



Green Button Download and Automated Data Exchange Conformance Suite

4/24/2013

Agenda

- Green Button background/standard progress
 - Dave Wollman, NIST
- Status of Green Button adoption
 - Don Von Dollen, EPRI
- Utility Perspective
 - Jerry Yip, Amy Costadone, PG&E
- Testing and Certification Progress
 - Marty Burns, HyperTek
- EPRI Supplemental Project
 - Gerald Gray, EPRI

The Green Button Initiative

Common-sense idea that households and businesses should be able to access their own energy usage data in a standard consumer- and computer-friendly format.



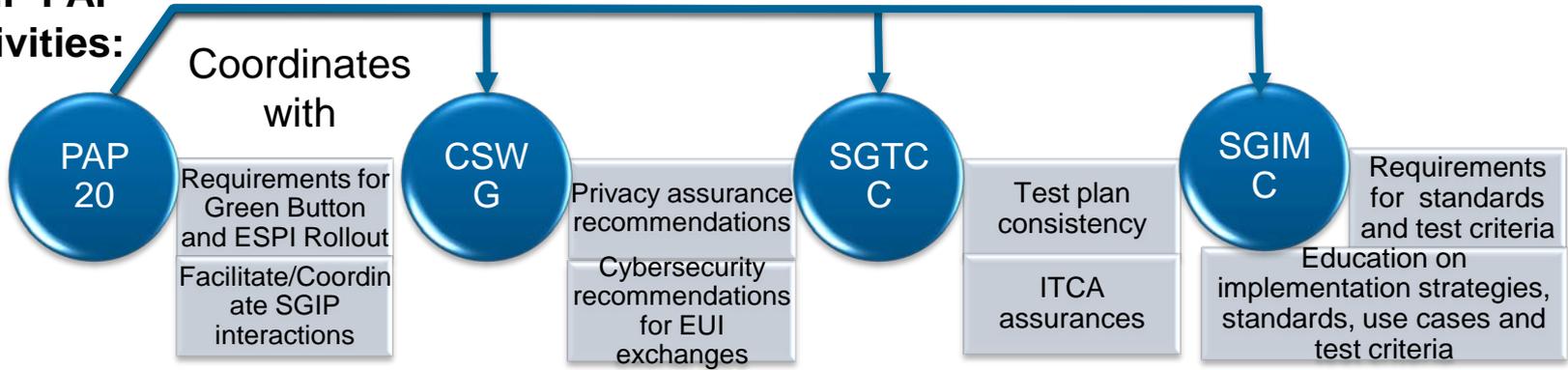
**Green Button
Download
My Data**

Green Button standards, testing/certification

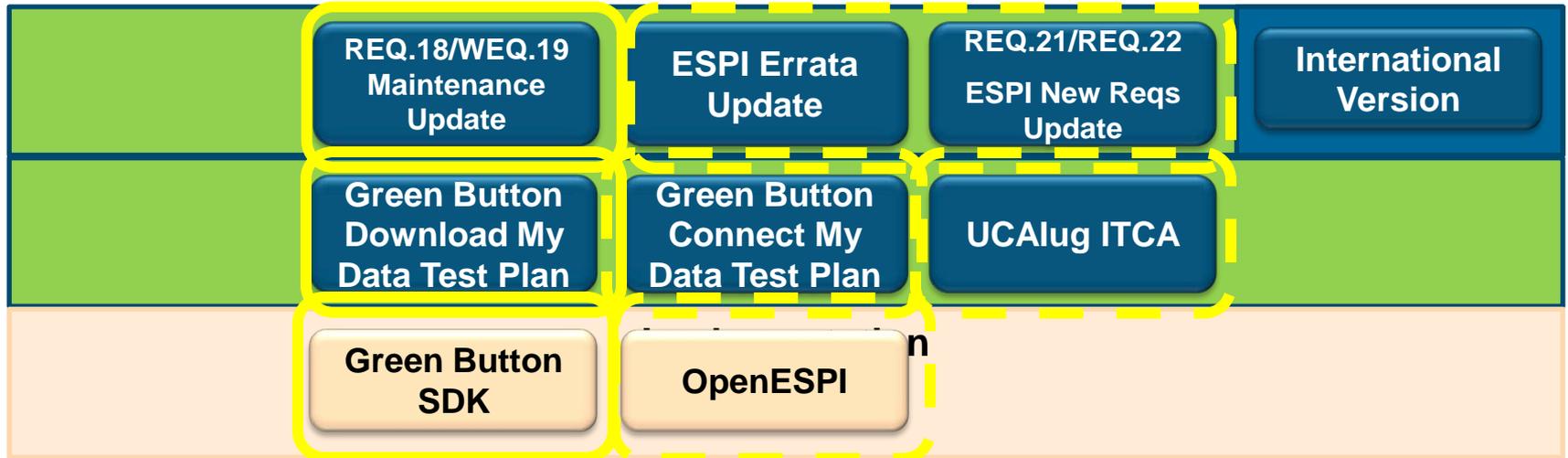
- Goal: provide technical foundation for Green Button
 - Support early adopters and implementations
 - Use lessons learned to feed back improvements into standards revision and testing and certification
 - Improve consistency of customer data experience
- SGIP Priority Action Plan PAP20 coordination
 - Green Button standardization - NAESB
 - Green Button testing and certification – UCAIug
 - Green Button implementation support (separate effort)

SGIP PAP20: Green Button ESPI Evolution Good progress to date ...

SGIP PAP Activities:



Specification Deliverables:



Key:

Completed

Near Complete

<https://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/GreenButtonSDK>

The screenshot shows a web browser window displaying a TWiki page. The address bar shows the URL: <https://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/GreenButtonSDK>. The page title is "USER GUIDE FOR THE NIST GREEN BUTTON SOFTWARE DEVELOPMENT KIT". The page content is organized into a table of contents with the following sections:

- Overview
- Green Button Certification and Testing and Specification Evolution
- Underlying Technology
- Versions of the SDK
 - Current File Versions
 - The current version of the SDK is available on GitHub
 - Original SDK and Development Artifacts
 - Anatomy of Green Button Data File
 - Green Button Data Major Classes
 - Sample Green Button Data Content
 - Linking of Entries
 - The ESPI standard says the following:
 - Proposed Link Best Practices
 - Structure of link URIs
 - Sample Links generated by Green Button Data Simulator
 - Timestamps in Green Button Data Files
 - The ESPI Schema
 - GreenButtonDataStyleSheet.xslt
 - Application of the stylesheet
 - GreenButtonDataSetGenerator.xlsm
 - Usage Simulation
 - External Data
 - Key Generator VBA Functions
 - GenerateGreenButtonDataSet()
 - GenerateGreenButtonDataSetSIM()
 - GenerateGreenButtonExternalDataSet()
 - External Data Format
 - Green Button Data Sample Web Presence
 - Sample Green Button Files
 - Sample Regional Customer Data Courtesy of SDG&E
 - Web Hosted Presentation Tool: Sample data manipulation -- charting and tabular output

Blue arrows point from callout boxes on the right to the following sections in the table of contents:

- Overview and Versions (points to Overview)
- Anatomy of GB Data (points to Anatomy of Green Button Data File)
- Customer Presentment Style Sheet (points to The ESPI Schema)
- Generator of sample data sets (points to Key Generator VBA Functions)
- Greenbuttondata.org Test Web Presence (points to Green Button Data Sample Web Presence)

Overview and Versions

Anatomy of GB Data

Customer Presentment Style Sheet

Generator of sample data sets

Greenbuttondata.org Test Web Presence

EPA Re-Launch of the Home Energy Yardstick with Green Button: Look for an EPA Announcement!



ENERGY STAR®

Home Energy Yardstick

Assess the energy efficiency of your home and see how it measures up:

EPA's Home Energy Yardstick provides a simple assessment of your home's annual energy use compared to similar homes. By answering a few basic questions about your home, you can get:

- Your home's Home Energy Yardstick score (on a scale of 1 to 10);
- Insights into how much of your home's energy use is related to heating and cooling versus other everyday uses like appliances, lighting, and hot water;
- Links to guidance from ENERGY STAR on how to increase your home's score, improve comfort, and lower utility bills; and
- An estimate of your home's annual carbon emissions.

Learn more about [how the Home Energy Yardstick works](#).

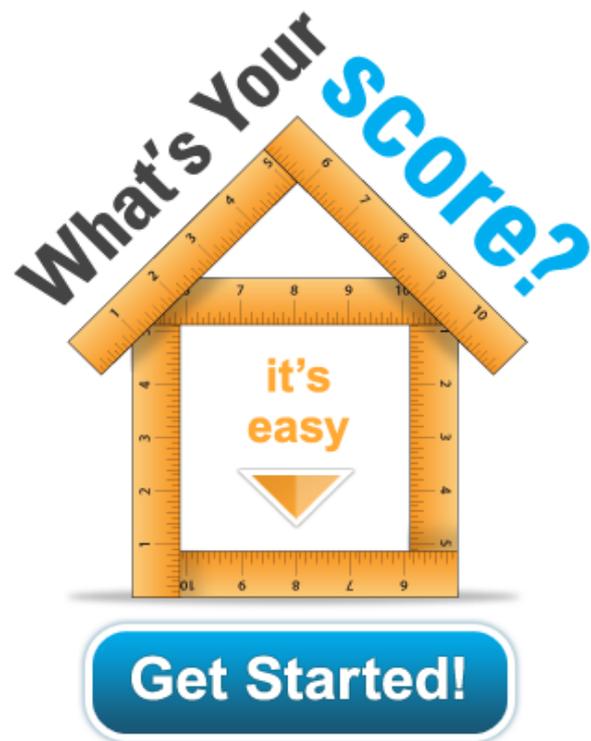
See a sample [results page](#).

Getting Started:

To calculate your Yardstick score, all you need is some basic information about your home:

- ✓ Your ZIP code;
- ✓ Your home's square footage;
- ✓ Number of full time home occupants;
- ✓ A list of all the different fuels used in your home (e.g., electricity, natural gas, fuel oil); and
- ✓ Your home's last 12 months of utility bills (usually found in the 12 month summary provided on your bill or through a Green Button file .

Having trouble with the Home Energy Yardstick? Contact us at yardstick@energystar.gov.

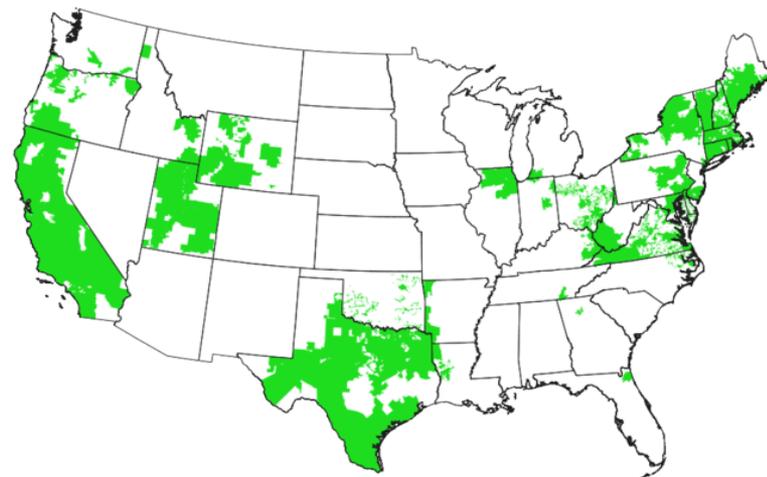


Utilities and electricity suppliers in **27 states and DC** across various regulatory regimes have committed to provide **36 million US homes and businesses** with Green Button data, over **16 million** of which already have

Green Button commitments

- American Electric Power (live in Texas!)
- Austin Energy
- Baltimore Gas & Electric (live!)
- Bangor Hydro Electric
- CenterPoint Energy (live!)
- Central Maine Power
- Chattanooga EPB
- Commonwealth Edison
- Consolidated Edison NY
- Glendale Water and Power
- JEA
- Kootenai Electric Cooperative
- National Grid
- Northeast Utilities:
 - Connecticut Light and Power
 - Western Mass. Electric Co.
 - New Hampshire Public Service Co.
- NSTAR (live!)
- Oncor (live!)
- Pacific Power
- Pacific Gas and Electric (live!)
- PECO
- PEPCO Holdings (live!)
- Portland General Electric
- PPL Electric Utilities
- Reliant (live!)
- Rocky Mountain Power
- Sawnee Electric Membership Corp.
- SDG&E (live!)
- Southern California Edison (live!)
- Texas New Mexico Power (live!)
- TXU Energy (live!)
- The United Illuminating Company
- Virginia Dominion Power
- Efficiency Vermont*

*Service Provider



Map of Green Button Commitments



**Green Button
Connect
My Data**

launched October 1st

Green Button to spur innovation in new areas

Insight: entrepreneur-created web portals analyze energy usage and provide actionable tips;

Heating and Cooling: customized heating and cooling activities for savings and comfort;

Education: community and student energy efficiency competitions;

Retrofits: improved decision-support tools to facilitate energy efficiency retrofits;

Verification: measurement of energy efficiency investments;

Real Estate: provide energy costs for tenants and/or new home purchasers; and

Solar: optimize the size and cost-effectiveness of rooftop solar panels.



For more information...

- <http://www.greenbuttondata.org>
- #GreenButton
- http://en.openei.org/wiki/Green_Button
- <http://energy.gov/data/green-button>
- <http://nist.gov/smartgrid/greenbutton.cfm>

Utility Perspective

Pacific Gas & Electric

Amy Costadone

Jerry Yip

Pacific Gas & Electric's Green Button Approach

Amy Kight Costadone
Jerry Yip



Wednesday, April 24, 2012

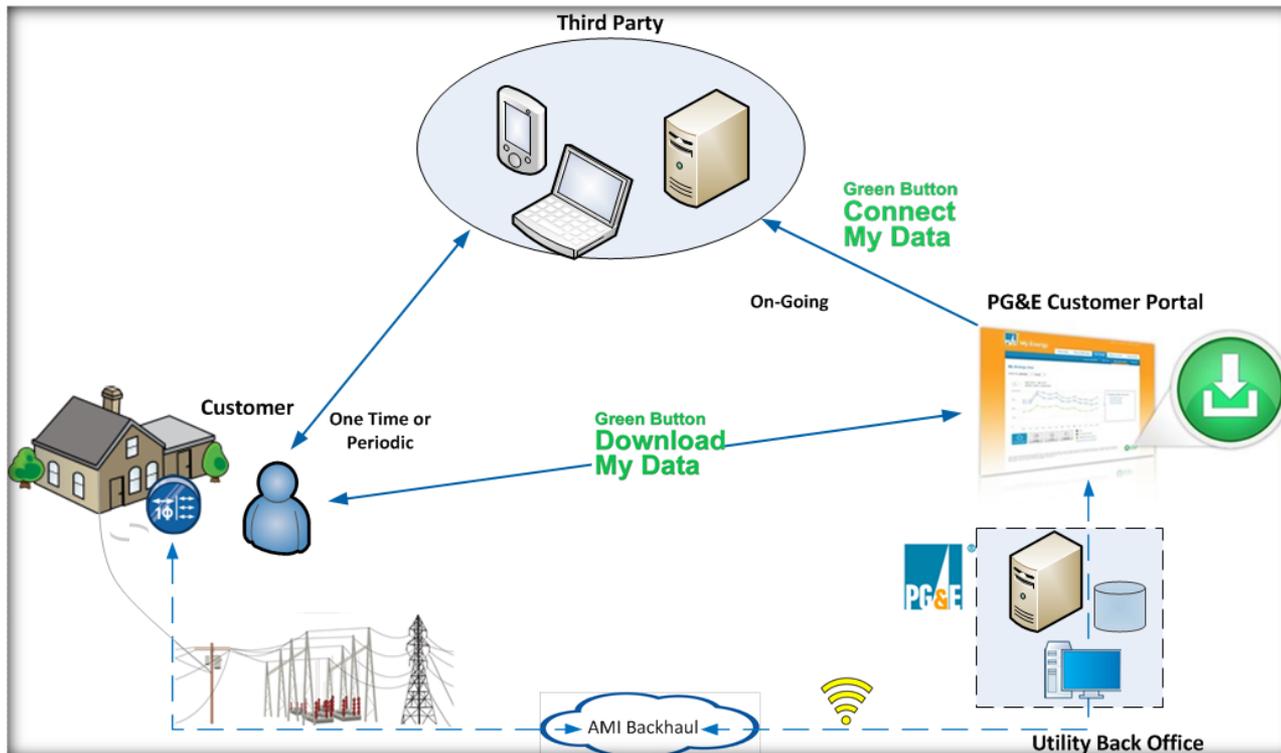


Green Button High Level Overview

- With the installation of SmartMeter technology, energy consumption data is readily available and at a much more granular level
- PG&E's goal is to provide energy usage data to consumers to empower them to consider how their daily consumption affects their bill and the environment

PG&E platforms to provide this data include:

- Real Time: Home and Business Area Network
- AMI Interval Data:
 - [Green Button → Customer Data Access \(CDA\)](#)





What's driving this market?

Regulatory Policy Goals

Call to Action

- White House “Call to Action” – enable consumers to download their detailed energy usage with the simple click of a “Green Button.”
-

Demand-Side Management

- Steadily growing number of requests from customers (and authorized third-parties) for access to their electricity usage data
 - Standardized, automated process for distributing customer meter data also expected to reduce cost and lead-time of supporting such requests
 - Streamlined access to customer data could fuel innovation and growth in the third-party services market, providing customers with more options to manage their energy usage
-

“Internet of things”

- Growing 3rd party retail market for energy management products and services
- Home controls and energy management is a key driver in this market



GB Download My Data

Launched in Dec 2011

Gives the ability for a customer to login to My Energy and download personalized energy usage data. By using Green Button:

- Customers can download their personal energy usage data
- Developers and third parties can receive energy usage data from customers in machine-readable form (when a customer sends this downloaded data to third parties)
- Launched December 2011
- 12/31/12 ~157,000 customers have downloaded their energy data

Green Button

Now you can download your detailed energy usage with the simple click of a button.

[Log in to My Energy](#)
or [Register](#)



**Green Button
Download
My Data**



GB Connect My Data (Beta)

Launched in Sept 2012

Green Button Connect is a software interface that allows PG&E customers to easily share their electrical data with other companies and service providers. These companies can then 'mash up' data in unique ways to help customers save energy.

Green Button Connect a trial project.

- PG&E has partnered with three initial companies and planning to add more in the near future.
- Learn as much as possible about customer and vendor experience
- GBC → replaced by scalable, long term solution, Customer Data Access (CDA) project.
- CDA implementation to be guided by industry standard OpenADE ESPI.
 - Ph 1 (est 2014) – Electric usage data
 - Ph 2 (est 2015) – Pricing and DR events

The screenshot shows the PG&E My Energy website. The top navigation bar includes 'Overview', 'Pay & Manage', 'My Usage', 'Ways to Save', and 'Community'. Below this is a secondary navigation bar with 'Accounts & Services', 'Billing & Payments', 'My Outages', 'Service Requests', 'Activity & Notifications', and 'Profile'. The main content area is titled 'My Accounts' and includes a 'Services' section with the text 'Edit Service names, view details on individual Services from your Profile.' and a link to 'Learn More about the Green Button'.



Services Linked to My Profile

<input type="checkbox"/>	<input type="checkbox"/>	Green Button Connect	Service Name	Service ID	Status	Address
<input type="checkbox"/>	<input type="checkbox"/>		<No Service Name> Edit	123456#	ACTIVE	123 B St.
<input type="checkbox"/>	<input type="checkbox"/>	123456 Change Delete	<No Service Name> Edit	78910##	ACTIVE	456 A St.

How do I share my Green Button Connect data?

Customers can choose to share their Green Button Connect data with third parties using a secure combination of Service ID and PIN code.

Our current authorized third parties include:

- [PEV4Me](#)
- [Unplug Stuff](#)
- [Leaffully](#)



GB Connect My Data – Initial Vendors

PEV4Me

- **Plug-in Electric Vehicle (PEV) calculator to find out how much electricity will cost to charge your car and how much money you'll save on gas.**

Plug-in Electric Vehicle
for me



Signed in as
Not you? [Sign out](#)
[Modify settings](#)

Plug-in Electric Vehicle (PEV) Calculator

Currently supports PG&E customers (no PG&E account? Check out the [demo page](#))

The PEV4me calculator helps potential and new plug-in electric vehicle (PEV) drivers understand the financial and environmental impact of operating a PEV. Results are personalized based on a driver's estimated daily miles driven and historical electricity usage extracted from Green Button data. [Learn more](#)

Select a plug-in electric vehicle

Chevy Volt

Enter average miles driven per day

40

Enter miles per gallon (mpg) for most recent gas vehicle

22

Enter estimated cost per gallon of gasoline

4.25



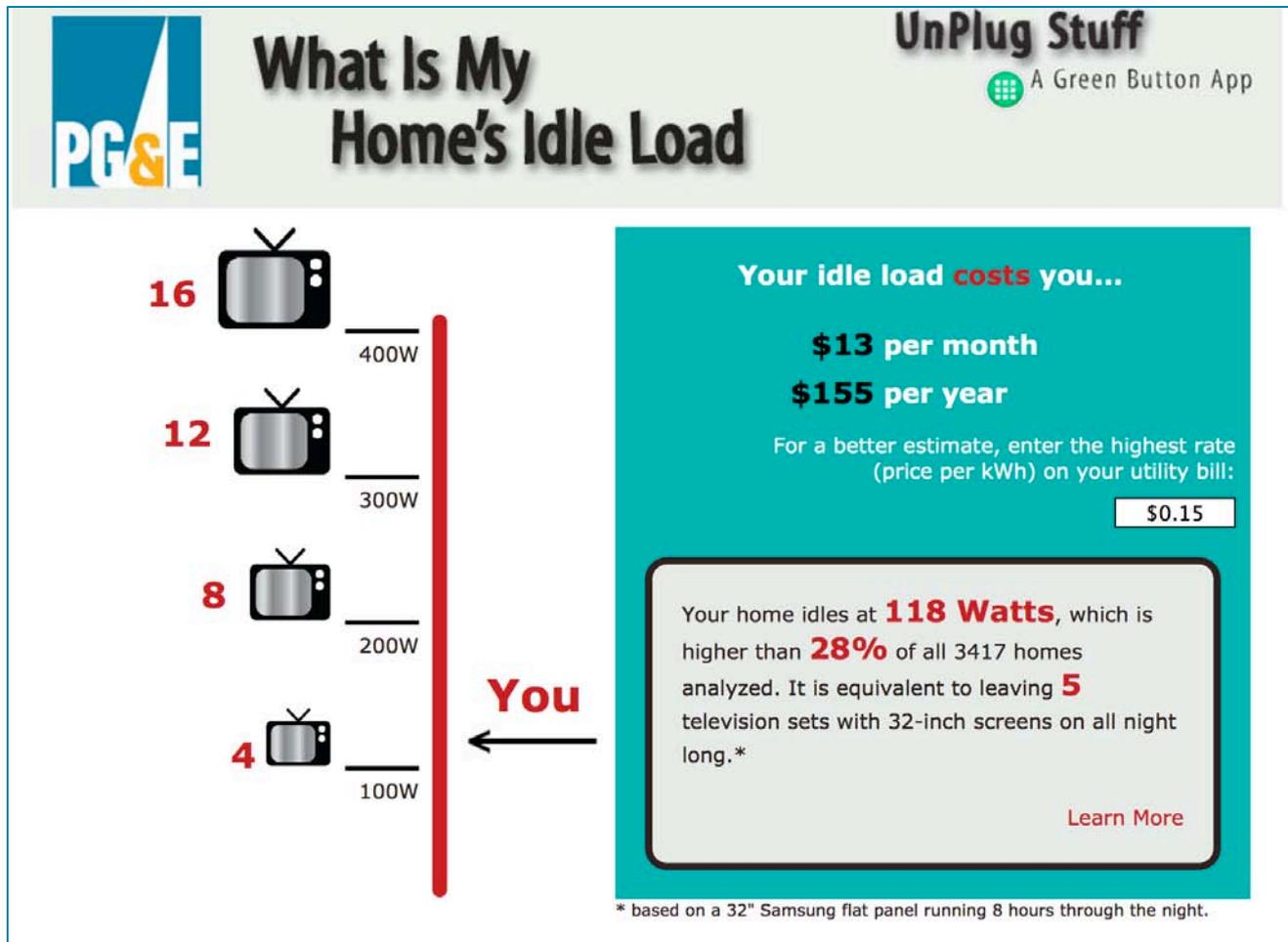
Calculate



GB Connect My Data – Initial Vendors

Unplug Stuff

- App analyzes how much energy your home is wasting when idling and encourages unplugging appliances in standby mode.



Leafly

- Shows you how many trees are needed to offset the emissions from your energy consumption along with actions you can take to reduce your impact.

The screenshot shows the Leafly app interface. At the top is a green navigation bar with the Leafly logo, an information icon, and links for 'Act', 'Track', 'Suggest', 'Login', and 'Sign up'. The main content area has a light green background. The title 'Replace inefficient light bulbs' is displayed in bold black text, with a '5' and a leaf icon to its right. Below the title is a text block explaining that Compact fluorescent light bulbs (CFLs) use about 75% less energy and last about 10 times longer than traditional incandescent bulbs. It also mentions upgrading to light-emitting diode (LED) bulbs. A second text block advises that CFLs need to be properly recycled and not tossed in the trash. Below this, it states the estimated individual impact is '2 Trees' and that there are '4' supporters. At the bottom left is a green button with the text 'I'll do it'. On the right side, there is a large image of a lit CFL bulb in a lantern-style fixture, and a row of four smaller thumbnail images below it. At the bottom right of the screenshot is a link that says 'See all pictures'.

leafly ⓘ Act Track Suggest Login Sign up

Replace inefficient light bulbs 5

Compact fluorescent light bulbs (CFLs) use about 75% less energy and last about 10 times longer than traditional incandescent bulbs. Upgrade your lights that you use often. If you want to go the extra mile, try light-emitting diode (LED) bulbs that use even less energy while providing high quality light.

Keep in mind that CFLs need to be [properly recycled](#), you can't just toss them in the trash! When used properly, CFL and LED bulbs are a simple way to save money and energy.

Estimated individual impact:

2 Trees

Supporters:

4

[I'll do it](#)

[See all pictures](#)



Green Button & CDA Benefits⁺⁺

Customer Education and Enabler of Innovation

- Allows customers to choose vendors and applications that support their education and understanding of energy
- PG&E supporting innovation and a partner in energy awareness

Protects Customer Privacy

- Prevents the risk of disclosing energy usage data and tracks customer acknowledgement of Privacy and Security policies
- Eliminates the need for customers to hand out usernames/passwords or account-specific information
- Tracks 3rd parties, the services they offer to PG&E customers, and their acceptance of Privacy and Security policies and procedures

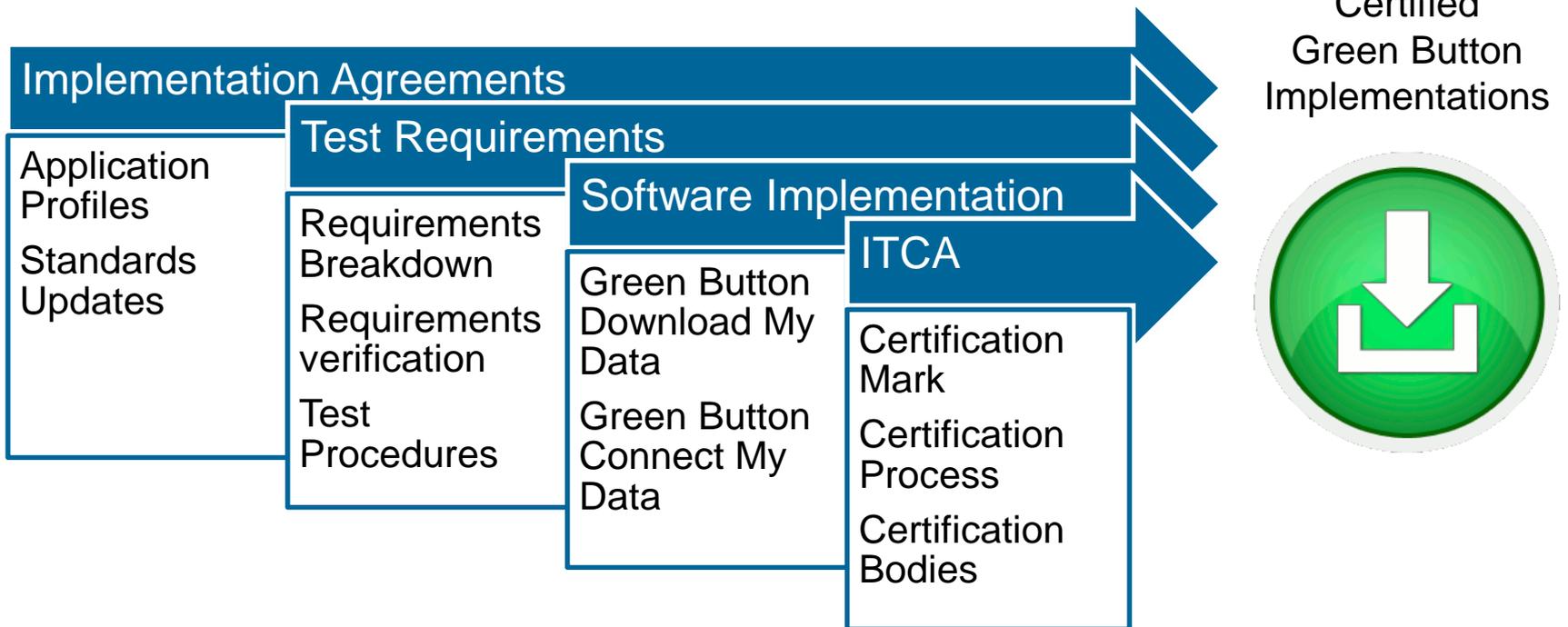
Uses Best Practices and Simplifies Implementations

- Industry standard format allows for consistent description of data, faster integration, and lower cost of solutions development
- PG&E can scale solution independently of the web tools as the market develops

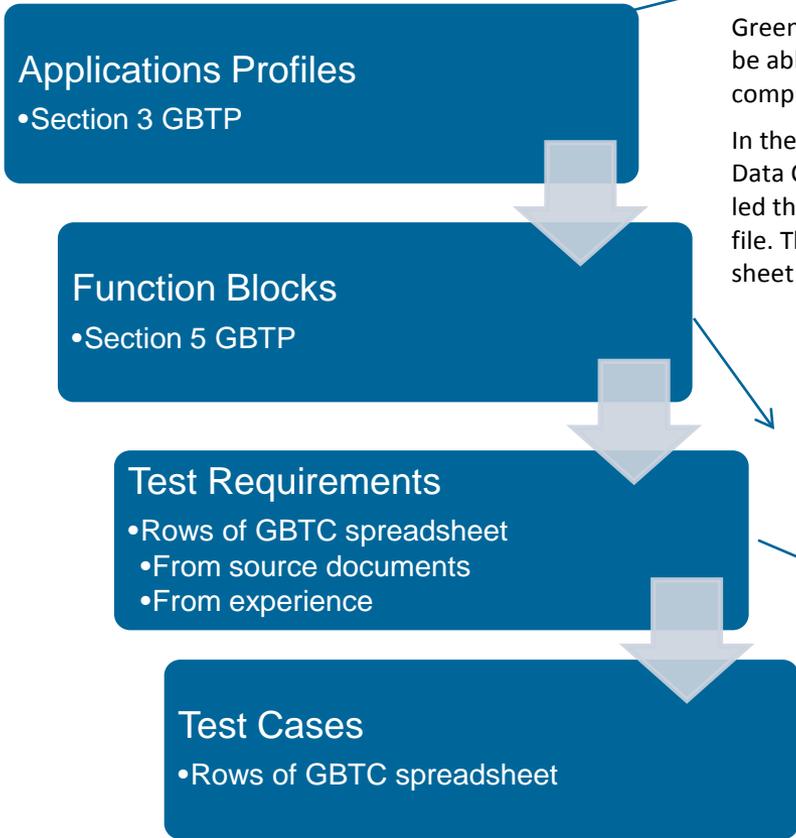
Testing and Certification

Marty Burns, HyperTek

Green Button Testing and Certification



Green Button Test Plan Requirements Breakdown



1.1 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.

1.1 Data Custodian Role

1.1.1 [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_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

Test Name	Test ID	M/D	Test Type	Category	Method	W/F	Test Purpose / Requirement	Initial Conditions
HTTP	PRCT01		Positive	Protocol		Ether	Verify implementation of HTTP	
HTTPS	PRCT02		Positive	Protocol		Ether	Verify implementation of HTTPS	
Configure Third Party	CONF1		Positive	Security		Both	Verify ability to authorize and configure a third party	
Atom feed - GET	FND1		Positive	Fundamental		Ether	Verify GET behavior for feeds	Third Party has been authorized and configured

GBTP – Green Button Test Plan Document

GBTC – Green Button Test Cases Spreadsheet



**Green
Button**

[About](#) | [How To](#) | [Ad](#)

Testing

GREEN BUTTON DOWNLOAD MY DATA SELF-TEST ANALYSIS:

Welcome to the Green Button Download My Data file test facility. This page is designed to support self-test of Green Button Data based on the testing and certification plan being developed at UCAIug. The OpenADE task force, which was responsible for the requirements that drove the standards underlying the Green Button, is developing a conformance and certification test for Green Button. NIST is supporting the development of Green Button test tools, such as provided below, through a contract with Hypertek Inc. as part of its support for the Green Button Initiative.

Testing a Green Button Data File

TEST YOUR GREEN BUTTON DATA FILE

You can analyze a Green Button data file following the steps below. Follow them in order.

1) First select the scope of your Green Button data file from the drop down list:

Electricity Metering

2) You can override and make additional selections of Function Blocks to test:

- [FB_1] Common
- [FB_4] Interval Metering
- [FB_5] Interval Electricity Metering
- [FB_6] Demand Electricity Metering
- [FB_7] Net Metering
- [FB_8] Forward and Reverse Metering
- [FB_9] Register Values
- [FB_10] Gas
- [FB_11] Water
- [FB_12] Cost of Interval Data
- [FB_15] Usage Summary
- [FB_16] Usage Summary with Cost
- [FB_17] Power Quality Summary
- [FB_27] Usage Summary with Demands and Previous Day Attributes
- [FB_28] Usage Summary Costs for Current Billing Period

3) Select a file to upload from your computer: Browse...

4) Please consider checking this box to allow us to keep your file on our server for further tests. Otherwise the file will be deleted after analysis:

Allow file to be saved on website

5) Then to upload the file and have it analyzed!

Select Common Scope

Edit Scope (Function Blocks)

Browse for file (IE9)
Drag/Drop (FF)

Allow us to save file

Analyze Results

Sample Results

TEST RESULTS

SUCCESS

File name: 1hrLP_32Days.xml evaluated at: 4/3/2013 7:30:25 PM

Function Block [FB_1]:Common
All tests successful.
Function Block [FB_4]:Interval Metering
All tests successful.
Function Block [FB_5]:Interval Electricity Metering
All tests successful.
Function Block [FB_15]:Usage Summary
All tests successful.

TEST RESULTS

ERRORS

File name: 1hrLP_32DaysBroken.xml evaluated at: 4/3/2013 7:33:21 PM

Function Block [FB_1]:Common			
All tests successful.			
Function Block [FB_4]:Interval Metering			
Failed Tests			
TestID	Report	Test Name	Test Requirement
D023	Failure to verify correct up link for the Meter reading up link.	Meter reading up link	verify correct up link
Function Block [FB_5]:Interval Electricity Metering			
All tests successful.			
Function Block [FB_15]:Usage Summary			
All tests successful.			



Green Button Testing Project update

Gerald R. Gray, PhD
Sr. Project Manager
Enterprise Architecture & Integration

Project Objective and Benefits

This project will accelerate the development of a comprehensive conformance test suite for the standards that underlie Green Button

- Accelerate the development of third party, value-added tools and service
- Accelerate the creation of an International Testing / Certification Authority
- Reduce utility implementation costs

Why Be a Project Funder?

- **Project Funders:**

- Have early access to project findings and deliverables
- Have immediate access to experts in implementing project results
- Have a seat on the project Steering Committee
- Have a direct and active role in ensuring that your deployment is interoperable with the apps your customers choose
- Reduces business risk



Benefits

- Confidence
 - Vendors that comply with testing can deliver results
 - Testing that matches the industry, not a single implementation
- Consistent
 - Core requirements are met – not a “one off” or custom solution
 - Interval data may drive customer presentation changes
- Competitive
 - With testing compliance as lowest common denominator vendors compete on:
 - Price
 - Value-adds
 - Service
 - Value-add to your integration testing budget

Schedule / Cost

- Project will start as soon as adequate funding is secured
- Funders get:
 - Immediate access to Green Button/ESPI experts
 - Early releases
- Staged development as directed by funding sources / UCA
 - Early releases for implementers
 - Green button tests?
 - ESPI tests?
- Total Cost: \$400,000
 - Expected Funders: 10
 - Cost / Funder : \$40,000

Benefit to Utilities

- Utilities are not required to participate in the process of reviewing and vetting third parties, and are not liable.
- Consistent standards across states.
- Alternative location for consumer complaints.
- Provides early warning system to eliminate bad actors.
- Ensures third parties (not utilities) are responsible for the actions of third parties.
- Ensures that the FTC is able to effectively enforce third parties.

Together...Shaping the Future of Electricity