

SELF-GENERATION INCENTIVE PROGRAM: RENEWABLE FUEL USE REPORT NO. 35

Final

Submitted to:
Pacific Gas and Electric Company
SGIP Working Group

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August 11, 2026





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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

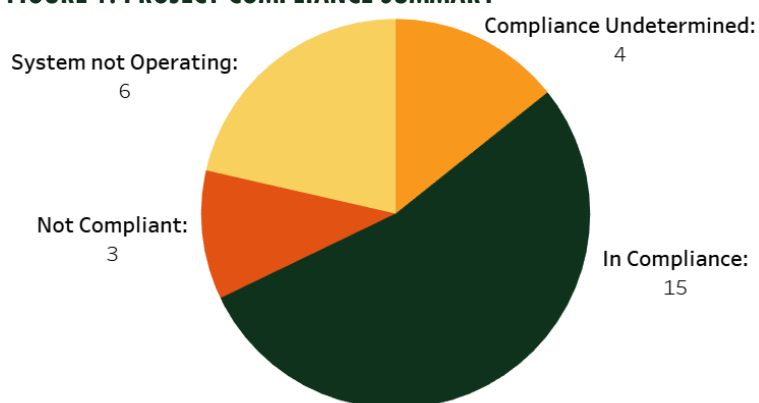
Term	Definition
2017+ RFU Requirement	For reporting purposes, projects with RFU requirements with application dates in 2017 or later are referred to as <i>2017+ RFU requirement</i> . Depending on the application year, all SGIP projects are required to use a certain percentage of renewable fuel.
Applicant	The entity, either the Host Customer, System Owner, or third party designated by the Host Customer, which is responsible for the development and submission of the SGIP application materials and is the main contact for the SGIP Program Administrator for a specific SGIP application.
Biogas	A gas composed primarily of methane and carbon dioxide produced by the anaerobic digestion of organic matter. This is a renewable fuel. Typically, biogas is produced in landfills, in digesters at wastewater treatment plants, food processing facilities, or dairies.
Biogas Baseline	The assumed treatment of biogas fuel in the absence of the SGIP generator. See <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	Refers to 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 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 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 incentivized capacity refers to 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 if 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 prior legal code, law or regulation requiring capture and flaring of the biogas. Only in this event can an SGIP project be credited with GHG emission reductions due to capture of methane in the biogas. A project cannot take credit for a prior action required by legal code, law, or regulation. See also: <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 generators’ renewable fuel consumption over the duration of the SGIP contract. Since 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 is currently a total of 28 completed projects within the compliance verification window, whose compliance outcome is summarized in Figure 1.

FIGURE 1: PROJECT COMPLIANCE SUMMARY



There are a total of 15 projects that met their compliance obligations; 10 of these were renewable fuel only projects (either no natural gas supply or only incentivized only based on the availability of biofuel to the facility) while five of them were blended onsite renewable projects (onsite biogas blended with natural gas). For four projects, Verdant was unable to make a compliance determination due to lack of contact with the customer. Three projects were out of compliance with minimum renewable fuel use requirements, and six projects were non-operational.

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>

1 INTRODUCTION AND EXECUTIVE SUMMARY

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

This report (RFU Report No. 35) includes detailed summaries produced for RFU projects that are still within their compliance period. Unlike prior reports, results of analysis of renewable fuel use compliance presented in this RFU Report are based on the 6 months of operation from July 1, 2025, through December 31, 2025, rather than 12 months.² Some projects completed their compliance requirements during this period, so their compliance determination is only made up until the time their compliance requirements expired.

1.1 RFU REPORT METHODOLOGY AND DATA OVERVIEW

SGIP RFU Report No. 35 provides information on the renewable fuel usage of the 28 renewable fuel projects which were still within their SGIP compliance requirement period as of July 1st, 2025, 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.

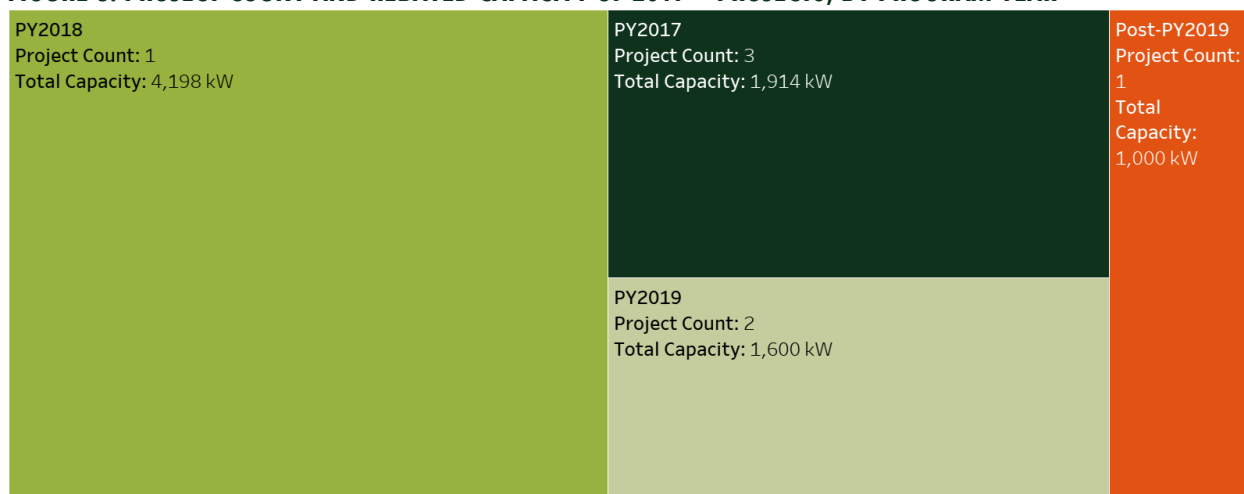
SGIP RFU projects are fueled by a variety of renewable sources. These renewable sources can be either located onsite (onsite biogas) or at a location other than the SGIP generator (directed biogas). All 28 SGIP generation projects within their compliance period are at least partially fueled by on-site biogas. Sources of on-site biogas include landfills; digester gas (DG) from wastewater treatment plants (WWTPs), dairies, and food processing facilities. No projects still within their SGIP permanency period are currently fueled by directed biogas.

² As highlighted in Decision 25-12-003, Attachment A: Final SGIP M&E Plan.

SGIP changed the fuel requirements in 2017, requiring a certain level of renewable fuel for all fueled generation projects. Pre-2017, renewably fueled generation projects that received an additional renewable fuel incentive were required to utilize at least 75% renewable fuel to generate electricity. Starting in 2017, all fueled generation projects were required to use 10% renewable fuel. Projects listed under a 2018 application were required to utilize 25% renewable fuel and those under 2019 application were required to utilize 50% renewable fuel.³ Additionally, some of these 2017-2019 projects have received “renewable fuel adders” receiving larger incentives for a higher percentage of renewable fuel. As of 2020, all fueled generation projects are now required to utilize 100% renewable fuel.

Of the 28 RFU projects discussed in this report, 21 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%).⁴ The 2017+ projects are highlighted below in Figure 3. 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 3: PROJECT COUNT AND REBATED CAPACITY OF 2017+ PROJECTS, BY PROGRAM YEAR



³ A typographical error was found in prior reports which stated that 2018 projects required 50% renewable fuel and 2019 projects required 75% renewable fuel. This has been corrected here.

⁴ These requirements will be referred to as *legacy* RFU requirements throughout the report.

Table 1 summarizes the status of the 28 RFU projects grouped by compliance status and renewable fuel type. Further discussion is provided in subsequent sections.

TABLE 1: RFU PROJECT DESIGNATIONS

		100% Renewable Gas	Blended Renewable/Natural Gas
In Compliance	Verified Compliance		5
	Implied Compliance, Unknown Operation	4	
	Implied Compliance, Verified Operation	6	
Compliance Undetermined	No Customer Contact		4
System not Operating	Decommissioned	4	2
Not Compliant	Not Compliant	1	2

1.2 SUMMARY OF RFU REPORT NO. 35 FINDINGS

As of July 1st, 2025, there are a total of 28 RFU projects within their compliance requirement period. Almost half of these projects (13) are blended onsite biogas projects with the rest being onsite biogas only (15). The project counts and capacities are shown below in Figure 4.

FIGURE 4: PROJECTS WITHIN COMPLIANCE REQUIREMENT PERIOD BY TECHNOLOGY AND FUEL TYPE

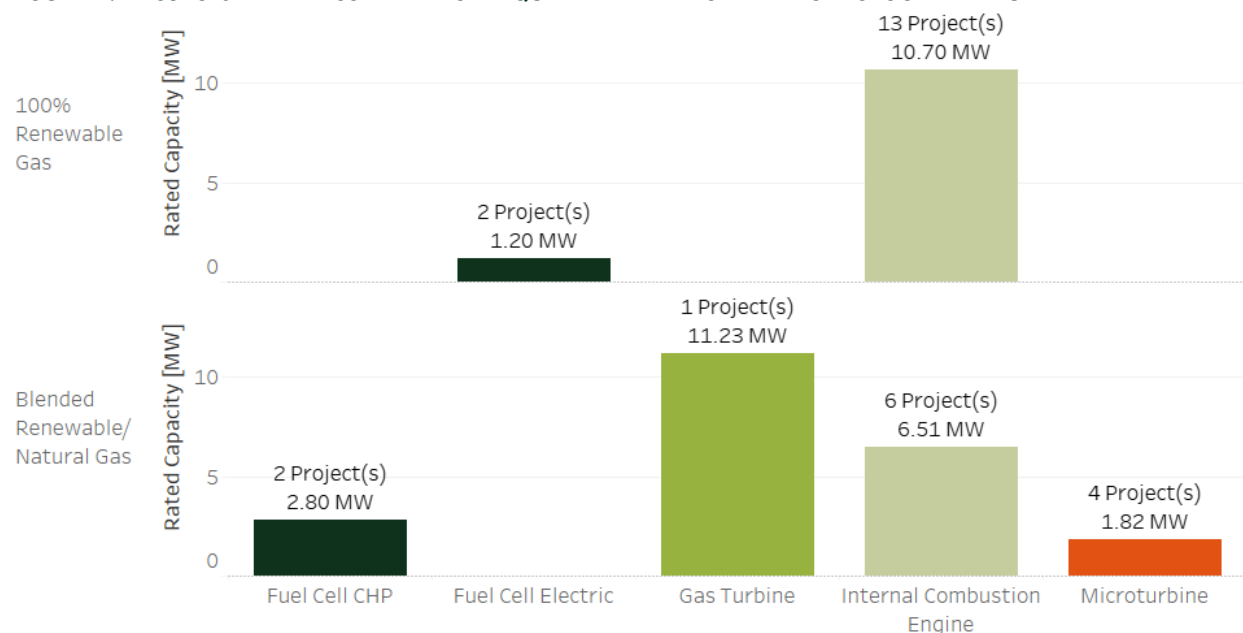
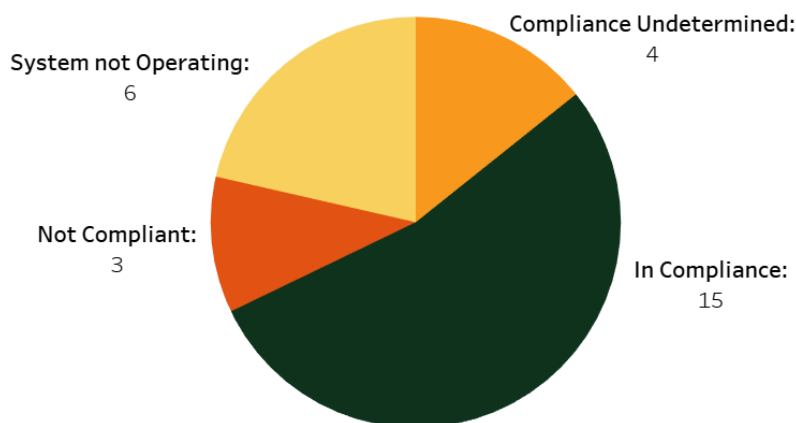


Figure 5 below shows the share of projects by their compliance determination. Verdant found that of the 28 projects, 15 were either verified to be compliant or assumed to be compliant (pre-2017 onsite biogas only projects). Verdant was unable to determine compliance with four projects, primarily because we were unsuccessful at reaching the facility or project contact. Three 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 5: SHARE OF PROJECTS BY COMPLIANCE DETERMINATION



The compliance determination is also shown below in Figure 6 by equipment type. Most renewably- or partially-renewably fueled systems are internal combustion engines. While most internal combustion engines are in-compliance, there are two systems that were not in compliance, two where compliance was undetermined, and another four where the system was not operational or decommissioned.

FIGURE 6: COUNT OF PROJECTS BY EQUIPMENT TYPE AND COMPLIANCE DETERMINATION

Fuel Cell CHP	In Compliance	1					
	Not Compliant	1					
Fuel Cell Electric	In Compliance	1					
	System not Operating	1					
Gas Turbine	In Compliance	1					
Internal Combustion Engine	In Compliance	11					
	System not Operating	4					
	Compliance Undetermined	2					
	Not Compliant	2					
Microturbine	In Compliance	1					
	System not Operating	1					
	Compliance Undetermined	2					

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 15 out of the 28 projects (53%) are meeting, or assumed to be meeting, their renewable fuel usage compliance requirements. While CPUC D. 25-12-003 does not require any future renewable fuel compliance reporting, calculating renewable fuel usage for blended fuel and new renewable fuel projects still within their permanency period can be performed with data that is already being collected as part of future SGIP impact evaluations. ***We recommend reporting renewable fuel use for blended fuel and new renewable fuel projects as part of future annual impact evaluation reports.***

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 for all projects within their requirement period is ten years. The SGIP applicant must provide warranty (and/or maintenance contract) start and end dates in the Reservation Confirmation and Incentive Claim Form. From PY20 on, renewable fuel projects must use renewable fuel for the life of the SGIP generator.

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

- “100% biogas” projects located where biogas is produced (e.g., wastewater treatment facilities, landfill gas recovery operations) and the biogas is the only source for the prime mover.
- “Blended” on-site RFU requirement facilities located where biogas is produced that use a blend of biogas and non-renewable fuel (e.g., natural gas); and
- “Directed” RFU requirement facilities located somewhere other than where biogas is produced and injected into the common carrier pipeline and are not necessarily directly receiving the biogas. Currently, there are no directed biogas projects still requiring compliance.

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

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

	Count of Projects	Incentivized Capacity [kW]
100% Renewable Gas	15	11,902
Blended Renewable/Natural Gas	13	22,361
Grand Total	28	34,263

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 542 to 701 BTU/SCF. As referenced in the Biomass CHP catalog⁵, 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 compliance. For natural gas energy density, an LHV of 930⁶ BTU/SCF is assumed. Figure 7 below highlights the historical compliance determination for all blended fuel projects, as well as the compliance determination for this year's reporting (RFU Report 35).

FIGURE 7: HISTORY OF COMPLIANCE DETERMINATION FOR BLENDED FUEL PROJECTS

Application Code	RFU Report Number									
	26	27	28	29	30	31	32	33	34	35
PGE-SGIP-2013-2484		UTD	UTD	UTD	UTD	Non-Op	Non-Op	Non-Op	Non-Op	Non-Op
PGE-SGIP-2014-2788				UTD	UTD	UTD	UTD	UTD	UTD	UTD
PGE-SGIP-2014-2813				UTD	UTD	Non-Op	Non-Op	Non-Op	Non-Op	Non-Op
PGE-SGIP-2014-2843	UTD	UTD	UTD	UTD	UTD	UTD	UTD	UTD	UTD	UTD
PGE-SGIP-2016-3004						Yes	No	No	No	No
SCE-SGIP-2014-0970						Yes	Yes	Yes	Yes	Yes
SCE-SGIP-2014-0986				No	No	UTD	UTD	No	UTD	UTD
SCE-SGIP-2014-1006				UTD	UTD	UTD	UTD	UTD	UTD	UTD
SCG-SGIP-2014-0205	Yes	UTD	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
SCG-SGIP-2015-0237		UTD	UTD	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SCG-SGIP-2019-1594								Yes	Yes	Yes
SD-SGIP-2014-0747				Yes	No	No	No	Yes	No	Yes
SD-SGIP-2017-1119				Yes	Yes	Yes	Yes	Yes	Yes	Yes

UTD = Unable to Determine. Explanations for why compliance was undetermined are explained in further detail below.

Non-Op = Non-Operational. Reasons why a project is non-operational include the system being decommissioned, facility shut down, and cost of operating too high, among others.

⁵ EPA Combined Heat and Power Partnership. Chapter 3, Biomass Resources. September 2007.

https://www.epa.gov/sites/default/files/2015-07/documents/biomass_combined_heat_and_power_catalog_of_technologies_3_biomass_resources.pdf

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

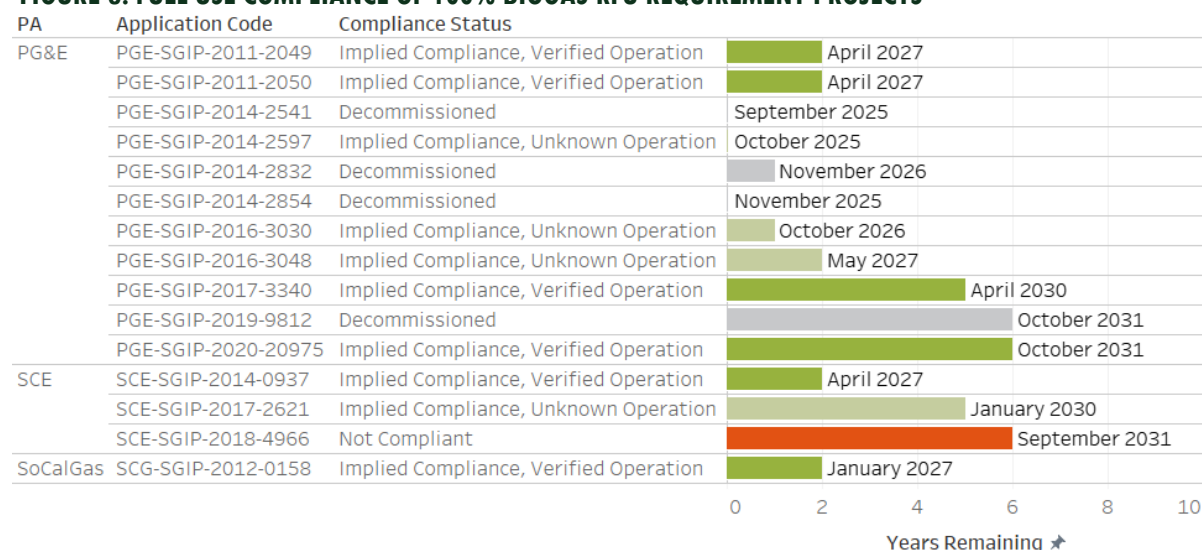
2.1 FUEL USE AT 100% BIOGAS PROJECTS

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

Of the 15 renewable-only projects, six projects had their operation verified and were found to be in compliance. An additional four projects were assumed to be in compliance, given that they are renewable only projects, even though we were unable to confirm operation. Four projects have either been decommissioned or are no longer operating. A single project was found to no longer be in compliance, as discussed below:

- **SCE-SGIP-2018-4966:** This project is made up of 4 separate internal combustion engines operating on 100% renewable fuel. The overall incentivized capacity of the system was derated to account for the total potential biofuel available to the system. However, the inspection report confirms that fuel is supplemented by natural gas. As of May 2023, the company filed for Chapter 11 bankruptcy and sold this facility. Verdant was unable to get ahold of the new owners to gather new metered data, however, for RFU#34 we held email discussions with the previous owners, who were still operating the facility and informed us that this system is now operating solely on natural gas.

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



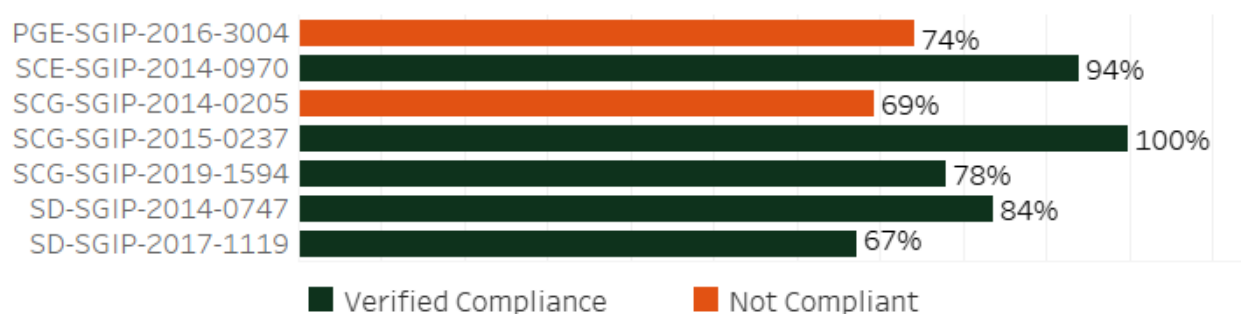
Note: When a project's operational date is not provided in the inspection reports, the incentive payment date as reported by the PAs is used as a proxy for the operational date for reporting purposes.

2.2 FUEL USE AT BLENDED ON-SITE RFU REQUIREMENT PROJECTS

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

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

FIGURE 9: PERCENT BIOGAS FOR BLENDED BIOGAS PROJECTS



* Note about SD-SGIP-2017-1119: This project is a PY2017 project, meaning it only is required to meet a renewable fuel requirement of 10%. This project received an incentive adder which upped its renewable fuel requirement to 94%. The determination of "Verified Compliance" indicates that it is meeting the minimum cohort compliance requirements of 10%, but this project is not meeting the requirements of the incentive adder.

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 #35, the system was only operating for the first three weeks of July 2025. The remaining period the system was not generating electricity but still utilizing small amounts of digester fuel. The overall fuel percentage is 74% for the last half of 2025.
- **SCG-SGIP-2014-0205.** This is a 1400 kW fuel cell CHP system. While this system has met its renewable fuel requirements in prior years, it only utilized 69% renewable fuel during this period. In reviewing the data and holding discussions with the PDP and the host customer, we found that the fuel cell experienced several trips and subsequent shutdowns, primarily due to site power outages. During these events, the fuel cell must be shut down to allow the backup generators to

engage at the site. The system operates solely on natural gas to keep the fuel cell hot while shut down and continues to operate on natural gas while the system is ramping back up again, which may have been driving the increased natural gas usage for this period.

2.2.2 Blended On-Site RFU Requirement Project Compliance Status Inconclusive

Four blended biogas projects could not have their compliance status determined during this reporting period. Verdant has not been able to get a hold of a customer contact at these facilities in the past, even after requesting assistance from the PA. Prior reports noted that our team is no longer attempting to contact these customers given the lack of success we have had over the years:

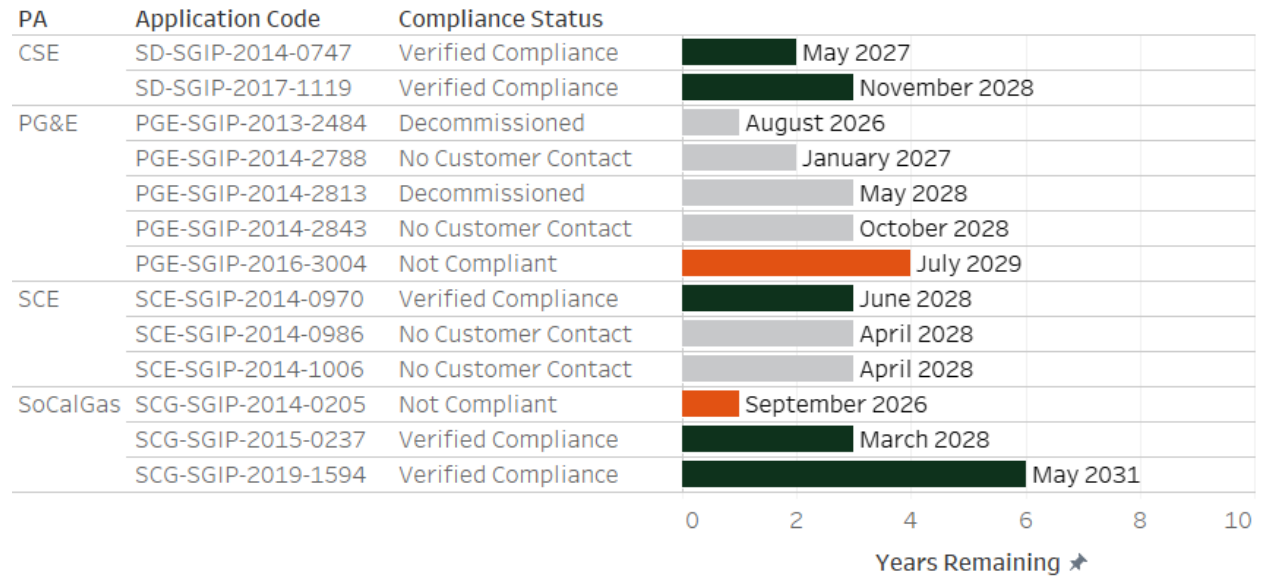
- **PGE-SGIP-2014-2788**
- **PGE-SGIP-2014-2843**
- **SCE-SGIP-2014-0986**
- **SCE-SGIP-2014-1006**

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

Two projects in this list do not fall into one of the above categories during the reporting period. Technically, these projects are not considered out of compliance with renewable fuel use requirements.

- **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, the host customer informed PG&E in 2022 that the microturbine has been removed due to the high maintenance cost in operating the microturbine using renewable fuel.
- **PGE-SGIP-2014-2813:** This 602 kW IC Engine utilizes wastewater digester gas and natural gas. The system was noted as operational in October 2018 and is therefore required to comply with SGIP renewable fuel use requirements. However, the customer informed the PA that the system has not been performing and has sold the system. The customer stated it was due to not wanting to spend over \$2M on electrical upgrades to export to the grid.

A summary of the 13 blended RFU requirement projects during this reporting period is presented in Figure 10. The table also displays the number of years remaining that each project is considered within their compliance period and therefore required to meet the renewable fuel requirements.

FIGURE 10: 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 3 presents the GHG emissions results for the blended renewable and natural gas projects and renewable-only PBI projects where data was available. Hourly GHG impacts are calculated for each SGIP generation project as the difference between the GHG emissions produced by the incentivized distributed generation project and baseline GHG emissions. Baseline GHG emissions are those that would have occurred in the absence of the SGIP project. SGIP projects displace baseline GHG emissions by satisfying site electric loads as well as heating or cooling loads in some cases. All projects were found to reduce emissions.

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

Application Code	Fuel	SGIP Emissions	Electric Power Plant Emissions	Heating Services	Biogas Treatment	Total Avoided Emissions	Emissions Impact
PGE-SGIP-2011-2049	100% Renewable	0.42	0.44	0.01	0.42	0.86	-0.44
PGE-SGIP-2011-2050	100% Renewable	0.70	0.44	0.01	0.70	1.15	-0.44
PGE-SGIP-2016-3004	Blended	0.76	0.42	0.00	0.57	0.99	-0.22
PGE-SGIP-2017-3340	100% Renewable	0.70	0.43	0.00	6.40	6.83	-6.13
PGE-SGIP-2020-20975	100% Renewable	0.39	0.43	0.00	3.62	4.05	-3.66
SCE-SGIP-2014-0970	Blended	0.24	0.10	0.00	0.23	0.33	-0.08
SCG-SGIP-2014-0205	Blended	0.66	0.36	0.00	0.46	0.82	-0.16
SCG-SGIP-2015-0237	Blended	0.57	0.37	0.00	0.57	0.94	-0.37
SCG-SGIP-2019-1594	Blended	0.52	0.37	0.04	0.41	0.81	-0.29
SD-SGIP-2014-0747	Blended	0.60	0.40	0.00	0.50	0.90	-0.31
SD-SGIP-2017-1119	Blended	0.46	0.39	0.01	0.31	0.72	-0.25

Greenhouse gas emissions are based on several factors:

- **SGIP Emissions:** Distributed generation projects emit CO₂ because 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.⁷ 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.⁸ The estimates of electric power plant CO₂ marginal emissions were accessed from WattTime.⁹

- **Heating Services Emissions:** Recovered useful heat may displace natural gas that would have been used in the absence of the SGIP to fuel boilers to satisfy site heating loads. This displaces accompanying CO₂ emissions from the boiler's combustion process. Only one project provided heat recovery data. A second project utilized a heat exchange to recover useful heat, but no heat data was available for the project.
- **Biogas Treatment:** Biogas-powered SGIP projects capture and use 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.¹⁰ At the state level, the California Air Resources Board (CARB) provides guidelines for control of methane and other volatile organic compounds from biogas facilities.¹¹ At the federal level, New Source Performance Standards and Emission Guidelines regulate methane capture and use.¹²

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

⁸ Consequently, during those hours when an SGIP project is idle, displacement of CO₂ emissions from central station power plants is equal to zero.

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

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

¹¹ In June of 2007, CARB approved the Landfill Methane Capture Strategy.

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

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



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