STATE OF RHODE ISLAND
PUBLIC UTILITIES COMMISSION

The Narragansett Electric Co.	**)**	
d/b/a Rhode Island Energy's	**)**	**Docket No. 22-49-EL**
Advanced Metering Functionality	**)**	
("AMF") Business Case	**)**	

DIRECT TESTIMONY AND SUPPORTING EXHIBITS OF MICHAEL MURRAY

ON BEHALF OF
MISSION:DATA COALITION

Date Filed: April 28, 2024

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I. QUALIFICATIONS

Q. PLEASE STATE YOUR NAME, TITLE AND BUSINESS ADDRESS OF YOUR EMPLOYER AND ROLE AT THE ORGANIZATION.

A. My name is Michael E. Murray. I am President of the Mission:data Coalition ("Mission:data"). My business address is 1752 NW Market Street #1513, Seattle, WA 98107.

Q. ON WHOSE BEHALF ARE YOU FILING THIS TESTIMONY?

A. I am filing this testimony on behalf of Mission:data, an intervenor in this case.

Q. WHAT IS MISSION:DATA COALITION?

A. Mission:data is national, non-profit coalition supported by approximately 30 technology companies that deliver consumer-focused, data-enabled energy savings for homes and businesses. An exciting new industry uses advanced software tools to analyze customer energy information – in particular, information generated by Advanced Metering Infrastructure ("AMI") – to deliver benefits to both consumers and utilities, and these companies are focused on bringing energy efficiency solutions to a national market. To realize that objective, Mission:data advocates nationwide for empowering consumers with "data portability" – that is, the ability for consumers to easily share or "port" their energy-related information from utilities to energy management companies of their choice. Mission:data also works with industry and policymakers to ensure technological consistency from state to state so that innovative solutions for energy management can achieve scale.

Q. PLEASE BRIEFLY DESCRIBE YOUR EDUCATIONAL BACKGROUND AND YOUR RELEVANT PROFESSIONAL EXPERIENCE.

A. I co-founded Mission:data in 2013 and have led our efforts to intervene at public utility commissions in 14 states as well as the District of Columbia on issues of advanced meters, data privacy and the benefits of electronic access to energy usage data.

Since 2012, I have authored publications and presented at conferences on the value of energy data and data portability. I recently published a report titled "Digital Platform Regulation of Electric Utilities," which discusses lessons learned from the mobile telephone "app store" markets and makes policy recommendations for regulatory oversight of advanced meters with "app stores."[1] I have presented at dozens of conferences on state developments in energy data access, such as at the National Association of Regulatory Utility Commissioners. In 2012, I presented at the White House with former Secretary of Energy Steven Chu and former U.S. Chief Technology Officer Aneesh Chopra on Green Button.

I began my career in 2004 as co-founder and CEO of Lucid, an energy management software company for commercial buildings, where I grew the company from zero to over 40 employees, raised $10 million in venture capital and recruited board members from Apple, Intuit and Bear Stearns. Lucid offered a cloud-based service that analyzes real-time meter data from thousands of commercial buildings

[1] Mission:data Coalition. Digital Platform Regulation of Electric Utilities. Available at http://www.missiondata.io/s/Digital-Platform-Regulation.pdf. Last Accessed April 28, 2023.

across North America to support energy efficiency. Lucid's customers included over 350 organizations such as Google, Yahoo!, and eight of the eight Ivy League universities and others. I hold two U.S. patents relating to energy data collection, sharing and analysis, #8,176,095 and #8,375,068. I earned a B.A. with highest honors from Oberlin College in 2004.

Q. HAVE YOU EVER TESTIFIED IN PROCEEDINGS BEFORE THE RHODE ISLAND PUBLIC UTILITIES COMMISSION OR THE DIVISION OF PUBLIC UTILITIES AND CARRIERS?

A. I have not.

Q. HAVE YOU TESTIFIED IN REGULATORY PROCEEDINGS OF OTHER STATES' PUBLIC UTILITY COMMISSIONS?

A. Yes. I have sponsored testimony before utility regulators in numerous states, including California, Colorado, Georgia, New Hampshire, New York, North Carolina, Ohio, Pennsylvania and Texas.

II. OVERVIEW AND SUMMARY

Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?

A. The purpose of my direct testimony is to promote consumer control over their data that is collected by RI Energy in order to achieve energy- and cost-saving benefits. This testimony outlines the shortfalls in the Company's Advanced Metering Functionality ("AMF") Business Case as it relates to Green Button Connect ("GBC"), the Home Area Network ("HAN") and Distributed Intelligence ("DI"). It seeks to provide the Commission

with the tools and knowledge necessary to ensure a level playing field between Rhode Island Energy ("RI Energy" or the "Company") and customer-authorized energy management firms as it relates to the novel digital services provided by advanced meters.

Q. PLEASE DESCRIBE HOW YOUR TESTIMONY IS ORGANIZED.

A. My testimony is organized as follows:

Section II provides a summary of the purpose of this testimony along with my recommendations;

Section III(A) contains my analysis regarding Green Button Connect;

Section III(B) contains my analysis regarding the Home Area Network;

Section III(D) contains my analysis regarding Distributed Intelligence capabilities; and

Section IV contains my conclusion.

Q. PLEASE SUMMARIZE YOUR RECOMMENDATIONS.

A. First, regarding Green Button Connect, I recommend that the Commission make its AMF approval contingent upon (i) a complete data set, (ii) periodic independent certification of RI Energy's GBC implementation, and (iii) participation in regional data sharing platforms so that ratepayers benefit from economies of scale. I also recommend (iv) small increases to GBC spending to account for ongoing support costs and (v) that the Commission, not RI Energy, establish the terms and conditions between RI Energy and customer-authorized data recipients.

Second, regarding the HAN capabilities of advanced meters, I recommend that the Commission make its AMF approval contingent upon: (i) RI Energy being required to adhere to non-discrimination and equal access principles as it relates to customer HAN devices; (ii) cost recovery for the portion of HAN hardware and software being delayed until the time at which the HAN functionality is actually usable by customers; (iii) periodic certification of the IEEE2030.5 standard; and (iv) support of what I refer to as "direct upload" capability that allows customers to have their energy data transmitted directly from their meter to any energy management service selected by a customer via the customer's home or business Wi-Fi network.

Third, regarding DI capabilities, I recommend that the Commission make its AMF approval contingent upon (i) adherence to fair competition principles and contractual terms; (ii) the ability of customers to have any DI software application ("DI App") loaded onto their meter; and (iii) the recognition that customers own, and should have full control over, any insights derived about their electric usage patterns from ratepayer-funded DI capabilities.

III. DISCUSSION

A. INTRODUCTION

Q. WHAT IS DATA PORTABILITY?

A. Data portability is defined as the ability for a consumer to share their data easily and electronically from an incumbent business to another entity. It is a policy that facilitates competition in various digital markets including social media, banking,

healthcare and energy. It prevents consumers from being "locked in" with a certain provider simply because the incumbent provider makes it difficult for personal data to be exchanged.

Q. DOES DATA PORTABILITY EXIST IN OTHER INDUSTRIES TODAY?

A. Yes. In social media, the major tech companies have created the Data Transfer Initiative which allows for personal photos, contacts, and online posts to be transferred seamlessly between Google, Facebook, Apple, Microsoft and Twitter.[2] In banking, financial institutions in the U.S. and other countries such as the United Kingdom, Europe and Australia have established data-sharing standards known as "Open Banking" by which a customer can transfer their balance or transaction data from one bank to another financial institution in order to shop for lower interest rates or access budgeting or holistic financial management software tools.[3] In healthcare, customers can easily download their health records from disparate clinics and hospital networks onto their mobile device using a common data standard and can share their medical records with other providers such as specialists or pharmacies that may offer second opinions on medical diagnoses or lower prescription drug prices.[4]

[2] See Data Transfer Initiative, https://dtinit.org/. Provided to indicate principle has been adopted by major software companies.

[3] See Open Banking, https://www.openbanking.org.uk/. Provided to indicate the broad application of principles in the financial industry.

[4] See HealthIT.gov, https://www.healthit.gov/topic/standards-technology/standards/fhir-fact-sheets. Provided to indicate the broad application of principles in healthcare industry.

Q. HAS DATA PORTABILITY BEEN DISCUSSED AT THE FEDERAL LEVEL AS A POLICY SOLUTION FOR VARIOUS DIGITAL MARKETS?

A. Yes, there are several federal efforts underway relating to personal data about consumers. The U.S. Consumer Financial Protection Bureau has a rulemaking underway addressing data portability in the banking sector, pursuant to Section 1033 of the Dodd-Frank Wall Street Reform and Consumer Protection Act.[5] Another example is that the U.S. House of Representatives Subcommittee on Anti-Trust, Commercial and Administrative Law published a report in July 2022 called "Investigation of Competition in Digital Markets," recommending that lawmakers consider data portability in markets as varied as e-commerce, social media, and smartphones, stating:

> Data portability is also a remedy for high costs associated with leaving a dominant platform. These costs present another barrier to entry for competitors and a barrier to exit for consumers. Dominant platforms can maintain market power in part because consumers experience significant frictions when moving to a new product. Users contribute data to a platform, for example, but can find it hard to migrate that data to a rival platform. The difficulty of switching tends to keep users on incumbent platforms.[6]

[5] Bureau of Consumer Financial Protection. Consumer Access to Financial Records. Proposed Rule, 85 FR 71003 (Docket No. CFPB-2020-0034). November 6, 2020. Available at https://www.govinfo.gov/content/pkg/FR-2020-11-06/pdf/2020-23723.pdf.

[6] House of Representatives Subcommittee on Antitrust, Commercial and Administrative Law, Investigation of Competition in Digital Markets: Majority Staff Report and Recommendations. Part 1 at 326. Available at https://www.govinfo.gov/content/pkg/CPRT-117HPRT47832/pdf/CPRT-117HPRT47832.pdf.

Q. WHAT IS THE ANALOG OF DATA PORTABILITY TO RI ENERGY'S AMF PROPOSAL?

A. Energy data portability is achieved by establishing secure, permission-based sharing mechanisms in two different domains: (1) Personal electricity data (and insights) collected by RI Energy's back-office systems and (2) that available directly off the meter. Below, I discuss Green Button Connect, which facilitates sharing of personal data collected in RI Energy's back-office systems, and the Home Area Network and Distributed Intelligence capabilities, which facilitate sharing of personal data directly from the meter to customer devices or customer-selected cloud-based services.

Q. WHAT IS THE BENEFIT TO RHODE ISLAND RATEPAYERS OF DATA PORTABILITY?

A. The opportunity for consumers to save energy and save money with smart meter data is based in part on advances in computational capability that did not exist a decade ago. With energy efficiency efforts, one fundamental problem has been the expense of evaluating how much a home or building is wasting energy as compared to a standard or "efficient" building and identifying appropriate steps needed to reduce that waste. In the industrial and large commercial sectors, the amounts of energy consumed are large enough to justify significant investments in customer-owned submeters and information technology systems to analyze energy use (even though those investments are often unnecessary in theory because the utility's advanced meters collect the same information). However, in the residential sector, loads are much smaller and more diverse, meaning that efficiency solutions that depend on usage data have been

severely limited up until recently because a multi-hundred-dollar cost per home in metering equipment, communications systems and installation is necessary when advanced meter data are not easily accessible.

A real opportunity in the residential sector is the availability of continuous energy usage information in a secure, standard electronic format made available by AMF. Energy usage patterns vary greatly across households; very few homes are alike. A detailed analysis of each home's use opens the door to tailored and highly effective strategies for managing energy use and helping consumers save money. Research and experience in other states shows that energy conservation solutions that use granular and real-time data generate bill savings more effectively and, in many instances, can cost ratepayers significantly less than traditional energy efficiency programs. In addition, increasing competition can reduce costs to consumers and expand choices for energy-saving products.

B. GREEN BUTTON CONNECT

Q. WHAT IS GREEN BUTTON CONNECT?

A. Green Button Connect ("GBC") is a national technical standard for exchanging energy usage, billing, account, and other customer information with customer-authorized third parties. With GBC, a utility hosts an automated web service through which developers of energy management software can, with customer authorization, automatically and securely retrieve meter data in their software. GBC is also known by its technical name, the Energy Services Provider Interface, published by the North American Energy Standards Board.

Q. WHAT IS RI ENERGY'S PLAN FOR GBC?

A. RI Energy states that it will be provide GBC as part of its "integrated Customer Experience ('CX') omni-channel portal."[7] The Company provides an example of the electric usage data that can be provided to third parties via GBC.[8] RI Energy proposes to spend $664,000 on GBC through September 2026[9] and states that "AMF will animate the market for third-party products and services by enabling customers to share energy usage information with authorized entities."[10]

Q. IS RI ENERGY'S GBC PLAN ADEQUATE IN YOUR VIEW?

A. No. In discovery, RI Energy did not provide satisfactory answers to basic queries about GBC features and operations. For example, when asked what types of data would be available via GBC, the Company could not answer, stating that "The Company has not yet determined all the details required to complete the attached spreadsheet for the design of Green Button Connect."[11] When asked which particular functions contained within the GBC technical standard that RI Energy intends to support, RI Energy could not answer, stating "It is too early in the process for Rhode Island Energy to have determined the Function Blocks that it will implement."[12] When asked if RI

[7] RI Energy. Advanced Metering Functionality Business Case. Schedule PJW/WR-1 at 96.

[8] Id. at 64.

[9] PUC 1-11.

[10] Testimony of Philip Walnock and Wanda Reder. AMF Book 1 at 55:8-9.

[11] MDC 1-4(a).

[12] MDC 1-4(g).

Energy has any quantitative targets by which it will evaluate the success or failure of "market animation," the Company said no.[13] When asked what terms and conditions will apply to data recipients, the Company said it has not determined the requirements and that it will determine eligibility requirements at a later date.[14] When asked whether it would attain independent certification of its GBC implementation to demonstrate adherence to the technical standard, the Company declined to make any such commitment.[15] Finally, the Company stated that natural gas data will not be included, despite electronic access to natural gas usage data being essential to Rhode Island's administration of $32 million in federal energy efficiency funding for homes under the Inflation Reduction Act, as further explained below.[16]

Q. WHAT IS YOUR OVERALL ASSESSMENT OF RI ENERGY'S GBC PLAN?

A. RI Energy is ill-prepared. Its GBC plan lacks key elements that are essential to a successful GBC implementation. While the Company claims it will "animate the market" for customer-authorized energy management services, these claims are unsubstantiated. For example, the Company admits it "has not conducted any formal interviews, research or surveys of third parties to inform proposed [GBC]

[13] "No, the Company has not established any quantitative targets due to unknowns in the marketplace currently." MDC1-10(a).

[14] "The Company has not yet determined specific access eligibility for the Rhode Island Energy Supplier Portal…The Company will determine specific access eligibility as part of the detailed design phase for AMF implementation." MDC1-2(a).

[15] "The Company has not yet determined all the details for the design of GBC. The Company plans to review all options available with respect to certification." MDC1-4(b).

[16] "At this time, there are no plans to include natural gas usage data via GBC." MDC1-4(e).

functionality…"[17] Based on my experience, it is very likely that, without improvement, RI Energy's GBC implementation will be an unsuccessful and fruitless expenditure of ratepayer funds and administrative effort.

Q. IS IT "TOO EARLY IN THE PROCESS" TO FOLLOW YOUR RECOMMENDATIONS AT THIS TIME?

A. No. Not only is it reasonable to consider my recommendations now – before information technology systems are procured and installed – but lessons learned from other states clearly indicate that failure to address the shortfalls I have identified could result in time-consuming delays and costly re-builds of RI Energy's GBC system to be successful.

For example, the California Commission mandated GBC in 2013,[18] but due in part to the lack of specificity in the initial order with regard to data types (other than kilowatt-hour readings), technical problems, and lack of standards compliance, the GBC systems needed to be re-worked at an additional cost to ratepayers of $12 million.[19] Another example is from Illinois. In 2017, the Illinois Commerce Commission approved GBC implementation without identifying the particular functions of the technical standard it wished to see. Commonwealth Edison's ("ComEd") resulting GBC implementation is widely seen as being a failure, in part because ComEd avoided scrutiny over the years

[17] MDC1-10(d).

[18] California Public Utilities Commission. Decision D.13-09-025. Issued September 23, 2013. Available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M077/K191/77191980.PDF.

[19] California Public Utilities Commission. Resolution E-4868. Issued August 25, 2017. Available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M194/K746/194746364.PDF.

as a result of the lack of specific functional requirements. In 2018, ComEd stated that only three (3) third parties had been able to register and only 218 customers (out of approximately 4 million) had ever shared their data via GBC.[20] Personal communication with two energy management companies indicated that they were unable to use ComEd's GBC system because it was inoperable and suffered from poor documentation and lack of standardization. In addition, ComEd's GBC system provides only kWh interval usage data (similar to RI Energy's proposal), and the lack of a complete data set meant it was impossible for multi-site customers to effectively use GBC because premise addresses are not available to help distinguish the location where energy was consumed. In 2023, six years after an unsuccessful implementation, the Illinois Commission established a working group to identify and remedy problems with ComEd's GBC.[21]

The above examples of problems and disappointing utilization contrast with a small California-based Community Choice Aggregator ("CCA") called Silicon Valley Clean Energy. This CCA has seen over 150 registered third parties for its GBC platform. Despite being a small CCA with approximately 270,000 customers, over 400 gigawatt-hours worth of energy-related data (including well-defined billing and account data) has been successfully shared.[22] The CCA's implementation vendor offers clear technical

[20] ComEd response to data requests dated August 7, 2018 in Illinois Commerce Commission Docket No. 17-0123.

[21] See Illinois Commerce Commission. Data Access Working Group. https://icc.illinois.gov/programs/Data-Access-Working-Group. Provided to demonstrate the limited remedy available after six years of contested proceedings.

[22] UtilityAPI Inc. Presentation to Illinois Data Access Working Group. March 22, 2023. Available at https://icc.illinois.gov/downloads/public/DAWG/utility-api-presentation-slides-meeting-1.pdf.

documentation outlining the specific GBC functions it supports, known as "function blocks."[23] It also supports comprehensive billing line item data and account information such as account number and service address, which are defined in part by function blocks #16 and #51 of the GBC technical standard.[24] The fact that RI Energy cannot address function blocks; define criteria for success; or state whether it will achieve independent certification adhering to the technical standard does not instill confidence that GBC will be successful in Rhode Island.

Finally, in my experience as a former software executive, it is always cheaper and more advantageous to establish a complete set of software requirements up front, rather than attempt fixes through a "change order" process after information technology systems have been deployed. The Commission's ability to exercise oversight over GBC functionality and achieve the lowest cost GBC implementation will become more limited in the future once there are sunk costs.

Q. WHAT IS YOUR FIRST RECOMMENDATION REGARDING GBC?

A. The Commission should specify that RI Energy must provide, in a format consistent with the GBC standard, a complete dataset consisting of: (a) at least 24 months of all energy usage data collected by a meter that a utility maintains as part of its regular records in the ordinary course of business, including kilowatt-hours used, load profile, and, where applicable to certain rate classes, kilo-volt-amps, kilo-volt-

[23] UtilityAPI, Inc. Green Button Authorization Scope. https://utilityapi.com/docs/greenbutton/scope#function-blocks.

[24] Id.

amperes-reactive, power factor, and the like; (b) all customer-specific information including customer name, mailing address, premise address, any contact information, payment history, account number(s), bill PDFs and all information on bills including, but not limited to, line item charges and charge descriptions, amounts billed, the rate or tariff applicable to the account or meter, billing cycle dates, etc., going back 24 months; (c) any information that might be necessary for participation in, or to determine customer eligibility for, bill payment assistance, renewable energy, demand-side management, load management, or energy efficiency programs; and (d) if RI Energy deploys meters with Distributed Intelligence (further described below), the power, voltage, current, or other aspects of electric energy, at whatever granularity or frequency it is sampled and analyzable by the meter, including any estimates or inferences calculated therefrom that pertain to or reflect the characteristics of an individual customer's use of electric energy.

Q. WHY DO YOU RECOMMEND THIS SET OF INFORMATION?

A. Over the past decade, in my experience as a software entrepreneur, leading Mission:data, and working with our members in the industry, the information above has been shown to be very important to a wide variety of distributed energy resources ("DERs"). For example, many energy efficiency applications require historic monthly bills through at least two "heating seasons" to accurately assess energy savings after some retrofit has occurred. 24 months at minimum ensures that seasonal and meteorological effects can be properly accounted for. In the case of demand response, participating in wholesale markets requires certain customer-specific information that only the utility has, such as peak load contribution. Neglecting to include such information in GBC

unnecessarily constrains the value of AMF to ratepayers and reduces the number of energy management offerings available to Rhode Islanders. Regarding bill history, without standardized, machine-readable access to historical billing data, customers will not be able to access new services that depend upon streamlined, zero-cost electronic accessibility, including, but not limited to: cost analysis software, automated bill audits that search for overcharges, financial benchmarking services against peers, and even certain financial products that allow customers to borrow money for efficiency improvements. It will also be difficult for customers to know whether investments they have made in energy efficiency are returning value if authorized vendors cannot easily access their customers' bills.

Q. CAN NATURAL GAS DATA BE INCORPORATED INTO GBC EVEN IF RI ENERGY DOES NOT HAVE ADVANCED GAS METERS?

A. Yes, the GBC standard can accommodate natural gas usage readings of any time period, including, but not limited to, monthly, bi-monthly and quarterly meter readings. Advanced metering for gas is not a requirement for the inclusion of natural gas data into GBC.

Q. WHY IS IT IMPORTANT TO SPECIFY NOW THE TYPES OF DATA AVAILABLE THROUGH GBC?

A. The design of information technology ("IT") systems is especially important at an early phase because different pieces of customer data ranging from usage data to bill history to account numbers are typically stored in different IT systems. Once the initial deployment of RI Energy's new customer information system and GBC system is done,

RI Energy's vendors gain considerable pricing power over change requests because the cost to replace an entire system is prohibitive.

Q. WHY IS THE INCLUSION OF NATURAL GAS DATA IN GBC IMPORTANT?

A. Under the Inflation Reduction Act ("IRA"), the United States Department of Energy ("DOE") has allocated $32 million to Rhode Island for the Home Energy Performance-Based, Whole-House Rebate program ("HOMES").[25] The IRA specifies that rebates for energy efficiency must be paid according to one of two calculation methods, known as modeled or measured approaches. In the modeled approach, the total energy usage of the home – including electricity, natural gas, propane, etc. – must be calibrated against at least 12 months of historical utility bills. With the measured approach, states must use open-source advanced measurement and verification software for determining the monthly and hourly (if available) weather-normalized energy use of a home before and after the implementation of a home energy efficiency retrofit.[26] Regardless of the method used, natural gas data needs to be easily accessible. Without a streamlined, electronic method for contractors and the state of Rhode Island to access electricity and natural gas data, it will be very inefficient and unnecessarily costly for Rhode Island to administer the HOMES funds.

Q. WHAT IS YOUR SECOND RECOMMENDATION REGARDING GBC?

[25] Department of Energy. Biden-Harris Administration Announces State and Tribe Allocations for Home Energy Rebate Program. November 2, 2022. Available at https://www.energy.gov/articles/biden-harris-administration-announces-state-and-tribe-allocations-home-energy-rebate

[26] Inflation Reduction Act § 50121(b)(1) and (2), 42 U.S.C. 18795 (2022).

A. The Commission should require that RI Energy deliver annual proof of independent certification to demonstrate its ongoing adherence to the GBC technical standard.

Q. WHAT IS CERTIFICATION?

A. The non-profit Green Button Alliance currently administers certification. It is common for technical standards to be evaluated by an independent testing organization to ensure reliability. For example, Wi-Fi and Bluetooth component manufacturers routinely have their products independently tested so that consumers can be assured that their device will work across widespread geographic areas.[27]

Q. WHAT DID RI ENERGY STATE REGARDING WHETHER IT WOULD SEEK CERTIFICATION?

A. In discovery, the Company would not commit to attaining certification. It stated, "The Company has not yet determined all the details for the design of GBC. The Company plans to review all options available with respect to certification."[28]

Q. WHY IS A CERTIFICATION REQUIREMENT NECESSARY?

A. Certification is necessary because it helps ensure interoperability between Rhode Island and customer-authorized data recipients. One of the key lessons learned from California's and New York's GBC implementations is that, despite claims by utilities that they follow the GBC standard, the truth is that each one is somewhat unique. Neither

[27] See Wi-Fi Alliance, https://www.wi-fi.org/certification. Provided to demonstrate the widespread testing of standards.

[28] MDC1-4(b).

Pacific Gas & Electric's, Southern California Edison's, San Diego Gas & Electric's or Consolidated Edison's GBC implementation has been certified by the Green Button Alliance as compliant. The result is that third parties must develop bespoke software for each utility, undermining the central purpose of technical standards. Although there are similarities among existing GBC platforms, the differences are large enough that third parties incur significant and unnecessary costs to accommodate each utility's technical idiosyncrasies.

I also note that certification is valuable for the Commission's oversight functions. Instead of relying on a utility's claims – and spending Commission time and resources adjudicating third parties' counter-claims that the GBC platform doesn't adhere to the GBC standard – the Commission can efficiently and effectively ensure accountability of RI Energy's implementation of GBC by requiring annual proof of certification.

In addition, by requiring GBC certification, Rhode Island customers would have access to a broader range of cost-effective DER products and services. This is because the barriers to market entry in Rhode Island would be reduced because of standardization. As a small jurisdiction with a small addressable market, innovative firms such as Google/Nest or SunRun or Tesla are unlikely to invest the capital necessary to develop Rhode Island-specific products.

Q. HOW MUCH DOES CERTIFICATION COST?

A. $3,200, according to the Green Button Alliance.[29]

[29] Green Button Alliance, https://www.greenbuttonalliance.org/testing.

Q. WHAT IS YOUR THIRD RECOMMENDATION REGARDING GBC?

A. The Commission should require RI Energy to participate in regional data sharing platforms currently underway in New York and New Hampshire so that ratepayers benefit from economies of scale.

Q. WHAT ARE REGIONAL DATA PLATFORMS?

A. Texas, New York and New Hampshire have policies establishing state-wide systems for customers to share their energy usage and billing data with third parties through a single application programming interface ("API"). These data platforms simplify the process for consumers to grant a data-sharing authorization regardless of where they live in each state. Smart Meter Texas ("SMT") was established in the early 2010s so that retail energy providers and other third parties could operate consistently throughout the four transmission and distribution utilities' service areas.[30] Rather than each retail energy provider or third party interacting with each utility's IT systems, SMT provides a unified gateway and set of APIs for accessing over 8 million customers' 15-minute electric usage data.[31] In New York, the Public Service Commission has required the state's investor-owned electric and natural gas utilities to coordinate with the New York State Energy Research and Development Authority ("NYSERDA") to create the integrated energy data resource ("IEDR"), a single, state-wide data platform that will, among other things, provide a "one stop shop" for energy management firms to access

[30] Mary Zientara, Ben Rankin, Rick Wornat. Understanding Smart Meter Texas. November 2, 2016. Available at https://www.ercot.com/files/docs/2016/11/30/FINAL_Understanding_Smart_Meter_Texas.pdf.

[31] Id.

their customers' data held by utilities with customer consent.[32] NYSERDA has contracted with vendors to build the IEDR, and consent-based data exchanges are anticipated to be released within the next year. In New Hampshire, the Public Utilities Commission has approved a comprehensive settlement agreement that calls for the creation of a state-wide, multi-use, electricity, and natural gas data platform, according to a consistent data model and GBC certification by the Green Button Alliance.[33] New Hampshire stakeholders, including Mission:data and the state's utilities, are currently developing a request for proposals which will be issued within the next year.

Q. WHAT ARE THE BENEFITS TO RHODE ISLAND RATEPAYERS OF RI ENERGY PARTICIPATING IN A REGIONAL DATA PLATFORM?

A. There are several efficiencies that add value to ratepayers. First, third parties will experience significant reduction in administrative costs and software development and maintenance costs because of centralizing the APIs. The result is very likely to be greater energy management choices for customers in Rhode Island. Greater competition typically results in reduced prices. Second, the administration of third parties – registering them with the platform, exchanging secure communications, and the like – would be streamlined. A third party who has successfully registered in New

[32] New York Public Service Commission. Order Implementing an Integrated Energy Data Resource. Case No. 20-M-0082. February 11, 2021. Available at https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={3CDC0522-7F50-49E1-A053-EA236B3DED10}.

[33] New Hampshire Public Utilities Commission. Order No. 26,589. Docket No. DE 19-197. March 2, 2022. Available at https://www.puc.nh.gov/Regulatory/Orders/2022orders/Documents/26-589.pdf.

York could simply click a button to apply to register in Rhode Island, simplifying the process for both third parties and RI Energy.

Q. WOULD RI ENERGY BE REQUIRED TO HAND OVER SENSITIVE CUSTOMER DATA TO ANOTHER ENTITY IN ORDER TO PARTICIPATE IN A REGIONAL DATA PLATFORM?

A. No. According to the New Hampshire system design, each utility maintains control over its own IT systems. In New Hampshire's design, a centralized, cloud-based service – known as the Platform Hub – does not store customer data but rather relays requests from authorized third parties to the appropriate utility. This design was acceptable to the New Hampshire utilities because the data transit through, but does not persist at, the Platform Hub. I further note that New Hampshire's centralized Platform Hub design is an improvement over SMT, which duplicates each utility's data in a centralized database. Not only is such duplication unnecessary and obsolete with today's technology, but it also creates uncertainty about which database is the official "source of truth," introducing inefficiencies associated with synchronization.

Q. WHAT IS YOUR FOURTH RECOMMENDATION?

A. The Commission should authorize modest increases to GBC operations and maintenance spending to account for ongoing support costs.

Q. WHY IS THAT NECESSARY?

A. It appears that RI Energy has no budget allocated to ongoing support costs of GBC. In discovery, the Company stated that its GBC budget is $664,000, and this is noted as a capital expense under FERC account 303, "Miscellaneous intangible

plant."[34] While that amount may be appropriate for the asset purchase, in my experience, it is both expected and desirable that some amount of RI Energy staff time will be necessary to troubleshoot and administer the GBC platform. It serves ratepayers' interests for RI Energy staff to be responsive to technical support requests from third parties who may experience GBC system outages, glitches, error messages, and the like when interacting with GBC because ratepayers have an interest in the $664,000 GBC asset performing properly. My understanding is that user support and administration costs are generally treated as operations and maintenance costs, whereas bug-fixing and improvements to software assets are capitalized.

Q. WHAT BUDGET FOR ONGOING SUPPORT COSTS OF GBC DO YOU RECOMMEND?

A. While I do not have an exact figure, I estimate $400,000 per year to cover staff time and expenses associated with (i) administering third party registrations, (ii) communicating scheduled and unscheduled outages to registered third parties, (iii) coordinating with regional utilities on the operation of the Platform Hub, (iv) managing the GBA testing and certification process, (v) managing version control issues as improvements are made to GBC over time and (vi) handling support requests and bug reports from registered third parties. This amount would cover approximately three full-time employees, or equivalent expenses if outsourced, to ensure that the GBC platform meets or exceeds reasonable expectations.

Q. WHAT IS YOUR FOURTH RECOMMENDATION?

[34] Attachment PUC 1-11.

A. The Commission, not RI Energy, should establish the terms and conditions between RI Energy and customer-authorized data recipients. The Commission should expressly prohibit RI Energy from imposing any term or condition on customer-authorized data recipients that is not approved in advance by the Commission.

Q. WHY IS THIS NECESSARY?

A. Limiting the power of the utility monopoly is a lesson learned from other states, such as California, Illinois and New York where the lack of direction from state regulators regarding the terms of use led to utilities introducing terms without commission oversight that were unfair, onerous or in conflict with commission orders. In my view, the Commission should consider the terms and conditions, rather then delegating authority to RI Energy. Just as the Commission defines the boundaries of monopoly services in telecommunications, or specifies under what conditions a rooftop solar array may interconnect with the distribution grid, the Commission must similarly define the terms of "digital interconnection" as between monopoly utilities and third parties accessing the platform. The foreseeable result of a failure to consider terms will be delays, unnecessary litigation and business uncertainty for third parties. Utilization of GBC is essential to achieving state energy efficiency and climate goals.

In California, the commission approved tariffed services for each utility's GBC platform. However, despite terms and conditions being codified in tariffs, each utility then introduced their own terms and conditions, on top of the tariff, without commission approval.[35] These terms and conditions require third parties to divulge sensitive and

[35] See Pacific Gas and Electric Company. Share My Data Platform Terms and Conditions. Available at https://www.pge.com/includes/docs/pdfs/myhome/addservices/moreservices/sharemydata/ShareMyData_

proprietary business information to utilities without good cause; permit utilities to unilaterally modify the terms at any time and without notice; and even permit utilities to terminate a third party's access at the whim of a utility without cause, in clear conflict with commission orders. One California utility quietly imposed new terms for all third parties over the Christmas holiday in 2019, with third parties coming back from vacation to discover that they were now subject to new terms that, among things, required an unlimited indemnity of the utility, even if the utility had acted negligently.

In Illinois, ComEd also has a tariffed service for its GBC platform. However, ComEd then required, without commission approval, third parties to sign a non-disclosure agreement. The non-disclosure agreement was overly strict and conflicted with the applicable tariff because it prevented third parties from using a contracted IT vendor to interact with the utility's GBC platform on the third party's behalf. Strict non-disclosure agreements can contravene the intentions of customers by prohibiting the sharing of information with third parties who use IT outsourcing, regardless of whether the third party and IT vendor have reasonable safeguards against privacy and security breaches.[36]

In New York, several years after its commission required GBC, the utilities unilaterally imposed a 15+ page set of terms and conditions on third parties. The terms,

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Platform_TermsofUse.pdf. Southern California Edison. Green Button – Third Party Connection. Registration example available at https://www.sce.com/partners/partnerships/thirdpartylandingpage. San Diego Gas and Electric. Using Green Button Connect. Registration page available at https://www.sdge.com/green-button/using-green-button-connect-my-data-developers.

[36] Mission:data Coalition. Scoping Comments. Provided to the New Hampshire Public Utilities Commission. Docket No. DE 19-197. March 11, 2020 at 16-17. Available at https://www.puc.nh.gov/Regulatory/Docketbk/2019/19-197/LETTERS-MEMOS-TARIFFS/19-197_2020-03-11_MISSION_SCOPING_COMMENTS.PDF.

which conflicted with commission orders, imposed anti-competitive provisions such as prohibiting third parties from making "derivations" of data, essentially handcuffing third parties in the development of innovative data-driven energy management solutions.[37] After two years of litigation, the terms and conditions were eventually modified and approved by the commission.[38]

C. HOME AREA NETWORK

Q. WHAT IS THE HOME AREA NETWORK?

A. The Home Area Network ("HAN") is a communications network within the customer's home or business that facilitates communication between the advanced electric meter with customer-owned devices, such as energy management systems, thermostats, home security systems, smart appliances or energy display devices.

Q. WHAT ARE THE CUSTOMER BENEFITS OF THE HOME AREA NETWORK?

A. A well-functioning HAN provides many customer benefits that revolve around the real-time provision of energy usage information to any device, or any Internet service, that a customer wishes to use. For example, appliances in the home could receive real-time usage data and modify their energy consumption to reduce costs, or customers

[37] Mission:data Coalition. Response to Commission Solicitation for Comments. Provided to New York Public Service Commission. Docket Nos. 18-M-0376, 18-M-0084, 16-M-0411 and 15-M-0180. April 30, 2019 at 12-13. Available at https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={1CF69884-458F-47E3-8B67-852BBF45D8F7}.

[38] New York Public Service Commission. Order Establishing Minimum Cybersecurity and Privacy Protections and Making Other Findings. Docket No. 18-M-0376. October 17, 2019. Available at https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={67FED85B-7A21-43AE-88D6-6633BFE66F24}.

could diagnose “energy hogs” in their home by turning on and off devices or appliances. Customers can access a smartphone application to immediately comprehend the magnitude of each device’s power draw. As a result of the Company’s potential decision to purchase DI-capable meters, it is also possible that information about what rate the customer is on, and granular information such as one-second or sub-second current, voltage, power and disaggregated energy loads, could be transmitted to devices in the home over Wi-Fi, or to Internet services designated by the customer. This type of information helps customers with bill savings from reduced energy usage, and information to support shifting load to optimal time-of-use rate periods.

Q. WHAT IS IEEE2030.5?

A. IEEE2030.5 is an open, non-proprietary communications protocol for exchanging energy information and controlling energy-consuming devices or appliances. It can operate over Wi-Fi or other communication mediums that support Internet protocols. Any software developer or device manufacturer can incorporate IEEE2030.5 into its product. IEEE2030.5 is perhaps best known in California where it is required to be implemented in so-called “smart inverters” for new rooftop solar interconnections; however, its functionality is not limited to photovoltaic systems, as evidenced by major meter manufacturers and electric utilities beginning to use IEEE2030.5 to securely broadcast 1-second kWh usage data from advanced meters to in-home devices.

Q. WHAT TYPES OF ENERGY DATA ARE AVAILABLE FROM THE WIFI HAN IN THE COMPANY’S PROPOSAL?

A. The Company states the HAN will provide "near-real-time data"[39] and "timely, granular energy usage information for all customers classes."[40]

Q. WHAT DEVICE TYPES OR DEVICE REQUIREMENTS WILL THE COMPANY REQUIRE WITH REGARD TO HAN?

A. The Company does not specify, stating:

> The details around the types of devices to be included have not been determined yet… The Company needs to conduct an analysis of the impacts of connecting a device by Wi-Fi, as well as the types of devices in the market, before it can specify the types if [*sic*] devices to include.[41]

Q. WHAT IS "BRING YOUR OWN DEVICE" (BYOD)?

A. "Bring your own device" ("BYOD") is the idea that a customer can purchase their own device and connect it to their meter's HAN. In this case, "connecting" or "pairing" a device means the process by which a device can securely acquire energy-related information in real-time from the meter. BYOD is contrasted with a closed, rather than open, system design in which only the utility's hand-picked devices are allowed to connect to a meter's HAN.

Q. DOES THE COMPANY COMMIT TO BRING YOUR OWN DEVICE?

A. No. The Company declines to commit to BYOD, stating that RI Energy "will follow its Cybersecurity, Data Privacy and Data Governance Plan….which provides provisions

[39] RI Energy. Advanced Metering Functionality Business Case. Schedule PJW/WR-1 at 37.

[40] Id at 44.

[41] MDC1-5(b).

to making data accessible while keeping it secure and maintaining customers' privacy."[42]

Q. WHAT IS THE COMPANY'S CYBERSECURITY, DATA PRIVACY AND DATA GOVERNANCE PLAN?

A. The plan appears to be an 8-page PowerPoint presentation that outlines generic principles such as "Develop best practices for effective data management and protection," aspirations such as "Ensure that a data trail is effectively documented" and unfinished suggestions such as "DRAFT – Data Privacy Review Categories."[43]

Q. IS THE COMPANY'S HAN PLAN ADEQUATE IN YOUR VIEW?

A. No, it is wholly inadequate. The Company's HAN plan is essentially "trust us to figure it out later." This is problematic because, in my experience in other states, utilities have used a vacuum of regulatory oversight to establish harmful HAN policies and practices which diminish customer choice and lock customers into the utility's own HAN services instead of enabling market-based innovation.

Q. PLEASE DESCRIBE THOSE CONCERNS IN DETAIL.

A. For at least a decade, the has been contested by investor-owned utilities across the United States. For example, some utilities have required that HAN devices be tested before they can be used. San Diego Gas & Electric in California states that its HAN device testing process is required: "SDG&E won't be able to connect devices that

[42] MDC 1-5(c).

[43] Attachment MDC 1-10.

haven't successfully passed testing, even if a customer purchased the device."[44] This practice violates the non-discrimination principle of BYOD because RI Energy could raise cybersecurity or other arguments to arbitrarily ban a particular manufacturer or service provider from its territory. For example, the Company could concoct an arduous testing process that would deny solar installers the ability to provide certain real-time information services to their customers. Another example is First Energy in Pennsylvania which provides a HAN connection form that states, "FirstEnergy Companies have the right to disconnect any HAN-enabled device, without notice, in their sole discretion…"[45] Southern California Edison has a similar notice.[46] Unilateral termination of a HAN service would have a chilling effect on energy innovation in Rhode Island because companies would not be confident that their product or service would be free from arbitrary interruption.

In states where BYOD has been abandoned, anti-competitive behaviors have been seen. For instance, some utilities contract with a company called Powerley. Powerley makes a Zigbee-based HAN gateway device called an "energy bridge," along with an accompanying mobile application. Some utilities have contracted with Powerley in order to evade BYOD by either refusing to pair non-Powerley Zigbee devices for

[44] San Diego Gas and Electric. Home Area Network Device Capability Validation. Technical standards available at https://www.sdge.com/residential/home-area-network-device-compatibility-validation.

[45] First Energy Service Company. Request to Connect a Home Area Network (HAN) Device to Your Smart Meter. Form available at https://www.firstenergycorp.com/content/dam/customer/get-help/files/oh-smart-meter/ProvisioningRequestForm.pdf.

[46] Southern California Edison. Home and Business Area Network Device Registration Terms and Conditions. Available at https://www.sce.com/tnc/device-registration. ("SCE may decide, in its sole discretion and without advanced notice, to terminate the connection between your device(s) and the SCE meter")

customers, or diminishing the customer experience of connecting a non-Powerley device so as to make it very difficult to do so.[47] In some jurisdictions, the Powerley energy bridge is shipped to a customer's home and is "plug and play," but non-Powerley devices – if they are supported at all – require customers to complete a more onerous pairing process. The result is that consumers do not have access to the full range of HAN products on the market, particularly those that could save them energy and money. These are the consequences of the lack of BYOD from day one.

Q. ARE THERE EXAMPLES IN OTHER JURISDICTIONS OF FINANCIAL INCENTIVES FOR UTILITIES TO MONOPOLIZE THE HAN MARKET?

A. Yes. DTE Energy in Detroit, Michigan is an investor in Powerley. DTE sells to consumers – or installs for free as part of a demand side management program – its energy bridge. DTE charges $1.99/month for consumers to use the Powerley mobile app, which is branded for DTE as "DTE Insight."[48]

Q. WHAT IS YOUR FIRST RECOMMENDATION REGARDING THE HAN?

A. My first recommendation is that RI Energy should be required to adhere to principles such as non-discrimination and equal access as it relates to customer HAN devices. As long as a HAN device complies with the IEEE2030.5 standard, RI Energy should be obligated to treat all device connection requests from customers equally.

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[47] See Mission:data Coalition. Deactivated: How Electric Utilities Turned Off the Data-Sharing Features of 14 Million Smart Meters. September 2022. Available at http://www.missiondata.io/s/Deactivated_white_paper.pdf.

[48] DTE Energy. Offer to purchase app available at https://www.dteenergy.com/us/en/insight/insight-app.html.

Q. PLEASE DESCRIBE THE COMPONENTS OF THIS RECOMMENDATION.

A. First, non-discrimination incorporates BYOD. Specifically, the Company should be prohibited from screening, certifying or pre-approving the device that a customer wants to connect to their HAN. This ensures an open marketplace in which any IEEE2030.5-compatible device can be selected by a customer. I note that this approach is similar to telephone handsets and cable modems in the telecommunications industry: any standards-compliant handset or cable modem can be attached to the network, and the monopoly must honor that request.[49]

Second, equal access means that the customer experience should be the same, regardless of the device maker or RI Energy's business relationship with the device maker. Without an equal access requirement, customer experiences could be designed to be unequal. RI Energy could make it extremely easy for customers to use its mobile application by connecting the mobile application to the meter in the fewest number of steps, while adding steps and additional manual effort for other devices. One example is that RI Energy could make it easy to connect an electric vehicle (EV) charger to the meter only if RI Energy has the ability to control the EV load. Customers who did not want to grant RI Energy a control capability could, without Commission oversight, be

[49] See. Hush-A-Phone v. United States, 238 F.2d 266 (D.C. Cir. 1956); Federal Communications Commission Carterfone decision (13 F.C.C.2d 420); 47 U.S.C. § 629 ("The [Federal Communications] Commission shall…adopt regulations to assure the commercial availability, to consumers of multichannel video programming and other services offered over multichannel video programming systems, of converter boxes, interactive communications equipment, and other equipment used by consumers to access multichannel video programming and other services offered over multichannel video programming systems, *from manufacturers, retailers, and other vendors not affiliated with any multichannel video programming distributor*…" (emphasis added)).

shunted to a more complex, multi-step process for their EV charger as a prerequisite for interacting with their own real-time usage data.

Q. WHAT ARE THE BENEFITS OF THIS RECOMMENDATION TO CONSUMERS?

A. The benefits of non-discriminatory access to energy data are twofold: fairness and an expanded array of choices for Rhode Island consumers. Selective treatment of HAN devices -- whether through denying connection requests to certain types of devices, establishing discriminatory customer experiences, or other methods – is inherently unfair because ratepayers are funding HAN capabilities of advanced meters. Ratepayers should not be restricted in their choice of types of HAN devices, HAN features, or energy management business models. RI Energy has no rationale as to why they should be able to unilaterally determine which HAN devices and companies are ultimately successful in Rhode Island.

Second, if non-discrimination principles regarding the HAN are not upheld and RI Energy has its thumb on the scale and can “pick winners,” the energy management ecosystem could be winnowed to whichever companies or devices serve the Company’s interests. The Company could easily create a “fast lane” whereby its chosen devices can connect to meters, while every other device is relegated to a “slow lane,” if connectivity is made possible at all. The Company could also impose onerous terms and conditions on HAN device makers, including screening and pre-approval

requirements and the right to unilaterally terminate HAN service at any time, as was done by FirstEnergy in Pennsylvania.[50]

Q. WHAT IS THE COMPANY'S PROPOSAL REGARDING COST RECOVERY OF METERING HARDWARE?

A. The Company states:

> For Meters and related costs, the Company will consider these as placed in service once they have been purchased and sample meter tested for quality. Once the new meters have been tested and determined to satisfy the guidelines, they will be functioning as a customer meter and considered as placed in service in the Company's plant accounting records.[51]

Q. IS THAT APPROPRIATE IN YOUR VIEW?

A. No. Just because a meter has been tested by the Company does not mean it is used and useful for customers, particularly with regard to the HAN. In my experience, utilities that lack a financial incentive to enable HAN functionality immediately following meter installation have delayed HAN enablement, sometimes for several years, and failed to enable HAN for all customers classes such as small business customers. In California, the utilities did not actually enable HAN for several years after meter installation, and the California Public Utilities Commission had to issue multiple orders requiring its regulated utilities to support BYOD because compliance was lacking.[52] In

[50] Supra, Note 45.

[51] PUC 1-9.

[52] Mission:data Coalition. Got Data? The Value of Energy Data Access to Consumers. February 2016, Appendix 2 at 29-30. Available at http://www.missiondata.io/s/Got-Data-value-of-energy-data-access-to-consumers.pdf.

2013, I believe I was the first person in the state of California to attempt to connect a HAN device to a commercial building meter. Despite having deployed advanced meters several years prior, Pacific Gas & Electric was unable to honor my request; while residential meters had received engineering time and attention from the utility, commercial meters had not, and only certain models or "form factors" actually worked for HAN. The utility did not fix the problem until I notified the state legislative committee on utilities and commerce. After that, the utility sent out a crew to replace the non-functional advanced meter with a working one. Permitting cost recovery without BYOD and HAN activation could easily lead to the same results in Rhode Island.

Q. WHAT IS YOUR SECOND RECOMMENDATION REGARDING THE HAN?

A. The Commission should postpone cost recovery for the portion of HAN hardware and software until the time at which the HAN functionality is usable by customers. This aligns incentives so that RI Energy needs to deliver HAN capabilities for ratepayers prior to receiving rate recovery.

Q. WHAT AMOUNT DO YOU PROPOSE?

A. I do not have an exact figure because the Company's cost proposal does not break down the Wi-Fi and HAN components from other elements of the advanced meter and related software purchases. I recommend the Commission hire an independent consultant to conduct a fair value assessment for each meter type. If the Company's vendors provide only bundled cost figures, then the independent consultant could use his or her professional judgment to arrive at a figure based upon the cost of Wi-Fi radio

hardware from manufacturers and Wi-Fi device management software platforms from other utilities or from other industries.

Q. WHAT IS YOUR THIRD RECOMMENDATION REGARDING HAN?

A. The Commission should require RI Energy to attain periodic certification of compliance with the IEEE2030.5 standard.

Q. WHAT IS IEEE2030.5 CERTIFICATION?

A. IEEE2030.5 certification involves running a product through various tests to ensure it is compliant with all aspects of the IEEE2030.5 communication specifications. Various testing firms can, for a fee, provide this testing and certification service.

Q. WHY IS IEEE2030.5 CERTIFICATION NECESSARY IN YOUR VIEW?

A. My concern is that RI Energy could change their IEEE2030.5 software on advanced meters in a major or minor fashion and the changes could significantly disrupt the market. For example, if RI Energy were to update its meters so that it no longer strictly adhered to the IEEE2030.5 standard, all customer-connected HAN devices would be “bricked,” that is, rendered wholly unusable. Avoiding catastrophic business uncertainty for HAN service providers is an important part of making market conditions conducive to energy innovation in Rhode Island.

Q. WHAT ARE THE BENEFITS OF RI ENERGY ATTAINING AND MAINTAINING IEEE2030.5 CERTIFICATION TO RHODE ISLAND?

A. Technological consistency is extremely important to the proper functioning of competitive markets. As IEEE2030.5 products are made by entrepreneurs and

innovators over the coming years, consumers in Rhode Island could experience products that appear to malfunction if the Company does not closely adhere to specifications. Economies of scale in the production of IEEE2030.5 devices can lead to easily interoperability and reduced costs for consumers, but HAN products will only work reliably if the Company is required to periodically verify its compliance with an independent entity.

1. Direct Upload Functionality

Q. PLEASE DESCRIBE YOUR FOURTH RECOMMENDATION REGARDING THE HAN.

A. RI Energy should be required to facilitate the transfer of real-time usage and customer insights to the internet web address, or Uniform Resource Locator ("URL"), of the customer's choice. Specifically, RI Energy should support a simple, customer-friendly authorization process on its customer web portal, using a secure standard known as OAuth 2.0, further described below. Customer usage data, the customer's rate, and insights derived on the meter – such as disaggregation results – will then be sent automatically every few seconds from a customer's Wi-Fi-connected meter to whatever service the customer wants. I refer to this functionality as "direct upload."

Q. PLEASE DESCRIBE HOW THIS WOULD WORK FROM THE CUSTOMER'S PERSPECTIVE.

A. As shown in Figure MEM-1 below, the customer would first create an online account with the third party to whom their data will be directed. In this example, suppose the third party is "Acme Energy Saver" with a web address of AcmeEnergySaver.com.

After creating an account in step one, the customer is told to grant an authorization at the Company's website. In step three, the customer is redirected to the Company's website to authenticate themselves – that is, to establish their identity by logging in. If the customer does not have online credentials established at this point, the customer can do so at this time. After successful authentication, the customer is presented with an authorization screen, which is enlarged in Figure MEM-1. The authorization screen informs the customer about (i) what entity will receive their data, (ii) the types of data and information that will be transmitted, (iii) the meter(s) in their account whose data will be transmitted, (iv) the time period for authorization, and (v) the scope of use, which is a statement written by Acme Energy Saver about how the customer's data will be used.

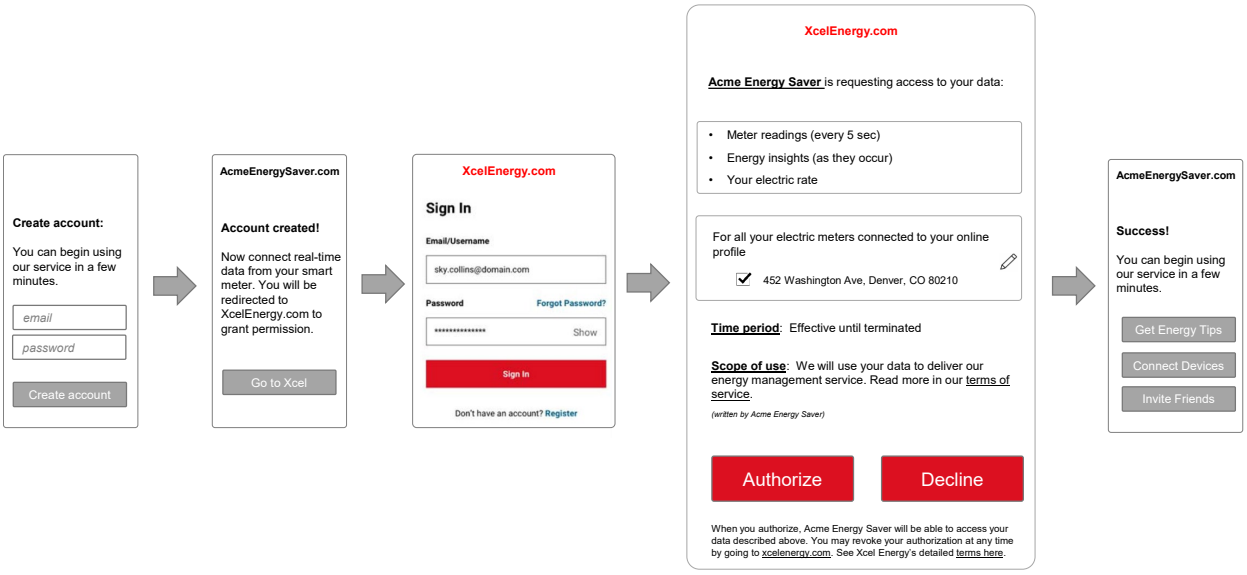


Figure MEM-1: The direct upload customer authorization experience using OAuth 2.0.

Q. WHAT IS OAUTH 2.0?

A. One secure authorization mechanism that is widely used on the Internet is called Open Authorization (OAuth) version 2.0. OAuth v2.0 is defined in detail in the specification known as IETF RFC 6749. OAuth 2.0 is an open standard for access delegation, and is used by many services so that Internet users can grant websites or applications access to their information on other websites without giving them the passwords to those websites. It is used by companies such as Amazon, Google, Facebook, Microsoft, Twitter and many others so users can share information with third-party applications or websites. In addition, OAuth2.0 is incorporated by reference into the GBC standard.[53]

Q. IS OAUTH 2.0 SECURE?

A. Yes. OAuth 2.0 has been used by major companies such as Microsoft, Google, Facebook, LinkedIn, and numerous financial institutions around the world for over a decade. I note that Paypal uses OAuth 2.0 to securely transact billions of dollars of money transfers every month between customers and online retailers.[54]

Q. WHY DO YOU RECOMMEND OAUTH 2.0 AND NOT SOME OTHER METHOD OF GRANTING ELECTRONIC AUTHORIZATION FOR DIRECT UPLOAD?

A. Because, whether customers are aware of it or not, OAuth 2.0 is very widespread on the Internet today and will be familiar to most Internet users. In my experience,

[53] Green Button Alliance. Information page regarding technical standards available at http://greenbuttonalliance.github.io/OpenESPI-GreenButton-API-Documentation/.

[54] PayPal Developer. Authentication. Technical standards available at https://developer.paypal.com/api/rest/authentication/. “PayPal uses REST APIs use OAuth 2.0 access tokens to authenticate requests.”

customers are much more likely to take advantage of a service if it is presented to them in a format and interface with which they are already familiar.

Q. WILL RI ENERGY USE OAUTH 2.0 ON ITS CUSTOMER WEB PORTAL?

A. Yes. Since the Company will be supporting GBC, it automatically has OAuth 2.0 because the GBC standard incorporates OAuth 2.0 by reference. Thus, RI Energy will already be familiar with OAuth 2.0 from a technical and implementation perspective.

Q. IS DIRECT UPLOAD BEING USED BY OTHER METERING SYSTEMS?

A. Yes. As the former CEO of Lucid, an energy management company for commercial buildings, I oversaw the installation of hundreds of Zigbee gateways, submeters and “dataloggers,” or devices that sent energy data to our cloud service via an outgoing internet request. Dataloggers from numerous manufacturers – such as eGauge and Obvius – allow users to set the URL and time interval of the data they want to upload. It is quite common for networked devices – such as submeters or dataloggers – to be configurable to send the energy usage data directly to any URL the customer wants.

Q. WHAT IS THE BENEFIT TO RATEPAYERS OF THIS RECOMMENDATION?

A. The primary benefit is that customers could access real-time energy management services without first needing to purchase a dedicated HAN hardware device. With older meter technologies, customers would need to purchase a Zigbee-based HAN device, which costs approximately $99. The expense of the HAN device is a barrier to customer adoption, particularly for low- and moderate-income customers. If RI Energy does not support direct upload, customers would need to purchase a dedicated

Wi-Fi HAN device to access 24x7 energy management services. Even if a Wi-Fi HAN device costs only $15 to $35 – such as a Raspberry Pi[55] – this expense is still an unnecessary barrier for consumers to derive energy-saving value from their advanced meters.

Q. ARE THERE SECURITY CONCERNS ASSOCIATED WITH DIRECT UPLOAD?

A. Not to my knowledge. Direct upload uses standardized, widely-used secure Internet protocols including the Transport Layer Security (TLS) protocol, Hypertext Transfer Protocol Secure (HTTPS), and the Secure Shell (SSH) Connection Protocol (standardized in IETF RFC 4254). All of these standards are used to secure the world's most security-sensitive systems.

D. DISTRIBUTED INTELLIGENCE

Q. WHAT IS DISTRIBUTED INTELLIGENCE?

A. Distributed Intelligence ("DI") refer to computers at the edge of the distribution grid – often, but not always, inside the meter – which can analyze high-frequency energy, voltage and current information ("DI Capabilities").

Q. IS DISTRIBUTED INTELLIGENCE A NEW TECHNOLOGY?

A. Yes. To my knowledge, only a handful of utilities have begun deploying advanced meters with DI Capabilities across the United States. Many, if not most, of those deployments are in their initial stages.

[55] Raspberry Pi. Marketing materials and pricing available at https://www.raspberrypi.com/products/raspberry-pi-4-model-b/.

Q. WHAT BENEFITS FOR CONSUMERS ARE AT STAKE WITH REGARD TO DI CAPABILITIES?

A. If my recommendations regarding DI Capabilities are adopted, consumers would be able to easily access new DERs, such as energy efficiency and demand response tools, and take advantage of the increased granularity of power, voltage and current data generated by DI meters. There could be significant benefits in terms of reduced utility bills, reduced carbon dioxide emissions, and systemwide cost reductions stemming from reducing peak demand and improved demand flexibility.

Q. WHAT DID RI ENERGY PROPOSE WITH REGARD TO DI CAPABILITIES?

A. The Company clearly intends to purchase DI-capable meters, although their exact functionality and limitations have not been provided for Commission review. "Grid Edge Computer" is shown as a $1.90 million nominal cost in the Company's direct testimony,[56] and RI Energy states:

> Grid Edge Computing includes load disaggregation software, and all costs are incurred in years 5-20 of the program. This represents a specific set of functionalities that is enabled by the AMF meters considered as part of this deployment. The costs were estimated this [*sic.*] as a Rhode Island Energy SaaS offering from the Meter Vendor.[57]

Q. HOW COULD ENHANCED DATA FROM DI-CAPABLE METERS LEAD TO CONSUMER BENEFITS?

[56] RI Energy. Advanced Metering Functionality Business Case. Schedule PJW/WR-1, Figure 12.24 at 163.

[57] Id. at 164.

A. One of the primary benefits to consumers stems from disaggregation calculations on the meter. Disaggregation is an evolving science in which individual loads inside a home or building can be identified and quantified by statistically analyzing the whole-premise power, voltage and current data. If a disaggregation can be accurately calculated, a variety of targeted messages could be sent to consumers with energy-saving recommendations.

Q. WHAT ARE THE POTENTIAL CONSUMER BENEFITS OF ACCURATE DISAGGREGATIONS?

A. There are several. Disaggregation algorithms running on the meter can (i) identify and (ii) quantify energy usage of various appliances or devices. The identification of a given load could lead to timely notifications to consumers via a smartphone app (for example, “Your resistance heater turned on”). If coupled with location-awareness tools on smartphones and internet-connected control switches, for example, a conservation message could be more tailored to say “It looks like you’ve left the house, but your resistance heater is still turned on. Would you like to turn it off now?”

Q. WHAT IS THE RELATIONSHIP BETWEEN THE FREQUENCY OF ELECTRICAL READINGS AND DISAGGREGATION ACCURACY?

A. A seminal paper from Stanford University researchers in 2013 established a correlation between the sample frequency of power readings and disaggregation accuracy. By evaluating the results of 40 detailed disaggregation studies, the Stanford researchers concluded that analysis of 15-minute or 60-minute usage data was only capable of identifying appliances at a very high level, for example the broad categories

of devices or appliances that are temperature-dependent, time-dependent, or continuous. When power is measured one to sixty times per second, some 10-20 appliance types are identifiable. However, when power is measured one million times per second, up to 100 specific devices are identifiable, meaning that individual light bulbs can be tracked.[58]

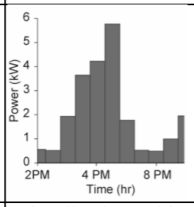
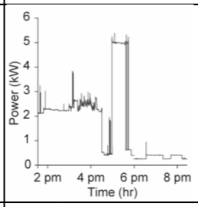
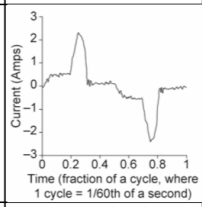
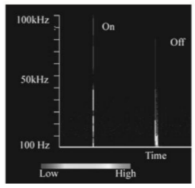
Data Frequency Analyzed	1 hr – 15 min	1 min – 1 s (1 Hz)	1-60 Hz	60 Hz-2 kHz	10-40 kHz	>1 MHz
Data Appearance						
Data Features Used by Algorithms	Visually observable patterns; duration and time of appliance use	Steady state steps/ transitions of power	Steady state steps/ transitions of power	Current and voltage, providing low order harmonics	Current and voltage, providing medium order harmonics to identify type of electrical circuitry in appliance	Current and voltage, providing very high order harmonics to identify both transients & the background noise of appliances
Appliances Identified	Differentiates ~3 general categories: loads that correlate with outdoor temperature, loads that are continuous, and loads that are time-dependent	Top <10 appliance types: Refrigerator, ACs, Heaters, Pool Pump, Washers, Dryers etc.	10-20 appliance types	Not known, see text for more details	20-40 appliance types: Toasters, Computers, etc. along with larger loads identified at lower frequencies	40-100 specific appliances: e.g., differentiates between 2 lights; requires separate power consumption data stream

Figure MEM-2: Disaggregation accuracy increases significantly as the frequency of power readings increases. Source: Armel, Carrie et al. "Is disaggregation the holy grail of energy efficiency?"

Q. WHAT ARE SOME ADDITIONAL EXAMPLES OF THE CONSUMER BENEFITS FROM MORE ACCURATE DISAGGREGATION?

[58] Carrie Armel, *et al*. Is disaggregation the holy grail of energy efficiency? Energy Policy vol. 52, 213-234. (2013) . Available at http://web.stanford.edu/group/peec/cgi-bin/docs/behavior/research/disaggregation-armel.pdf.

A. As for the quantification of loads, the potential consumer benefits of accurate disaggregation are many. For example, combining the square footage of a home, meteorological data and detailed disaggregations, software tools could tell consumers that there is a problem with their heat pump furnace or ductwork because they are using more energy than they should as compared to homes of comparable size. Also, fault detection tools using disaggregation analysis could detect when a compressor on a refrigerator or freezer is about to fail and provide consumers with rebates to purchase energy-efficient replacements. When compared with other equipment alternatives, the Stanford researchers concluded that on-meter computation is the least costly method to derive detailed disaggregations.[59]

Q. PLEASE SUMMARIZE YOUR RECOMMENDATIONS REGARDING DI.

A. I recommend that the Commission require RI Energy to adhere to fair competition principles in its roll-out of AMF. DI is a new technology, and regulators, utilities and technology providers nationwide have very few established rules and best practices to work from. As a result of DI's incipiency and the Company's lack of detail regarding DI in its direct testimony, the principles set forth below should be adopted in order to guide the Company in its procurement and deployment decisions. Those principles include fair, reasonable and non-discriminatory terms; information symmetry; user experience symmetry; customer data belongs to customers; and anti-blocking.

1. INTRODUCTION TO FAIR COMPETITION

[59] Id. at 31.

Q. WHAT ARE YOUR CONCERNS ABOUT FAIR COMPETITION?

A. RI Energy could easily leverage its power over the DI Capabilities and Wi-Fi of advanced meters to develop digital offerings that are outside of its natural monopoly. A natural monopoly can be defined as an industry in which multi-firm production is more costly than production by a monopoly.[60] While distribution poles, wires and meters are generally understood to meet the definition of natural monopoly, it is highly doubtful that software to analyze energy usage data falls under that umbrella. My concern is that RI Energy could crush innovation in the competitive market by denying access to DI Capabilities; charging unfair fees; requiring the purchase of unnecessary hardware or software from RI Energy or the Company's unregulated affiliates; conducting unjust surveillance on third party software applications that run on the meter in order to capture the software author's proprietary algorithms or trade secrets; or punish RI Energy's perceived competitors by arbitrarily limiting customer use of their energy data if customers want to use those competitors' services. Without Commission oversight in this area, RI Energy could easily abuse its monopoly power.

Q. WHAT ARE YOUR PUBLIC POLICY CONCERNS WITH DI CAPABILITIES SPECIFICALLY?

A. One concern is information asymmetry, which is an imbalance of information or knowledge between two entities. RI Energy's proposal appears to retain for itself the high-frequency DI data measured many times per second, whereas it will only provide

[60] William J. Baumol. On the Proper Cost Tests for Natural Monopoly in a Multiproduct Industry. American Economic Review 67, 809–822 (1977).

customers and customer-authorized energy management companies with less granular usage data. Information asymmetry leads to an un-level playing field and results in unnecessarily high costs for the competitor that is at a disadvantage.

A second concern is RI Energy or its technology vendors cornering the market. By exploiting unearned advantages and incumbency, the Company and its vendors could unfairly distort the competitive market for energy management services, resulting in market failure. For example, some advanced metering companies are offering energy management and demand response services which directly compete with the private marketplace. The metering vendor could make it harder for its perceived competitors to access data from Rhode Island meters in retaliation by, for example, establishing restrictive terms and conditions on some users but not others, denying Wi-Fi access to some but not others, or degrading the transmission of data for selective users. Such discrimination might be very difficult for the Commission to detect and remedy.

Q. WHAT ALTERNATIVES DO ENERGY MANAGEMENT FIRMS HAVE TO ACQUIRE SUB-SECOND POWER, VOLTAGE AND CURRENT DATA?

A. Currently, for DER providers to access the same sub-second level of information available to DI-capable meters requires purchase of a device of at least $299 that must be installed in a residential customer's electrical panel by a licensed and certified electrician, costing several hundred dollars more.[61] The cost to an energy management firm to acquire the same high-frequency power, voltage and current data about a

[61] See. Sense, https://sense.com/buy. Providing publicly available pricing for products.

customer's home or building that the Company will collect from its advanced meters is substantial.

Q. WHY IS THAT A PROBLEM IN YOUR VIEW?

A. Customers are expected to pay for advanced meters, and they should be entitled to all of the direct benefits that the Wi-Fi-capable and DI-capable meters can provide. This is because the meter is a regulated asset. Customers should be entitled to receive direct benefits, even if those benefits accrue to the customer and not to the utility. For example, energy savings that occur outside of regulated energy efficiency programs might have benefits to customers but not to RI Energy. There is reason to be concerned about information symmetry between the Company and energy management companies, and a lack of data portability from the Company.

2. Fair, Reasonable and Non-Discriminatory Terms

Q. PLEASE DESCRIBE FAIR, REASONABLE AND NON-DISCRIMINATORY TERMS.

A. I recommend that the Commission require the Company to provide energy data, including sub-second DI data and customer insights such as disaggregation results ("DI Data"), to customer-authorized third parties according to the principles of fair, reasonable and non-discriminatory ("FRAND"). In addition, software developer access to the DI App Store should be consistent with FRAND so that customers can authorize any DI App of their choice to load on their meter.

Q. WHAT DOES THIS MEAN IN PRACTICE?

A. It means that if a software company believes that RI Energy or its vendors are not providing access to DI Data pursuant to FRAND principles, the software company could seek a remedy before the Commission.

3. Information Symmetry

Q. PLEASE DESCRIBE FAIR, REASONABLE AND NON-DISCRIMINATORY TERMS.

A. In order to eliminate information asymmetry, I recommend that, within six (6) months following a final order in this proceeding, the Commission should require RI Energy to file an application addressing how to make DI Data available to local Wi-Fi devices and to cloud-based devices.

Q. WHY IS THIS NECESSARY?

A. Because RI Energy has not provided sufficient information about its utilization of DI and Wi-Fi to ensure that the market risks of information asymmetry are mitigated. Six months also gives the Company sufficient time to refine its technology plans with regard to DI, in accordance with my recommendations.

Q. IF YOUR RECOMMENDATION IS NOT FOLLOWED, WHAT NEGATIVE CONSEQUENCES COULD RESULT?

A. One negative consequence is that the Company could relegate the DI developer terms and conditions to its meter vendor, thereby vesting the meter vendor with

extraordinary control over the market for DI Apps. Discriminatory terms and conditions mandated by the meter vendor in the future could diminish the Company's (and customers') ability to acquire innovative DI Apps in the future. Moreover, information asymmetry and discriminatory practices could prevent Rhode Island consumers from accessing new, innovative energy management technologies.

Q. HOW CAN YOUR RECOMMENDATION OF PROVIDING DI DATA TO DEVICES AND CLOUD SERVICES BE ACHIEVED TECHNICALLY?

A. There are a variety of ways this can be achieved technically. One option would be to securely broadcast DI Data to authenticated Wi-Fi devices using an internet protocol known as the Uniform Datagram Protocol ("UDP"). UDP is a streaming protocol for communications used most commonly for video streams. UDP is well-suited to providing DI Data because it uses less bandwidth than regulator internet protocols such as Transmission Control Protocol ("TCP") and it tolerates the occasional loss of information during transmission.

Q. CAN STREAMING DI DATA BE DONE SECURELY?

A. Yes. First, receiving devices can be authenticated in a manner similar to HAN devices. The customer can provide the Company with a device identifier of some sort, and the Company can add that identifier to the meter's Access Control List of authenticated devices. Second, UDP can be broadcast over an encrypted channel known as Transport Layer Security ("TLS"). TLS is the same technology behind Hypertext Transfer Protocol Secure ("HTTPS"), which is used routinely to encrypt information over the Internet.

Q. WHAT ARE THE BENEFITS OF YOUR RECOMMENDATION?

A. The Company's proposal to reserve DI Data for itself and to exclude competitors represents information asymmetry as well as an artificial barrier to entry for competitive products and services. With symmetry restored and artificial barriers removed, it is possible that entrepreneurs will develop new ways to help consumers manage their utility bills. Furthermore, ratepayers will not need to fund such innovations because development costs will be borne by the private market.

4. User Experience Symmetry

Q. PLEASE EXPLAIN WHAT YOU MEAN BY USER EXPERIENCE SYMMETRY.

A. User experience symmetry means that the user experience should be substantially similar, if not identical, for various customer attempts to access and use their energy usage data and DI data for whatever purpose, and to whatever device, the customer wants. For example, the Company has developed a mobile application that allows customers to view their real-time energy usage over Wi-Fi. The first step of this process is for the customer to provide their Wi-Fi network's SSID and password. A "symmetrical" user experience means that a customer attempting to connect a HAN device that is not provided by the Company or does not benefit the Company should have a substantially similar user experience.

Q. WHAT ARE THE NEGATIVE EFFECTS OF USER EXPERIENCE ASYMMETRY?

A. If one has attempted to roll over a 401(k) retirement account to a new financial institution one can relate to the personal difficulty caused by an incumbent who is

reluctant to facilitate a customer's wishes when those wishes go against the interests of the incumbent. The effect of a strategically inferior user experience is to reduce the likelihood that customers exercise freedom of choice. For example, the U.S. Federal Trade Commission has proposed a rule colloquially called "click to cancel" that would make it easier for consumers to cancel recurring subscriptions by making the cancellation process as easy as the sign-up process.[62] In various digital markets, including home energy management, user experience asymmetry has very detrimental effects on customer adoption. An incumbent such as RI Energy can make it easy and seamless for customers to sign up for their own digital offering, while making the process extremely difficult for the customer to complete a similar process in order to access a competitor's service.

The U.S. House of Representatives Subcommittee on Anti-Trust, Commercial and Administrative Law recently issued a majority report that highlighted user experience asymmetries as a cause of reduced competition and reduced innovation in some markets.[63] For example, the report observed that default "apps" on mobile devices favor dominant (i.e. incumbent) platforms by increasing "switching costs" to consumers.[64] In the energy sector, a study by EnergyHub found dramatically different rates of consumer participation in demand response programs among eligible

[62] Federal Trade Commission. Negative Option Rule. Proposed Rule, 88 FR 24716. April 24, 2023. Available at https://www.govinfo.gov/content/pkg/FR-2023-04-24/pdf/2023-07035.pdf.

[63] House of Representatives Subcommittee on Antitrust, Commercial and Administrative Law. Investigation of Competition in Digital Markets: Majority Staff Report and Recommendations. Majority Staff Report and Recommendation (2020). Available at https://www.govinfo.gov/content/pkg/CPRT-117HPRT47832/pdf/CPRT-117HPRT47832.pdf

[64] Id. At 41-42.

customers depending upon the level of difficulty customers experience in the enrollment process. When the enrollment forms were electronic and simple, some 40% of customers presented with an offering completed an enrollment. But when the process was difficult and involved many steps, only 3% of customers completed the enrollment.[65] User experience asymmetry can diminish the exercise of customer choices by an order of magnitude.

Q. WHAT PARTS OF THE COMPANY'S APPLICATION COULD LEAD TO USER EXPERIENCE ASYMMETRY?

A. For BYOD to be implemented, the Company must offer technological mechanisms for customers to connect their IEEE2030.5-compliant device. It is possible that RI Energy could make connecting a third-party device much more onerous than connecting the Company's mobile app, thereby disadvantaging third parties.

5. Customer Data Belongs to Customers

Q. PLEASE EXPLAIN THIS PRINCIPLE.

A. Since DI Data is very granular, it can reveal additional information about customers that is not possible with 15-minute usage data from traditional smart meters. For example, DI Data can contain detailed information about customers' lives and activities, such as behaviors, lifestyles, schedules, and device choices. As a result, I believe that all customer data – particularly DI Data, and any insights derived therefrom – fundamentally belong to customers. In practice, this means three things. First,

[65] Energy Hub, Inc. Optimizing the demand response program enrollment process. April 2016. Available at http://www.energyhub.com/blog/optimizing-demand-response-enrollment.

customers should be able to easily exercise their rights to data portability with respect to DI Data. Second, because disaggregation can be very invasive, RI Energy should be prohibited from executing disaggregation calculations on meters unless either (i) the customer has consented or (ii) pre-clearance has been granted by the Commission. Prior to beginning disaggregation, it is important that the Commission consider the dimensions of privacy including, but not limited to, and under what circumstances RI Energy can share disaggregation results with state or federal law enforcement agencies. The Commission should also consider negative impacts on fair competition *before* any anti-competitive damage is done. Third, RI Energy should be prohibited from using DI Data for any unregulated purpose, with prohibitions on sharing any DI Data or derivative customer data with unregulated affiliates.

Q. WHAT ARE THE NEGATIVE EFFECTS IF THIS PRINCIPLE IS NOT ADOPTED?

A. As discussed previously, the lack of data portability results in reduced competition and reduced innovation in digital energy services and behind-the-meter energy management. Information asymmetry leads to an un-level playing field. Without this principle, ongoing contestation between RI Energy and customer-authorized third parties will likely continue into the future, creating unnecessary litigation. In addition, there is the risk of a consumer backlash against the Company for conducting unconsented disaggregation and peering into the details of customers' habits and private lives.

Q. WHAT PARTS OF THE COMPANY'S APPLICATION CONFLICT WITH CUSTOMER OWNERSHIP AND CONTROL OVER THEIR DATA?

A. The Company's posture toward customer data ownership indicate a discrepancy between the rich data the Company keeps for itself and the inferior data the Company provides to customer-authorized third parties. With regard to GBC, the Company provides only 15-minute usage data,[66] and with regard to HAN, my understanding is that IEEE2030.5 is limited to providing 1-second usage data. In other words, the Company proposes to provide only the lower-granularity, inferior usage data to customers and customer-authorized third parties, while retaining the sub-second DI Data – and all the disaggregation insights derived therefrom – for itself.

6. Anti-Blocking

Q. PLEASE EXPLAIN YOUR ANTI-BLOCKING PRINCIPLE.

A. RI Energy Service should be subject to digital anti-blocking provisions that ensure the Company does not interfere with customer-authorized third parties' timely access to energy usage data and DI Data, subject to certain conditions.

Q. WHAT ARE THOSE CONDITIONS?

A. Diminutions or interruptions of data flows should be excepted if they are proven to be: (i) directly related to a necessary measure to protect privacy, security or normal utility operations; and (ii) tailored to specific risks; and (iii) no broader or longer than necessary; and (iv) implemented in a consistent and non-discriminatory manner,

[66] RI Energy. Advanced Metering Functionality Business Case. Schedule PJW/WR at 7.

meaning that RI Energy's competitive offerings are also affected; or (v) caused by uncontrollable events, such as war, famine, terrorist attack, etc.

Q. WHAT INFORMED THE DEVELOPMENT OF THE ANTI-BLOCKING PRINCIPLE AND THE EXCEPTIONS?

A. These principles are derived from the Centers for Medicare and Medicaid Services ("CMS") anti-blocking rule for health data.[67] Pursuant to the 21st Century Cures Act passed by the U.S. Congress in 2020, CMS established rules for application programming interfaces ("APIs") so that customers can choose to have their health information securely transferred to another healthcare provider. In a rulemaking, CMS linked the payment of Medicare and Medicaid reimbursements to healthcare providers on (i) achieving certification of a standards-compliant API and (ii) adherence to its anti-blocking rule.[68] After receiving comments from healthcare providers and information technology professionals, CMS established its anti-blocking rule with exceptions that are substantially similar to those I provided above.

Q. WHY DO YOU BELIEVE THIS PRINCIPLE IS NECESSARY?

A. In my experience working on data portability topics across the country, I have seen myriad ways in which utilities have caused harm to, and imposed costs on, customer-authorized third parties through various technical means involving the

[67] See Department of Health and Human Services. 21st Century Cures Act: Interoperability, Information Blocking, and the ONC Health IT Certification Program. 45 CFR Parts 170 and 171. Federal Register, Vol. 84, No. 42. March 4, 2019. Available at https://www.govinfo.gov/content/pkg/FR-2019-03-04/pdf/2019-02224.pdf.

[68] Id.

electronic transmission of customer data. For example, some California utilities have (i) caused significant delays in the transmission of customer data to third parties, despite the utility having possession of such data; (ii) delivered data about the wrong customer to the third party; (iii) experienced unplanned information technology outages with little explanation; (iv) modified data formats with little or no warning and poor documentation; etc.[69] For third parties to continuously accommodate unpredictable and changeable technical circumstances amounts to a significant and unnecessary cost burden. For these reasons, it is necessary to go beyond merely establishing a commitment to data portability and affirmatively prohibit data blocking when it occurs for anti-competitive purposes.

E. REPORTING METRICS

Q. WHAT METRICS ASSOCIATED WITH AMR DEPLOYMENT DID RI ENERGY PROPOSE TO REPORT ON?

A. The Company proposes various metrics which are put into three categories: program implementation, customer-focused, and operations.[70]

Q. PLEASE DESCRIBE THE COMPANY'S PROPOSED METRIC(S) THAT ARE RELEVANT TO YOUR TESTIMONY.

[69] See. Mission:data Coalition. Energy Data Portability. Pages 9 -12. January 2019. Available at http://www.missiondata.io/s/Energy-Data-Portability.pdf. Discussion complaint of OhmConnect, Inc. Against Southern California Edison for Data Failures before the California Public Utilities Commission, proceeding no. C1903005, filed March 8, 2019.

[70] RI Energy. Advanced Metering Functionality Business Case. Schedule PJW/WR at 197-199.

A. Within the customer-focused category, the Company proposes only two metrics that are pertinent to my testimony: counts of customers signing up for Customer Portal ("CP") access, and "counts of customers who have exported their Green Button Connect data."[71]

Q. ARE THESE METRICS ADEQUATE IN YOUR VIEW?

A. No. The metrics proposed report on certain actions customers have taken, but they are not reflective of RI Energy's performance. Ensuring meaningful data portability demands that RI Energy be transparent in its operation of digital services (GBC, HAN and DI Capabilities). Without more detailed information, it would be very difficult for the Commission to judge the Company's performance in administering these functions.

Q. PLEASE EXPLAIN WHAT REPORTING METRICS YOU RECOMMEND.

A. In order to support the objectives of fair competition with energy management services, increasing RI Energy's performance in achieving direct customer benefits and ensuring accountability in ratepayer spending, I recommend the Company be required to report on the following metrics as a condition of receiving approval in this proceeding:

1. For Green Button Connect:
    a. Time elapsed for a random sample of customers to complete a data-sharing authorization with a third party
    b. Average and maximum data delivery time (seconds) following customer authorization (searchable timeframe)

[71] Id. at 198.

c. GBC system availability (uptime), calculated on a monthly basis as the number of minutes the GBC service is available for use and operating correctly without a severe defect divided by the total number of minutes, excluding scheduled maintenance windows
d. Number and type of errors generated, if any
e. Number and type of issues raised by third parties and customers, including severity, mean and max acknowledgment time, and mean and max resolution time
f. Number and status of third parties going through administrative onboarding
g. Number and status of third parties going through technical onboarding

2. For Home Area Network:
   a. Number and type of errors experienced in device pairing
   b. The average time it takes for a random sample of customers randomly recruited for assessment purposes to complete a HAN pairing process, with an explanation of obstacles experienced and remediation plans
   c. The number of customer attempts to pair a device and the number of successfully completed attempts
   d. For direct upload functionality, the number and type of errors experienced in the customer authorization process
   e. For direct upload functionality, the number of customer attempts and the number of successfully completed attempts
3. For Distributed Intelligence:
   a. A list of all apps deployed on meters including:
      i. Name of the app
      ii. Author, creator, or licensor(s) of the app
      iii. Detailed technical description of the app

iv. The number of meters on which the app is deployed grouped by customer class (residential, small commercial, medium/large commercial, etc.)

v. Whether the app is utility-facing, customer-facing or both

vi. If the app is customer-facing, screenshots showing how customers initiate, use and/or benefit from the app

vii. Cost of the app

viii. A description of where customer data and resulting insights are transmitted and held

ix. Whether and how the app creator or licensor(s) are entitled to access or use customer data or insights for any purpose

b. A list of DI apps that have been uninstalled or terminated in any manner, with a detailed description of the circumstances

c. For each app developer that seeks to have an app deployed:

i. Time elapsed for administrative onboarding

ii. Time elapsed for technical, security or functional review

d. Number and description of consumer complaints received that relate to Wi-Fi connectivity

Q. WHAT FREQUENCY OF REPORTING DO YOU RECOMMEND?

A. For GBC metrics, I recommend that the Company be required to report continuously on a publicly-accessible website; for HAN metrics, at least monthly; and for DI metrics, quarterly. Regarding the user experience samples, those should be reported once per year, or after material changes to the user experience are made.

Q. WHY DO YOU PROPOSE THESE REPORTING METRICS?

A. I propose these metrics due to the novelty of DI Capabilities; the potential for negative effects on the competitive market for energy management; and my experience with under-performing HAN and GBC capabilities in other jurisdictions. These metrics would enhance stakeholders' and the Commission's ability to understand how AMF is performing from a customer's perspective and help identify anti-competitive behaviors.

Regarding GBC metrics, continuous reporting is important because poor performance with no reporting was a lesson learned from other jurisdictions. In Texas, for instance, when third party access functionality was first released in April, 2015, SMT inexplicably went offline for a period of two weeks, with no accountability.[72] It was difficult for parties, and the regulator, to assess SMT's uptime because, at the time, SMT's operators did not provide any metrics. The Texas commission later approved monthly reporting metrics. In California, poor performance and a lack of operational metrics led the commission to require the state's utilities with GBC platforms to report ongoing performance on a publicly-accessible website.[73] The California commission reasoned that "A webpage or dashboard would allow the Commission, members of the public, and third-party demand response providers to effectively monitor the performance" of the utilities' data-sharing platforms.[74] It is normal and expected in the technology industry that digital platform operators will continuously report on their

[72] Mission:data Coalition. Comments in Response to Staff's Request for Comments Regarding the Smart Meter Texas Web Portal. Public Utility Commission of Texas, Docket No. 42786. April 1, 2016. Available at https://interchange.puc.texas.gov/Documents/42786_22_888088.PDF.

[73] California Public Utilities Commission. Resolution E-4868. Page 56. August 25, 2017. Available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M194/K746/194746364.PDF.

[74] Id.

"uptime" – the percentage of time that a platform is online and fully functional. Uptime is a common metric of online platform availability. Similarly, response times to API requests and explanations of errors are part and parcel of operating a digital platform in the 21st century.

Regarding HAN and DI, my proposed metrics provide important information about customer privacy and the competitive fairness with which RI Energy provides customer data. Without this information, it will be difficult for the Commission to exercise meaningful regulatory oversight.

Q. WHY DO YOU PROPOSE THE PARTICULAR CADENCE OF REPORTING METRICS?

A. Traditionally, accountability of investor-owned utilities is addressed through prudence review and the threat of cost disallowance. However, prudence review during rate cases introduces delays of several years between when an imprudent act occurs and when the punishment is doled out. Such delays are inherently problematic for software platforms (whether DI capabilities, HAN or GBC), where a failure to function properly for a few days or weeks could be disastrous. Prudence review that takes one or two years after such an event occurs is too long a cycle for cost disallowance to be an optimal or effective coercive device.

IV. CONCLUSION

Q. WHAT IS YOUR CONCLUSION?

A. The Commission has a unique opportunity to design the energy management market for optimal outcomes in this proceeding by establishing reasonable safeguards against abuses of monopoly power. A vibrant, competitive market for certain data-dependent, behind-the-meter DERs will benefit consumers and provide many choices for cost-effectively reducing utility bills, but only if the Commission ensures fairness in information accessibility; requires RI Energy to participate in regional data-sharing platforms; and safeguards the rights of consumers to have meaningful abilities to access new energy management services being developed by entrepreneurs and innovators – critically, new technologies that are not available from RI Energy. Since ratepayers are expected to pay for advanced meters, they should be entitled to the maximum amount of benefits enabled by meters' new technologies.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, and I reserve the right to supplement this testimony based on receipt of further information.