Green Button Data Conformance Testing Specification

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# Introduction

## Scope

This document describes Test Suites whose purpose is to:

Validate data files conformant to Green Button requirements

Validate implementations which consume data files conformant to Green Button requirements.

## Overview

The California Utilities have agreed to use a file format derived from the NAESB ESPI data format for Energy Usage as described in [1]. This document describes 2 sets of test cases:

The first test cases can be used to verify that data files generated by applications are not “non-conformant” to the ESPI XML format.

The second set of test cases can be used to verify that an application which consumes files conformant to the ESPI XML data format can correctly interpret valid data and behave predictably when presented with invalid data.

Note this draft document essentially combines the requirements for the testing and certification (sections 3 and 4) and the detailed description of the test environment and plan.

## Glossary

This section provides a list of acronyms and abbreviations required to properly interpret the document.

Table 1: Glossary

|  |  |
| --- | --- |
| Name | Definition |
| Actor | A generic name for devices, systems, or programs that make decisions and exchange information necessary for performing applications: smart meters, solar generators, and control systems represent examples of devices and systems. |
| AMI | Advanced Metering Infrastructure |
| Applications | Tasks performed by one or more actors within a domain. |
| CIM | IEC TC57 Common Information Model |
| Common Web Portal | Web interface for Regional Transmission Operator, customers, retail electric providers and transmission distribution service provider to function as a clearing house for energy information. Commonly used in deregulated markets. |
| Energy Service Interface | Provides security and, often, coordination functions that enable secure interactions between relevant Home Area Network Devices and the Utility. Permits applications such as remote load control, monitoring and control of distributed generation, in-home display of customer usage, reading of non-energy meters, and integration with building management systems. Also provides auditing/logging functions that record transactions to and from Home Area Networking Devices. |
| End-to-End Abstract Test Case | A collection of abstract test cases designed to prove the ability of two (or more) systems and standards to interoperate |
| System Under Test | A collection of either one or more QA and an AUT |
| WS-I | Web Service Interoperability Organization |

Table 2: Acronyms

|  |  |
| --- | --- |
| Acronym | Name |
| AMI | Advanced Metering Infrastructure |
| CIM | IEC TC57 Common Information Model |
| ESI | Energy Service Interface |
| HAN | Home Area Network |
| PCT | Programmable Communicating Thermostat |
| WS-I | Web Service Interoperability Organization |
| IUT | Implementation Under Test |
| QI | Qualified Implementation |
| MoC | Means of Communication |
| POC | Point of Control and Observation |
| SUT | System Under Test |
| ESPI | Energy Services Provider Interface |
| NAESB | North American Energy Standards Board |
| POC | Point of Control and Observation |
| W | Watts |
| Wh | Watt-hours |

# References

[1] NAESB REQ.21 Energy Service Provider Specification (ESPI)

[2] UCAIug OpenADE Task Force Document: AtomLinks.docx

[3] UCAIug OpenADE Task Force Document: Authorization.docx

[4] UCAIug OpenADE Task Force Document: HelpDeskItems.docx

[5] UCAIug OpenADE Task Force Document: GreenButtonTest Cases.xlsm

[6] UCAIug OpenADE Task Force Document: TimeStampConverter20140523.xlsm

# Applications Profiles

This section contains “Application Profiles” that represent groupings of Green Button behavior that are to be tested and certified.

Each Application Profile describes the basic grouping and identifies a Conformance Block Definition. The Conformance Block Definition associated with the Application Profile list Function Blocks (see section 5) that organize the tests to be performed to certify the profile. Each Function Block may be either required by the profile or optionally asserted in the PICS so that the optional features can be tested. For example for a specific case of electricity Green Button Download My Data it will be required for the Data Custodian to provide interval data of kWh. Optional may be the provision of demand measurements.

## Green Button Download My Data

Green Button Download my data is the common-sense idea that electricity customers should be able to download their own energy usage information in consumer-understandable and computer-consumable format.

In the Green Button Download My Data scenario, a Retail Customer goes to a web portal of the Data Custodian. The Retail Customer establishes his credentials via a login process and is then led through a dialog to select data he is eligible for. The data is downloaded as a simple XML file. The XML file references the XML schema that governs its contents and references a style sheet that renders it in a web browser.

## Green Button Connect My Data

Note: the creation and operation of the Green Button Connect My Data is explicitly defined in the Use Cases of the ESPI standard. Green Button Connect My Data extends the concepts and benefits of Green Button Download My Data; while Download My Data provides a one-time download of historical energy usage information directly to the consumer, Connect My Data enables the secure delivery of historical and ongoing usage information from the Data Custodian to one (or possibly more) 3rd Parties, as selected by the Retail Customer.

In the Green Button Connect My Data scenario, a Retail Customer goes to a web portal to select a Data Custodian and a Third Party. In order to complete the establishment of the three-way relationship between the Retail Customer, the Data Custodian, and the Third Party, the Retail Customer must independently establish his identity with the Data Custodian and the Third Party.

The Retail Customer connects with the Data Custodian and is then led through a dialog to select available data. Additionally, the Retail Customer chooses a time period for the ongoing delivery of future usage information. The Data Custodian indicates to the 3rd Party that a Retail Customer has initiated this three-way relationship and data exchange. Once the three-way relationship is successfully established, the Data Custodian securely delivers usage information to the 3rd Party.

The authorization of the exchange does not require the sharing of private information between the Data Custodian and the Third Party. No Private information about the Customer is exchanged between Data Custodian and the Third Party.

## Smart Device acquires Green Button Data from Data Custodian

This scenario exemplifies the notion that Green Button data can be accessed and used by individual smart devices such as a handheld or a thermostat installed in a building (commercial, industrial or residential). In this case the device or an application executing on the device plays the role of a Third Party in the scenario that autonomously acquires the Green Button data from the Data Custodian. The device can acquire the data on demand or automatically based on the initial granting of the authority.

Devices such as a building automation systems (BAS), energy management systems, handheld devices, thermostats, or human interface displays receive historical energy consumption data from a Data Custodian (which may be a third-party service provider that retrieved the data originally from a utility).  The data can be obtained on demand by the device and/or “pushed” from the service provider.  The device owner provides advance authorization for the Data Custodian to provide the Green Button data to the device.

## Third Party acquires large batches of Green Button Data from single Utility

A Third Party service provider has a very large number of Customer accounts with a specific Data Custodian (utility). Authorization for Green Button data has been previously obtained for each individual Customer. The Third Party needs to acquire the Green Button data daily, or on a varying periodic basis, on behalf of the very large number of customers. This process is repeated with other Data Custodians the Third Party has Customer’s associated with.

For practical reasons, Green Button data from large numbers of individual authorizations must be able to be aggregated into a bulk exchange to balance demands on infrastructure throughput.

## Original reads (Catch up data)

Bulk Historic Data Download. This use case would be around the need for systems that use historic data to forecast future events, such as DR, to be able to download as much historic data as needed.

• ability to load historic time series data as defined by GB schema

• ability to specify a time period for download

Best practices require the persistence of the historical data, so that the same data isn’t repeatedly transferred between the Data Custodian and Third Party. If ongoing usage information is required via Green Button Download My Data, the Customer should ask for incremental data from the Data Custodian.

## Collecting Sub-metering Data[[1]](#footnote-1)

In this use case, a Metering Data Management Agent (MDMA) (which could be the Meter Service Provider (MSP)) provides the sub-metering data to the billing agent (traditionally the utility).

The MDMA would act in the role of a Data Custodian and the utility would be the Third Party. The metering data supplied would either be billing quality (VEE) or corrected/historical data, and the rules related to the provisioning of the data depend upon the requirements of the billing agent (e.g., aggregated/disaggregated, time period for delivery, intervals, push or pull, etc.) under the auspices of the sub-metering customer.

Note: this Application Profile is similar to the Green Button Connect My Data, above, however it points out the role reversal of the organizations that typically act as Data Custodian and Third Party.

## Green Button Commercial Profile

Commercial applications of Green Button typically range from 20-200KW of demand and will typically be sensitive to changes that occur in the electrical supply.

Commercial applications of Green Button will require access to usage data in KWh and demand data in KW along with power quality data. Energy usage information may also include ratchet demand, reading quality, peak demand and other detail and/or summary information that enables the commercial owner/operator to better manage energy consumption on a day-to-day and year-to-year basis. Power quality information includes statistics such as voltage, voltage perturbations, outage, frequency, and other relevant measurements.

Commercial applications may utilize sub-meters. In the case of sub-meters, the parent meter needs to be identified using appropriate nomenclature. Understanding the parent-child meter relationships permits the consolidation of facility energy data. A Data Custodian, who could be a utility/service provider or an energy management system monitoring its own meters, would be required to be able to maintain the relationship between submeters and parent-meters and provide coherent sets of UsagePoints that expose this relationship.

## Green Button Industrial Profile

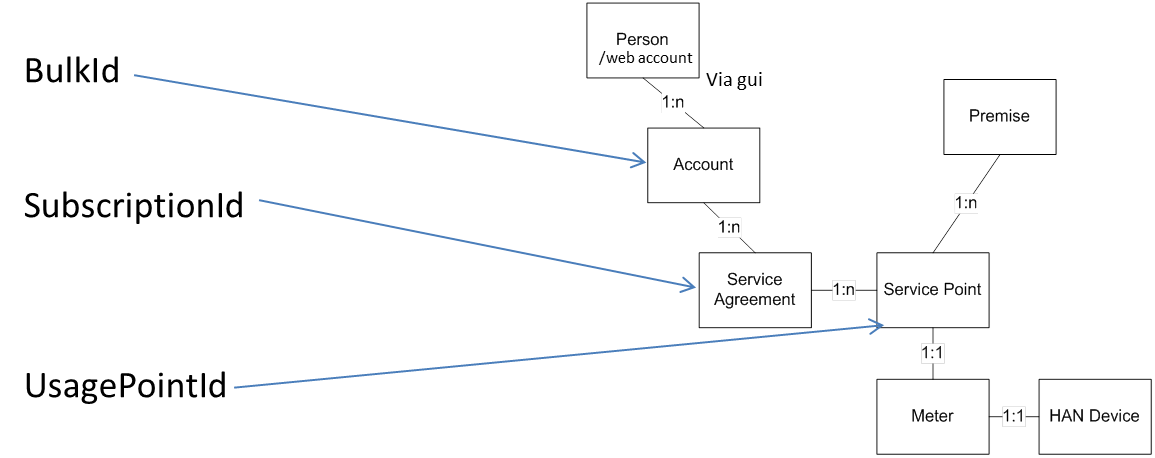
Industrial applications typically range above 200KW of demand. These applications need access to interval usage information in KWh or MWh and demand information in KW or MW depending upon facility consumption.

Industrial applications of Green Button will require access to usage data in KWh and MWh and demand data in KW and MW along with power quality data. Energy usage information may also include ratchet demand, reading quality, peak demand and other detail and/or summary information that enables the commercial owner/operator to better manage energy consumption on a day-to-day and year-to-year basis. Power quality information includes statistics such as voltage, voltage perturbations, outage, frequency, and other relevant measurements.

Industrial applications may utilize sub-meters. In the case of sub-meters, the parent meter needs to be identified using appropriate nomenclature. Understanding the parent-child meter relationships permits the consolidation of facility energy data. A Data Custodian, who could be a utility/service provider or an energy management system monitoring its own meters, would be required to be able to maintain the relationship between submeters and parent-meters and provide coherent sets of UsagePoints that expose this relationship.

## Web Customer Manages Multiple Customer Accounts

A Web Customer for a major utility account accesses a Data Custodian’s Web Portal to manage multiple customer Accounts. Upon log in to the Data Custodian’s Web Portal, the web customer can manage multiple customer accounts, for which each customer account can represent multiple usage points (for electricity and/or gas). This mostly impacts large agricultural and commercial customer accounts for which a single web customer can represent hundreds to thousands of individual usage points – imagine a franchise manager with multiple branch locations across a data custodian’s service territory.



In this scenario, the Web Customer should have the ability to authorize, de-authorize and change scope on an individual “usage point” basis and optionally at the larger aggregated web customer or customer account basis. This includes the ability to perform one-time authorization of multiple customer accounts by a single web customer to third party, and any subsequent scope changes (whether on an aggregated or individual basis) – third party acknowledgement/communication of which customer accounts have been authorized, de-authorized or whose scope has changed needs to be determined.

## Conformance Blocks

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Function Block | Green Button Download My Data | Green Button Connect My Data | Smart Device acquires Green Button Data from Data Custodian | Third Party acquires large batches of Green Button Data from single Utility | Original reads (Catch up data) | Collecting Sub-metering Data | Green Button Commercial Profile: DMD | Green Button Commercial Profile: CMD |
| Data Custodian Role |  |  |  |  |  |  |  |  |
| [FB\_1]Common | M | M | M | M | M | M | M | M |
| [FB\_2] Green Button Download My Data | M |  |  |  |  |  | M |  |
| [FB\_3] Green Button Connect My Data |  | M | M | M | M | M |  | M |
| [FB\_4] Interval Metering | O | O | M | M | M | M | M | M |
| [FB\_5] Interval Electricity Metering | O | O | O | O | O | O | O | O |
| [FB\_6] Demand Electricity Metering | O | O | O | O | O | O | O | O |
| [FB\_7] Net Metering | O | O | O | O | O | O | O | O |
| [FB\_8] Forward and Reverse Metering | O | O | O | O | O | O | O | O |
| [FB\_9] Register Values | O | O | O | O | O | O | O | O |
| [FB\_10] Gas | O | O | O | O | O | O | O | O |
| [FB\_11] Water | O | O | O | O | O | O | O | O |
| [FB\_12] Cost of Interval Data | O | O | O | O | O | O | O | O |
| [FB\_13] Security and Privacy classes | O | M | M | M | M | M | M | M |
| [FB\_14] Authorization and Authentication | O | M | M | M | M | M | M | M |
| [FB\_15] Usage Summary | O | O | O | O | O | O | O | O |
| [FB\_16] Usage Summary with Cost | O | O | O | O | O |  | O | O |
| [FB\_17] Power Quality Summary | O | O | O | O | O | O | O | O |
| [FB\_18] Multiple UsagePoints | O | O | O | M | O | O | M | M |
| [FB\_19] Partial update data | O | O | O | M | M | M | M | M |
| [FB\_27] Usage Summary with Demands and Previous Day Attributes | O | O | O | O | O |  | O | O |
| [FB\_28] Usage Summary Costs for Current Billing Period | O | O | O | O | O |  | O | O |
| [FB\_29] Temperature | O | O | O | O | O | O | O | O |
| [FB\_30] Common User Experience | O |  | O | O | O | O | O | O |
| [FB\_33] Management REST Services |  | O |  |  |  |  |  | O |
| [FB\_34] SFTP for Bulk |  | O |  |  |  |  |  | O |
| [FB\_35] REST for Bulk |  | O |  |  |  |  |  | O |
| [FB\_36] Third Party Dynamic Registration |  | O |  |  |  |  |  | O |
| Third Party Role |  |  |  |  |  |  |  |  |
| [FB\_20] Common |  | M |  |  |  |  |  | M |
| [FB\_21] Green Button Connect My Data |  | M |  |  |  |  |  | M |
| [FB\_22] Third Party Security |  | M |  |  |  |  |  | M |
| [FB\_23] Authorization and Authentication – Third Party Role |  | M |  |  |  |  |  | M |
| [FB\_24] Request Bulk UsagePoints from Data Custodian |  | O |  |  |  |  |  | O |
| [FB\_25] Request Partial Update Data |  | O |  |  |  |  |  | O |
| [FB\_26] Properly Respond to Various Bad or Missing Data |  | M |  |  |  |  |  | M |
| [FB\_42] Third Party Core REST Services |  | O |  |  |  |  |  | O |
| [FB\_43] Third Party Management REST Services |  | O |  |  |  |  |  | O |

# High Level Requirements for Test Plan and Deliverables

The high level requirements in this section come from the SGIP PAP20 allocations of requirements to the Green Button Test Plan. See <http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/PAP20Objective1>.

## Green Button Download My Data

### Test Plan Requirements

[PAP20\_1] The Green Button Download My Data [File Transfer] Test Plan shall define the implementation and testing requirements for “Green Button Download My Data”.

[PAP20\_2] The Test Plan shall be requirements driven.

[PAP20\_3] The Test Plan Requirements shall include requirements documented by the initial adopters of Green Button and accepted in the OpenADE Test Plan development process.

[PAP20\_4] The Test Plan Requirements shall include requirements derived from early experiences with Green Button implementations and accepted in the OpenADE Test Plan development process.

[PAP20\_5] The Test Plan Requirements shall include high level requirements that derive from documented usage scenarios (Application Profiles) for Green Button Download My Data.

[PAP20\_6] The Test Plan Requirements document shall include a mapping of detailed requirements to high level requirements (Application Profiles).

[PAP20\_7] The Test Plan Requirements document shall be published and maintained separately from the test documents so that it can be separately versioned, easily correlated to test cases (e.g. by aligning outline structures), and is not inadvertently changed as the test documents are iterated.

[PAP20\_8] The Test Plan shall include the definition of conformance blocks to identify subsets of functionality.

[PAP20\_9] The Test Plan shall include the definition of profiles which are groupings of conformance blocks to suit different capabilities needed by different providers.

[PAP20\_10] There should be as few such profiles as can be rationally achieved in the definition of the test plan to maximize interoperability.

[PAP20\_11] At least one core profile shall be defined that is part of all others.

[PAP20\_12] A test profile shall have a conformance block that indicates inclusion or exclusion of cost information.

[PAP20\_13] The Test Plan shall include implementation agreements that make clear interpretations of the NAESB REQ.21ESPI standard.

[PAP20\_14] Test Plan document should identify the Application Profiles the Test Plan is intended to support.

### Test Plan

[PAP20\_15] The Green Button Download My Data Test Plan shall include tests of composition of the file.

[PAP20\_16] The Test Plan shall define a set of Test Cases.

[PAP20\_17] The Test Plan shall include tests of internal referential consistency (that is what entries are associated with what other entries).

[PAP20\_18] Publically available test vectors (examples) shall be produced.

[PAP20\_19] The Test Cases shall be repeatable producing the same results.

[PAP20\_20] Test Cases shall have explicit pass-fail criteria.

[PAP20\_21] Test Cases shall be described in a reproducible test procedure.

[PAP20\_22] The Test Plan shall include reporting requirements for test results (mapping of results to the test case pass/fail criteria).

[PAP20\_23] The Test Plan and Test Report shall describe the detailed test environment.

[PAP20\_24] The Test Plan and Test Report shall identify relevant version information for all version-varying bases for the test.

[PAP20\_25] The Test Report shall contain a compilation of the test results from all the relevant test cases (as specified in the PICS).

### Test Tools

[PAP20\_26] The Test Tools shall support implementer self-evaluation for pretesting for his own confidence testing.

[PAP20\_27] The Test Tools may have purposes and implement features beyond certification testing (such as stress testing).

[PAP20\_28] The Test Tools shall be suitable for use in certification testing.

[PAP20\_29] The Test Tools shall define and implement a standard interface for attaching a UUT to the test harness.

### Privacy and Cybersecurity Requirements

[PAP20\_30] The Green Button Test Plan shall have a test case that verifies that no personal identification information is in the Green Button Data file – such data includes name, address, phone number, email, account number, meter IP or MAC address, HAN IP address, Social Security Number, or financial information (e.g., credit card number or bank routing information used for automatic payments).

[PAP20\_31] Use of identity credentials should be aligned with the Four Guiding Principles of the National Strategy for Trusted Identities in Cyberspace: identity solutions should be privacy-enhancing and voluntary, secure and resilient, interoperable, and cost-effective and easy to use. An assesment of this requirement shall produce a summary artifact of how it is satisfied.

[PAP20\_32] All identifiers in the Green Button Test Plan shall be anonymous IDs that can only be associated with a specific customer account by information held by the Data Custodian that must be shared by separate action outside the NAESB REQ.21ESPI protocol.

## Green Button Connect My Data

### Test Plan Requirements

[PAP20\_33] The Green Button Connect My Data[Automated Data Exchange] Test Plan shall define the implementation and testing requirements for “Green Button Connect My Data”.

[PAP20\_34] The Test Plan shall be requirements driven.

[PAP20\_35] The Test Plan Requirements shall include requirements documented by the initial adoptors of Green Button and accepted in the OpenADE Test Plan development process.

[PAP20\_36] The Test Plan Requirements shall include requirements derived from early experiences with Green Button implementations and accepted in the OpenADE Test Plan development process.

[PAP20\_37] The Test Plan Requirements shall include high level requirements that derive from document usage scenarios (Application Profiles) for Green Button Green Button Connect My Data.

[PAP20\_38] The Test Plan Requirements document shall include a mapping of detailed requirements to high level requirements (Application Profiles).

[PAP20\_39] The Test Plan Requirements document shall be published and maintained separately from the test documents so that it can be separately versioned, easily correlated to test cases (e.g. by aligning outline structures), and is not inadvertently changed as the test documents are iterated.

[PAP20\_40] The scope of the Test Plan extends the Green Button Download My Data plan and includes the NAESB REQ.21ESPI communications protocols and Use Cases

[PAP20\_41] The Test Plan shall include the definition of conformance blocks for the Services and Use Cases of NAESB REQ.21ESPI.

[PAP20\_42] The Test Plan shall include the definition of profiles which are groupings of conformance blocks to suit different capabilities needed by different providers.

[PAP20\_43] There should be as few such profiles as can be rationally achieved in the definition.

[PAP20\_44] At least one core profile shall be defined.

[PAP20\_45] The Test Plan shall include implementation agreements that make clear interpretations of the NAESB REQ.21ESPI standard.

### Test Plan

[PAP20\_46] The Green Button Connect My Data Test Plan shall include tests of all 12 NAESB REQ.21ESPI Use Case scenarios.

[PAP20\_47] The Test Plan shall incorporate all data content tests from the Green Button Download My Data Test Plan, including conformance blocks.

[PAP20\_48] The Test Plan shall include negative test cases.

[PAP20\_49] Publically available test vectors (examples) shall be produced.

[PAP20\_50] The Test Cases shall be repeatable producing the same results.

[PAP20\_51] Test Plan document should identify the Application Profiles the test plan is intended to support.

[PAP20\_52] The Test Plan shall define a set of Test Cases.

[PAP20\_53] Test Cases shall have explicit pass-fail criteria.

[PAP20\_54] Test Cases shall be described in a reproducible test procedure.

[PAP20\_55] The Test Plan shall include reporting requirements for test results (mapping of results to the test case pass/fail criteria).

[PAP20\_56] The Test Plan and Test Report shall describe the detailed test environment.

[PAP20\_57] The Test Plan and Test Report shall identify relevant version information for all version-varying bases for the test.

[PAP20\_58] The Test Report shall contain a compilation of the test results from all the relevant test cases (as specified in the PICS).

### Test Tools

[PAP20\_59] The Test Tools shall support implementer self evaluation for pretesting for his own confidence testing.

[PAP20\_60] Tools developed as part of the test plan should be unit tested.

[PAP20\_61] Tools developed as part of the test plan should be integration tested.

[PAP20\_62] The Test Tools may have purposes and implement features beyond certification testing (such as stress testing).

[PAP20\_63] The Test Tools shall be suitable for use in certification testing.

[PAP20\_64] The Test Tools shall define and implement a standard interface for attaching a UUT to the test harness.

### Privacy and Cybersecurity Requirements

[PAP20\_65] The Green Button Test Plan shall have a test case that verifies that no personal identification information is in the Green Button Data file – such data includes name, address, phone number, email, account number, meter IP or MAC address, HAN IP address, Social Security Number, or financial information (e.g., credit card number or bank routing information used for automatic payments).

[PAP20\_66] Use of identity credentials should be aligned with the Four Guiding Principles of the National Strategy for Trusted Identities in Cyberspace: identity solutions should be privacy-enhancing and voluntary, secure and resilient, interoperable, and cost-effective and easy to use. An assesment of this requirement shall produce a summary artifact of how it is satisfied.

[PAP20\_67] All identifiers in the Green Button Test Plan shall be anonymous IDs that can only be associated with a specific customer account by information held by the Data Custodian that must be shared by separate action outside the NAESB REQ.21ESPI protocol.

# Function Block Test Requirements

*Issue: Does the Third party have to perform an observable testable behavior when it receives Green Button Data. Some say no. Some say yes.*

The descriptions in this section, below each Function Block definition are informative descriptions. The normative requirement is the test requirement [TR\_xxxx]. Each Function Block has an identifier [FB\_XX] where XX makes the identifier unique within this document.

*Note: At the time of this version, the function block requirements are completed for Green Button Download My Data. Function Blocks for Green Button Connect My Data will be completed in the coming months.*

## Data Custodian Role

### [FB\_1] Common

This block contains the test requirements that all Data Custodian Green Button implementations must satisfy.

#### Other requirements

[TR\_CPYRT001] Verify Data Custodian Purchase of Standard: Verify the implementer has purchased the NAESB ESPI standard.

[TR\_CERT001] Certification Link: Verify that data set contains link to certification status record.

#### Protocol requirements

[TR\_PROTO001] Verify implementation of HTTP: Verify implementation of HTTP

#### Data requirements

##### General

[TR\_D144] Timestamps in UTC: Verify by analysis that ESPI timestamps (based on espi:TimeType) in Green Button data files are based on UTC without timezone or DST offsets.

[TR\_FDFTP008] Correct timestamps: Check atom timestamps (based on atom:dateTimeType) are encoded as Universal Coordinated Time (UTC)

[TR\_D004] entry id's (URNs): verify the uniqueness

##### Feed

[TR\_D000] feed: verify the presence of a valid value

[TR\_D001] feed id: verify the presence of a valid value

[TR\_D002] feed title: verify the presence of a valid value

[TR\_D003] feed updated: verify the presence of a valid value

##### UsagePoint

[TR\_FDFTP001] Repeatable UUIDs: Check UUIDs remain the same over time.

[TR\_D014] UsagePoint self link: verify that link is unique

[TR\_D011] UsagePoint id: verify the presence of a valid value

[TR\_D012] UsagePoint title: verify the presence of a valid value

[TR\_D013] UsagePoint self link: verify the presence of a valid value

[TR\_D015] UsagePoint up link: verify the presence of a valid value

[TR\_D016] UsagePoint related MeterReadingList: verify the presence of a valid value

[TR\_D008] UsagePoint ServiceCategory: verify the presence of a valid value

[TR\_D009] UsagePoint published: verify the presence of a valid value

[TR\_D010] UsagePoint updated: verify the presence of a valid value

[TR\_D006] UsagePoint: verify the presence of a valid value

[TR\_D007] UsagePoint related LocalTimeParameters: verify that UsagePoint points to at most one LocalTimeParameters

##### LocalTimeParameters

[TR\_D136] LocalTimeParameters: verify the presence of a valid value

[TR\_D137] LocalTimeParameters title: verify the presence of a valid value

[TR\_D138] LocalTimeParameters id: verify the presence of a valid value

[TR\_D139] LocalTimeParameters self link: verify the presence of a valid value

[TR\_D140] LocalTimeParameters up link: verify the presence of a valid value

[TR\_D141] LocalTimeParameters published: verify the presence of a valid value

[TR\_D142] LocalTimeParameters updated: verify the presence of a valid value

[TR\_D143] LocalTimeParameters self link: verify that link is unique

[TR\_D135] LocalTimeParameters self link: verify that each LocalTimeParameter points to at least one UsagePoint

### [FB\_2] Green Button Download My Data

This block contains the test requirements that are unique to the Green Button Download My data application.

[TR\_FDFTP002] Automated Content Tests for DMD: Verify that schema validation and all automated test succeed

[TR\_GB007] GB Data - Privacy: Export should not provide or use Personally Identifiable Information (PII)

### [FB\_3] Green Button Connect My Data

This block contains the test requirements that are unique to the Green Button Connect My data application.

[TR\_FND001] Initial test configuration: Initial configuation of the DataCustiodian under test and provide test harness with prerequisite information

[TR\_FND002] Authorized GET access to ApplicationInformation entry: Verify positive GET behavior for atom:entry with ApplicationInformation as the source using registration\_access\_token

[TR\_FND003] Authorized GET access to Authorization feed: Verify positive GET behavior for atom:feed with Authorization as the source using client\_access\_token

[TR\_FND004] Authorized GET access to Authorization entry: Verify GET behavior for entries with Authorization as the source using client\_access\_token

[TR\_FND005] Authorized GET access to Batch/Subscription feed: Verify GET behavior for Batch/Subscription resource using access\_token

[TR\_FND006] Authorized GET access to ReadServiceStatus: Verify GET behaviour for ReadServiceStatus resource using client\_access\_token

### [FB\_4] Interval Metering

Green button data contains historical interval load profile data for at least 13 months.

##### General

[TR\_D026] MeterReading: verify that "load profile" meter readings (ReadingType.accumulationBehavour=4) have associated interval blocks

##### MeterReading

[TR\_D018] MeterReading id: verify the presence of a valid value

[TR\_D019] MeterReading title: verify the presence of a valid value

[TR\_D020] MeterReading self link: verify the presence of a valid value

[TR\_D021] MeterReading self link: verify that link is unique

[TR\_D022] MeterReading up link: verify the presence of a valid value

[TR\_D023] Meter reading up link: verify correct up link

[TR\_D024] MeterReading related (ReadingType): verify that each MeterReading has one and only one associated ReadingType

[TR\_D025] MeterReading related (IntervalBlockList): verify that each MeterReading has associated metering data

[TR\_D027] MeterReading: verify the presence of a valid value

[TR\_D028] MeterReading (this test row is temporary for testing): verify the presence of a valid value

[TR\_D029] MeterReading published: verify the presence of a valid value

[TR\_D030] MeterReading updated: verify the presence of a valid value

[TR\_D145] MeterReading Interval Block/Interval Readings/ are all unique (by start time): verify the presence of unique values

[TR\_D146] MeterReading Interval Blocks are all unique (by start time): verify the presence of unique values

##### IntervalBlock

[TR\_D031] IntervalBlock id: verify the presence of a valid value

[TR\_D032] IntervalBlock: verify the presence of a valid value

[TR\_D033] IntervalBlock title: verify the presence of a valid value

[TR\_D034] IntervalBlock self link: verify the presence of a valid value

[TR\_D035] IntervalBlock self link unique: verify that link is unique

[TR\_D036] IntervalBlock up link: verify the presence of a valid value

[TR\_D037] IntervalBlock up link: verify that each IntervalBlock points to a single MeterReading

[TR\_D038] IntervalBlock interval duration: verify the presence of a valid value

[TR\_D039] IntervalBlock interval start: verify the presence of a valid value

[TR\_D040] IntervalBlock published: verify the presence of a valid value

[TR\_D041] IntervalBlock updated: verify the presence of a valid value

##### ReadingType

[TR\_D048] ReadingType id: verify the presence of a valid value

[TR\_D049] ReadingType: verify the presence of a valid value

[TR\_D050] ReadingType title: verify the presence of a valid value

[TR\_D051] ReadingType self link: verify the presence of a valid value

[TR\_D052] ReadingType self link: verify that link is unique

[TR\_D053] ReadingType up link: verify the presence of a valid value

[TR\_D054] MeterReading has ReadingType: verify that each MeterReading points to a ReadingType

[TR\_D069] ReadingType published: verify the presence of a valid value

[TR\_D070] ReadingType updated: verify the presence of a valid value

[TR\_D062] ReadingType intervalLength: verify the presence of a valid value

[TR\_D063] ReadingType kind: verify the presence of a valid value

[TR\_D065] ReadingType powerOfTenMultiplier: verify the presence of a valid value

[TR\_D068] ReadingType uom: verify the presence of a valid value

##### IntervalReading

[TR\_D044] IntervalReading timePeriod duration: verify the presence of a valid value

[TR\_D045] IntervalReading timePeriod start: verify the presence of a valid value

[TR\_D046] IntervalReading value: verify the presence of a valid value

[TR\_D042] first interval in block: verify that first interval in block start time matches the start time of the block

### Measurements

These measurements are optional but at least one must be selected.

#### [FB\_5] Interval Electricity Metering

Interval data contains Wh integrated over an interval.

[TR\_D078] ReadingType: verify the presence of 'Wh integrated over an interval' readings

[TR\_D064] ReadingType phase: verify the presence of a valid value for electricity

#### [FB\_6] Register Demand Electricity Metering

Interval data contains W readings.

[TR\_D071] ReadingType: verify the presence of W demand readings

[TR\_D072] ReadingType: verify the presence of VA demand readings

[TR\_D073] ReadingType: verify the presence of VAR demand readings

#### [FB\_7] Net Electricity Metering

Green button data contains net flow MeterReadings.

[TR\_D074] ReadingType: verify the presence of Wh net flow readings

#### [FB\_8] Forward and Reverse Electricity Metering

Green button data contains forward, reverse MeterReadings. Note forward is energy consumed by customer, reverse is provided to the grid.

[TR\_D075] ReadingType: verify the presence of Wh forward readings

[TR\_D076] ReadingType: verify the presence of Wh reverse readings

#### [FB\_9] Register Electricity Values for Dial Reading

Green Button Data contains register values (total energy since meter reset) – e.g. The “dial reading” in Wh”.

[TR\_D077] ReadingType: verify the presence of Wh register readings

#### [FB\_10] Interval Gas Metering

Interval data is gas in therms.

[TR\_D079] ReadingType: verify the presence of gas (therms) readings

#### [FB\_11] Interval Water Metering

Interval data is water in gallons.

[TR\_D080] ReadingType: verify the presence of water (USG) readings

### [FB\_12] Cost of Interval Data

Interval data contains cost attribute.

[TR\_D058] ReadingType currency: verify the presence of a valid value

[TR\_D043] IntervalReading cost: verify the presence of a valid value

### [FB\_13] Security and Privacy classes

Privacy and confidentiality tests on exchange of Green Button Data.

[TR\_TC001] Use of HTTPS: Verify the Data Custodian uses https for all endpoints.

[TR\_TC003] Data Custodian implements TLS 1.2: Verify the Data Custodian under test implements TLS 1.2.

[TR\_TC004] Negotiate highest level of TLS with browser: Verify that when communicating with a Retail Customer the Data Custodian negotiates the highest level of TLS supported by both parties.

[TR\_TC005] Reject TLS\_RSA\_WITH\_NULL\_SHA cipher suite: Verify that when communicating with a Retail Customer the Data Custodian rejects TLS\_RSA\_WITH\_NULL\_SHA cipher suites.

[TR\_TC006] Accept TLS\_RSA\_WITH\_AES\_128\_CBC\_SHA cipher suite: Verify that when communicating with a Retail Customer at a minimum the Data Custodian accepts the TLS\_RSA\_WITH\_AES\_128\_CBC\_SHA cipher suite.

[TR\_TC007] Negotiate highest level of cipher suite- covered by test FB\_13:TC003: Verify that when communicating with a Third Party the Data Custodian negotiates the highest level of TLS mutually supported.

[TR\_TC008] Quality of Certificate: Verify that the Data Custodian maintains an unexpired unrevoked RSA certificate with a public key length of at least 2048 bits.

[TR\_TC009] Root of trust: Test software or manual inspection shall verify that the Data Custodian RSA certificate was issued by a Certificate Authority (CA) that has been successfully audited according to the criteria of ETSI or WebTrust.

[TR\_TC010] Tokens and IDs have no PII: Test software or manual inspection shall verify that Tokens and IDs communicated by the Data Custodian are opaque and if based on actual Customer information that they are randomized using a secure method to protect privacy.

[TR\_TC011] Tokens and IDs have at least 48bits: Test software or manual inspection shall verify that Tokens and IDs communicated by the Data Custodian consist of at least 48 bits and can be the random number part of an RFC2422 UUID.

[TR\_TC012] FIPS 140-2 support: Manual inspection of supporting documentation shall confirm that the Data Custodian implementation utilizes software libraries which are FIPS 140-2 level 1 or higher and listed on the CMVP website.

### [FB\_14] Authorization and Authentication

This FB contains tests associated with the establishment and takedown of authorization and authentication of the DataCustodian and its peers.

#### Authorization

[TR\_OAD001] Malformed Authorization Code Requests: Verify Data Custodian rejects malformed OAuth Authorization Request

[TR\_OAD002] Authorization Code Request (Retail Customer Passes Authentication and DENIES access): Verify Data Custodian properly handles a Retail Customer who DENIES access while processing a valid Authorization Code Request

[TR\_OAD003] Access Token Request Authorization Header Rejection and malformed OAuth Authorization Code Access Token Request: Verify Data Custodian rejects an Access Token Request with an INVALID HTTP BASIC Authorization header or a malformed Authorization Code Access Token Request

[TR\_OAD004] Invalid Authorization Code Grant Access Token Request ("code" field-value pair contains a previously used authorization code): Verify Data Custodian rejects an Authorization Code Access Token Request containing a previously used authorization\_code

[TR\_OAD016] Invalid Access Token Request (Access Token contained in the Authorization Header has expired): Verify Data Custodian under test rejects a request containing an Access Token that has expired

#### Client Credentials

[TR\_OAD014] Malformed Client Credentials Grant Access Token Request: Verify Data Custodian rejects a malformed Client Credentials Access Token Request

[TR\_OAD015] Valid JSON structure returned during Data Custodian Client Credentials Grant Access Token Request processing: Verify Data Custodian responds with a valid Client Credentials Access Token Request JSON response

#### Access Token

[TR\_OAD005] Successful Access Token Request: Verify Data Custodian successfully issues an Authorization Code Access Token

[TR\_OAD006] Invalid Access Token Requests for ApplicationInformation: Verify Data Custodian rejects a GET RESTful request for ApplicationInformation resource that contains an incorrect "access token"

[TR\_OAD007] Invalid Access Token Requests for Authorization entry: Verify Data Custodian rejects a GET RESTful request for Authorization entry resource that contains an incorrect "access token"

[TR\_OAD008] Invalid Access Token Requests for Authorization feed: Verify Data Custodian rejects a GET RESTful request for Authorization feed resource that contains an incorrect "access token"

[TR\_OAD009] Invalid Access Token Request (Get RESTful Batch/Subscription request contains "registration\_access\_token"): Verify Data Custodian rejects a GET RESTful request for Batch/Subscription resource that contains an incorrect "access token"

[TR\_OAD010] Invalid Access Token Request (Get RESTful ReadServiceStats request contains "registration\_access\_token"): Verify Data Custodian rejects a GET RESTful request for ServiceStatus resource that contains an incorrect "access token"

#### Refresh Token

[TR\_OAD012] Valid refresh\_token request: Verify Data Custodian successfully process a refresh\_token request

[TR\_OAD013] Valid refresh\_token request invalidates prior access\_token: Verify Data Custodian invalidates prior access\_token after a successful refresh\_token request

[TR\_OAD011] Malformed Refresh Token Request: Verify Data Custodian rejects a malformed Refresh Token Access Token Request

### [FB\_15] Usage Summary

Includes a Usage Summary.

[TR\_D082] ElectricPowerUsageSummary id: verify the presence of a valid value

[TR\_D084] ElectricPowerUsageSummary title: verify the presence of a valid value

[TR\_D085] ElectricPowerUsageSummary self link: verify the presence of a valid value

[TR\_D087] ElectricPowerUsageSummary up link: verify the presence of a valid value

[TR\_D083] ElectricPowerUsageSummary: verify the presence of a valid value

[TR\_D086] ElectricPowerUsageSummary self link: verify that link is unique

[TR\_D088] ElectricPowerUsageSummary up link: verify that each ElectricPowerUsageSummary points to a single UsagePoint

[TR\_D089] ElectricPowerUsageSummary billingPeriod duration: verify the presence of a valid value

[TR\_D090] ElectricPowerUsageSummary billingPeriod start: verify the presence of a valid value

[TR\_D095] ElectricPowerUsageSummary currentBillingPeriodOverAllConsumption powerOfTenMultiplier: verify the presence of a valid value

[TR\_D096] ElectricPowerUsageSummary currentBillingPeriodOverAllConsumption timeStamp: verify the presence of a valid value

[TR\_D097] ElectricPowerUsageSummary currentBillingPeriodOverAllConsumption uom: verify the presence of a valid value

[TR\_D098] ElectricPowerUsageSummary currentBillingPeriodOverAllConsumption value: verify the presence of a valid value

[TR\_D099] ElectricPowerUsageSummary qualityOfReading: verify the presence of a valid value

[TR\_D081] ElectricPowerUsageSummary overallConsumptionLastPeriod: verify the presence of a valid value

[TR\_D100] ElectricPowerUsageSummary statusTimeStamp: verify the presence of a valid value

[TR\_D101] ElectricPowerUsageSummary published: verify the presence of a valid value

[TR\_D102] ElectricPowerUsageSummary updated: verify the presence of a valid value

### [FB\_16] Usage Summary Cost Components

Includes a Usage Summary with cost information.

[TR\_D091] ElectricPowerUsageSummary billLastPeriod: verify the presence of a valid value

[TR\_D093] ElectricPowerUsageSummary costAdditionalLastPeriod: verify the presence of a valid value

[TR\_D094] ElectricPowerUsageSummary currency: verify the presence of a valid value

### [FB\_17] Power Quality Summary

Includes a Power Quality Summary with the following data:.flickerPlt, flickerPst, harmonicVoltage, longInterruptions, mainsVoltage, powerFrequency, rapidVoltageChanges, shortInterruptions, summaryInterval, supplyVoltageDips, supplyVoltageImbalance, supplyVoltageVariations, tempOvervoltage   
NOTE: Would be good to have reactive measurements. E.g. VOLT/VAR

[TR\_D113] ElectricPowerQualitySummary flickerPlt: verify the presence of a valid value

[TR\_D114] ElectricPowerQualitySummary flickerPst: verify the presence of a valid value

[TR\_D115] ElectricPowerQualitySummary harmonicVoltage: verify the presence of a valid value

[TR\_D116] ElectricPowerQualitySummary longInterruptions: verify the presence of a valid value

[TR\_D117] ElectricPowerQualitySummary mainsVoltage: verify the presence of a valid value

[TR\_D118] ElectricPowerQualitySummary powerFrequency: verify the presence of a valid value

[TR\_D119] ElectricPowerQualitySummary rapidVoltageChanges: verify the presence of a valid value

[TR\_D120] ElectricPowerQualitySummary shortInterruptions: verify the presence of a valid value

[TR\_D134] summaryInterval DateTimeInterval: verify the presence of a valid value

[TR\_D121] ElectricPowerQualitySummary summaryInterval: verify the presence of a valid value

[TR\_D122] ElectricPowerQualitySummary supplyVoltageDips: verify the presence of a valid value

[TR\_D123] ElectricPowerQualitySummary supplyVoltageImbalance: verify the presence of a valid value

[TR\_D124] ElectricPowerQualitySummary supplyVoltageVariations: verify the presence of a valid value

[TR\_D125] ElectricPowerQualitySummary tempOvervoltage: verify the presence of a valid value

[TR\_D126] ElectricPowerQualitySummary: verify the presence of a valid value

[TR\_D127] ElectricPowerQualitySummary title: verify the presence of a valid value

[TR\_D128] ElectricPowerQualitySummary id: verify the presence of a valid value

[TR\_D129] ElectricPowerQualitySummary self link: verify the presence of a valid value

[TR\_D130] ElectricPowerQualitySummary up link: verify the presence of a valid value

[TR\_D131] ElectricPowerQualitySummary published: verify the presence of a valid value

[TR\_D132] ElectricPowerQualitySummary updated: verify the presence of a valid value

[TR\_D133] ElectricPowerQualitySummary self link: verify that link is unique

### [FB\_18] Multiple UsagePoints

Green Button Data contains multiple UsagePoints.

### [FB\_19] Partial update data

This group provides for periodic updates of a complete data set. Some subset of resources must be included with correct references to the correct collections.

### [FB\_27] Usage Summary with Demands and Previous Day Attributes

This group provides summary values for commercial demand measurements: ratchetDemand, ratchetDemandPeriod, peakDemand, currentDayOverallConsumption, previousDayOverallConsumption.

[TR\_D103] ElectricPowerUsageSummary ratchetDemand: verify the presence of a valid value

[TR\_D108] ratchetDemand SummaryMeasurement: verify the presence of a valid value

[TR\_D104] ElectricPowerUsageSummary ratchetDemandPeriod: verify the presence of a valid value

[TR\_D109] ratchetDemandPeriod DateTimeInterval: verify the presence of a valid value

[TR\_D105] ElectricPowerUsageSummary peakDemand: verify the presence of a valid value

[TR\_D110] peakDemand SummaryMeasurement: verify the presence of a valid value

[TR\_D106] ElectricPowerUsageSummary currentDayOverallConsumption: verify the presence of a valid value

[TR\_D111] currentDayOverallConsumption SummaryMeasurement: verify the presence of a valid value

[TR\_D107] ElectricPowerUsageSummary previousDayOverallConsumption: verify the presence of a valid value

[TR\_D112] previousDayOverallConsumptionSummaryMeasurement: verify the presence of a valid value

### [FB\_28] Usage Summary Costs for Current Billing Period

This group provides Usage Summaries that provide cost data for the current billing period in progress.

[TR\_D092] ElectricPowerUsageSummary billToDate: verify the presence of a valid value

### [FB\_29] Temperature

This group supports the reporting of temperature data. Interval data is in degrees K.

[TR\_D147] ReadingType: verify the presence of temperature (Kelvin) readings

### [FB\_30] Common User Experience

The requirements in this section provide for a common user experience through a web browser performing a Green Button Download My Data. *Note these requirements were originally derived by the California IOUs during the origination of the Green Button Initiative.*

[TR\_GB001] Green Button: Customers shall have the ability to download usage data using a Green Button

[TR\_GB011] GB Access: Customer shall access the information based on current login to access their consumption data

[TR\_GB014] GB No Re-authentication: Customer should not be authenticated or authorized as part of the download process

[TR\_GB015] GB Data - Access: Customer shall only have access to usage data from points associated with their customer accounts.

[TR\_GB016] GB Data - Timeframe: Customer shall be able to access at least 13 months of data, limited by usage data that has been collected by the data custodian and/or access rights

[TR\_GB017] GB Date Range Selection: Customers should be able to input \_from\_ and \_to\_ dates

[TR\_GB018] GB Warning Missing: If the full data range selected is not available, a message should be displayed that states that the data file does not cover the entire selected period.

[TR\_GB019] GB Save As: Customer should be able to save export file to any location they can access from the local machine

[TR\_GB009] GB File Naming: Export should use a standard file naming process and allow customer to change the file name when saving

[TR\_GB013] GB Graphics: Common Green Button icon graphics shall be displayed

[TR\_GB012] GB File Naming Convention: Export shall have a common filename convention

### [FB\_32] Resource Level REST

### [FB\_33] Management REST Services

### [FB\_34] SFTP for Bulk

[TR\_SFTP\_001] SFTP for BULK notification: Verify Thirdparty notification of Bulk data by DataCustodian and data transfer using SFTP

### [FB\_35] REST for Bulk

[TR\_RBK\_001] REST for BULK notification - authorized GET access: Verify Thirdparty notification of Bulk data by DataCustodian and data transfer using REST GET with client\_access\_token

[TR\_RBK\_002] REST for BULK notification - Forbidden GET access: Verify Thirdparty notification of Bulk data and fobidden access using access\_token, registration\_access\_token, empty access token

### [FB\_36] Third Party Dynamic Registration

### [FB\_37] Query Parameters

[TR\_QRY\_001] Query Parameters: support published\_min, published\_max

### [FB\_38] On Demand Requests

### [FB\_39] PUSH Model

[TR\_PSH\_001] Notification Push/POST to ThirdParty of ApplicationInformation: Verify Thirdparty notification of ApplicationInformation by DataCustodian

[TR\_PSH\_002] Notification Push/POST to ThirdParty of Authorization: Verify Thirdparty notification of Authorization by DataCustodian

[TR\_PSH\_003] Notification Push/POST to ThirdParty of Subscription: Verify Thirdparty notification of Subscription by DataCustodian

[TR\_PSH\_004] DataCustodian detection of Notification Push/POST failure: Verify by demonstration that notifcation to TP failure is detected by DC

### [FB\_40] Offline Authorization

[TR\_OFA\_001] Offline RetailCustomer Authorization: This test requires that the DC provide the TP with ApplicationInformation and one or more Authorizations in valid XML files. If the file contents are valid, they are good. In essence these are similar to what is needed for other tests but this FB requires that they be provided as valid XML.

### [FB\_41] Authorized PUT/DELETE ApplicationInformation Resource

[TR\_MGT\_001] Authorized PUT access to ApplicationInformation entry: Verify positive PUT behavior for atom:entry with ApplicationInformation as the source using registration\_access\_token

[TR\_MGT\_002] Authorized DELETE access to ApplicationInformation entry: Verify positive DELETE behavior for atom:entry with ApplicationInformation as the source using registration\_access\_token

[TR\_MGT\_003] Forbidden PUT, DELETE access to ApplicationInformation entry: Verify forbidden access to atom:entry, ApplicationInformation in response to PUT, DELETE using client\_access\_token, access\_token, empty access token

### [FB\_44] PUT/DELETE Authorization

[TR\_MGA\_001] Authorized PUT access to Authorization entry: Verify positive GET behavior for atom:feed with Authorization as the source using client\_access\_token

[TR\_MGA\_002] Authorized DELETE access to Authorization entry: Verify positive DELETE behavior for atom:feed with Authorization as the source using client\_access\_token

[TR\_MGA\_003] Forbidden PUT, DELETE access to Authorization entry: Verify forbidden access to atom:entry, Authorization in response to PUT, DELETE using registration\_access\_token, access\_token, empty access token

## Third Party Role (TBD)

20150818 – Not defined yet.

### [FB\_20]Common

This block contains the test requirements that all Third Party Green Button implementations must satisfy.

[TR\_CPYRT002] Verify Third Party Purchase of Standard: Verify the implementer has purchased the NAESB ESPI standard.

[TR\_CDPTP004] Valid input: Check that the client application processes correctly formatted XML as described by the current approved version of espi.xsd

[TR\_CDPTP005] Correct entries: Check that the client application shall process file with correct entries

[TR\_CDPTP006] Correct data types: Check that the client application shall process file with valid data types

[TR\_CDPTP007] Correct data units: Check that the client application shall process correct data units.

[TR\_CDPTP008] Correct data ranges: Check that client application correctly process data ranges

[TR\_CDPTP009] Valid links: Check that client application correctly processes links that point to contained entries.

[TR\_CDPTP010] Present required components: Check that client application correctly process timestamps

[TR\_CDPTP011] Unique UUIDs: Check client ability to handle multiple usage points

[TR\_CDPTP001] Correct timestamps: Check client ability to handle multiple meter readings (different reading types, if possible?)

[TR\_CDPTP002] Missing intervals: Check client ability to handle missing intervals

[TR\_CDPTP003] Default interval length: Check client ability to handle default (ReadingType) intervalLength, with subsequent IntervalReadings having only value

[TR\_CDPTN001] Invalid input: Check that the client application processes incorrectly formatted XML

[TR\_CDPTN002] Incorrect entries: Check that the client application shall process file with incorrect entries

[TR\_CDPTN003] Invalid data types: Check that the client application shall process file with invalid data types

[TR\_CDPTN004] Incorrect data units: Check that the client application shall process incorrect data units.

[TR\_CDPTN005] Invalid data ranges: Check client application correctly process invalid data ranges

[TR\_CDPTN006] Invalid links: Check that client application correctly processes links that point to invalid entries.

[TR\_CDPTN007] Correct Date Representations: Check that the client appication shall process file with correct date representations

[TR\_CDPTN008] Invalid Date Representations: Check that client appication correctly processes invalid date representations

### [FB\_21] Green Button Connect My Data

This block contains the test requirements that are unique to the Green Button Connect My data application.

[TR\_TC13] UpdateData\_ ((thirdPartyDefaultBatchResource)): Check Send requested and subscribed EUI

[TR\_TC14] NotifyData\_ ((thirdPartyDefaultNotifyResource)): Check Notify requested and subscribed EUI is available

### [FB\_22] Security and Privacy classes

Privacy and confidentiality tests on exchange of Green Button Data.

[TR\_TCT01] Third Party implements TLS 1.1 or higher: Verify that the Third Party implements TLS 1.1 or higher.

[TR\_TCT02] Third Party negotiates highest level of TLS: Verify that when communicating with a Retail Customer the Third Party negotiates the highest level of TLS mutually supported.

[TR\_TCT03] Third Party negotiates highest level of TLS: Verify that when communicating with a Data Custodian the Third Party negotiates the highest level of TLS mutually supported.

[TR\_TCT04] Quality of Certificate: Verify that the Third Party maintains an unexpired unrevoked RSA certificate with a public key length of at least 2048 bits.

[TR\_TCT05] Root of trust: Test software or manual inspection shall verify that the Third Party RSA certificate was issued by a Certificate Authority (CA) that has been successfully audited according to the criteria of ETSI or WebTrust.

[TR\_TCT06] Tokens and IDs have no PII: Test software or manual inspection shall verify that Tokens and IDs communicated by the Third Party are opaque and if based on actual Customer information that they are randomized using a secure method to protect privacy.

[TR\_TCT07] Tokens and IDs have at least 48bits: Test software or manual inspection shall verify that Tokens and IDs communicated by the Third Party consist of at least 48 bits and can be the random number part of an RFC2422 UUID.

[TR\_TCT08] FIPS 140-2 support: Manual inspection of supporting documentation shall confirm that the Third Party implementation utilizes software libraries which are FIPS 140-2 level 1 or higher and listed on the CMVP website.

### [FB\_23] Authorization and Authentication

This FB contains tests associated with the establishment and takedown of authorization and authentication of the Third Party and its peers.

[TR\_OAT001] Redirect Endpoint Verification: Verify through Inspection Third Party provides an OAuth Redirection Endpoint

[TR\_OAT002] Properly Formatted Authorization Code Request: Verify through Inspection Third Party issues a validly formatted OAuth Authorization Code Request

[TR\_OAT003] Authorization Code Request (Ignore invalid Authorization Code Response elements): Verify Third Party ignores any unrecognized response parameters in the Authorization Code Response

[TR\_OAT004] Properly Formatted Authorizaiton Code Access Token Request: Verify Third Party Issues a validly formatted OAuth Authorization Code Access Token Request

[TR\_OAT005] Authorization Code Grant Access Token Request response is successfully processed: Verify Third Party successfully processes a properly formatted Access Token Response

[TR\_OAT006] Properly Formatted Client Credentials Access Token Request: Verify Third Party Issues a validly formatted OAuth Client Credentials Access Token Request

[TR\_OAT007] Client Credentials Grant Access Token Request response is successfully processed: Verify Third Party successfully processes a properly formatted Client Credentials Grant Access Token Response

[TR\_OAT008] Properly Formatted Refresh Token Request: Verify Third Party Issues a validly formatted Refresh Token Request

### [FB\_24] Request bulk of UsagePoints from DataCustodian

A Third Party representing a large number of UsagePoints and Authorizations needs to be able to request them.

### [FB\_25] Request of Partial Update Data

A Third Party that needs to be able to request update data.

### [FB\_26] Respond properly to various bad or missing data

A third party responds accordingly to errant messages that don’t satisfy schema or are otherwise malformed.

# Testing Process

## Overview

Green Button testing can be performed for Green Button Download My Data or Green Button Connect My Data. This section summarizes the critical components of this testing. All tests are defined along with their test requirements in the GreenButtonTestCases.xlsm spreadsheet (see link in section 7.1 How to generate this document from the other artifacts).

The test requirements are found in section 5. The test procedures are found in section 6.4 Test.

## Policies and Principles and Test Assessment

The policies and principles under which testing and certification occurs at UCAIug can be retrieved from the following link:

<http://files.gbitca.org/certification-policies-procedures>.

## Application Submission

The application for testing and certification can be retrieved from the following link:

Download My Data: <http://files.gbitca.org/certification-application>

## Test Procedures

### Overview

This section contains the test procedures to be followed in concert with the certification process. These test procedures, separate for Green Button Download My Data and Green Button Connect My Data, form the basis of both the procedures and the resulting Test Data Sheet which is used to record and report the results of a given test.

### Green Button Download My Data

[FB\_01] Common

Tests: [TR\_CERT001] Verify that data set contains link to certification status record.

Procedure:

1. Inspect data set for link to https://cert.greenbuttonalliance.org/<id>

2. Paste link into web browser

3. Verify that record is returned

Passing Result:

Certification status record is returned.

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| <enter any comments or notes here including pasted images> |

* \_\_ COMPLIANT \_\_ NONCOMPLIANT Tester Initials: \_\_\_\_ Testee Initials: \_\_\_\_

Tests: [TR\_CPYRT001] Verify the implementer has purchased the NAESB ESPI standard.

Procedure:

1. Obtain the current "NAESB Copyright Policy and Companies with Access to NAESB Standard at http://www.naesb.org/pdf2/copyright.pdf. Alternatively, review list of purchased standards provided by NAESB to UCAIug for this purpose. If using NAESB list, skip steps 2&3 and paste instead row from NAESB list into box below.

2. Locate implementer's name on the North American Energy Standards Board's (NAESB) "Companies with Access to NAESB Standards" report.

3. Verify the "Retail Version(s)" column of the report's "Standard Products" section contains evidence of implementer having purchased the NAESB ESPI 1.0 Standard [column includes the "2.0" version or "Final Action (ESPI): 2011 Retail API 8c/R10008" | "REQ.21 (ESPI"] or equivalent evidence of purchase.

Passing Result:

Implementer's purchase of NAESB ESPI Standard is witnessed and verified using the NAESB "Companies with Access to NAESB Standards" report by Tester.

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| <enter any comments or notes here including pasted images> |

* \_\_ COMPLIANT \_\_ NONCOMPLIANT Tester Initials: \_\_\_\_ Testee Initials: \_\_\_\_

Tests: [TR\_D144] Verify by analysis that ESPI timestamps (based on espi:TimeType) in Green Button data files are based on UTC without timezone or DST offsets.

Procedure:

Note: if already logged in from a previous step, there is no need to log in again. Also, if the file needed has already been downloaded in a previous step, there is no need to download it again.

1. Log in the test account.

2. Download UsagePoints and save XML Instance

3. Log out.

4. The testee will indicate the time and reference of the first IntervalBlock. This may be the start of the first date selected in a range on the testee’s download page. Alternatively, the testee may know the expected start time reference for the first IntervalBlock in the file.

Time reference for first IntervalBlock enter here:

Passing Result:

All timestamps are based on UTC without timezone or DST offsets.

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| <enter any comments or notes here including pasted images> |

* \_\_ COMPLIANT \_\_ NONCOMPLIANT Tester Initials: \_\_\_\_ Testee Initials: \_\_\_\_

Tests: [TR\_FDFTP001] Check UUIDs remain the same over time.

Procedure:

Note: if already logged in from a previous step, there is no need to log in again. This procedure does require a separate download of a data file.

1. Log in the test account.

2. Select at least one UsagePoint associated with the account.

3. Download UsagePoints and save XML Instance.

4. Log out.

5. Log into same account.

6. Select same UsagePoints that were selected in the first enquiry.

7. Download UsagePoints and save XML Instance.

8. Compare saved XML Instance files.

9. All UUIDs for the UsagePoints in the two XML Instance files should be the same (the id tag of the UsagePoint entry.

Passing Result:

All UsagePoint UUIDs remain the same over time.

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| <enter any comments or notes here including pasted images> |

* \_\_ COMPLIANT \_\_ NONCOMPLIANT Tester Initials: \_\_\_\_ Testee Initials: \_\_\_\_

Tests: [TR\_FDFTP008] Check atom timestamps (based on atom:dateTimeType) are encoded as Universal Coordinated Time (UTC)

Procedure:

1. Using the previously downloaded file, the testee indicates the time at which the feed.updated timestamp was created (could be when it was downloaded)

Timestamp provided by testee enter here:

\_\_\_\_\_\_\_\_\_\_\_\_

2. Retrieve the timestamp from feed.updated enter here:

\_\_\_\_\_\_\_\_\_\_\_\_

3. Verify that the value of this timestamp is referenced to Zulu time (agrees with the time represented by the time given in 1)

4. Verify that timestamp in 2) ends in “Z” for Zulu

Passing Result:

All atom timestamps are based on UTC without timezone or DST offsets.

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| <enter any comments or notes here including pasted images> |

* \_\_ COMPLIANT \_\_ NONCOMPLIANT Tester Initials: \_\_\_\_ Testee Initials: \_\_\_\_

Tests: [TR\_PROTO001] Verify implementation of HTTP

Procedure:

Note: if already logged in from a previous step, there is no need to log in again.

1. Log in the test account.

2. Navigate to web portal Green Button Download My Data screen.

3. Verify that screen is shown

4. Verify webpage URL utilizes HTTP Protocol – inspect browser for http:// or https://.

Passing Result:

Web portal interface utilizes HTTP Protocol.

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| <enter any comments or notes here including pasted images> |

* \_\_ COMPLIANT \_\_ NONCOMPLIANT Tester Initials: \_\_\_\_ Testee Initials: \_\_\_\_

[FB\_02] Green Button Download My Data

Tests: [TR\_FDFTP002] Verify that schema validation and all automated test succeed

Procedure:

1. Go to URL for automated test using FF web browser http://www.greenbuttondata.org/greentest.aspx

2. Select the data content analysis FBs subset according to the PICS (note: only select the data content FBs that are also selected in the PICs – from among 1,4,5,6,7,8,9,10,11,12,15,16,17,27,28,29)

3. Check the box for download test results (under “4) Enable download of test results after test execution”)

4. Run the automated test by dropping the downloaded XML file on the designated place (under “5\_Drop File Here to Upload”)

5. Download results file

6. Insert the test report below by using insert/object/text from file and select downloaded test results and paste in the results paste area below.

Passing Result:

All tests successful

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| <enter any comments or notes here including pasted images> |

* \_\_ COMPLIANT \_\_ NONCOMPLIANT Tester Initials: \_\_\_\_ Testee Initials: \_\_\_\_

Tests: [TR\_GB007] Export should not provide or use Personally Identifiable Information (PII)

Procedure:

Note: if already logged in from a previous step, there is no need to log in again. Also, if the file needed has already been downloaded in a previous step, there is no need to download it again.

1. Log into test account.

2. Download the Green Button file and accept the recommended file name

3. Verify that the filename has no PII

4. Inspect the file contents and verify that no PII is present -- look at atom titles and uris

5. If “<extension>” tags are present in the file, review their contents for PII

6. Ask the Testee to assert that the URIs contain no encoded account numbers or other PII (This document does not define how this requirement shall be tested but compliance with this requirement is mandatory. In the absence of specific testing requirements, the vendor shall confirm compliance via a self-declaration statement and/or attestation.)

Passing Result:

Verify that no non-standard tags appear in the data file.

Inspect the extension fields for illegitimate data.

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| <enter any comments or notes here including pasted images> |

* \_\_ COMPLIANT \_\_ NONCOMPLIANT Tester Initials: \_\_\_\_ Testee Initials: \_\_\_\_

[FB\_04] Interval Metering

These tests are part of the automated suite of test procedures covered by [TR\_FDFTP002].

[FB\_05] Interval Electricity Metering

These tests are part of the automated suite of test procedures covered by [TR\_FDFTP002].

[FB\_06] Register Demand Electricity Metering

These tests are part of the automated suite of test procedures covered by [TR\_FDFTP002].

[FB\_07] Net Electricity Metering

These tests are part of the automated suite of test procedures covered by [TR\_FDFTP002].

[FB\_08] Forward and Reverse Electricity Metering

These tests are part of the automated suite of test procedures covered by [TR\_FDFTP002].

[FB\_09] Register Electricity Values for Dial Reading

These tests are part of the automated suite of test procedures covered by [TR\_FDFTP002].

[FB\_10] Interval Gas Metering

These tests are part of the automated suite of test procedures covered by [TR\_FDFTP002].

[FB\_11] Interval Water Metering

These tests are part of the automated suite of test procedures covered by [TR\_FDFTP002].

[FB\_12] Cost of Interval Data

These tests are part of the automated suite of test procedures covered by [TR\_FDFTP002].

[FB\_15] Usage Summary

These tests are part of the automated suite of test procedures covered by [TR\_FDFTP002].

[FB\_16] Usage Summary Cost Components

These tests are part of the automated suite of test procedures covered by [TR\_FDFTP002].

[FB\_17] Power Quality Summary

These tests are part of the automated suite of test procedures covered by [TR\_FDFTP002].

[FB\_27] Usage Summary with Demands and Previous Day Attributes

These tests are part of the automated suite of test procedures covered by [TR\_FDFTP002].

[FB\_28] Usage Summary Costs for Current Billing Period

These tests are part of the automated suite of test procedures covered by [TR\_FDFTP002].

[FB\_29] Interval Temperature Data

These tests are part of the automated suite of test procedures covered by [TR\_FDFTP002].

[FB\_30] Common User Experience

Tests: [TR\_GB009] Export should use a standard file naming process and allow customer to change the file name when saving

Procedure:

Note: if already logged in from a previous step, there is no need to log in again. Also, if the file needed has already been downloaded in a previous step, there is no need to download it again.

1. Begin the download data.

2. During the file "SaveAs" dialog, change the file name to "test.xml".

3. Verify that the file was saved as “test.xml”.

Passing Result:

Verify that the file saved is "Test.xml"

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| <enter any comments or notes here including pasted images> |

* \_\_ COMPLIANT \_\_ NONCOMPLIANT Tester Initials: \_\_\_\_ Testee Initials: \_\_\_\_

Tests: [TR\_GB011] Customer shall access the information based on current login to access their consumption data

Procedure:

1. Log in the test account and verify that applicable information is accessible by Green Button Icon on access screen.

2. Access the download function through accessing the Green Button Icon

3. Verify that unique information about the logged in user is presented prior to download.

4. Use the key combination alt + print screen and paste image here (paste in the results paste area below) – Note if appropriate erase or otherwise cover up personal data with “Paint Program"):

Passing Result:

After login, the user is presented with Green Button Graphic.

Pressing the Green Button Graphic provides the download or dialog to retrieve Green Button Data file.

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| <enter any comments or notes here including pasted images> |

* \_\_ COMPLIANT \_\_ NONCOMPLIANT Tester Initials: \_\_\_\_ Testee Initials: \_\_\_\_

Tests: [TR\_GB012] Export shall have a common filename convention

Procedure:

1. Begin the download data.

2. Inspect the file "SaveAs" for the default file name format.

3. Inspect the filename for these features:

1) Company name e.g. SDGE

2) Type of service e.g. Electric, Gas, or Water

3) Type of data e.g. Interval Data, Usage

4) Timeframe of the data being downloaded start time and end time.

Filename Example: SDGE\_Electric\_60\_Minute\_01-11-2012\_02-10-2013.XML

5) Paste the filename in the results paste area below.

Passing Result:

Verify that the file name provided meets the defined format.

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| <enter any comments or notes here including pasted images> |

* \_\_ COMPLIANT \_\_ NONCOMPLIANT Tester Initials: \_\_\_\_ Testee Initials: \_\_\_\_

Tests: [TR\_GB013] Common Green Button icon graphics shall be displayed

Procedure:

1. Navigate to the Download My Data web page and verify that green button Download My Data is available

2. Verify that a Green Button Download My Data graphic is displayed on this page.

Passing Result:

Verify that page has Green Button "Download My Data" graphic

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| <enter any comments or notes here including pasted images> |

* \_\_ COMPLIANT \_\_ NONCOMPLIANT Tester Initials: \_\_\_\_ Testee Initials: \_\_\_\_

Tests: [TR\_GB014] Customer should not be authenticated or authorized as part of the download process

Procedure:

1. Log out and verify that green button is not accessible

2. Log in the test account and verify that green button is accessible

3. Proceed to follow the instruction to download Green Button Data file

4. Verify that download does not require re-authentication

Passing Result:

No second log in is required to access Green Button Data

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| <enter any comments or notes here including pasted images> |

* \_\_ COMPLIANT \_\_ NONCOMPLIANT Tester Initials: \_\_\_\_ Testee Initials: \_\_\_\_

Tests: [TR\_GB015] Customer shall only have access to usage data from points associated with their customer accounts.

Procedure:

This document does not define how this requirement shall be tested but compliance with this requirement is mandatory. In the absence of specific testing requirements, the vendor shall confirm compliance via a self-declaration statement and/or attestation.

Passing Result:

User should not be able to download data for Usage Point(s) before they became the owner, or for which they are not currently the owner

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| <enter any comments or notes here including pasted images> |

* \_\_ COMPLIANT \_\_ NONCOMPLIANT Tester Initials: \_\_\_\_ Testee Initials: \_\_\_\_

Tests: [TR\_GB016] Customer shall be able to access at least 13 months of data, limited by usage data that has been collected by the data custodian and/or access rights

Procedure:

1. Use procedure from Test GB017 to attempt to download at least 13 months of data from a valid point where at least 13 months of data exist.

2. Verify that there are at least 13 months of data in the file by using the http://www.epochconverter.com/ and compare the start of the first and last IntervalBlock in the file and verify they therefore contain 13 months of data. – total duration in days = (last IntervalBlock start time + duration – first IntervalBlock.start) / 86400

Passing Result:

User should be able to retrieve at least 13 months if it has been acquired by the Data Custodian or the Testee asserts the system will support when that much data has been accumulated. This document does not define how this requirement shall be tested but compliance with this requirement is mandatory. In the absence of specific testing requirements, the vendor shall confirm compliance via a self-declaration statement and/or attestation.

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| <enter any comments or notes here including pasted images> |

* \_\_ COMPLIANT \_\_ NONCOMPLIANT Tester Initials: \_\_\_\_ Testee Initials: \_\_\_\_

Tests: [TR\_GB017] Customers should be able to input \_from\_ and \_to\_ dates

Procedure:

1. Navigate to Green Button download selection page, and verify that "from" and "to" date input controls are present.

2. Download an arbitrary selection of dates that are less than 13 months total duration

3. Verify that the GBDMD file has only data from dates including the “from” and “to” dates (note the start and end of the included IntervalBlocks may not align precisely with the “from” and “to” dates due to billing period boundaries).

Passing Result:

The controls are present

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| <enter any comments or notes here including pasted images> |

* \_\_ COMPLIANT \_\_ NONCOMPLIANT Tester Initials: \_\_\_\_ Testee Initials: \_\_\_\_

Tests: [TR\_GB018] If the full data range selected is not available, a message should be displayed that states that the data file does not cover the entire selected period.

Procedure:

1. Attempt to download a range of data larger than what exists.

2. Verify that a message is displayed stating the data is unavailable.

Passing Result:

A notice is displayed noting that the dataset does not contain all the requested intervals due to data availability.

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| <enter any comments or notes here including pasted images> |

* \_\_ COMPLIANT \_\_ NONCOMPLIANT Tester Initials: \_\_\_\_ Testee Initials: \_\_\_\_

Tests: [TR\_GB019] Customer should be able to save export file to any location they can access from the local machine

Procedure:

After selecting the point and other inputs, verify that the save dialog allows the user to choose the save location.

Passing Result:

Verify save location includes desktop, download, and My Documents directory.

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| <enter any comments or notes here including pasted images> |

* \_\_ COMPLIANT \_\_ NONCOMPLIANT Tester Initials: \_\_\_\_ Testee Initials: \_\_\_\_

### Green Button Connect My Data

## Test Results

The Test Data Sheet is filled out during the testing process (see section 6.4 Test) and is submitted.

# HowTo

## How to generate this document from the other artifacts

The test requirements and test implementations are generated by macros from the following referenced spreadsheet:

<http://osgug.ucaiug.org/sgsystems/OpenADE/Shared%20Documents/Testing%20and%20Certification/GreenButtonTestPlan/GreenButtonTestCases.xlsm>

# ~~Annex A: Proforma PICS~~

~~The Proforma PICS can be retrieved from the following link:~~

~~Download My Data:~~ [~~http://osgug.ucaiug.org/sgsystems/OpenADE/Shared%20Documents/Testing%20and%20Certification/GreenButtonTestPlan/GreenButtonDownloadMyDataPICS.docx~~](http://osgug.ucaiug.org/sgsystems/OpenADE/Shared%20Documents/Testing%20and%20Certification/GreenButtonTestPlan/GreenButtonDownloadMyDataPICS.docx)

# Annex B: Test Data Sheet

The Test Data Sheet can be retrieved from the following link:

Download My Data: <http://osgug.ucaiug.org/sgsystems/OpenADE/Shared%20Documents/Testing%20and%20Certification/GreenButtonTestPlan/GreenButtonTestDataSheet.docx>

# ~~Annex C: Proforma PIXIT~~

# Annex D: Orphaned Test Requirements

These requirements were captured over the course of the OpenADE Task Force review of Green Button and found to be unnecessary for the certification process. They are maintained here for historical purposes. They are “Informative” to the process only.

[FB\_99]

[TR\_TC002] Secure REST response header: Verify Data Custodian under test REST presonse headers include fields TBD

[TR\_TC013] Negotiate highest level of TLS using resourceServer: Verify that when communicating with a resourceServer the Data Custodian negotiates the highest level of TLS supported by both parties.

[TR\_TC014] Negotiate highest level of TLS using authorizationServer: Verify that when communicating with a authorizationServer the Data Custodian negotiates the highest level of TLS supported by both parties.

[TR\_D005] UsagePoint status: verify the presence of a valid value

[TR\_D017] UsagePoint roleFlags: verify the presence of a valid value

[TR\_D047] IntervalReading ReadingQuality: verify the presence of a valid value

[TR\_D057] ReadingType consumptionTier: verify the presence of a valid value

[TR\_D059] ReadingType dataQualifier: verify the presence of a valid value

[TR\_D060] ReadingType defaultQuality: verify the presence of a valid value

[TR\_D066] ReadingType timeAttribute: verify the presence of a valid value

[TR\_D067] ReadingType tou: verify the presence of a valid value

[TR\_GB002] [? Ensure that quality flags are applied as appropriate?] GB Granular Data: Export should not summarize usage data beyond what was captured by the meter

[TR\_GB003] GB Total Usage: Export shall provide total usage by commodity type

[TR\_GB004] GB Data - Actual and Estimated: Export shall include all usage data available, including actual or estimates data (whichever available)

[TR\_GB005] GB Data - Denote Estimated: Export should denote estimated usage data

[TR\_GB006] GB Data - Cost: Export should provide billing and/or pricing data available

[TR\_GB008] GB Security File: Export should not encrypt the data

[TR\_GB010] GB File Format: Export shall use ESPI file format

[TR\_GB020] GB Intervals: Export usage data shall be based on customer's meter intervals.

[TR\_GB021] GB Data - Grouping: Export shall group usage data by date, month and year, e.g. starting at 00 to 24 hours for each day in the month, from day 1 to end of month and then by year, demarked on a daily basis

[TR\_PRT\_001] Partial update of data: TBD. Is this requirement for upload role and not core data custodian

[TR\_CONF001] Configure Third Party: Verify ability to authorize and configure a third party

[TR\_APP001] ApplicationInformation:

[TR\_BAT001] Subscription:

[TR\_BAT002] Notification:

[TR\_BAT003] Deliver (Push):

[TR\_BAT004] Receive (Pull):

[TR\_INF001] ServiceStatus - DELETE: Verify DELETE behavior for ServiceStatus

[TR\_INF002] ServiceStatus - GET: Verify GET behavior for ServiceStatus

[TR\_INF003] ServiceStatus - PUT: Verify PUT behavior for ServiceStatus

[TR\_INF004] ServiceStatus - POST: Verify POST behavior for ServiceStatus

[TR\_ON001] Request / Reply:

[TR\_FND001a] Atom feed - GET: Verify GET behavior for feeds

[TR\_FND002a] Atom feed - PUT: Verify PUT behavior for feeds

[TR\_FND003a] Atom feed - POST: Verify POST behavior for feeds

[TR\_FND004a] Atom feed - DELETE: Verify DELETE behavior for feeds

[TR\_FND005a] Atom entry - GET: Verify GET behavior for entries

[TR\_FND006a] Atom entry - PUT: Verify PUT behavior for entries

[TR\_FND007a] Atom entry - POST: Verify POST behavior for entries

[TR\_FND008a] Atom entry - DELETE: Verify DELETE behavior for entries

[OTHER]

1. The California IOUs have been engaging with the OpenADE task force to be able to use the Green Button technology to facilitate transfer of sub-metered EV consumption measurements due to CPUC requirements for private party collection of data from charging. Here the private party acts as a Data Custodian and the utility acts as a Third Party. [↑](#footnote-ref-1)