

**STATE OF WASHINGTON
UTILITIES AND TRANSPORTATION COMMISSION**

Rulemaking to modify existing consumer)
protection and meter rules to include Advanced)
Metering Infrastructure)

Docket No. U-180525

State Of WASH.
UTIL. AND TRANSP.
COMMISSION

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**RESPONSE OF MISSION:DATA COALITION TO THE COMMISSION’S QUESTIONS
DATED JULY 10TH, 2018**

The Mission:data Coalition (“Mission:data”),¹ a national non-profit coalition of technology companies delivering data-enabled energy management services, is pleased to provide this response to the Commission’s questions concerning Advanced Metering Infrastructure (AMI) rules. Mission:data was founded six years ago to advocate for consumers’ rights to access, use and share energy information collected about them by utilities. Mission:data and our members – 35 companies who provide over \$1.0 billion per year in energy efficiency, demand response and distributed energy resource (DER) business across North America – advance “data access” policies in states across the country. Empowering customers with secure access to their own energy usage and cost information – including the ability to easily share that information with third parties of their choice – will give consumers access to advanced tools that cost-effectively reduce energy consumption and save money. We are the primary advocate of Green Button Connect (“GBC”) nationwide, a standard developed by industry and government stakeholders to facilitate permission-based customer sharing of energy usage information with third parties. To date, five (5) leading states, representing over 32 million electric meters, have adopted Green Button Connect.

Mission:data applauds the Commission for thoughtfully examining privacy, cybersecurity, the benefits to customers from using their AMI data, customer education and other matters. Our

¹ www.missiondata.org

objective is to contribute productively to this docket by providing information about how other states have successfully balanced privacy concerns with customer benefits of AMI.

Question 1a, What incremental or different information will companies collect or retain with the implementation of AMI?

There is no doubt that AMI data – particularly electrical or natural gas readings at, say, 60-minute intervals – is particularly helpful for conservation purposes. Analyzing AMI data with outdoor temperature and humidity allow consumers or their authorized third parties to assess energy used for heating and cooling homes and buildings, to benchmark such usage against other buildings and suggest tailored recommendations for improvement. The potential for innovative energy-saving applications is significant: In one example from California, smartphone apps with permission-based access to customer usage data have turned household energy conservation into a game, giving users points for saving energy at peak times. This strategy is proving effective throughout the state, particularly among low-income households, as nearly 100,000 residences are contributing over 100 megawatts of demand response from innovative engagement strategies.

However, while granular AMI data may be the impetus for this rulemaking, Mission: data urges the Commission to consider customer data more broadly. There are numerous other pieces of information that utilities hold about consumers – information which, when combined with interval AMI data (where available), additional efficiency and conservation value can be realized. An overview of these elements are provide below; we also attach our whitepaper, “Energy Data: Unlocking Innovation With Smart Policy,” as Attachment 1, which further describes these data elements.

Customer data includes contact information such as name, address, phone number, etc. Address information may be particularly important in the case of multi-site commercial customers because a third party energy manager serving that customer needs to match up the consumption readings with specific sites.

Billing data includes all information contained on bills, such as what rate the customer is on, billing cycle dates, account number, meter number, volumetric charges, distribution charges, taxes and fees. Today, many multifamily properties and commercial buildings use third parties to manage billing and data collection on their behalf. Many large businesses need to report annual energy, water and greenhouse gas emissions to investors. It is very expensive to collect this information manually for dozens or hundreds of sites across the country, and so a standards-based electronic interface for customer-authorized third parties to billing information would save considerable expense. Mission:data emphasizes that billing information should include an electronic version of the information contained in bills as well as the original PDFs, as accounting rules for many businesses require retaining utility invoices for compliance purposes.

Usage data includes both interval readings and “register” readings. Mission:data supports metering intervals at the shortest intervals that are possible – for instance, electricity readings at 5-minute intervals and natural gas readings at hourly intervals. It is also important that the quality of the reading be made available to third parties with customer permission. The quality could be actual, estimated, billed, etc., as determined in the validation, editing and estimation (VEE) process. Mission:data recommends that utilities store at least four (4) years of historical usage data for each meter for energy management purposes, in order to have sufficient information across multiple heating seasons and cooling seasons to support regression analysis.

Also important is real-time information gathered from the smart meter and transmitted to an on-premise device. This is known as the Home Area Network (HAN), and virtually every smart meter manufactured today has HAN capability. While the utility will not collect data via the HAN, we believe it is the utility’s responsibility to provide an easy-to-use, web-based method for consumers to connect or “pair” any HAN device of their choosing with the meter. This enables real-time energy management applications to exist, such as smartphone apps that help consumers interactively identify the “energy hogs” in their house. Most states with AMI offer HAN capability using secure, industry-standard wireless communications protocol known as Zigbee Smart Energy Profile. To be clear, the HAN is strictly opt-in, and it is the customer’s responsibility to purchase a HAN device if they wish. But Mission:data believes the Commission’s rules should require utilities to offer HAN connectivity to any customer-purchased device so that the benefits of AMI can accrue to customers directly.

Question 1(c), If not necessary for providing utility service, what information do companies anticipate sharing with third parties for the benefit of customers, and for what specific purpose should the utility share the information with third parties?

In addition to the points above, Mission:data believes that energy information belongs to the consumer, and consumers should be free to access, use or share their information for any purpose. If the customer has provided their consent to a third party, then Mission:data does not believe either the Commission or a utility should be in a position to decide what is a legitimate purpose and what is an illegitimate purpose. (Note that “purpose specification” in consent forms is a different issue; Mission:data supports purpose specifications, a topic that is addressed in our Attachment 1.) That said, it may be reasonable for the Commission to decide not on a basket of legitimate uses but rather to enumerate certain uses that should be prohibited. For example, state Commissions in California and Illinois have determined that customer-authorized third parties are prohibited from selling AMI data to any other entity without express customer consent. As Attachment 2, Mission:data provides a table showing five states and the key terms, as decided by their utility Commissions, concerning third party access to customer energy data with permission.

Question 2a, What kind of historical data, and for what time period, should companies maintain information in order to comply with regulatory reporting needs (load studies, conservation and energy efficiency, reliability)?

As mentioned above, Mission:data believes utilities should hold usage data and billing data for at least four (4) years in order to support energy efficiency purposes. For reference, the requirements of other state Commissions are described in Attachment 2.

Question 2b, What rights do or should customers have with respect to their energy use data (co-owners of the data, right to access, right to share with third-parties)?

Mission:data strongly believes that customers should have the right to access information about them held by utilities, and that manner in which the information is accessed should follow nationally-recognized standards and best practices.

Mission:data believes the Commission should not reinvent the wheel. While advanced meters produce more data than analog meters, there are existing processes by which customers access and use their data. For example, Puget Sound Energy (PSE) has an information release form on its website,² and PSE and Avista offer “automated benchmarking” that sends commercial customers’ data to EnergyStar electronically with customer permission. Third parties have had, and will continue to have, access to customer energy data held by utilities with customer permission in Washington state.³ While Mission:data is not aware of existing state law or Commission regulation that requires utilities to provide such services to customers, we feel that the Commission should be cognizant of existing processes and, at a minimum, should not disrupt those practices without due consideration.

Furthermore, third party access to energy data with customer consent has been considered by many other states. Complex issues such as electronic consent, prohibited uses of energy data, eligibility criteria of third parties, Commission jurisdiction over third parties and many other issues have been debated for years. Mission:data provides these comments, and attachments, in order to inform the Commission about lessons learned from other jurisdictions. Attachment 3 is an in-depth look at the data-access policies in California, Illinois and Texas.

In our experience working across 14 states and the District of Columbia for the past six years, while it is academically interesting to debate the notion of customer “ownership” of their data, it is of little practical meaning. Regardless of whether or not consumers own AMI data, utilities still need to collect it in order to bill customers for their energy use. Customers still have to request their information from utilities, or request that it be shared with a third party, even if customers “own” their data. Mission:data believes it will be more productive for the Commission to focus on *access* – when, how, under what circumstances, etc. – than to break entirely new legal ground with notions of co-ownership.

² See https://pse.com/savingsandenergycenter/ForBusinesses/Documents/4255_PSEUtilityRelease.pdf.

³ This includes interval kWh data, too, for customers – mostly commercial – with the previous generation of “smart” meters.

Question 2b(i), What type of customer notice should be required regarding the collection, storage, use, and disclosure of customer data (within a company and with third-parties)?

While Mission:data has no opinion on how utilities should notify customers about *the utility's* use of customer information, we believe that, for informing customers about their designated *third party's* use, a simple consent form – either paper, PDF, or web- or mobile-app-based – is sufficient. Some states have chosen to require certain authorization language to educate customers (see Attachment 2). Mission:data supports succinct, Commission-approved authorization language so that customers are uniformly exposed to the same information across the state. Standardized authorization language also ensures that utilities have the certainty of a “safe harbor” to guide their consent-gathering practices.

Question 2b(ii), How should the companies be required to obtain customer authorization to share data?

In our experience, it is all too easy to focus on a Commission-approved consent “form” – usually a piece of paper that is mailed or faxed into the utility – and ignore the fact that the internet and mobile devices have completely transformed the public’s expectations for interacting with large corporations in the last decade. If consumers are going to receive direct benefits from AMI, they must be able to access such benefits, such as energy efficiency, via 21st-century norms – not 20th-century norms. At the outset, we strongly urge the Commission to expand its consideration beyond paper forms and toward electronic, convenient methods of consent to which modern consumers are accustomed. This means understanding the difference between the *content* of a consent form and how it is *submitted*. For example, the same content on a paper form can also be displayed on a mobile phone and executed electronically. Mission:data believes the Commission should carefully consider the data-authorization process so that modern technologies are not discriminated against.

An anecdote from California underscores the pitfalls associated with narrow rulings focused only on paper forms. In 2016, one report found that, despite billions of dollars invested

in AMI across the state, the process for consumers to share their AMI data with an energy efficiency service was extremely arduous. The state's ambitious DER adoption goals, including signing up over 150,000 households in third party demand response, were held back by 5-page paper consent forms. The cost to utilities of handling these forms was significant, with one utility requesting rate recovery for 12 full-time employees simply to process paperwork. That proposal was rejected in favor of an "electronic" form, but even that was not a panacea. The word "electronic" was understood by the utilities to mean "an electronic replica of the paper form," requiring a lengthy online process for consumers involving multiple steps: the customer had to create an online account with the utility, navigate through a complex maze of 8-13 web pages, enter information multiple times (such as the customer address, service address, email address, telephone number, third party mailing address, third party email address, third party telephone number, etc.), click "submit," and then wait over five (5) business days for this ostensibly "electronic" request to be "processed." All told, it required users to be quite technologically sophisticated and make 25 correct mouse clicks prior to completing the authorization. Not surprisingly, California policymakers were disappointed because of the obvious inhibiting effects this laborious process had on consumer adoption of energy efficiency and demand response, which can benefit all ratepayers. As a result of the utilities' lack of thoughtful design of the electronic form, the California Commission created a "click-through" working group to develop an automated, streamlined authorization process to minimize "customer fatigue."⁴ The California Commission subsequently required utilities to support electronic consents with strict ease-of-use requirements because merely ordering the paper form to be made available "electronically" did not result in the desired outcome.⁵ Here, the Washington Commission can avoid these pitfalls by adopting not just "forms" but holistic, data-authorization processes that are tested, streamlined, secure and adopted in other jurisdictions. See Attachment 1.

⁴ California PUC, decision D.16-06-008 dated June 9, 2016 at p. 2. Available at <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M163/K294/163294060.PDF>.

⁵ California PUC, Resolution E-4868, dated August 24, 2017, available at <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M194/K746/194746364.PDF>.

Question 3a, How should the rules differ for individual customer data and aggregated use data? and Question 3b(i), How should the rules differ for Anonymous Personal Usage Information?

While Mission:data understands today's uses of aggregated, whole-building energy usage data for EnergyStar benchmarking, and the potential uses in the future for research and policy planning of aggregated or anonymized energy usage data, we strongly urge the Commission to consider the issues of aggregated data in a separate, dedicated rulemaking. To be blunt, aggregated data is incredibly thorny and will take years to resolve in even the best of circumstances. In the meantime, it would be a mistake to prevent customers from receiving benefits of their advanced meters – by giving individual permission to a third party – until a lengthy debate is held about aggregated and anonymized data. In order to secure benefits of AMI for ratepayers in the shortest timeframe possible, we urge the Commission to postpone consideration of aggregated data until other questions are resolved first.

Question 4a, How will customers have access to their energy usage information collected in AMI?

It's important to recognize that most customers – even “energy geeks” – are not likely to access their raw data very frequently because it's difficult to make meaning of it. In the same way that customers are not likely to pore over their raw blood test results, customers will naturally seek advice from experts – doctors or, in this case, energy management services – to interpret the information on their behalf. Therefore, while it is important for customers to be able to access their own usage information on the utility's website, we do not have high expectations for the data being widely used by customers themselves. Indeed, statistics from other jurisdictions indicate that the number of customers using utility websites and viewing or downloading their own usage information is low.⁶ Instead, the much more likely route by which customers will manage their energy consumption is by engaging with online tools or smartphone apps. A

⁶ For example, see Consolidated Edison Company of New York, AMI reporting metrics in Case No. 16-E-0060 dated April 30, 2018 in which only 0.18% of customers logged into the utility website to view their “usage/analytics” page. Available at <http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={23049042-3B53-462A-A233-7B30982C7A8A}>

customer will hear about a service that is of interest, begin using it, and then the service will help facilitate submission of the authorization form to the utility. We encourage the Commission to treat this “third party-led” authorization as the primary mechanism by which customers will interact with, and receive benefits from, investments in AMI.

Thank you for the opportunity to provide comment.

Dated: September 21st, 2018

Respectfully submitted,

FOR THE MISSION:DATA COALITION, INC.

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ENERGY DATA

UNLOCKING INNOVATION
WITH SMART POLICY

BY MICHAEL MURRAY, LAURA KIER AND BOB KING, P.E.
DECEMBER, 2017

MISSION DATA
empowering energy savings

 advanced
energy
management
alliance





ABOUT

MISSION:DATA empowering energy savings

Mission:data Coalition is a non-profit coalition of 35+ innovative technology companies that empower

consumers with access to their own energy usage data.

Mission:data advocates for customer-friendly data access policies throughout the country in order to deliver energy-savings benefits for consumers and to enable an innovative, vibrant market for energy management services.



Advanced Energy Management Alliance (AEMA) is made up of distributed energy resource (DER) companies that are united to

overcome barriers to nationwide use of demand-side resources.

We advocate for policies that empower and compensate customers appropriately for managing their energy use in a manner that contributes to a more efficient, cost-effective, resilient, reliable and environmentally sustainable grid.

EXECUTIVE SUMMARY

This report outlines how state policymakers and advocates can empower consumers to manage their utility bills with access to their own energy usage information.

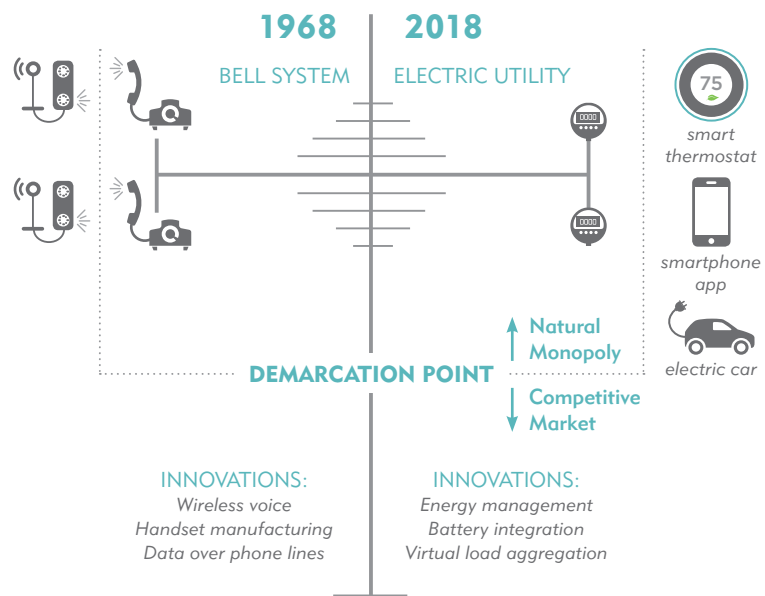
There are over 70 million “smart” meters installed by electric utilities across the U.S. But getting the most value from smart meters for consumers hasn’t been fast or easy. That’s why we synthesized the data-sharing policies of leading states into a single, comprehensive guide. Based on our experience working in over a dozen states and the District of Columbia, we outline the best practices that promote the portability of, and customer control over, their energy information. The 10 policy elements discussed in this report are meant to instruct public utility commissions (PUC) in addressing all of the relevant issues in a comprehensive data sharing policy: privacy, consumer protections, technical standards, enforcement issues and more.

State policymakers don’t have to reinvent the wheel. Leading states such as California, Illinois, New York and Texas have carefully considered data privacy and electronic access to customer data held by utilities. We believe that any state can incorporate our recommendations, even states that do not yet have smart meters. All customers benefit when they have control over their energy information in a modern, technologically-consistent manner from state to state, and from utility to utility.

As customer-owned distributed energy resources (DERs) grow at the “grid edge,” we can learn from other industries about the importance of clear policy boundaries around regulated utilities. In telecommunications some 50 years ago, the Federal Communication Commission’s (FCC) “Carterfone” decision enabled customers to attach their own accessories to AT&T’s



The FCC’s 1968 Carterfone decision defined the boundaries of monopoly telephone service.



telephone network. Before this point, telephone handsets could only be purchased from AT&T. This pivotal decision defined a demarcation point between competitive services and monopoly telephony services; it sparked innovations that include the modem and wireless voice. Today, energy consumers seek to connect their own electrical “accessories” to the grid: solar panels, electric vehicles, batteries and advanced energy management systems. The FCC’s Carterfone decision provides an excellent historical analog for defining the interface point at which regulated services should end and competitive services should begin. In that spirit, we believe that our data-sharing “rules of the road” will help create the conditions for market animation necessary for a more interactive, efficient and flexible electric grid.

SNAPSHOT OF ENERGY DATA SHARING POLICIES

(as of late 2017)

CALIFORNIA

11.5 MILLION ELECTRIC METERS

2013: CPUC approves applications for GBC implementation at investor-owned utilities (D.13-09-025)

2017: CPUC approves resolution on the "click-through" process to streamline the customer authorization process (Resolution E-4868)

COLORADO

1.5 MILLION ELECTRIC METERS (XCEL ENERGY)

2017: PUC approves settlement agreement for deployment of advanced meters with GBC to go live in 2020 (16A-0588E)

HAWAI'I

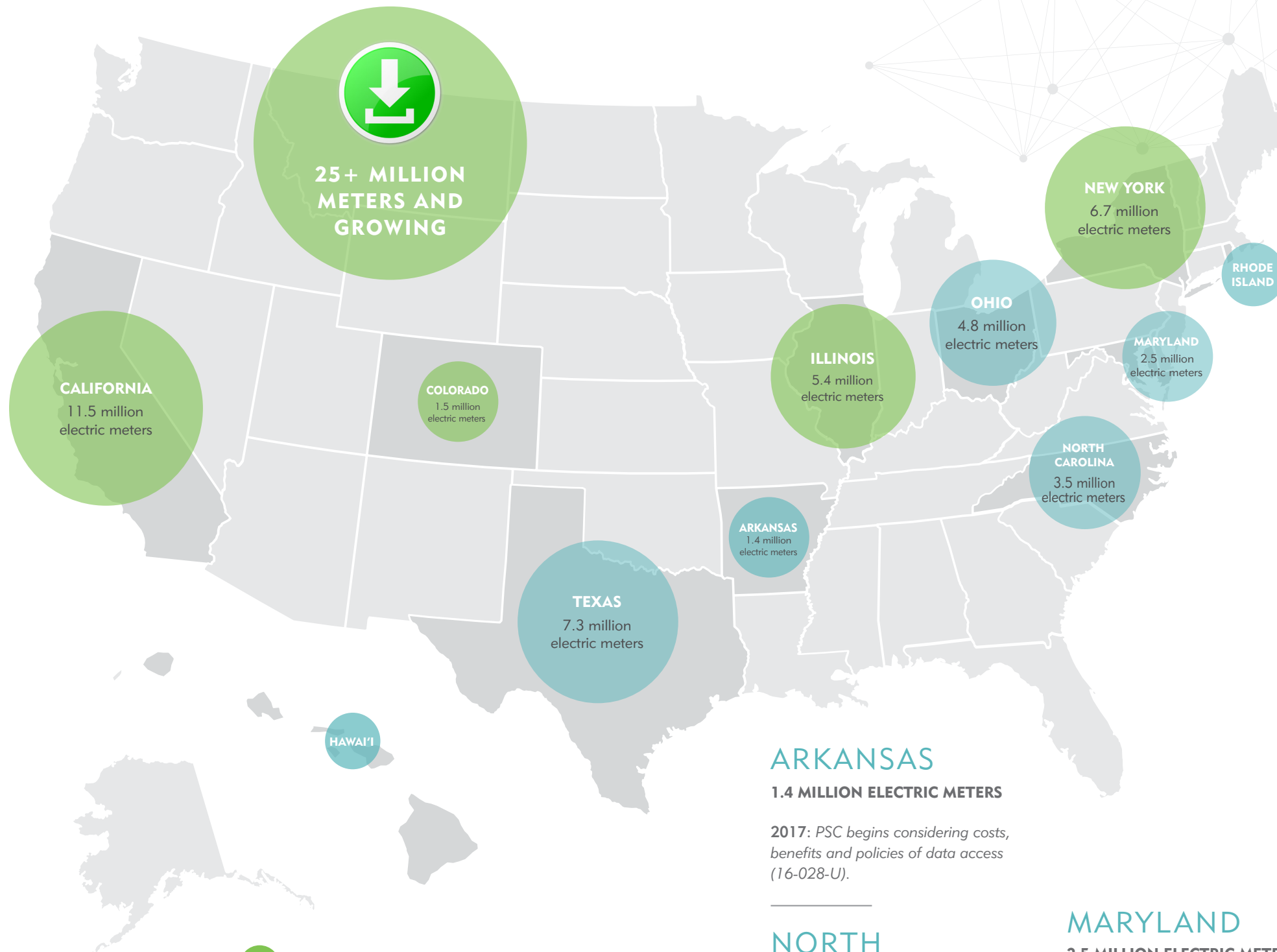
0.4 MILLION ELECTRIC METERS

2017: PUC requires grid modernization plan to address "data access and privacy"; in response, HECO's plan hints at GBC for "customer-authorized third parties" (2016-0087)

TEXAS

7.3 MILLION ELECTRIC METERS (ERCOT REGION)

2015-2017: PUCT considers changes to Smart Meter Texas (SMT) to adhere to the GBC standard (46204, 46206, 47472)



- GREEN BUTTON CONNECT (GBC) MANDATE IN PLACE
- UNDER CONSIDERATION

NEW YORK

6.7 MILLION ELECTRIC METERS

2016: PSC's REV Track Two order requires GBC for any utility that pursues advanced metering (14-M-0101). GBC planned by ConEd, Orange & Rockland, NYSEG, RG&E and National Grid

RHODE ISLAND

0.5 MILLION ELECTRIC METERS

2017: PUC report on "Power Sector Transformation" calls for National Grid to address data access

OHIO

4.8 MILLION ELECTRIC METERS

2016: AEP Ohio agrees to hold gridSMART collaborative meetings to discuss data access (ongoing)

2017: PUCO approves Dayton Power & Light settlement that mentions GBC (16-395-EL-SSO); Duke Energy Ohio cases ongoing

ILLINOIS

5.4 MILLION ELECTRIC METERS

2016: ICC approves authorization processes for non-retail electric service providers, a prerequisite to GBC (15-0073)

2017: ICC approves Open Data Access Framework in which Ameren Illinois and ComEd agree to implement GBC (14-0507)

ARKANSAS

1.4 MILLION ELECTRIC METERS

2017: PSC begins considering costs, benefits and policies of data access (16-028-U).

NORTH CAROLINA

3.5 MILLION ELECTRIC METERS

2017: NCUC considers GBC in Smart Grid Technology Plans, saying data access is "essential" but declines to open a rulemaking process (E-100, Sub 147). Duke Energy rate cases underway.

MARYLAND

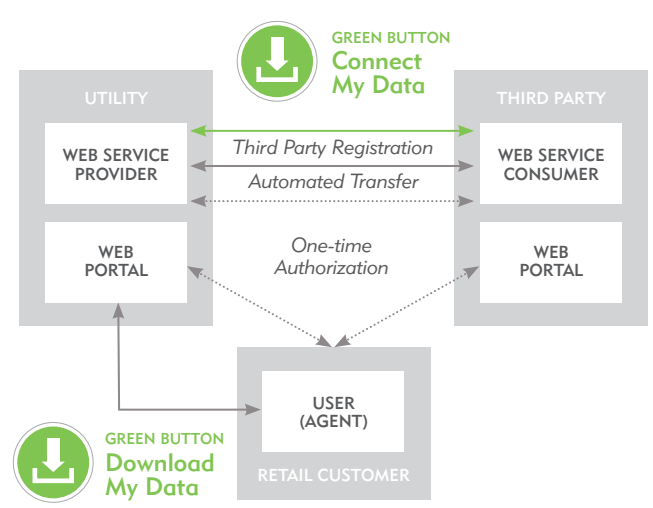
2.5 MILLION ELECTRIC METERS

2016: PSC considers "maximizing AMI's benefits for Maryland ratepayers" (PC44)

2017: PSC cites the benefits of new technologies to consumers; declares that customer data "belongs to the customer"; draft rules call for GBC implementation (PC44)

GLOSSARY OF TERMS

CUSTOMER	A utility customer – residential, commercial or industrial.
THIRD PARTY	An energy management company, solar company, consultant or other entity authorized by the customer to receive the customer’s energy information held by utilities.
GREEN BUTTON CONNECT MY DATA (GBC)	GBC is the standard for sharing energy information from a utility to a Third Party with customer consent. Also known by its technical name, the North American Energy Standards Board’s Energy Services Provider Interface (ESPI).



For more information about Green Button Connect, see "Got Data? The Value of Energy Data Access to Consumers."

ELEMENTS OF A DATA SHARING POLICY

Based on our experience with public utility commissions in over a dozen states and the District of Columbia, AEMA and Mission:data propose a 10-point framework of a comprehensive energy data sharing policy. By making customers’ energy information held by electricity and natural gas utilities portable and easily accessible, customers can take advantage of new technologies that will help them manage their monthly utility bills.

Our objectives in creating this framework are:

- To effectively balance consumers’ rights to privacy and security of their personal information with the rights to conveniently access energy information and new energy management technologies.
- To promote consistency in data-sharing policies from state to state, and utility to utility, so that technology providers can flourish in a more uniform environment across the nation.
- To assist state commissions in holistic treatment of data access and data privacy, thereby avoiding many pitfalls of piecemeal treatment.

Our recommendations are intended to apply to both electric and natural gas utilities.

1. DEFINITION OF ENERGY DATA: The following four categories of information capture the range of customer information that should be portable, meaning that customers should be able to instruct utilities to transmit the information to a Third Party. Any information that is

specific to the customer, or generated by the activity of the customer — such as energy usage and resulting bills is referred to as “standard customer data.”

Customer data: Name, address, phone number, etc.

Billing data: Information generally contained on bills and having to do with payment such as what rate(s) the customer is on, what retail provider the customer uses, billing cycle dates, account number(s), meter number(s), payment history, and line items of costs such as volumetric charges, delivery charges, demand charges, taxes, fees, etc. Utilities should support up to four (4) years of historic billing data, or the length of the time the customer has been at the premise in question, whichever is less.

Usage data: Electric or natural gas usage in kilowatt-hours, cubic feet or therms, containing both “register reads” (i.e. representing the overall usage to date, equivalent to the dial positions of an older, analog meter) and “interval reads,” also known as a “load profile,” which is time-series energy use typically in hourly or 15-minute periods. Utilities should support up to four (4) years of historic usage data, or the length of the time the customer has been at the premise in question, whichever is less.

Systems data: This could include the customer assigned peak load contribution, energy and capacity loss factors, or other information needed for wholesale market participation. Examples from different wholesale grid operators are below.

	CALIFORNIA (CAISO)	NEW YORK (NYISO)	PJM
Examples of systems data necessary for wholesale market participation	<i>Phode Sublap LCA LSE MDMA MSP</i>	<i>Installed Capacity tag (ICAP)</i>	<i>Peak load contribution (capacity and transmission)</i>

2. FORMAT AND TRANSMISSION PROTOCOL:

Recognizing that customer choice is enhanced when utilities adhere to nationally-recognized, open standards and best practices, Green Button Connect (GBC) should be adopted by utilities to transfer standard customer data to authorized Third Parties.

3. THIRD PARTY ELIGIBILITY CRITERIA:

Third parties should be required to meet the following eligibility criteria:

1. Provide utilities its contact information, including federal tax ID number;
2. Provide a certificate of good standing from the state;
3. Agree to reasonable terms of utility data access (see #4 below);
4. Complete a technical interoperability test with a utility's GBC platform.

4. BINDING TERMS OF USE:

Third Parties should agree to binding terms of use when registering with a utility to receive customer data. A contractual agreement should address the following:

1. Privacy policy: A Third Party's privacy policy must be conspicuously posted on its website.
2. Prohibited uses: Third Parties may not use standard customer data for anything other than the purposes specified. The "purpose" statement should be succinct and understandable. In addition, Third Parties may not sell standard customer data to other entities, except to contractors or affiliates that must abide by requirements of equal or greater stringency.
3. Waiver of liability: Third Parties must waive liability claims against the utility for the Third Party's use of standard customer data.

5. CLEAR AUTHORIZATION LANGUAGE.

Standardized language should be presented to the customer to support informed consent. Authorization language should address the following:

1. **Description of standard customer data.** The customer should have a clear, plain-English description of the standard customer data (or relevant subset) to be shared with a Third Party.

2. Length of authorization. The term length (e.g., number of months). Unlimited terms should be permitted at the option of the customer. This is also known as "valid until rescinded." Third Parties should be able to optionally specify a minimum term.

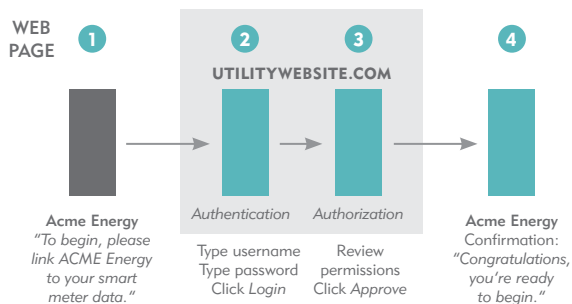
3. Purpose specification. A succinct, plain-English statement of the Third Party's purpose in accessing standard customer data, as defined by the Third Party.

4. Revocation procedure. A succinct statement about how a customer can revoke access at any time (see also #7 below). If a Third Party will not terminate access or is not responding to customer requests, then a customer should always be able to revoke authorization by contacting the utility.

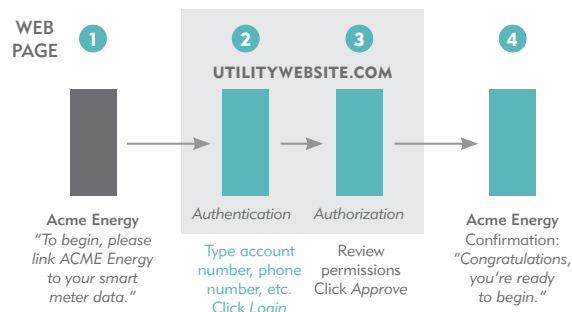
6. STREAMLINED CUSTOMER EXPERIENCE AND EASE-OF-USE.

There are five (5) discrete authorization processes. These processes should make use of a customer's online utility account, if one is already created, but a utility account should not be required. The first two processes use the GBC standard and OAuth 2.0¹ for online authentication and authorization. Two additional processes are discussed that further reduce customer effort, or "friction," required to share their data; these approaches place more burden and expense on third parties, but also allow increased control over the customer experience. The final process is paper-based and should be retained for customers who do not want to use an online account.

1. Customer has an online utility account.



2. Authorization without a utility account.



¹ OAuth 2.0 is used by major websites such as Facebook, Twitter and LinkedIn. For information on the Oauth 2.0 standard, see <https://oauth.net/2/>

In the above scenarios, the utility should strive to minimize the number of “screens” required of the consumer as much as possible. For example, in scenarios #1 and #2 above, there is one (1) authentication page and one (1) authorization page.

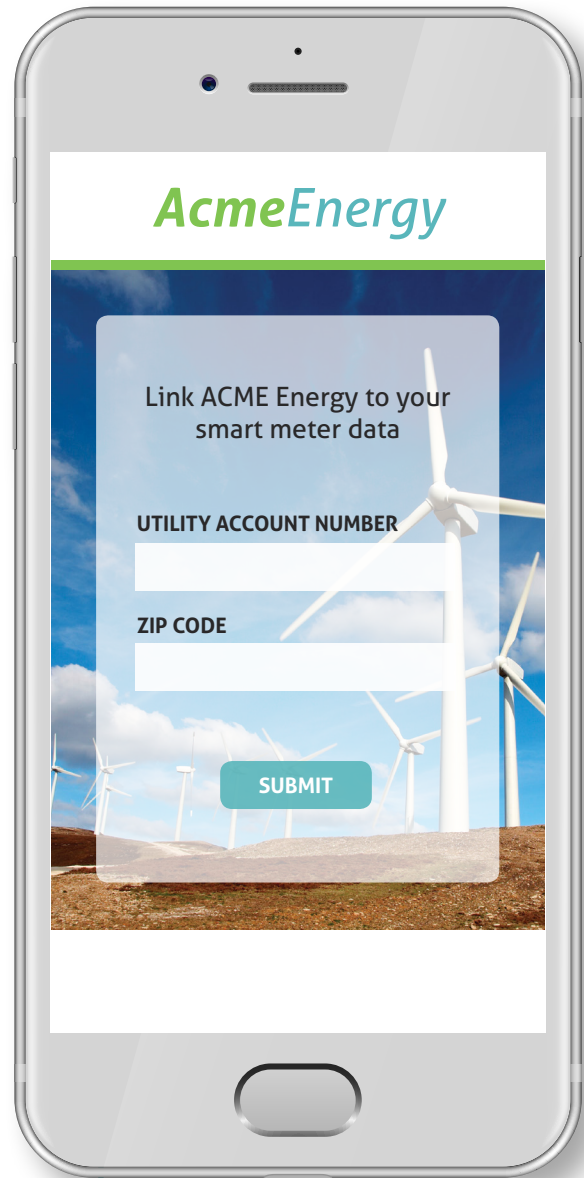
Nevertheless, while one (1) authentication page and one (1) authorization page is helpful in reducing “customer fatigue,” empirical evidence suggests that even the above process leads to customer drop-offs, with mobile web browsers being particularly vulnerable.² Therefore, utilities should support authorization processes that use Third Party designs, as discussed below.

3. Customer authorization via Third Party designs. This process allows the Third Party to more completely manage the communication with the utility and the customer experience. The utility will verify customer credentials, but the Third Party can embed the authentication function into its website or mobile application, further reducing friction associated with the transaction. The authentication and authorization information are securely passed to the utility and confirmed in real time.

4. Warrant process. A “warrant process” allows utility verification of the authorization to be delayed or waived entirely. The Third Party would obtain the authentication and authorization required, and keep such authorization on file, where it could be confirmed at any time by an audit. This allows the utility or regulatory authority to confirm anytime that a valid authorization has been obtained, but does not require the development of real-time response capabilities by the utilities’ systems. This option gives the Third Party maximum flexibility in designing the user experience and adapting it to technological changes over time. It also minimizes any additional technical functionality that the utility would have to create to accommodate customer authentication and authorization. The warrant process is used today by retail energy providers in states with competition and is generally offered only to entities licensed by state commissions.

Both authorization options #3 and #4 give Third Parties the power to create a seamless customer experience, and to modify such designs as technologies and user expectations change without burdening the utility. In these scenarios, Third Parties are less vulnerable to a poor user interface offered by the utility that does not sufficiently accommodate evolving customer needs.

5. A paper-based form (intended primarily for commercial and industrial customers) should continue to be permitted for data sharing.



Secure authorization fully designed by Third Party

7. FEATURES OF UTILITY DATA-SHARING PLATFORMS FOR THIRD PARTIES:

- 1. Testing and production environment.** Utilities should provide a testing environment and a production environment of GBC for Third Parties’ use.
- 2. Multiple display names to reduce customer confusion.** Utilities should enable third parties to use data services or other contracted support, while operating under their own consumer brand. For example, if “SmithCo” manages the collection of standard customer data on behalf of “AcmeEnergy,”

² See, e.g., “Optimizing the demand response program enrollment process.” White paper by EnergyHub, Inc. dated April, 2016. Available at <http://www.energyhub.com/blog/optimizing-demand-response-enrollment>

then “SmithCo” should be able to be seen by the customer as “AcmeEnergy,” in addition to its own name.

8. REVOCATION PROCESS: The revocation process should first encourage the customer to revoke the service by contacting the Third Party directly, to avoid bothering the utility. However, if a customer is unable to contact a Third Party, or a Third Party is not responding, the customer should be able to terminate a data-sharing agreement at any time through the utility’s GBC web portal or by calling the utility.

9. ENFORCEMENT PROCESS AGAINST A “BAD ACTOR.”

In our experience, agreement of a consumer to share their data with a specified Third Party does not require state commissions to adopt the same level of regulation for third parties as that reserved for retail electric providers.³ Nevertheless, an enforcement process is both reasonable and necessary, and should include the following elements:

1. Either the utility on its own motion, or a consumer via complaint, should be able to trigger an investigation by the state commission of the Third Party’s adherence to the data sharing agreement with the utility, and the scope of the given customer’s authorization;
2. A customer complaint about a breach of agreement by a Third Party can trigger an investigation, but until a commission judgment has been made, Third Party access may not be suspended by the utility unilaterally for the customer in question;
3. Inadvertent mistakes may eventually occur through simple data transpositions (i.e. “fat fingers”), misunderstandings or other unwitting actions. In all cases, due process should be afforded to Third Parties in any dispute, including reasonable notice, the opportunity to respond to contemplated enforcement actions, the ability to defend its actions, and provision of a cure period. Most Third Parties want to have customer feedback in order to be able to respond appropriately to customer complaints.



³ In states with retail competition, retail energy providers must comply with various consumer protection rules.

4. Ultimately, based on its own investigation, state commissions can order a utility to shut off data to a Third Party for a “pattern or practice” of violating requirements. Termination should be proportional to the judged offenses, enabling termination of a specific customer(s) data, temporary suspension, or complete termination.

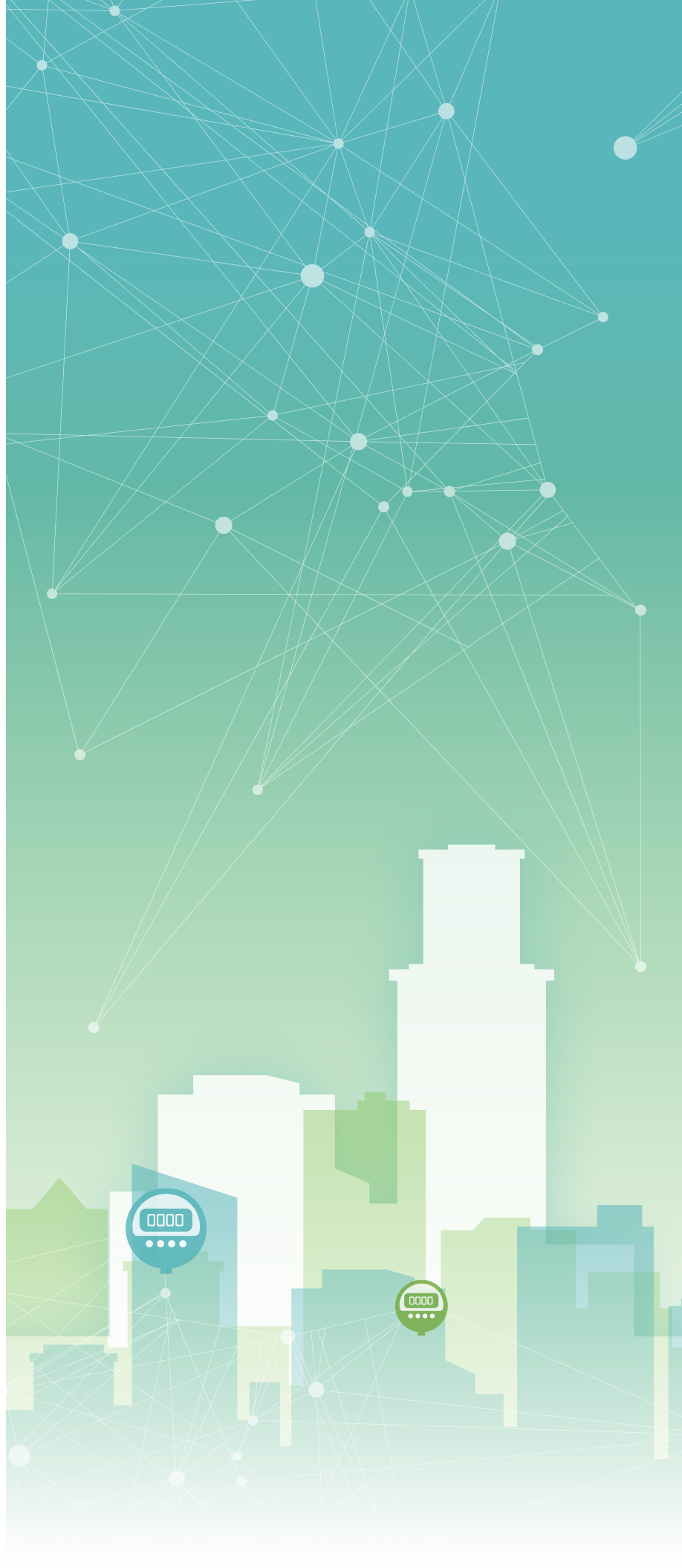
For clarity, a customer may terminate a data sharing agreement at any time. Data-sharing agreements should expire upon the date specified by the customer, unless earlier terminated by order of the commission.

10. QUALITY OF SERVICE; TRANSPARENCY. The following requirements ensure that customer choice of energy management services is fully realized by providing web services and GBC platforms at a sufficiently high level of service such that market participants can depend upon the GBC platforms.

1. Utilities should strictly adhere to the most current GBC standard and documented best practices.
2. Utilities must attain periodic certification of GBC by the nonprofit Green Button Alliance, with non-compliance remedied in a timely manner.
3. Utilities should make their best efforts to implement GBC in technologically consistent ways with one another, with customers having nearly identical user experiences.
4. Utility performance metrics reported on daily basis, including technical support response times and resolution times, data fulfillment times, customer webpage loading times, system outage statistics, mobile device compatibility, and usage statistics such as number of historic data transfers and number of ongoing data-sharing agreements.
5. Data accuracy must be properly denoted in GBC by using the “QualityOfReading” feature, allowing the utility to specify whether energy readings are “raw,” “validated” or “billing quality.” Updates to any data as a result of the validation, editing or estimation (VEE) process should be automatically provided at no charge to Third Parties.
6. Service level agreement: GBC downtime should not exceed 6 hours per calendar month, including scheduled maintenance windows.
7. A clear enforcement process against the utility should be articulated if the utility does not honor authorizations in a timely manner, breaches the service level agreement, or is subject to a verified complaint by a Third Party.



MISSION DATA
empowering energy savings



Green Button Connect: State-Level Policy Summary

<i>State</i>	<i>Who submits consent to the utility – the customer or third party?</i>	<i>Technical standard required by Commission</i>	<i>Scope of data</i>	<i>Third party eligibility criteria</i>
California (E-4868, D1309025, Rule 24/32)	Today, customer. IOUs required to propose a third party-driven, API-based system in Nov '18	Green Button Connect (GBC)	48 months interval usage history, ongoing 15- or 60-minute readings, billing and account info, DR participation info, Home Area Network	Must not be on the Commission-maintained list of “banned” third parties
Colorado (16A-0588E, 18A-0194E)	Customer. The customer needs to log into the utility’s website to grant an authorization	“A nationally-recognized open standard and best practice.” GBC today, and utility has burden to prove GBC is no longer appropriate	Usage history, near-real-time 15-minute readings and Home Area Network	None. Rule 3027(e) says, “Nothing in these rules shall limit a customer’s right to provide his or her customer data to anyone.”
Illinois (17-0123, 15-0073, 14-0507)	Today, customer. Third party electronic submission is pending before the ICC	Green Button Connect (GBC)	24 months interval usage history, ongoing 30-minute readings every day, and Home Area Network	None
New York (15-M-0180, 14-M-0101)	ConEd supports customer submissions today, but PSC orders call for third party submissions as well	“Green Button Connect or alternate standard with similar functionality”	24 months interval usage history (marked actual, estimated or billed), ongoing 5- or 15-min readings, service address, electric account number, meter numbers, “ICAP” tag needed for DR, other items such as rate class	None
Texas (47472)	Third party; the utility then emails the customer a link to confirm	Green Button API ¹	24 months interval usage history, ongoing 15-minute readings (billing data not available)	None

¹Texas deviates slightly from the standard in order to accommodate Texas’s unique market structure in which the retailers hold the consumer relationship, not the utility. Thus, the Green Button APIs are used, but not the authorization standard within Green Button Connect known as “OAuth.”

<i>State</i>	<i>Standard authorization language for customers</i>	<i>Commission jurisdiction over third parties</i>	<i>I.T. performance monitoring & transparency</i>	<i>User experience requirements</i>
California	None (except for lengthy privacy policy)	Commission claims jurisdiction over any entity receiving utility-held data about 11 or more customers per D.11-07-056, but courts have not yet weighed in	Website must show real-time performance statistics including availability, “funnel” metrics and start-to-finish times	Extensive – 2 screens and 4 clicks (see E-4868), no account required at utility website, optimization for mobile devices required
Colorado	Yes, approved in 15A-0789E	None	Annual testing and reporting on I.T. system availability and performance metrics	Xcel will work to “minimize the number of screens and clicks required” and minimize the time lag between authorization and data transmission
Illinois	Yes, approved in 15-0073	None yet; a contested issue (see 15-0073, 17-0123)	None	Being discussed in 17-0123
New York	None	Commission claims jurisdiction but has no requirements at this time beyond “truth in advertising” (15-M-0180 DER Oversight Order, Oct 19, 2017)	None	None
Texas	Yes (to be resolved in compliance filing)	None	99.5% uptime requirement and monthly reporting on various metrics	Detailed specifications include: no online utility account requirement, one click to confirm from email link



GOT DATA?

*The Value of Energy Data
Access to Consumers*

JANUARY 2016



MORE THAN SMART

MISSION:DATA



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MORE THAN SMART

Creating integrated distribution grids one state at a time

More than Smart (MTS), formerly Greentech Leadership Group, is a 501(c)(3) non profit organization started in 2009 on the premise that green energy and climate policies are driven by thoughtful, diverse and politically minded people working together to develop new and innovative solutions. MTS has a proven track record in developing and implementing policies in areas such as promoting energy efficient electronics, improving cap and trade offset options, enabling regional cleantech funding and now in upgrading the distribution grid. Today, all MTS programs are focused on upgrading the electricity distribution grid so a state can enable more DER, enabling more players in DER markets and enabling a networked grid that can enhance other existing infrastructure grids like water and natural gas.

MISSION:DATA COALITION

The Mission:data Coalition is a national coalition of 35+ innovative technology companies that empower consumers with access to their own energy usage data. Mission:data advocates for customer-friendly data access policies throughout the country in order to deliver benefits for consumers and enable an innovative, vibrant market for energy management services.

TABLE of CONTENTS

1	EXECUTIVE SUMMARY	01
2	INTRODUCTION	03
	<i>Why is access to energy usage data important?</i>	03
	<i>Why this report?</i>	03
	<i>Definitions and scope of this report</i>	05
	<i>What is Green Button?</i>	08
3	HOW IS ENERGY DATA USEFUL?	09
	<i>New players in energy efficiency</i>	10
	<i>Gateway to energy savings</i>	10
4	COSTS OF NOT HAVING ACCESS TO ENERGY DATA	14
	<i>Commercial and Industrial Users</i>	14
	<i>Solar Industry Examples</i>	15
	<i>Web scraping on the rise</i>	16
5	SOLUTIONS: STATES THAT LEAD THE WAY ON DATA ACCESS	17
	<i>California</i>	17
	<i>Texas</i>	18
	<i>Colorado</i>	19
	<i>Illinois</i>	19
6	ADDRESSING PRIVACY CONCERNS	20
7	POLICY RECOMMENDATIONS	23
a1	APPENDIX 1 <i>Good examples of privacy laws and rules</i>	25
a2	APPENDIX 2 <i>Summary of California PUC decisions on data access</i>	29
a3	APPENDIX 3 <i>Recommended reading</i>	32
a4	APPENDIX 4 <i>Technical resources</i>	33



1

EXECUTIVE SUMMARY

This report outlines how providing access to customer energy use data from “smart meters” can help state policymakers and advocates reach their renewable energy and climate goals faster. It outlines how advanced metering can be used to accelerate energy efficiency with data protocols like Green Button while protecting customer privacy.

With modernization efforts underway to make the electric grid cleaner and more efficient, many states are investigating how to best structure the electricity sector in order to promote renewables and other distributed energy resources (DERs) like energy efficiency, demand response and solar photovoltaics (PV). New York, for example, seeks to “animate DER markets” with its Reforming the Energy Vision

proceeding, while California seeks to enable “plug-and-play DER,” meaning that DERs should be able to instantly connect to the power grid and begin providing services. One of the most important requirements for stimulating innovation in the private sector with respect to DER is the sharing of data from utility “smart meters” with customers and customers’ authorized service providers. When shared securely and with customer permission, the privacy of customers can be maintained while providing essential information to DER providers for the sizing, operation and maintenance of innovative grid services. Granular meter readings every 15 minutes or 60 minutes can be used for a host of promising software applications such as “virtual energy audits” that identify efficiency opportunities instantly, the sizing of





photovoltaic systems to maximize peak demand reductions or helping customers choose alternate electricity rates such as time-of-use (TOU) pricing that may save them money.

Of all the DERs available, energy efficiency will likely receive the largest boost from meter data flowing to contractors, auditors and software companies. One research paper from 2010 found 4% - 12% energy savings in households in the presence of energy usage data. **Since 2010, 12 other studies that indicate energy savings potential of 6% - 18% when customers have easy access to meter data.** Academic research indicates that when energy usage data presented to customers are more detailed, greater energy savings will result. Data access can thus accelerate energy efficiency because people exhibit greater conservation behaviors when stimulated by granular feedback than by monthly bills.

Data access improves human conservation behaviors, but it can also improve the efficiency of appliances. By transmitting price or real-time usage electronically to devices, curtailments or “sleep” modes can be automatically triggered. Originally, this was the promise of the smart grid: customer-owned devices producing and consuming energy in harmony with the power grid. As it stands now, however, many innovative companies spend a great deal of time and money accommodating each utility’s idiosyncratic differences with regard to data access; even worse, many companies are forced to install their own electric meter on the customer’s premise, redundant to the utility’s, in order to get usage information in the manner they require. As we show, the costs of the lack of data access are significant—in the tens of millions of dollars in one sector alone. These costs make energy efficiency unnecessarily expensive, hindering the efforts of entrepreneurs and innovators to

develop and deploy climate solutions.

When simple interactions with the grid are expensive and complex, we fail to reach the goals of “market animation” and “plug-and-play DERs.” But getting the right data doesn’t need to be expensive and complex. This report documents the data access policies of leading states where innovative companies have recently begun accessing billing-quality meter data electronically at no charge, with customer permission.

We recommend that:

- 1) Commissions should require utilities to provide the best available energy usage data to customers (and their authorized third parties) in a standardized, electronic format as part of basic utility service.**
- 2) Tariffs should be published in standardized, machine-readable forms so that software applications can quickly and accurately calculate expected costs.**
- 3) Customer bills should also be available to customers (and authorized third parties) in standardized, electronic format.**

Time is of the essence because, without standardized policies and procedures governing data access nationwide, regulators inadvertently handicap the adoption of DER. Regulators can learn a lot from states that have already considered smart meters, the Home Area Network, grid modernization, privacy policies and information technology (IT) systems that empower customers with choices about how and when to use power. Modernizing the grid depends upon thoughtful policies and procedures governing meter data as much as it does on the infrastructure moving energy across the system.

INTRODUCTION

WHY IS ACCESS TO ENERGY USAGE DATA IMPORTANT?

American homes and buildings account for 39% of the country's carbon dioxide emissions¹ and 69% of its electricity consumption.² Although electricity demand has been nearly flat for the past five years, the scale of American electricity use remains daunting: electricity used merely for air conditioning our buildings is larger than the entire African continent's usage, for everything.³

Despite the existence of numerous technologies that can help reduce electricity consumption—or shift usage to off-peak times—much more can be done in state energy policy to enable promising new technologies. Utilities have long collected customer usage data for billing purposes. But once-a-month utility bills provide little to no insight to customers as to how electricity or natural gas are actually used. Web and mobile tools have provided consumers with significantly more information about various services from personal finance and travel to health and fitness over the past five years, but the analogous level of service provided by energy utilities has not appreciably progressed. The absence of web and mobile tools offered by utilities is remarkable when one observes that many states have approved advanced metering infrastructure (AMI) or automated meter reading (AMR) systems, measuring the consumption of homes and businesses at 15-minute or hourly intervals. Rich datasets for understanding and



optimizing both financial and environmental costs in homes and buildings exist—if only one could access them. Sadly, monthly bills remain the norm.

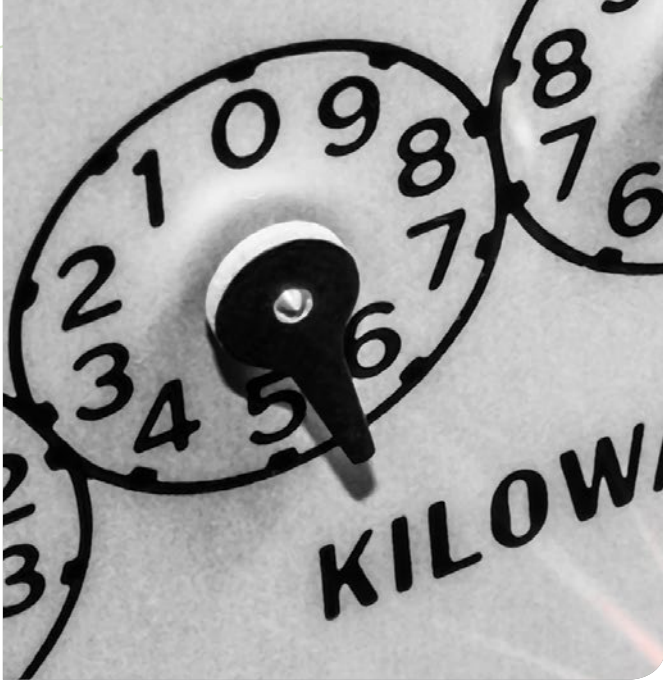
Bolstered by the American Recovery and Reinvestment Act of 2009, the number of “smart meters” providing interval usage data to the utility has risen to nearly 50 million across the United States, providing a potential foundation for better informing customers.⁴ From the beginning, meter vendors and utilities eager to secure regulatory approval for billion-dollar investments in AMI highlighted the benefits to customers from granular data: phrases such as “consumer empowerment” were heard in state public utility commissions (PUCs) across the country. Despite these promises, access to usage data is still challenging and costly, even in utility territories with AMI. Consent forms requiring “wet-ink” signatures and inconsistent data formats are persistent barriers for data-seekers. As a result, interval

1 Energy Information Administration. “U.S. carbon dioxide emissions from energy consumption.” Sept. 2015. Tables 12.1, 12.2 and 12.3. <http://www.eia.gov/environment/data.cfm#summary>

2 Energy Information Administration. http://www.eia.gov/electricity/annual/html/epa_02_02.html

3 Henley, Jon. “World set to use more energy for cooling than heating.” *The Guardian*, 26 October 2015. <http://www.theguardian.com/environment/2015/oct/26/cold-economy-cop21-global-warming-carbon-emissions>

4 Edison Foundation Institute for Electric Innovation. “Utility-scale Smart Meter Deployments: Building Block of the Evolving Power Grid.” IEI Report, September, 2014.



usage data is costly for market actors to acquire in a usable form, requiring specialists to navigate utility bureaucracies, consent forms and tedious data-formatting tasks to attain the consistency that software applications require.

Despite these challenges, entrepreneurs and innovators have begun offering numerous services that analyze energy data. Software-based tools can interpret usage data automatically and do things such as notify you of tomorrow's peak demand costs, disaggregate your monthly bill into heating, cooling, lighting and other components, and recommend cost-effective efficiency improvements.

Consumers—who ultimately pay for advanced meter functionality through rates—ought to be able to see detailed information about how much energy they purchase. After all, many other activities common in daily life provide consumers with information about quantities consumed: Gas stations are obliged to show gallons pumped in real time, not merely a price, so that customers can halt the pump when their wallets get squeezed. Grocery stores offer receipts showing quantities purchased, and products can be returned at check-out. But electricity is altogether different. Sometimes referred to as “the invisible commodity,” whole-home electricity usage is not easily itemized into a shopping cart. When utilities consider providing insights to ratepayers, there are two common reasons against it: the lingering perception that customers don't care for such insights, or that utilities cannot provide insight anyway due to electricity's ephemeral nature. What is “behind the meter,” as they say, is the customer's own business. Regulated utilities have “the obligation to serve,” but that obligation has not been widely understood to include much in the way of providing information about the consumption of the product itself.

Just as medical patients have rights to access their medical records, most reasonable people believe energy users ought to be able to access their own usage records. But as with medicine, the records themselves aren't always comprehensible. Some information, such as dollars owed, are quite clear for non-experts to understand, similar to a pregnancy test: the information is obviously meaningful and does not require much in the way of decryption. But what about systolic blood pressure, white blood-cell count or the difference between HDL and LDL cholesterol counts? Data alone do not convey much meaning to the layperson; interpretation by an expert is called for. We cannot expect many individuals to become skilled enough in analyzing charts and interval electricity consumption data to attain the insight that a professional has. For this reason, it is reasonable to expect utilities to provide energy data to third party experts for interpretation, just as laboratories send test results to doctors, not merely to patients. And third party access is where complex policy issues in utility regulation begin.

WHY THIS REPORT?

The modernization of the electric grid presents tremendous opportunities meeting the challenges of climate change. Incorporating renewable energy sources, reducing peak demand and conserving energy can be achieved when the grid is smarter and generation more decentralized. Efforts toward grid modernization are currently underway in states such as California, Massachusetts, Minnesota, New York and others. California and New York have correctly observed that a cleaner and more efficient electric system is directly related to the ability of market participants to access meter data. Meanwhile, smart meter deployments are still underway in many jurisdictions, and potential investments in millions of new smart meters are being considered. The accomplishments of a few states on data access in the past five years can and should be studied by regulators so that the same mistakes are not repeated and so that distributed energy resources can be effectively incorporated at a much quicker pace.

Indeed, the scarcity of utility meter data stands as a formidable obstacle to progress on reducing greenhouse gas emissions: only when the policies and practices surrounding utility meter data access are mature can the immense range of benefits be available to customers. Many activities such

as ENERGY STAR benchmarking or utility-run efficiency programs require usage data. Access to data is often a prerequisite to consumer action on energy efficiency: some consumers and building owners aren't going to invest significant amounts of money before they have examined simple, no-cost measures.

Some recent developments in data access are gaining traction, such as Green Button (see page 8), but there are no reports or resource guides that comprehensively cover all aspects of data access. With state policy, not federal policy, having the largest influence over electric and gas utilities, state regulators need to be informed on issues ranging from advanced metering technology to privacy and "big data." In speaking with regulators and policymakers in over a dozen states, we have seen the following obstacles to enacting data access policies:

- Policymakers have not been quick to understand software's tremendous potential to save energy cost-effectively, in part due to its technical nature
- Private access to one's own data has been conflated with "open data," or data access without customer authorization, raising privacy concerns

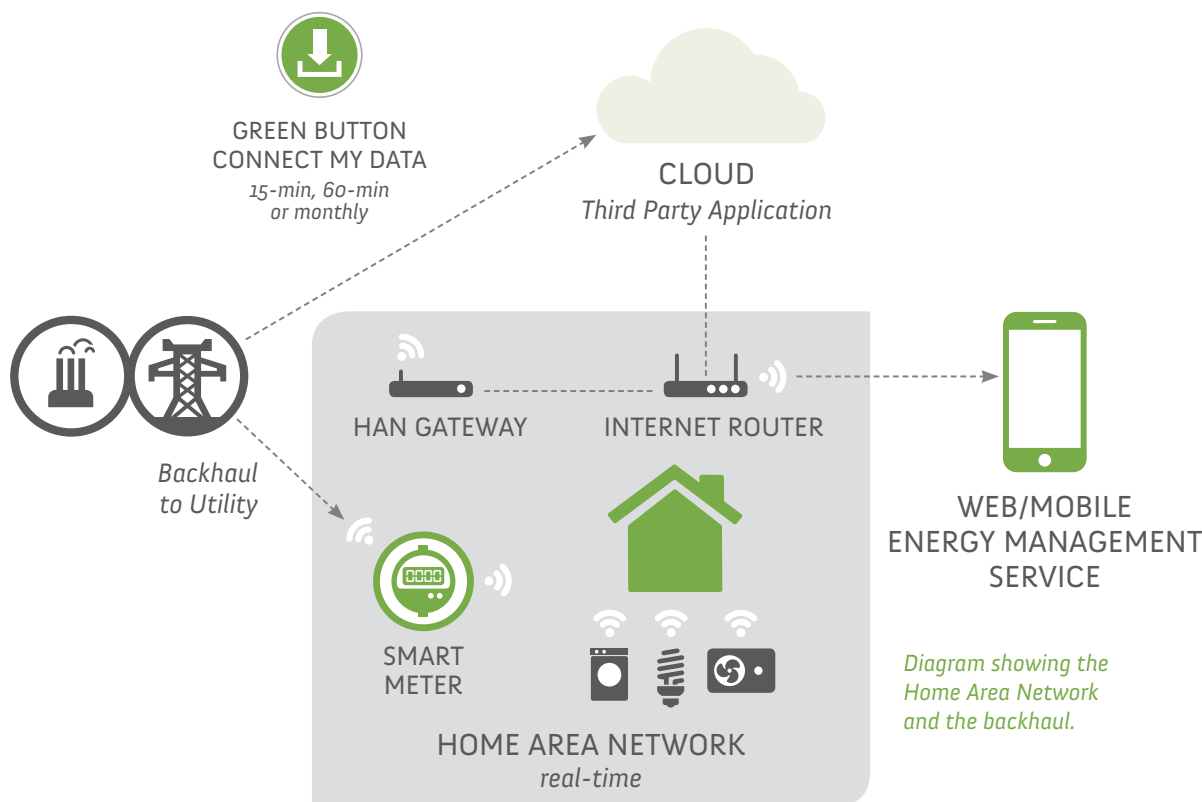
- The benefits of data access have not been adequately described or made tangible to policymakers; conversely, the costs from the *lack* of data access have not been identified

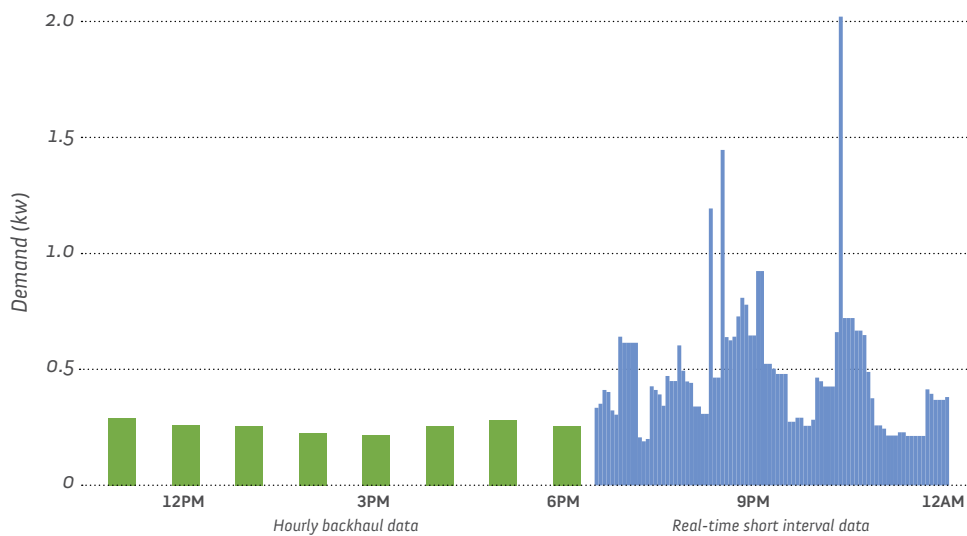
For these reasons, combined with the fact that about 50% of all American households and businesses have smart meters (and even more will have them soon), we felt it was essential to catalogue the lessons learned for the benefit of other states. The report concludes with detailed policy recommendations for those states considering smart meters, grid modernization or new privacy policies.

DEFINITIONS AND THE SCOPE OF THIS REPORT

The utility industry and information technology are each complex and their own right, requiring a common vocabulary to communicate effectively about either. Thus, a few words about terminology are in order.

By **data access** we are referring to consumers' access to energy usage data. Consumption data—in kilowatt-hours of electricity, or therms (or cubic feet) of natural gas—is referred to by various terms. **Customer Energy Usage Data** or CEUD is used by the U.S. National Institutes for





Standards in Technology (NIST) and others; sometimes consumption readings are simply called energy data. For clarity, throughout this report, when we use **data** or **energy data**, we are referring to meter readings regardless of granularity—5-, 15-, 60-minute or monthly.

Furthermore, by **energy data** we refer to consumption readings as well as cost information. As we explain, acquiring cost information in certain states presents challenges (some states have retail competition in which the metering provider does not have pricing information). Nevertheless, we wish to make clear to readers that **data access** hereafter refers to two critical components of a customer’s bill: the usage and cost information.⁵

Advanced metering infrastructure (AMI) is defined by the U.S. Department of Energy (DOE) as an integrated system of smart meters, communications equipment and data management systems.⁶ Smart meters collect interval data (generally hourly or more frequent) to enable pricing structures that are more granular than merely one reading per month such as demand charges or time-of-use (TOU) pricing. AMI also includes two-way communication so that the utility can transmit messages to the meter such as pricing or shut-off signals. Equivalent terms are sometimes

used in different states, such as advanced metering functionality (AMF) or advanced metering system (AMS).

In advanced metering systems, there are two general methods by which energy data may be transmitted from the meter to the customer. The first method is termed **the backhaul**. Referring to the communications network of fixed or mobile receivers by which the utility collects data from a group of meters, backhauled data are transmitted from the meter back to the utility on a periodic basis, often several times per day. There are no instances to our knowledge of real-time readings being made available to customers via the backhaul.

The second method of data access is the **Home Area Network (HAN)**, starting with a radio in the meter with a limited range (75-150 feet) that communicates with devices in the home. Real-time usage, prices and certain signals such as peak demand notifications can be transmitted from the utility through the backhaul to the meter, and from the meter through the HAN to in-home displays, smart thermostats, pool pumps, and other devices. Also, because advanced meters are installed in small and medium commercial buildings as well as homes, the HAN is sometimes referred to as the “Business Area Network” (BAN), a different name but with an identical meaning. We use the term HAN to describe both residential and commercial cases.

We refer to the wide range of companies providing DERs—energy management, solar, demand response, smart

⁵ Utility rates are complex, to say the least. Knowledgeable readers will raise their hand in exception to the notion that monthly utility bills are simply the product of consumption and price per unit, as fixed charges, taxes, fees and time-of-use (TOU) rates all complicate the calculation. Experts will debate the best method of capturing all billing elements in an electronic form, so needless to say that throughout this report when we refer to pricing information we mean the “best available” information on pricing.

⁶ See, e.g., https://www.smartgrid.gov/recovery_act/overview/smart_grid_investment_grant_program.html



thermostat, etc. as simply **third parties** to distinguish them from regulated utilities and customers. (In states with retail electric competition, there is both a “wires and poles” utility and a retail supplier. We refer to third parties as different from both entities.) Third parties often install **submeters**—that is, meters owned by the customer or third party and that may be redundant to a utility meter—due to the difficulty in getting meter data from utilities. Submeters refer to any meter on a circuit regardless of scale, i.e. from an individual appliance up to a whole home or building.

Finally, a critical distinction with regard to data access is who requests it. The privacy of consumers, including the consumer’s right to decide what third parties, if any, should have access to his or her energy data, is obviously a critical issue for regulators. Much has been written about this topic, particularly the question: Under what circumstances may customer energy data be accessed *without* customer consent? This report’s treatment of data access is limited

to instances where the customer *has* granted authorization to third parties. To help the reader better understand this distinction, consider the following cases where authorization is not granted by the customer. These cases are *not* considered in this report.

- Local governments seek aggregated usage data by zip code in order to calculate baseline energy use and greenhouse gas emissions for climate action plans.
- Owners of a commercial building with 10 tenants seek whole-building usage data to comply with municipal benchmarking and transparency ordinances without having to get explicit permission from each of the 10 tenants.
- A residential solar installer wants to know which customers in a given neighborhood have sufficiently high electric bills to be good candidates for solar without contacting each customer individually.



What is Green Button?

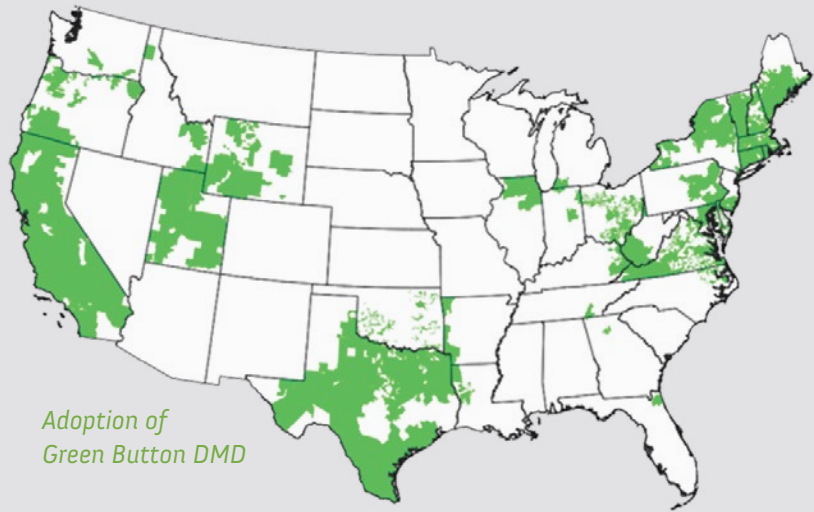


Green Button is a technical standard developed by industry for exchanging energy usage data.

Championed by a White House call to action in 2011, Green Button is being adopted by dozens of utilities. Green Button is formally known as the North American Energy Standards Board's (NAESB) REQ21, the Energy Services Provider Interface (ESPI). These terms are interchangeable.

As with other technical standards, the primary benefits of widespread adoption of Green Button are reduced transaction costs and the facilitation of commerce. For example, if every state had its own W-Fi standard (IEEE 802.11), business travellers would need to buy different Wi-Fi communication cards for each state in order to use a laptop at an airport or coffee shop. Energy management firms today need to write software for parsing and manipulating the unique energy data formats of each utility.

There are two flavors of Green Button. As the name suggests, Green Button DMD requires users to login to their online utility account and download a file manually. The file format is standardized using an XML (eXtensible Markup Language) schema, and the file can be opened in spreadsheet programs such as Microsoft Excel or OpenOffice. The benefit of DMD is data portability—customers can upload their Green Button files into over 60 apps made by software developers,



Adoption of Green Button DMD

such as energy conservation games or electric vehicle (EV) cost estimators.⁷

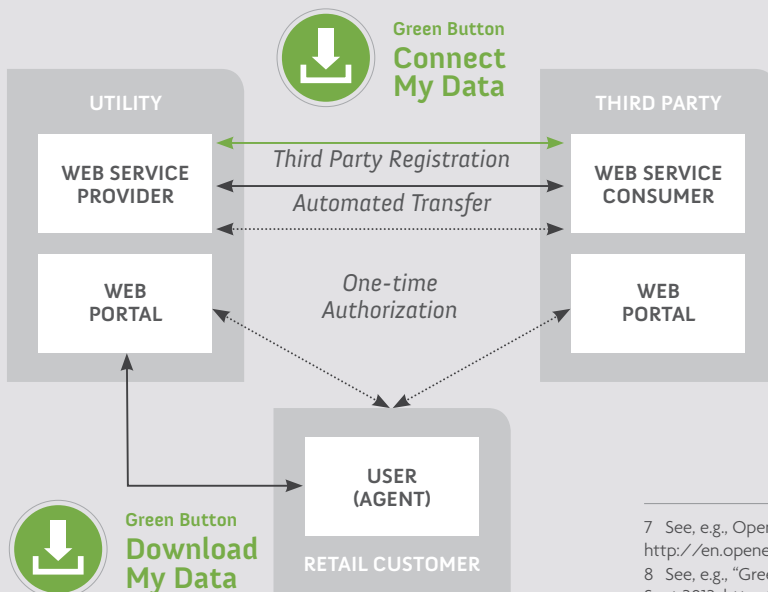
Unfortunately, despite adoption by 55 utilities (see map), DMD has not been widely used by customers. The primary reason is the friction introduced by the downloading-and-uploading process. Many of the best energy applications function in an ongoing capacity, making recommendations to the customer by email or text messages as usage increases, for instance. Asking customers to periodically upload a data file into a website to keep their energy app current presents a burden that nearly all attention-constrained customers will not bear.⁸ As a result, most third parties do not consider DMD an adequate solution.

In contrast, Green Button Connect My Data (CMD) is an automatic, ongoing transfer of usage data to a third party upon authorization by the customer. Initially, 12 to 24 months of historical usage data are transferred to the third party.

Thereafter, every day the previous day's interval readings are transmitted, giving the third party ongoing access to a customer's usage data.

As of January, 2016, only five American utilities have enabled CMD, enabling registration by any third party:

- Pacific Gas & Electric
- San Diego Gas & Electric
- Southern California Edison
- PEPCO (Washington, D.C.; commercial customers only)
- Commonwealth Edison (commercial customers only)



7 See, e.g., OpenEI.org's "Energy Apps Catalogue" at <http://en.openei.org/apps/?keyword=Green%20Button%20Apps>

8 See, e.g., "Green Button: One Year Later." Edison Foundation's IEE Issue Brief, Sept 2012. http://www.edisonfoundation.net/iee/Documents/IEE_Green%20Button%20Report_Final.pdf

3

HOW IS ENERGY DATA USEFUL?

12 STUDIES
from 2011-2015

FOUND

6% TO 18%
ENERGY SAVINGS



WHEN USERS
HAVE ACCESS
TO METER DATA

*coupled with new technologies
like disaggregation, actionable
feedback and smart controls*

A wide variety of digital services—old, new, and as-yet unimagined—offer great promise for cost-effectively reducing consumption, responding to time-of-use (TOU) prices, shifting demand and increasing the adoption of renewables and efficiency. If usage data could be consistently obtained across the nation's 3,200 retail electric utilities, new software technologies could be applied widely to enormous benefit. For example, energy efficiency and clean energy applications using meter data include, but are not limited to:

INSIGHT

web portals analyze usage data and provide actionable tips for saving energy and money

HEATING AND COOLING

customized heating and cooling recommendations for comfort

EDUCATION

community and student energy efficiency competitions, or using a school's energy usage in educational curricula to teach science or mathematics concepts

TARGETING ENERGY EFFICIENCY PROGRAMS

pre-screening of homes or buildings for energy savings potential to more efficiently deliver rate-payer funded programs

REAL ESTATE

provide energy costs to prospective buyers or renters

BENCHMARKING

ENERGY STAR scoring and compliance with transparency laws

COST REDUCTIONS

Use batteries or demand response to shift usage to times when electricity is less expensive

RATE SELECTION

Suggest cost savings by switching rate plans based on usage patterns, electric vehicle (EV) ownership

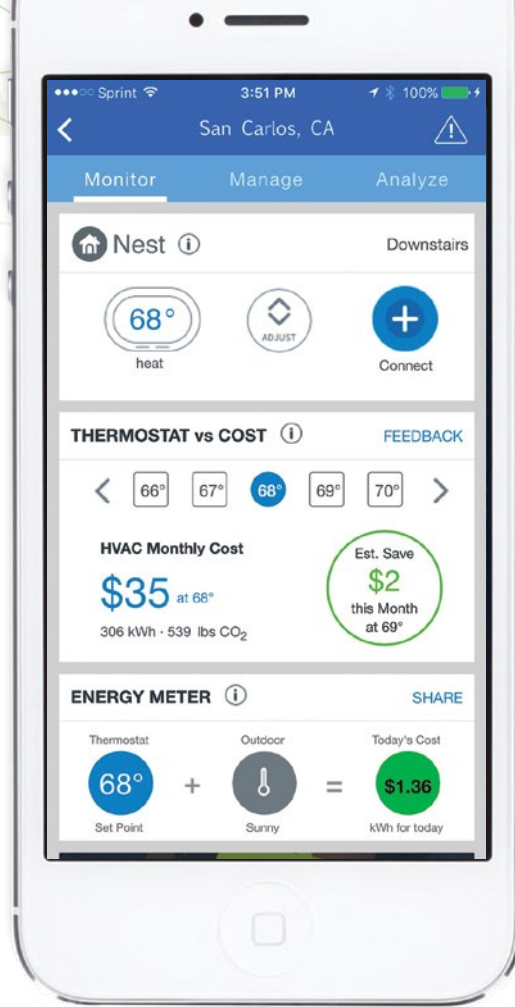
RENEWABLE ENERGY

optimize the size and cost-effectiveness of rooftop photovoltaic installations, accurately predict demand reductions due to solar

NEW PLAYERS IN ENERGY EFFICIENCY

WeatherBug Home (WBH) is not your typical participant in electricity markets. WBH's parent, Earth Networks Inc., boasts the largest private network of weather stations around the world. The company, based in Germantown, Maryland, made its name by selling hyper-localized meteorological data to governments (for disaster planning and emergency operations) and sports stadiums (for planning game cancellations due to inclement weather). Now the company offers energy efficiency services through a smartphone app.

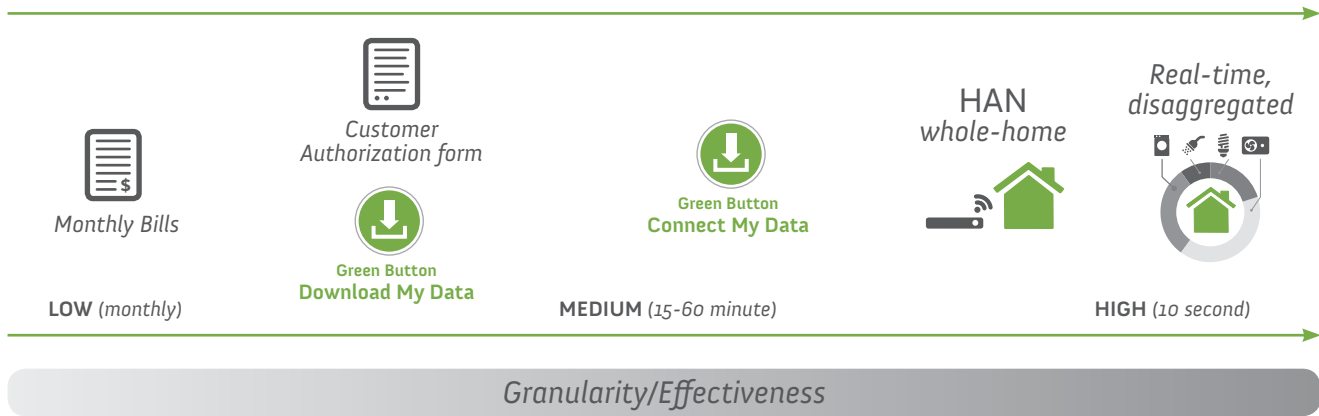
WBH represents a new category of player in the electric industry, one that is neither contracted to a utility to provide energy efficiency nor a thermostat manufacturer, although WBH has overlap with both. Over 20 million consumers interact with WBH's app on a regular basis. Besides local weather forecasts, the app provides energy and dollar savings estimates from changing thermostat setpoints. Recent technology partnerships with Honeywell and Nest allow you to control your thermostat from the



app itself, taking advantage of weather conditions to heat or cool in the most efficient manner. Users in certain utility territories can also bring in usage and billing history from their electric utility for analysis.

“Weather is universal. Everyone talks about the weather. Not everyone talks about energy,” says Joey Barr, Director of Partnerships for WBH. “By engaging a universal set of users first, we’re able to reach a lot more people and educate them about energy efficiency.” Over 4 million people have interacted with the app’s energy features—an impressive reach, much to the envy of other companies specializing in energy efficiency.

For WBH and many other companies, accessing user’s utility data with consent can empower consumers who ordinarily would not engage in energy efficiency at all. For these firms, interaction with energy users does not originate with utility bills or in the aisle of a hardware store. Instead, it can begin with social networks, discussions about home security systems or even weather forecasts. Data access can enable new services to bridge previously unconnected aspects of consumers’ lives and begin conversations about efficiency that would not happen otherwise.



GATEWAY TO ENERGY SAVINGS

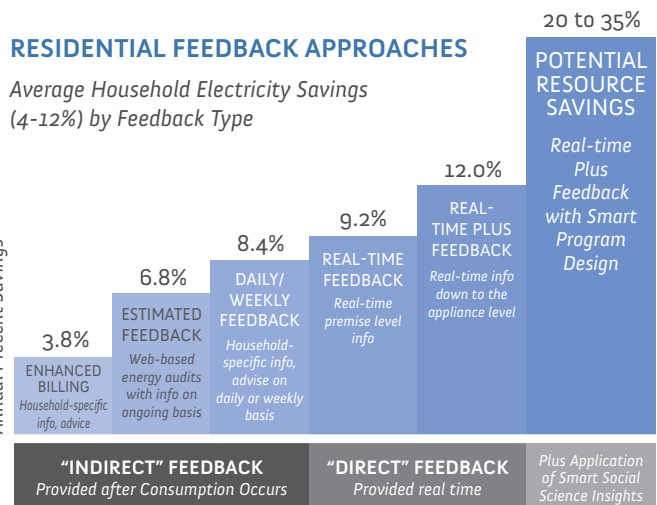
Easy access to usage data is a prerequisite for achieving many dimensions of energy efficiency, but not necessarily in ways one might expect. The average consumer should seldom be expected to study usage data herself. Nor should many businesses, for whom energy typically represents less than 1% of annual operating expenses. “Rational inattention” is an expected and perfectly normal behavior; consumers spend less than ten minutes per year thinking about energy.⁹ Realizing significant gains in energy efficiency will come not from consumers interacting with their raw energy data, but rather indirectly from technology companies and service providers who process, digest and act upon energy data on the customer’s behalf.

This is why data access is, by itself, insufficient to save energy; other steps are required, too. Nevertheless, it is instructive to review the impressive range of energy savings attained by data-driven feedback measures. Many studies have been conducted, the most comprehensive of which is ACEEE’s meta-analysis of 57 feedback studies (2010), summarized in the chart below.

Since ACEEE’s report in 2010, additional studies by industry, academics and utilities have continued to advance the case for data access. Some studies demonstrate energy savings, while others demonstrate reductions in peak demand—load shifting in addition to load reducing. **We found 12 studies from 2011 to 2015 in which 6% to 18% of electricity use was saved because of access to interval meter data coupled with new technologies.**

⁹ Accenture, “Actionable Insights for the New Energy Consumer.” 2012. https://www.accenture.com/t201511271210510_w_us-en/_acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Industries_9/Accenture-Actionable-Insights-New-Energy-Consumer.pdf

If energy savings increase as a function of granularity and timeliness of feedback as indicated by ACEEE (2010), then what utility information technology (IT) functions can in turn provide the greatest opportunities for savings? The figure above shows Green Button functionality (Download and Connect) and HAN features on a spectrum of effectiveness. Beginning at left, monthly bills provide, of course, the lowest granularity and effectiveness. Utilities manually send data to third parties pursuant to a customer authorization form in spreadsheets or PDFs via email. Such data can be monthly (low granularity) to 15-minute or 60-minute (medium granularity) depending upon the utility, the meter and customer class. Green Button Download My Data can similarly span low to medium granularity and, as stated before, its effectiveness is muted by the fact that its use requires action by the user each time (not altogether



Ehrhardt-Martinez, K., Donnelly, K.A., and Laitner, J.A. 2010
Faruqi, A. and Sergici, S., 2009



YEAR	AUTHOR	SAVINGS (%)	METHOD	SECTOR
2011	<i>Conservation and Customer Perceptions: The Real Time Monitor Pilot of Santee Cooper</i>	6% savings	311 residents with real-time IHDs	residential
2012	<i>Alberta Real-time Electricity Consumption Monitoring Study</i>	9% - 17% savings	260 residents with real-time IHDs	residential
2012	<i>Dean Mountain, "Real-time Feedback and Residential Electricity Consumption: The Newfoundland and Labrador Pilot"</i>	18.1% savings	Stratified random sample of 100 residents with real-time IHDs	residential
2013	<i>Armel, Gupta et al.</i>	12.0%	Disaggregation	residential
2013	<i>Granderson, Lin and Piette (Lawrence Berkeley National Laboratory)</i>	17% median savings after the first year, rising to over 40% after several years	Survey of energy information systems (EISs) at 28 sites, predominantly using whole-building interval electricity use data.	commercial
2013	<i>Houde, Todd, Sudarshan et al.</i>	5.7% savings	Randomized controlled trial with over 1,700 residents exposed to real-time feedback technology (but with 10-minute interval data)	residential
2014	<i>Ben Ho, Vassar College for EnergyHub, Inc.</i>	6%	smart thermostat with web and mobile software	residential
2014	<i>BKi</i>	7.4% electric, 13% gas	Bimonthly energy reports showing disaggregation	residential
2014	<i>Churchwell, Sullivan, Thompson and Oh (Nexant, for Pacific Gas & Electric)</i>	7.7% savings for customers on TOU rates	277 customers were exposed to either a website and mobile app with real-time data via the HAN or an in-home display (IHD)	residential
2014	<i>City of Mountain View, Acterra, Home Energy Analytics</i>	5.5% savings	Over 2,000 residents signed up for website and email reports with statistical disaggregation of energy use	residential
2015	<i>Blumsack and Hines for Green Mountain Power</i>	6.2% - 16.4% peak load reduction	in-home display coupled with critical peak pricing or critical peak rebates	residential
2015	<i>DTE Electric Company</i>	17.5% peak load reduction with IHD; 43% peak load reduction with IHD + programmable thermostat	Randomized controlled trial with email and automated phone messaging regarding peak days	residential

different from a customer authorization form). Moving to the right, Green Button Connect My Data offers more effectiveness by having a typical latency of 24 hours. At the most advanced level, the HAN offers real-time readings, often at intervals of 10 seconds or less, allowing users to turn on lights or appliances in the home and immediately see what impact such actions have on power consumption. Finally, the most advanced and effective feedback is at a very detailed level: the appliance. It makes sense that the most actionable information will be specific ("Turning

down your air conditioner will save you \$30") rather than general ("Something appears to be using a lot of energy right now"). Appliance-level measurement is typically an expensive proposition, although HAN-connected devices such as thermostats can offer some clues. For example, with a HAN-connected smart thermostat, air conditioning load can be quantified without installing an additional submeter by simply correlating on/off status of the thermostat with power increases measured at the utility meter.

In general, however, appliance-level measurement is



prohibitively expensive. Thus one of the more fascinating developments in residential energy efficiency in the past ten years is the maturation of statistical disaggregation using nothing more than meter readings and software tools. Armel et al. (2013) at Stanford University have been leaders in this field. As Armel et al. show, the ability to recognize individual loads in a home is proportional to the granularity of measurement: Advanced software with 15- to 60-minute readings can differentiate only coarsely between loads that correlate with outdoor temperature and loads that are time-dependent; at one second of measurement, software can uniquely identify the top five to ten appliance types (air conditioning, heaters, refrigerators, etc.); at one millionth of a second in measurement or less, individual lightbulbs can be identified with software, without using a single submeter.

The potential impact of software-based disaggregation is impressive. Utility bills itemized by appliance – even if their accuracy isn't 100%—are a quantum leap beyond the last century of practice in the utility industry. Recognizing the power of disaggregation, one major retail energy provider recently announced it will provide an itemized utility bill to customers.¹⁰ Microsecond measurement may not be possible with off-the-shelf smart meters from major manufacturers, but nevertheless, disaggregation's prevalence will likely grow substantially, using whatever interval readings are available. Techniques such as machine learning and advanced statistics promise to provide customers with more detail about their energy usage than they have ever had before. More detail means greater customer choice: what electrical devices to buy and how to operate them. But of course, services that use disaggregation will only be widely available if two conditions are met: First, policies must enable third party access (with customer consent) while protecting privacy, and second, policies must ensure technologically-consistent implementations across utilities so that HAN devices can connect to meters regardless of geographic location.

With so many benefits, it's tempting to want to quantify the value of data access relative to the energy savings cited above. Separate from the other elements of packaging and presenting data to users in influential ways, what is the relative contribution of data access to energy savings, in hard numbers?¹¹ Cost-benefit analyses are typical

when weighing utility investments, and so regulators understandably ask the question. But we caution readers from attempting to value data access in isolation. Data access alone and without other efforts is unlikely to lead to energy savings. It is, rather, an enabling technology that makes substantial energy savings possible. Perhaps the best articulation of the value of data access comes from Lawrence Berkeley National Laboratory writing about energy information systems (EISs) in the commercial sector. Asked what value he placed on an EIS providing whole-building interval data, one building manager said, "Does a mechanic quantify the value of *their* tools?"¹²



¹⁰ Press release by Direct Energy, July 21, 2015. <https://www.directenergy.com/newsroom/press-releases/2015/direct-energy-direct-your-energy>
¹¹ See, e.g., Chapter 4 of *Residential Electricity Use Feedback: A Research Synthesis and Economic Framework*. EPRI, Palo Alto, CA: 2009. 1016844.

¹² Granderson, J, Lin, G, Piette, MA. Energy information systems (EIS): Technology costs, benefits, and best practice uses. Lawrence Berkeley National Laboratory, November 2013. LBNL-6476E.

“Data access with Xcel has been an uphill battle. It’s easier to just bypass them. That’s why Boulder County chose to install their own submeters on our recent energy advising project.”

- Brad Queen
Energy Consultant at Cube Resources (Boulder, CO)

4

THE COSTS OF NOT HAVING ACCESS TO ENERGY DATA

There are numerous examples from across different market segments such as solar or energy efficiency services that are indicative of the costs involved in gathering, digitizing, normalizing and manipulating energy data from utilities. Unfortunately, these costs are very widespread and persistent. In many cases, service providers find it easier to install a new meter, redundant to the utility’s, because it is cheaper than getting data from the utility—even with customer consent. This burden is ultimately reflected in increased costs to those users of energy efficiency services, penalizing precisely the offerings many state energy policies are trying to promote: renewable energy and energy efficiency.

“If we can’t access meter data, we lose customers. It’s that simple. Installing new meters is too expensive for most of our clients.”

- Nitin Manchanda
CEO of Energy Hippo

COMMERCIAL/INDUSTRIAL

With larger electric consumers, there are four cost drivers of submetering. First, there is the cost of the meters themselves. Unlike the residential market, the commercial sector has many types of electrical configurations, leading

to a wide variety of options. Current transducers (CTs) need to be sized to the correct amperage, for instance, whereas residential electrical panels are often (though not always) standardized at 200 amps. Submeters are fairly expensive in the commercial sector owing to greater specialization and because business customers have a higher willingness to pay than consumers, eliminating downward pricing pressure on manufacturers.

Second, a data acquisition computer or “datalogger” is required to gather the data, transmit data via an internet connection and store data on disk if there is an interruption in connectivity.¹³

Third, there are significant installation costs from a certified electrician. Unlike the installation of residential utility meters, which have standardized sockets and can be swapped out in minutes (at least in North America), installing equipment “behind the meter” on commercial switchgear is complex and unique to every location. Sometimes installation requires more than one site visit from an electrician due to special equipment needs. Commercial electrical service at 480 volts is more dangerous than 120 volts and requires installers to wear personal protective equipment. Sometimes a planned shutdown of a building is required to de-energize circuits so that the meter can be safely installed; the inconveniences and costs of disruption often weigh heavily in the minds of business owners.

Fourth are connectivity costs for downloading data periodically. Unlike consumer energy management devices, which can easily connect to home broadband routers,

¹³ Some submeters have dataloggers built in, but most off-the-shelf submeters from major manufacturers do not.

ITEM

RANGE

Meter	\$500 to \$2,000
Data Acquisition	\$900 to \$2,400
Installation	\$1,500 to \$2,000
Total	\$2,900 to \$6,400



businesses work to protect their networks from intrusions, and any foreign device on a network is viewed as a threat. Many businesses simply do not allow unapproved devices to connect to their network. That requires many third parties to seek alternatives, such as cellular modems, that carry both one-time and ongoing monthly expenses.

THE SOLAR INDUSTRY OFFERS ENERGY MANAGEMENT, BUT METER DATA ACCESS IS A HANDICAP

SolarCity has first-hand experience with the challenges associated with accessing and leveraging utility AMI to provide customers with a more holistic sense of their energy consumption.

SolarCity, the country's largest solar installer, wanted to offer its customers online energy management services. The customers who install solar panels are clearly more inclined toward energy management than the average consumer. Not only would presenting its customers with energy use information reinforce the value of solar panels, but SolarCity could also broaden its offerings to include stand-alone energy efficiency services, such as targeted recommendations and retrofits.

SolarCity released its "MySolarCity" app in Apple's App Store and Google's Play Store in 2014. MySolarCity shows customers their real-time energy consumption

SolarCity found the HAN "pairing" process to be so time-consuming and plagued with errors that it now installs its own meter

and compares it with solar output. Given the universal penetration of AMI in California, SolarCity's largest market, one would have thought that MySolarCity would take advantage of smart meters. However, SolarCity found the HAN "pairing" process to be so time-consuming and plagued with errors that it now installs its own meter, redundant to the utility meter.

Fortunately, SolarCity already has electricians on site to connect the solar panels and inverters, so the incremental labor cost of an electric meter is small. But the meter itself adds a nontrivial expense to an industry known for aggressively cutting pennies from its cost structure. If nearly 300,000 customers of SolarCity's have an additional meter, that equate to tens of millions of dollars spent on redundant equipment. "We actually have a Zigbee radio in our inverters already," said Eric Carlson, SolarCity's Senior Director of Grid System Integration. "We could have integrated with the Home Area Network for zero marginal cost, but it was ultimately lower cost and more scalable to install our own meter. If a simple utility method to activate HAN equipment for our customers was available, we would have used the existing smart meters instead." Carlson also cited the differences among utilities' HAN activation processes, the manual nature of HAN activation and SolarCity's need to standardize a nation-wide offering as reasons for bypassing the utility meter.



Web scraping on the rise

When data-dependent companies experience costs or hurdles in accessing their customers' usage data, they naturally seek alternatives. One option is to use the utility's customer-facing website. By logging in with a customer's credentials, third parties can access bill histories, rate information and, often times, interval data. Customized software that logs into websites in this fashion are known as "scrapers."

What are web scrapers?

Also known as spiders, crawlers, robots or simply "bots," scrapers refer to software built to automatically extract information from websites. Typically, scraping is the process of simulating web browsing as a human. Scrapers are widely used on the internet, ranging from search engines that index website content to marketing firms that compile the prices of products online. In the utility context, scrapers are made by a growing number of energy efficiency firms and other third parties to gather utility bill and consumption information from customers' online accounts. Scraping reduces the costs of manually transcribing information, a nontrivial expense for repetitive tasks such as entering 12- or 24-month bill histories. Typically, the customer gives his/her login and password to a third party, and the third party's scraper automatically logs in to the utility website and gathers the information needed.

How does scraping work?

- 1) The customer establishes an account on the utility's website for viewing and paying bills.
- 2) The customer signs up for a third party service, giving the third party his/her utility login and password
- 3) The service automatically logs into the utility on a periodic interval (say, once per day) and downloads the user's usage data, historical bill information, etc.

Potential problems from scraping

Scraping is well-known as a concern for many companies such as online retailers, but it is rarely thought of by utilities as a problem worth addressing. First of all, it may go undetected for a long period of time. When scraping accurately simulates a human's browsing of a website, it is very difficult to tell the difference between a computer and a human, leading Chief Information Officers to believe that scraping isn't prevalent. If scraping is detected, it could be that the robot is merely accessing information customers were already authorized to access in the first place. In the context of very large and embarrassing data breaches of late (Home Depot, Sony Pictures Entertainment, the U.S. Office of Personnel Management) involving data much more sensitive than utility bills, it is understandable that scraping may be viewed by many utility managers as a low-risk threat.




Then there is the fact that many customers have provided their credentials willingly to a third party. Provided the consent was informed, it is reasonable to view third parties as agents acting on behalf of customers – identical to, for example, aging parents giving their children control over bill payment. If such agency is legitimate, it is hard to say any harm resulted from password-sharing.

On the other hand, careless credential-sharing can lead to specific IT problems. For example, while under development by their authors, scrapers can result in highly repetitive requests, increasing traffic loads. A scraper that inadvertently enters an infinite loop (not uncommon in software development) can greatly slow down web servers that are serving legitimate users. Overloading can be managed with a range of IT tools such as rate limiting, IP filtering, deep packet inspection and various intrusion-prevention systems, but website outages and unpredictable traffic loads are risks from scraping.

In vertically-integrated markets, another risk to utilities is more existential in nature: disintermediation by third parties. The utility risks losing its strong and direct customer relationship to app makers and third parties once the utility interacts less frequently with the customer. More and more services are provided by utilities online, such as bill payment, service requests, rate selection tools and the marketing of efficiency programs. But if customers rely on third parties for those services instead of interacting with their utility, the fear is that utilities are relegated to managing wires and poles, thereby missing out on future sources of revenue.

As for scraping, regulators should start by acknowledging its existence. Regulators will likely feel that ratepayers are better served by legitimate third parties that must register with the PUC or the utility, rather than face a growing number of unknown third parties who could easily pass around customer login credentials to fourth or fifth parties without anyone's knowledge. **Password-sharing is not a future, hypothetical risk.** Data-driven applications are growing every day in number. If the path of least resistance for third parties is scraping, then it is likely to continue until utilities and regulators provide a sanctioned data access method that is simple and convenient and supported by thoughtful policies and procedures.



Pacific Gas & Electric had over 100 third parties attempt registration within the first month Green Button Connect became available.

5

SOLUTIONS: STATES THAT LEAD THE WAY ON DATA ACCESS

Only two states with smart meter deployments—California and Texas – have, through their public utility commissions, ordered utilities to provide consumers and authorized third parties with access to their electricity data. Two states, Illinois and Colorado, are in the process of modernizing their rules governing customer information disclosures. Although each is different in approach, these states’ experiences are instructive to those who seek guidance amidst competing interests and, often, highly technical material.

CALIFORNIA

From the mid-2000s, California has consistently embraced data access without charge as a requirement in connection with AMI deployment. The Commission established six functional requirements for AMI systems, including collection of “data at a detail level that supports customer understanding of hourly usage patterns and their relation to energy costs” and “access to personal usage data such that customer access frequency does not result in additional AMI system hardware costs.”¹⁴ California has not made a determination regarding ownership of energy usage data, but it has clearly established that consumers have a right to receive data from their meter and share it with third parties of their choice.¹⁵

California requires investor-owned utilities (IOUs) to provide backhauled data to customers and third parties designated by the customer via Green Button Connect and to activate the HAN radio. A detailed summary of major California PUC decisions regarding data access can be found in Appendix 2

While it has taken many years to finally meet the state’s

requirements (*see Appendix 2*), California IOUs can rightfully claim to be the nation’s first large-scale adopters of Green Button Connect. The resolution of three key issues is largely responsible for this accomplishment. First, the Commission was very explicit that the IOUs should not be held liable when a third party breaches customer privacy in violation of the law. Without assurances from the Commission that their liability would be strictly limited, the IOUs would not embrace data access. Second, the Commission established very simple and straightforward eligibility criteria for third parties. Simplicity was critical because onerous requirements would have severely limited the participation of innovative third parties and gone against the state’s goals to encourage new efficiency offerings.

In order to be eligible to receive customer usage data, the Commission ruled that third parties must:

- (i) demonstrate technical capability to interact with the IOUs’ servers using Green Button;
- (ii) provide contact information and a federal tax identification number in order to unify the registration system state-wide;
- (iii) acknowledge receipt of the Commission’s privacy policy in D.11-07-056; and
- (iv) not be present on the Commission’s list of banned third parties.¹⁶


This policy of simplicity has been very successful: Pacific Gas & Electric had over 100 third parties begin registration within the first month it became available.¹⁷

¹⁴ See A.05-03-016 (2006) and A.06-12-026 (2007) approving pre-deployment funding for PG&E and Southern California Edison AMI projects, respectively.

¹⁵ California Public Utilities Commission, D.11-07-056, p. 36.

¹⁶ Observant readers will notice that IT security requirements, representations and warranties regarding business practices, liquidated damages in cases of breach, and other contractual obligations that would typically be found in agreements between utilities and their contractors are conspicuously absent from this list.

¹⁷ Presentation by Pacific Gas & Electric at “Birth of the Green Button” event in San Diego, CA, February 6, 2015.



That last eligibility criterion represents perhaps the most important solution to the challenge of enabling data access while simultaneously protecting privacy: by having the Commission, and not utilities, adjudicate disputes, the utilities are relieved of their responsibility to police third parties. As long as the utilities were ultimately left holding the bag for a “bad actor”’s misdeeds, the utilities would understandably clamp down on data-sharing and keep third party participation to a minimum. In California, an IOU cannot unilaterally decide to terminate data-sharing; that responsibility is exclusively in the hands of the customer and the Commission.

TEXAS

Texas has made the determination that consumers own their own energy usage data. A common web portal, Smart Meter Texas (SMT), was established that allows consumers across the state a consistent method to access their own energy usage data. Real-time data is available through the Home Area Network interface. The state activated backhaul data access, which is made available in 15-minute increments the following day. The data available for customer download are in Green Button/ESPI format, but the data transmitted automatically to authorized third parties is in a different format that is not ESPI-compliant.

Texas PUC Substantive Rule 25.130(g) establishes requirements for advanced metering systems in Texas. The list of requirements is extensive and includes:

- the capability to provide direct, real-time access to customer usage data to the customer and the customer’s retail electric provider (REP). The initial requirement for interval data, delivered on a day-after basis, was 60 minute, with a goal of 15 minute intervals by 2010. This objective has been realized.
- open standards and protocols that comply with nationally recognized, non-proprietary standards;
- capability to communicate with devices inside the premises, including, but not limited to, usage monitoring devices, load control devices, and prepayment systems through a home area network (HAN), based on open standards and protocols that comply with nationally recognized non-proprietary standards such as Zigbee, HomePlug, or the equivalent;
- the ability to upgrade these minimum capabilities as technology advances.

With respect to customer data access specifically, PUC rule 25.130(j) requires that:

- An electric utility shall provide a customer, the customer’s REP, and other entities authorized by the customer read-only access to the customer’s advanced meter data, including meter data used to calculate charges for service, historical load data, and any other proprietary customer information. The access shall be convenient and secure, and the data shall be made available no later than the day after it was created;
- The requirement to provide access to the data begins when the electric utility has installed 2,000 advanced meters for residential and non-residential customers;
- An electric utility shall use industry standards and methods for providing secure customer and REP access to the meter data;
- A customer may authorize its data to be available to any entity, not just its REP.¹⁸

While Texas’s policies on data access represent a large step forward, there are similarities to California in that implementation has lagged in some areas. For example, the consent process at Smart Meter Texas by which a customer grants access to a third party has been criticized by market participants as clumsy and an unnecessary friction point, leading to disappointing customer usage statistics as shown in a recent report.¹⁹ Also, the fact that SMT does not adhere to national standards like Green Button Connect means that idiosyncracies delay third parties’ integration with the system. As of December 1, 2015, only four third parties had successfully received customer energy data, while 76 third parties are actively attempting registration.²⁰

Finally, the management of SMT, jointly run by four transmission and distribution utilities in the state, have been criticized for ballooning costs and poor support, including a two-week outage of SMT in 2015 that interrupted all data transfers. As a result, there is an ongoing case at the PUC regarding long-term governance of this unique, state-wide system.²¹

18 See, e.g., Texas PUC Order re: AEP Texas’s Request for Approval of Advanced Metering System Deployment Plan and Request for AMS Surcharges, PUC Docket No. 36928, 2009, p. 7.

19 South-central Partnership for Energy Efficiency as a Resource (SPEER), *Smart Energy Roadmap for Texas*, 2015. <https://eepartnership.org/program-areas/policy/intelligent-energy-management/>

20 Presentation of ERCOT Advanced Metering Working Group, December 15, 2015. http://www.ercot.com/content/wcm/key_documents_lists/55957/SMT_Third_Party_Statistics_Report_Reporting_Period_November_as_of_12.1.15.docx

21 Texas PUC Project No. 42786. Note that SMT serves only customers in competitive areas in Texas.



COLORADO

Colorado has recently amended its rules addressing backhauled data, though its smart meter penetration is modest. Beginning in 2014, the Colorado PUC sought to amend the rules set forth in Code of Colorado Regulations (723-3, section 3026) governing access to and privacy of customer information in the possession of utilities. The objective was to protect ratepayer privacy while allowing local governments and energy efficiency firms to have access to a customer's meter data upon informed consent. Section 3026(d) now states:

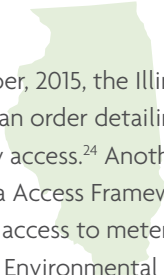
As part of basic utility service, a utility shall provide access to the customer's standard customer data in electronic machine-readable form, without additional charge, to the customer or to any third-party recipient to whom the customer has authorized disclosure of the customer's customer data. Such access shall conform to nationally recognized open standards and best practices. The utility shall provide access in a manner that ensures adequate protections for the utility's system security and the continued privacy of the customer data during transmission.

Section 3026 also affirms customers' rights to transmit their data to anyone of their choosing. And similar to California's privacy ruling, it states that utilities shall have no liability for a third party's breach of customer data, provided that the utility receives the customer's consent and transmits the data securely.

As part of amending its electric and gas utility rules, Colorado also updated the utilities' outdated, paper-based consent forms.²² Notable changes include: (i) web-based consent with the same information as the paper form was approved; (ii) eliminating the requirement that third parties must have a Colorado address for service of process; and (iii) a checkbox indicating how long the consent is valid, either 12 months, 24 months or indefinitely.

Implementing these rules changes, which were adopted in 2015, is the subject of an ongoing proceeding, and much remains to be done. Colorado's biggest utility, Xcel, is resisting implementing Green Button Connect.²³ Nevertheless, it is noteworthy that Colorado has affirmed data access as part of basic utility service, ensuring that commercial building owners, homeowners and others will be able to benefit from the utilities' investments in advanced metering.

ILLINOIS



In December, 2015, the Illinois Commerce Commission proposed an order detailing how consumers can authorize third party access.²⁴ Another proceeding considers the Open Data Access Framework, a kind of "customer bill of rights" for access to meter data, proposed by Citizens' Utility Board and Environmental Defense Fund in 2014.²⁵ Illinois's AMI deployment is underway, with approximately 5 million meters to be fully installed by 2019. Illinois is likely to become the third state with data access.

²² Colorado PUC Decision No. C15-0752 dated July 16, 2015.

²³ *Verified Compliance Application of Public Service Company of Colorado*. Colorado PUC Docket No. 15A-0789E, dated October 2nd, 2015, p. 5.

²⁴ Illinois Commerce Commission, Proposed Order in Docket No. 15-0073 on "Investigation Into the Customer Authorization Required for Access by Third Parties Other Than Retail Electric Suppliers to Advanced Metering Infrastructure Interval Meter Data." December 23, 2015. Docket No. 15-0073

²⁵ Illinois Commerce Commission, Docket No. 14-0507.



6

ADDRESSING PRIVACY CONCERNS

In policy debates, we often hear of the need to “balance” the benefits of data accessibility with privacy rights. With each introduction of new technologies as smartphones’ GPS features or fitness trackers, the volume of personal data generated increases substantially, and it is only sensible to consider how to get the most personal or societal benefit from these technologies while limiting the risks of misuse. However, the policy discourse around the data collected by smart meters too often over-simplifies issues, framing the challenge as one of technological progress versus privacy where a gain on one side means a loss for the other. While such trade-offs exist in many areas, it would be premature to simply declare smart meters and privacy as opponents in a zero-sum game.

A more accurate and nuanced understanding is one that places customers in the center of a new set of information relationships.

A more accurate and nuanced understanding is one that places customers in the center of a new set of information relationships. From this perspective, giving the consumer access to, and control over, his or her energy data is consistent with the trend towards greater privacy protection and consumer empowerment. Previously, the utility was the

sole supplier of information to customers; monthly bills provide information uni-directionally to the customer. But DER adoption is reshaping the flows of information, not just the flows of energy. Photovoltaic energy generated from rooftops and EV charging patterns contain data that are generated by customers, not by a utility. If, in effect, the meter measures customer behaviors, then the resulting data from the smart meter arguably belong to the customer. Empowering customers with smart meter data can thus be considered giving the customer control over data he or she generated in the first place. And, as we mentioned previously, a customer accessing his or her own personal information should not raise privacy concerns.²⁶ One can argue persuasively that access to one’s own digital information does not result in a “trade-off” in which privacy is sacrificed.

Privacy issues do legitimately arise when consumer data are shared with a third party. Fortunately, several privacy laws and state commissions have addressed privacy specifically with regard to AMI data, just as laws and rules have been successfully crafted in the finance and healthcare sectors to protect consumers. Many of these existing policies emphasize transparency to customers and provide customers with ways to control the use of their personal information. To begin to understand privacy law with regard to energy data, it will be worth our readers’ time to become familiar with one of the earliest privacy policies to come from the U.S. government, the Fair Information Practice Principles (FIPPs). Developed by the U.S. Federal Trade Commission with origins dating back to the 1970s, the FIPPs are commonly referenced in state commission proceedings.

²⁶ Provided, of course, that the information is transmitted securely.



The FIPPs are simple guidelines that represent widely-adopted concepts of fair information practices:

1. **Notice/awareness**, making customers aware before personal information is collected about them;
2. **Consent**, securing affirmative consent from customers to use their personal information in clearly specified ways;
3. **Access**, enabling customers to view and access the information collected about them;
4. **Integrity/security**, protecting the personal data in a secure manner; and
5. **Enforcement/redress**, which could include either self-regulation, civil actions through the court system, or government enforcement that can include civil or criminal penalties

The FIPPs are a simple starting point. But for state regulators that oversee public utilities, the first challenge in creating a thoughtful privacy rule lies not with the utilities per se, many of whom are already prohibited from sharing or selling any customer data, but rather with third parties. What jurisdiction do commissions have over third parties? Most third parties are emerging software and hardware companies and are not provided guaranteed rates of return or afforded legal protections as the utilities are. Instead, they operate in competitive markets quite unlike regulated entities.

The lack of explicit commission authority over third parties does not mean alleged privacy violations are without recourse entirely.

No PUCs to our knowledge have explicit authority to regulate entities outside of public utilities, commercial transport, railroads and the like. But the lack of explicit authority does not mean alleged privacy violations are without recourse entirely. Most third parties operate like other internet or software companies, and several mechanisms exist to ensure the privacy and security of individuals' energy usage data. These companies are

subject to a wide variety of laws governing electronic communications, such as:

- The federal Electronic Communications Privacy Act protecting communications and stored data from government intrusion;
- the Federal Trade Commission Act protecting consumers from “unfair or deceptive” practices;
- state laws that require companies to respond to consumer requests for the data held about them;
- state laws that require website operators to explain their privacy policies to consumers; and
- state data breach laws that require companies to notify customers when personal information is compromised as a result of an intrusion or lapse in security practices.

Thus, calling high-tech software companies “unregulated” is not strictly true; it would be fairer to say that high-tech companies are seldom regulated by state commissions but are subject to oversight by other entities such as state attorneys general or federal regulators.

With respect to smart meter data specifically, states may seek specific assurances with regard to the use of these data, much in the way that lawmakers have mandated information practices in healthcare and financial services. For commissions that are considering data access policies, there are a number of templates that states will find very useful. States like California and Texas have created policies that ensure strong protections of privacy and security in ways consistent with continued innovation. These templates are outlined in Appendix 1.

U.S. DEPARTMENT OF ENERGY'S VOLUNTARY CODE OF CONDUCT

In 2015, the U.S. Department of Energy (DOE) began implementation of a “DataGuard” seal for utilities and third parties committed to implementing the January 2015 Voluntary Code of Conduct (VCC) Final Concepts and Principles for Data Privacy and the Smart Grid.²⁷ The DOE spent two years developing the VCC with input from utilities and third parties, with a principal objective being to establish consistent, voluntary guidelines to which third parties can voluntarily and publicly embrace and be held accountable.

²⁷ See, e.g., https://www.smartgrid.gov/sites/default/files/VCC_Concepts_and_Principles_2015_01_08_FINAL_1.pdf and https://www.smartgrid.gov/data_guard.html



DataGuard

Energy Data Privacy Program

DataGuard was developed in order to help fill the gap between third parties and commission jurisdiction, which is typically limited to regulated utilities. DataGuard works by third parties signing an adoption statement and submitting it to DOE, who maintains it on file and publicly lists the third party as a VCC adopter. If a company then fails to comply with the VCC, it would be subject to an action for misrepresentation under state law or Section 5 of the Federal Trade Commission Act barring unfair or deceptive acts or practices.²⁸ The idea is to put regulators at ease by providing an enforcement mechanism against non-regulated entities who breach customer privacy.

The Privacy Voluntary Code of Conduct describes principles for voluntary adoption that:

1. encourage innovation while appropriately protecting the privacy and confidentiality of Customer Data and providing reliable, affordable electric and energy-related services;
2. provide customers with appropriate access to their own Customer Data; and
3. do not infringe on or supersede any law, regulation, or governance by any applicable federal, state, or local regulatory authority.

THE VCC IS SUMMARIZED IN FIVE KEY CONCEPTS:

1. CUSTOMER NOTICE & AWARENESS

The VCC emphasizes “that customers should be given notice about privacy-related policies and practices as part of providing service.”²⁹ Additionally, service providers should provide materials in formats that are easily accessible and comprehensible to users. Notices should be provided at the start of service, on a recurring basis after, and at a customer’s request. Notices should be clear and concise and focus on what data is gathered by service providers as well as access to his or her own data usage. The notice ensures that service providers must receive consent from consumers before their information is shared.

2. CUSTOMER CHOICE & CONSENT

Describes requirements for processes that allow the customer to control access to his or her data for Secondary Purposes (i.e., to authorize differential access to multiple third parties, limit the duration of access, keep a record of data releases, rescind authorizations, and dispose or de-identify data once authorization or the need for the data has expired). Identifies data types and disclosures that do not require customer consent. Includes a requirement requiring certain data to be obtained directly from the customer.

3. CUSTOMER DATA ACCESS

Describes requirements for procedures that allow customers to access their data, identify possible inaccuracies, and request they be corrected.

4. DATA INTEGRITY & SECURITY

Describes requirements for a cyber security risk management program, and methodologies for creating aggregated or anonymized data.

5. SELF-ENFORCEMENT MANAGEMENT & REDRESS

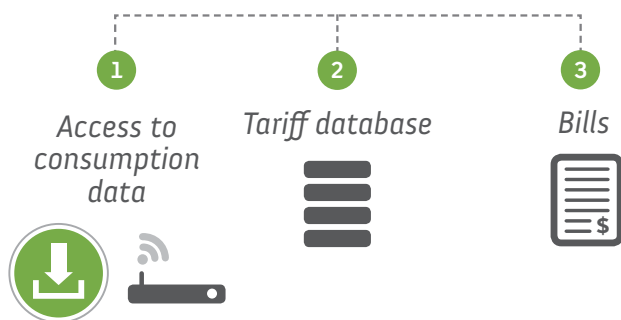
Describes requirements for actions by Service Providers who voluntarily adopt the Voluntary Code of Conduct to ensure that they comply with it.

²⁸ See <https://www.ftc.gov/public-statements/1983/10/ftc-policy-statement-deception>

²⁹ VCC, p. 5.

POLICY RECOMMENDATIONS

THREE PILLARS OF DATA ACCESS



- **Energy usage data should be available free of charge as part of basic utility service.** Access should be viewed as a foundational feature of the modern electric grid. Backhauled data should follow the best practices of ESPI/Green Button Connect, while the HAN should be immediately enabled. Enact a “bring your own device” (BYOD) policy in which customers can easily connect any Zigbee-compliant device; testing and certification of Zigbee devices should be very inexpensive and standardized state-wide.
- **Tariffs and customer bills should be published in standardized, machine-readable forms.** People care about dollars, not kilowatt-hours. Giving third parties access to tariffs in a machine-readable format is important because it takes human beings out of the cost-calculation process and lets software do the work, regardless of how complex tariffs may be. Commissions should publish approved tariffs in a standardized XML format.³⁰

³⁰ The same group that developed the ESPI standard, the UCA-IUG OpenADE Task Force, is working on developing a standardized XML schema for tariffs: <https://github.com/energyos/OpenESPI-GreenbuttonDataSDK/tree/master/GreenButtonTariff>

Separately, historical bills should also be available for download in a standardized XML format, with third party access to whomever the customer authorizes.

In addition:

- **Utilities implementing ESPI/Green Button Connect should have their implementations periodically tested and approved by an independent certification authority.** Besides ensuring technical consistency, certification demonstrates to the market that a utility is truly compliant with the standard. New market entrants will postpone activity in uncertified areas because of the risk of costly, idiosyncratic variances. Periodic certification also provides a transparent enforcement mechanism for regulators, who can exert effective oversight over utilities by simply requiring independent certification. In 2015, the non-profit Green Button Alliance³¹ was formed to provide exactly this testing and certification function, similar to the Wifi Alliance for devices using IEEE 802.11 or the Zigbee Alliance for devices using IEEE 802.15.4.
- **Third party-led authorization processes should be allowed.** For customers with access to an online utility account, authorizing a third party to access his or her usage data is relatively straightforward. But what about the huge number of consumers and businesses nationwide who do not have, or do not want, an online account? The friction associated with creating such an account as a precondition to using a third party’s energy management service is not trivial. One solution is for commissions to require utilities to accept a third party-submitted form requesting access to usage data. With a paper

³¹ See <http://greenbuttonalliance.org/>



form, website or mobile app, the third party collects the customer account number and/or service address and submits this information to the utility as proof of the customer's authorization. This "third party-led" process is placed in contrast with a customer-led authorization that requires the customer to interact directly with the utility, sometimes a process fraught with complexity for many consumers.³² This process exists today with paper forms, sometimes called customer information service requests (CISR) or letters of authorization (LOA). We note that some states with competitive retail markets have already ruled on this issue as it relates to retail suppliers.³³

- **Utilities should have no liability for a third party's breach of customer privacy.** Simply put, only a third party should be liable for acts committed by the third party. So long as a utility has fulfilled certain obligations, it should not bear any responsibility for privacy breaches committed by third parties. The utility's obligations include (i) receiving valid authorization from the customer to share energy data and (ii) sharing such data securely with the designated third party (using modern encryption

such as Transport Layer Security, or TLS). Failure on the part of regulators to make explicit a utility's limited liability will result in utilities policing third parties to avoid potential liabilities and inevitably lead to significant delays in enabling consumers to make effective use of their data.

- **If a third party engages in a "pattern or practice" of misusing customer data in violation of state or federal law, the Commission should order utilities to cease providing energy data.** The question of commission jurisdiction over third parties arises frequently in the context of privacy violations. What can a utility regulator do when a third party breaches customer privacy? The simplest answer is: order the utility to terminate data-sharing with the entity in question. Termination will not prevent future breaches of usage data already transmitted, but it will prevent ongoing data transfers from being put at risk. In such cases, it is important to remember that third parties should be entitled to due process before the commission before data access is revoked. We recommend California as a model.³⁴

³² For more detail on third party-led authorizations, see, e.g., presentation by Michael Murray at Joint RMS/WMS Workshop II on Improving 3rd Party Access to Smart Meter Texas, October 16th, 2015. http://ercot.com/content/wcm/key_documents_lists/73667/07_Murray_presentation__ERCOT_workshop_Oct_16.pptx
³³ See, e.g., Illinois Commerce Commission Docket No. 14-0701.

³⁴ California Public Utilities Commission Decision D.13-09-025 dated September 19th, 2013. <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M077/K191/77191980.PDF>

APPENDIX 1

Good Examples of Privacy Laws and Rules

CALIFORNIA STRIKES A BALANCE

PUC privacy decision (2011)

In 2009, California enacted Senate Bill (SB) 17 (Padilla) which, among other things, reiterates California's requirement that utilities deploying AMI provide consumers with access to their data;³⁵ prohibits utilities from selling consumer AMI energy usage data;³⁶ and, except in limited exceptions, prohibits making that data available to third parties not under contract with the utility, unless consented to by the customer.³⁷ If the utility does contract with a third party to provide a service that allows a customer to monitor his or her energy usage, and that third party uses the data for a "secondary commercial purpose," the utility must include in the contract a requirement that the third party prominently disclose that secondary commercial purpose to the customer and secure customer consent to the use of his or her data for that secondary commercial purpose prior to the use of the data.³⁸

On July 28, 2011, the CPUC adopted rules intended to implement SB 1476, imposing privacy and security requirements on utilities and contractors who handle consumer energy data. Public Utilities Commission Decision D.11-07-056, establishes strict timelines for activation of backhauled data access, through Green Button Connect using a "common data format consistent with ongoing national standards" and enablement of the Home Area Network (HAN) radio embedded in each meter. It

simultaneously adopts privacy and security rules governing smart meter data, among other requirements. The Order included the following salient directives related to customer data access:

- All California investor-owned utilities must provide, or continue to provide, customers with price and usage data. It must be "updated on at least a daily basis, with each day's usage data, along with applicable price and cost details and with hourly or 15-minute granularity (matching the time granularity programmed into the customer's smart meter) available by the next day." Residential customers must be offered "bill-to-date, bill forecast data, projected month-end tiered rate, and notifications to customers as they cross tiers to higher rates."³⁹
- Within six months, the IOUs must provide third parties access to a customer's usage data via the backhaul when authorized by the customer. The utilities were to coordinate with each other to "propose a common data format to the extent possible and be consistent with national data standards efforts." The approaches must propose for third parties "eligibility criteria and a process for determining eligibility where the Commission can exercise oversight over third parties receiving this data."⁴⁰
- Within six months, the IOUs must complete a pilot study to provide price information to consumers in real time or near-real time.⁴¹
- Within four months, the IOUs must submit plans to implement HAN functionality. These implementation

35 California Public Utilities Code §8380(b)(4)

36 *Ibid.*, §8380(b)(2)


37 *Ibid.*, §8380(b)(1)

38 *Ibid.*, §8380(c)

39 California Public Utilities Commission, D-11-07-056, Ordering Paragraphs 5, 6, p. 164.

40 *Ibid.*, Ordering Paragraphs 8, 9, p. 165

41 *Ibid.*, Ordering Paragraph 10, p. 166



plans must include the capability to support at least 5,000 HAN devices, and progressively larger deployments over time with an ultimate goal of unlimited HAN devices by 2015. The implementation strategies must address issues such as costs, expanded data access and granularity, current and evolving national standards and security risk mitigation and best practices, etc.⁴²

Regarding privacy and security, D.11-07-056 reaffirmed the PUC's jurisdiction over utilities and authority to require utilities to extend those rules to third parties under contract with utilities, but did not address the question of jurisdiction over third parties not under contract to a utility. The utility is required to educate customers about the "potential uses and abuses of usage data."⁴³ The rules do not regulate the consumer's own decision as to with whom to share data, but they state that the utility is not responsible for policing those entities who receive information pursuant to a Commission requirement or customer wishes.⁴⁴

The rules establish a distinction between a primary purpose of electrical or gas consumption data (providing a bill for electric power, fulfilling operational needs of the electrical system, providing services required by state or federal law or implementing demand response, energy management or energy efficiency programs under contract with a utility, the Commission or as part of a Commission authorized program conducted by a governmental entity under supervision of the Commission) and secondary purposes (e.g., any other purpose such as marketing or research) and require customer consent before a utility can share data with a third party.⁴⁵ The "covered information" subject to the rules is electrical usage information obtained through AMI when associated with information that can be used to identify a customer, excluding information where the identifying information has been removed such that a customer cannot be re-identified.⁴⁶ Finally, the Rule establishes a definition of "covered entity" includes electrical utilities, third parties under direct contract with electrical utilities for conducting a primary purpose, third parties that the Commission either selects, authorizes, or funds for conducting a primary purpose, and third parties who acquire data from the utility with the authorization of the customer.⁴⁷

Generally, the requirements as to covered entities who receive covered information are as follows:

TRANSPARENCY. Covered entities must provide customers with meaningful, clear, accurate, specific, and comprehensive notice regarding the collection, storage, use, and disclosure of covered information in their first paper or electronic correspondence with the customer, if any, and conspicuous posting the notice or link to the notice on the homepage of their website.

PURPOSE. Covered entities shall disclose each category of covered information collected, used, stored or disclosed by the covered entity, and, the reasonably specific purposes for which it will be collected, stored, used, or disclosed. For covered information disclosed to third parties, the covered entity shall disclose each category of covered information and the purposes which it is disclosed, and the identities of the third parties to which it is disclosed; the periods of time that covered information is retained by the covered entity; and a description of the means by which customers may view, inquire about, or dispute their covered information, and how customers may limit the collection, use, storage or disclosure of covered information and the consequences to customers if they exercise such limits.

ACCESS. Covered entities shall provide to customers upon request convenient and secure access to their information, at a level no less detailed than that at which the covered entity discloses the data to third parties. Covered entities shall provide customers with convenient mechanisms for granting and revoking authorization for secondary uses of covered information, disputing the accuracy or completeness of covered information and requesting corrections to covered information. As for disclosure entities like law enforcement agencies pursuant to legal process, a covered entity may not disclose covered information except under a warrant or other court order naming with specificity the customers whose information is sought. Unless otherwise directed by a court, law, or order of the Commission, covered entities shall treat requests for real time access to covered information as wiretaps, requiring approval under the federal or state wiretap law as necessary.

One issue is data minimization. The Commission adopted a principle that covered entities shall collect, store, use, and disclose only as much covered information as is

42 *Ibid.*, Ordering Paragraph 11, p. 166-167


43 *Ibid.*, p. 36

44 *Ibid.*, p. 35

45 *Ibid.*, Factual Finding 10, p. 12

46 *Ibid.*, Factual Finding 10, p. 150-1

47 *Ibid.*, Factual Finding 10, p. 150



reasonably necessary or as authorized by the Commission to accomplish the purpose, may retain such information only for as long as reasonably necessary for such purpose and may not disclose to third parties more information than is reasonably necessary or authorized by the Commission for that purpose.⁴⁸

In adopting a data minimization principle, the Commission recognized that the data typically collected addressed only “company costs, aggregate demand, and company revenues” and that much more powerful data made available by AMI could disclose activities of customers. Presented with evidence that different utilities have different practices relating to the time of retention of customer data (which typically ranged from 3-10 years), the Commission declined to establish a specific limitation on the amount of time or purpose for which data could be collected opining ultimately that “[a]dopting a principle of “data minimization” does not change any regulations that currently require the retention of data for periods of time nor does it change any specific reporting requirements” and that the “recommended rules create no new liability that would fall upon utilities and other entities in conjunction with data retention.”⁴⁹

USE AND DISCLOSURE LIMITATIONS. With few exceptions, customer data can be shared only with customer consent, or under a “chain of responsibility” approach whereby parties that received covered information may disclose such information without consent to another party only for a primary purpose and only if the contract requires that party to adopt restrictions no less restrictive than those adopted by the providing entity.⁵⁰ The contract must consider a “pattern or practice” of violations to constitute a material breach and a covered entity must promptly cease disclosing information to a third party if the Commission determines that such a pattern or practice has occurred or otherwise orders the covered entity to cease provide such information.⁵¹

One key issue in use the term of the customer authorization. Recognizing that an arbitrary time limit could inhibit innovation of promising new energy services and/or customers’ access to them, the Commission rejected a

proposed two-year limitation on the term for which a customer’s authorization would be valid, substituting a requirement of an annual notice of the authorization and an opportunity for the customer to opt-out.⁵²

DATA SECURITY. The rules also require covered entities to ensure that the covered information they collect, store, use and disclose is reasonably accurate and complete and they must use reasonable administrative, technical and physical safeguards to protect covered information from unauthorized access, destruction, use, modification or disclosure. If data is disclosed through a security breach affecting 1,000 or more customers, the covered entity must provide notice of that breach to the Commission.

AUDITS. Covered entities must provide to the Commission information on their privacy notices to consumers, including internal privacy and data security policies, the categories of agents and third parties to whom they disclose covered information, data on customer complaints, and, on an annual basis, the number of third parties accessing covered information and the number of non-compliances with the privacy rule.

California’s Assembly Bill 1274 (2013)

In 2013, the California Legislature, which had not originally imposed privacy rules on non-regulated third parties, approved AB 1274 to establish requirements applicable to third parties not under Commission jurisdiction. AB 1274 is intended to provide a less detailed and more flexible regulatory framework, with the objective of fostering innovation while ensuring protection of energy usage data that identifies a specific individual.

AB 1274 applies to a customer’s electrical or natural gas usage made available to the business as part of an advanced metering infrastructure provided by a utility and that includes the name, account number, or physical address of the customer.

Under AB 1274:

“Unless otherwise required or authorized by federal or state law, a business shall not share, disclose, or otherwise make accessible to any third party a customer’s data without obtaining the express consent of the customer and conspicuously disclosing to whom the disclosure will be

48 *Ibid.*, Factual Finding 10, p. 156

49 *Ibid.*, p. 72

50 *Ibid.*, p. 79.

51 *Ibid.*, p. 158.

52 *Ibid.*, p. 81.



made and how the data will be used”⁵³

Therefore, a business would be prohibited from sharing or disclosing a customer’s data usage information to any third party without obtaining consent from the customer. AB 1274 also requires a business and nonaffiliated third party to implement and maintain reasonable security procedures and practices to protect the data from unauthorized disclosure. Further, the law prohibits a business from providing an incentive or discount to the customer for accessing their usage data without the prior consent of the customer. Once the records are no longer to be retained by the business, the business must dispose of the data by (1) shredding, (2) erasing, or (3) otherwise modifying the data to make it unreadable or undecipherable through any means. Willful violations expose a violator to civil remedies.

COLORADO MODERNIZES PRIVACY RULES

In 2014, the Colorado PUC sought to amend the rules set forth in Code of Colorado Regulations 723-3, section 3026, governing access to and privacy of customer information in the possession of utilities in order to protect ratepayer privacy while allowing local governments and energy efficiency firms to have access to a customer’s meter data upon informed consent. The amended rules, affecting both electric and gas utilities, require that customer data be maintained as strictly confidential and that customer data can only be used by the utility “as necessary to provide regulated utility services.”

Section 3026 (d) states that, “As part of basic utility service, a utility shall provide access to the customer’s standard customer data in electronic machine-readable form, without additional charge, to the customer or to any third-party recipient to whom the customer has authorized disclosure of the customer’s customer data. Such access shall conform to nationally recognized open standards and best practices. The utility shall provide access in a manner that ensures adequate protections for the utility’s system security and the continued privacy of the customer data during transmission.” Section 3026 also affirms customers’ rights to transmit their data to anyone of their choosing. And similar to California’s privacy ruling, it also states that utilities shall have no liability for a third party’s breach of customer data, provided that the utility receives the customer’s consent and transmits the data securely.

As part of amending the electric and gas utility rules, Colorado had to address its outdated, paper-based consent form. Notable changes include: (i) web-based consent with the same information as the paper form was approved; (ii) eliminating the requirement that third parties must have a Colorado address for service of process; and (iii) a checkbox indicating how long in the future the consent is valid, either 12 months, 24 months or indefinitely.

⁵³ Assembly Bill 1274, 2013-2014, California Civil Code Division 3 Party 4, Section 1, 6B.

APPENDIX 2

Summary of California PUC decisions on data access

Decision D.09-12-046, dated December 17, 2009, required investor-owned utilities (IOUs) to (1) provide “an authorized third party with access to the customer’s usage information collected by the utility” by end of 2010 and to (2) provide customers with access to smart meter data on a “real-time or near real-time basis no later than the end of 2011.” Neither deadline was achieved.

Decision D.11-07-056, dated July 28, 2011, ordered strict timelines for activation of backhauled data access and HAN enablement. It adopted privacy and security rules governing smart meter data, among other requirements. The Order included the following salient directives:

- Within six months, all IOUs must provide, or continue to provide, customers with price and usage data. It must be “updated on at least a daily basis, with each day’s usage data, along with applicable price and cost details and with hourly or 15-minute granularity (matching the time granularity programmed into the customer’s smart meter) available by the next day. Residential customers must be offered “bill-to-date, bill forecast data, projected month-end tiered rate, and notifications to customers as they cross tiers to higher rates.”⁵⁴
- The IOUs must work with the California Independent System Operator (CAISO) in developing a methodology to make wholesale prices available to customers on each company’s website.⁵⁵
- Within six months, the IOUs must provide third parties

access to a customer’s usage data via the backhaul when authorized by the customer. The utilities were to coordinate with each other to “propose a common data format to the extent possible and be consistent with national data standards efforts.” The approaches must propose for third parties “eligibility criteria and a process for determining eligibility where the Commission can exercise oversight over third parties receiving this data.”⁵⁶

- Within six months, the IOUs must complete a pilot study to provide price information to consumers in real time or near real-time.⁵⁷
- Within four months, the IOUs must submit plans to implement HAN functionality. These implementation plans must include initial deployments of at least 5,000 HAN devices. The implementation strategies must address issues such as costs, expanded data access and granularity, current and evolving national standards and security risk mitigation and best practices, etc.⁵⁸

Regarding privacy and security, D.11-07-056 reaffirmed the PUC’s jurisdiction over utilities and authority to require utilities to extend those rules to third parties under contract with utilities, but did not address the question of jurisdiction over third parties *not* under contract to a utility. The utility is required to educate customers about the “potential uses and abuses of usage data.”⁵⁹ The rules do not regulate the consumer’s own decision as to with whom to share data, but provide that the utility is not responsible for

54 California Public Utilities Commission, Decision D.11-07-056, July 28, 2011. Order Paragraphs 5, 6.


55 *Ibid.*, Ordering Paragraph 7.

56 *Ibid.*, Ordering Paragraphs 8, 9.

57 *Ibid.*, Ordering Paragraph 10.

58 *Ibid.*, Ordering Paragraph 11.

59 *Ibid.*, p. 36.



policing those entities who receive information pursuant to a Commission requirement or customer wishes.⁶⁰ The rules outline a distinction between *primary purposes* (providing customers with a certain feature or service) and *secondary purposes* (e.g., marketing purposes, amalgamation with other data sets) and require customer consent before a utility can share data with a third party. A customer's consent is presumed indefinite but can be revoked at any time.

Resolution E-4527 (HAN implementation). Following protests of utility HAN implementation plans, the Commission in Resolution E-4527 (September 27, 2012) imposed specific deadlines and requirements for implementation of HAN functionality. IOUs were required:

- to begin accepting HAN activation requests from customers beginning in January 15, 2013—5,000 before June 30, 2013; 25,000 before December 31, 2013, 200,000 before December 31, 2014 and an unlimited number thereafter (Ordering Paragraph 1, p. 28);
- to collaborate with each other and third parties and relevant standards-related organizations, to develop (1) a common set of reasonable requirements and testing processes for validating interoperability between utility smart meters and commercially available HAN devices for the purpose of monitoring real-time electricity usage; and (2) a set of reasonable requirements to be satisfied by a HAN device supplier for its device to be eligible for interoperability testing (E-4527, p. 28-29);
- to publish, by February 1, 2013, on their websites a list of at least 5 commercially-available HAN devices validated for interoperability, with updates within 6 months (E-4527, p. 29); and
- to collaborate with each other and third parties to provide basic education to customers about the HAN function, its potential applications and benefits, potential interoperability risks associated with HAN devices not subjected to validation tests and the respective responsibilities of the utility, HAN device supplier and customer (E-4527, p. 30).

Customer Data Access to Interval Data through the Utility. Pursuant to Decision D.11-07-056, Ordering Paragraphs 8-9, the Commission ordered the IOUs to provide third parties with customer data upon consent in D.13-09-025 dated September 19th, 2013. The decision allowed PG&E

and SCE to recover up to \$19.4 million and \$9.1 million from ratepayers, respectively.⁶¹ The Commission affirmed that the price to customers (and third parties) of this service should be zero; ordered that eligibility criteria of third parties and technical operation of the web service should be made consistent amongst all the IOUs; outlined a dispute resolution process in which the Commission, and not a utility, has the sole power to revoke a third party's access in case of an alleged breach; and affirmed that utilities have no liability for a third party's breach, provided that the utility follows the Commission's rules and has not acted "recklessly."

"Customer data" includes electricity consumption data, generally at hourly resolution for residential and 15-minute for commercial and industrial. In a somewhat vaguely-defined "phase two" of Customer Data Access, PG&E and SDG&E stated their intention to add (i) natural gas data and (ii) pricing data to the files transmitted to authorized third parties. The data format and communication protocol standard to be followed is the Energy Services Provider Interface (ESPI).

The decision affirmed simple and straightforward eligibility criteria for third parties. To receive customer energy data, a third party must (i) demonstrate technical capability to interact with the IOUs' servers, (ii) provide contact information and a federal tax identification number in order to unify the registration system state-wide, (iii) acknowledge receipt of the Commission's privacy policy in D.11-07-056, and (iv) not be present on the Commission's list of banned third parties.

Data quality was only mentioned briefly in D.13-09-025. The IOUs are required to notify third parties whether customer usage and pricing data is, or is not, revenue quality. ("Revenue quality" is generally understood to mean the usage readings that are used to generate bills. Data become "revenue quality" after the validating, editing and estimation process.) Unfortunately, the Commission's lack of specificity regarding data quality, and the IOUs' resulting "advice letters" documenting their ESPI implementation, led to protests by several stakeholders. The IOUs explained that backhauled data from the previous day are not

⁶¹ For states or utilities considering Green Button Connect, we caution the reader against using California's costs to estimate their own. The California utilities were the nation's first adopters and had to build the technology themselves; now, multiple utility vendors offer Green Button Connect functionality for sale.

⁶⁰ *Ibid.*, p. 35.



necessarily revenue quality right away, but rather, bills must first be generated in order for data to be deemed revenue quality. The problem for third parties was that settlement of demand response or ancillary services with the Independent System Operator (ISO) require revenue-quality data. If the IOUs did not provide revenue-quality data through ESPI, then an entire class of services that save ratepayers money and that were originally envisioned as consumers of data through ESPI would be jeopardized. Ultimately, PG&E and SDG&E agreed to provide revenue-quality meter data via Green Button Connect, making use of the “QualityOfReading” flag within ESPI to denote its quality classification.⁶²

⁶² See Pacific Gas & Electric Amended Advice Letter #4378-E-A dated August 14, 2014 and San Diego Gas & Electric Amended Advice Letter #2586-E-A dated August 15, 2014.

APPENDIX 3

Recommended reading

Klass, Alexandra B. and Wilson, Elizabeth J., *Energy Consumption Data: The Key to Improved Energy Efficiency* (May 5, 2015). 6 San Diego Journal of Climate and Energy Law 69 (2015), Minnesota Legal Studies Research Paper No. 15-13. <http://ssrn.com/abstract=2602974>

State and Local Energy Efficiency Action Network. 2012. *A Regulator's Privacy Guide to Third-Party Data Access for Energy Efficiency*. Prepared by M. Dworkin, K. Johnson, D. Kreis, C. Rosser, J. Voegelé, Vermont Law School; S. Weissman, UC Berkeley; M. Billingsley, C. Goldman, Lawrence Berkeley National Laboratory. http://energy.gov/sites/prod/files/2014/05/f15/cib_regulator_privacy_guide.pdf

North American Energy Standards Board (NAESB). *RXQ.6.10 - Retail Customer Authorization Form*. NAESB membership required: https://naesb.org/retail_standards.asp

OpenEI, Utility Data Access Map. http://en.openei.org/wiki/OpenEI:Utility_data_access_map

Krukowski, Andrea and Majersik, Cliff, Institute for Market Transformation. *Utilities' Guide to Data Access for Building Benchmarking*. March, 2013. <http://www.imt.org/resources/detail/utilities-guide-to-data-access-for-building-benchmarking>

"Why 50 million smart meters still haven't fixed America's energy habits." *Washington Post*, Jan 29 2015 by Chris Mooney. <http://www.washingtonpost.com/news/energy-environment/wp/2015/01/29/americans-are-this-close-to-finally-understanding-their-electricity-bills/>

Residential Electricity Use Feedback: A Research Synthesis and Economic Framework. EPRI, Palo Alto, CA: 2009. 1016844.

Ehrhardt-Martinez, Karen, Kat Donnelly and John "Skip" Laitner. 2010. *Advanced Metering Initiatives and Residential Feedback Programs: A Meta-Review for Household Electricity-Saving Opportunities*. Washington, DC: American Council for an Energy-Efficient Economy. <http://aceee.org/sites/default/files/publications/researchreports/e105.pdf>

Armel, Carrie; Gupta, Abhay; Shrimali, Gireesh and Albert, Adrian. Is disaggregation the holy grail of energy efficiency? The case of electricity. *Energy Policy* 52, p. 213-234. January, 2013. <http://web.stanford.edu/group/peec/cgi-bin/docs/behavior/research/disaggregation-armel.pdf>

APPENDIX 4

Technical resources

GREEN BUTTON STANDARDS DEVELOPMENT

The standards body guiding Green Button (also referred to as the Energy Services Provider Interface) is the North American Energy Standards Board (NAESB):

https://www.naesb.org/espi_standards.asp

Technical working groups are led by the UCA International Users' Group, which convenes the Open Smart Grid Users' Group. Listserv and conference call information is available:

<http://osgug.ucaiug.org/sgsystems/OpenADE/default.aspx>

NIST provides many resources on smart grid standards including Green Button:

<http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/GreenButtonInitiative>

Software development resources such as software development kits (SDKs) are available on Github:

<https://github.com/energyos>



MORE THAN SMART

MISSION DATA

