File Format Specification

for

Self-Generation Incentive Program

PDP Data Management New Functionality

Version 1.06

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Revision History

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1 Introduction

1.1 Purpose

This File Format Specification will detail the data submission format for meter data readings on SGIP projects with equipment with a capacity of 30kW or greater beginning in Program Year 2011. The meter data will be used to analyze the production, emissions, and efficiency performance of the installed equipment over a 5-year time frame following the initial commissioning of a project. The results of the analysis will be used to execute Performance Based Incentive (PBI) payment structure, as per SGIP Handbook.

2 Specification Overview

Performance Data Providers will be tasked with submitting monthly performance data to the Program Administrators on behalf of the Host Customer or System Owner via the SGIP Online Database PDP Upload Portal. This specification outlines the data format and upload procedures required by the SGIP Online Database for successful submission.

3 Details

3.1 Overview of PDP Submittal Process

All Applicants with projects 30kW or larger must contract with an approved Performance Data Provider (PDP) to install and monitor meters that can record 15-minute electrical and thermal data as well as hourly fuel data, when applicable. The meters must remotely transmit that data to the PDP daily. All meters must meet the requirements set forth in the SGIP Handbook.

The PDP is responsible for validating the incoming meter data transmissions according to the Data Transfer rules in the SGIP Handbook. They are also responsible for monthly submission of the data to the Program Administrators in the two formats specified: Meter Interval Report and Application Interval Report.

The Application Interval Report will be used for calculating the Annual Performance Based Incentive payments. The Meter Interval Report will be referenced as needed to support the data submitted for payment processing in the Application Interval Report. Both file types may be used for reporting and/or auditing purposes.

3.1.1 Online Submission Process

Approved PDPs will be given a user-account for the SGIP Online Database PDP Upload Portal. The portal will be accessed through www.selfgenca.com. All performance data will be submitted via the PDP Upload Portal. Files that are submitted via e-mail will not be accepted.

PDPs will log into the SGIP Online Database web-portal, select the report type from the dropdown selection, and then attach and upload the .CSV file. The system will then provide immediate feedback as to whether the file was successfully uploaded.

For the Meter Interval Report, which does not undergo any data validations, a successful upload will result in a redirection to the File History View whereby the PDP can view the record of the file in the SGIP Online Database system.

For the Application Interval Report, the PDP will get feedback that the file was uploaded and that the data validations are in process. Once the validations are completed, the PDP will be directed to the File History View where the File Upload Record will list the File Status of either Submitted or Failed Validation.

A file is not considered submitted until it has the "Submitted" status on the File History View.

3.1.2   Data Submission Timeline

For new projects, data recording for PBI Payment purposes should typically commence on the 1st of the month following the initial 50% Incentive Payment. Customers may choose to submit data since interconnection, if interconnection has occurred within the past 6 months. Any request for an alternate data collection commencement date will require Program Administrator approval.

Data for an application must be submitted in full calendar months. Once a month of data has been collected, the PDP has up until the 1st of the following month to validate, format, and submit the Meter and Application Interval data for that application. Submissions will be accepted earlier, and are encouraged. Annual PBI Incentive Payment amounts will only be processed after a full year of data has been submitted for the application.

3.2   Data Format & Standards

The following section defines the specific data formatting requirements for the Meter Interval Report and the Application Interval Report.

The data file format for submission will be .CSV. The maximum file size per upload will be limited to 25MB. Files may be submitted in a compressed format for faster upload speeds and larger file submissions so long as the compressed file size does not exceed 25MB. Acceptable compressed file formats are .ZIP, GZIP, or .BZIP2.

The file formats are designed for bulk submission of data for any number of applications in a single calendar month. However, the file types (Meter Interval and Application Interval) must be submitted in separate files. If a Performance Data Provider is contracted to report data for more than one Program Administrator, they shall submit a separate file for each Program Administrator to maintain the confidentiality of the data. The Application Code indicates the Program Administrator who should receive the performance data submissions for that application.

Throughout the specification as the File Format is referenced, the terms Entry, Field, and Data Value will be used. An Entry refers to a row of data in the .CSV file and a Field refers to a column in the file. A Data Value is the intersection of an Entry and a Field.

3.2.1 Meter Interval Report

The Meter Interval Report format will vary by PDP. The PDPs shall format their report so that it includes all meter and sensor data recorded for the Application. This report should display the readings in their original units, basis and frequency as they were recorded. The fields reported may be more granular than those listed above for more complex systems. The data should not be altered beyond the validations required by the SGIP Handbook.

There are very basic formatting requirements for this report. Each entry in the report must include at a minimum:

- The Application Code that the meter or sensor is associated with.
- The Meter ID (Unique identifier) that matches with the Application Meter IDs reported in the PDP Setup sheet (on the Incentive Claim Form)
- The recorded/measured value of the reading
- The Unit of Measure for the reading

Although the data format is flexible, some examples have been provided for guidance. Please refer to the example files provided in the download folder for an example of the Meter Interval Report.

The Meter ID and Units provided in a Meter Interval Report should match the PDP Setup Sheet and the Metering and Monitoring Plan for the Application. The PDP Setup Sheet is submitted by the Applicant to the Program Administrators as part of the Incentive Claim Form.

3.2.2 Application Interval Report

The Application Interval Report format will be the same for all PDPs and all Applications as specified in Section 3.2.2.2. The data in this file will be will be validated upon upload and used for the calculation of Annual PBI payments. An Entry in this file shall represent the combined data readings of all meters associated with a particular SGIP Application Code. Please refer to Section 3.2.2.1 for clarification on reporting Application Interval Entries for sites with multiple meters.

3.2.2.1 Sites with Multiple Meters

SGIP Applications may list multiple pieces of equipment of the same technology type under a single SGIP Application Code; these complex configurations may require more than one Meter per Application code to meet the SGIP Metering Requirements. However, in the SGIP system, the Incentive Amount and PBI Incentive Rate are calculated per Application, not per individual piece of equipment or meter.

Therefore, all performance Data Values provided in the Application Interval Report must represent the combined performance of all equipment associated with the SGIP Application. If a site has multiple meters, the readings shall be aggregated so that a single Entry per interval can be submitted for the Application. Data readings that are collected as measured amounts shall be summed across all meters or data collection points.

For example, if a site has two meters reporting Net Energy Generated (Interval) of 100 kWh and 150 kWh for two different units on a site, the Application Interval Report value for that interval would be 250 kWh.

It is up to the PDP to determine the best manner for aggregating data from multiple meters on the same equipment configuration.

In the case of a Hybrid System where multiple types of equipment are being installed on the same site, but with separate application codes, the PDPs shall submit the data separately, based on the Application Code that the metered equipment is associated with.

3.2.2.2   Application Interval Report Format Specification

The Application Interval Data report shall include the Fields shown in Table 1. Files shall be submitted with a header row that matches the Field Names and order as listed below in Table 1. The header row should start in cell A1 and the Entry rows should start in cell A2. All Entries must be normalized to 15-minute intervals with the exception of fuel consumption (hourly interval).

Table 1: File Format for the Application Interval Report

Field No.	Field Name	Data Type	Units	Required For
1	App Code	VarChar(18)		All
2	Date & Timestamp	VarChar(19)	YYYY-MM-DD HH:MM:SS	All
3	Month of Data Reporting	Int (2)		All
4	Net Energy Generated (Interval)	VarChar(8,3)	kWh	All Generation Types
5	Net Energy Generated (Cumulative)	Num(15,3)	kWh	All Generation Types
6	Net Real Power Delivered	Num(15,3)	kW	All Generation Types
7	Fuel Consumption	Num(6,2)	Standard Ft3	Conventional CHP and Fuel Cells*
8	Useful Waste Heat Recovered	Num(12,3)	MBtu	Non-Renewable Fueled CHP Systems**
9	Charge Events	Int(10)		AES
10	Discharge Events	Int(10)		AES
11	AES Energy Stored	Num(15,3)	AC kWh	AES
12	AES Energy Discharged	Num(15,3)	AC kWh	AES

* Applicable Equipment Types are: Gas Turbine, Microturbine, Internal Combustion Engine, Fuel Cell CHP, and Fuel Cell Electric regardless of Fuel Type

** Applicable Equipment Types are: Gas Turbine, Microturbine, Internal Combustion Engine, and Fuel Cell CHP with the Fuel Type: Natural Gas, Propane, or Waste Gas.

The combination of the App Code, and Date & Timestamp fields will be the unique identifier so that a full month of readings for multiple applications can be uploaded in the same file.
- SGIP App Code will be used for mapping the data to the appropriate application within the SGIP Online Database.
- Timestamps may not be used more than once for an application, but are not unique in that the same timestamp may be valid for different applications.

For these reasons, App Code and Date & Timestamp are required for every Entry in the Application Interval Data Report. Month of Data Reporting is also required for every Entry. The rest of the fields may be required based on the equipment type of the application.

Fields that are not applicable based on the equipment type of a given application must be left blank. For example, an application for Advanced Energy Storage should not have any data entered in the Fuel Consumption column. If data is submitted in non-applicable Fields the uploaded file will be

rejected. Conversely, fields that are required for an application based on the equipment type must have a value, i.e. no blanks will be accepted in applicable Fields.

3.2.2.3 Data Backfill Restrictions

In the case that generation data (electric, fuel and thermal) could not be transmitted for a given time period due to a communication error, any data that was **recorded and stored in the meter's memory at a 15-minute interval frequency** should be submitted in both the Meter and Application Interval Files.

In the case that generation data could not be collected over a period in which the meter **did not record and/or store 15-minute interval data**, the following rules shall apply:

- In the case that <u>energy generation data</u> could not be collected over a period in which the meter did not record and/or store 15-minute interval data, the Net Energy Generated (Interval) column shall display a value of "N" for intervals where 15-minute recorded interval data is not available. The PDP shall then report the total value of Net Energy Generated (Interval) that was generated since the last valid reading as a lump sum in the first interval where data collection and/or reporting is restored. There is no time limit to this rule as long as energy generated can be proven via the cumulative meter reading. (An example of this has been provided in Section 3.2.2.4).
- In the case that <u>fuel data</u> is not available for an interval, the Data Value for the interval(s) during which the malfunction occurred shall be set to the previous cumulative reading.
- In the case that <u>thermal data</u> is not available for an interval, the Data Value for the interval(s) during which the data gap occurred shall be set to "0".
- In the case that <u>AES data</u> is not available for an interval, the Data Value for the interval(s) during which the data gap occurred shall be set to "0".

For Generation Applications, the system is considered to be producing electricity if the Net Energy Generated (Interval) is not zero ("0"). If the system is not producing electricity (i.e. the net energy generated (Interval) is zero), then the Fields of Net Real Power Delivered and Useful Waste Heat Recovered must also be zero and the cumulative Fuel Consumption reading should not increase from the previous reading. If the value of Net Energy Generated (Interval) is null ("N") values will be accepted in the field of Useful Waste Heat Recovered but not Net Real Power Delivered.

3.2.2.4 Example: Null Values in Net Energy Generated

If the system is producing electricity, but the meter is unable to record and store 15-minute interval data it is possible to know the total energy generated over the period from the cumulative meter, but it is impossible to know the incremental system performance during the malfunction. If this occurs, the Net Energy Generated (Interval) and Net Energy Generated (Cumulative) columns should be formatted as follows:

- Net Energy Generated (Cumulative): Report the last available reading of the cumulative meter until a new value is available
- Net Energy Generated (Interval): Report the letter "N" in the intervals for which no data is available[1].

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[1] In contrast, PDPs shall report a value of "0" for intervals where the meter was functioning but no energy generation was measured (i.e. the system was not generating).

Then, in the first interval where data collection and/or reporting is available again after the malfunction, the PDP shall:

- Net Energy Generated (Cumulative): Display the new cumulative meter reading
- Net Energy Generated (Interval): Display the total value of energy that was generated since the last valid reading based on the change in the Net Energy Generated (Cumulative)

Please refer to Table 2 and Figure 1 for an example of how these columns would appear in the Application Interval Report if there was a recording malfunction (red) followed by a system outage (green). During the recording malfunction, the Net Energy Generated (Interval) values are set to "N" and during the system outage the values are set to "0".

Table 2: Example of Null and Zero Values of Net Energy Generated (Interval)

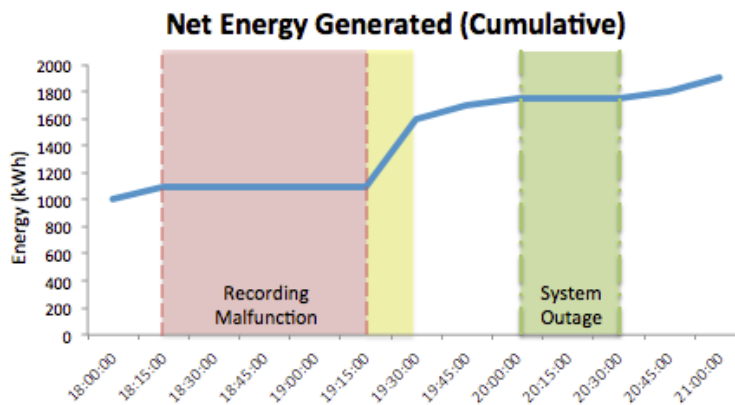| App Code	Date & Timestamp	Net Energy Generated (Interval)	Net Energy Generated (Cumulative)
X-SGIP-201X-XXX	12/21/2012 18:15:00	100	1000
X-SGIP-201X-XXX	12/21/2012 18:15:00	100	1100
X-SGIP-201X-XXX	12/21/2012 18:30:00	N	1100
X-SGIP-201X-XXX	12/21/2012 18:45:00	N	1100
X-SGIP-201X-XXX	12/21/2012 19:00:00	N	1100
X-SGIP-201X-XXX	12/21/2012 19:15:00	N	1100
X-SGIP-201X-XXX	12/21/2012 19:30:00	500	1600
X-SGIP-201X-XXX	12/21/2012 19:45:00	100	1700
X-SGIP-201X-XXX	12/21/2012 20:00:00	50	1750
X-SGIP-201X-XXX	12/21/2012 20:15:00	0	1750
X-SGIP-201X-XXX	12/21/2012 20:30:00	0	1750
X-SGIP-201X-XXX	12/21/2012 20:45:00	50	1800
X-SGIP-201X-XXX	12/21/2012 21:00:00	100	1900

Figure 1: Net Energy Generated (Cumulative) from Table 2

3.2.2.5 Field Definitions

App Code:
The SGIP Application Code is a string that links the meter data to the proper application in the SGIP Online Database. The Application Code is assigned at the time of application reservation and is fixed for the term of the project.

Date & Timestamp:
The Date and Timestamp shall be reported in the format of YYYY-MM-DD HH:MM:SS. The reading should be provided in GMT, instead of local time, to avoid the use of Daylight Savings Time. On a given application, timestamps shall be 15 minutes apart and the sum of timestamps should be equivalent to the number of 15-minute intervals in the respective month. For example, there are 96 intervals per day, so for a 30-day month, 2880 intervals shall be submitted. Timestamp reporting will be interval ending, so the first timestamp record for a month will start at 00:15:00.

Timestamps for an application should be contiguous between reports; for example, the report for the current month should start reporting intervals right where the last report stopped.

Month of Data Reporting:
This field shall report the month since data performance reporting commenced for the particular Application Interval file submission. Acceptable values will range from 1 to 60 months. An application has 59 contiguous months to submit data for performance payments after the first performance data submission. If performance data is not available for a month due to system down time, the submission of that report may be skipped, and the Month of Data Reporting should be adjusted forward on the next month's submission.

Net Energy Generated (Interval):
This field is applicable for all Generation applications and must be left blank for Storage applications. This field should report the incremental Net Energy Generated by all equipment on the application in the given 15-minute interval. The units are kWh. For a given Generation application, the sum of all Net Energy Generated (Interval) for the year will be used in the calculation of PBI Payment as the value of Total Production.

Net Energy Generated (Cumulative):
This field is applicable for all Generation applications and must be left blank for Storage applications. This field should report the cumulative Net Energy Generated by all equipment on the application at the time of the reading. The reading should take place at the end of the 15-minute interval and shall be reported as the amount of energy generated since commissioning.

Net Real Power Delivered:
This field is applicable for all Generation applications and must be left blank for Storage applications. The Net Real Power Delivered for a given application shall be reported as the average instantaneous kW delivered over the 15-minute interval of the reading. The SGIP Database may calculate a monthly average value of Net Real Power Delivered as the average over all valid production intervals provided.

Fuel Consumption:
This field is only applicable for all Conventional CHP and Fuel Cell applications, regardless of Fuel Type. Applicable Equipment Types are Gas Turbine, Microturbine, Internal Combustion Engine, Fuel Cell Electric, and Fuel Cell CHP. This column must be left blank for all other application types.

Fuel Consumption shall be reported on an ***hourly*** basis, rather than every 15-minutes. A reading shall be taken once per hour, at the first interval of the hour, and submitted in the interval row for that timestamp. The following three intervals in that hour shall have an entry of "0". Since Fuel Meters report cumulative values, the delta between two hourly readings shall represent the amount of fuel consumed by all equipment on the application in Standard Cubic Feet per hour. The annual value of Fuel Consumption year will be used in the calculation of Operating Efficiency and the Gross GHG Output of the Generator.

Useful Waste Heat Recovered:
This field is only applicable for Non-Renewable Fueled Conventional CHP and Fuel Cell CHP applications. Applicable Equipment Types are Gas Turbine, Microturbine, Internal Combustion Engine, and Fuel Cell CHP that are fueled by a non-renewable fuel. Please refer to the SGIP Handbook for a list of eligible non-renewable fuels. This column must be left blank for all other application types.

The Useful Waste Heat Recovered by all equipment on the application shall be combined and reported as a single value per 15-minute interval. For multiple CHP systems in one application, the per-unit value per interval shall be calculated and then summed to reach a single reportable value for that interval.

The units are MBtu per 15-minute interval. The sum of four consecutive intervals would represent the industry standard rate of Useful Heat Recovery in units of MBtu/hr. The sum of all Useful Waste Heat Recovered for the year will be used in the calculation of Waste Heat Utilization and the GHG Savings from Waste Heat Recovery.

Charge Events
This field is only applicable for AES applications and must be left blank for all others. This field shall report the number of charge events that the AES equipment goes through in the 15-minute interval. Events shall be reported as integer values.

Discharge Events:
This field is only applicable for AES applications and must be left blank for all others. This field shall report the number of discharge events that the AES equipment goes through in the 15-minute interval. Events shall be reported as integer values.

AES Energy Stored:
This field is only applicable for AES applications and must be left blank for all others. The field shall report the total amount of energy that is stored in AC kWh during the 15-minute interval. The sum of interval data for AES Energy Stored shall be compared to the sum of interval data for AES Energy Discharged, to calculate the Round Trip Efficiency of the system.

AES Energy Discharged:
This field is only applicable for AES applications and must be left blank for all others. The field shall report the total amount of energy that is discharged in AC kWh during the 15-minute interval. For an AES project, the sum of interval data for AES Energy Discharged per year will be used in the calculation of PBI Payment as the value of Total Production. Additionally, the annual ratio of AES Energy Discharged over AES Energy Stored will be calculated as the Round Trip Efficiency as used in the calculation of PBI Penalty Factor for AES applications.

3.3   File Validations and Submission

3.3.1   PDP Data Validations

The PDPs are required to validate all data prior to submission as per the SGIP Handbook.

3.3.2   Data Validations Performed by the SGIP Online Database

No validations will be conducted on the Meter Interval Files since the format is flexible. Rather, the Meter Interval Report files will be accepted and stored as submitted.

The Application Interval Report file will be validated after the user uploads the file but before the data is accepted as a "Submitted" file. A file that is undergoing validation will display the status of "Validation in Process" on the File History view. After validation the file will either be rejected or approved. The Validations have been categorized into three types, listed below in order of increasing depth and complexity of the validation.

3.3.2.1   *File Format Validations*
- The file is a valid .CSV file with the expected number of Fields as specified in Table 1
- All Data Values entered match the Data Type for the Field as specified in Table 1
- Every Entry has valid Data Values in the first three Fields of the Report
- A complete month of 15-minute Interval Entries have been submitted for each Application Code in the file

3.3.2.2   *File Submission Validations*
- All App Codes can be matched to an App Code in the SGIP Online Database
- Each Application Code & Timestamp combination is unique and the Entry has not already been submitted

3.3.2.3   *Data Integrity Validations*
- Based on the Equipment Type of the App Code, all required Fields are filled out and no data is entered into Fields that are not applicable
- The sum of Net Energy Generated (Interval) is equal to the delta of Net Energy Generated (Cumulative) for the month
- The sum of AES Energy Discharged does not exceed the sum of AES Energy Stored for the month
- For Generation Applications, when Net Energy Generated (Interval) for the Entry is exactly zero ("0"), the subsequent Data Values for the Entry are zero ("0").

3.3.3   Rejected Application Interval Report Files

An Application Interval Report file will be rejected if any one of the above validations fail for any of the Entries in the file. If a file is rejected, the SGIP Online Database will notify the user immediately in two ways, first by changing the status on the File History View to "Failed Validation" and second by sending an email to the PDP user.

The "Failed Validation" status in the File History view will include a description of the error to expedite the process of correcting the file. The user should then correct the file and upload the revised file for validation. If more than one error has occurred, the Failed Validation description will list out each error in the file so that they may be corrected at the same time.

3.3.4   Approved Application Interval Report Files

Once all validations have passed for the Application Interval file, the status is changed to "Submitted" in the File History View and the PDP user will be notified via email.

The report file is then stored in the SGIP Online Database as it was uploaded. The data from the file will also be parsed out by Application Code and used to calculate the monthly cumulative values for each Application. Once a full year of data has been submitted for an Application, the Annual Performance Based Incentive payment amount will be calculated by the SGIP Online Database. Once the payment amount has been reviewed and approved by the Program Administrator, the Annual PBI payment will be paid to the Payee according to the rules of the SGIP Handbook.

3.3.5   File Submissions are Final

Rejected files which have the status "Failed Validation" can be corrected and resubmitted, however once a file has successfully reached the "Submitted" status, it is stored in the database and cannot be overwritten, revised, or deleted by the PDP. Any attempt to upload duplicate Application Interval Report data will result in a rejection of the file. The Program Administrators may elect to review issues with Submitted files on a case-by-case basis.