Self-Generation Incentive Program
Semi-Annual Renewable Fuel Use Report No. 7
For the Six-Month Period Ending December 31, 2005

1. Purpose of this Report

The purpose of this report is to provide the Energy Division of the California Public Utilities Commission (CPUC) with updated information on fuel use and installed costs of renewable fuel use projects implemented under the Self-Generation Incentive Program. The report identifies the compliance of renewable fuel use projects in meeting renewable fuel use provisions (i.e., having non-renewable fuels comprise less than twenty-five percent of their annual fuel consumption). In addition, the report provides cost comparisons between Level 3 and Level 3-R projects to identify if Level 3-R project costs have fallen below Level 3 projects.[1] This information is provided to the Energy Division to assist staff in making recommendations to the Commission concerning modifications to the renewable project aspects of the Program. This report complies with Decision D-02-09-051 (September 19, 2002) of the California Public Utilities Commission (CPUC) that requires the Program Administrators to provide updated information on renewable fuel use projects on a six-month basis.[2] The six-month reporting period for this report extends from July 1, 2005 to December 31, 2005.

2. Summary of Operational Projects

During the six month reporting period, there was little growth in new renewable fuel use projects, with only two new projects becoming operational. Addition of the two new projects brings the total number of renewable fuel use projects operational in the Program as of December 31, 2005 to eighteen. Both of the new projects coming on line during the reporting period are Level 3-R facilities employing microturbine generator systems. One of the projects is fueled by digester gas from a wastewater treatment facility; the other is fueled by landfill gas. According to project inspection reports, both projects are expected to operate on 100% renewable fuels.

Project-specific information is presented in further detail in Table 1 on the following page. Several observations can be made from the information in Table 1. First, the eighteen operating renewable fuel projects represent nearly 5.4 megawatts of installed generating capacity. Second, microturbine generation systems represent the vast majority (nearly 67 percent) of the prime mover technologies used by renewable fuel use projects in the Program. Third, there has been a

[1] The reason for this comparison is a concern that as Level 3-R projects are exempt from waste heat recovery requirements, they could have lower project costs than Level 3 projects and could result in fuel switching.

[2] 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."

steady increase in the number of microturbine generator systems used in the Program since 2004. Lastly, the source of the renewable fuel is almost equally split between landfill gas and digester gas (from wastewater treatment facilities).

Table 1: Renewable Fuel Use Monitoring Information

Project ID No.	Program Administrator/ Funding Level	Technology/ Fuel Type	Capacity (kW)	Operational Date[3]	Natural Gas Energy Flow (Therms)	Renewable Fuel Use (% of Total Fuel Input)	Meets Program Renewable Fuel Use Requirements?
0007-01	SDREO/ Level 3[4]	Microturbines/ Digester Biogas	88	8/30/2002	0	100%	N/A
PY02-055	SCE/ Level 3-R	Microturbines/ Landfill gas	420	4/18/2003	0	100%	Yes
PY01-031	SCE/ Level 3	Engine/ Landfill gas	970	9/29/2003	0	100%	N/A
110	PG&E/ Level 3[4]	Engine/ Digester Biogas & Natural Gas	900	10/23/2003	TBD[5]	TBD[5]	N/A
PY02-074	SCE/ Level 3-R	Microturbines/ Landfill gas	300	2/12/2004	0	100%	Yes
0026-01	SDREO/ Level 3[4]	Microturbines/ Digester gas	120	4/23/2004	0	100%	N/A
514	PG&E/ Level 3-R	Microturbines/ Digester gas	90	5/19/2004	0	100%	Yes
0023-01	SDREO/ Level 3	Microturbines/ Digester gas	360	9/3/2004	0	100%	N/A
379	PG&E/ Level 3-R	Engine/ Landfill gas	280	1/14/2005	0	100%	Yes
PY03-092	SCE/ Level 1	Fuel Cell/ Digester gas	500	3/11/2005	0	100%	Yes
640	PG&E/ Level 3-R	Microturbines/ Landfill gas	70	4/14/2005	0	100%	Yes
641	PG&E/ Level 3-R	Microturbines/ Landfill gas	70	4/14/2005	0	100%	Yes
PY03-045	SCE/ Level 1	Fuel Cell/ Digester gas	250	4/19/2005	0	99%?	Likely
PY03-008	SCE/ Level 3-R	Microturbines/ Landfill gas	70	5/11/2005	0	100%	Yes
PY03-017	SCE/ Level 3-R	Engine/ Digester gas	500	5/11/2005	0	99%?	Likely
842A	PG&E/ Level 3-R	Microturbines/ Digester gas	60	5/27/2005	0	100%	Yes
PY04-747	PGE Level 3-R	Microturbines/ Digester gas	60	7/18/2005	0	100%	Yes
PY03-038	SCE Level3-R	Microturbines/ Landfill gas	250	7/12/2005	0	100%	Yes

[3] Since assignment of a project's operational date is subject to individual judgment, the incentive payment date as reported by the Program Administrators is used as a proxy for the operational date for reporting purposes.

[4] These projects were approved and funded prior to the effective date of Decision 02-09-051; therefore they do not fall under the classification of, or need to meet the requirements of, Incentive Level 3-R projects.

[5] Information necessary to calculate estimates of natural gas energy use and renewable fuel use has not yet been compiled or analyzed. However, because this is a Level 3 project (vs. 3-R), this information is not required in order to assess compliance with the Program's renewable fuel use requirements.

3. Renewable Fuel Use at Renewable Fuel Use Projects

As shown in Table 1, fifteen of the eighteen renewable fuel use projects have 100 percent dedicated use of renewable fuel (i.e., there is no connecting natural gas or other fuel supply to the facility). Of the remaining three projects, two projects (SCE PY03-092 and SCE PY03-017) use natural gas for start-up or piloting purposes. In these instances, natural gas use is estimated to be less than one percent of the total fuel used annually. Natural gas meters are being installed on these projects to verify that natural gas consumption remains below the requisite twenty-five percent of annual fuel use. For the remaining project (PGE 110), natural gas is blended with digester gas from a wastewater treatment facility. The project is reported to be using eighty percent of its annual fuel consumption from digester gas. A natural gas metering system has been installed to monitor natural gas use.

In light of the information collected to date, we conclude that fifteen of the eighteen operating renewable fuel use projects implemented under the Program are in compliance with the renewable fuel use provisions. The remaining three projects will be monitored to determine if they meet the renewable fuel use provisions.

4. Cost Comparison Between Level 3 and Level 3-R Projects

Concerns were expressed in CPUC Decision D.02-09-051 that Level 3-R project costs could fall below Level 3 costs due to Level 3-R projects being exempt from waste heat recovery requirements. As a result, Level 3-R projects could potentially be receiving a greater than necessary incentive level which could lead to fuel switching. To address this concern, the CPUC directed the Program Administrators to monitor Level 3 and Level 3-R project costs.

Table 2 is a summary of eligible installed costs for Level 1, Level 3 and Level 3-R projects operational as of December 31, 2005. The table shows various project costs on a dollar per watt basis, including minimum, maximum and average values for each incentive level.

Table 2: Summary of Eligible Installed Costs for Operational Projects ($/Watt)[6]

Technology	Incentive Level	No. Projects	$/Watt Eligible Installed Costs			
			Minimum	Maximum	Median	Average
Fuel Cell - Ren. Fuel	1	2	$9.41	$9.85	$9.63	$9.63
Fuel Cell - Nonren. Fuel	2	3	$7.10	$19.00	$8.15	$11.42
All Fuel Cells		**5**	**$7.10**	**$19.00**	**$9.41**	**$10.70**
Microturbine - Ren. Fuel	3-R	13	$1.23	$7.01	$3.33	$3.94
Microturbine - Nonren. Fuel	3	75	$0.70	$9.01	$3.06	$3.16
All Microturbines		**88**	**$0.70**	**$9.01**	**$3.17**	**$3.27**
IC Engine - Ren. Fuel	3-R	3	$1.56	$3.22	$2.79	$2.52
IC Engine - Nonren. Fuel	3	141	$0.38	$5.00	$2.09	$2.15
All IC Engines		**144**	**$0.38**	**$5.00**	**$2.09**	**$2.16**

[6] Eligible installed system cost data was obtained from the Program tracking system files provided to Itron by the Program Administrators on a monthly basis. As before, operational projects are defined as projects for which an incentive check has been issued.

Level 3 and 3-R Microturbine Project Cost Comparison:

There were seventy-five microturbines powered by non-renewable fuels and thirteen microturbines operating off of renewable fuels during the reporting period. For Level 3 microturbines using non-renewable fuels, the average project cost was $3.16 per watt. For Level 3-R microturbine projects using renewable fuels, the average project cost was $3.94 per watt, $0.78 per watt higher than non-renewable powered microturbines. Comparison of median project cost values between the Level 3 and Level 3-R microturbine projects also indicate that most renewable fueled microturbine projects had higher installed costs than their non-renewable fueled counterparts.

Level 3 and 3-R Internal Combustion Engine Cost Comparison:

There were 141 internal combustion (IC) engines using non-renewable fuels during the reporting period and only three IC engines powered by renewable fuels. For Level 3 IC engines using non-renewable fuels, the average project cost was $2.15 per watt. For Level 3-R IC engines operating off of renewable fuel, the average project cost was $2.52 per watt, $0.37 per watt higher than non-renewable powered IC engines. Comparison of the median project cost values also indicate that most renewable fueled IC engine projects had higher installed costs than their non-renewable fueled counterparts.

Gas Clean Up Costs for Renewable Fuel Projects:

As noted in Renewable Fuel Use Report Number 6, it is difficult to draw sound conclusions about incremental gas clean up costs for fuel cells and renewable IC engines due to the small number of operating systems. In particular, there are only four operating fuel cell systems, split evenly between renewable and non-renewable fuels. However, there is a significant range in the non-renewable fuel cell costs per watt, making the average a questionable indicator of the typical cost. In general, the incremental cost of gas clean up equipment on fuel cells should be approximately represented by the difference in the average cost of a non-renewable fuel powered fuel cell and a renewable fuel powered fuel cell. Due to the sensitivity of fuel cells to contaminants in the gas stream, gas clean up costs for fuel cells powered by renewable fuels, which contain sulfur, halide and other contaminants, should be higher than gas clean up costs for fuel cells operating off of cleaner fuels such as natural gas. If the minimum project cost of a fuel cell operating off of non-renewable fuel is used instead of the average, then the difference between non-renewable and renewable powered fuel cells is on the order of $2.50 per watt. We investigated outside information sources to see if $2.50 per watt seemed a reasonable proxy for the incremental gas clean up systems for renewable powered fuel cells. However, due to the variability in digester gas constituents and the differing types of fuel cells, it was impossible to develop an accurate and representative incremental gas clean up cost estimate.

On a similar note, there are only three renewable-fueled IC engine projects. The wide range of project costs per watt on the three systems and the small sample size makes an average value questionable over the long term. Given these caveats, a comparison between the average cost per watt of renewable and non-renewable IC engines shows an incremental cost difference of $0.37 per watt. This value represents a proxy of the additional cost for gas clean up associated with operating IC engines with renewable fuels.

Comparisons between renewable and non-renewable microturbine are somewhat more reasonable given the larger sample sizes. Based on the average cost per watt, the incremental cost for gas clean up on microturbines is approximately $0.78 per watt.

In summary, comparison of the installed costs between renewable and non-renewable fueled generation systems operational as of December 1, 2005 confirms that most non-renewable generators are less capital intensive than their renewable-fueled counterparts. Similarly, it appears that the differences in capital cost between renewable and non-renewable fueled generators may be due mainly to increased gas clean up required on the renewable powered systems. However, independent estimates of gas clean up equipment costs for renewable powered IC engines and microturbines have not been confirmed through secondary sources.