

# SELF-GENERATION INCENTIVE PROGRAM: RENEWABLE FUEL USE REPORT NO. 30

Submitted to:  
Pacific Gas and Electric Company

Prepared by:  
Verdant Associates

Verdant Associates, LLC  
Berkeley, CA 94707  
[www.verdantassoc.com](http://www.verdantassoc.com)

May 12<sup>th</sup>, 2023





# TABLE OF CONTENTS

---

<b>GLOSSARY</b> .....	<b>III</b>
Abbreviations and Acronyms .....	iii
Key Terms .....	iv
<b>RENEWABLE FUEL USE VERIFICATION SUMMARY</b> .....	<b>1</b>
<b>1 INTRODUCTION AND EXECUTIVE SUMMARY</b> .....	<b>2</b>
1.1 REGULATORY AND REPORTING HISTORY .....	2
1.2 RFU REPORT METHODOLOGY AND DATA OVERVIEW .....	4
1.3 SUMMARY OF RFU REPORT NO. 30 FINDINGS .....	6
1.4 CONCLUSIONS AND RECOMMENDATIONS .....	9
<b>2 PROJECT CLASSIFICATIONS AND FUEL USE SUMMARY</b> .....	<b>13</b>
2.1 DIRECTED BIOGAS PROJECTS .....	14
2.2 PROJECT CAPACITIES, FUEL TYPES, AND PRIME MOVER TECHNOLOGIES .....	14
2.3 SUMMARY OF COMPLETED RFU REQUIREMENT PROJECTS .....	18
<b>3 FUEL USE AT RFU REQUIREMENT PROJECTS – COMPLIANCE DETERMINATION</b> .....	<b>20</b>
3.1 FUEL USE AT DEDICATED ON-SITE RFU REQUIREMENT PROJECTS .....	21
3.2 FUEL USE AT BLENDED ON-SITE RFU REQUIREMENT PROJECTS .....	23
3.2.1 Blended On-Site RFU Requirement Projects in Compliance .....	24
3.2.2 Blended On-Site RFU Requirement Projects out of Compliance .....	26
3.2.3 Blended On-Site RFU Requirement Project Compliance Status Inconclusive .....	26
3.2.4 Blended On-Site RFU Requirement Project Compliance Status – Non Operational and No Longer Participating in the program .....	28
3.3 FUEL USE AT DIRECTED RFU REQUIREMENT PROJECTS .....	31
<b>4 GREENHOUSE GAS EMISSIONS</b> .....	<b>33</b>
<b>APPENDIX A HISTORICAL LIST OF ALL SGIP PROJECTS UTILIZING RENEWABLE FUEL</b> .....	<b>35</b>
<b>APPENDIX B DIRECTED BIOGAS AUDIT PROTOCOL</b> .....	<b>43</b>
B.1 TRANSFER OF OWNERSHIP .....	43
B.2 TRANSPORTATION PATH AND ENERGY ACCOUNTING .....	43
B.3 GAS FUEL CONSUMPTION .....	44
B.4 USAGE DETERMINATION .....	44



## LIST OF FIGURES

---

Figure 1: Project Compliance Summary.....	1
Figure 2: Total Number of Projects In and Out of Compliance Requirement Period.....	7
Figure 3: Share of Projects by Compliance Determination.....	8
Figure 4: Project Capacity Trend (RFU Reports 1-30).....	15
Figure 5: RFU Requirement Project Compliance History.....	16
Figure 6: Renewable Fuel Use Project Rebated Capacity by Fuel Type.....	17
Figure 7: Contribution of Biogas Fuel Type by Prime Mover Technology.....	18
Figure 8: Cumulative Rebated RFU Requirement Capacity by Technology and Project Completion Year.....	19
Figure 9: History of Compliance Determination.....	24

## LIST OF TABLES

---

Table 1: RFU Project Designations.....	6
Table 2: Forecasted RFU Projects Requiring Compliance by RFU Report Number.....	9
Table 3: RFU Requirement Changes by Program Year.....	13
Table 4: Summary of RFU Project Differences.....	14
Table 5: Summary of Prime Movers for RFU Requirement Projects.....	19
Table 6: Summary of Fuel Supplies and Project Compliance Status for RFU Requirement Projects.....	21
Table 7: Fuel Use Compliance of Dedicated RFU Requirement Projects.....	22
Table 8: Fuel Use Compliance of Blended On-Site RFU Requirement Projects.....	29
Table 9: Breakdown of status for the Blended RFUR Requirement Projects.....	31
Table 10: Properties of Directed Biogas Injection and Extraction.....	32
Table 11: Summary of GHG Emission Impacts from SGIP Renewably Fueled Projects in 2019.....	33
Table 12: SGIP Projects Utilizing Renewable Fuel.....	35



## 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
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

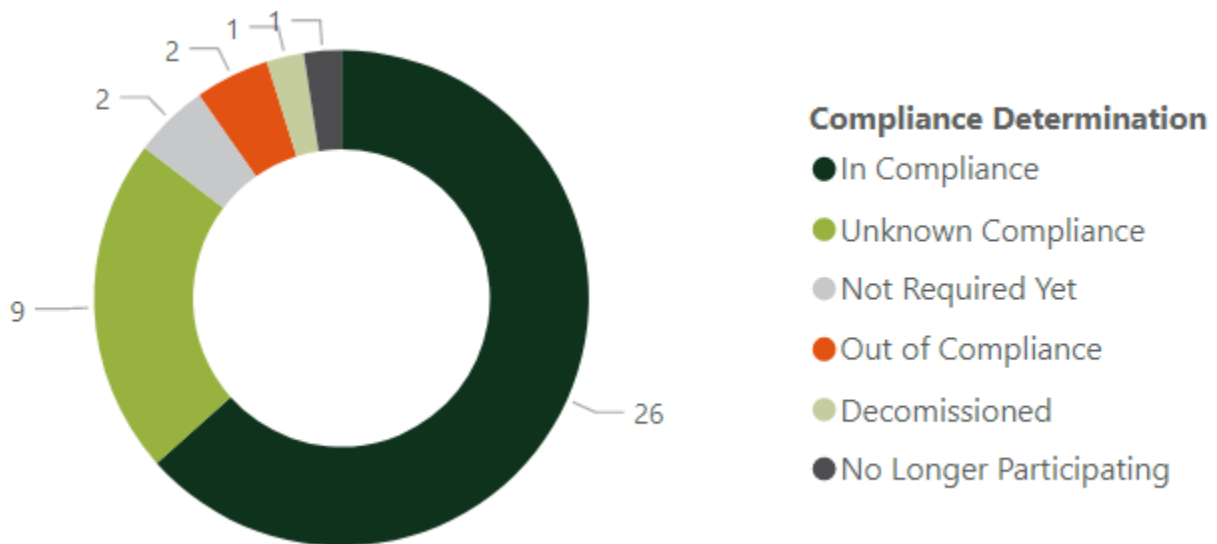
Term	Definition
2017+ RFU Requirement	For reporting purposes, projects with RFU requirements with application dates in 2017 or later are referred to as <i>2017+ RFU requirement</i> . Depending on the year of the application, all SGIP projects are required to use a certain percentage of renewable fuel.
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.
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.
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 <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.
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.
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.

Term	Definition
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.
Rebated Capacity	The capacity rating associated with the rebate (incentive) provided to the program participant. The rebated capacity may be lower than the manufacturer’s nominal “nameplate” system size rating.
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. SGIP participants are required 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 2021 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. There are currently a total of 41 projects within the compliance verification window. Figure 1 presents the compliance determination for each of these 41 projects, grouped by the compliance outcome.

**FIGURE 1: PROJECT COMPLIANCE SUMMARY**



There are a total of 26 projects that met their compliance obligations; 18 of these were renewable fuel only projects (no natural gas supply therefore compliance is inferred) while eight of them were blended renewable projects (biogas blended with natural gas). For nine additional projects (eight blended biogas

<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>



projects and one directed biogas project), Verdant was unable to make a compliance determination due to a lack of data. Two additional blended biogas projects were found to be out of compliance, one more was decommissioned during the permanency period, and one project decided to no longer participate in the program and forfeited their performance based incentive. Finally, there are two projects that are less than a year old and therefore Verdant has not made a compliance determination for this reporting period.

Both projects found to be out of compliance during this reporting period used 74% renewable fuel, 1% below their target compliance level of 75%.

Site-specific details about compliance determinations can be found in Section 3.

# 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) 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 ED in making recommendations concerning modifications to the renewable project aspects of the SGIP.

## 1.1 REGULATORY AND REPORTING HISTORY

This report fulfills CPUC Decision (D.) 02-09-051 (September 19, 2002). That decision required SGIP<sup>2</sup> Program Administrators (PAs) to provide updated information every six months<sup>3</sup> on completed SGIP

---

<sup>2</sup> The SGIP provides incentives to eligible utility customers for the installation of new qualifying technologies that are installed to meet all or a portion of the energy needs of a facility. The Program is implemented by the CPUC and administered by Pacific Gas and Electric Company (PG&E), Southern California Edison (SCE) and Southern California Gas Company (SCG) in their respective territories, and the Center for Sustainable Energy (CSE) in San Diego Gas and Electric (SDG&E) territory.

<sup>3</sup> Ordering Paragraph 7 of Decision 02-09-051 states:

“Program administrators for the self-generation program or their consultants shall conduct on-site inspections of projects that utilize renewable fuels to monitor compliance with the renewable fuel provisions once the projects are operational. They shall file fuel-use monitoring information every six months in the form of a report to the Commission, until further order by the Commission or Assigned Commissioner. The reports shall include a cost comparison between Level 3 and 3-R projects....”

Ordering Paragraph 9 of Decision 02-09-051 states:

“Program administrators shall file the first on-site monitoring report on fuel-use within six months of the effective date of this decision [September 19, 2002], and every six months thereafter until further notice by the Commission or Assigned Commissioner.”



projects using renewable fuel.<sup>4</sup> CPUC Rulemaking 12-11-005 (November 8, 2012) reduced the frequency of the filing requirement for these reports from a semi-annual to an annual filing requirement. CPUC D. 16-06-055 (June 23, 2016) revised the SGIP pursuant to Senate Bill (SB) 871 and Assembly Bill (AB) 1478.<sup>5</sup> D. 16-06-055 states that an SGIP M&E Plan should be developed by ED staff in consultation with program administrators. On January 13, 2017, the CPUC ED submitted their plan to measure and evaluate the progress and impacts of the SGIP for Program Years 2016-2020.

The 2017 SGIP M&E plan states that “... to maximize the ability to use the RFURs in a timely fashion to sanction those SGIP participants that do not meet renewable fuel use requirements, the RFUR shall include an analysis of renewable fuel use data collected through June 30<sup>th</sup> of the year the report is delivered. Furthermore... the cost analysis performed in the RFUR is no longer required.”<sup>6</sup>

In June of 2021, CPUC Decision 21-06-005<sup>7</sup> created additional rules regarding the use of renewable fuels, including:

- Requiring projects to use 100% renewable fuel for the life of the system,
- Require biogas fuel to meet a 96% methane gas quality standard, and
- Require the PAs to propose ways to strengthen the SGIP renewable fuel documentation and at a minimum, require monthly reporting of directed and on-site biogas fuel usage.

Due to an ongoing interest in the potential for renewable fuel use projects to reduce greenhouse gas (GHG) emissions,<sup>8</sup> a section on GHG emission impacts from renewable fuel SGIP projects was added to the

---

<sup>4</sup> The Decision defines renewable fuels as wind, solar, biomass, digester gas, and landfill gas. Renewable fuel use in the context of this report effectively refers to biogas fuels obtained from landfills, wastewater treatment plants, food processing facilities, SYNGAS, and dairy anaerobic digesters.

<sup>5</sup> Decision Revising the Self-Generation Incentive Program Pursuant to Senate Bill 861, Assembly Bill 1478, and Implementing Other Changes. Decision 16-06-055. June 23<sup>rd</sup>, 2016. Date of Issuance: 07/01/2016. <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M163/K928/163928075.PDF>

<sup>6</sup> The term “RFUR” in this quote refers to Renewable Fuel Use Report.

<sup>7</sup> Decision 21-06-005, June 3<sup>rd</sup>, 2021. Decision Revising Self-Generation Incentive Program Renewable Generation Technology Program Requirements and Other Matters. <https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M387/K064/387064243.PDF>

<sup>8</sup> While the SGIP was initially implemented in response to AB 970 (Ducheny, chaptered 09/07/00) primarily to reduce demand for electricity, SB 412 (Kehoe, chaptered 10/11/09) limits the eligibility for incentives to distributed energy resources that the CPUC, in consultation with the California Air Resources Board (CARB), determines will achieve reduction of greenhouse gas emissions pursuant to the California Global Warming Solutions Act of 2006.



reports beginning with RFU Report No. 15. GHG emissions used in RFU Report No. 30 are taken from the most recent SGIP Impact Evaluation Report, completed in 2020 for calendar years 2018-2019.<sup>9</sup>

Incomplete compliance determinations create uncertainty in assessing the overall status of Renewable Fuel Use projects. While this report does not address reasons for incomplete determinations, during a previous compliance period (RFU Report No. 25), the PAs and the CPUC directed the evaluation consultant to investigate projects associated with incomplete compliance determinations. RFU Report No. 25 contains the findings from additional research performed to understand the reasons for incomplete compliance determinations.

This report (RFU Report No. 30) includes high level summary statistics for all RFU projects installed under the SGIP since the program's inception. More detailed summaries are 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, 2020, through June 30, 2021. As per the CPUC's 2017 SGIP M&E plan, this report no longer contains a cost analysis of RFU projects.

## **1.2 RFU REPORT METHODOLOGY AND DATA OVERVIEW**

SGIP RFU Report No. 30 information on the renewable fuel usage from the 169 renewable fuel projects rebated by the SGIP as of June 30, 2021. 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). Of the 169 RFU projects rebated by the SGIP as of June 30, 2021, 105 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. The remaining 64 facilities are 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 technologies that utilize these biogas resources include fuel cells (FCs), internal combustion engines (IC engines or ICEs), microturbines (MTs), and gas turbines (GTs). Fuel cells in the program operate either in combined heat and power (FC-CHP) mode, or in electric only mode (FC-Elec.).

---

<sup>9</sup> 2018-2019 SGIP Impact Evaluation Draft Report. Verdant Associates, 2020. As of 08/24/2021, this report is in draft state and being reviewed by the CPUC.



Projects that received incentives at renewable levels (formerly Level 3R projects, then called a biogas adder until Program Year (PY) 2016) are required to comply with minimum renewable fuel usage requirements. Namely, these projects are required to consume a minimum of 75 percent of their energy input on an annual energy basis from renewable sources. Of the 169 RFU projects discussed in this report, 159 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>10</sup> The compliance period is defined by the project's warranty which can be three, five, or ten years depending on the technology type and the year the project applied to the SGIP. Beginning with PY 2017, all fueled projects must procure a minimum amount of biogas (10 percent for PY 2017 projects, increasing to 100% by 2020). These will be referred to as 2017+ RFU requirements. For this reporting period, there are two PY 2017 fueled projects that have been issued an upfront incentive and are subject to PY 2017 biogas consumption requirements.

The methodology used to assess compliance with SGIP minimum renewable fuel use requirements is different for on-site biogas projects than for directed biogas projects. Historically, on-site biogas projects that operate exclusively on renewable fuel (no natural gas supplementation) were automatically assumed to be in compliance. However, during the RFU Report No. 25 reporting period, fuel supply systems for on-site biogas projects were physically inspected to verify compliance. All such systems were found to be in compliance, and repeated inspection for subsequent reports was deemed unnecessary. Projects equipment with two fuel supplies (biogas and natural gas) are termed as blended projects. For the blended projects, we use metered electrical generation, natural gas consumption data, and biogas consumption data to estimate percentage of renewable fuel used. For directed biogas projects, compliance determinations are made following the audit protocols prepared by a third-party consultant (see Appendix B). A detailed overview of renewable fuel use compliance findings is presented in Section 3. Table 1 summarizes the current status of the 169 RFU projects grouped by compliance status and renewable fuel type. Further discussion is provided in subsequent sections.

---

<sup>10</sup> These requirements will be referred to as *legacy* RFU requirements throughout the report.



**TABLE 1: RFU PROJECT DESIGNATIONS**

<b>Compliance Status</b>	<b>Compliance Methodology</b>	<b>Renewable Only</b>	<b>Non-Renewable &amp; On-Site Renewable</b>	<b>Off-Site, Directed Renewable</b>
In Compliance	Implied Compliance	18	-	-
	Evaluated Compliance	-	8	-
Not Compliant	Evaluated Compliance	-	2	-
Unknown Compliance	No Compliance Determined	-	8	1
Non-Operational	System Decommissioned	-	1	-
	No Longer Participating in program		1	
No Compliance Requirement Yet	Less than a full year of data		2	
Compliance Requirement Expired	Out of Compliance Requirement	38	19	-
	RFU Procurement Term Ended	-	-	63
	No Renewable Incentives	4	4	-

### **1.3 SUMMARY OF RFU REPORT NO. 30 FINDINGS**

As of June 30, 2021, there are a total of 169 RFU projects, shown below in Figure 2. Out of these, 128 are outside their compliance requirement while 41 are still 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 with the remainder being onsite biogas only projects.

**FIGURE 2: TOTAL NUMBER OF PROJECTS IN AND OUT OF COMPLIANCE REQUIREMENT PERIOD**

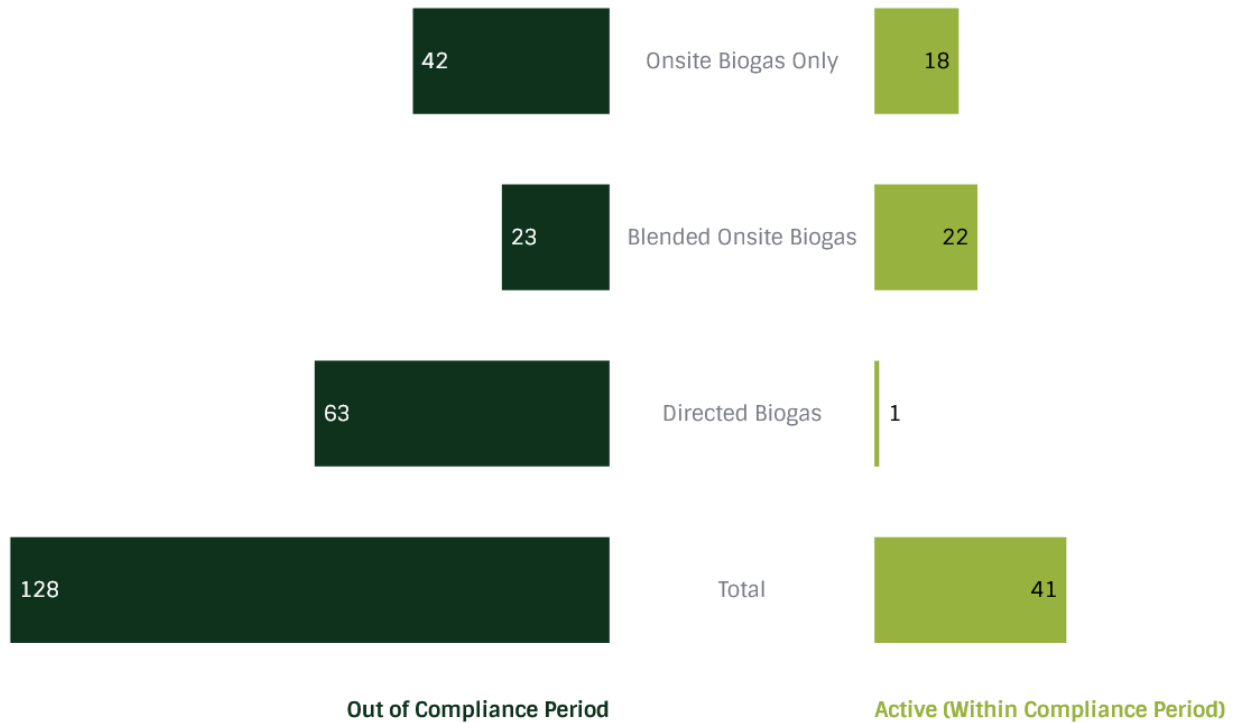
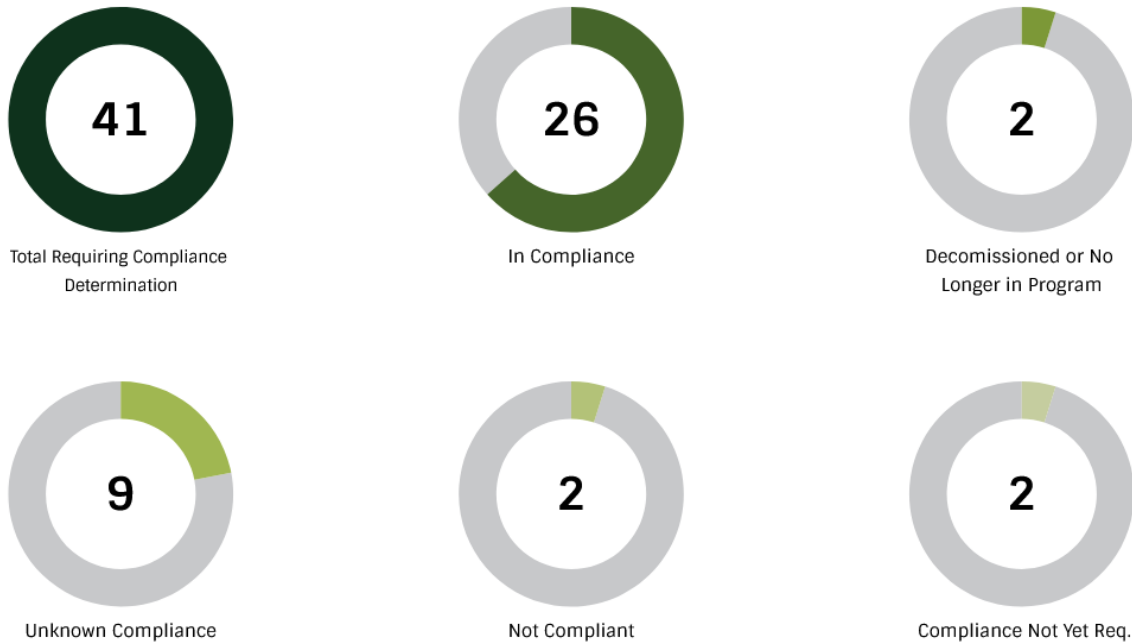


Figure 3 below, displays the share of active projects by their compliance determination. Verdant found that of the 41 active projects (within compliance period), two projects had not been operating for a full year and therefore did not require a compliance determination during this reporting period. Out of the remaining 39 active projects, 26 were either evaluated as compliant or assumed to be compliant (onsite biogas only projects). For nine projects Verdant was unable to determine compliance due to lack of sufficient data. Two projects were not compliant with SGIP minimum renewable fuel use requirements and the remaining two were either decommissioned or no longer participating in the program.

**FIGURE 3: SHARE OF PROJECTS BY COMPLIANCE DETERMINATION**



The number of potential RFU projects requiring compliance going forward is shown in Table 2. The numbers do not include any potential pipeline projects which have not yet been finalized or paid. There are a total of 11 RFU projects in the pipeline, one PY17 project, one PY18 project, three PY19 projects, 3 PY20 projects, and 3 PY21 projects.

**TABLE 2: FORECASTED RFU PROJECTS REQUIRING COMPLIANCE BY RFU REPORT NUMBER<sup>11</sup>**

<b>RFU Report #</b>	<b>Report Ending Date</b>	<b>Number of Projects Requiring Compliance Determination</b>
30	June 2021	22
31	June 2022	23
32	June 2023	22
33	June 2024	22
34	June 2025	20
35	June 2026	15

## **1.4 CONCLUSIONS AND RECOMMENDATIONS**

In accordance with the original CPUC Decision 02-09-051, the overall purpose of the renewable fuel use reports is to help ensure that projects receiving increased incentives for being renewably fueled 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 two biogas projects out of compliance with SGIP renewable fuel use requirements.

While two projects were found to be out of compliance, nine other biogas projects could not have their compliance status determined due to insufficient data. We find that for on-site biogas projects, many data availability issues originate during the PBI setup process. In other situations, the PDP reported that their meter was no longer operational, and therefore no data could be gathered. For directed biogas projects, historical compliance issues were due to difficulties in working with gas marketers and delays in obtaining appropriate documentation.

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

---

<sup>11</sup> The numbers in this table assume no new projects are completed, therefore this table reflects the lower end estimate of projects.

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.

Considering these conclusions and the general findings of this report, we make the following recommendations:

**1. Ensure Complete Monitoring and Streamlined Data Delivery of Fuel Supply Data**

As per the SGIP guidelines, all technologies 30 kW or larger must install metering and monitoring equipment that measures net electrical output from the system. Furthermore, CHP and electric-only fuel cell technologies must also install metering and monitoring equipment that measures and reports fuel input.<sup>12</sup>

During this reporting period, Verdant Associates had to work with individual PDPs to obtain metered data from metering equipment to make compliance determinations. In some cases, these data were not sufficient to make compliance determinations.

While the breakout between renewable and non-renewable fuel was gathered for many PBI projects, the meter interval data, which shows the breakout of renewable and non-renewable fuel, could not be directly downloaded from the SGIP Application Portal. Having these data readily available from the portal for download would streamline this process further. There were several other projects where the compliance could not be determined either because of data communication issues or because a fuel meter was never installed at the location. Finally, the meter interval data provided by the PDPs only accounts for the breakout of fuel types by volume

---

<sup>12</sup> 2015 Self-Generation Incentive Program Handbook. January 13, 2015. Page 60 (Metering & Data Collection): *“All SGIP technologies 30 kW or larger must install metering and monitoring equipment that measures net electrical output from the system(s). Combined heat and power technologies operating on non-renewable fuels will in addition install metering and monitoring equipment that measures and reports useful thermal energy delivered to the Site from the CHP system as well as fuel input to the generator(s).”*



of fuel. Additional calculations and assumptions were made on the heat content of the renewable fuel to determine compliance.

Decision 21-06-005<sup>13</sup> dictates that “at a minimum, monthly reporting of directed and on-site biogas fuel reports, attestations, supporting documentation, nomination records, procurement invoices, and meter data...”. To support the requirements of this decision, the PAs should work with PDPs 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.

Since 2015, SGIP has begun to provide more clarity on metering, monitoring, and auditing obligations after the adoption of biogas fuel blending requirements.<sup>14</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.

## **2. Identify Ways to Increase Participation of Biogas Projects – Particularly Those That Would Have Otherwise Vented Biogas to the Atmosphere**

Biogas projects represent a significant source of GHG reductions for the SGIP. During 2019, biogas projects contributed 168,000 metric tons of CO<sub>2</sub>eq GHG reductions. To ensure continued program wide GHG reductions, we recommend that the PAs identify ways to increase the adoption of self-generation technologies at dairies, landfills, wastewater treatment plants, and other facilities that produce excess biogas. Emphasis should be placed on facilities that would otherwise have vented methane to the atmosphere like dairy digesters since this vented methane has far greater global warming potential than biogas that would have otherwise been flared.

## **3. Further research should be performed on projects not meeting compliance requirements.**

During this evaluation period, three projects were found to not meet the RFU compliance requirements. For one of the projects, this is the second year in a row the project has not met compliance requirements. The PAs should contact these customers to determine reasons for non-compliance and identify remediation approaches to increase renewable fuel usage and bring the project into compliance.

---

<sup>13</sup> CPUC D.21-06-005.

<sup>14</sup> CPUC D.16-06-055.



## 2 PROJECT CLASSIFICATIONS AND FUEL USE SUMMARY

The incentives and requirements for SGIP projects utilizing renewable fuel have varied throughout the life of the SGIP.<sup>15</sup> This report focuses on the assessment of compliance with the SGIP’s minimum RFU Requirements, which have changed over time. Table 3 below summarizes these changes.

**TABLE 3: RFU REQUIREMENT CHANGES BY PROGRAM YEAR**

Application Year	Minimum % of Renewable Fuel Required	Total Number of Projects	Total Rebated Capacity [kW]
Pre-2017 (Legacy)	75%	159	100,906
2017	10%	2	1,273
2018	25%	0	-
2019	50%	0	-
2020	100%	0	-
<b>Total</b>		<b>161</b>	<b>102,179</b>

Legacy RFU projects with pre-2017 application dates that were subject to RFU requirements (received additional incentives to incorporate a minimum percentage of renewable fuel) were required to utilize renewable fuel for at least 75 percent of their total fuel usage (energy basis). Beginning in 2017, 2017+ RFU requirements direct all fuel-consuming projects to utilize renewable fuel for at least 10 percent of their total fuel usage (energy basis). In 2018, this minimum requirement increased to 25 percent, and in 2019 the requirement increased again to 50 percent. Starting in 2020, all fuel-consuming projects are required to utilize 100 percent renewable fuel. To date, there have been no projects that are subject to the PY 2018 or later requirements.

There are an additional eight pre-2017 RFU projects in this report that consumed renewable fuel but were not subject to any RFU verification requirements as they did not claim the higher incentives for renewable fuels. These details are shown below in Table 4.

---

<sup>15</sup> A list of program handbooks going back to 2011, along with other project information can be found on the SGIP Online Application Database at <https://www.selfgenca.com/home/resources/>.

**TABLE 4: SUMMARY OF RFU PROJECT DIFFERENCES**

Parameter	RFU Projects		
	No Minimum RFU Requirement	Legacy RFU Requirement	2017+ RFU Requirement
Allowed level of annual renewable fuel use	0 – 100%	75 – 100%	10 – 100%
Heat recovery	Required	Not Required	Not Required
Incentive level	Same as non-renewable projects	Higher than non-renewable projects	Only allowable incentive level going forward
No. of projects	8	159	2
Rebated capacity (MW)	3.8	100.9	1.3

## 2.1 DIRECTED BIOGAS PROJECTS

In CPUC Decision 09-09-048 (September 24, 2009), eligibility for biogas incentives was expanded to include “directed biogas” projects. Directed biogas projects purchase biogas fuel that is produced at another location than the project site. The procured biogas is processed, cleaned-up, and injected into a natural gas pipeline for distribution. Although the purchased biogas is not likely to be delivered and used at the SGIP renewable fuel project, the SGIP is credited with the use of biogas resources. Deemed to be RFU projects, directed biogas projects were eligible for higher incentives (relative to non-renewable projects) under the SGIP, and subject to the fuel use requirements of RFU requirement projects.

RFU Report No. 17, released in 2011, marked the first appearance of completed directed biogas projects under the SGIP. Each project is equipped with an on-site supply of utility-delivered natural gas. As such, the directed biogas is not literally delivered, but notionally delivered, as the biogas may be utilized at any other location along the pipeline route. Beginning in PY 2011 eligibility for directed biogas as a renewable fuel was limited to in-state sources. The SGIP requires that directed biogas projects comply with minimum renewable fuel use requirements (75 percent energy consumption) for five years (pre-PY 2011) or ten years (PY 2011 or later), after which they are allowed to operate on 100 percent non-renewable fuel. Going forward, D. 21-06-005 requires renewable fuel use for the life of the entire life of the system.

## 2.2 PROJECT CAPACITIES, FUEL TYPES, AND PRIME MOVER TECHNOLOGIES

The capacity of RFU requirement and non-RFU requirement projects and the combined total (RFU projects) covered by each RFU report are depicted graphically in Figure 4.

**FIGURE 4: PROJECT CAPACITY TREND (RFU REPORTS 1-30)**

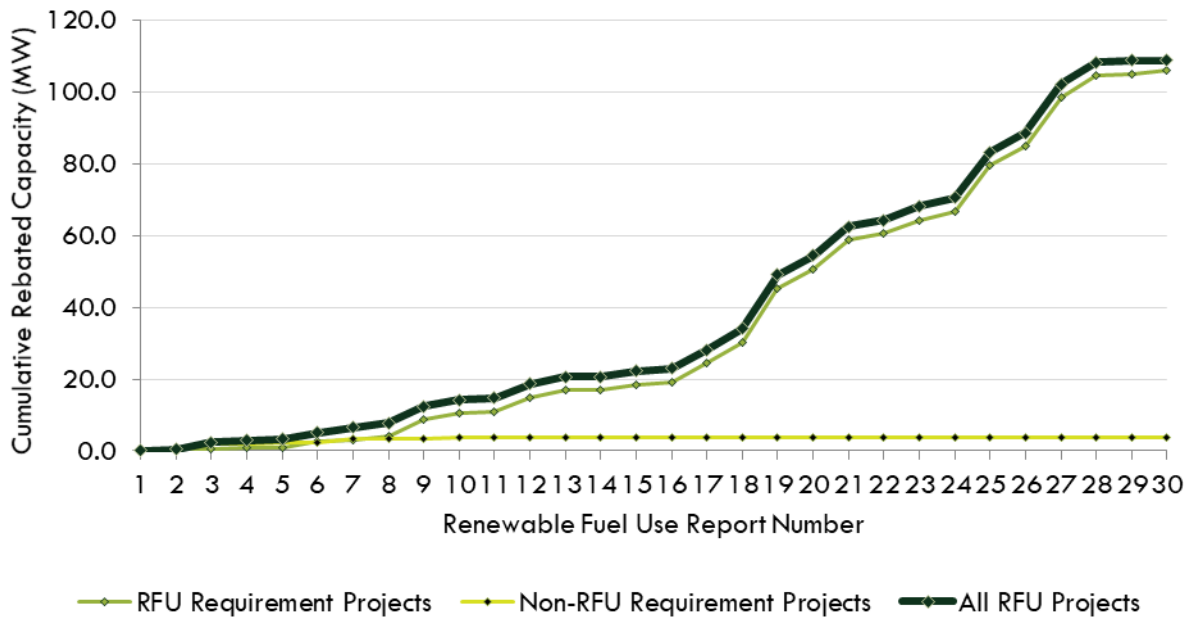
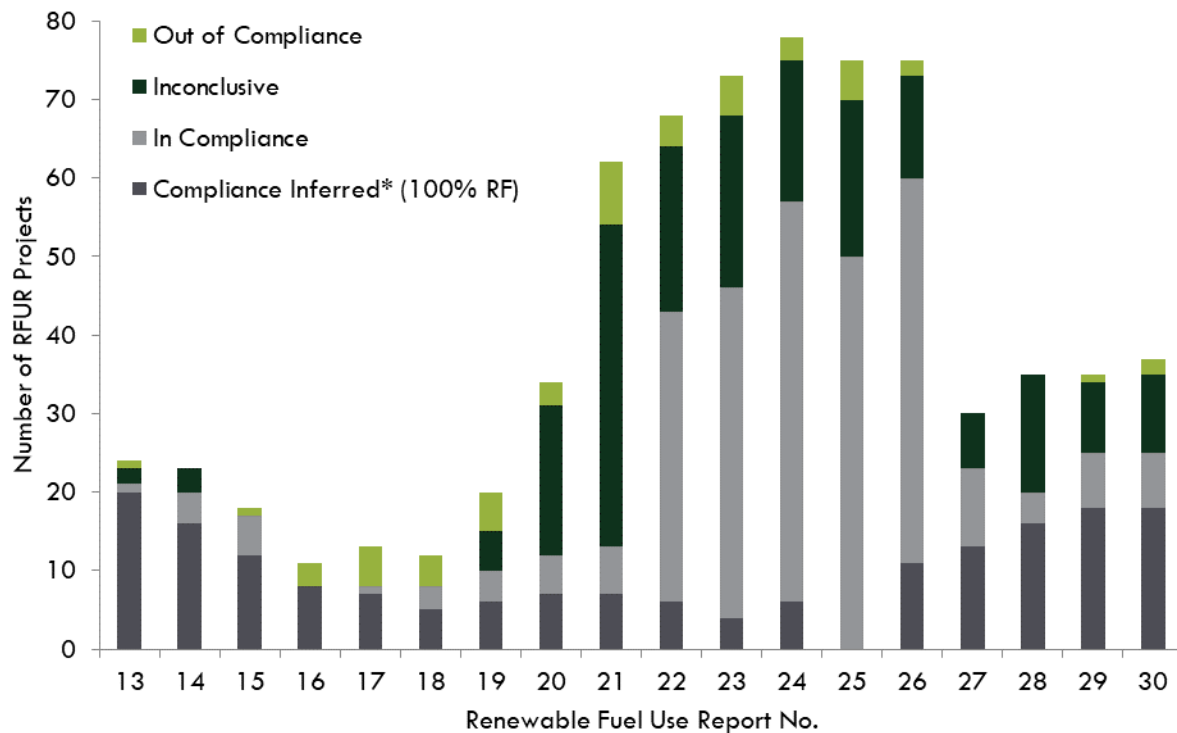


Figure 5 shows the history of compliance back to RFU Report No. 13 for all projects that were subject to the renewable fuel use requirement when the respective report was written. Up to and including RFU Report No. 12, there were no instances where available data indicated non-compliance with the Program’s renewable fuel use requirements. However, note that prior to RFU Report No. 13, some data were not available to evaluate the compliance of projects. Note that this figure does not show those projects whose compliance was not evaluated due to either not having been operational for a full year or due to their compliance period has elapsed.

**FIGURE 5: RFU REQUIREMENT PROJECT COMPLIANCE HISTORY**

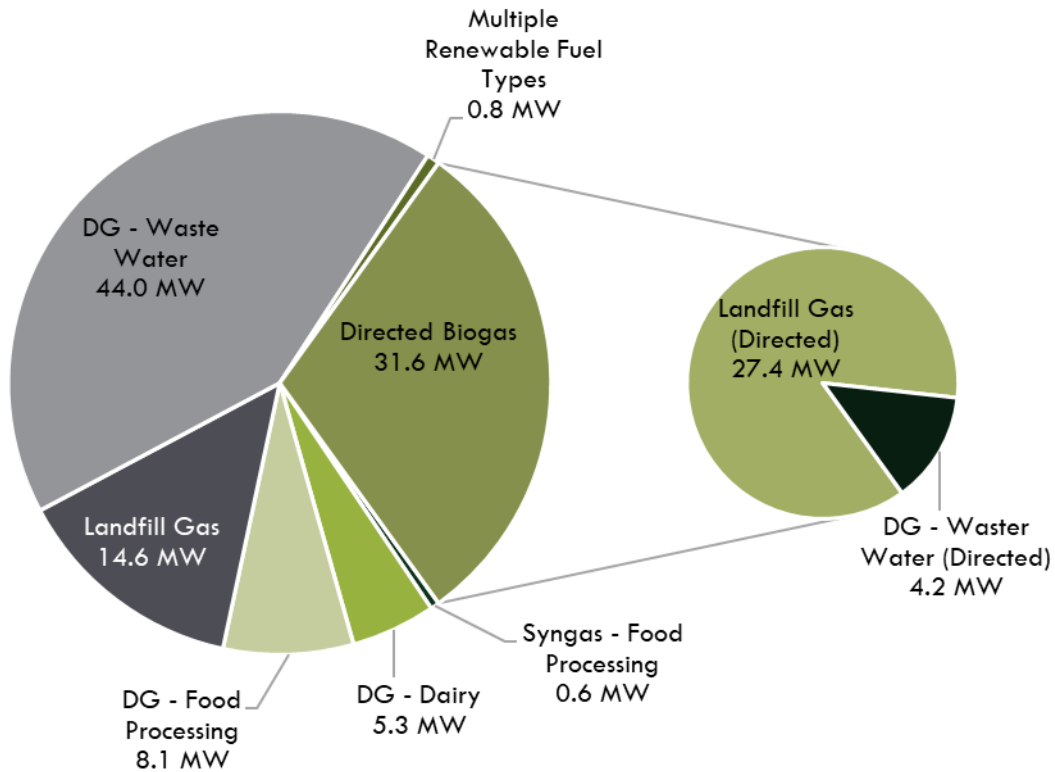


\* During RFU Report 25, compliance with renewable fuel use requirements was not inferred for dedicated biogas projects.

RFU projects typically use biogas derived from landfills or anaerobic digestion processes that convert biological matter to a renewable fuel source. Anaerobic digesters are used at dairies, wastewater treatment plants, or food processing facilities to convert waste from these facilities to biogas. Figure 6 shows a breakout of all RFU projects as of June 30, 2021, by source of biogas (e.g., landfill gas, dairy digester gas, food processing digester gas, syngas) on a rebated capacity basis. Based on total rebated capacity, the largest contribution of biogas used in SGIP RFU projects is delivered as directed biogas.<sup>16</sup> Note that this does not account for directed biogas projects that completed their compliance period and may continue operating on natural gas. Dairy digesters provide the smallest contribution to total rebated RFU project capacity.

<sup>16</sup> The biogas source of directed biogas projects is not always known. Historically, the primary source of SGIP directed biogas has been landfill gas.

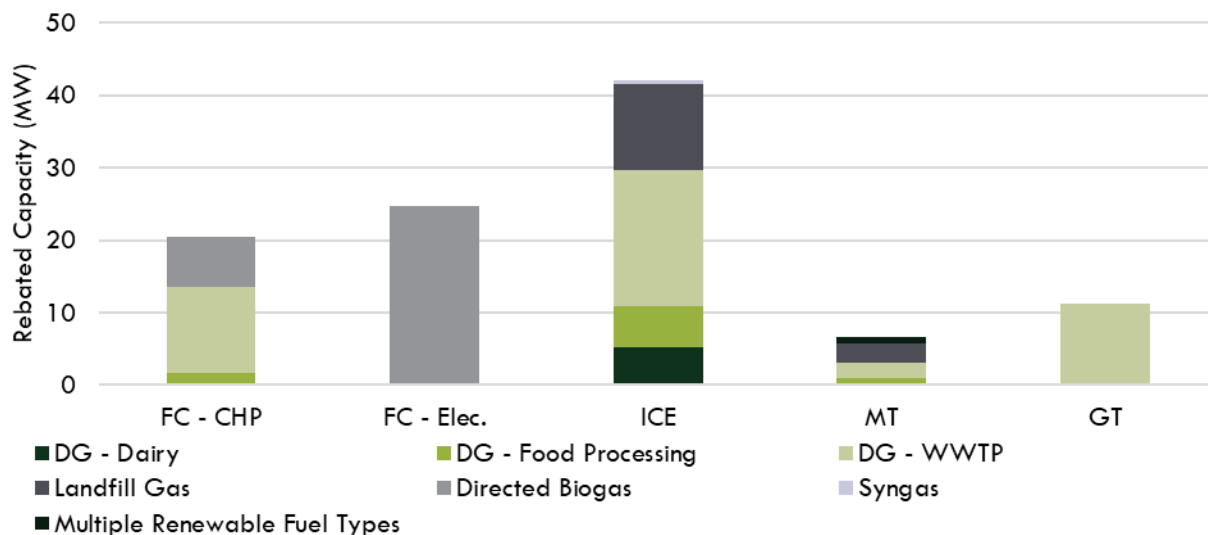
**FIGURE 6: RENEWABLE FUEL USE PROJECT REBATED CAPACITY BY FUEL TYPE**



\* DG = Digester Gas

Figure 7 provides a breakdown of the relative contribution of the different biogas fuels by prime mover technology. Internal combustion engines are the dominant technology with more than 40 percent of rebated RFU capacity.

**FIGURE 7: CONTRIBUTION OF BIOGAS FUEL TYPE BY PRIME MOVER TECHNOLOGY**



### 2.3 SUMMARY OF COMPLETED RFU REQUIREMENT PROJECTS

There is one new RFU requirement project completed during the RFU Report No. 30 twelve-month reporting period. The completed project used IC engines that are fueled by on-site biogas sources. A total of 161 RFU requirement projects had been completed as of June 30, 2021. A list of all SGIP projects utilizing renewable fuel (RFU requirement and non-RFU requirement projects) is included as Appendix A. Two of these projects are subject to 2017+ RFU requirements, while the rest are subject to Legacy RFU requirements.

The 161 completed RFU requirement projects represent 102.1 MW of rebated generating capacity. The prime mover technologies used by these projects are summarized in Table 5. Fuel cells alone (both FC-CHP and FC-Elec) account for about 43 percent of RFU requirement rebated capacity, with IC engines, gas turbines, and microturbines making up the remaining 57 percent. The availability of out-of-state directed biogas as an eligible SGIP renewable fuel until PY 2010 led to significant growth in fuel cell projects during that period. The average sizes of fuel cell and IC engine projects are two to four times those of microturbine projects.

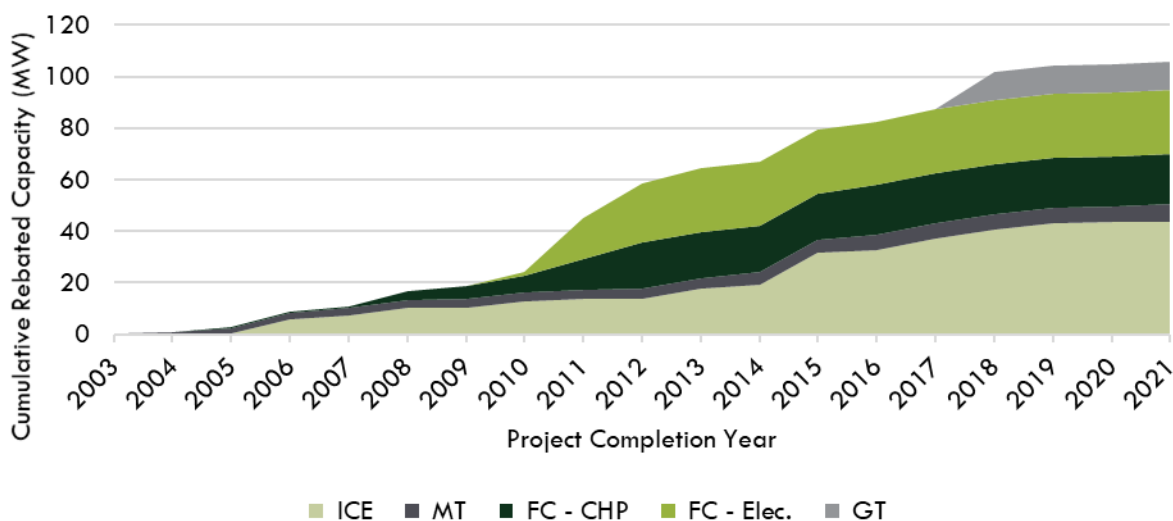


**TABLE 5: SUMMARY OF PRIME MOVERS FOR RFU REQUIREMENT PROJECTS**

Prime Mover	Number of Projects	Total Rebated Capacity (kW)	Arithmetic Average Rebated Capacity per Project (kW)
Fuel Cell - CHP	21	19,410	924
Fuel Cell - Elec.	58	24,660	425
Internal Combustion Engine	54	40,031	741
Microturbine	27	6,808	252
Gas Turbine	1	11,230	11,230
All	161	102,138	634

Figure 8 shows the cumulative RFU requirement capacity for each year by technology. Calendar year 2015 saw the largest growth in IC engine projects with over 12 MW of rebated capacity. Electric-only fuel cells were by far the most common RFU requirement projects introduced in 2011 and 2012 with over 21 MW of rebated capacity completed in both years. This period is also aligned with the eligibility of out-of-state directed biogas projects for increased SGIP incentives. The first half of 2018 saw the installation of a single, large gas turbine project.

**FIGURE 8: CUMULATIVE REBATED RFU REQUIREMENT CAPACITY BY TECHNOLOGY AND PROJECT COMPLETION YEAR**



### 3 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. 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. Going forward, renewable fuel projects must use renewable fuel for the life of the SGIP generator.

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

- “Dedicated” RFU requirement facilities located where biogas is produced (e.g., wastewater treatment facilities, landfill gas recovery operations) and the biogas is the only source for the prime mover.
- “Blended” on-site RFU requirement facilities located where biogas is produced that use a blend of biogas and non-renewable fuel (e.g., natural gas); and
- “Directed” RFU requirement facilities, located somewhere other than where biogas is produced and not necessarily directly receiving any of the biogas.

Fuel supply and contract status for RFU requirement projects are summarized in Table 6. Thirty-nine of the total 159 RFU requirement projects had active status or completed their directed biogas procurement term during this reporting period. There were 120 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 39 active RFU requirement projects, there were two projects that had not yet completed one year of operation. Eighteen projects operated solely on renewable fuel.

**TABLE 6: SUMMARY OF FUEL SUPPLIES AND PROJECT COMPLIANCE STATUS FOR RFU REQUIREMENT PROJECTS**

Fuel Supply	Compliance/Renewable Fuel Use Requirement Status					
	Active*		Expired		Total	
	No. Projects (n)	Rebated Capacity (kW)	No. Projects (n)	Rebated Capacity (kW)	No. Projects (n)	Rebated Capacity (kW)
Dedicated	18	10,980	38	15,228	56	26,208
Blended	20**	29,236	19	13,688	40	43,401
Directed	1	500	63	31,070	64	31,570
<b>Total</b>	<b>39</b>	<b>40,716</b>	<b>120</b>	<b>59,986</b>	<b>159</b>	<b>100,702</b>

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

\*\* Two of these projects have been decommissioned and another project no longer participating in the program. More details are provided in Section 3.2.4

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

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

Given the program rule changes suggested by Decision 21-06-005, going forward compliance will no longer be inferred for any renewable fuel use project. We anticipate that the PAs will recommend enhanced verification protocols for all renewable fuel use projects.



**TABLE 7: FUEL USE COMPLIANCE OF DEDICATED RFU REQUIREMENT PROJECTS**

PA	SGIP Reservation No.	Tech	Renewable Fuel Type	Capacity (kW)	Operational Date*	Renewable Fuel Use	Compliance Status
SCE	SCE-SGIP-2012-0413	MT	DG - Food Processing	750	2/26/2014	100%	Implied
PG&E	PGE-SGIP-2012-2110	ICE	DG - Food Processing	800	7/25/2014	100%	Implied
PG&E	PGE-SGIP-2012-2415	MT	Landfill Gas	65	7/31/2014	100%	Implied
PG&E	PGE-SGIP-2012-2432	MT	Landfill Gas	65	9/12/2014	100%	Implied
CSE	SD-SGIP-2012-0486	ICE	DG - WWTP	145	11/26/2014	100%	Implied
SCE	SCE-SGIP-2012-0433	ICE	DG - WWTP	627	4/21/2015	100%	Implied
PG&E	PGE-SGIP-2014-2541	ICE	Syngas - Food Processing	99	9/11/2015	100%	Implied
PG&E	PGE-SGIP-2014-2854	ICE	Syngas - Food Processing	160	11/13/2015	100%	Implied
PG&E	PGE-SGIP-2015-2852	ICE	Syngas - Food Processing	297	12/18/2015	100%	Implied
PG&E	PGE-SGIP-2012-2052	ICE	Landfill Gas	2,852	12/21/2015	100%	Implied
PG&E	PGE-SGIP-2014-2597	ICE	Landfill Gas	220	6/28/2016	100%	Implied
PG&E	PGE-SGIP-2014-2832	ICE	DG - Dairy	800	11/29/2016	100%	Implied
SoCalGas	SCG-SGIP-2012-0158	MT	DG - WWTP	150	1/19/2017	100%	Implied
PG&E	PGE-SGIP-2011-2049	ICE	DG - Food Processing	1000	4/7/2017	100%	Implied
PG&E	PGE-SGIP-2011-2050	ICE	DG - Food Processing	1000	4/7/2017	100%	Implied
PG&E	PGE-SGIP-2016-3030	ICE	DG - Dairy	1000	8/21/2017	100%	Implied
PG&E	PGE-SGIP-2016-3048	ICE	DG - Dairy	600	10/18/2017	100%	Implied
SCE	SCE-SGIP-2014-0937	ICE	DG - Digester	800	10/24/2017	100%	Implied

\* 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.

### 3.2 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 550 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 522 to 587 BTU/SCF. As referenced in the Biomass CHP catalog<sup>17</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>18</sup> BTU/SCF is assumed. There are currently 21 active blended on-site RFU projects. Figure 9 below highlights the historical compliance determination for these projects, as well as the compliance determination for this year's reporting (RFU Report 30).

---

<sup>17</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>18</sup> US Energy Information Administration. California Heat Content of Natural Gas Deliveries to Consumers.  
[https://www.eia.gov/dnav/ng/hist/nga\\_epg0\\_vgth\\_sca\\_btucfA.htm](https://www.eia.gov/dnav/ng/hist/nga_epg0_vgth_sca_btucfA.htm).

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 9: HISTORY OF COMPLIANCE DETERMINATION**

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

\* 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.

\* OOP = Out of Program. One facility has returned their PBI incentive and is no longer participating in the program.

### 3.2.1 Blended On-Site RFU Requirement Projects in Compliance

During this reporting period, eight blended RFU requirement projects were confirmed to be compliant with SGIP renewable fuel use requirements.

- PGE-SGIP-2012-2061.** This 3,800 kW IC engine system utilizes a blend of digester gas from a wastewater treatment plant and natural gas. The system came online in October 2013 and is therefore required to comply with SGIP renewable fuel use requirements. At the time of the PG&E installation verification inspection, the system was operating on 90 percent digester gas, and the output of the IC engine modulated based on the diurnal cycle of the biogas production. Based on metered electrical generation and natural gas consumption data, renewable fuel use during the

current reporting period was approximately 77 percent of the total fuel input and is therefore in compliance with SGIP renewable fuel use provisions for this reporting period.

- **SCE-SGIP-2011-0348.** This 650 kW IC engine system is installed at a wastewater treatment plant. The system utilizes a combination of wastewater digester gas produced on-site and natural gas. The system became operational in March 2014 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 was approximately 86 percent of the total fuel input and is therefore in compliance with SGIP renewable fuel use provisions for this reporting period.
- **PGE-SGIP-2012-1987.** This 1,700 kW IC engine system utilizes a blend of digester gas from a wastewater treatment plant and natural gas. The system came online in April 2015 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 was approximately 81 percent of the total fuel input and is therefore in compliance with SGIP renewable fuel use provisions for this reporting period.
- **PGE-SGIP-2012-1966.** This 1,132 kW IC engine system utilizes a blend of digester gas from a wastewater treatment plant and natural gas. The system came online in March 2015 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 97 percent of the total fuel input and is therefore in compliance with SGIP renewable fuel use provisions for this reporting period.
- **SCG-SGIP-2014-0205.** This 1,400 kW fuel cell system utilizes a blend of digester gas from a wastewater treatment plant and natural gas. The system came online in November 2016 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 88 percent of the total fuel input and is therefore in compliance with SGIP renewable fuel use provisions for this reporting period.
- **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 PY 2017 project, it needs to utilize at least 10 percent renewable fuel of the total fuel usage (energy basis). Based on metered electrical generation and natural gas consumption data, renewable fuel use during the current reporting period made up about 74 percent of the total fuel input and is therefore in compliance with SGIP renewable fuel use provisions for this reporting period.
- **PGE-SGIP-2012-2206.** This 1,266 kW IC engine utilizes wastewater digester gas and natural gas. The system was noted as operational in November 2015 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 92 percent of the total fuel input and is therefore in compliance with SGIP renewable fuel use provisions for this reporting period.

- **SCG-SGIP-2015-0237.** This facility installed two large gas turbines each approximately 11 MW for a total of 22.3 MW. While only one of these two systems was incentivized, 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. The system was noted as operational in March 2018 and is therefore required to comply with SGIP renewable fuel use requirements. The combined renewable fuel use for both the incentivized and non-incentivized generators was 74 percent for this reporting period, indicating that the renewable fuel usage for just the incentivized generator was well above the 75 percent renewable fuel requirement and is therefore in compliance with SGIP renewable fuel use provisions for this reporting period.

### 3.2.2 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.

- **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. Based on metered electrical generation and natural gas consumption data, renewable fuel use during the current reporting period made up about 74 percent of the total fuel input, and therefore it is not in compliance with SGIP renewable fuel use provisions for this reporting period.
- **SD-SGIP-2014-0747.** This 472 kW IC engine utilizes wastewater digester gas and natural gas. The system was noted 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 74 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.

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

Eight blended biogas projects could not have their compliance status determined during this reporting period because they did not provide sufficient information to make a compliance determination:



- **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 performance data provider (PDP) indicated that they have had an outstanding communication issue with this site beginning from 2018. Therefore, no compliance determination could be made. Verdant was not able to get a hold of the customer to gather the breakout fuel data directly.
- **SCE-SGIP-2012-0450.** This project consists of two 800 kW IC engines utilizing a combination of wastewater digester gas and natural gas. The system became operational in November 2015 and is therefore required to comply with SGIP renewable fuel use requirements. However, the PDP informed us that the metering equipment failed and as the site has now reached the end of its 5-year PBI compliance period, they did not replace the metering equipment. Therefore, no compliance determination could be made. While the facility was running at 100% biogas at the time of inspection, the system does have a natural gas supply line.
- **PGE-SGIP-2014-2788.** This 5.5 kW microturbine utilizes digester gas and natural gas. The system was noted as operational in November 2017 and is therefore required to comply with SGIP renewable fuel use requirements. It is not clear whether this project runs entirely on renewable fuel or not. The inspection report specifies that the site should be derated to just over 5 kW, although the application data list this project at over 16 kW. Another generator onsite also uses mostly natural gas but can handle up to 15% biogas. We were not able to gather metered fuel data to confirm that this project does indeed run on 100% renewable fuel. Therefore, no compliance determination could be made.
- **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 PDP confirmed that they do not receive fuel data from this site, and Verdant was unable to get a hold of a site contact to provide the information. Therefore, no compliance determination could be made.
- **PGE-SGIP-2014-2843.** This 43 kW microturbine 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 PDP confirmed that they do not receive fuel data from this site, and Verdant was unable to get a hold of a site contact to provide the information. Therefore, no compliance determination could be made.
- **SCE-SGIP-2014-1006.** This 2.8 MW 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 PDP confirmed that they do not have a breakdown of renewable versus natural gas fuel. Therefore, no compliance determination could be made.

- **PGE-SGIP-2017-3340.** This 74 kW IC engine utilizes a combination of dairy digester gas and natural gas. The system became operational in April 2020 and is therefore required to comply with SGIP renewable fuel use requirements. However, the PDP does not have a breakdown of renewable versus natural gas fuel, and Verdant was unable to get ahold of the site contact to provide a breakdown of fuel. Therefore, no compliance determination could be made.
- **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. The PDP noted that their metering equipment no longer communicates with the facility, and because the facility has now met their PBI reporting requirement, they have not fixed the communication issues. Therefore, no compliance determination could be made.

### **3.2.4 Blended On-Site RFU Requirement Project Compliance Status – Non Operational and No Longer Participating in the program.**

There were two 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 is therefore 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. The PDP had been advised by the customer 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.

A summary of the 20 active blended RFU requirement projects during this reporting period is presented in Table 8. Of the 20 active blended RFU requirement projects, two were found out of compliance. This was the second year in a row that one of these projects did not meet the compliance requirements.



**TABLE 8: FUEL USE COMPLIANCE OF BLENDED ON-SITE RFU REQUIREMENT PROJECTS**

PA	SGIP Reservation No.	Tech	Renewable Fuel Type	Capacity (kW)	Operational Date*	Annual Nat. Gas Energy Flow (MMBtu)†	Renewable Fuel Use	In Compliance?
PGE	PGE-SGIP-2011-1966	ICE	DG - WWTP	1132	2015-03-26	2,045	97%	Yes
PGE	PGE-SGIP-2011-1987	ICE	DG - WWTP	1700	2015-04-07	16,844	81%	Yes
PGE	PGE-SGIP-2012-2061	ICE	DG - WWTP	950	2013-10-31	33,907	77%	Yes
PGE	PGE-SGIP-2012-2112	ICE	DG - WWTP	190	2015-07-03	N/A	N/A	No longer participating in the program
PGE	PGE-SGIP-2012-2206	ICE	DG - WWTP	977	2015-11-13	6,193	92%	Yes
PGE	PGE-SGIP-2012-2212	ICE	DG - Dairy	1000	2015-03-05	N/A	N/A	System Decommissioned
PGE	PGE-SGIP-2013-2484	MT	Multiple Renewable Fuel Types	800	2016-08-03	UTD	UTD	Data Communication Issues
PGE	PGE-SGIP-2014-2788	MT	DG - Food Processing	5.49	2017-11-17	UTD	UTD	Data Not Collected by PDP
PGE	PGE-SGIP-2014-2813	ICE	DG - Food Processing	710	2018-10-05	UTD	UTD	Data Communication Issues
PGE	PGE-SGIP-2014-2843	MT	DG - WWTP	43.12	2018-10-22	UTD	UTD	Data Not Collected by PDP
PGE	PGE-SGIP-2017-3340	ICE	DG - Dairy	73.4	2020-04-02	UTD	UTD	Data Not Collected by PDP
SCE	SCE-SGIP-2011-0348	ICE	DG - WWTP	650	2014-06-18	5,893	86%	Yes
SCE	SCE-SGIP-2012-0450	ICE	DG - WWTP	1550	2015-07-02	UTD	UTD	Data Not Collected by PDP
SCE	SCE-SGIP-2014-0986	ICE	DG - WWTP	846	2019-03-07	16,195 <sup>£</sup>	74%	No
SCE	SCE-SGIP-2014-1006	ICE	Landfill Gas	2806.9	2018-10-05	UTD	UTD	Data Not Collected by PDP



SCG	SCG-SGIP-2012-0156	ICE	DG - Food Processing	1500	2015-09-04	UTD	UTD	Data Communication Issues
SCG	SCG-SGIP-2014-0205	FC - CHP	DG - WWTP	1400	2016-11-15	9,585	88%	Yes
SCG	SCG-SGIP-2015-0237	GT	DG - WWTP	11230	2018-03-15	398,358	>75%	Yes
CSE	SD-SGIP-2014-0747	ICE	DG - WWTP	472.2	2019-05-15	12,222	74%	No
CSE	SD-SGIP-2017-1119	ICE	DG - WWTP	1200	2019-02-19	15,688	74%	Yes

\* Since 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.

† This field represents the natural gas consumption during the 12-month period ending June 30, 2021. A heating value of 930 BTU/SCF was used. The determination of “UTD” means “unable to determine”.

£ For this project the PDP provided data for 11-month period (07/01/2020 – 05/31/2021).



For this reporting period, the compliance for only 10 of the 20 projects were determined. For the remaining projects, the main reason for the inability to determine the compliance is either communication issues with the meter systems or the data provider not collecting data.

Table 9 provides the breakdown of the status of the 20 projects.

**TABLE 9: BREAKDOWN OF STATUS FOR THE BLENDED RFUR REQUIREMENT PROJECTS**

<b>Category</b>	<b>No. of Projects</b>
Received Data. Compliant	8
Data not collected by data provider	5
Data Communication Issues	3
System Offline or Decommissioned	1
No longer participating in the program	1
Received Data. Not Compliant	2

### **3.3 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. These properties are summarized in Table 10. 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.



**TABLE 10: PROPERTIES OF DIRECTED BIOGAS INJECTION AND EXTRACTION**

<b>Property</b>	<b>At Injection</b>	<b>At Extraction</b>
Carrier for renewable fuel	Biogas	Natural Gas
Transaction type	Physical	Notional
Information source	Metering	Invoices

The properties of directed biogas injection and extraction have a direct bearing on the information needed to assess renewable fuel use compliance of directed biogas projects. On April 14, 2011, the SGIP PAs and their consultant AESC developed protocols for the audit of directed biogas usage. The audit protocol establishes data and verification requirements and is separated into three elements:

- 1. Transfer of Ownership**
- 2. Transportation Path and Energy Accounting**
- 3. Gas Fuel Consumption**

More information about the audit protocol for the directed biogas projects is provided in Appendix B.

For this reporting period, there are 64 directed biogas projects. However, 63 of the 64 directed biogas projects were rebated on or before PY 2011, meaning their compliance requirement period was only five years and have all completed their compliance requirements.

The only active project with compliance requirements is a PY 2011 with a compliance period of 10 years. Verdant reached out to the facility and attempted to gather the required information but was told that the facility is in the process of shutting down, and expects to be completely shut down by the end of the year. Based on when this project received its upfront incentive, it would be considered an active project until April 2022.

## 4 GREENHOUSE GAS EMISSIONS

Information regarding GHG emission impacts is presented in this section. The GHG emission information presented here is derived from data used to prepare the 2018-2019 SGIP Impact Evaluation Report<sup>19</sup> (the most recent source of SGIP RFU project performance data). Additionally, key factors that could influence GHG emission impacts from renewable fuel projects in the future are discussed.

Table 11 presents capacity-weighted average GHG emission results for renewable projects developed for the most recent (2018-2019) SGIP Impact Evaluation Report. GHG emission impacts are calculated as the difference between SGIP emissions and the total baseline emissions. Results in Table 11 suggest one important observation: The baseline assumed for the biogas (i.e., whether the biogas would have been vented to the atmosphere or flared) is the most influential determinant of GHG emission impacts. This is due to the global warming potential of methane (CH<sub>4</sub>) vented directly into the atmosphere, which is much higher than the global warming potential of CO<sub>2</sub> resulting from the flaring of CH<sub>4</sub>.

**TABLE 11: SUMMARY OF GHG EMISSION IMPACTS FROM SGIP RENEWABLY FUELED PROJECTS IN 2019**

Baseline Biogas Assumption	Prime Mover Technology	Average GHG Impact Rate (Metric Tons CO <sub>2</sub> eq / MWh)
Flare	CHP fuel cell	-0.25
	Electric-only fuel cell	-0.13
	Gas Turbine	-0.29
	Internal combustion engine	-0.28
	Microturbine	-0.28
Vent	Internal combustion engine	-4.74

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>20</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>21</sup> At the

<sup>19</sup> 2018-2019 SGIP Impact Evaluation Draft Report. Verdant Associates, 2020. As of 08/24/2021, this report is in draft state and being reviewed by the CPUC.

<sup>20</sup> An overview of California’s air quality districts is available at: <http://www.capcoa.org>

<sup>21</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.



federal level, New Source Performance Standards and Emission Guidelines regulate methane capture and use.<sup>22</sup>

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 for which a venting baseline is assumed to achieve significantly greater GHG reductions per unit of electricity generated than those for which a flaring baseline is assumed. Additional information on the GHG impact methodology and findings are available in the 2018-2019 SGIP Impact Evaluation Report.

Another important factor affecting GHG emissions from biogas projects is the finite biogas contracts associated with directed biogas projects. Directed biogas projects represent a significant share of online (not decommissioned or offline) SGIP biogas project capacity. These directed biogas projects are a significant driver behind the SGIP's historical GHG reductions. However, all but one DBG project has now completed its biogas contract term. This means that going forward, if these projects operate on non-renewable fuel, they will not realize the GHG reductions associated with biogas. Per D.21-06-005, all renewable fuel projects (onsite or directed) will now be required to utilize renewable fuel for the entire life of the technology.

---

<sup>22</sup> EPA's Landfill Methane Outreach Program provides background information on control of methane at the federal level. See: <http://www.epa.gov/lmop/>





## APPENDIX A HISTORICAL LIST OF ALL SGIP PROJECTS UTILIZING RENEWABLE FUEL

All SGIP projects supplied with renewable fuel are listed in Table 12. Renewable Fuel Use (RFU) requirement projects subject to renewable fuel use requirements and exempt from heat recovery requirements are identified in the column titled “RFUR Project”. Only a portion of these projects (about 65 percent by count) are also equipped with a non-renewable fuel supply. These projects are identified in the “Non-Renewable Fuel Supply” column.

**TABLE 12: SGIP PROJECTS UTILIZING RENEWABLE FUEL**

SGIP Reservation No.	PA	Tech	Renewable Fuel Type	Size (kW)	Operational Date*	RFUR Project	Non-Renewable Fuel Supply
PGE-SGIP-2016-3004	PGE	ICE	DG - WWTP	477.1	4/23/2020	Yes	Yes
PGE-SGIP-2017-3340	PGE	ICE	DG - Dairy	73.4	4/2/2020	Yes	Yes
SD-SGIP-2014-0747	CSE	ICE	DG - WWTP	472.2	5/15/2019	Yes	Yes
SCG-SGIP-2015-0237	SCG	GT	DG - WWTP	11,230	3/15/2018	Yes	Yes
SCE-SGIP-2014-0986	SCE	ICE	DG - WWTP	846	3/7/2019	Yes	Yes
PGE-SGIP-2013-2484	PGE	MT	Multiple Renewable Fuel Types	800	8/3/2016	Yes	Yes
PGE-SGIP-2012-2206	PGE	ICE	DG - WWTP	1,266	11/13/2015	Yes	Yes
PGE-SGIP-2014-2813	PGE	ICE	DG - Food Processing	602	10/5/2018	Yes	Yes
SD-SGIP-2017-1119	CSE	ICE	DG - WWTP	1,200	2/19/2019	Yes	Yes
SCG-SGIP-2012-0156	SCG	ICE	DG - Food Processing	1,500	9/4/2015	Yes	Yes
PGE-SGIP-2016-3030	PGE	ICE	DG - Dairy	1,000	8/21/2017	Yes	No
SCG-SGIP-2012-0158	SCG	MT	DG - WWTP	150	1/19/2017	Yes	No
PGE-SGIP-2014-2832	PGE	ICE	DG - Dairy	800	11/29/2016	Yes	No
SCE-SGIP-2012-0413	SCE	MT	DG - Food Processing	750	2/26/2014	Yes	No
PGE-SGIP-2012-2110	PGE	ICE	DG - Food Processing	800	7/25/2014	Yes	No
PGE-SGIP-2016-3048	PGE	ICE	DG - Dairy	600	10/18/2017	Yes	No



<b>SGIP Reservation No.</b>	<b>PA</b>	<b>Tech</b>	<b>Renewable Fuel Type</b>	<b>Size (kW)</b>	<b>Operational Date*</b>	<b>RFUR Project</b>	<b>Non-Renewable Fuel Supply</b>
PGE-SGIP-2015-2852	PGE	ICE	Syngas - Food Processing	480	12/18/2015	Yes	No
PGE-SGIP-2014-2843	PGE	MT	DG - WWTP	43.12	10/22/2018	Yes	Yes
PGE-SGIP-2012-2112	PGE	ICE	DG - WWTP	190	7/3/2015	Yes	Yes
PGE-SGIP-2014-2854	PGE	ICE	Syngas - Food Processing	160	11/13/2015	Yes	No
PGE-SGIP-2012-2415	PGE	MT	Landfill Gas	65	7/31/2014	Yes	No
PGE-SGIP-2012-2052	PGE	ICE	Landfill Gas	2,852	12/21/2015	Yes	No
PGE-SGIP-2011-1987	PGE	ICE	DG - WWTP	1,700	4/7/2015	Yes	Yes
PGE-SGIP-2014-2597	PGE	ICE	Landfill Gas	220	6/28/2016	Yes	No
PGE-SGIP-2014-2541	PGE	ICE	Syngas - Food Processing	160	9/11/2015	Yes	No
SCE-SGIP-2014-1006	SCE	ICE	Landfill Gas	2,806.9	10/5/2018	Yes	Yes
PGE-SGIP-2011-1966	PGE	ICE	DG - WWTP	1,132	3/26/2015	Yes	Yes
PGE-SGIP-2014-2788	PGE	MT	DG - Food Processing	5.49	11/17/2017	Yes	Yes
PGE-SGIP-2011-2050	PGE	ICE	DG - Food Processing	1,000	4/7/2017	Yes	No
SCE-SGIP-2011-0348	SCE	ICE	DG - WWTP	650	6/18/2014	Yes	Yes
PGE-SGIP-2012-2061	PGE	ICE	DG - WWTP	3,800	10/31/2013	Yes	Yes
SCE-SGIP-2012-0450	SCE	ICE	DG - WWTP	1,550	7/2/2015	Yes	Yes
SCE-SGIP-2014-0937	SCE	ICE	DG - Dairy	800	10/24/2017	Yes	No
SCE-SGIP-2012-0433	SCE	ICE	DG - WWTP	627	4/21/2015	Yes	No
SD-SGIP-2012-0486	CSE	ICE	DG - WWTP	145	11/26/2014	Yes	No
PGE-SGIP-2012-2432	PGE	MT	Landfill Gas	65	9/12/2014	Yes	No
SCG-SGIP-2014-0205	SCG	FC - CHP	DG - WWTP	1,400	11/15/2016	Yes	Yes
PGE-SGIP-2011-2049	PGE	ICE	DG - Food Processing	1,000	4/7/2017	Yes	No
PGE-SGIP-2012-2212	PGE	ICE	DG - Dairy	1,000	3/5/2015	Yes	Yes



<b>SGIP Reservation No.</b>	<b>PA</b>	<b>Tech</b>	<b>Renewable Fuel Type</b>	<b>Size (kW)</b>	<b>Operational Date*</b>	<b>RFUR Project</b>	<b>Non-Renewable Fuel Supply</b>
SCG-SGIP-2010-0034	SCG	FC - Elec.	TBD (Directed)	210	6/20/2013	Yes	Yes
SCG-SGIP-2010-0033	SCG	FC – Elec.	TBD (Directed)	105	6/19/2013	Yes	Yes
PGE-SGIP-2010-1914	PGE	FC - Elec.	TBD (Directed)	420	5/29/2013	Yes	Yes
SCE-SGIP-2010-0024	SCE	FC - Elec.	TBD (Directed)	1,050	3/29/2013	Yes	Yes
SCE-SGIP-2010-0037	SCE	FC - Elec.	TBD (Directed)	1,050	12/24/2012	Yes	Yes
SCE-SGIP-2010-0041	SCE	FC - Elec.	TBD (Directed)	840	12/24/2012	Yes	Yes
SCG-SGIP-2010-0026	SCG	FC - CHP	DG - WWTP	2,800	12/21/2012	Yes	Yes
SCE-SGIP-2010-0035	SCE	FC - CHP	TBD (Directed)	1,110	12/17/2012	Yes	Yes
PGE-SGIP-2010-1867	PGE	FC - CHP	DG - WWTP	1,400	11/29/2012	Yes	Yes
SCE-SGIP-2010-0038	SCE	FC - Elec.	TBD (Directed)	630	10/4/2012	Yes	Yes
SCE-SGIP-2010-0039	SCE	FC - Elec.	TBD (Directed)	315	8/8/2012	Yes	Yes
SCE-SGIP-2007-0006	SCE	MT	Landfill Gas	750	6/12/2012	Yes	No
SD-SGIP-2010-0398	CSE	FC - Elec.	TBD (Directed)	420	5/1/2012	Yes	Yes
SD-SGIP-2010-0399	CSE	FC - Elec.	TBD (Directed)	630	5/1/2012	Yes	Yes
PGE-SGIP-2011-1950	PGE	FC - Elec.	Landfill Gas (Directed)	500	4/11/2012	Yes	Yes
SCE-SGIP-2009-0013	SCE	FC - CHP	DG - WWTP	600	3/28/2012	Yes	Yes
SCE-SGIP-2010-0011	SCE	FC - Elec.	TBD (Directed)	210	3/28/2012	Yes	Yes
SCE-SGIP-2010-0028	SCE	FC - Elec.	TBD (Directed)	600	3/28/2012	Yes	Yes
PGE-SGIP-2010-1860	PGE	FC - Elec.	TBD (Directed)	800	2/28/2012	Yes	Yes
PGE-SGIP-2010-1926	PGE	FC - Elec.	Landfill Gas (Directed)	400	2/28/2012	Yes	Yes
SD-SGIP-2010-0374	CSE	FC - Elec.	TBD (Directed)	210	2/27/2012	Yes	Yes
SD-SGIP-2010-0376	CSE	FC - Elec.	TBD (Directed)	210	2/27/2012	Yes	Yes
PGE-SGIP-2010-1852	PGE	FC - Elec.	TBD (Directed)	400	12/29/2011	Yes	Yes
PGE-SGIP-2010-1857	PGE	FC - Elec.	TBD (Directed)	300	12/29/2011	Yes	Yes



<b>SGIP Reservation No.</b>	<b>PA</b>	<b>Tech</b>	<b>Renewable Fuel Type</b>	<b>Size (kW)</b>	<b>Operational Date*</b>	<b>RFUR Project</b>	<b>Non-Renewable Fuel Supply</b>
PGE-SGIP-2010-1858	PGE	FC - Elec.	Landfill Gas (Directed)	300	12/29/2011	Yes	Yes
PGE-SGIP-2010-1868	PGE	FC - Elec.	TBD (Directed)	400	12/29/2011	Yes	Yes
PGE-SGIP-2010-1869	PGE	FC - Elec.	TBD (Directed)	600	12/29/2011	Yes	Yes
PGE-SGIP-2010-1876	PGE	FC - Elec.	TBD (Directed)	200	12/29/2011	Yes	Yes
PGE-SGIP-2010-1877	PGE	FC - Elec.	TBD (Directed)	200	12/29/2011	Yes	Yes
PGE-SGIP-2010-1929	PGE	FC - Elec.	Landfill Gas (Directed)	420	12/29/2011	Yes	Yes
SD-SGIP-2009-0361	CSE	FC - CHP	DG - WWTP (Directed)	1,400	12/21/2011	Yes	Yes
SD-SGIP-2009-0362	CSE	FC - CHP	DG - WWTP	300	12/21/2011	Yes	Yes
SD-SGIP-2009-0363	CSE	FC - CHP	DG - WWTP (Directed)	2,800	12/21/2011	Yes	Yes
SD-SGIP-2010-0375	CSE	FC - Elec.	TBD (Directed)	300	12/21/2011	Yes	Yes
SCG-SGIP-2010-0015	SCG	FC - Elec.	Landfill Gas (Directed)	420	12/16/2011	Yes	Yes
SCG-SGIP-2010-0018	SCG	FC - Elec.	Landfill Gas (Directed)	420	12/15/2011	Yes	Yes
SCG-SGIP-2010-0019	SCG	FC - Elec.	Landfill Gas (Directed)	420	12/15/2011	Yes	Yes
SCG-SGIP-2010-0020	SCG	FC - Elec.	Landfill Gas (Directed)	420	12/15/2011	Yes	Yes
SCE-SGIP-2010-0014	SCE	FC - Elec.	TBD (Directed)	420	11/15/2011	Yes	Yes
SCG-SGIP-2007-0036	SCG	ICE	DG - WWTP	340	11/1/2011	Yes	No
PGE-SGIP-2010-1855	PGE	FC - Elec.	Landfill Gas (Directed)	300	9/29/2011	Yes	Yes
SCE-SGIP-2007-0017	SCE	ICE	DG - WWTP	364	9/27/2011	Yes	No
SCG-SGIP-2010-0011	SCG	FC - Elec.	Landfill Gas (Directed)	900	9/21/2011	Yes	Yes
SCG-SGIP-2010-0005	SCG	FC - Elec.	Landfill Gas (Directed)	100	9/20/2011	Yes	Yes
PGE-SGIP-2010-1850	PGE	FC - Elec.	Landfill Gas (Directed)	420	9/7/2011	Yes	Yes
PGE-SGIP-2010-1874	PGE	FC - Elec.	Landfill Gas (Directed)	500	9/7/2011	Yes	Yes
PGE-SGIP-2010-1892	PGE	FC - Elec.	Landfill Gas (Directed)	210	9/7/2011	Yes	Yes



<b>SGIP Reservation No.</b>	<b>PA</b>	<b>Tech</b>	<b>Renewable Fuel Type</b>	<b>Size (kW)</b>	<b>Operational Date*</b>	<b>RFUR Project</b>	<b>Non-Renewable Fuel Supply</b>
PGE-SGIP-2010-1893	PGE	FC - Elec.	Landfill Gas (Directed)	210	9/7/2011	Yes	Yes
SCE-SGIP-2009-0003	SCE	FC - CHP	DG - WWTP	300	8/30/2011	Yes	Yes
SCE-SGIP-2010-0009	SCE	FC - Elec.	Landfill Gas (Directed)	300	8/8/2011	Yes	Yes
SCE-SGIP-2010-0012	SCE	FC - Elec.	Landfill Gas (Directed)	300	8/8/2011	Yes	Yes
SCE-SGIP-2010-0022	SCE	FC - Elec.	Landfill Gas (Directed)	400	8/8/2011	Yes	Yes
SCE-SGIP-2010-0023	SCE	FC - Elec.	Landfill Gas (Directed)	400	8/8/2011	Yes	Yes
SCG-SGIP-2007-0013	SCG	ICE	DG - WWTP	150	7/13/2011	Yes	No
PGE-SGIP-2010-1851	PGE	FC - Elec.	Landfill Gas (Directed)	300	6/29/2011	Yes	Yes
PGE-SGIP-2010-1878	PGE	FC - Elec.	Landfill Gas (Directed)	500	6/29/2011	Yes	Yes
PGE-SGIP-2010-1885	PGE	FC - Elec.	Landfill Gas (Directed)	300	5/31/2011	Yes	Yes
PGE-SGIP-2010-1853	PGE	FC - Elec.	Landfill Gas (Directed)	600	5/24/2011	Yes	Yes
PGE-SGIP-2010-1882	PGE	FC - Elec.	Landfill Gas (Directed)	400	5/24/2011	Yes	Yes
PGE-SGIP-2010-1886	PGE	FC - Elec.	Landfill Gas (Directed)	300	5/24/2011	Yes	Yes
PGE-SGIP-2010-1849	PGE	FC - Elec.	Landfill Gas (Directed)	500	5/9/2011	Yes	Yes
PGE-SGIP-2010-1856	PGE	FC - Elec.	Landfill Gas (Directed)	300	5/9/2011	Yes	Yes
SCE-SGIP-2010-0004	SCE	FC - CHP	Landfill Gas (Directed)	800	3/23/2011	Yes	Yes
PGE-SGIP-2010-1871	PGE	FC - Elec.	Landfill Gas (Directed)	300	3/14/2011	Yes	Yes
PGE-SGIP-2010-1859	PGE	FC - Elec.	Landfill Gas (Directed)	500	3/11/2011	Yes	Yes
SCG-SGIP-2010-0012	SCG	FC - Elec.	Landfill Gas (Directed)	1,000	1/24/2011	Yes	Yes
PGE-SGIP-2009-1805	PGE	FC - Elec.	Landfill Gas (Directed)	200	1/18/2011	Yes	Yes
SD-SGIP-2010-0369	CSE	FC - CHP	Landfill Gas (Directed)	400	12/31/2010	Yes	Yes
SD-SGIP-2010-0370	CSE	FC - CHP	Landfill Gas (Directed)	400	12/31/2010	Yes	Yes



<b>SGIP Reservation No.</b>	<b>PA</b>	<b>Tech</b>	<b>Renewable Fuel Type</b>	<b>Size (kW)</b>	<b>Operational Date*</b>	<b>RFUR Project</b>	<b>Non-Renewable Fuel Supply</b>
PGE-SGIP-2007-1759	PGE	ICE	DG - WWTP	1,696	12/24/2010	Yes	No
PGE-SGIP-2007-1761	PGE	ICE	DG - WWTP	330	12/23/2010	Yes	No
PGE-SGIP-2009-1802	PGE	FC - Elec.	Landfill Gas (Directed)	400	12/22/2010	Yes	Yes
PGE-SGIP-2009-1810	PGE	FC - Elec.	Landfill Gas (Directed)	400	11/10/2010	Yes	Yes
PGE-SGIP-2009-1811	PGE	FC - Elec.	Landfill Gas (Directed)	400	11/10/2010	Yes	Yes
PGE-SGIP-2009-1812	PGE	FC - Elec.	Landfill Gas (Directed)	400	11/10/2010	Yes	Yes
SCE-SGIP-2010-0334	SCE	FC - CHP	DG - WWTP	250	10/31/2010	Yes	Yes
SCE-SGIP-2010-0002	SCE	FC - CHP	DG - WWTP	500	10/31/2010	Yes	Yes
SD-SGIP-2007-0351	CSE	ICE	DG - WWTP	560	4/16/2010	Yes	Yes
PGE-SGIP-2007-1775	PGE	ICE	DG - Dairy	75	2/3/2010	Yes	No
SCG-SGIP-2006-0012	SCG	FC - CHP	DG - WWTP	900	12/18/2009	Yes	Yes
SCG-SGIP-2008-0003	SCG	FC - CHP	DG - Food Processing	600	12/14/2009	Yes	Yes
PGE-SGIP-2007-1749	PGE	ICE	DG - WWTP	130	11/9/2009	Yes	Yes
SCG-SGIP-2006-0036	SCG	FC - CHP	DG - WWTP	1,200	10/27/2008	Yes	Yes
PGE-SGIP-2006-1498	PGE	MT	Landfill Gas	210	8/5/2008	Yes	No
PGE-SGIP-2006-1640	PGE	ICE	DG - WWTP	643	7/29/2008	Yes	No
PGE-SGIP-2006-1490	PGE	FC - CHP	DG - WWTP	600	4/24/2008	Yes	Yes
SD-SGIP-2005-0270	CSE	MT	Landfill Gas	210	4/4/2008	Yes	No
SCE-SGIP-2006-0062	SCE	FC - CHP	DG - WWTP	900	3/4/2008	Yes	Yes
SCG-SGIP-2006-0014	SCG	ICE	Landfill Gas	1,030	2/21/2008	Yes	No
SCG-SGIP-2005-0082	SCG	ICE	DG - Food Processing	1,080	1/15/2008	Yes	No
PGE-SGIP-2006-1577	PGE	ICE	DG - Dairy	80	12/31/2007	Yes	No
SCE-SGIP-2006-0094	SCE	ICE	DG - WWTP	500	11/8/2007	Yes	No



<b>SGIP Reservation No.</b>	<b>PA</b>	<b>Tech</b>	<b>Renewable Fuel Type</b>	<b>Size (kW)</b>	<b>Operational Date*</b>	<b>RFUR Project</b>	<b>Non-Renewable Fuel Supply</b>
PGE-SGIP-2006-1528	PGE	MT	DG - Food Processing	70	6/15/2007	Yes	No
PGE-SGIP-2005-1298	PGE	MT	DG - WWTP	250	6/11/2007	No	Yes
PGE-SGIP-2006-1559	PGE	ICE	DG - WWTP	160	5/16/2007	Yes	No
SCE-SGIP-2005-0093	SCE	ICE	Landfill Gas	1,030	3/16/2007	Yes	No
PGE-SGIP-2005-1313	PGE	MT	DG - WWTP	240	3/6/2007	Yes	Yes
PGE-SGIP-2003-0298	PGE	MT	DG - WWTP	30	1/31/2007	Yes	No
PGE-SGIP-2006-1505	PGE	ICE	Landfill Gas	970	11/24/2006	Yes	No
PGE-SGIP-2005-1308	PGE	ICE	DG - Dairy	400	11/17/2006	Yes	No
SCE-SGIP-2004-0159	SCE	ICE	DG - WWTP	704	10/26/2006	Yes	Yes
SCE-SGIP-2004-0158	SCE	ICE	DG - WWTP	704	10/25/2006	Yes	Yes
PGE-SGIP-2005-1316	PGE	ICE	Landfill Gas	970	10/2/2006	Yes	No
PGE-SGIP-2005-1222	PGE	ICE	Landfill Gas	970	7/5/2006	Yes	No
PGE-SGIP-2004-0658	PGE	ICE	DG - Dairy	160	5/22/2006	Yes	No
PGE-SGIP-2004-0856	PGE	MT	Landfill Gas	210	5/5/2006	Yes	No
PGE-SGIP-2005-1297	PGE	MT	DG - WWTP	280	4/7/2006	Yes	No
PGE-SGIP-2003-0313	PGE	MT	DG - WWTP	300	3/16/2006	Yes	No
PGE-SGIP-2003-0483	PGE	ICE	DG - Dairy	300	1/13/2006	Yes	No
PGE-SGIP-2004-0833	PGE	MT	DG - Food Processing	70	11/7/2005	No	Yes
PGE-SGIP-2004-0653	PGE	FC - CHP	DG - Food Processing	1,000	8/9/2005	No	Yes
PGE-SGIP-2004-0747	PGE	MT	DG - WWTP	60	7/18/2005	Yes	No
SCE-SGIP-2003-0038	SCE	MT	DG - WWTP	250	7/12/2005	Yes	No
PGE-SGIP-2004-0842A	PGE	MT	DG - WWTP	60	5/27/2005	Yes	No



<b>SGIP Reservation No.</b>	<b>PA</b>	<b>Tech</b>	<b>Renewable Fuel Type</b>	<b>Size (kW)</b>	<b>Operational Date*</b>	<b>RFUR Project</b>	<b>Non-Renewable Fuel Supply</b>
SCE-SGIP-2003-0008	SCE	MT	Landfill Gas	70	5/11/2005	Yes	No
SCE-SGIP-2003-0017	SCE	ICE	DG - WWTP	500	5/11/2005	Yes	Yes
SCE-SGIP-2003-0045	SCE	FC - CHP	DG - WWTP	250	4/19/2005	Yes	No
PGE-SGIP-2004-0640	PGE	MT	Landfill Gas	70	4/14/2005	Yes	No
PGE-SGIP-2004-0641	PGE	MT	Landfill Gas	70	4/14/2005	Yes	No
SCE-SGIP-2003-0092	SCE	FC - CHP	DG - WWTP	500	3/11/2005	Yes	Yes
PGE-SGIP-2003-0379	PGE	MT	Landfill Gas	280	1/14/2005	Yes	No
SD-SGIP-2001-0023	CSE	MT	DG - WWTP	360	9/3/2004	No	No
PGE-SGIP-2003-0514	PGE	MT	DG - WWTP	90	5/19/2004	Yes	No
SD-SGIP-2001-0026	CSE	MT	DG - WWTP	120	4/23/2004	No	No
SCE-SGIP-2002-0074	SCE	MT	Landfill Gas	300	2/11/2004	Yes	No
PGE-SGIP-2002-0110	PGE	ICE	DG - WWTP	900	10/23/2003	No	Yes
SCE-SGIP-2001-0031	SCE	ICE	Landfill Gas	991	9/29/2003	No	No
SCE-SGIP-2002-0055	SCE	MT	Landfill Gas	420	5/19/2003	Yes	No
SD-SGIP-2001-0007	CSE	MT	DG - WWTP	84	8/30/2002	No	No
SCE-SGIP-2014-0970	SCE	MT	DG - WWTP	959	2021-01-25	Yes	Yes

\* Since 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.



## APPENDIX B DIRECTED BIOGAS AUDIT PROTOCOL

The properties of directed biogas injection and extraction have a direct bearing on information needed to assess renewable fuel use compliance of directed biogas projects. On April 14, 2011, the SGIP PAs and their consultant AESC developed protocols for the audit of directed biogas usage. The audit protocol establishes data and verification requirements and is separated into three elements:

1. **Transfer of Ownership** – documentation and “linkage” demonstrating transfer of ownership of the directed biogas from source to one or more serial entities and then to the system owner.
2. **Transportation Path and Energy Accounting** – documentation reporting the amount (energy) of directed biogas from the eligible source to one or more serial pipelines and then to the System Owner. The documentation must report verifiable inputs and outputs of each pipeline segment. Imbalances, losses, and fees (paid in gas energy) must be included in the documented reports. Note that because directed biogas “accounting” is lost once it enters a gas distribution system, directed biogas can be notionally accounted for up to the gas utility receipt points (city gates). Note that “pooling” or carryover from unconsumed directed biogas is allowed.
3. **Gas Fuel Consumption** – documentation from the gas utility matching directed biogas receipts and reporting the metered total energy input to a SGIP eligible generator or fleet of SGIP eligible generators.

The data and documentation requirements for each element of the verification process are described in more detail below.

### B.1 TRANSFER OF OWNERSHIP

Acceptable documentation includes invoices or other statements showing transfer of ownership of biogas between the source and the SGIP system owner. If a broker, marketer, or scheduler takes ownership of the gas between the source and the system owner then intermediate documentation showing transfer of ownership is also required.

### B.2 TRANSPORTATION PATH AND ENERGY ACCOUNTING

Documentation from each entity in the transportation path must include:

- Documentation from the source showing the amount of directed biogas being moved onto the pipeline. Any non-renewable gas added at the source must be identified.

- Documentation from the gas transmission system showing:
  - Receipt of directed biogas (from source, storage, or other pipelines)
  - Pipeline losses or fees paid in gas (not carried over)
  - Positive or negative imbalances (carried over)
  - Delivery of directed biogas to either another pipeline, storage facility, or California utility receipt point
- Utility documentation showing the amount of biogas received at all California entry points
- Utility documentation showing the amount of fuel consumed by each SGIP project being supplied the directed biogas

The gas transportation accounting ends at the California entry point (city gate) and does not continue inside the gas company's distribution system.

### **B.3 GAS FUEL CONSUMPTION**

Utility documentation showing the amount of fuel consumed by each SGIP project must be provided.

### **B.4 USAGE DETERMINATION**

SGIP projects are assumed to procure no more than 75 percent of their fuel input as directed biogas. The directed biogas delivered is compared to 75 percent of the project's fuel consumption. If the amount of directed biogas procured is less than 75 percent of the project's fuel consumption, then the project is out of compliance with the SGIP's renewable fuel use requirements. If the amount of directed biogas procured is equal to 75 percent of the project's fuel consumption, then the project is in compliance with the SGIP's renewable fuel use requirements. If the amount of directed biogas procured is greater than 75 percent of the project's fuel consumption, then the project is in compliance with the SGIP's renewable fuel use requirements and the remaining directed biogas over 75 percent of the project's fuel input will be considered pooled for future use. Once the pool is depleted, it cannot be borrowed against.