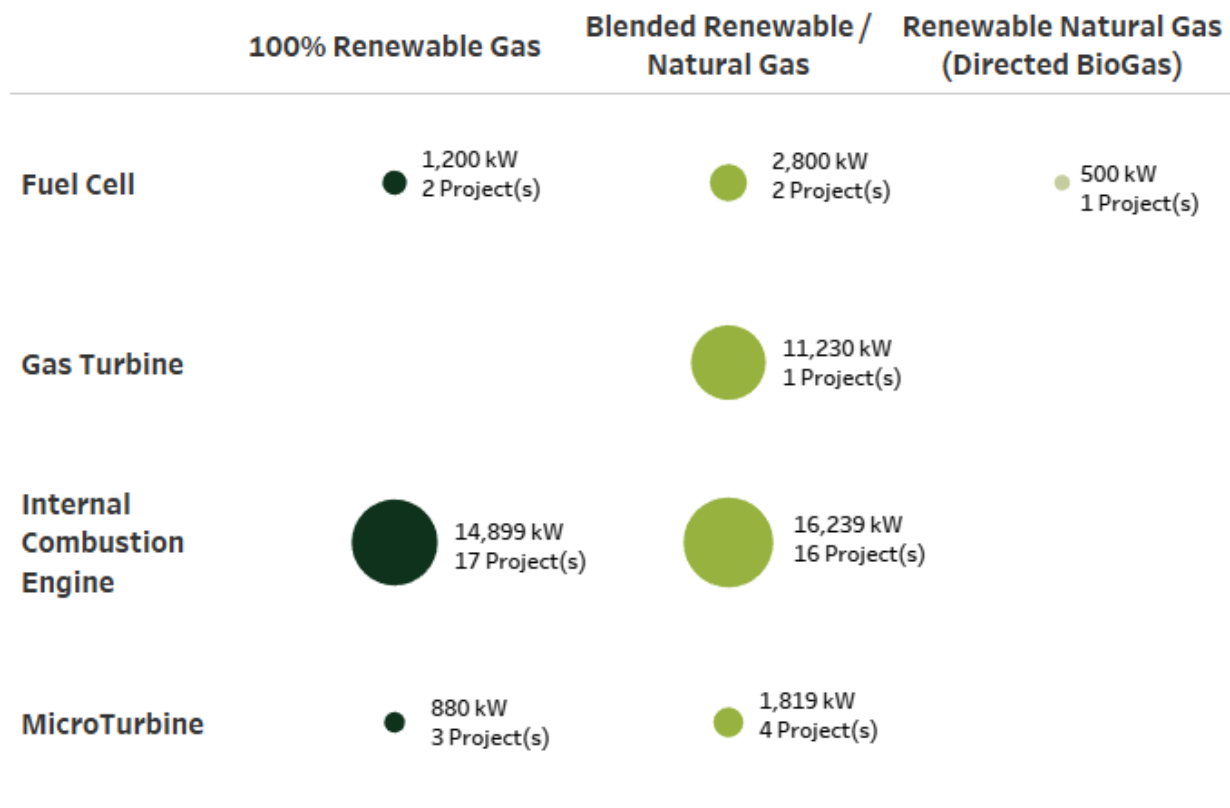
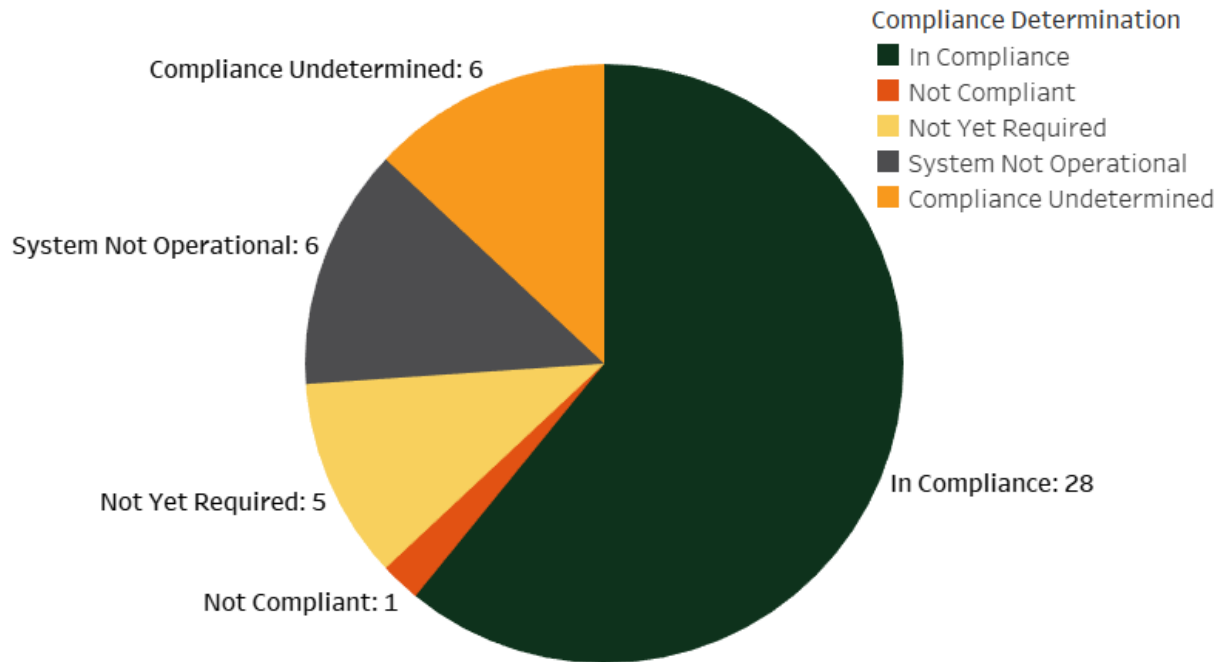


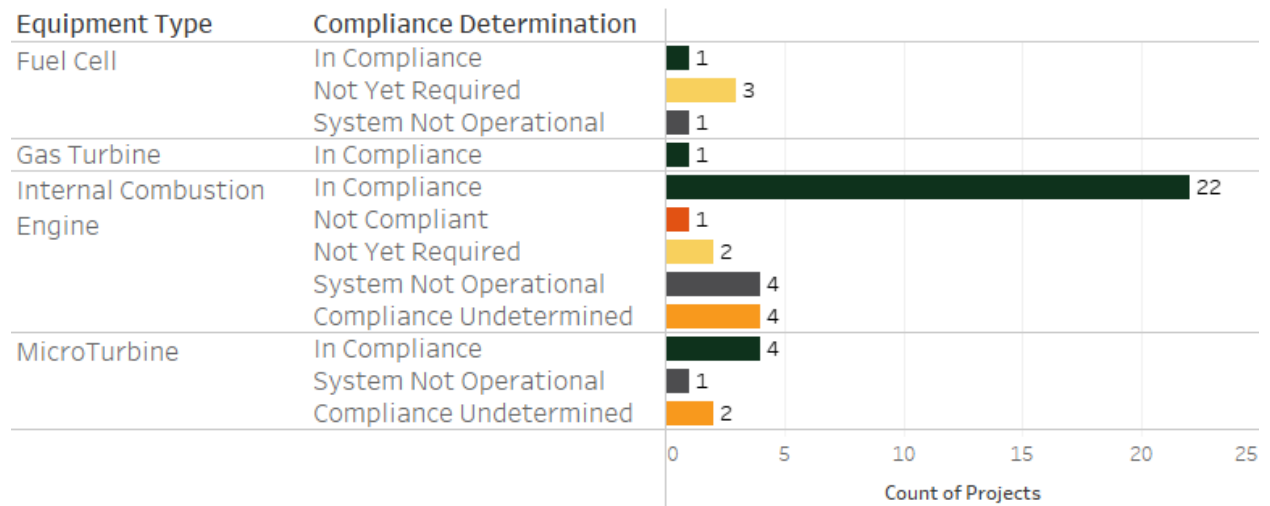
Figure 4 below shows the share of active projects by their compliance determination. Verdant found that of the 46 projects within their compliance period, five projects had not been operating for a full year and therefore did not require a compliance determination during this reporting period. Out of the remaining 41 projects, 28 were either evaluated as compliant or assumed to be compliant (onsite biogas only projects). For six projects Verdant was unable to determine compliance, mostly due to insufficient data. One project was 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 five projects that were either not in compliance or where compliance was undetermined, and another four 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 #	Reporting End Date	
#32	June 2023	27
#33	June 2024	25
#34	June 2025	22
#35	June 2026	18
#36	June 2027	16
#37	June 2028	14
#38	June 2029	8
#39	June 2030	6
#40	June 2031	5
#41	June 2032	3

There are also 10 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, but out of the 10 all but one are PY2020 or beyond projects, requiring 100 percent renewable fuel. The one pre-PY2020 project, an almost 3 MW internal combustion engine, is from PY2018, and it 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. This report found one biogas project out of compliance with SGIP renewable fuel use requirements.

While one project was found to be out of compliance, six other projects could not have their compliance status determined due to insufficient data. For four of these projects, we requested the assistance of the PA, and we were told no additional contact information was available. For another project, there are ongoing issues with the customer’s data that are in the process of being resolved. For the last project, the data is available, but due to PA privacy issues that could not be resolved, Verdant was unable to access the data.



The data necessary to complete this report are not included in the Application Interval Files submitted to the SGIP website. 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 still not sufficient to make compliance determinations.

Decision 21-06-005 dictates that customers submit “at minimum, monthly reporting of directed and on-site biogas fuel reports, attestations, supporting documentation, nomination records, procurement invoices, and meter data...” in order 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 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. Project 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. This presents two challenges from an evaluation perspective. First, there is no clear guidance in the SGIP Handbook or relevant CPUC Decisions regarding the scope of minimum renewable fuel use requirements in this scenario. Is the project required to procure sufficient biogas for a 3 MW generator (the maximum incentivized capacity), an 11 MW generator (the entire capacity of the incentivized generator), or a 22.23 MW generator (the total capacity of both systems fed by the single fuel supply)? In this RFUR, Verdant chose to define compliance as the percentage of renewable fuel used by the entire 11 MW generator (that is partially rebated at 3 MW), but not the second 11 MW. This posed a second challenge – since the fuel metering does not differentiate between the two generators, Verdant had to choose to either allocate all the renewable fuel to the first generator, or allocate it across both generators, which would cause the first to not comply with SGIP minimum renewable fuel use requirements. We chose to prioritize all renewable fuel to the partially rebated SGIP generator and ultimately found this project in compliance with SGIP renewable fuel use requirements based on the assumptions listed above. While only the incentivized generator was evaluated against the 75 percent renewable fuel requirement, the non-incentivized system (which was not subject to evaluation) is likely increasing GHG emissions during this reporting period. The customer has identified lower than expected onsite biogas production due to an operational upset during this reporting period. Since 2015, SGIP has begun to provide more clarity on metering, monitoring, and auditing obligations<sup>3</sup> after the adoption of

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<sup>3</sup> CPUC D.21-06-005.



biogas fuel blending requirements.<sup>4</sup> New projects moving forward must meet these RNG program requirements before they receive incentives. Any future changes to SGIP eligibility rules for biogas generators should carefully consider implications to evaluation protocols. At a minimum, renewable and non-renewable fuel should always be metered separately for each generator.

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<sup>4</sup> CPUC D.16-06-055.



## 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 are located somewhere other than where biogas is produced and injected into the common carrier pipeline and are not necessarily directly receiving the biogas.

Fuel supply and contract status for RFU requirement projects are summarized in Table 3. Forty-six of the total 176 RFU requirement projects had active status during this reporting period. There were 130 RFU requirement projects that had an expired compliance period or completed their directed biogas procurement term before the beginning of this reporting period. Along with the 46 active RFU requirement projects, there were five projects that had not yet completed one year of operation. Twenty-two 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]
Blended Onsite Biogas	23	32,087	25	16,170	48	48,257
Directed Biogas (RNG)	1	500	63	30,980	64	31,480
Onsite Biogas Only	22	16,979	42	16,458	64	33,437
<b>Grand Total</b>	<b>46</b>	<b>49,567</b>	<b>130</b>	<b>63,608</b>	<b>176</b>	<b>113,175</b>

\* Only active projects that have been operational for one full year are required to comply with SGIP renewable fuel use requirements. Five projects that are considered ‘active’ have not completed one full year of operation.

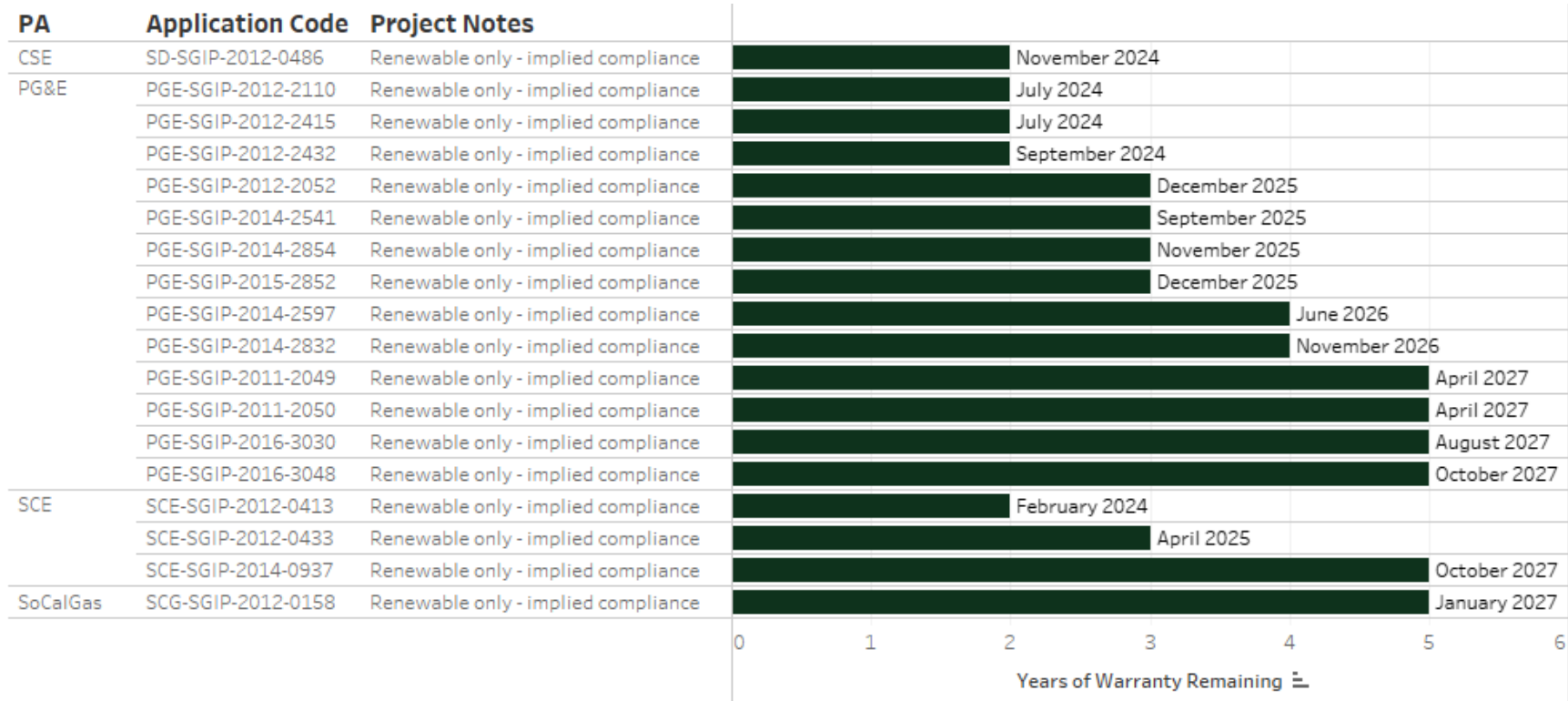
\*\* Four of these projects are no longer participating in the program and have had their systems removed or facilities shut down, and two additional systems were confirmed to be non-operational at this time. More details are provided in Section 2.2.3

## 2.1 FUEL USE AT DEDICATED ON-SITE RFU REQUIREMENT PROJECTS

Figure 6 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. While there are no 2017+ dedicated on-site projects for this reporting period, for future projects with an application date of 2017 or later, the evaluation team will rely on project inspection reports to ensure that natural gas meters were not installed, and the system truly operated on 100 percent onsite renewable fuel.



**FIGURE 6: FUEL USE COMPLIANCE OF DEDICATED RFU REQUIREMENT PROJECTS**



\* 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

Unlike dedicated RFU requirement sites, whose compliance is assumed, blended RFU requirement facilities are subject to compliance assessment. 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.

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. Typically, the Lower Heating Value (LHV) of the renewable fuel ranges from 500 to 650 BTU/SCF based on the methane content of the fuel. As part of the data collection, we attempt to collect the 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 591 BTU/SCF. As referenced in the Biomass CHP catalog<sup>5</sup>, 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<sup>6</sup> BTU/SCF is assumed. There are currently 22 active blended on-site RFU projects requiring a compliance determination. Figure 7 below highlights the historical compliance determination for these projects, as well as the compliance determination for this year's reporting (RFU Report 31).

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<sup>5</sup> 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](https://www.epa.gov/sites/default/files/2015-07/documents/biomass_combined_heat_and_power_catalog_of_technologies_3_biomass_resources.pdf)

<sup>6</sup> 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**

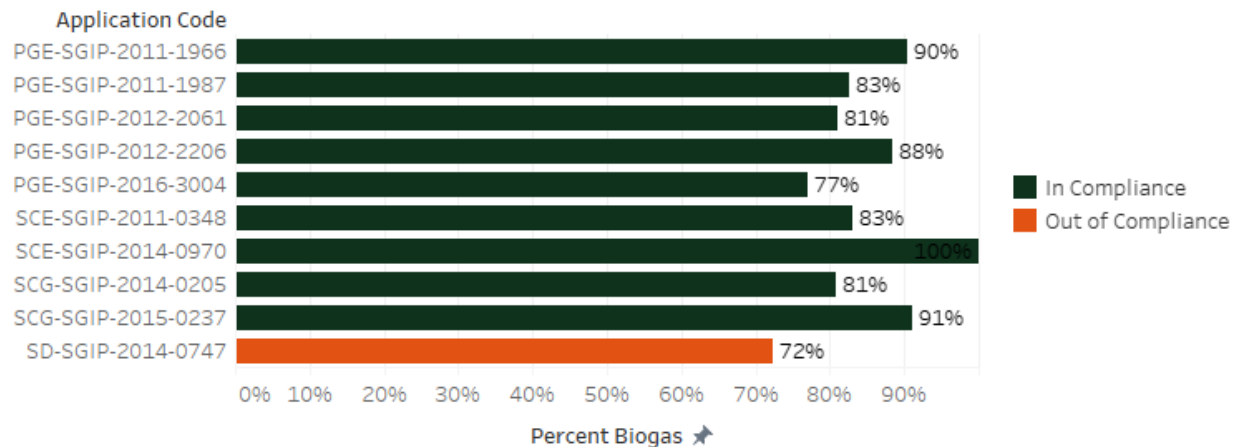
SGIP Application Code	RFU Report Number							
	24	25	26	27	28	29	30	31
PGE-SGIP-2012-2061	UTD	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SCE-SGIP-2011-0348		UTD	Yes	Yes	Yes	Yes	Yes	Yes
PGE-SGIP-2012-2212			UTD	UTD	UTD	Non-Op	Non-Op	Non-Op
PGE-SGIP-2011-1966			Yes	Yes	Yes	Yes	Yes	Yes
PGE-SGIP-2011-1987			Yes	Yes	Yes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

\* One project is believed to meet compliance requirements, but independent verification has not been performed. The host customer informed PG&E that the site utilized 100 percent onsite renewable fuel. Verdant confirmed that the system’s generation did not exceed the available renewable fuel based on details from the Inspection Report. Finally, this project is only required to procure 10 percent renewable fuel per the 2017 application requirements, but it has received an additional renewable fuel adder for 100 percent fuel use.

\*\* **UTD = Unable to Determine.** There are various reasons why Verdant has been unable to determine the compliance for projects. These are explained in further detail below. **Non-Op = Non-Operational.** There are various reasons why a project is non-operational, which include reasons like the system being decommissioned, facility shut down, cost of operating too high, among others.

Figure 8 below highlights the biogas percentage for each of the ten 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, one blended RFU requirement project was determined to be out of compliance with SGIP renewable fuel use requirements. This project represented the second year in a row that these projects did not meet the compliance requirements.

- 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

Six 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, unless Verdant receives any new information for these customers regarding updated contact information, Verdant does not plan to continue attempting to verify compliance for the following projects:
  - PGE-SGIP-2014-2788
  - PGE-SGIP-2014-2843
  - SCE-SGIP-2012-0450
  - SCE-SGIP-2014-1006

**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. Due to data privacy concerns, Verdant was unable to obtain the necessary data to make a compliance determination.

- **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. Once data quality issues are resolved, compliance for this period (July 2021 to June 2022) 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.”

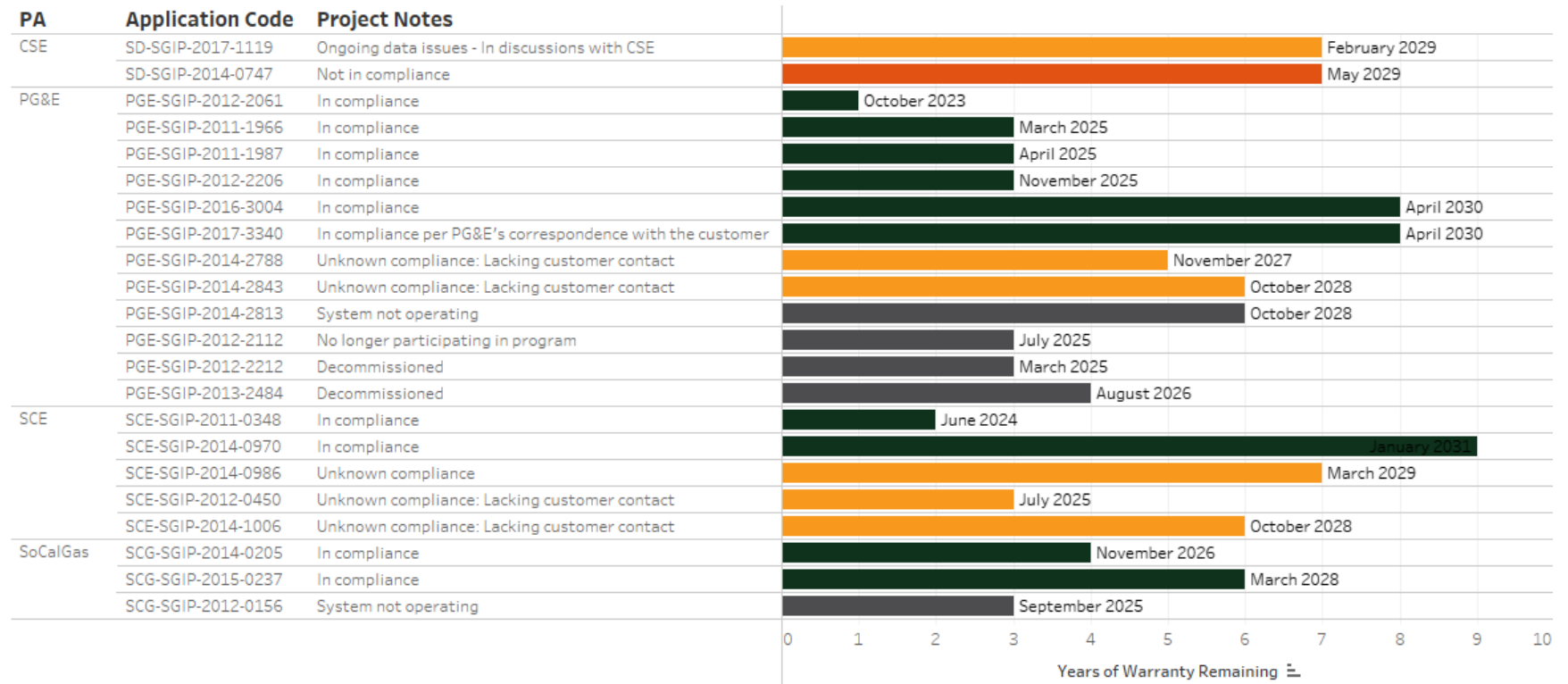
- **PGE-SGIP-2012-2112.** This 190 kW IC engine utilizes wastewater digester gas and natural gas. This system became operational in July 2015 and is therefore required to comply with the SGIP fuel use requirements. However, according to the PA and the customer, this project is no longer enrolled in the 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 that 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 20 active blended RFU requirement projects during this reporting period is presented in Figure 9. The table also displays the number of years remaining that the 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**





## **2.3 FUEL USE AT DIRECTED RFU REQUIREMENT PROJECTS**

It is not possible to use the same method in assessing compliance of directed biogas projects as that used for assessing compliance of blended on-site RFU requirement projects. In blended RFU requirement projects using biogas produced on-site, the metered amount of non-renewable fuel is used to determine if it is less than or equal to 25 percent of the total annual energy input to the RFU requirement project (for PY 2001-PY 2016 projects). However, in directed biogas RFU requirement projects, metering of SGIP systems captures total fuel use only; it provides no information on how much biogas was produced and allocated to the project.

Assessing compliance of directed biogas projects requires information about off-site biogas production, transportation, and subsequent allocation to customers that may or may not be SGIP participants. Specification of the approach used to assess the balance of injections and extractions is dictated by the properties of transactions at the two points. The properties at the extraction point represent a significant departure from conditions encountered for dedicated and blended on-site RFU requirement projects. Specifically, at the extraction point the transaction type is notional rather than physical, and information is obtained from invoices rather than metering. To assess the system's balance and thereby enable accurate assessment of the role of SGIP specifically in increasing overall biogas production and consumption, complete information for injections and extractions is required.

There was only a single project requiring compliance during this period, however, Verdant has confirmed the facility is now closed. Therefore, there are currently no more directed biogas projects in the SGIP required to meet biogas procurement compliance.

### 3 GREENHOUSE GAS EMISSIONS

This section presents information regarding GHG emission impacts. The GHG emission information was calculated based on 14 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 14 projects were found to reduce emissions. The one project was not operating for much of the RFU period while the plant was dealing with a process design issue that they were working to correct.

**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	0.34	0.00	0.43	0.78	-0.30
PGE-SGIP-2011-1987	Blended	0.55	0.34	0.00	0.45	0.80	-0.25
PGE-SGIP-2012-2061	Blended	0.58	0.34	0.33	0.47	1.14	-0.56
PGE-SGIP-2012-2206	Blended	0.63	0.34	0.00	0.56	0.90	-0.27
PGE-SGIP-2016-3004	Blended	0.66	0.35	0.00	0.51	0.86	-0.19
PGE-SGIP-2016-3048	Renewable Only	0.67	0.36	0.00	6.05	6.41	-5.74
SCE-SGIP-2011-0348	Blended	0.71	0.30	0.00	0.59	0.89	-0.18
SCE-SGIP-2014-0937	Renewable Only	0.26	0.30	0.00	2.32	2.62	-2.37
SCE-SGIP-2014-0970	Blended	1.05	0.00	0.00	1.05	1.04	0.00
SCE-SGIP-2017-2621	Renewable Only	0.64	0.28	0.00	5.81	6.10	-5.46
SCE-SGIP-2018-4966	Renewable Only	1.57	0.29	0.00	1.57	1.87	-0.29
SCG-SGIP-2014-0205	Blended	0.57	0.30	0.00	0.46	0.76	-0.19
SCG-SGIP-2015-0237	Blended	0.68	0.29	0.00	0.62	0.91	-0.23
SD-SGIP-2014-0747	Blended	0.56	0.32	0.00	0.41	0.72	-0.16

The greenhouse gas emissions are based on several factors:

- SGIP Emissions:** The operation of distributed generation projects emit CO<sub>2</sub> as a result of combustion and conversion of the fuel powering the project. Hour-by-hour emissions of CO<sub>2</sub> 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.<sup>7</sup> As a result, SGIP projects displace the accompanying CO<sub>2</sub> emissions that these central station power plants would have released to the atmosphere. The avoided CO<sub>2</sub> emissions for these baseline conventional power plants are estimated on an hour-by-hour basis over all 8,760 hours of the year.<sup>8</sup> The estimates of electric power plant CO<sub>2</sub> marginal emissions were accessed from WattTime.<sup>9</sup>

- **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<sub>2</sub> 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 CH<sub>4</sub> that otherwise may have been emitted to the atmosphere (vented), or captured and burned, producing CO<sub>2</sub> (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.<sup>10</sup> At the state level, the California Air Resources Board (CARB) provides guidelines for control of methane and other volatile organic compounds from biogas facilities.<sup>11</sup> At the federal level, New Source Performance Standards and Emission Guidelines regulate methane capture and use.<sup>12</sup>

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<sup>7</sup> 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.

<sup>8</sup> Consequently, during those hours when an SGIP project is idle, displacement of CO<sub>2</sub> emissions from central station power plants is equal to zero.

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

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

<sup>11</sup> In June of 2007, CARB approved the Landfill Methane Capture Strategy.

See <http://www.arb.ca.gov/cc/landfills/landfills.htm> for additional information.

<sup>12</sup> 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.