GREEN BUTTON: ONE YEAR LATER

IEE Issue Brief
September 2012

IEE | INNOVATION ELECTRICITY EFFICIENCY
An Institute of the Edison Foundation

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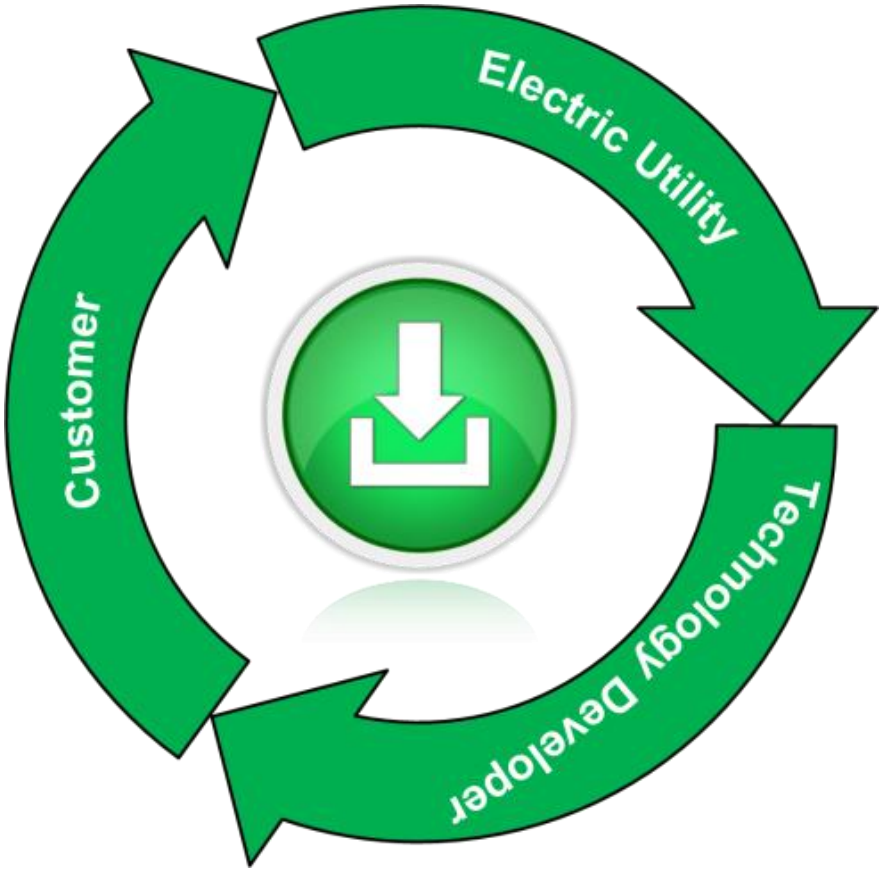
INTRODUCTION

The Green Button initiative, launched one year ago by the White House Office of Science and Technology Policy, is a voluntary power industry effort to standardize electricity usage data to encourage development of applications that can help customers understand and manage their energy usage. By agreeing to provide customer usage data in a common Green Button format, electric utilities are providing the building block to greater customer engagement.

When combined with innovative applications, standardized consumption data provided by the utility serves as a catalyst to greater customer engagement. Active customers then provide feedback to the utility, prompting further advances in standardization and another iteration of the innovation cycle (see Figure 1). Green Button, and similar standardization efforts, can succeed if it launches an innovation cycle between utilities, technology developers, and customers.

Figure 1: The Potential Green Button Innovation Cycle



As of June 2012, 20 utilities in about half the states have committed to bringing the Green Button to almost 36 million residential customers (see Figure 2). To date, 68 Green Button ready applications have been developed.[1] This paper provides an overview of how utility customer engagement programs can be enhanced by the Green Button initiative and uses case studies to demonstrate how the adoption of Green Button by utilities is lowering barriers to entry and accelerating innovation by technology companies.

The cycle works as follows:

- Utilities are gatekeepers of customer energy consumption data.
- Technology developers create applications that help customers understand and manage energy use.
- Customers signal preferences and provide feedback to developers by using certain types of applications. Customer feedback and comments inform developer efforts.

ELECTRIC UTILITIES

Electric utilities are the gate keepers of customer specific energy consumption and the support for applications that help customers understand and manage their energy use is consistent with the role of utilities as trusted energy advisors.

Already, over 11 million residential customers have access to their energy consumption data in the Green Button format, with 25 million more slated to have such access in the near future. Figure 2 identifies the electric utilities that have either committed to or implemented Green Button for their residential customers. In addition, many software vendors have already integrated Green Button into products for their utility customers.

[1] http://en.openei.org/apps/?keyword=Green%20Button%20Apps (63 total apps), http://appsforenergy.challenge.gov/submissions (3 additional apps), http://sdappschallenge.com/submissions (2 additional apps).

Figure 2: Utilities Committed to Green Button (as of June 2012)[2,3]

Utility	State	Customers
Implemented		
Pacific Gas & Electric Company	CA	4,570,000
San Diego Gas & Electric	CA	1,230,000
NSTAR	MA	790,000
Smart Meter Texas (Oncor, CenterPoint, AEP)	TX	5,230,000
Reliant	TX	N/A - Retailer
TXU Energy	TX	N/A - Retailer
Committed		
Southern California Edison	CA	4,270,000
Glendale Water and Power	CA	70,000
PacifiCorp	CA, ID, OR, UT, WA, WY	1,470,000
Pepco Holdings Inc.	DC, DE, MD, NJ	1,560,000
Commonwealth Edison	IL	3,430,000
American Electric Power	IN, LA, MI, OH, OK, VA, WV	3,650,000
National Grid	MA, NH, NY, RI	2,730,000
Baltimore Gas and Electric	MD	1,010,000
Virginia Dominion Power	NC, VA	2,160,000
Portland General Electric	OR	720,000
PPL	PA	910,000
PECO	PA	1,400,000
Chattanooga EPB	TN	140,000
Austin Energy	TX	370,000
Total		**35,710,000**

CASE STUDY: PACIFIC GAS & ELECTRIC

Pacific Gas & Electric (PG&E) worked with Opower to integrate the Green Button download option into its MyEnergy customer portal. As an early adopter of Green Button, PG&E is exploring how to leverage Green Button to support customer interests in energy efficiency and bill management. PG&E believes that by letting customers download their data and independently choose their preferred energy analysis customers become more engaged and more motivated to adopt energy efficient practices. Once informed and empowered, PG&E believes that customers will return to enroll in energy efficiency programs.

[2] US EIA, Class of Ownership, Number of Consumers, Sales, Revenue, and Average Retail Price by State and Utility: Residential Sector, 2010: http://www.eia.gov/electricity/sales_revenue_price/pdf/table6.pdf.

[3] Oncor's implementation of Green Button is through the Smart Meter Texas Web Portal, accessible by all customers served by Oncor, CenterPoint Energy, AEP Texas Central, AEP Texas North, and Texas New Mexico Power: http://www.puc.state.tx.us/agency/resources/pubs/news/2010/032310.pdf.

CASE STUDY: ACLARA & SAN DIEGO GAS & ELECTRIC

Aclara is a leading provider of consumer-engagement portals and advanced meter-reading systems to utilities. Aclara's portal is used by more than 50 utilities, and any utility using the portal can activate Green Button.[4] San Diego Gas & Electric was the first of five utilities to turn on Green Button functionality through Aclara's platform. For SDG&E, allowing users to retrieve their data in a standardized format was always planned but a key challenge SDG&E now faces is in communicating to customers how to download their energy data.

TECHNOLOGY DEVELOPERS

Technology developers participate in Green Button by creating compelling customer engagement solutions for the utilities. By connecting customer interests with analytic insights, applications (apps) can build a bridge between smart meter data, customer engagement, and action.

As of June 2012, 36 technology companies publicly supported the Green Button initiative (see Figure 3). By developing ways to integrate Green Button data into their existing products, technology companies open up operational efficiencies and new business opportunities.

Figure 3: Technology Companies Supporting Green Button (as of June 2012)

Technology Company (Organized Alphabetically)		
Aclara	Hara	Plotwatt
Autodesk	High Energy Audits	Pulse Energy
Belkin	Honest Buildings	Retroficiency
C3	HyperTek	Schneider-Electric
EcoDog	Itron	Silver Spring Networks
Efficiency 2.0	Johnson Controls Inc.	Simple Energy
eMeter-A Siemens Business	Lucid	Sunrun
EnergyAI	Melon Power	Smart Grid Labs
EnergySavvy	Opower	Snugg Home
EnerNex	Oracle	Tendril
EnerNOC	People Power	US Green Data
First Fuel	Performance Systems Development	Wattvision

[4] http://www.greentechmedia.com/articles/read/aclara-turns-on-green-button-for-pepco/

CASE STUDY: SNUGG HOME

Snugg Home has created a tool that assists contractors with the home energy audit process. By using a web-based auditing tool, contractors can reduce the time needed to perform an audit, while improving the accuracy and effectiveness of home energy efficiency recommendations.

The accuracy of Snugg Home's auditing tool is highly dependent on input of historical energy usage data, which Green Button provides. Without historical energy data, Snugg Home users must either make assumptions about energy consumption or manually enter utility bills into the system.

Green Button data can help contractors using Snugg Home develop an accurate preliminary energy assessment, increase participation in home audits and upgrades, and help track the results of energy efficiency upgrades.

CASE STUDY: RETROFICIENCY

Retroficiency's software product allows utilities, energy service companies, and building owners to assess energy efficiency across an entire portfolio of buildings, helping managers target the ripest retrofit opportunities across hundreds of sites.

To perform portfolio-wide assessments, Retroficiency gathers historical consumption data (in 15 minute or hourly increments) from the portfolio manager or utility. Currently, this data is primarily delivered through spreadsheets or proprietary web-based software. Retroficiency analyzes these inputs and converts them to a format accepted by its software, a process that becomes increasingly lengthy if a portfolio spans multiple utilities or states. Green Button standardization provides an operational efficiency: data is delivered in a standard format eliminating the need for a custom conversion process.

In the past 10 years, a small set of energy software vendors created products to engage utility customers with their energy usage. These vendors and developers working with a utility's proprietary legacy systems created businesses to support utility energy efficiency programs, such as demand response, competitive energy reporting, energy tips, and personalized energy efficient product recommendations. With utilities adopting the Green Button format – an interoperable, openly accessible data format – many more developers can access this ecosystem.

Eliminating this barrier to entry for software developers is a proven approach for developing a thriving developer ecosystem. For example, in the smart phone industry, Apple charges developers $100 for access to their iOS platform. Allowing developers to economically build for their platform has yielded over 650,000 apps in the Apple App Store as of June 2012. As a shared benefit, Apple has paid over $5 billion to their developers through shared revenue.[5]

In addition to improving access, standardization also frees up more time for innovation. Developers can focus on creating analytic tools based on a common data platform rather than expending resources on conforming to different data formats. Standards also provide long-term certainty, a condition that supports investments in new ideas.

APPS FOR ENERGY CHALLENGE

The utility community has been actively supporting the Green Button ecosystem through competitions and centralized application marketplaces. Between April and May 2012, the Department of Energy partnered with Itron and PG&E to host the Apps for Energy Challenge. In just two months, the competition attracted over 12,000 followers and helped facilitate the development of 56 Green Button enabled applications.[6] These applications continue to thrive in various app marketplaces such as the National Renewable Energy Laboratory's Open Energy Info (OpenEI) website and Tendril's Green Button Connect platform.

Leafully is a Green Button enabled web application that captured first place and the $30,000 grand prize in the Apps for Energy Challenge. To use Leafully, users first upload their utility-provided Green Button data. Leafully then analyzes this data and helps users understand how their actions affect the environment: instead of displaying energy usage in dollars or kilowatt-hours, Leafully displays it in terms of trees needed to offset the resulting carbon dioxide.

Leafully is a prime example of how Green Button can motivate developers from outside of the energy space to build energy-related applications. Leafully attracted significant interest due to Apps for Energy and its success prompted the app's creators, former engineers at Microsoft, to continue working on it full-time.

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[5] http://betanews.com/2012/06/11/apple-app-store-reaches-650000/

[6] http://appsforenergy.challenge.gov/, Homepage has 12392 follows (as of 7/25/2012), 56 apps in Submission Gallery.

CUSTOMERS AND THE NEXT ITERATION

The Green Button initiative will be a success if it can drive customers to understand their energy consumption and to take action to reduce it. Given that the average customer spends only 6 minutes per year interacting with their utility, drawing attention to energy consumption continues to be a tough challenge.[7] To successfully engage the customer through Green Button, we believe that the initiative must advance in at least three areas:

1. Currently, Green Button requires customers to download their energy usage data to a computer and then manually upload it to a third party application. The downloading process is a barrier. As the Green Button movement matures, an automation process, known as "Green Button Connect My Data," where the customer clicks a button to push the data to a third-party, will become the norm.

2. Utilities and regulators will need to identify the proper protocols for disclosing customer usage data to third parties. In California, momentum is already shifting towards more open third party access to customer energy data.[8] As a first step, the data authorization process must be easy and include electronic data access authorizations (similar to signing up for paperless billing).

3. While developers have made a significant amount of progress since the inception of the Green Button initiative by producing 68 applications, getting these apps to the customer remains a challenge.

Examples of initial marketplaces are:

- National Renewable Energy Laboratory's Open Energy Info (OpenEI) Apps website,[9]
- Tendril's Green Button Connect platform,[10]
- Apps for Energy submission gallery,[11]
- AT&T San Diego Apps Challenge application gallery.[12]

These efforts are a good first start, but in large part these marketplaces are unknown and underutilized. Key decisions need to be made on how to increase customer awareness of the apps including use of high traffic websites or consumer recommendation sites (e.g., Consumer

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[7] Accenture, Understanding Consumer Preferences in Energy Efficiency, 2010.
[8] In California, decision 11-07-056 was issued in July 2011 allowing customers to grant third parties access to energy usage data if the customers submit a written notice to their utilities.
[9] http://en.openei.org/apps/?keyword=Green%20Button%20Apps
[10] http://greenbuttonconnect.com/applications
[11] http://appsforenergy.challenge.gov/submissions
[12] http://sdappschallenge.com/

Reports). Utilities can play a role in supporting the adoption and use of applications by recommending specific applications or integrating them into their customer portals. And, customers will play a role by providing feedback.

CASE STUDY: SAN DIEGO GAS & ELECTRIC

San Diego Gas & Electric is moving forward with Green Button "Connect My Data." In the fall of 2012, SDG&E plans to open a platform which will enable third parties to have access to electric usage data from the utility back office once customers provide their consent for such access. This data will be provided in an industry standard format and on an automated, recurring basis. SDG&E supports the customer's right to choose to share usage data with third parties and believes that making this data accessible by customer consent will spur innovation in energy information services.

CONCLUSION

In just one year, Green Button has received commitments from 20 utilities representing 36 million residential customers and has motivated the development of 68 applications. Such standardization of energy data increases the potential market size for all energy software, attracting more developers and more investment.

Green Button is an impressive first step towards standardization of electricity usage data. With so many utilities and technology companies already committed to the initiative, the crucial link becomes the customer. To engage customers, three elements are critical:

1. A push towards the automation of data transfer.
2. The establishment of frameworks for third party authorization.
3. A 'go-to' marketplace for Green Button applications

Once customers are on board, Green Button could become the tipping point that unleashes the innovation cycle for energy usage data.

ADDENDUM

As of October 1, 2012, 29 utilities – representing 35 percent of the nation's residential customers – have created, or have committed to create, a "Green Button" on their website for their customers to download their energy use info in an easy-to-use format. And 39 technology companies are now developing apps to use the Green Button data. This is up from 20 utilities and 36 technology companies a week ago when IEE released its report.

Figure 4: Utilities Committed to Green Button (as of October 2012)

Utility	State	Customers
Implemented		
Pacific Gas & Electric Company	CA	4,570,000
San Diego Gas & Electric	CA	1,230,000
NSTAR	MA	790,000
Smart Meter Texas (Oncor, CenterPoint, AEP)	TX	5,230,000
Reliant	TX	N/A - Retailer
TXU Energy	TX	N/A - Retailer
Committed		
Southern California Edison	CA	4,270,000
Glendale Water and Power	CA	70,000
PacifiCorp	CA, ID, OR, UT, WA, WY	1,470,000
United Illuminating Company	CT	324,000
Northeast Utilities	CT, MA, NH	3,090,000
Pepco Holdings Inc.	DC, DE, MD, NJ	1,560,000
JEA	FL	430,000
Sawnee Electric Membership Corporation	GA	150,000
Kootenai Electric Cooperative	ID	3,000
Commonwealth Edison	IL	3,430,000
American Electric Power	IN, LA, MI, OH, OK, VA, WV	3,650,000
National Grid	MA, NH, NY, RI	2,730,000
Baltimore Gas and Electric	MD	1,010,000
Bangor Hydro Electric Company	ME	117,000
Central Maine Power	ME	620,000
Virginia Dominion Power	NC, VA	2,160,000
Consolidated Edison*	NY	2,500
Portland General Electric	OR	720,000
PPL	PA	910,000
PECO	PA	1,400,000
Chattanooga EPB	TN	140,000
Austin Energy	TX	370,000
Efficiency Vermont	VT	330,000
Total		**40,446,500**

*Consolidated Edison will initially offer Green Button to 2,500 large building owners.

About IEE

IEE is an institute of the Edison Foundation focused on *innovation*, *electricity*, and *efficiency*. The power industry is at an inflection point and IEE's role is to help inform the future. IEE is dedicated to advancing innovation, new techonlogies, and energy efficiency among electric utilities and technology partners. IEE promotes the sharing of information, ideas, and experiences among regulators, policymakers, technology companies, and the electric power industry aimed at grid modernization to enable an affordable, more secure, cleaner energy future.

IEE is goverened by a Management Committee of 22 electric industry Chief Executive Officers. IEE members are the investor-owned utilties who represent about 70% of the U.S. electric power industry. IEE has a permanent Advisory Committee of leaders fromt he regulatory community, federal and state governement agencies, and other informed stakeholders. IEE also has a Strategy Committee of senior electric industry executives that identify strategies and projects for IEE.

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