THE STATE OF NEW HAMPSHIRE

BEFORE THE

NEW HAMPSHIRE PUBLIC UTILITIES COMMISSION

JOINT PREPARED TESTIMONY FOR POSSIBLE OPTIONS FOR A STATEWIDE ENERGY DATA PLATFORM

THOMAS BELAIR, RILEY HASTINGS, AND DENNIS MOORE FOR EVERSOURCE

JUSTIN EISFELLER, KIMBERLY HOOD AND JEREMY HAYNES FOR UNITIL

Docket No. DE 19-197

August 12, 2020

Q. Mr. Belair, please state your name, business address, and position.

A. My name is Tom Belair, I work at 73 West Brook Street in Manchester New Hampshire. I am manager of energy efficiency services for Public Service Company of New Hampshire, d/b/a Eversource Energy ("Eversource")

Q. Have you previously testified before the Commission?

A. Yes, I have testified in several of the CORE NH Energy Efficiency proceedings before the NHPUC.

Q. Please describe your educational and professional experience.

A. I have a Bachelor of Arts degree in Mathematics from Saint Anselm College. I have worked at Eversource for 38 years, developing Information Technology systems, modifying customer and supplier computer systems during Customer Choice and Deregulation, and designing and implementing Energy Efficiency programs in New Hampshire.

Q. Ms. Hastings, please state your name, business address, and position.

A. My name is Riley Hastings, I work at 247 Station Drive in Westwood Massachusetts. I am a lead analyst doing strategic data management for the energy efficiency group at Eversource Energy ("Eversource").

Q. Have you previously testified before the Commission?

A. No, but I have testified before the Massachusetts commission on energy efficiency dockets.

Q. Please describe your educational and professional experience.

A. I have a Bachelor of Arts degree in economics from Colgate University. I have worked as a consultant to the Environmental Protection Agency and then in the energy efficiency field as an evaluation consultant and now in the energy efficiency group at Eversource.

Q. Mr. Moore, please state your name, business address, and position.

A. My name is Dennis Moore, I work at 107 Selden Street in Berlin, Connecticut. I am the Director of IT Enterprise Business Solutions at Eversource Energy.

Q. Have you previously testified before the Commission?

A. No, I have not.

Q. Please describe your educational and professional experience.

A. I have a Bachelor of Science degree in Mathematics from the University of Connecticut. I have worked at Eversource for 22 years developing, implementing and maintaining enterprise business solutions. Prior to that I worked as a Manager of Resource Planning and Economic Analysis at Yankee Gas Services Company.

Q. Mr. Eisfeller, please state your name, position and your responsibilities.

A. Justin Eisfeller. I am the Vice President, Information Technology at Unitil Service Corp. ("USC"), which provides centralized utility management services to Unitil Corporation's subsidiary companies including Unitil Energy Systems, Inc. and Northern Utilities, Inc. As VP, Information Technology, I am responsible for Unitil's information technology infrastructure, software development, cyber security and software systems support. I have previously held the positions of Manager of Distribution Engineering, Director of Engineering and Director of Energy Measurement and Control at USC.

Q. Please describe your business and educational background.

A. I received my Bachelor of Science Degree in Electrical Engineering (Power Option) from Northeastern University in 1990 and my Master of Business Administration from the

University of New Hampshire in 2005. I joined USC in 2002 as Manager of Distribution Engineering and was promoted in 2004 to the position of Director of Engineering with responsibilities for distribution engineering, planning, transmission and substation engineering, system protection and control, computer aided design, and geographic information systems. In 2008, I assumed responsibilities of Director, EM&C and in 2017 I was promoted to VP, Information Technology, my current position.

Q. Do you have any licenses or certifications that qualify you to speak to issues related to information technology or project management?

A. Yes. I have been a registered Professional Engineer in the State of New Hampshire since 1996; received my Project Management Professional certificate in 2005; and received my Information Technology Infrastructure Library Foundation Certificate in IT Service Management in 2018.

Q. Have you previously testified before Commission or any other Regulatory agencies?

A. Yes, I have testified before the New Hampshire Public Utilities Commission, Massachusetts Department Public Utilities, and the Maine Public Utilities Commission on previous occasions regarding a variety of technical issues.

Q. Mr. Haynes, please state your name, business address, and position.

A. My name is Jeremy Haynes and I am the Director of Information Technology, Application Development for Unitil Service Corp. ("USC"), which provides centralized utility management services to Unitil Corporation's subsidiary companies including Unitil Energy Systems, Inc. and Northern Utilities, Inc.

Q. Have you previously testified before the Commission?

A. No, I have not previously testified.

Q. Please describe your educational and professional experience.

A. I have a Master's Degree in Business Administration from the University of New Hampshire, as well as a Bachelor of Science in CiS from Post University. I joined the Unitil Information Technology department in January 2013 where I have personnel and technological responsibility for all aspects of the design, creation, delivery and support for Unitil's internal line of business applications and database systems. In total, I have nearly 25 years of professional experience with increasing levels of hands on technical and managerial responsibility covering a wide range of varied vertical domains, in addition to the Electric and Gas utility industry which has been my focus for the past 7 plus years.

Q. Ms. Hood, please state your name, business address, and position.

A. My name is Kimberly Hood, I am Manager of Cyber Security and Compliance for Unitil Service Corp. (“USC”), which provides centralized utility management services to Unitil Corporation’s subsidiary companies including Unitil Energy Systems, Inc. and Northern Utilities, Inc.

Q. Have you previously testified before the Commission?

A. No, I have not previously testified.

Q. Please describe your educational and professional experience.

A. I have 30 years of experience in a variety of information systems roles, including both programming and infrastructure. I have a BS in Computer Science from Oklahoma Christian University and a Master's Certificate in Cyber Security with a concentration in Power Systems from Worcester Polytechnic Institute. I joined Unitil in September of 2012 where I am the Manager of Cyber Security and Compliance. I am responsible for cyber security policies and procedures, security awareness training, threat and vulnerability management, vendor security posture assessment, Industrial Control System (ICS) and SCADA infrastructure protection at electric substations and natural gas plants

and leading the Cyber Incident Response Team (CIRT). I manage both internal and external audits and assessments including SOX, NERC-CIP, PCI, C2M2/NIST Framework, and penetration testing. In addition, I am a member of the American Gas Association (AGA) Cyber Security Strategy Task Force, the Edison Electric Institute (EEI) Security Committee, and InfraGard NH and Boston.

Q. On whose behalf are all of you testifying?

A. We are testifying on behalf of Eversource and Unitil (collectively, Eversource and Unitil are "the Utilities"). Granite State Electric Company and EnergyNorth Natural Gas (jointly d/b/a "Liberty Utilities") are not parties to this testimony.

Q. What is the purpose of your joint testimony?

A. The purpose of this testimony is to present what the Utilities see as viable possibilities for fulfilling the objectives of this docket, and by extension RSA 378:50-54 (the "Data Platform Law"), and to describe the associated levels of effort, costs, and implications of the options presented. The Data Platform Law became law following the passage of Senate Bill 284 ("SB 284") from the 2019 legislative session on September 17, 2019. The New Hampshire General Court found in SB 284 that:

> *Access to granular energy data is a foundational element for moving New Hampshire's electric and natural gas systems to a more efficient paradigm in which empowering consumers is a critical element. By enabling the aggregation and anonymization of community-level energy data and requiring a consent-driven process for access to or sharing of customer-level energy usage data, the state can open the door to innovative business applications that will save customers money, allow them to make better and more creative use of the electricity grid as well as other utility services, and facilitate municipal and county aggregation programs authorized by RSA 53-E. Such a program of robust data is also likely to be useful in local planning, conducting market research, fostering increased awareness of energy consumption patterns, and the adoption of more efficient and sustainable energy use. . .*[1]

[1] http://gencourt.state.nh.us/bill_Status/billText.aspx?sy=2019&id=1077&txtFormat=html

With these findings in mind, the Commission directed the utilities to explore the possibilities for a statewide online energy data platform that would allow utilities, customers and distributed energy market participants to access and share customer energy usage data to further the energy policy goals stated above.[2]

Q. What have Eversource and Unitil done in this docket leading up to your testimony?

A. The Commission opened Docket No. DE 19-197 on December 13, 2019 pursuant RSA 378:51 to determine the following during an adjudicative proceeding: (1) the governance, development, implementation, change management, and versioning of the energy data platform; (2) standards for data accuracy, retention, availability, privacy, and security, including the integrity and uniformity of the logical data model; and (3) financial security standards or other mechanisms to assure third-party compliance with privacy standards.[3] Given these requirements for constructing a data platform in addition to the size and complexity of the project itself, cost implications are a primary consideration on whether to act, and if so, how to build a statewide platform to best serve New Hampshire. This is why the data platform law also directs the Commission to "defer the implementation of the statewide, multi-use, online energy data platform... if it determines that the cost of such platform to be recovered from customers is unreasonable and not in the public interest."[4]

Several stakeholder technical sessions have been held since February, with robust participation and discussion throughout. The Utilities have been active participants during all of these meetings, offering feedback, industry expertise and insight to use cases as presented by the parties. The Utilities also provided presentations during technical sessions to facilitate and advance the dialogue among the parties as to possible viable options for creating a New Hampshire data platform with an aim towards functionality in

[2] December 13, 2019 NH PUC DE 19-197 Order of Notice https://www.puc.nh.gov/Regulatory/Docketbk/2019/19-197/ORDERS/19-197_2019-12-13_OON.PDF at 1.
[3] *Id*.
[4] NH RSA 378:51, III

furthering modern energy policy while keeping costs in check. Following these robust exchanges of information, this testimony offers options for the Commission's consideration—should the Commission find that the cost is reasonable and a statewide data platform is in the public interest—that create a platform that meets the policy objectives and statutory requirements of RSA 378:51-54 with a focus on useful, secure, and cost-effective data platform possibilities for New Hampshire customers and energy market participants.

Q. Do your companies have any general concerns pertaining to the subject matter being discussed in your testimony?

A. While the goal is to fulfill the intent and purpose of the Data Platform Law, the Utilities are equally mindful of our customers' privacy, security, and cost issues along with the legal obligations that must be met in designing and operating such a platform. These are all necessary conditions to fulfilling the utility role in the Data Platform Law, and so we consider them with equal weight. RSA 378:52 states, in relevant part, "the utilities shall: I. Design and operate the energy data platform to provide opportunities for utilities, their customers, and third parties to access the online energy data platform and to participate in data sharing. II. Require, as a condition of accessing the online energy data platform, that a third party complete a qualification and registration process to ensure that any customer data downloaded from the platform remains in a safe, secure environment according to data privacy standards established by the commission. III. Administer the online energy data platform in a manner consistent with RSA 363:38." These critical considerations are reflected throughout the Utilities' recommendations to the Commission, as neither security nor privacy can be compromised by the creation or operation of a statewide data platform.

Q. What data-sharing offerings do the Utilities already provide to New Hampshire customers and entities such as community aggregators?

A. Before discussing if and how to design and build a statewide data platform, it is important to know how energy data is already being used and shared in New Hampshire, and the options the Utilities are currently offering customers to provide context to better inform the recommendations and proposals that the Commission is to consider. In addition to standard bill mailings or .pdf documents, the Utilities have a variety of data sharing systems that enable customer access for viewing, downloading, and sharing energy usage and interval data. Downloaded information is available in several formats, including Comma Separated Values (.csv) and/or eXtensible Markup Language (.xml). This downloadable information can be imported into various programs and applications by the customer, or the customers' vendor, for all manner of analysis.

Further, customers have options on how they choose to access their data. The Utilities have websites that provide access to data as well as applications that interpret and display data in a way that gives customers insight into controlling their energy usage. Between Eversource and Unitil, customers can access monthly, daily, and interval energy usage data via several web-based media and may have that data presented in a number of ways, and in several standard formats such as those previously mentioned.

Additionally, customers may authorize their Competitive Electric Power Supplier ("CEPS") or other service provider to access their monthly, daily, and interval data. Approved CEPSs can download current customer usage, demand data, and interval data along with 12 months of historical information via Electronic Data Interchange ("EDI"). This information is provided in a variety of standard industry formats. There are data offerings for municipal and county entities, as well as approved representatives of municipal aggregation efforts. Upon request by an appropriate city or town official, the Utilities provide aggregated and anonymized usage data for all customers in that municipality by customer class. Likewise, upon request the Utilities provide reports of

anonymized data in .csv or spreadsheet formats to approved municipal representatives for the purpose of future municipal aggregation.

Data services provided by Utilities are evolving along with the technology that captures the data and customer energy usage. This is particularly true for interval data. Currently, Eversource offers a software tool—Energy Profiler Online ("EPO")—that provides interval data with online load analysis, reporting, graphing, and download capabilities. Customers and customer-authorized third parties pay to access this data by using this software. The company is currently looking into the option of retrieving data from EPO using Green Button Connect ("GBC"), an excellent example of the versatility and interoperability of already-existing data services. Unitil's customer engagement platform provides daily interval data with the inherent capability to offer hourly data to all customers with ongoing deployment of interval-based meters. Today, a limited number of Unitil customers have meters with 15-minute interval capability. As more Unitil customers get this capability, the company plans to deploy this functionality more broadly to accommodate such expansion.

If a customer chooses to do so, both Eversource and Unitil electric customers may elect to have direct interval data access. The Utilities offer tariff-based interval service to all customers and authorized parties. This service requires a specific meter installation which provides direct access to interval data (load pulse output). This interface is inherently secure since access is not through corporate systems and originates from an analog source. This service provides customers or their third-party energy partner with direct, real-time access to meters and energy use data for analysis or troubleshooting. Customers may choose direct interval data access in order to have access to their energy data in real-time and make contemporaneous decisions about usage. A limited number of customers have chosen to utilize this service at this time.

Data is currently provided in files and reports directly from Utility information systems, via automated file transfer mechanisms, to internal and external consumers. These include files sent from Customer Information System ("CIS") to suppliers via EDI transfers, Green Button Download My Data, and others. At Eversource, EPO receives interval data in a variety of file formats. Users access the online application with a user-id and password for load analysis and data download. Vendor registration and customer authorization is conducted manually by the utility. There is a fee for this software and file transfer services, as defined in the relevant tariff[5] for example, as part of load pulse output or extended metering services.

The following lists some specific examples of the Utilities' data offerings:

- Monthly usage data in tabular format or in a bar chart (Eversource and Unitil).
- Daily usage data in tabular format or bar chart (Unitil).
- Usage data via mobile application (Eversource).
- "Green Button Download My Data": instant access to download usage data via CSV or XML format for up to 13 months. (Eversource and Unitil). Unitil also provides daily usage data via this application.
- Data usage emailed to the customer by visiting the utility website or by calling customer service operations (Eversource and Unitil).
- Tailored customer energy analysis to a subset of gas and electric customers comparing individual usage to nearby or regional customer usage (Unitil and Eversource).

Q. What experiences do the Utilities have to inform incremental cost-benefit analyses to provide additional data usage sharing services?

A. To date, there has been limited discussion regarding quantitative benefits from enhanced utility data sharing offerings. In an attempt to address this lack of dialog while

[5] See Eversource's current tariff, pg 34: https://www.eversource.com/content/docs/default-source/rates-tariffs/electric-delivery-service-tariff-nh.pdf?sfvrsn=7fb7f062_62

maintaining a collaborative perspective to enable stakeholder use cases, the Utilities are offering a suite of possible data platform options for the Commission to consider in this testimony. To facilitate future use cases and development, the Utilities' methodology behind these options will enable iterative, incremental and enhanced functionality as customer needs demand. This approach provides flexibility to measure usefulness coupled to currently unknown needs over time. The Utilities do not recommend building out a perceived full architecture without an assessment of how and how often the platform will be used by customers and third parties alike.

There is a consistent trend with the data offerings that raises questions as to the value of investing in a data platform. Today, customers may download, and otherwise use their energy usage data for a variety of reasons. But to date, very few customers have leveraged these options. Eversource's IT department's findings show in 2019, fewer than 0.1% of Eversource customers downloaded their energy usage data. While it is clear that this docket seeks to enable expanded uses for energy usage data designed for additional user types, the uses and users discussed above have significant overlap with this docket's objectives. The Utilities believe the limited engagement with current data service offerings should be taken into account when deciding the size and scope of a statewide data platform for New Hampshire. Alternatively, the Utilities understand that automating the transfer of energy data might spur more use. The actual use of customer energy data will of course be taken into consideration in the benefits when determining the cost effectiveness of implementing any solution. If the platform is utilized, it should be because the benefits of such a platform are clearly defined and demonstrated to provide meaningful value to a sizeable number of customers.

Q. How do the current utility offerings in New Hampshire compare with other jurisdictions?

A. For comparison and context, the Utilities have collected information on efforts in five jurisdictions that either have been raised by parties to this docket as examples (California,

Texas, and New York) or are jurisdictions where the Utilities also operate (Massachusetts and Connecticut). These varied examples provide comparative context which can in turn inform the development of data sharing in New Hampshire.

California:

In response to a 2014 order by the California Public Utilities Commission, the three Investor-Owned Utilities (IOUs) in California: Pacific Gas and Electric (PG&E), San Diego Gas & Electric (SDG&E), and Southern California Edison (SCE) developed platforms where customers could share data with third parties. [6] The California utilities have smart interval meters and the infrastructure to store interval data for all customers. Each of the IOUs provided access to their customers' energy usage data using a common standard, specifically the GBC standard. Each utility has their own vetting and onboarding processes and testing/rules for third parties. Third-party software providers decide which utilities (and utility customers) they want to work with.

GBC allows customers to send their electric and gas utility energy use data directly to third-party software applications via an Application Programming Interface ("API"). An

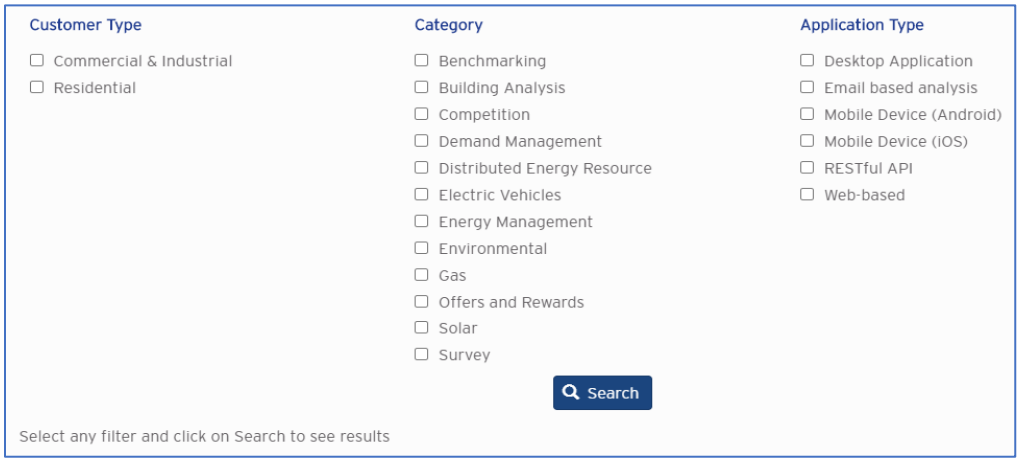

FIGURE 1: SDG&E'S THIRD-PARTY SOFTWARE FILTERING TOOL, HIGHLIGHTING TYPES OF THIRD-PARTY SOFTWARE PROVIDERS.

[6] CPUC Decision 14-05-016 *"Decision Adopting Rules To Provide Access To Energy Usage And Usage-Related Data While Protecting Privacy Of Personal Data"* (May 1, 2014).

API is simply software that allows two different applications to talk to each other. The following is San Diego Gas & Electric's filtering tool for customers to help them select services and third-parties who provide these selected services.[7] Figure 1 has been included to show the types of vendors and services that the Utilities anticipate being interested in being authorized to access customer energy data in New Hampshire. According to SDG&E's website, the energy use data includes up to 13 months of smart meter energy usage data, for every hour (Residential) or 15 minutes (Business) of every day.[8] Electricity energy usage data is available through both Green Button options: Download My Data and Connect My Data.

Texas:

The Smart Meter Texas (SMT) portal was deployed in 2008 when the state deployed what were described as advanced meters, for that time. The portal enables consumers to download and access their smart meter data. SMT hosts a website which stores daily, monthly and 15-minute interval energy data recorded by smart meters, providing secure data access to customers, Retail Electric Providers ("REP"s), and Competitive Services Providers ("CSP"s; third parties) including through Green Button. One of the goals of SMT is to enable customers to better manage their energy consumption to lower their monthly electric bills and benefit from new products and services offered by REPs and CSPs.

SMT represents a joint venture between the four IOUs contract to a third party for the development and operation of the platform based on their share of customers. In 2016, 73,000 residential and business customers out of 7.15 million[9] (one percent of customers) were registered on the SMT website to access their data, many of which are associated with a state-mandated program for low income participants, or more expensive on-site

[7] https://www.sdge.com/businesses/pay-bill/green-button
[8] https://www.sdge.com/green-button
[9] https://www.saveonenergy.com/learning-center/post/how-reliable-are-texas-largest-utilities/

solar installations. Texas designed meter data networks specifically intended to facilitate data analysis and management services.[10]

The Electric Reliability Council of Texas (ERCOT) is networked to track customer supply services, and notifies utilities when customers select a retail electric provider (i.e., Reliant), allowing data on SMT to be shared with the electric provider without separate customer authorization. The SMT budget for 2020 was reported to exceed nine million dollars, nearly all of which is devoted to ongoing maintenance of the system.[11]

New York:

In April 2018, the New York State Public Service Commission (PSC) issued the *Order Adopting the Utility Energy Registry* in CASE 17-M-0315. The Order requires utilities under PSC regulation to develop and report community energy use data to the Utility Energy Registry (UER). The UER is a database platform managed by the New York State Energy Research and Development Authority (NYSERDA) that provides streamlined public access to aggregated, community-scale, utility-reported energy data. The UER does not contain private data, addresses, names, or individual account information.

The PSC has addressed GBC implementation in the 2016 Distributed System Implementation Plan (DISP) Guidance Order[12] and the 2018 Accelerated Energy Efficiency ("EE") Order[13]. Currently, two New York utilities have fully adopted GBC, and those utilities have had three third parties register for access to the data, with ten more in the process of registration. ConEd reported that, from the time period between

[10] https://eepartnership.org/wp-content/uploads/2016/10/Meter-Data-Access-Report-FINAL.pdf
[11] http://interchange.puc.texas.gov/Documents/49730_2_1050709.PDF
[12] Case 14-M-0101, *Order Adopting Distributed System Implementation Plan Guidance* (issued April 20, 2016) (DSIP Guidance Order).
[13] Case 18-M-0084, *In the Matter of a Comprehensive Energy Efficiency Initiative, Order Adopting Accelerated Energy Efficiency Targets* (Issued December 13, 2018) (Accelerated EE Order).

April to October 2019, only 362 of its customers had shared data via GBC. New York also ordered a pilot data platform be implemented with the assistance of a third party.[14] A utility was selected for being able to test many of the desired data sharing functionalities, but data was limited to a subset of items to reduce complexity and streamline development and testing. Currently over 20 DER industry participants are registered users of the pilot. Users are actively providing feedback so that the utility and third-party contractors operating the platform can make adjustments as necessary.

The PSC, along with efforts from NYSERDA, is currently exploring the possibility of a different modality of data sharing via an Integrated Energy Data Resource. Delegating the inquiry to NYSERDA, and the information on the volume and variety of information NYSERDA has deemed necessary for a proper assessment of viability, indicate that this is a complex project.[15] The probability that this project will be implemented is unknown at this time.

Massachusetts:

The Mass Save Data ("MSD") website[16] is jointly sponsored by all Massachusetts EE Program Administrators ("PA"s).[17] MSD provides uploaded EE performance data but has been applied to provide monthly usage data by sector (residential and commercial) and town. The MSD website also includes monthly usage data by town, and has been used by towns to track their progress toward greenhouse gas emission reduction goals. [18] Currently, electric MWh and gas therms usage data is uploaded on an annual basis during

[14] Case 18-E-0130, *In the Matter of Energy Storage Deployment Program, Order Establishing Energy Storage Goal and Deployment Policy* (issued December 13, 2018) (Storage Deployment Order).
[15] To assess viability, NYSERDA put out an RFI on the following: Program Management; Development of the IEDR Architecture; Development and Integration of IEDR Detailed Designs and Specifications; Deployment and Integration of Components and Services; Testing and Commissioning the IEDR's Capabilities; System Administration; and System Operations for 5 Years After Completion of Commissioning.
[16] https://www.masssavedata.com/public/home
[17] The Massachusetts program administrators include: Eversource, Unitil, Liberty, National Grid, Cape Light Compact, Berkshire Gas, and Columbia Gas of Massachusetts.
[18] https://www.masssavedata.com/Public/GeographicSavings?view=C

the subsequent year. Recently the Metropolitan Area Planning Council released a tool that guides communities in inventorying their greenhouse gas emissions and refers communities to use MSD to acquire usage data to further the efforts to reduce greenhouse gases.[19] Aggregated usage data by town is shown on the website. To protect customer privacy, residential data is only shown when it represents a minimum of 100 households. Commercial data is shown when there is a minimum of 15 accounts and no single account represents more than 15 percent of the total usage.

As a privacy protection the Massachusetts Department of Public Utilities set forth aggregation standards used by the PAs.[20] The standards call for the PAs to aggregate data, including combining geographic areas, until the minimum aggregation level is achieved. Additionally, PAs have legal and contractual obligations to protect customer data and privacy. The Massachusetts PAs have spent approximately $600,000 since 2013 on the development, enhancement, and maintenance of the MSD website which includes energy efficiency performance data in addition to the usage data by town. This does not include PA staff time and other costs to collect, compile, and upload the data to the website.

Connecticut:

Connecticut has an energy efficiency performance dashboard where the most recent annual usage (currently 2019) data is shown by sector (households and businesses) and town. [21] The data is shown as electric (kWh) and natural gas usage (ccf). The Connecticut dashboard cost less than $200,000 for the original design build and the annual maintenance is approximately $80,000. These statewide costs are shared among the utilities that operate in the State. This does not include staff time and other costs to collect, compile, and upload the data to the website.

[19] https://www.mapc.org/planning101/community-ghg-assessment/
[20] See D.P.U. 14-141, at 6-7.
[21] https://www.ctenergydashboard.com/Login.aspx

Q. Do the Utilities have a proposed framework for a data platform, or options for functionality that would satisfy the objective of the Data Platform Law in New Hampshire?

A. Yes. RSA 378:50-54 provides clear direction on several foundational components of the online energy data platform, and the Utilities have worked to ensure that these items are incorporated into the proposed design presented as part of the "straw proposal". Two of these foundational components are at the core of this proposal as required by the enabling statute: (1) suitability for Green Button Alliance approval, and (2) the creation of and adherence to a "logical data model". The Utilities recognize that there are numerous functional use cases of value to interested parties that warrant consideration for inclusion in options for platform design. Development of the unique functionality necessary to support the specific data and output for all desired outcomes would require an enormous and potentially unrealistic level of up-front design and requirements gathering, likely necessitating a traditional "Waterfall" style software development lifecycle. "Waterfall" projects – where project activities occur in linear, sequential phases – by their nature traditionally incur a much longer time-to-launch trajectory with all of the accompanying cost and obsolescence risks that can follow. In an attempt to avoid this, the Utilities propose an "enabling platform" that securely provides a core set of customer energy usage and billing data points in a standardized data format. The Utilities refer to this architecture as a "Virtual Energy Data Platform", the structure of which is depicted in Figure 2.

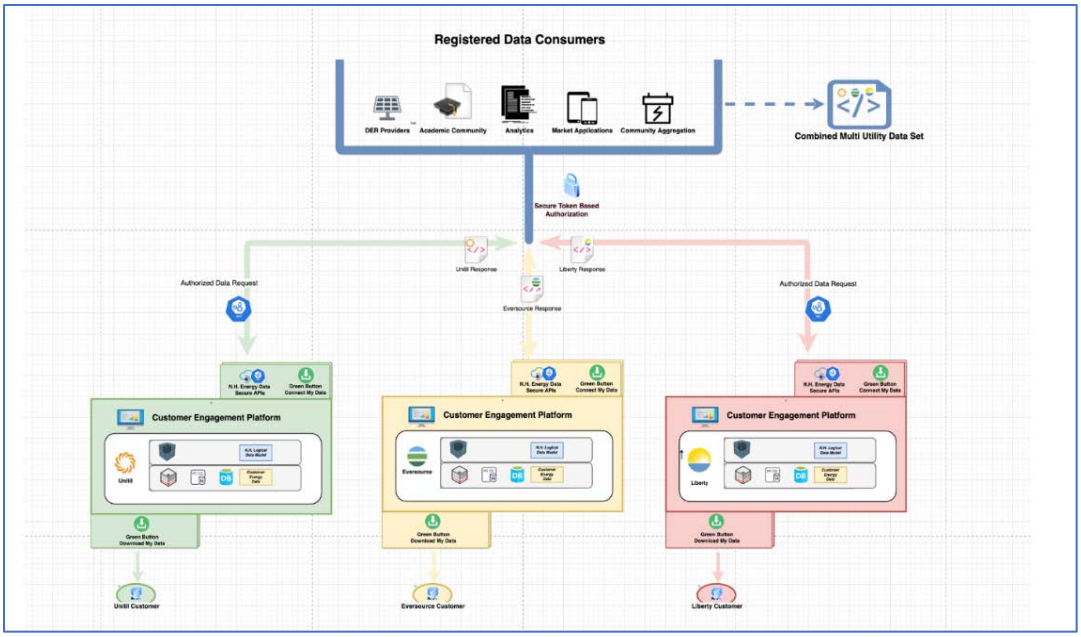

FIGURE 2: VIRTUAL ENERGY DATA PLATFORM

The Utilities are proposing an Agile implementation approach along with a modular architecture that is well suited for this type of iterative methodology. The process will be based on a collaborative platform backlog that will be prioritized by the stakeholder group to ensure that the highest value items are being worked and delivered at any given time. Employing an Agile approach will allow for the enabling platform functionality and functional enhancements to be delivered incrementally as cost-benefit justification warrants. Doing so, enables a more contemporaneous stakeholder feedback loop and helps to avoid imprudent spending and technological and functional obsolescence. The architecture proposed by the Utilities is well suited for this type of iterative cost-benefit driven methodology.

Q. ***Why do the Utilities prefer a decentralized design as opposed to a central database?***

A. In the Utilities' assessment a virtual platform is superior to a centralized data warehouse. Recognizing that a single, centralized, physical data warehouse exists as one of many possible architectural models for such a platform, the Utilities believe that a modular, and

primarily decentralized, design will allow for maximum cost/benefit justified flexibility while minimizing many of the data security, privacy, and governance complexities and risks which come from a centralized database. Protecting the privacy, integrity and security of customers' data is a paramount concern for the Utilities. Furthermore, the most significant implementation costs will result from the work supporting the utility back-end integrations and the extraction and translation of the utility-specific data and data stores. This work must be completed whether the platform is decentralized as proposed, or through the use of a centralized database architecture. Therefore, it is reasonable and appropriate to adopt the platform that will deliver the most value from this effort.

The virtual platform model is designed to be extensible in an effort to provide the greatest level of cost mitigation and flexibility. Recognizing the need for cost prudence subject to Commission determination pursuant RSA 378:51, III, and demonstrating the modularity of the architecture, the Utilities are proposing three potential options for the "starting point" of the platform. Each option presented has successively more functionality. Based on the outcome of the appropriate cost-benefit analysis, the Commission should choose the most prudent configuration for the platform representing the "minimum viable product" at such time. In the future, if incremental cost justification and customer usage goals are met, the decision may be made to expand and extend functionality.

Q. Are there any overall issues and value to consider before comparing the different options proposed by the Utilities?

A. Yes. All three of the proposed platform configuration options contain the following core components that would be shared across the state's utilities:

- Logical Data Model
- Single Customer Data Download via Green Button standards
- Single Customer Data Sharing via Green Button standards
- Aggregate Customer Data Download

Logical Data Model[22]

Regardless of the ultimate format of a platform, each of the NH gas and electric utilities will have unique challenges associated with the process of mining and combining customer energy data from individual, disparate systems to the platform. Numerous technical and non-technical hurdles exist with retrieving and processing the data necessary to support the platform. For example, these data may exist in various vendor relational database systems, they may exist in flat or unstructured data files, or even in legacy mainframe systems. All of these scenarios will require the utilities' IT departments to implement data extraction and parsing systems (the "extract" portion of the traditional ETL, or extract, transform and load model), representing a complex and non-trivial exercise.

After each utility has completed all of the work necessary to identify and extract the required data from internal systems, a second challenge unique to each company arises: combining all of the data as the result of these "extraction" efforts into a single, cohesive, data set that can be interpreted and processed by third-parties (the "transform" portion of the ETL model). Without complex standardization and coordination across the utilities, this would be a near impossibility. The introduction of a "Logical Data Model" attempts to solve some of these problems.

The model provides a common abstraction with agreed upon semantics for field names and data conventions, allowing the utilities to "speak the same language" with common terms and agreed upon units of measurement. The Energy Service Provider Interface (ESPI) data standard released and maintained by the North American Energy Standards Board (NAESB) is proposed to be used as the basis for the model. If data fields are

[22] Under RSA 378:51, The data platform is to allow for sharing of individual customer data consistent with the opt-in requirements for third-party access specified in RSA 363:38 and…adhere to a common statewide logical data model that defines the relationships among the various categories of data included in the platform.

required that are above and beyond what is offered in the ESPI model, the desired approach is to work with the governing body to extend the model, however the standard is already quite robust containing constructs for various energy usage components such as: Usage Points, Meter Readings, Intervals, Reading Types, etc.

The Utilities' proposed Logical Data Model will act as a "mapping layer" that sits on top of the native utility data sets. Because of this mapping layer, utilities would not need to make any changes to their existing back end systems to support this. However, it would still require a non-trivial data mapping exercise. Adherence to this logical data standard is a cornerstone of the "Virtual Energy Data Platform" as this is what allows multi-utility data to be combined by the API consumer.

<u>Single Customer Data Download and Single Customer Data Sharing via Green Button standards</u>

All proposed configurations of the Utilities' proposed Virtual Energy Data Platform specify the use of Green Button Download My Data to provide single customer energy usage data sets directly to the customer. The utilities would allow customers to download their own energy usage data directly from their customer engagement platforms using the Green Button Download My Data standard, and the platform Logical Data Model by design will support this capability. Note that the Green Button standard does not presently accommodate multi-customer aggregated data, and as a result, a different standardized file format will be employed for that data.

Green Button Download My Data allows access to energy usage data directly by a retail customer from the utilities' consumer-facing web portals, using a standard web browser. Vendors wishing to consume data in this format would need to code and create their own tools to read the downloaded files accessed via API. As an alternative, a helper style sheet can also be downloaded that allows the XML data to be transformed into a more "human readable" format. In addition, the platform can alternatively provide a

downloadable comma-separated values (CSV) file to support smaller third parties who do not have the technical capabilities to process a Green Button XML file.

Aggregate Customer Data Download

In addition to the individual customer level energy data discussed above, SB 284 also provides a purpose for the platform to facilitate access to aggregated data, stating that: "By enabling the aggregation and anonymization of community-level energy data and requiring a consent-driven process for access to or sharing of customer-level energy usage data, the state can open the door to innovative business applications that will save customers money as well as facilitate municipal and county aggregation programs authorized by RSA 53-E."[23] In the data platform options provided below, varying degrees of utility-provided data aggregation tools are offered for consideration of value and usefulness.

Q. Can you explain the major functionality and design of each of the three options?

A. In the view of the Utilities, each of the three options presented below represent a possible viable product for the platform. Assuming a favorable outcome of any prospective incremental cost analysis, these options could also serve as a starting point for future enhancements and additions. By design, each of the options below builds on the prior in terms of functionality and relative ease of use while implementing the core platform components described above. The Utilities view Options 1, 2, and 3 as the successively enhanced solutions, and successively more expensive, tailored to address many of the use cases and user stories submitted during this docket process. The aim is to present incremental benefits that can be quantified such that the Commission is able to understand and ultimately select the solution offering the best value for customers. The platform options as presented allow for incremental development due to the flexibility and scalability of the approach.

[23] http://gencourt.state.nh.us/bill_status/billText.aspx?sy=2019&id=1077&txtFormat=html

Option 1 – Green Button Download My Data

This proposed option is an extension of the Green Button Download My Data option that already exists where customers can, with a few clicks, download a file of their usage that they may analyze or supply to others for analysis and use on the customer's behalf. The addition of the logical data model to this existing function would allow data sets to be combined by either the customer or by a customer-authorized third party.

Customers interested in procuring their own usage information will download their data directly in XML format from each of their utilities using a web browser and the Green Button Download My Data feature. CSV file alternatives to the XML format are also provided in addition to one or more "stylesheets" that can be used to render the XML in a more "human-friendly" format. "Stylesheets" are similar to reports and provide a user-friendly output. Liberty Utilities endorses the three option designs, and so their logo has been included in figures depicting all three options solely for this limited purpose.

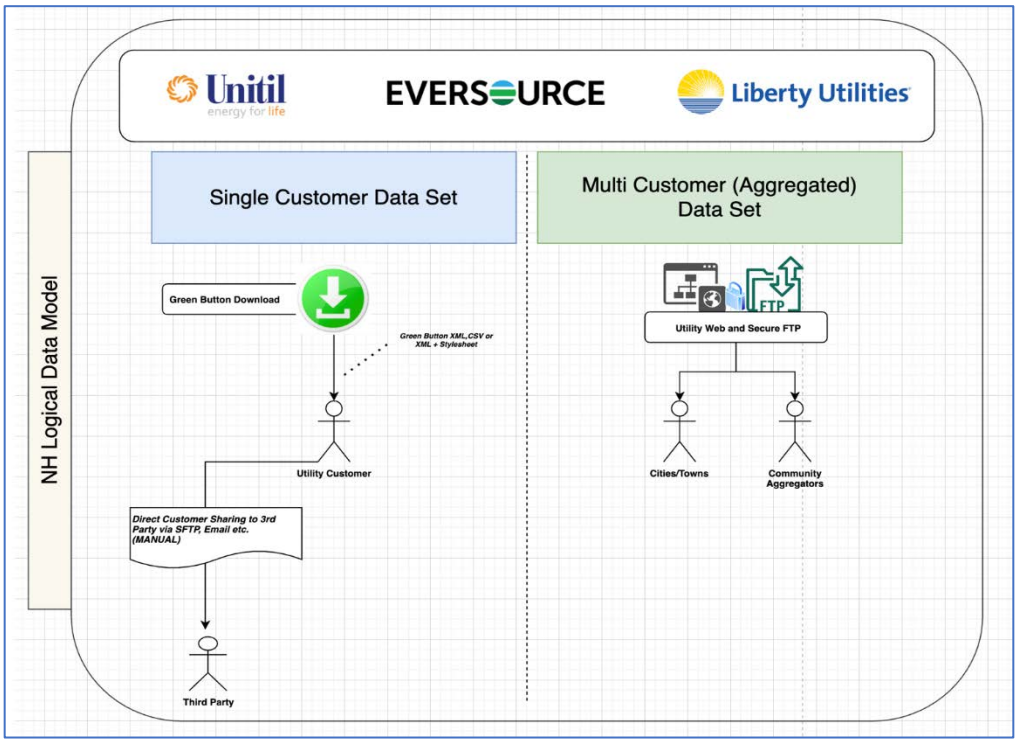

FIGURE 3: OPTION 1 – GREEN BUTTON DOWNLOAD MY DATA

The Option 1 platform does not provide any automated data sharing, however the combination of the logical data model and the Green Button Download My Data capabilities allow the customer to manually download, combine the data files downloaded from other utilities (in the case of a multi-utility customer, for example), and manually share that data with third parties of the customer's choosing through a variety of potential means (including email, secure upload etc.)

Unlike the single customer use case, a standard output form for this aggregated data does not exist which could make combining these data sets across multiple utilities cumbersome without an alternative. With Option 1, the utilities would continue to use their existing processes for generating aggregated data files but would agree to an Excel format implemented across all participating utilities that could be easily combined for multi-utility analysis, and also agree on a standardize means of transmitting this data.

While developing a meaningful cost estimate cannot reasonably happen until the scope of the potential project has been defined, what is clear is that because this option would represent only a relatively small expansion of the utilities' current offerings, it would be the least costly to implement and would have the shortest development timeline.

Option 2 – Green Button: Download and Connect My Data

With Option 2, single customer data downloads are handled in the same manner as in Option 1, leveraging the power of the logical data model and Green Button Download

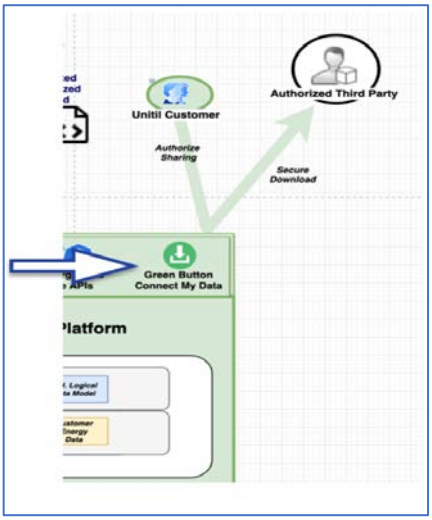

FIGURE 4: GREEN BUTTON CONNECT MY DATA

My Data as the means for accessing data. Where Option 2 differs from Option 1 is the introduction of the GBC protocol for automated data sharing as well as the introduction of the distributed "NH Utility Energy Data Sharing APIs" which are described in more detail below. This option is the preferred option of the Utilities as the platform starting point.

Single customer data download capability is implemented the same manner as Option 1 leveraging the Green Button Download My Data feature, but with simplified usability by

mitigating the manual sharing process. The use of GBC APIs will allow the Utilities to automate customer authorization and secure delivery of data directly to authorized third parties, adding ease of use and reducing complexity for customers.

GBC requires implementing multiple standards:

- NAESB REQ.21 Energy Services Provider Interface [24] and
- IETF Oauth 2.0 (RFC 6749 and RFC 6750).[25]

Using these standards will provide a retail customer with the ability to "authorize" a verified third party to access data provided by the utilities without any further interaction with the retail customer. The standards support the ability for the utilities to implement restricted access to these endpoints based on various screening and approval steps performed by the utilities for a given third party. Similar to data downloaded using the Green Button Download My Data standard, vendors would need to code and create their own tools to read the XML files access via the APIs. Helper style sheets can be provided to assist with rendering these XML data files into something that is more "human friendly".

For aggregated or multi-customer data, in Option 2, each utility will expose a library of decentralized APIs allowing for automated retrieval and processing of multi-customer data by approved third-parties.

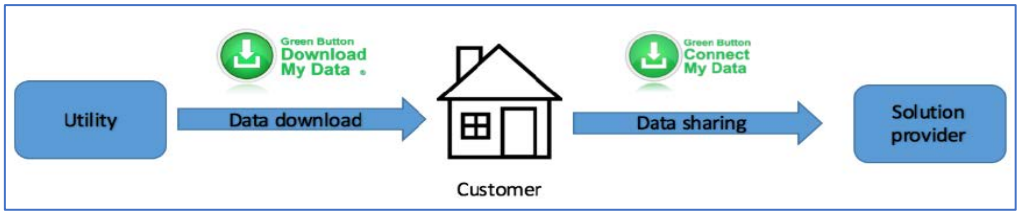

FIGURE 5: GREEN BUTTON DOWNLOAD AND CONNECT MY DATA OVERVIEW

[24] REQ.21 – Energy Services Provider Interface, NAESB 2010, http://www.naesb.org/ESPI_Standards.asp
[25] The OAuth 2.0 Authorization Framework, RFC 6749, http://www.ietf.org/rfc/rfc6749.txt

Each Utility will expose a standard set of REST[26] accessible APIs over Secure Socket Layer connections. The interface for these APIs, as well as the data formats returned will be exactly the same for each implementing utility and will provide standard interfaces for on-demand or scheduled energy data transfers to external requestors. Even though the back-end logic for extracting and transforming the data for each utility will be unique, the APIs will be programmed against the logical data model abstraction, ensuring simple combination of multiple Utility data sets irrespective of underlying differences in data storage, nomenclature and processing.

The APIs will implement standard token-based authentication and authorization similar to ISO-NE's API model and will return cleansed, validated and cryptographically secure data sets enabling the creation of any number of market applications and analyses. Vendors and third parties will need to request and receive an API access token in order to request data from the APIs. The API access tokens can be crafted to allow and deny access to specific granular data and data types. Once authorized, vendors and third-parties can automate analytics and combining of data using the APIs and programmatic means. Figure 6 depicting Option 2 shows how single customer energy data downloads would work using both Green Button Download and Connect My Data as well as how a multi-customer (aggregated) energy use would work in a town, for example, that has areas served by three utilities.

[26] "RESTful Web services: The basics", IBM Developer Works, https://www.ibm.com/developerworks/webservices/library/ws-restful/

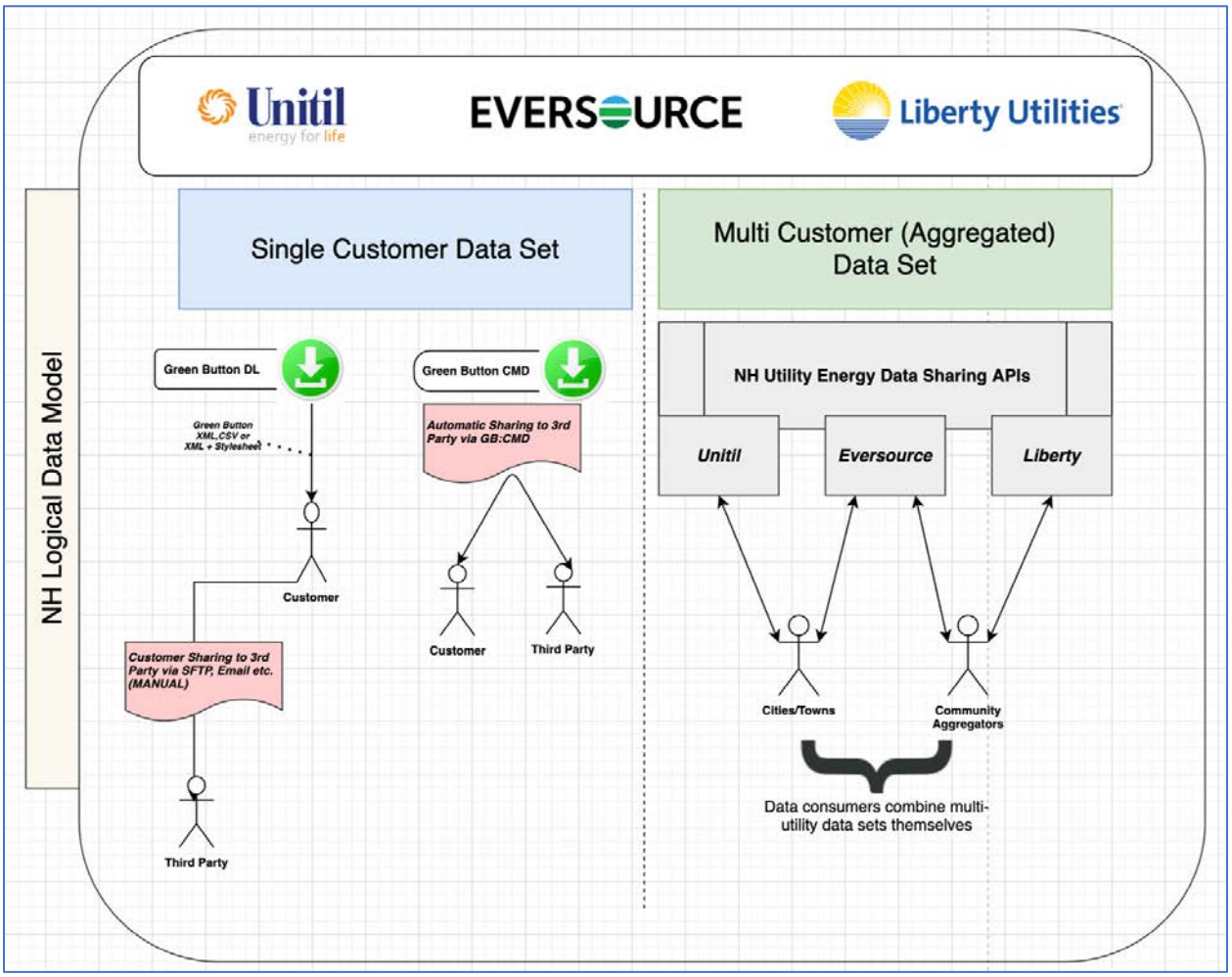

FIGURE 6: OPTION 2 – GREEN BUTTON DOWNLOAD AND CONNECT MY DATA

Option 2 would entail additional costs beyond those of Option 1 to modify and prepare utility systems to successfully and seamlessly make use of the GBC protocols and processes, and additional incremental ongoing maintenance costs would exist with this option. Ultimately, any proposed platform will need to pass the Commission's cost-benefit analysis; in the Utilities' judgment, the proposed Option 2 offers the greatest likelihood for a cost-beneficial outcome for customers, while still allowing room for later enhancements should they be warranted and justified.

Option 3 - Green Button: Download and Connect My Data plus Aggregation

All of the core features described in Options 1 and 2 are present in Option 3. In this version of the platform, the data retrieval process is streamlined and additional features in the areas of data representation and presentation have been enabled. In particular, Option 3 has been designed to enable pre-assembly of utility data to simplify aggregation and data combinations described in Options 1 and 2. The additional development and management required of these convenience features increases the cost and scope of the platform; substantially, the Commission must weigh whether the significant incremental costs are justified by such enhanced functionality.

Virtual Data Mart - Aggregation and Brokering

The decentralized API model introduced in Option 2 enables many of the desired platform use cases described by stakeholders during our technical discovery sessions, but not without some additional work by the consumers of the data. For example, as depicted in Option 2, to retrieve and build an aggregated data set across all participating utilities, the consumer is required to make multiple API calls (one to each participating utility end-point) and combine the data themselves.

The Utilities recognize that although technically feasible, this may not represent the ideal user experience, and have designed the platform to be purpose built to allow for an "aggregation" endpoint or an "API of APIs". Doing so introduces an additional, centralized, API gateway allowing for authorized consumers to make a single call to a centrally exposed statewide API that, assuming the appropriate access tokens are in place, would broker calls behind the scenes to each of the individual utility APIs and aggregate the data based on to be defined industry aggregation standards, to deliver the combined multi-utility data set seamlessly. Thus, the same data and data sets would be made available to the customer as in Option 2, but that information would be provided through a single interface rather than through interactions with each utility. For individual residential customers, the incremental benefit would likely be minimal. However, to

entities like commercial customers with locations in the territories of multiple utilities, the added convenience would likely be more valuable.

Virtual Data Mart - Centralized Web Portal

The API architecture proposed would also readily facilitate the creation of a centralized Web Portal that provides combined and aggregated data by municipality should the incremental cost/benefit analysis justify this work. This web portal could provide formatted reporting, stylesheets, templates and other user-friendly ways to consume aggregated data and would utilize the aggregation service and the decentralized APIs provided by the virtual platform.

Virtual Data Mart – System and Third-Party Data

As depicted below in Figure 7, Option 3 also introduces the ability for viewing limited forms of system level data from the utilities and provides that data via the Virtual Data Mart. The specific types of system data offered will ultimately be determined by security considerations and the outcome of other Commission proceedings, such as the ongoing Grid Modernization docket. The Utilities acknowledge that a variety of approaches exist to solve this problem, each accompanied by unique challenges, complexities, and costs considerations. A full cost-benefit analysis must be performed to determine the value and desirability of this functionality before committing to an overly complex (and potentially expensive) solution.

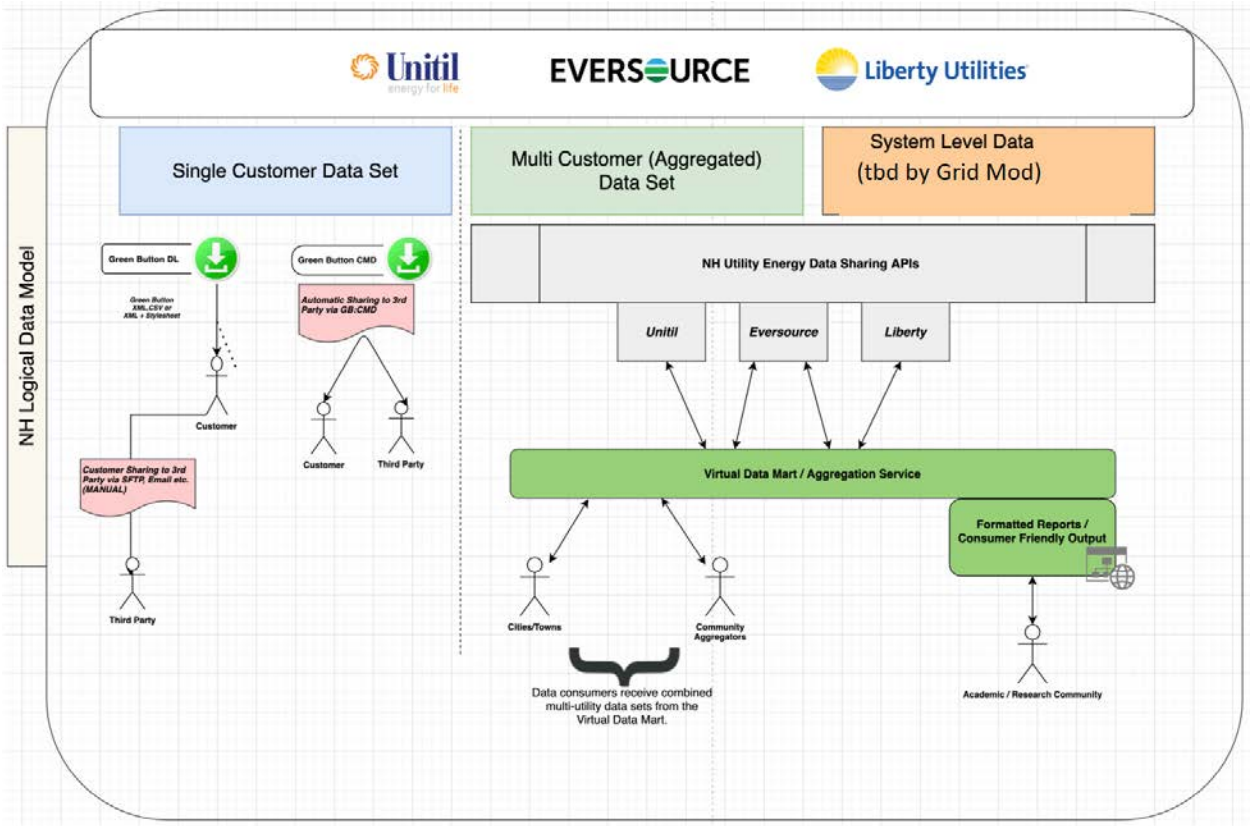

FIGURE 7: OPTION 3 – GREEN BUTTON DOWNLOAD AND CONNECT PLUS AGGREGATION WITH DATA MART FEATURE

The three proposed Options and their main functional components can be compared in the table below.

Platform Functionality Summary

	Customer Download	**Customer Sharing**	**Aggregate Data**	**Reporting / Queries**
Option 1	Green Button: Download My Data	Manual	CSV from Website and/or File Transfer Protocol (FTP)	N/A
Option 2	Green Button: Download My Data	Green Button: Connect My Data	Multiple API calls and consumer aggregation	N/A
Option 3	Green Button: Download My Data	Green Button: Connect My Data	Single API call Platform does aggregation	Enabled by Virtual Data Warehouse

Q. What data is proposed for sharing via the platform by the Utilities to meet the statutory requirements of the Data Platform Law?

A. RSA 378:51 mandates that the data platform be built with a "common base of energy data for use in a wide range of applications and business uses." It also dictates that, where applicable, "specific and well-documented standards" will be used in the design and implementation. The utility logical data model will be built using the NAESB ESPI (North American Energy Standards Board Energy Services Provider Interface) data standard. This standard format contains schema for both broad energy usage data as well as information about the retail customers themselves. The purpose of the NAESB ESPI standard (REQ.21) is to create a standardized process and interface for the exchange of a retail customer's energy usage information between their designated data custodian (i.e. Distribution Company) and an authorized third-party service provider.

Providing a consistent method for the authorization of third-party access to retail consumers' usage information and a standardized interface for the exchange of that information will support the development of innovative products that will allow customers to better understand their energy usage and make informed decisions about their usage. The NAESB ESPI standard provides business practices, use cases, models and an XML schema that describe the mechanisms by which the orchestrated exchange of energy usage information may be enabled. The NAESB standards development effort was conducted with the support of the National Institute of Standards & Technology (NIST) and the Smart Grid Interoperability Panel (SGIP) and serves as an extension of the NAESB Energy Usage Information Model developed at the request of NIST and the SGIP.

Q. What kinds of energy usage could be provided for these options, and what purposes could they serve?

A. The Utilities have leveraged the classifications used in the Green Button standard to organize Energy Usage Information (EUI) into three categories: (1) identification,

(2) summary information, and (3) measure component. Those three categories are described in more detail below. These classifications of data can represent residential or commercial energy usage independent of commodity. The audience for this data can be humans or machines. The origin of the EUI in the Utilities' systems is when a meter is read.

1. Identification – The source of the information including how it was required.
    - Note that the Green Button standard dictates that identifiable information is stored separately from the energy usage info for privacy reasons.
2. Summary Information – This contains the summary of usage from the current period to date. Essentially, this is the level of detail available to customers through their energy bills.
3. Measure Component – These are the details of the actual minute-by-minute / hour-by-hour / day-by-day usage of energy.
    - This component is designed so that it can represent any set of measurements from watt-hours (Wh) to watts (W) to volt-amp-reactive (VARs) to related measurements such as voltage and temperature.

Q. How might the EUI data be used?

A. See bullets below:

- When a customer participates in demand response, their EUI (including the cost component) is key feedback to the consumer of the direct consequences of their actions.
- When a customer is looking to conserve energy, the EUI is reference they might use for study/planning.

- Business with energy controls might use the EUI as feedback to minimize costs.

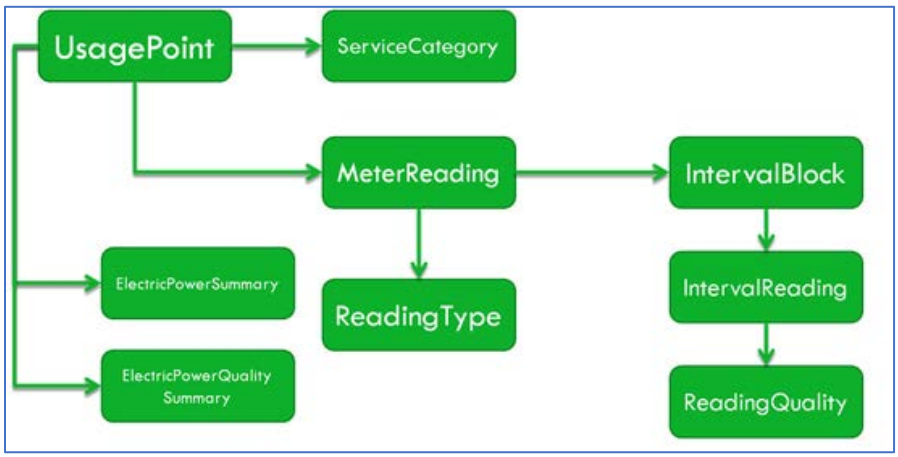

FIGURE 8: LOGICAL EXAMPLE OF THE ENERGY SERVICE PROVIDER (ESPI) MODEL FOR ENERGY USAGE INFORMATION (EUI)

The following specific examples below represent many of the types of New Hampshire customer information that would be made available from the platform. A final list of available data endpoints will be decided after an appropriate cost-benefit analysis has been performed.

- Name
- Service Address
- Home Phone
- Mobile phone
- Email address
- Operating Company
- Billing Account Numbers
- Meter Numbers
- Requested by
- Requested Date

The following types of New Hampshire usage energy data would be made available in the platform:

- Account Number
- Read Date
- kW Demand (for non-residential)
- kVA (for largest customers)
- kWh Usage
- Number of days in the billing period
- kWh / Day
- Read Type

Q. How will the platform provide a user-friendly interface and accommodate for users with disabilities?

The Utilities agree that the platform should be user-friendly and accessible to people with disabilities, while still maintaining the security of Multi-Factor Authentication.
A user-friendly interface is important to the adoption and regular use of the platform. User interface design focuses on anticipating what users might need to do and ensuring that the interface has elements that are easy to access, understand, and use to facilitate desired actions. Interface elements include, but are not limited to, input controls (buttons, text fields, checkboxes, radio buttons, dropdown lists), navigational components (breadcrumb, slider, search field), informational components (tooltips, icons, progress bar, notifications) and containers (accordions).

Best practice recommendations help guide the design and functionality of a website for accessibility and ease of use:

- Keep the interface simple with a common landing page for all utilities
- Create consistency and use common UI elements
- Be purposeful in page layout
- Strategically use color and texture

- Use typography to create hierarchy and clarity
- Make sure that the system communicates what's happening
- Think about defaults that reduce the burden on the user

Web accessibility has become an important consideration for interface design and user experience testing and success. The Web Content Accessibility Guidelines (WCAG), published by the Worldwide Web Consortium (W3C), aim to provide a single shared standard for web content accessibility that meets the needs of individuals, organizations, and governments internationally. These documents explain how to make web content more accessible to people with disabilities. Web "content" generally refers to the information in a web page or web application, including natural information such as text, images, and sounds; and code or markup that defines structure, presentation, etc.[27] The Utilities aim to strike a balance between usability and security without increasing risk of inappropriate or malicious access.

Q. What data ownership and access structures will be followed within the data platform architecture?

A. The Utilities plan to follow the DataGuard framework[28] published by the US Department of Energy (DOE). Use of the Framework will ensure the protections of the system and customer understanding of the storage and use of the data. The DataGuard framework includes the following practices:

- Consumer Notice and Awareness
- Customer Consent
- Integrity and Security
- Customer Data Access and Participation, and
- Self-Enforcement Management and Redress

[27] WCAG 2.0 was published on 11 December 2008. WCAG 2.1 was published on 5 June 2018. All requirements ("success criteria") from 2.0 are included in 2.1 and there are additional success criteria in 2.1 that are not in 2.0. The common data-sharing platform should target to achieve WCAG 2.1 AA success criteria, thereby offering an accessible solution that benefits all users.

[28] https://www.smartgrid.gov/data_guard.html

Customer data such as (but not limited to) usage data, customer address, or account number may be used in the aggregate or original form for this analysis, however the utilities will use the minimal amount of data necessary depending on the nature of the analysis. Where feasible, aggregated data or anonymized data will be used. The basic premise in data access is that the data is owned by the customer and the utilities are the custodians of the data. The customer must explicitly authorize the release of this data outside of the utilities, in accordance with their respective privacy policies, regulatory requirements, and laws. The customer has the right to know what data is collected and what it is used for by third parties. If customer data is found to be incorrect, then the customer has the ability to correct it. Operational data are developed and collected as part of managing the energy delivery systems. This data is modeled and analyzed to improve the resiliency of the energy delivery systems, is the property of the utilities and must be protected to ensure the reliability of the energy delivery systems.

Q. What aspects of the design and functional elements proposed by the Utilities are certifiable by the Green Button Alliance?

A. The monthly and interval energy data transactions that are part of the three options can become certified by Green Button Alliance ("GBA"), as the Data Platform law requires. Green Button Download My Data (Option 1) is currently operational today and would require that the Utilities add interval meter data. Green Button Connect My Data (Options 2 and 3) would need to be developed and be certified. Because there is no standard transaction to automate the transfer of aggregated town level data, or anonymized community customer level data, the Utilities have recommended alternative delivery mechanisms that would provide the data either via a web site or a secure FTP site. It may be possible for the Utilities to develop a standard format that could be reviewed and potentially certified by the Green Button Alliance in the future. RSA 378:53. GBA conducts the testing and certification of the platform as they are the only organization offering a testing program for electricity, gas and water utilities. The GBA

would administer the test at a fixed cost and assist the Utilities in preparing the platform implementation for compliance on a time and materials basis. Green Button testing is done remotely against the utility servers and a testing mark is issued to denote compliance with the standard. By obtaining certification, the Utilities greatly increase the ability to deliver GBA-compatible solutions to the market.

The Utilities have engaged with GBA during the initial scoping design process of this docket and will work with them closely to ensure compliance of anything the Utilities are directed to design pursuant to this docket.

Q. Are there comparable offerings like an "off the shelf" third-party systems that could provide similar functionality?

A. No, it's worth noting that no ready-made, "off the shelf" third-party products or services can do what the Utilities are proposing in this testimony, nor what is being asked of the utilities in this docket and in the Data Platform Law. This is primarily because the data being sought to populate the platform is contained in legacy utility-specific systems. Because of this, as noted previously, the vast majority of the work to be done, regardless of the design of the final data platform, is the process of getting data from the utilities to the platform. That work requires extensive labor-intensive efforts with multiple systems within each utility, no matter what process is used or what form the result takes.

To do this, rather than rely on an incomplete "off-the-shelf" product, utilities would build semi-automated capabilities to receive vendor registration information, process it, track it, and provide reporting. The same holds true for customer authorization. Utilities would model the data to the common format consistently across all the utilities and then build the ability to provide the data to the third-parties. Utilities would ensure that access to data is secured in a manner compliant with company policies, cyber security guidelines, Commission requirements, and all legal and regulatory mandates. Third parties will not need to customize, but simply build applications compatible with the common format.

Q. How can the proposed data platform enable data flows to third-party systems?

A. Figure 9 illustrates how the utilities and third-party service providers share data today with standards like Green Button. Utilities collect and validate meter data, which is then used for billing and a host of internal functions such as ISO-NE load settlement, transmission and distribution system planning, energy efficiency programs, and others.

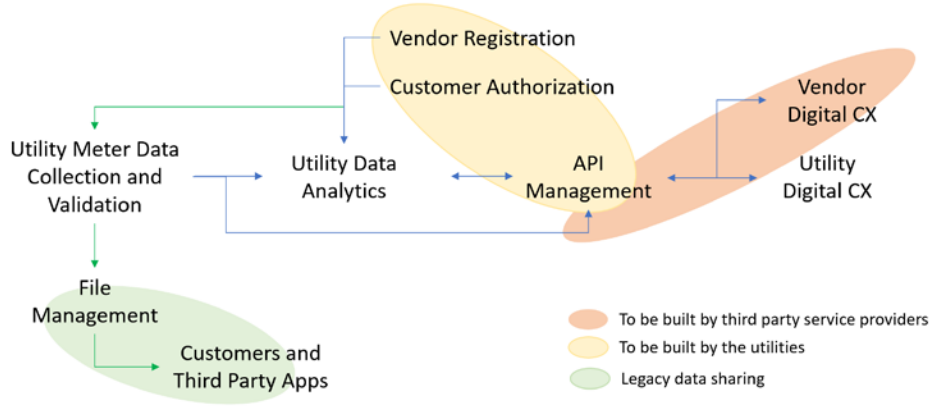

FIGURE 9: IT COMPONENTS ENABLING THIRD-PARTY ACCESS OF ENERGY DATA VIA THE VENDOR DIGITAL CUSTOMER EXPERIENCE (CX)

For external use, Option 1 data would be transferred in files to customers and other utility industry players, as shown in the green bubble in the diagram above. In addition, these parties may have their own software that makes this data available to customers, suppliers, etc.

Both Eversource and Unitil plan to offer this data utilizing the Green Button Download My Data format.

With Option 2, the Utilities would provide data in the common Green Button format and expose it to registered and authorized third parties via API, leveraging the Green Button Connect My Data process. Any third party that has the Green Button standard built into their application would then be able to retrieve the data in an automated fashion, and

since all three utilities will offer the same standard, the third-party software can be developed to one format instead of multiple formats. Both the utilities and the third-parties have software development work to do in order to use the Green Button standard as depicted in Figure 9, where the yellow and orange bubbles overlap. In fact, it has been demonstrated in the course of this docket that this approach is advantageous with two third-party vendors. mPrest and Kevala Analytics, both provided presentations to the stakeholders of this docket showing compatibility with the Utilities' API designs, further reinforcing that applications and software could easily work with the options presented in this testimony. Anticipating future uses by the industry, market participants and customer needs, the Utilities provided three options that serve as an enabling platform for the development of external application software and services.

Q. What protections do the Utilities propose to protect from unauthorized disclosure the personally identifying information or personal information of customers?

A. The Utilities recognize that data repositories storing customer data represent high-risk targets. Bad actors regularly work to steal customer information for economic gain and to support social engineering activities. The data platform is intended to contain various customer data which requires security controls to adequately protect the data. The controls proposed by the Utilities are consistent with controls currently in use. These controls are based on industry standards including the NIST Guidelines for Smart Grid Cyber Security, NISTIR 7628, and the DataGuard Energy Data Privacy Program, developed by the DOE. The platform must also ensure compliance with, at a minimum, the following state and federal mandated standards:

- Puc 300 Rules for Electric Service
- 18 CFR § 125.1 Preservation of Records of Public Utilities and Licensees
- 18 CFR § 125.3 Schedule of Records and Periods of Retention, and
- Consumer Data Breach Notification Law, RSA 359-C:19.

Understanding the threat landscape and risks helps to ensure the controls are appropriately designed. The following risk scenarios should be considered in designing data protection controls. These risks are the most significant but should not be considered all-inclusive until further information is available on the final design requirements, which could impact the threat landscape.

- Confidentiality of customer data could be compromised by unauthorized access to customer data, resulting in a data breach where the data could be sold on the Dark Web.
- Confidentiality of usage data could be compromised and used to target customers' privacy and allow an attacker to monitor behavior patterns.
- Integrity of customer data could be impacted by unauthorized access to customer data, resulting in decision-making based on invalid data.
- Unauthorized access to the data platform could result in a compromise and theft of user credentials, increasing the ability of an adversary to potentially access systems outside of the data platform and attack other energy system infrastructures.
- Third parties receiving data from the portal may not have sufficient data protection controls to ensure the risk of a compromise of customer data is minimized.
- Third-parties requesting data from the portal may be Foreign-Owned, Controlled, or Influenced (FOCI), resulting in data being provided to a nation state for purposes other than intended by the Commission or the Legislature. This situation could result in a violation of customer privacy or improve the likelihood of an attack on the power grid.[29]

While the Utilities understand that all risk cannot be eliminated, the utilities have a responsibility to ensure that customer and operational data are adequately protected, including when provided to a third party for legitimate business reasons. The Utilities plan to incorporate process and system controls into the platform, commensurate with the

[29] Reference the Presidential Executive Order 13920 issued May 1, 2020 titled "Securing the United States Bulk-Power System".

risk to customer privacy as well as critical infrastructure. The requirements are intended to ensure the Confidentiality, Integrity, and Availability (CIA) of the systems and data. Consistent with NIST Guidelines for Smart Grid Cyber Security, NISTIR 7628, the Utilities plan to implement a comprehensive cyber program to protect any actual data stored via the platform. These program requirements include implementing appropriate privacy impact assessments, appropriate access controls to the systems and data, security awareness training for non-utility staff that may support the portal, incident response procedures, media protection, supply chain, and appropriate system development and maintenance procedures and controls.

The following controls will be required for the platform. These controls are the key controls and others will likely be required as the system is designed:

- Access and Authentication Controls
- Configuration Management
- Encryption
- Logging and Monitoring
- Vulnerability Management

Another important step in reducing the risk of sharing Customer and Operational data is an assessment of the security posture of the third-parties that request data. The Utilities propose to adopt a common cyber security assessment process. Third-parties will complete the assessment and be certified to access data from all utilities, if appropriate. Third-parties will be reassessed annually or immediately following a change in their environment or a cyber incident. Third-parties will also be required to sign a Mutual Non-Disclosure Agreement (NDA) with the Utilities. This non-disclosure will address the requirements of the third party to protect and keep confidential customer energy use data, security and retention requirements. Additional NDAs from departments such as purchasing or IT may also be required, as appropriate.

The proposed common cyber security assessment would evaluate:

- Obligations of third-parties and contractual relationships;
- Oversight of third-party certification/vetting and annual re-certification process;
- Monitoring of third-parties for appropriate use of data;
- Liability for third-party breach of privacy rules;
- Protection of Customer Data and utility infrastructure from compromised third-parties;
- Data breach notification to utilities, customers, the Commission and stakeholders;
- Process for decertification, revoking data platform access, and third-party appeal process;
- Creation of reference materials (links, training, communications, User Guides, Business Intelligence references)

Q. Are utility-entities outside the three investor-owned utilities able to participate given the design options you recommend?

A. The Utilities believe in a statewide energy data platform that could be expanded regionally depending on utilization and usefulness. The Utilities operate in multiple jurisdictions and have developed the platform to be simple, flexible, and scaled for other energy market participants in a variety of jurisdictions. Although any statewide data platform will be principally designed and fully operated by the utilities, the inherent standards being recommended could be adopted by other state utilities. Governance documentation, which will include platform standards, operational process documentation, FAQ's and use cases examples would serve as a guide for the NHEC or NH Municipal electric utilities considering adoption of the standard. The Utilities are open to the participation of the NHEC or NH Municipal electric utilities in the stakeholder process and would work with them should they express interest.

Q. How will governance ensure the necessary cyber security and privacy protections for the data in the platform?

A. As mentioned all throughout this testimony, security and privacy are top concerns for the Utilities with a possible data platform, and governance is a central factor in ensuring protections can be properly structured. The Utilities strongly recommend a thorough data governance framework to manage the data throughout its life cycle to comply with the security and privacy legal and regulatory requirements in place to protect customers and their data. Data governance includes the people, processes and technologies needed to guarantee understandable, correct, complete, trustworthy, secure and discoverable data. Data governance establishes the decision rights, stewardship, controls, and definitions for all data within the utilities' responsibility and mitigates the risk of inaccurate and unsecure data. Data governance encompasses: Policies and Standards, Information Quality, Privacy, Compliance, Security, Architecture and Integration.

Policies and standards are a crucial part of data governance. Policies must be developed to define the data governance structure, secure data access and usage, and to ensure data integrity for successful integration. Data stewardship ensures information quality. Data stewardship is a central element of managing data from a variety of sources and guaranteeing the quality of the data gathered, stored and used by the platform. Data stewardship requires documenting and enforcing rules around data collection, storage and use, and executing the policies and standards established by the data governance framework. Data stewardship ensures access to the right data by the right users at the right time based on whether information is private, public or sensitive data; and it also creates and implements processes and procedures for data collection, storage, use and security.

Privacy in the data governance framework refers to the use and governance of personal data and personally identifiable information. Privacy requires customer notice and consent, data de-identification guidelines (anonymization and aggregation procedures)

and a data sharing framework: from terms of service to cyber incident response plans. Compliance with the data governance framework must be systematic and transparent to ensure that all who operate and interact with the platform meet the relevant obligations under applicable laws, regulations, best practices and standards, and contract terms. Platform users that utilize and store customer data should be subject to external assessment and audit for security management controls. The security component of the governance framework focuses on protecting data from unauthorized access, including intentional malicious attacks. Crucial to data security is development of a vulnerability management program and regular penetration testing.

Architecture and integration in relation to data governance includes information, metadata, storage, transport and system standards; it aims to achieve operational efficiency by simplifying data integration architecture components such as data modeling and APIs. Architecture and integration inform the data sharing platform roadmap. Governance processes are required to identify, manage, audit, and disseminate all information related to architecture management, contracts, and implementation, and to ensure that all architecture artifacts and contracts, principles, and operational-level agreements are monitored on an ongoing basis with clear auditability of all decisions made.

Q. What happens if there are glitches or problems arise with the platform itself that require immediate attention?

A. Change Management provides procedures for bug-fixes and a defined process for addressing emergency issues. The Utilities recommend a stage-gated Change Management and approval process such as the one described in the Figure 10 below. Stage-gating the process prevents changes from being made without proper review and approval.

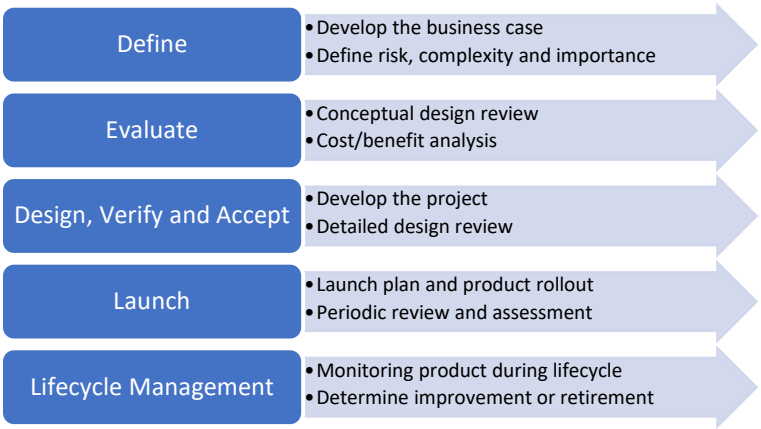

FIGURE 10: DATA PLATFORM CHANGE MANAGEMENT PROCESS

A change control review team, under the direction of the operations management committee, would be formed from a cross-functional section of the utility implementation teams and will be responsible to review, approve and communicate changes to the technology, implementation approach and functional requirements for the platform. Change management applied to platform software development entails using the industry standard software development lifecycle and change control techniques to ensure the integrity and traceability all software and database components.

Q. Are there particular cyber security standards the Utilities recommend?

A. The Utilities strongly recommend adopting the guidance given by the NIST Cybersecurity Framework (CSF).[30] The CSF is the result of a collaborative effort between the US government and private sector organizations to provide cybersecurity best practices along with a framework for managing risk. Likely half of all U.S. organizations will use this framework by the end of this year, including healthcare, retail, financial services, and all sectors of critical national infrastructure.

The CSF is made up of five core functions that help organizations establish a cybersecurity strategy and establishes the processes and controls necessary to manage

[30] https://www.nist.gov/cyberframework

and mitigate cyber risks. Based on this information, the framework profile assists organizations with identifying where cybersecurity must be improved upon, as well as how to prioritize those initiatives. The most recent version of the framework also includes updated recommendations surrounding authentication, cyber risk assessments, and vulnerability disclosures.

Q. And what processes and protections specific to privacy and security of the data do you propose?

A. Data privacy must represent a primary concern for any platform storing and transmitting private customer data. With this in mind, the Utilities suggest leveraging the protections recommended by the US DOE Data Privacy and the Smart Grid: A Voluntary Code of Conduct and the DataGuard Energy Data Privacy Program including Multifactor Authentication ("MFA").[31] MFA reduces the risk of account takeovers and fraudulent transactions, the risk of system administrator account security breaches, and increases consumer confidence in the security of the platform. MFA is a security enhancement that allows a user to present several pieces of evidence when logging into an account. This evidence falls into three categories - something you know (e.g., password), something you have (e.g., smart card) and something you are (e.g., fingerprint). The presented evidence must come from at least two different categories to enhance security. Assuring the integrity, privacy and security of any customer data made available through the platform will require a well-informed, proactive approach and must be carefully considered through all phases of the planning and development process. It is also critical that all relevant Federal Energy Regulatory Commission ("FERC") data and record retention requirements, such as 18 CFR § 125.1 (Preservation of Records of Public Utilities and Licensees) and 18 CFR § 125.3 (Schedule of records and periods of retention), are evaluated and incorporated into data platform planning discussions on data

[31] https://www.energy.gov/oe/downloads/data-privacy-and-smart-grid-voluntary-code-conduct

retention and archiving rules along with the record retention and disposal requirements from DataGuard.

If developed, the platform should be designed following principles of reasonable high availability (understanding cost considerations) with appropriate business continuity and disaster recovery plans in place. The scope of these availability and continuity discussions is highly dependent on future implementation decisions and should be discussed further at that time.

Q. How do you address the risk of accidental or malicious acts of third parties with access to the platform?

A. Third-party risk is a significant risk which is impossible to completely eliminate, so this risk and the implications of an actual third-party data breach or other abuse of the platform should be carefully considered before endorsing a course of action for developing a data platform for New Hampshire. According to the Ponemon Institute's second annual *Data Risk in the Third-Party Ecosystem* study, which interviewed 625 information security professionals across varied industries, 56% confirmed third parties led to some form of data breach.[32] Additionally, 42% noted that third parties led to misuse of sensitive data. If a third-party breach occurs that involves data shared from the data platform, the utilities could suffer significant reputational damage as a result of the incident. Crucially, customers could be at increased risk from criminals seeking to exploit a breach regardless of how the incident originated.

Third-party cyber risks arise out of vendor security vulnerabilities. Utilities control and secure their own environments but have limited visibility into the security measures taken by third parties. The third-party security assessment process described earlier in this testimony allows for review of a potential recipient of customer data for security

[32] https://insidecybersecurity.com/sites/insidecybersecurity.com/files/documents/sep2017/cs2017_0340.pdf

weaknesses. While third-party business relationships rely on trust, this assessment process allows trust to be verified with action.

In addition, a third-party breach notification process must be implemented to protect the infrastructure of the data platform and the customer data it contains. If a third party experiences a breach or suspects a breach, they must notify all stakeholders immediately to initiate incident response, containment and mitigation of the attack. Third parties should be subject to the Vendor Assessment, third-party audit and relevant New Hampshire laws regarding breach notification and related customer protections. Utilities can develop a third-party cyber assessment to establish a baseline of the entity's cyber security posture; however, the utilities are unable to audit that posture in real time or have direct visibility into a third-party's processes and infrastructure. Because of this inherent limitation, we urge the Commission to include a process to ensure that customer protections are implemented and protections are in place to ensure a pre-access third-party assessment is conducted and that utilities can be held harmless for data once it is out of the utilities' possession.

Q. Is there a role for stakeholder participation and input in the governance process proposed by the Utilities?

A. Ongoing stakeholder input would be pivotal to the success of any data platform, as stakeholders represent the user experience and advocate for policy purposes of the platform, a salient factor in both design and maintenance. The Utilities propose two working groups to provide this valuable insight and to handle versioning and change management of the platform, as was discussed just previously in our testimony. One group would be focused on the overall use and objectives of the platform, while the other would handle operational and technical design elements to execute the objectives. The Utilities recommend these groups be named the Governance Working Group ("GWG") and the Operations Committee ("OC"), respectively.

The GWG would consist of a cross section of data platform stakeholders to provide a diversity of ideas and ensure the platform capabilities can provide ongoing value to state energy policies and initiatives and would make recommendations to the Commission on a semi-annual or annual basis that the Commission could consider for implementation. The group could be comprised of the following: two representatives total from each utility involved with the data platform (a total of 6 representatives with the utilities with gas and electric operations being combined), three Commission-appointed stakeholder representatives for specified terms; two representatives from the Office of the Consumer Advocate; and up to three representatives from Commission Staff, as available. Recommendations will be made by general consensus, with dissenting opinions noted for consideration. Recommendations must have more than six representatives supporting it to be submitted to the Commission. The GWG should meet at least monthly for the first year after the platform is active, with less frequent meetings as appropriate thereafter.

The OC would consist of equal representatives of each utility and be responsible for drafting platform operation policy and procedures, technical design, scoping and pricing changes, change management, security management and recommendations on the feasibility and cost/benefit analysis of requests for enhancements or changes. The proposals of the OC would be submitted to the GWG should it want to add recommendations to OC proposals. Proposals of the OC would be submitted periodically or as needed to the Commission, but no more frequently than semi-annually.

Q. What registration and qualifications should be required for users of the platform?

A. In addition to the Data Platform Law's requirement for registration qualifications,[33] the Utilities believe that both registration and a qualification process is essential to preserve

[33] "[A]s a condition of accessing the online energy data platform, that a third party complete a qualification and registration process to ensure that any customer data downloaded from the platform remains in a safe, secure environment according to data privacy standards established by the commission." RSA 378:52.

the security standards that have already been discussed. The process the Utilities have developed allows the utilities to review and approve potential third-party participants before they are permitted to access any data to ensure proper stewardship of utility customer data.

To participate in the data platform, a prospective vendor or third party will need to be granted a cryptographically secure access token. These tokens will be crafted to provide time bound access to a specific set of data and the data access APIs will be developed to verify the tokens through an authorization layer, a process not unlike that being used by organizations such as ISO-NE.

The flexible nature of the proposed virtual platform architecture allows for vendor registration to be managed. On each utility's web platform, a new "vendor registration" form will be developed. Vendors complete a set of certification steps from this page and can also manage their existing authorizations. This includes the cyber security assessment discussed in detail earlier in this testimony. Once submitted, their application is reviewed, and when approved, the vendor is notified and they receive API access details.

As has already been mentioned, the Utilities have obligations to take all reasonable measures to ensure data integrity, privacy and security and therefore propose the following core tenants pertaining to the data available to third parties, and the authorization process. These conditions should inform the design, development and operation of the platform in a way that minimizes any risk of misuse of the data by third parties:

- Reasonable measures must be taken to ensure that customers are given notice about all agreed upon privacy-related policies and practices, as well as any changes to these policies and practices on an ongoing basis.
- The customer must control access to their own data.

- The customer will have access to their own data and the ability to actively participate in the sharing of their data.
- Customer data should be as accurate as reasonably possible and protected against unauthorized access.
- Customers must grant explicit rights to share their data with a requesting third party on a case-by-case basis.
- Customers must also be able to review existing sharing agreements and participate in the maintenance or termination of those agreements.
- APIs will be developed to support the customer authorization process.
- Each utility will offer, as part of their existing systems, a web interface for customers to perform data sharing authorization.

Example of Customer Authorization

We have provided a sample customer authorization to illustrate the affirmative action required of customers in order for their data to be shared. A customer logs into the utility's customer engagement portal using multi-factor authentication and, if eligible to participate in data sharing, is presented with a "Green Button Connect My Data" button. The customer is then presented with a form and the following steps (varying slightly by utility).

- Chooses an account to share as well as the meter(s) from which to share data.
- Review list of registered third parties and vendors that are authorized to request data from the platform.
- Select which third parties to authorize.
- Select the type of data to share (monthly energy usage, interval energy usage data, etc.)
- Indicate consented period for historical data allowed by this authorization
- View and manage prior authorizations.
- Once submitted, the selected third parties receive notification as well as a token granting them access to the data authorized by the customer.

- Data requests and responses made using the secure HTTPS protocol and authenticated via two-way certificate exchange.

Q. How would the Utilities approach estimating cost for these project elements?

A. As discussed above, the ultimate costs of any platform will depend on the level of complexity that is deemed to be desirable or necessary. Presently, the Utilities are not able to provide specific cost estimates because the scope of the work is not yet defined, and the scope, features, and elements of any non-utility proposals are entirely unknown. The Utilities recommend that the within this docket, the Commission evaluate the cost drivers and the benefits of the option they want explored and issue an order expressing a preference for a platform model to be evaluated for cost viability. The Commission may define the specific costs about which it is concerned. For example, the Commission may want information on the utilities' direct capital costs as well as incremental ongoing maintenance costs but may be less concerned with the costs associated with website enhancement or third-party verification and testing. With that information, the utilities could develop high-level, initial cost estimates and submit those for the Commission's evaluation. Those submissions would be subject to further refinement and analysis, but they would provide a basis to conduct a meaningful cost-benefit analysis. The Utilities could also competitively solicit bids to scope development of the platform components to determine accurate costs commensurate with the Commission's minimum viable product. Should the utilities be directed to add to the functionality of any given proposal, costs could likely increase exponentially; such costs may not be commensurate with the benefits. Analyses should be conducted prior to extending functionality of the platform. The process for developing estimates is iterative. The conceptual design and scoping requirements are developed to a level of detail that facilitate order-of-magnitude estimates by the developers. Standard costs are then added for project development resources, testing services, security requirements, architecture support, software licensing, and any hardware and data storage needs. Estimates also include training for the contact center representatives who will support customers and vendors on an ongoing

basis. The estimate will include ongoing annual maintenance and licensing costs, as well as new labor needed to support operations of the system. While the Utilities do not believe the volume of platform use will have an impact on the design options recommended in this testimony, the amount of use would add to the cost of managing the service, including registering vendors, procuring customer authorization, and providing ongoing contact support to the vendors and utility customers for this service. This would be the case no matter the design of the platform, and it is a cost factor to be considered in the ongoing maintenance cost of a statewide data platform. The development may be conducted internally, through managed contract services, third-party vendors, or a combination of these services. Depending on the expected magnitude of the work and available internal resources, each utility may opt to publish an RFP. Once testimony is completed, project scope and costs are updated and approved, before project work finally begins. The cost estimate proposal process typically takes three-months to complete.

Q. What should the Commission consider for cost recovery options?

A. As for cost recovery as contemplated under RSA 378:54, as the Commission is aware all electric and gas utilities in New Hampshire are at different points in the rate case cycle, or are in multi-year rate plans, and each utility may or may not have rate elements conducive to recovery of costs such as those for implementation of a data platform. Prior to the inclusion of platform design costs resulting from the energy data platform in distribution rates as part of a base rate case filing, the Utilities would propose that cost recovery is allowed as a stand-alone adder that would be outside of any alternative rate plan capital investment or revenue caps. Platform costs may include but are not limited to: design and software development, system integration, development of processes and procedures, contracting, project management, testing and quality assurance, system documentation, support prior to and during go live, vulnerability management, penetration testing, cyber and security assessments of vendors and platform users, customer and user support, etc.

If it is determined that more timely recovery is not permitted, the Utilities would propose to defer the cost of the investments to a regulatory asset to be recovered at the time of the Company's next rate case. The deferred cost should include at least the following components: depreciation on the asset, return on the asset, and O&M cost offset by potential third-party revenues. As described above, the Utilities expect the energy data platform to need modifications and updates. Recovery of these ongoing capital investments and O&M costs will also need to be considered and addressed by the Commission. The Data Platform Law directs the Commission must develop a methodology pursuant RSA 378:54, I to "impose reasonable charges to third parties for access to data" from the platform. Such uses may include but are not limited to marketing products and services, data aggregation, energy system research, etc.

Q. Does this conclude your testimony?

A. Yes.