

ACCESS TO DATA

Bringing the Electricity Grid into the Information Age

A 21st Century Electricity System Issue Brief

By Advanced Energy Economy

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ABOUT ADVANCED ENERGY ECONOMY

Advanced Energy Economy (AEE) is a national association of businesses and business leaders who are making the global energy system more secure, clean and affordable. Advanced energy encompasses a broad range of products and services that constitute the best available technologies for meeting energy needs today and tomorrow. AEE's mission is to transform public policy to enable rapid growth of advanced energy businesses. AEE and its State Partner organizations are active in 26 states across the country, representing roughly 1,000 companies and organizations in the advanced energy industry. Visit www.aee.net for more information.

ABOUT THIS ISSUE BRIEF

The U.S. utility sector has entered a period of foundational change not seen since the restructuring of the late 1990s. Change is being driven by new technologies, evolving customer needs and desires, environmental imperatives, and an increased focus on grid resiliency. With these developments come challenges, but also new opportunities to create an energy system that meets the changing expectations of consumers and society for the coming decades. We call this the *21st Century Electricity System*: a high-performing, customer-focused electricity system that is efficient, flexible, resilient, reliable, affordable, safe, secure, and clean. A successful transition to a 21st Century Electricity System requires careful consideration of a range of interrelated issues that will ultimately redefine the regulatory framework and utility business model while creating new opportunities for third-party providers and customers to contribute to the operation of the electricity system.

To support this transition, Advanced Energy Economy (AEE) has prepared several issue briefs that are intended to be a resource for regulators, policymakers, and other interested parties as they tackle issues arising in the rapidly evolving electric power regulatory and business landscape.¹ This issue brief on [Access to Data](#) lays out why and how access to data is integral to enabling a high-performing modern grid, describes several potential obstacles and questions that utilities and regulators should consider in implementing improved data access, and makes recommendations on the best path forward.²



SUMMARY

Data is the lifeblood of today's economy. Timely and convenient access to granular customer and electricity system data is critical to support the development of a modern grid. Such access allows utilities and competitive suppliers to optimize offers and enables individual customers and their designated third-party providers to better manage energy use, consider distributed energy resource (DER) options, reduce costs, and participate in utility demand management programs and emerging transactive energy markets.ⁱⁱⁱ In addition, providing third parties with access to anonymized, aggregated customer data and electricity system data is critical to enabling these companies to design and offer products and services that will benefit utility customers, and the electricity grid as a whole.

In order to accelerate data sharing by utilities, policymakers should adopt regulations that enable a data-rich environment that encourages and empowers customers and third parties to use energy billing, system, and usage data.

AEE believes that data must be available in three basic ways to allow customers the greatest control and benefits:

1. A standardized data exchange, such as the Department of Energy's Green Button (if fully and completely implemented), is the most scalable way to provide **individual customer data** to customers and customer-authorized third parties for non-billing products.
2. In states with retail open access, **bill-quality data** for billing of energy is necessary, preferably through Electronic Data Interchanges (EDIs).
3. **Aggregated, anonymized customer data, system data and grid planning data** should be made available on an as-requested basis, as part of targeted utility solicitations for DER solutions, or as part of broader efforts to make such data continuously available so that the market can better develop customer offerings and propose solutions that the utility may not realize are available. For example, California is developing online feeder maps as part of that state's effort to more fully integrate DER on the grid.

Regulations should incentivize utilities to raise customers' awareness and understanding of their ability to access their own data, how to authorize third parties to access the data, and how they can use this data to reduce their energy usage and costs. In addition, utilities should streamline the customer and third-party authorization process for release of data to ensure robust participation in any data exchange. Strong security protocols must be utilized to protect and secure customer and electric system data from bad actors trying to do harm. If done properly these various data access efforts can stimulate job-creating innovation, lead to the development of new products and services, animate the DER market, provide benefits to the electricity



system, enhance customer choice, and support the transition to a modern grid.

It is important to note that these issues are the same as those that have been successfully addressed in other industries, including telecommunications, banking, travel and health care, where greater access to data is transforming the way companies in those industries do business. We expect the same will be true of electricity.

There is a real opportunity for the multiple benefits of data for individual customers and the electric power system as a whole to be realized if the following steps are taken:

1. Adopt foundational regulations and technologies that enable a data-rich environment
2. Promote universal interface standards to exchange data between utilities,

customers, retail suppliers, and third parties

3. Incentivize utilities to raise customer awareness and understanding of data's potential to reduce energy usage and costs
4. Develop strong security protocols to protect and secure customer and electric system data
5. Streamline the customer and third-party authorization process to enable robust participation
6. Revisit utility business models to ensure utilities are properly incentivized to help reduce usage, innovate, and animate distribution-level markets

Distributed Energy Resources

AEE defines DER broadly to include distributed generation of all types (e.g., combined heat and power, solar photovoltaics, small wind, fuel cells), energy efficiency, demand response, energy storage, electric vehicles and the associated

electric vehicle supply equipment, and microgrids. As such, it includes options for generating electricity, but also for managing how much and when electricity is used.



THE INCREASING VALUE OF DATA

Improved access to data, coupled with the growing ability to analyze and act upon it, are driving change and stimulating innovation in every industry. The electric utility industry is no different, although arguably it has lagged behind other sectors. Access to energy usage data is critical for:

1. Helping customers track and manage their energy use
2. Helping utilities and competitive suppliers to develop new and innovative customer offerings and dynamic rate structures
3. Empowering third-party (non-utility) companies to support the transition to a modern grid
4. Enabling utilities to transition to a more customer-focused culture and business model

Historically, most electric meters were read monthly, severely limiting the actionable data available. Today, with over 50% of U.S. households having electric meters with advanced metering functionality (AMF),^{iv} tens of millions of customers now have meters that can collect granular usage data and transmit that data to the utility. Utilities and regional market operators are collecting the data, but the key is making it available in a timely, usable manner, whether directly to customers, their designated third-party providers, or competitive retail suppliers. The data can also be provided in anonymized, aggregated form to third parties to facilitate development of

new products and services. At the same time, making electricity system data more readily available promises to unlock additional value from DER by targeting deployment of these resources in constrained areas of the grid and enabling the provision of new services to customers and utilities that lead to benefits greater than those provided by traditional utility investments.

Once the data is made available, it becomes possible to offer customers actionable insights and products that will drive customer behavior and investment in DER that will benefit customers and the grid as a whole. That makes data access a foundational requirement for maximizing the benefits from the substantial investments utilities have made in advanced metering infrastructure (AMI), as well as investments in DER by customers and the advanced energy industry. Modernizing rates is also a critical element. In particular, time-varying rates, which rely on granular data, can create compelling value propositions for customers to invest in DER and energy management options that have them reduce their energy use when it matters most to the grid, lowering the costs of the system overall. When customers have access to data they will also be able to access new technologies in ways that fit their lifestyle.

The current inability of many third parties to access data authorized by their customers is a barrier to fully realizing the benefits of an animated DER marketplace. Without a standardized way to access data, companies



are forced to figure out how each utility stores and makes their data available or must install their own redundant metering on a customer premise to track individual customer loads. In addition, without data, investments in DER and energy management systems are done

without full accounting of the costs and benefits they generate for the utility system as a whole. Improved data access will help to optimize and maximize these customer-driven investments to the benefit of all ratepayers.

MAKING DATA AVAILABLE TO DRIVE INNOVATION

As noted above, data access takes three basic forms: (i) **customer-specific data** that can be securely accessed in a timely manner by such customers, their electricity suppliers, and their designated third-party service providers, (ii) **aggregated, anonymized customer data** that can be accessed directly by third-party providers, and (iii) **utility system data** made available to third-party providers. Each has its place in a modern electricity system.

Customer-specific usage data – including daily, hourly, sub-hourly, and near real-time data – will enable new third-party products to be developed and offered to customers. While larger customers may want to track their own energy use, the overwhelming majority of customers need and want utilities, competitive suppliers, and/or third parties to process their usage data and provide actionable insights. With granular customer usage data, an energy efficiency company can more accurately tailor its services and recommendations to target customers; a solar photovoltaic installer can better pinpoint which customers would benefit

most from a rooftop array and where that array would most benefit the grid; a retail supplier can offer pricing based on individual usage profiles to optimize the energy market for the consumer; and a demand response company can provide more actionable feedback on customer energy usage to help the customer save money while benefitting all customers by reducing the system's peak demand.

Customer-specific data can also mean data commonly found on a utility bill, such as account numbers, meter numbers, rate class, location on the grid, and retail providers used. This information may be necessary to map the customer to their location on the grid or ensure that the customer is in a rate class that would enable them to participate in a third-party or utility program.

Making aggregated, anonymized customer data and appropriate system-wide data available to third-party companies in a timely manner will enable them to identify and offer more cost-effective alternatives to traditional utility infrastructure investments for the benefit



of customers and the grid. Aggregated customer data can help third-party companies develop new and innovative products and services that apply broadly to targeted customer classes or locations. Customer data is also used by utility-contracted agents, such as energy efficiency providers, for program implementation or evaluation, such as verifying reductions in energy use from energy efficiency programs.^v

System data – such as information on circuit-level distributed generation (DG) hosting capacity or locations of the grid with capacity constraints (load pockets) or power quality

problems – can help DER providers determine the best places to locate DER and respond to system needs with cost-effective DER solutions. This could include geo-targeting customers for energy efficiency services or strategically locating energy storage assets so they can sell load reduction as a service to utilities in lieu of the utility making expensive infrastructure upgrades. In addition, data access will allow customers to fully benefit from all the economic benefits of DER through demand response, market responsive pricing, and proper settlement based on time of production/usage prices.

QUESTIONS TO CONSIDER

While the benefits of increased data access are clear and numerous, there are several key questions to consider to ensure smooth implementation of data access policies and regulations:

- ⦿ What can be done to enable robust participation by customer-authorized third parties in the marketplace?
- ⦿ How can utilities and policymakers increase understanding and engagement among industry participants and end-use customers?
- ⦿ What types and granularity of data should be made available?
- ⦿ What regulations, privacy standards, and authorization processes are needed to ensure consumer privacy and confidence?
- ⦿ Should utilities be allowed to charge third parties for access to data, and if so, when and on what basis?
- ⦿ How will success be measured (i.e., what are the criteria that matter?)



RECOMMENDATIONS FOR IMPROVED DATA ACCESS

The regulated electricity industry has fallen behind other industries when it comes to utilizing and making data available to engage customers and create new products and services. Experience from early adopting states suggests that the following recommendations can help regulators, policymakers, and utilities design and implement a process that best fits their specific needs and circumstances.

LAYING THE FOUNDATION

Policymakers should implement foundational policies to enable a data-rich energy environment as soon as possible. Policymakers and regulators should then direct utilities that have not already done so to submit a business case for deployment of AMF to ensure availability of actionable granular energy usage data.

DATA EXCHANGE INFRASTRUCTURE

Once utilities have collected the necessary data, they should implement a system that provides this data to customers, their retail suppliers (as applicable), and customer-designated third parties. The most scalable way to provide this information to customers

and then subsequently to third parties is by a data exchange standard across all utilities. Green Button and Green Button Connect (see box below) are the leading standards for this purpose. AEE believes that they are the appropriate standards to use and that utilities should begin to implement them fully. Already, over 50 utilities and electricity suppliers use Green Button and over 60 million households and businesses have the ability to use Green Button.

Benefits will only be realized if customers can easily take advantage of this access. Regulators should also create rules that ensure standard utility implementation of Green Button across their state. To address inconsistencies in implementation, the Green Button Alliance has commenced a testing-and-certification process to make it easier for a utility to ensure its Green Button implementation complies with the Green Button standard, while also assuring that developers can write a single application that can work across utilities. Utilities should work with the Green Button Alliance to ensure that their implementations of Green Button are fully compliant with the standard.



Green Button

Green Button was established—after a White House call-to-action in 2011—as a technical standard to provide utility customers with access to their energy usage information. Specifically, it is an information exchange standard, which ensures that usage and/or billing data (regardless of the utility) is accessible in a standardized format.^{vi} Green Button is also known as the Energy Service Provider Interface (ESPI), established by the North American Energy Standards Board's (NAESB) REQ 21. Green Button currently has two programs:

Green Button Download My Data provides a standardized format for customers to digitally download usage data. Once downloaded, the data can be analyzed or shared with a third party.

Green Button Connect My Data provides an easy way for end users to grant authorization to a third party to retrieve customer data directly from the utility's website.

Early Adopters

In 2015, Pacific Gas and Electric (PG&E) launched its Green Button Connect “Share My Data” program, which allows customers to authorize access to their usage and billing data through a third party's website. With it, PG&E customers no longer have to log in to download and share their energy usage files. Instead, once authorized, the system automatically packages customer data, informs the authorized third-party businesses and securely sends it out.

At this time, National Grid, Consolidated Edison, Duquesne Light Co., Commonwealth Edison, Baltimore Gas & Electric, Pepco Maryland, and Ameren Illinois were all actively planning real-time data implementation that will include Green Button.

Moreover, any Green Button implementation should adhere to the following principles to optimize data access while ensuring privacy, security, and auditability:

1. **Ensure bill-quality data:** Require interval data provided by the utility to customers, electricity suppliers, and third parties is the same data the utility will use to bill the customer.
2. **Provide full data sets:** Standardize the availability of a requisite set of usage, billing, and location data for historical and ongoing data access.
3. **Provide synchronous data:** Once a data request is authorized and authenticated by

a customer, data should be delivered on-demand.

4. **Adopt strong security protocols:** Data security must accommodate cloud-based systems.
5. **Ensure quality of service and transparency:** Web services and Green Button Connect platforms must be provided at a sufficiently high level of service, with performance metrics reported publicly.
6. **Provide testing environment:** Utilities should provide a testing environment and a production environment of Green Button Connect for third-party use.



CUSTOMER RELEASE OF DATA

A customer's authorized release of data to a third party (and similarly, the process of the customer simply accessing their data) must be a simple and seamless experience. If not, the customer will likely abandon the process of releasing data, and programs dependent on the use of the data will not achieve their full potential. General principles for the customer experience in authorizing release of data include:

1. **Authentication credentials:** Information asked of the customer for release of data must be easily accessible and knowable without being sensitive. For instance, customers should not be asked to provide their social security number or more information than the utility itself uses to authenticate customer identities.
2. **Accept instant, digital authorization:** A digital signature (including click-through) should be valid for authorization.
3. **Ensure seamless click-through:** A utility account holder should be allowed to begin and end the click-through process on the third-party website. The third party may lead the customer request for the types of data and the time frame of data sharing, and the customer may approve or reject such a request at its sole discretion.
4. **Standardized language:** Standardized language should be presented to the customer to support informed consent. This language should include, but not be limited to, description of data, length of authorization, purpose specification, and revocation.

5. **Reduce customer effort:** The authentication process should require no more than four screens and no more than two clicks to reach completion.

FACILITATING ACCESS TO OTHER FORMS OF DATA

Beyond making individual customer data available to customers and their authorized third-party providers, regulators should also consider whether utilities should make aggregated, anonymized customer data available to third parties to further facilitate development of energy products and services.

Making distribution system data available is of equal importance to customer data, and policymakers and regulators should consider a range of options. One option is to incentivize utilities to seek out third-party solutions for meeting defined system needs instead of pursuing traditional "poles and wires" solutions. So-called non-wires alternatives (NWA) can serve as cost-effective alternatives to equipment upgrades in situations such as meeting load growth in constrained areas of the grid. Under these programs utilities would procure grid services instead of making direct investments in infrastructure. For this to be effective, appropriate data about the system needs to be made available through the solicitation process, and far enough in advance of the need, so that third-party providers are able to develop proposals that can be compared in an open and transparent manner to the traditional utility solution.

Beyond these targeted deployments, making system data more broadly available should also be part of efforts to develop truly



animated markets. Making utility system planning and operational data available to qualified third parties – including investment plans and data on system constraints and DER hosting capacity – will allow third-party providers to develop offerings to customers and to the utility that are more responsive to customer and system needs, rather than wait for a utility solicitation. An example of this is the development of online feeder maps and hosting capacity analysis in California, being done as part of that state’s effort to more fully integrate DER on the grid.

INCENTIVIZING ADOPTION

To animate the market for energy services, utilities must be incentivized to develop an accessible data platform and raise customer awareness and understanding of opportunities to reduce their energy usage and costs. Furthermore, engaging customers and encouraging them to actively utilize the data at their fingertips is necessary for the creation of a truly animated market. This will be more likely to occur if data access is facilitated through utilities’ existing customer web portals. Utilities can also be incentivized through new business models or performance metrics that reward them for achieving increased customer engagement and information access. Specific performance categories that should be considered include customer engagement and information access, and information access by market participants.

Beyond these metrics, other performance incentives may also be needed that address other changes that would result from greater customer engagement, such as higher DER

penetration. Also, greater benefits from access to data will be enabled by changes to rate designs that send more accurate price signals to customers to encourage beneficial behavior and DER deployment.^{vii}

SAFEGUARDING DATA

Developing regulations to protect customers and safeguard data is vital to ensure customer privacy and confidence in the market. First and foremost, any personally identifiable customer data should not be shared without the consent of the customer. The sharing of aggregated, anonymized data need not be subject to consent provided it meets certain conditions. For example, states could apply the “4/80 rule” where data must include at least four customers with no one customer accounting for more than 80 percent of the combined load.

Facilitating data access is premised upon the view that customers should be the owners of their own billing and usage data, and sharing this data with third parties should be at the customer’s discretion. That said, if the sharing process between customers and third parties is too cumbersome, very few customers are likely to complete the process. Therefore, AEE believes third parties should be able to initiate a data sharing agreement on a customer’s behalf, and the customer should be able to provide consent through a simple “single click” process. To further protect customers, the utility should be required to notify the customer, at the time of downloading or sharing, that providing this data to another company will entail revealing private usage information. Customers should also be advised



to review the privacy and data handling polices of the recipient company before sending their information.

Data Guard Energy Data Privacy Program

In January 2015, The U.S. Department of Energy announced the release of *Data Guard*. Data Guard is a privacy program that was created by the Department of Energy, utilities, and third-party stakeholders to provide companies with a mechanism to show their commitment to protecting customer data. With *Data Guard*, a utility or a third-party energy services company commits to a Voluntary Code of Conduct (VCC). If a company violates the VCC they could be subject to an action for misrepresentation under Section 5 of the Federal Trade Commission Act or state law.^{viii}

With respect to distribution system data, states will need to decide what level of detail to make available and in what form, given their specific goals for developing distribution-level markets and engaging customers and third parties. While states have legitimate concerns with security, there are levels of system data that can be provided without raising issues. Where it exists, load information for transformers and feeders can be given without any security risk. Feeder locations are viewed as more sensitive, but the Department of Homeland Security^{ix} has stated that there is no

significant security risk with the release of this data. At the same time, the benefits of providing system data include better competition among solutions to meet system needs, more transparency and accountability in the distribution planning process, and the potential for cost savings to customers over current utility practices. Those states that have carefully considered collecting and making system data available, such as California and New York, have been moving in the direction of making more data available, not less.

PAYING FOR DATA

AEE believes that utilities should not charge customers or companies for receiving near real time, customer usage data through Green Button Connect or other similar standards. While the frequency, granularity, timeliness, and types of data provided can generate costs for the utility, these costs are generally small compared to the costs already incurred by the utilities in deploying AMF and collecting the data – costs that customers already pay through rates. Moreover, given the benefits of making the data available that accrue to all customers, any incremental costs associated with making the data available should be borne by all ratepayers. This does not preclude the option of utilities charging for enhanced data services where individual customers or companies are making requests for non-standard or otherwise customized data or analysis.



A leading state on customer data access and privacy: California

California has taken a comprehensive regulatory approach to consumer energy data access and privacy. Starting in 2008, the California Public Utilities Commission (CPUC) adopted a series of access-to-customer data rules culminating in Decision D.11-07-056 (July 2011), which required all three investor owned utilities (IOUs) to make information available to customers in a consistent manner, specifically providing customers with approximate electricity price, actual usage, and estimated final monthly bill, updated daily. In addition, the utilities were directed to provide bill-to-date, bill forecast data, projected month-end tiered rate, and notifications of crossing pricing tiers. The CPUC also directed utilities to develop a process that would allow customers to utilize a Home Area Network (HAN) to access meter data.

The Commission also adopted a framework for protecting customer privacy and differentiated “primary purposes” that did not require customer consent from “secondary purposes” that did. It directed utilities to allow customers to share usage information with third parties with such consent and use a standardized method for third-party access, as well as the use of a standardized customer access format. In a June 2016 Decision (D.16-06-008), the CPUC streamlined its rules by authorizing utilities to use a click-through electronic signature process for verifying customer identity and authorizing the release of data. This decision will improve data access and improve the user experience – critical to boosting the rates of customers that share their data.

CONCLUSION

Data is the lifeblood of today’s modern economy. Timely and convenient access to utility and customer data is a necessary and vital component of moving the electric utility industry into the digital age, unlocking value, and engaging customers in new ways. Access to customer data will transform how customers manage their own energy usage and interact with their utility, electricity supplier, and third parties. Access to system data will also allow third-party providers to actively participate in developing and deploying cost-effective solutions to traditional utility infrastructure investments, further animating a distribution level market, engaging customers on their energy usage and pricing, and providing significant customer benefits and cost savings. If the following steps are taken, there is a real

opportunity for these benefits to be realized in the near future.

- Adopt foundational regulations and technologies that enable a data-rich environment
- Promote universal interface standards to exchange data between utilities, customers, retail suppliers, and third parties
- Incentivize utilities to raise customer awareness and understanding of data’s potential to reduce energy usage and costs
- Develop strong security protocols to protect and secure customer and electric system data



- ⦿ Streamline the customer and third-party authorization process to enable robust participation
- ⦿ Revisit utility business models to ensure utilities are properly incentivized to help reduce usage, innovate, and animate distribution-level markets

Whether this future can be realized will depend on policymakers, regulators, utilities, third-party providers and customers working together and devising a plan that is suitable for all parties.



ADDITIONAL RESOURCES

Resource	Link
Center for the New Energy Economy State Policy Opportunity Tracker: Customer Data Access	http://spotforcleanenergy.org/policy/customer-data-access/
American Council for an Energy-Efficient Economy, on Data Access	http://database.aceee.org/state/data-access
GridWise Alliance Policy Position on Data Access & Privacy Issues:	http://www.smartgridinformation.info/pdf/4887_doc_1.pdf
EIA Assessment of Interval Data and Their Potential Application to Residential Electricity End Use Modeling:	https://www.eia.gov/consumption/residential/reports/smartmetering/pdf/assessment.pdf
Mission Data, Index of Mission Data Activities:	http://www.missiondata.org/activities/#index
UtilityAPI, authorization, data formats, and API endpoints:	https://utilityapi.com/docs
California PUC Data Privacy and Protection Decision	http://docs.cpuc.ca.gov/published/final_decision/140369.htm



END NOTES

¹ <http://info.aee.net/21ces-issue-briefs>

² Advanced Energy Economy (AEE) is comprised of a diverse membership. As such, the information contained herein may not represent the position of all AEE members.

ⁱⁱⁱ Transactive energy describes a marketplace or network of DERs involving multi-sided transactions between utilities, third parties, and end-use customers.

^{iv} <http://www.eia.gov/electricity/data/eia861/index.html>. For more information on AMF see our issue brief titled Advanced Metering, available at <http://info.aee.net/21ces-issue-briefs>

^v Contracted agent status, meaning that they work directly on behalf of the utility, allows these companies to access and use individual customer data (for defined purposes) similar to a regulated utility.

^{vi} <http://www.greenbuttondata.org/learn/>

^{vii} For more on these topics see AEE's Issue Briefs on Performance-based Regulation and Rate Design.

^{viii} <https://www.dataguardprivacyprogram.org/>

^{ix} <https://www.dhs.gov/science-and-technology/csd-resources>

