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Preliminary Comments on Customer Usage Data
Consumer Engagement Committee (Working Group I)

Dear LuAnn,

Thank you for the opportunity to respond to your request for information related to the value, methods, security and other issues associated with consumer data access. As you are aware, Mission:data is a coalition of companies delivering consumer-focused energy services and solutions. This national coalition of more than 20 technology companies believes consumers should have convenient, electronic access to the best available information about their own electricity use in order to support innovative new services, such as:

- "no-touch" energy audits
- end use, device-specific recommendations to significantly reduce energy use
- recommendations for and sizing of solar installations
- frictionless verification of efficiency or demand response curtailments

We actively support two priorities: (1) consumers' access to their electricity usage and cost data through the implementation of the industry-led Green Button Connect standard, and (2) direct access to smart meter usage data in real-time through the Home/Business Area Network (HAN/BAN).

Your June 9 email outlines a series of questions related to customer usage data, service products, data usage, privacy protection and delivery methods. We have organized our comments according to the topic categories outlined in your email.

Customer Usage Data

1. ***Customer Access to "Backhauled" Interval data (through Green Button Connect)***. *By "interval data" we refer to a customer's own energy data collected through the meter and the utility infrastructure and provide via the utility website to the customer and authorized third parties.* Time-series consumption data available either at a monthly level or so-called "interval data" (i.e., 5-minute, 15-minute or hourly intervals, typically with a time lag) are both valuable in different ways. We believe customers should have access to their

own, best-available data, i.e., the most granular usage data that is available. Monthly usage data for individual meters, in both a residential and commercial/industrial context, is useful for things such as:

- EnergyStar benchmarking, by making it easier to voluntarily benchmark and pursue efficiency measures, or to easily comply with various benchmarking and disclosure laws, such as Governor Cuomo's Executive Order 88 for State-owned buildings or New York City's Local Law 84;
- For landlords to communicate to prospective tenants annual utility usage and costs in homes, apartments or commercial buildings for rent, so that tenants can take that into account in their rental decisions;
- Degree-day analysis (i.e., understanding the magnitude of temperature impacts on energy use);
- Bill analysis, to flag outliers for further investigation;
- Cost management, for businesses or homeowners to actively manage energy use, rather than passively treat it as a fixed cost;
- Prioritizing and sequencing efficiency pursuits, starting with the "worst energy offenders," for large apartment complex landlords or commercial building portfolio owners

Interval data is important for applications including, but not limited to, the following:

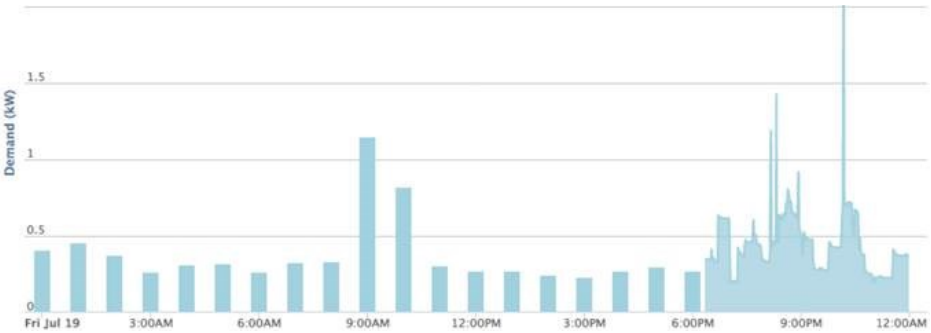
- Virtual or "no touch" energy audits that identify efficiency opportunities such as poor building scheduling, high air infiltration, HVAC equipment problems, etc.;
- Algorithmic disaggregation of energy use (for example, an "itemized utility bill" based on statistical inference to give specific, actionable guidance to homeowners or businesses), though aggregation through high-interval data is generally less powerful;
- Peak load management (for example, predicting when a peak is going to occur, and proactively notifying the homeowner or business via email or text message);
- Measurement and verification of energy savings from efficiency programs, or peak load reductions for participation in demand response programs;
- Generating, instantly and with software, an accurate cost-savings estimate of solar photovoltaic installations, taking into account time-of-use rates, as opposed to using state-wide average electricity rates

2. **Real-time data to the HAN/BAN.** By this term, we refer to data transmitted from a HAN radio in the Smart Meter directly to a home area network device (e.g. a gateway) owned by the customer that can provide that data in a useable format to the customer, allowing the customer to see, understand and control his or her energy use in real time through smart phones, personal computer or other devices.

   In order to maximize energy savings for consumers, real-time data typically made available from the smart meter directly in the HAN/BAN to the consumer, implemented in both California and Texas, is superior to 24-hour delayed data.

Real-time data made available to customers in small increments – as little as 6 seconds, compared to the lagged time 15 minute or hour-increments enabled by interval data -- enables disaggregation, the use of algorithms to interpret smart meter data to identify energy used in a household by *device*. Appliances have unique electricity usage "signatures" that allow algorithms using high-interval, real-time data to identify the device being used and its energy performance (e.g. whether it is an Energy Star refrigerator working well or a 20 year old clunker that needs to be replaced). This in turn enables the development of automated personalized recommendations such as "Reduce your pool pump run time by 30 minutes per day to save $__ per month" or "Buying a new washer could save you $___ per year." Real time data, with feedback, also allows consumers to easily gain an instant understanding of any device and enables more effective demand response.

The combination of real-time data and tools providing specific feedback about how to save energy drives household efficiency gains of up to 12%[1] (with average savings running about half that across large numbers of homes) compared with the more modest household savings achieved with lagged time interval data.[2] The chart below depicts the difference between lagged interval data, on the left, and real-time data, on the right.



Typically real-time data transmitted to a consumer device is secured through Zigbee standard protocols (Smart Energy Profile 1.x or 2.0). California, for example, requires the use of reasonable security procedures and practices that are widely used in this sector.

The importance of convenient consumer access to data in an electronic format.

The key value of data in a machine-readable format is that software (via PCs or cloud-based services accessed through mobile devices or other consumers devices) can instantly parse and analyze it. This eliminates the friction involved in all manner of transactions, from evaluation, measurement and verification exercises; retrofit coordination among commissioning agents, contractors, energy services companies,

[1] Carrie Armel, et. al. "Is Disaggregartion the Holy Grail of Energy Efficiency? The Case of Electricity," Precourt Energy Efficiency Center, Stanford University. 2012. p. 6.

[2] ACEEE. "Advanced metering initiatives and residential feedback programs: a meta-review for household savings opportunities." Karen Ehrhardt-Martinez, Kat Donnelly, John Laitner. June 2010. Report number E105.

and building owners; real estate transactions triggering benchmarking and disclosure; to price quotations from solar installers.

Energy usage in buildings depends upon a large number of individual decisions. If software can automatically be applied to these decisions, then transaction costs will be dramatically reduced; a much larger percentage of energy-use decisions can be cost-effectively managed to optimize energy use; and consumer confidence in the outcomes of efficiency projects or renewables installation will be increased, because they can easily and independently be assessed. In short, software can lubricate all manner of efficiency transactions that are conducted today with manual work, data manipulations, spreadsheets emailed back and forth, scrutinizing paper bills and manual data entry exercises, etc. Software also enables information and insight to penetrate decision-making processes that are currently devoid of actual data, helping reduce many of the so-called "market failures" in energy efficiency.

Mission:data companies are working to develop ever-more powerful software to save energy and manage consumption. While the technology exists to support recommendations on saving energy in your home, the most powerful energy saving tools require that a consumer have access to their own energy usage information. Because many utilities do not today provide usage data in an electronic, standardized format, consumers in the regions served by these utilities are missing out on significant opportunities to take advantage of the most effective tools to save energy and money.

Mission:data would highlight studies such as those by the Institute for Electric Efficiency showing that a large part of the value of Adanced Metering Infrastructure is not just operational savings for utilities but consumer savings enabled by better energy management.[3] Further, the California Public Utilities Commission, in its order mandating activation of the HAN, referenced Southern California Edison's estimate of approximately $1.1 billion in operational benefits and more than $800 million in consumer demand side reduction benefits from AMI[4].

With regard to aggregated data, we see some important uses, but it is important to assert the difference between an individual's basic right to access his or her own usage data from the more complex questions surrounding aggregation such as privacy.

We do not believe an individual consumer's right to access his or her own usage data raises the level of privacy concerns raised by access to the data of others. (Obviously, data accessed over the web by such individual would be done in an encrypted session according to generally-accepted security norms that currently handle credit card information, medical information and the like. Generally we agree that consumers should have the opportunity to understand how their energy usage data is being used and to consent to that use, although there are important details that must be considered and addressed in developing policies in this area.)

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[3] Ahmad Faruqui, *The Costs and Benefits of Smart Meters for Residential Customers*, Institute for Electric Efficiency, July 2011.
[4] California Public Utilities Commission, Resolution E-4527, September 2012.

We therefore encourage the Commission to consider these two issues separately: individual access versus aggregated data access. With regard to aggregated data, we would point you toward the California PUC's recent "Energy Data Center" decision, and in particular its "use cases," that outline how aggregated data might be useful for complying with benchmarking and disclosure rules, academic research, and evaluation of efficiency program effectiveness.

Mission:data's priority is focused principally on an individual's access to his or her own data, and we believe the published literature and our members' accomplishments clearly establish significant energy savings benefits that do not require access to aggregated or "anonymized" data.

Energy Savings

Energy savings that are significant and sustained have been witnessed where energy usage and cost data are effectively delivered to consumers. For example, the American Council for an Energy Efficiency Economy (ACEEE) has conducted several studies demonstrating how data access has been effective in delivering savings for consumers, whether in the form of in-home displays or information pamphlets that contextualize usage according to socially normative comparisons. Such approaches are varied and may or may not be implemented under the umbrella of a utility program. For example, the ACEEE's meta-analysis found 4% to 12% energy savings among consumers exposed to feedback on their consumption,[5] with real-time data and feedback mechanisms enabling the highest energy savings. That study estimated the national savings potential at over 100 billion kWhs per year. ACEEE stressed the importance of going beyond AMI alone and making data actionable and empowering:

> Advanced metering initiatives alone are neither necessary nor sufficient for providing households with the feedback that they need to achieve energy saving; however, they do offer important opportunities. To realize potential feedback-induced savings, advanced meters must be used in conjunction with in-home (or on-line) displays and well-designed programs that successfully inform, engage, empower, and motivate people.[6]

A more recent study of real-time information feedback approaches, in which consumers could react to instant power usage readings by reducing lighting or appliance loads, found energy savings on average of 3.8%; most encouraging was that some households saved over 25%.[7] In the commercial and industrial sectors, Lawrence Berkeley National Laboratory has found median savings of 17% from energy information

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[5] ACEEE. "Advanced metering initiatives and residential feedback programs: a meta-review for household savings opportunities." Karen Ehrhardt-Martinez, Kat Donnelly, John Laitner. June 2010. Report number E105. These savings would be approximately half of this over large numbers of households.

[6] http://www.aceee.org/press/2010/06/aceee-study-finds-smart-meters-not-smart-enough-slash-re

[7] ACEEE. "Results from recent real-time feedback studies." Ben Foster and Susan Mazur-Stommen. February, 2012. Report number B122.

systems (EIS) that analyze interval usage data.[8] A Natural Resources Defense Council (NRDC) study found 13.2% energy savings in commercial buildings with an EIS.[9] Many other studies document the benefits of monitoring-based commissioning, which depends entirely on electronic access to interval usage data. We submit that one of the primary reasons that EISs and monitoring-based commissioning are not more prevalent in the marketplace today is largely due to the fact that conventional methods of acquiring interval usage data for analysis are messy, labor-intensive, and utility-specific.

Current Implementations

We encourage the Commission to review the following website listing commitments and implementations of Green Button by utilities across the country. There are currently 55 committed utilities nationwide.

Please note that there are two flavors of Green Button – Green Button Download, which requires a user to manually download their usage data and upload it to third-party applications, and Green Button Connect, which lets the user authorize a third party to have consistent access to that user's data. While Green Button Download is a useful first step, it has very limited use.

Green Button Connect is much more powerful as an efficiency tool, as it is the only method that supports ongoing, automatic analysis of usage data without manual user intervention.) Green Button Connect will be implemented by California's investor-owned utilities in early 2015; pilots are currently underway at Pepco (Washington D.C.), ComEd (Illinois) and PECO (Philadelphia). In California, San Diego Gas & Electric has already implemented Green Button Connect (before they were required by the Commission to do so) with early positive results: over 15 third parties registered, and thousands of customers have downloaded their usage data or shared it with third parties.

http://www.greenbuttondata.org

Data Delivery Methods and Standards

We strongly believe that all stakeholders' interests are served by data exchange platforms that strictly conform to nationally-recognized standards. Since many entrepreneurs and innovators come from across the country, it is important to reduce the barriers to their participation in the New York market. Writing code for different states and different utilities because of non-standard electronic interfaces costs time and money. Balkanizing the data landscape into arbitrary utility geographies serves no one. Indeed, many innovative software developers simply will not enter the New York market at all if the data exchange protocols deviate from national norms.

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[8] Energy Information Systems (EIS): Technology Costs, Benefits, and Best Practice Uses. Granderson, J., G. Lin. November 2013. LBNL-6476E.

[9] NRDC. "Real-time energy management: A case study of three large commercial buildings in Washington, D.C." Philip Henderson and Meg Waltner. October 2013. Study number CS:13-07-A.

We therefore believe that the Green Button Connect standard is the most appropriate for implementation in New York. Also referred to as the Energy Services Provider Interface (ESPI), Green Button Connect was ratified as a standard by the ANSI-accredited North American Energy Standards Board (NAESB). The National Institutes of Standards and Technology (NIST) is the federal agency that coordinated the development of Green Button Connect beginning in 2009 among industry stakeholders including utilities, entrepreneurs, device manufacturers, etc. There is now a testing and certification process so that utilities can seek third party certification of their compliance with the standard. We strongly support regular, third-party testing and certification of utility Green Button Connect implementations so that technical consistency is assured while continuous improvements to the system are made.

Finally, it is important to note that Green Button Connect is time-interval agnostic. Whether the utility billing interval is monthly, hourly, 15-minute or 5-minute, all time resolutions (and all customer classes – residential, commercial, industrial) are supported by the Green Button Connect standard, making it truly universal. We strongly recommend Green Button Connect for "backhauled" data.

Regarding real-time data, it is also important to consider the Home Area Network (HAN) for a wide range of applications. Although the HAN is commonly associated with in-home displays, it is important to note the other uses of the HAN such as smart appliances that can automatically respond in periods of high usage without user intervention. Currently, California and Texas have the largest deployments of HAN-capable smart meters, based on use of the Zigbee Smart Energy Profile standards. As of February, 2014, Pacific Gas & Electric (PG&E) customers can log in to their online account and automatically "pair" a HAN device with their smart meter, simply by entering the HAN device's serial number. (HAN devices are inexpensive, with some available on Amazon.com today for as little as $60-100.)

The HAN uses a Zigbee radio to communicate with devices in the home or building, generally with a 75-foot range. All smart meters from manufacturers today come with the Zigbee radio by default, and it is a standard offering. Indeed, we understand from our conversations that removing the Zigbee radio from a smart meter incurs an additional fee. We encourage the Commission to support HAN activation as a critical part of future smart meter efforts, as the benefits of real-time data are tremendous.

Conclusion

In summary, Mission:data believes that consumers benefit from usage data in two forms: "backhauled" data via Green Button Connect, and through activation of the Home Area Network (HAN). It has been demonstrated that usage information can be effective in driving both energy savings and myriad energy management applications. While the above examples are illustrative, it is important to note that software innovation is continuous, and we expect many "killer apps" to be developed in the future, provided that customers across the nation can access their data electronically and in a standardized format.

Thank you for the opportunity to provide these comments.

Cameron Brooks

Jim Hawley

Michael Murray

Tony Brunello

Mission:data members include:

Alarm.com

Alarm.com is an industry leading technology company that provides interactive security, video monitoring, energy management and home automation services through an intelligent platform and easy-to-use mobile apps. Access to data is important to be able to offer apps that can intelligently manage and control energy consumption in the home.

Bidgely

Bidgely is working to enable customers to save energy and utilities to meet their demand-side energy goals by disaggregating energy to itemize home energy usage data down to the appliance level without using any plug-level monitors. Energy data access helps Bidgely itemize how much energy each appliance uses. This allows households to identify sources of greatest inefficiencies and cost savings.

Blue Line Innovations

Blue Line Innovations has developed a very simple technology that passively acquires real time data from any electricity meter and then makes that available to the user in a number of different solutions from wireless monitors to cool smart phone apps to integrated wifi thermostats.

Bright Power

Bright Power helps building owners save energy, money and time by providing energy management and solar energy solutions. Specializing in multifamily residential buildings, Bright Power helps encourage waste reduction, improve cash flows, achieve energy law compliances and make building occupants more comfortable. Bright Power's EnergyScoreCards benchmarking software helps maximize energy efficiency, minimize cost to building occupants and owners make smart decisions and investments.

BuildingIQ

BuildingIQ provides a unique Software-as-a-Service solution to optimize energy use in commercial buildings. Using advanced algorithms to fine tune and control HVAC systems to reduce costs and peak loads while maintaining and improving building performance. The solution makes buildings HVAC systems smarter, more energy efficient and enables AutoDR without affecting tenant comfort.

The Cleanweb Initiative

The Cleanweb Initiative is a member-driven organization comprised of developers, entrepreneurs, investors and enterprises large and small who believe that the growing web of information technologies may be our most powerful tool to improving global sustainability, economic prosperity and human well being. Data access is important to help drive smarter IT-based solutions and accelerate clean technologies to help spread sustainable behaviors.

EcoFactor

EcoFactor provides a cloud-based platform that analyzes data from various sources including connected thermostats, weather, consumer preferences, and unique home thermodynamics and applies customized algorithms to maximize savings to utilities, home service providers and energy retailers.

EnergyHub

EnergyHub is developing systems that reduce home energy consumption and save consumers money. They provide detailed energy usage information and support utility peak power reduction programs by delivering the next generation of energy management solutions to help the grid work smarter. Energy use data is important in accelerating utility demand response and energy efficiency programs.

EnerNOC

EnerNOC is a leading provider of energy intelligence software (EIS) and technology. Global enterprises use EnerNOC's applications to bring new clarity to how they buy energy, how much they consume, and when they use it to drive operational efficiency and improve productivity, while utilities and grid operators use EnerNOC's technology to enhance grid reliability and provide cost-effective alternatives to traditional power supply resources.

FirstFuel

FirstFuel is an end-to-end meter data analytics platform for commercial energy efficiency at a mass scale. They find, size, plan, deliver and track operational and retrofit improvements each building.

Genability

Genability enables New Energy Companies, such as solar developers, EV manufacturers and makers of Internet connected devices, to include smart energy into their products. Genability collects energy data, benchmark energy, and identifies cost savings to help build energy intelligence into different products and services.

iControl Networks

iControl Networks offers home management software solutions and enables service providers to deliver low-cost, high value services to customers. Data access is important to enable iControl to allow users to manage their home security, energy and healthcare activities.

Lucid

Lucid is revolutionizing buildings with software by providing real-time feedback on energy and water use. They developed a tool to manage and access all building performance energy data through a single interface. Data access through utilities will help customers eliminate the costs associated with redundant submetering.

Open Utility

Open Utility is a London-based "internet of energy" company enabling electricity purchases directly from local suppliers. Support renewables not just on the grid, but from your neighbors.

People Power

People Power offers mobile and cloud technology solutions of connecting devices and analytics add-ins to be controlled by a mobile app. Their platform to power the Internet of Everything connects devices to People Power cloud services and allows customers to control them from anywhere.

Plotwatt

Using cloud-based algorithms, Plotwatt analyzes customer smart meter data to figure out appliance level energy costs without monitoring each individual appliance. Plotwatt provides appliance monitoring, savings, peak usages and rate optimization data to homes and restaurant businesses to help reduce energy bills.

Rainforest Automation

Rainforest Automation provides products that allow utilities and their customers to manage real time energy use. The wireless Home Area Network (HAN) product connects smart meter data systems to the cloud and allows, "plug and play" access.

Retroficiency

Retroficiency is fundamentally changing the way building efficiency is assessed by combining energy efficiency experience with software and data. Using analytics, Retroficiency is developing energy models for any type of building and allowing one to see how a specific building is consuming energy.

Solar City

Solar City provides solar energy for homeowners, businesses, school, non-profits and government organizations at lower costs than energy generated from fossil fuels. They provide full-service solar power system design, financing, installation and monitoring services.

ThinkEco

ThinkEco is a green technology company creating cost-effective energy efficiency solutions. They developed the modlet, a self-installable solution that brings energy awareness and device-level energy management to home and office environments. In addition, they have developed a unique smartAC kit to control room AC and a platform for third party hardware integration.

Verdafero

Verdafero puts businesses' utility consumption information all in one place, providing unified utility management tools and services for some of the best-known companies and brands around the world, including Concord Hilton, Sugar Bowl Ski Resorts, the British Consulate-General, and Tech Credit Union.

More information about Mission:data is available at www.missiondata.org