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August 17, 2020

Debra Howland, Executive Director
NH Public Utilities Commission
21 South Fruit Street
Concord, NH 03301

Re: Docket No. DE 19-197, Development of a Statewide, Multi-Use Online Energy Data Platform

Testimony of Ethan Goldman for Clean Energy NH

Dear Director Howland:

On behalf of Clean Energy NH, please accept the testimony of Ethan Goldman for filing in Docket No. DE 19-197.

Thank you for your assistance with this matter and please feel free to contact me if any questions arise.

Sincerely,

Madeleine Mineau
Executive Director, Clean Energy NH
madeleine@cleanenergynh.org

STATE OF NEW HAMPSHIRE

BEFORE THE

PUBLIC UTILITIES COMMISSION

Docket No. DE 19-197

Electric and Natural Gas Utilities

Development of a Statewide, Multi-use Online Energy Data Platform

TESTIMONY OF

ETHAN GOLDMAN

August 17, 2020

On behalf of Clean Energy NH

STATE OF NEW HAMPSHIRE

BEFORE THE PUBLIC UTILITIES COMMISSION

DIRECT TESTIMONY OF ETHAN GOLDMAN

DEVELOPMENT OF A STATEWIDE, MULTI-USE ONLINE ENERGY DATA PLATFORM

August 17, 2020

Docket No. DE 19-197

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I. GLOSSARY OF TERMS

Application Programming Interface (API): An application programming interface (API) is a computing interface which defines interactions between multiple software intermediaries. It defines the kinds of calls or requests that can be made, how to make them, the data formats that should be used, the conventions to follow, etc. It can also provide extension mechanisms so that users can extend existing functionality in various ways and to varying degrees. An API can be entirely custom, specific to a component, or it can be designed based on an industry-standard to ensure interoperability.

Data Sources: Any entity or system that provides data through the statewide, multi-use line energy data platform (Energy Data Platform or Data Platform). Examples include electric and gas utilities; third party energy service providers (e.g., distributed energy resource provider); competitive energy suppliers; and Community Power Aggregators.

Data Users: Any entity or system that requests and receives data from the Data Platform. Examples include: residential, commercial, municipal energy consumers; Community Power Aggregations (CPAs); third party service providers; researchers; utilities; state government agencies.

Data Platform Hub: A centralized web-based directory of approved and available data sets, the location of all approved Data Sources, including documentation for their APIs and the shared logical data model on which they are based. The Hub is a separate and distinct component from all the individual Data Sources. The Hub and all Data Sources collectively comprise the Data Platform.

Data Platform Council: The proposed governance body tasked with: (1) Approving standards for publication on the Data Platform Hub, including shared logical data model, API standards,

and standards for authentication and authorization; (2) Ensuring that new Data Sources meet established standards in order to be listed on the Data Platform Hub; and (3) Evaluating the ongoing performance of Data Platform and its component Data Sources to ensure it is meeting its goals (e.g., enabling priority user stories listed in Exhibit CENH-1.).

II. INTRODUCTION & WITNESS QUALIFICATIONS

Q. State your name, the organization you work for, your position, and your business address.

A. My name is Ethan Goldman, I am the founder of Resilient Edge, LLC, a consulting firm which is located at 5 Pavilion Ave in South Burlington, VT.

Q. Describe your background and qualifications.

A. I have been working as an information technology professional for more than 20 years, and specifically in energy data analytics for more than 10 years. I have designed, developed, delivered, and supported software systems that analyzed utility billing data as well as non-utility-meter energy use data and grid system data from Independent System Operators (ISOs). Notably, I was the technical subject matter expert for Efficiency Vermont's planning and deployment of a state-wide multi-utility Advanced Metering Infrastructure (AMI) data warehouse. I hold multiple patents for software algorithms that analyze data from energy meters and other sensors in order to provide insights about energy use in buildings. I have published multiple peer-reviewed articles on the topic of energy data analysis and have spoken at numerous national conferences on this topic. I have participated in both regional and national committees on energy efficiency

measurement and verification techniques and practices, such as the Lawrence Berkeley National Labs M&V 2.0 National Stakeholder Group. I earned an MS from Carnegie Mellon University, where I researched non-intrusive load monitoring, a machine learning technique for disaggregating multiple electric loads from whole-house meter data using machine learning techniques.

Q. Have you previously testified before the New Hampshire Public Utilities Commission (NHPUC) or other regulatory bodies?

A. I have not.

Q. On whose behalf are you testifying?

A. I am testifying on behalf of Clean Energy NH (CENH).

Q. Explain CENH's interest in the creation of a statewide, multi-use online energy data platform.

A. CENH is a member-based 501(c)(3) nonprofit organization whose members include 26 New Hampshire local governments (cities, towns, and counties), over 130 businesses providing a breadth and depth of energy related services, and hundreds of individual members. CENH acts on behalf of both municipal and residential energy customers, and the third-party energy companies offering in-state energy solutions to those energy consumers. A successful data platform will cater to the needs of both the market actors and municipal and residential customers of CENH's membership.[1]

[1] Clean Energy NH's local government and business membership may be viewed at www.cleanenergynh.org/our-members.

Q. Describe your involvement in DE 19-197 up until this point.

A. I have participated actively in many PUC-led technical sessions and in informal conversations with utility and non-utility stakeholders since early in this docket process.

III. SUMMARY OF POLICY CONTEXT & LEGISLATIVE OBJECTIVES

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to share expertise in energy data systems and platforms with the Commission to support informed decision-making and the successful implementation of Senate Bill 284 and RSA 378:51. My testimony covers both the functionality of the Data Platform, and the importance of a thoughtful approach to data platform governance.

Q. Briefly summarize the key points of your testimony.

A. My testimony explains and endorses a virtual approach to establishment of the Energy Data Platform. I describe the importance of shared standards for Data Sources (including electric and gas utilities, as well as other Data Sources). Shared standards relate to: a logical data model; Application Programming Interfaces (APIs); authentication (i.e., "are you who you say you are?"); and authorization ("is this account allowed to access this data?"). I explain why a successful Data Platform will have a single, unified point of access to energy data from multiple Data Sources and for multiple Data Users, which I refer to as the Data Platform Hub. I describe how a limited governance process providing oversight to both the establishment and enforcement of shared standards, and the unified point of access to energy data, will allow for the agile development and ongoing evolution of the Energy Data Platform.

Q. What are the legislative objectives of Senate Bill 284 and RSA 378:51?

A. The New Hampshire General Court adopted Senate Bill 284[2] to further accomplish the purposes of electric utility restructuring under RSA 374-F,[3] the most compelling of which is to foster market competition in both retail and wholesale electricity markets, and to meet state energy policy goals under RSA 378:37.[4] Senate Bill 284 also acknowledges the importance of energy data access, both as individual data and as aggregated and anonymized data, in fostering innovative business applications and enabling Community Power Aggregations (CPAs) under RSA 53-E.[5] The State also aims to empower customers and to make the State's energy systems more distributed, responsive, dynamic, and customer focused. The State legislature recognized that in order to achieve these objectives, it is necessary to provide consumers and stakeholders with safe, secure access to granular information about their energy usage.

Q. How does the establishment of a statewide, multi-use online energy data platform relate to electric grid modernization and NHPUC Docket No. IR 15-296?

A. I have not been a participant in New Hampshire's grid modernization proceedings, so I cannot speak to the particulars of that specific docket. The objectives of Electric Grid Modernization in New Hampshire as established by the Order No. 25,877[6] include: integrate

[2] Senate Bill 284 and NH RSA 378:51, Multi-use Online Energy Data Platform. Retrieved from: https://www.gencourt.state.nh.us/rsa/html/XXXIV/378/378-51.htm
[3] NH RSA 374-F, Electric Utility Restructuring. Retrieved from: http://www.gencourt.state.nh.us/rsa/html/XXXIV/374-F/374-F-mrg.htm
[4] NH RSA 378:37, Least Cost Energy Planning. Retrieved from: https://www.gencourt.state.nh.us/rsa/html/XXXIV/378/378-37.htm
[5] NH RSA 53-E, Aggregation of Electric Customers by Municipality and County. Retrieved from: https://www.gencourt.state.nh.us/rsa/html/III/53-E/53-E-mrg.htm
[6] NHPUC Docket No. IR 15-296 Investigation into Grid Modernization, Order on Scope and Process. April 1, 2016. Page 2. Retrieved from: https://www.puc.nh.gov/Regulatory/Docketbk/2015/15-296/ORDERS/15-296_2016-04-01_ORDER_25877.PDF

distributed energy resources; empower customers to use electricity more efficiently and to lower their electric bills; reduce generation, transmission, and distribution system costs; and improve reliability, resiliency, and operational efficiency of the grid. These objectives appear to be similar to the objectives of Senate Bill 284, electric utility restructuring under RSA 374-F, and state policy goals under RSA 378:37.

The Grid Modernization Working Group Report to the New Hampshire Public Utilities Commission[7] of March 2017 emphasizes the importance and the necessity of data access and more dynamic rate design to empowering customers and modernizing the grid.

Q. Please discuss RSA 53-E, relative to Aggregation of Electric Customers by Municipalities and Counties, and its relationship to the Energy Data Platform.

A. In order to provide electricity and other retail products and services to their residents and businesses, Community Power Aggregations (CPAs) require ongoing access to individual and aggregated customer energy data. A successful and modern Energy Data Platform will be of great use to these CPAs.

[7] New Hampshire Grid Modernization Working Group Report to the New Hampshire Public Utilities Commission. March 20, 2017. Retrieved from: https://www.puc.nh.gov/Regulatory/Docketbk/2015/15-296/LETTERS-MEMOS-TARIFFS/15-296_2017-03-20_NH_GRID_MOD_GRP_FINAL_RPT.PDF

IV. AN AGILE PROCESS FOR DEFINING FUNCTIONAL REQUIREMENTS OF THE ENERGY DATA PLATFORM

Q. At a high level, who do you anticipate would use the Energy Data Platform, and for what purposes?

A. The statewide Energy Data Platform should contain multiple types of energy data (electric and gas usage, and potentially other types in the future) from multiple different sources. I anticipate that the Data Platform will be accessed by a variety of different types of users, including individual customers, authorized third-party service providers, community planners, and researchers, to name just a few. While the Platform would support individual energy customers or staff from a third-party service provider manually seeking out a particular data set in order to perform a discrete analysis task, the true value of the Data Platform is enabling automated software that makes use of energy data. The goal of the Platform is to move away from infrequent individual data requests that require utility staff time as well as expert analyst time, and toward an ecosystem of energy-aware market-based energy services that drive economic growth in New Hampshire while lowering costs for ratepayers.

Q. Should the Commission Order specify the exact functional requirements and standards of the Data Platform? What is an agile software development process?

A. No. It is not practical to specify at the outset all of the functional requirements and standards that will enable the Data Platform to meet the obligations described in RSA 378:51, nor would such an approach be advisable to attempt. Rather, modern software development best practices point to an "agile" approach to projects such as this, where functionality is developed

incrementally over time so that feedback from users can be incorporated into the design. An agile software development approach saves time and money that would otherwise be spent building unnecessary features, and delivers a more useful product more quickly. Adjudicative regulatory processes are slow, adversarial, costly in time, money and resources, and in many ways the anthesis of agile software development. It is not appropriate to adjudicate every iteration of a Data Platform that needs to grow and evolve over time.

Q. Is it a valid alternative to direct and expect each utility to determine the detailed functionality and standards of their portion of the Platform over time?

A. No. I do not believe it is wise or reasonable to fully delegate the authority and responsibility for detailing functionality and standards to monopoly investor-owned utilities without empowered market and stakeholder engagement and oversight. The purpose of the Energy Data Platform is to foster market competition through access to information. Investor-owned monopolies are not good at making their markets competitive. This approach is not likely to produce a successful Data Platform.

If each utility is left to detail its own functionality and standards, the outcome is likely to be a disparate, uncoordinated, difficult to use series of separate data access points.

Q. If you do not recommend detailing functional requirements in the Commission Order, and you do not recommend each utility detail its own functional requirements independently, what would you recommend is the best approach to detailing functional requirements?

A. Functional requirements should be detailed through establishment of a simple and limited governance process, subject to final oversight by the Commission, which for the sake of this testimony we will call the "Data Platform Council." The Data Platform Council should be responsible for three narrowly defined roles:

1. Approving standards for publication on the Data Platform Hub, including shared logical data model, API standards, and standards for authentication and authorization;
2. Ensuring that new Data Sources meet established standards in order to be included in the Data Platform Hub;[8]
3. Evaluating the ongoing performance of Data Platform to ensure it is meeting its goals (e.g., enabling priority user stories listed in Exhibit CENH-1.).

These three roles are described in more detail in **Section VI. Governance**.

Q. Why is governance an important part of the Energy Data Platform?

A. A thoughtful governance mechanism is critical for several reasons. First, it is necessary to provide oversight to the agile software development process, establishing of standards, and detailing of functional requirements that will evolve over time. Second, it is the most efficient way to monitor ongoing performance. Both ongoing development of incremental features and maintenance of existing features require oversight to ensure that the results are delivered on time and to the required level of quality. A third function of governance is to assess the completion of

[8] The Data Platform Hub is a centralized web-based directory of approved and available data sets, the location of various Data Sources, including documentation for APIs and the shared logical data model on which they are based. It is described in further detail in **Section V. Virtual Data Platform & Data Platform Hub**.

new functionality and bug fixes to confirm that API services and data results meet all approved standards. In this way, the role of the Data Platform Council is to serve as technical expert acting in the interest of the marketplace, representing the interests of the "customers" (including both ratepayers and third parties) in answering the questions: "is the Data Platform working? Does it meet my needs? Is there a better technical solution to enabling data access?" A simple and streamlined governance approach paired with the appropriate software and data expertise, and subject to final Commission oversight, will not only be able to provide faster feedback than would be possible through traditional regulatory review processes, it will also be able to effectively assess the results of the data providers' development process, balancing the level of functionality and the level of effort.

The final role of the Data Platform Council is to carry a small stick: in the event that a Data Source does not comply with the shared logical data model or API standards, the Data Platform Council can exclude that Data Source from being listed on the Data Platform Hub.

Commission adjudication is the right process to set up governance, but not the right process to oversee agile software development or develop technical requirements in an ongoing fashion. Good governance will allow for Data Platform extensibility, the quality of being designed to allow the addition of new capabilities or functionality over time.

V. VIRTUAL DATA PLATFORM & DATA PLATFORM HUB

Q. Please describe, at a high level, what you would recommend as the appropriate structure and management of the Data Platform.

A. The defining feature of the Data Platform is that it provides a single, unified point of access to energy data from multiple Data Sources and for multiple Data Users. This means that there is one place to find a list of all available New Hampshire energy data, along with instructions for creating an account and requesting or granting permission to access particular data files, and documented procedures for retrieving standard-format data files. While multiple Data Sources will all be providing data from a variety of software systems, users will receive data that conforms to a single logical data model via consistent Application Programming Interfaces (API), regardless of the Data Source. We refer to this centralized, standardizing repository as the "Data Platform Hub." Without this centralized, standardized hub for Data Users, there is no Data Platform, but rather series of disparate data sources with disparate and uncoordinated user interfaces.

In order to unify the various energy Data Sources into a cohesive Platform, there must be a governance mechanism that sets standards for data formats and APIs, then validates that participating Data Sources meet that standard in order to be part of the Platform.

Q. Simply define the Data Platform Hub.

A. A centralized web-based directory of approved and available data sets, the location of various Data Sources, including documentation for APIs and the shared logical data model on which they are based.

Q. Explain what is meant by "virtual platform" and/or "hybrid model".

A. During the technical sessions, the terms "virtual platform" and "hybrid model" were used synonymously. While neither term has a standard meaning in the industry, I will use the former in my testimony as I believe that "virtual platform" more aptly describes the solution that was discussed in those sessions: something that acts like a platform from the perspective of users, but could be built in a distributed fashion so there is no singular "platform" installed on a server somewhere.

Through the technical sessions held by PUC staff over the last several months, it seems unlikely that there is appetite for a "physical" data platform that would ingest data from all sources, transform it into a common data format, and then provide standardized data to authorized users. Instead, there seemed to be consensus among utility and non-utility parties in support of a "virtual" platform providing standard-format energy data from a single point of access by routing those requests to the appropriate sources in real-time.

A good analogy is the way Amazon.com allows many merchants to sell their products through their marketplace: it has a single point of entry where you can find products, you only need to create one customer account with your payment info and shipping address, but each product in your order might ultimately be fulfilled by a different vendor. If there was no front page with categories to browse and a site-wide search feature, there would be no marketplace at all. If each vendor used a different page layout to explain their product and required you to create a separate account, the shopping experience would be much more cumbersome and hardly better than visiting multiple sites to compare products and place your order.

This virtual platform approach would serve well the interests of Clean Energy NH, provided it includes an accompanying governance process for ensuring Data Sources adhere to a

shared logical data model and other standards, as well as a Data Platform Hub that is independently managed.

Q. Explain further the role of centralized documentation for all data feeds that make up the Data Platform. How does the Energy Data Platform work?

A. First, note that the technical details of how all the individual Data Sources implement their services is not only beyond the scope of this testimony, it is, by definition, immaterial to the functioning of the virtual platform. The only centrally-managed portion of the virtual platform that must be built outside of all Data Sources' IT systems is the documentation in the Data Platform Hub. This would simply be a small website with instructions on where to find different kinds of data and how to access it. This Data Platform Hub should include documentation about how to access the different APIs that provide energy data and how to interpret the data files returned by those APIs, as well as documentation for the logical data model that is used to organize data across all the platform's Data Sources.

Some additional technology that could tie together the various Data Sources' APIs is a thin layer that routes data queries to the appropriate Data Source. That would allow, for example, an energy service provider to fetch customer data from any utility by sending an API request to (hypothetically) energy-data.nh.gov/electricity/get-data and include the utility name and customer account number in the request. The Platform would then redirect that request to the appropriate utility's server, where it would be authenticated and (if the requestor was authorized) the utility's server would then respond with the appropriate data. The exact details of how this would work need to be determined in coordination with representatives of both the Data Source and users of the system, but the overarching philosophy should be to minimize the role of the

Platform and allow the Data Source to maintain control over their systems, so long as they conform to the established standards. If this same level of seamless access to data from different Data Sources can be achieved with no additional technology beyond what is provided by the Data Sources, that solution would be preferable.

Q. What is an API?

A. The acronym "API" stands for Application Programming Interface. It refers to an interface between software applications that clearly defines the inputs and outputs, including protocols, data formats, error messages, etc. The use of APIs allows different computer systems to interact with one another in predictable ways. Rather than requiring explicit coordination between developers on all components that need to exchange data or integrate functionality, the API allows different software teams to create systems that work together simply by complying with the standards defined by the API. This reusable, modular development approach has facilitated an explosion of richly featured software that can be built much more quickly by leveraging data and services provided by APIs.

One example is the proliferation of websites that include some sort of mapping functionality to find locations near you and map the route to them, whether for a national chain of retail stores or community meet-ups. While very few entities have the resources to create and maintain systems that collect and organize these huge, complicated sets of geospatial data, because they offer APIs to access the data through defined searches that return maps and routing information, this data has facilitated or enhanced numerous websites and apps.

In a similar way, today's access to energy data is analogous to requesting a local map from a city's chamber of commerce, then manually reading the legend to figure out how to

interpret the particular symbols they used in order to figure out where to get lunch nearby and whether there is a bus that takes you there. If energy data is provided through APIs, it will be possible for a wide variety of enterprises to build new functionality that incorporates that energy data with their services, whether providing estimates for efficiency or solar PV projects, estimating a building's carbon footprint, aggregating demand response, stimulating a friendly competition to lower energy consumption, etc. Many of the apps that use mapping data today would have been hard to conceive of 20 years ago, and would probably not have been built if only Garmin and Delorme were providing services with that data.

Q. Are APIs secure against data breaches or cyber-attacks?

A. Yes. While APIs may openly publish the documentation for how to submit a data request and how to interpret the result, it does not mean that they must also provide all the data to any software application that submits a request. APIs can require authentication, as do the ones used by online financial management software to access a user's bank records. In fact, not only can APIs require authentication before returning particular records, they can even require that the software application making the request has registered with the Data Source and accepted the terms of service, including security and privacy requirements, before being allowed to even issue requests. APIs can operate over secure connections, protecting both the data and the user credentials from the request.

Q. Are there other security considerations for the design of the Data Platform?

A. Access to energy data through the platform requires two components: authentication ("Are you the owner of this account?") and authorization ("Is this account allowed to access this data?"). Because the Virtual Data Platform should feel like a single, cohesive point of access to

all of New Hampshire energy data, even though it relies on multiple Data Sources, the Platform should use a Federated Identity Management system that allows users to create a single set of authentication credentials (i.e. username and password) that can be linked to all of their utility (and other Data Source) accounts. This would also apply to third parties, who would also have a single set of credentials across all Data Sources. This would simplify tasks such as an energy customer granting or revoking authorization for a third-party energy service provider to all of their energy data (e.g. from both electricity and gas utilities, or for accounts from multiple buildings). It would also make it easier for the Data Platform to enforce stronger security rules regarding password strength, scheduled password changes, or even multi-factor authentication, because all participants would be using a single Federated Identity Management system.

Q. Explain what is meant by "logical data model." Explain how the logical data model relates to the "virtual platform" and is responsible for keeping the separate data APIs coordinated.

A. A logical data model is an abstract representation of the structure and meaning of data that will be delivered through the Data Platform. It does not specify how the database or other storage mechanism will be implemented; there are multiple ways to satisfy the requirements specified by the logical data model, based on the existing infrastructure and other constraints of each data provider who will be conforming to it.

The logical data model defines data entities such as customer, premises, meter, and reading. It also defines the attributes of those entities, such as customer name, premises service address, meter scaling factor, and reading period end date, which ensures that there is a common definition of terms and means of encoding information. For example, is the rate code (which can

change over time) an attribute of a meter reading, meter service point, or premises? Is rate code instead an attribute of a service contract entity linking a customer to a meter, and which has start and end dates? These questions should have consistent answers that apply to all Data Sources.

This brings us to the last component of a logical data model: the relationships. These describe how to link entities to one another, and whether they are one-to-one, one-to-many, or many-to-many. This is a critical distinction when trying to determine which accounts belong to a single customer, or when assembling the total energy use across all the meters on a single building.

Again, since the logical data model is not a description of how any system will be implemented, there are many ways that utilities and other data providers can input and store their data, so long as it can be delivered in a format that matches the logical data model. In my past experience, utility data systems organize billing data in many different ways. Some have an explicit customer record, while others simply duplicate the billing address for each premises; some associate meter readings with a "service point" that can, over time, have multiple meters with distinct IDs installed in it. In fact, I have even encountered utility data where different customer accounts were configured according to different logic, based on how each customer wanted to receive their bills (e.g., all bills sent to one address as opposed to each bill sent to the service address). In order for users of the Data Platform to analyze and interpret data about multiple buildings or customers from different utilities, it is critical that all the data providers are able to map their source data to the logical data model. Not only does this require that the logical data model is clearly defined so that it can be unambiguously interpreted by both Data Sources (such as utilities) and Data Users, it also requires that the logical data model be carefully defined so that it can accurately represent data from all possible sources.

Q. What kind of Data Sources will the logical data model apply to?

A. The logical data model will need to encompass not only electric and gas utility meter and billing data, it will also need to be able to expand to include other types of data, if not in the first version of the Data Platform, then in a future version. This might include Distribute Energy Resource (DER) installation and operation data, distribution system and grid operations data, market data such as utility tariffs and/or data from ISO New England, and various other energy data that can help customers, service providers, and communities understand and make decisions about their energy use. The logical data model is not static; it will evolve with the Platform.

Q. Why is a shared logical data model critical to the success of the Data Platform?

A. Without a shared logical data model, Data Users will be forced to attempt their own interpretation and translation of data from different sources. The absence of a shared logical data model imposes additional costs on types of activities the statewide Data Platform is meant to enable. The absence of a shared logical data model would also mean that analysis and interpretation by different users cannot be compared without first unpacking all of the data-mapping steps that each analysis used. Rather than being able to draw a straight line from an academic analysis through a regulatory ruling to an energy service offering and finally to individual project results, every calculation performed with energy data will be an island unto itself.

It is essential that all Data Sources participating in the Energy Data Platform adhere to the logical data model so that users of the Platform can be assured that data will be consistent and clearly defined. This requirement must also be backed up with a testing regiment. If a Data

Source's APIs do not pass the required tests then they will be removed from the Platform, meaning that they will no longer be listed in the Data Platform Hub. Note there could be a grace period, during which they can correct the error. If the Platform maintained a redirection function to route requests to the Data Sources, then it could cut off requests to non-conforming Data Sources as well. For entities like gas and electric utilities that are required to feed data into the Platform, the PUC could levy penalties if they are no longer supplying data through the NH Energy Data Platform as required because they failed to conform to the logical data model in a timely fashion.

Q. Should a Commission order in this docket prescribe the logical data model? What should the Commission order specify as it relates to the logical data model?

A. A Commission order should not prescribe the logical data model, because the logical data model will need to evolve through an agile software development process over time. An order should, however, require that all Data Sources to the Energy Data Platform conform to a single logical data model, and that the logical data model be defined and approved by a Data Platform Council. The Commission could establish the charter for the Data Platform Council, defining its composition and decision-making process, any requirements for public input on proposed changes to standards or participation rules, etc.

The logical data model will need to change over time as new types of energy data are added to the Platform, or when participants identify problems or opportunities to improve the logical data model. The Commission should establish a streamlined and limited governance process under which a Data Platform Council defines and approves the details of the logical data

model and other standards. This will ensure good governance, transparency, democratic engagement, and agility in the process of creating the logical data model.

Q. What is the appropriate way for System Data to interface with the data platform? How can we ensure security with regard to system data?

A. System data refers to electric distribution system data related to demand, capacity, circuit loading, voltage, circuit mapping and grid topography, power quality, hosting capacity, etc. We can think of two categories of system data: (1) Public (system data that poses no security risks and is publicly available to everyone); and (2) Permission-protected (system data that poses security risks and is available only through special permission). Since utility customer use data, which will almost certainly be part of the Platform, is also considered private when individually identified, the Platform will necessarily include security features that control what data is available to which users, which could also protect non-public system data. In the future, system data of both types (public and permission-protected) could be made available through the Data Platform. This may be a topic more appropriate to be addressed through future proceedings such as Electric Grid Modernization.

Q. Could you please summarize your recommendation for the structure of the Data Platform?

A. We recommend a virtual platform, in which Data Sources remain distributed, but users experience a unified Platform with a single login, a central hub with a directory of all Data Sources, and a shared logical data model (the Data Platform Hub). This will allow data from all sources to be accessed, analyzed, and interpreted consistently. All Data Sources that comply with

the logical data model, API standards, and other standards will be listed on a single centralized Data Platform Hub. This can include not only energy use and billing data from electricity and gas utilities but could also expand to include other types of energy data such as distribution system data (e.g., hosting capacity), DER data, ISO New England data, utility tariff data, and other types of data. While the technical implementation details of each Data Source are left up to that Data Source (e.g., an electric or gas utility, or another Data Source), the functional specifications are established and enforced through the governance of the Data Platform Council.

VI. GOVERNANCE: DATA PLATFORM COUNCIL

Q. What is an appropriate governance framework to ensure successful implementation and ongoing operational performance of the Data Platform?

A. NHPUC Docket No. DE 19-197 is an appropriate forum for furthering the strategic direction of the Data Platform in accordance with legislative objectives of Senate Bill 284. As discussed previously, adjudicated regulation is not the appropriate framework to guide the agile implementation and ongoing operational performance of the Data Platform. A more appropriate forum would be the creation of a "Data Platform Council" that would be responsible for three core functions:

1. Approving standards for publication on the Data Platform Hub, including shared logical data model, API standards, and standards for authentication and authorization;
2. Ensuring that new Data Sources meet established standards in order to be included in the Data Platform Hub;
3. Evaluating the ongoing performance of Data Platform to ensure it is meeting its goals (e.g., enabling priority user stories listed in Exhibit CENH-1.).

The Data Platform Council would oversee implementation and ensure successful ongoing operation of the Data Platform, in accordance with the direction set by PUC and subject to final oversight by PUC.

Q. Should the utilities be responsible for building, managing, and governing the Data Platform?

A. Not without meaningful oversight. While each of the utilities has an important role to play in creating the Virtual Data Platform, no individual utility will be responsible for creating an overarching organizational structure that ties all the diverse data structures into a cohesive experience. If SB 284 had simply directed each utility to provide energy use data to customers and their authorized agents through a standard interface, each utility could just set up Green Button Connect and demonstrate compliance to the PUC. However, the law directed the PUC to create a statewide, multi-use online energy data platform, which implies a system where multiple energy data suppliers and consumers can integrate their functionality using shared standards. If the Platform is going to develop and enforce these shared standards, there must be an entity that can incorporate both the desires of Data Users and the technical limitations of Data Sources into a set of functional requirements that represents a cost-benefit optimized design, which all participants can then implement their software systems against in whatever way they see fit. In this way, the utilities (and other Data Sources) can build and manage their portions of the Virtual Platform, but the governance must be carried out by an independent body.

Q: Should the PUC provide management and oversight for the Platform?

A: The PUC does have an important role to play in the Data Platform: they have been directed to determine if this Platform is a good investment by the ratepayers of NH, which will require the PUC to articulate the structure and rules for operating the platform. However, evaluation of the Platform should not be based on an annual pass/fail review, nor should it be evaluated by adjudication. Design decisions are nuanced and we will get a better outcome if the

process is iterative on a shorter time-scale than PUC adjudication. Ongoing oversight and input from technical experts representing market interests will avoid utility delays and can guard against utility overspending. Non-utility actors (either Data Sources or consumers) that are involved with the Platform are not subject to PUC regulation. However, if a Data Platform Council is established and endowed with the authority and responsibilities to set data standards and to enforce them by barring non-complying data services from participation, that Council can engage with stakeholders and ensure compliance with and evolution of standards, even as it is accountable to the PUC.

Q. Who would be the members of the Data Platform Council?

A. The Data Platform Council should have representation from diverse groups that represent the market, including public and private sectors, as well as representatives with technical familiarity with the subject matter. Candidates for Data Platform Council membership could include:

- One or more seats for Data Sources (including utilities)
- One or more seats for state government (PUC, OCA, State Energy Manager)
- One or more seats for local government
- One or more seats for academia and other researchers
- One or more seats for advocacy groups
- One or more seats for third party energy service providers and DER representatives

Note that it is expected that all parties participating in the Data Platform Council have adequate proficiency to participate in technical conversations about the functional requirements of the Platform and the tradeoffs inherent in different options. It would be acceptable to allow

Council members to designate a technical expert to participate in proceedings on their behalf, or to accompany the voting member at meetings to help parse the implications of different choices.

Q. How would the members of the Data Platform Council be selected?

A. Members of the Data Platform Council could be selected through an application/nomination process to be vetted and approved by the PUC. It is recommended that terms are staggered so that the Council maintains institutional memory through inter-term transitions.

Q. What is the role of utilities in the Data Platform Council? Should utilities have a voting role?

A. The utilities should play an active role in the process for defining and updating the shared logical data model and other standards. Whether or not utilities should have voting seats on the Data Platform Council is an interesting question. While the utilities are not the owners of the Data Platform, they are a major Data Source. It would be valuable to have the utilities (and representatives from other Data Sources) closely involved with setting these standards so that they can help to avoid requirements that would be impossible or unduly expensive to meet, and instead to look for ways to leverage existing data systems and functionality.

However, SB 284 seems to suggest that regulated gas and electric investor-owned utilities would be required to provide some key types of data through the Data Platform and would therefore be in the position of seeking cost recovery for those efforts. If the decisions of the Data Platform Council have implications regarding the cost of development efforts needed to

meet those requirements, this could potentially represent a conflict-of-interest for the utilities if they are also allowed to vote.

Q: What does the Data Platform Hub and its governance cost?

A: Given that participation in the Council will only require a few hours a month (after an initial push to establish the draft standards) and that all participants will all be representing organizations that will likely be willing to let them participate "on the clock" I would assume that Council members will not require compensation. The majority of the Virtual Data Platform will be built by the Data Sources, but the Data Platform Hub should be hosted independently of any of the Data Sources. The Data Platform Hub is simply a repository of information about the Data Platform, including documentation about the logical data model, how to create credentials from the Federated Identity Management system, where to find APIs for each Data Source, etc. The cost of hosting a small website and hiring someone to keep it updated whenever the Council adds or updates a standard should only cost a few thousand dollars per year.

It is possible that the Federated Identity Management system will also need to be hosted independently of all the Data Sources, so that function could also be an expense of the Platform Hub. This would likely cost less than $20,000 per year. If this and the previously-described web hosting functionality could be accomplished by an existing NH State IT department, the cost could be even lower.

The last budget category to consider is the occasional need to hire an expert consultant who can provide independent advice to the Council regarding database structure, API mechanisms, security models, etc. This expertise should primarily be the responsibility of the

Council members, so the need for such outside consulting contracts should be the exception, not the rule.

One way to fund these costs for the Data Platform would be to charge each Data Source a modest amount for the use of the platform, which the utilities could presumably rate-base if the Commission deemed such an expense prudent.

Q. How would you describe start-up costs vs. operating costs for the Data Platform, and how might those costs be approved and recovered?

A. Some investment will be needed for the initial start-up cost of the Data Platform. The Commission could approve a specific limited budget for each utility that it deems is reasonable to meet the legislative objectives of SB 284. The utilities could then be confident that these investments are prudent, and will be recovered. It also ensures that spending is capped. If, upon working with the Data Platform Council, parties determine additional funds are required, those parties could seek Commission approval for modification of those budgets. Once the Data Platform is established, operating costs could then be recovered under a performance-based ratemaking approach.

Q. Do you recommend traditional cost-recovery approaches for Data Platform costs?

A. No. I do not believe it is the best approach for regulated utilities to recover costs they incur to meet the requirements imposed by the Platform through traditional models. If the Platform is treated as an "OpEx" pass-through cost, the motivation is to do as little work as possible on it so their IT resources are available for other work. If it is treated as a "CapEx" investment, it benefits utilities to invest more in the Platform, but spending more on software is

not consistently correlated with producing a more valuable result. Instead, I recommend the use of performance-based ratemaking (PBR) to compensate utilities for implementing their portions of the Data Platform.

Q. What is the role of performance-based ratemaking in the operation of the data platform?

A. To create incentives for utilities to focus on ways to make the Platform truly successful, I recommend creating a performance-based regulation framework for compensating utilities if the Platform meets performance metrics, which could include: Platform traffic or amount of use; timely responsiveness to requests for third-party authorization and data delivery; prevalence of reported bugs (and ability to fix quickly); ability to keep the API services online with minimal downtime; or other metrics. These metrics should all be quantifiable through automated means (such as logging server activity, bug-tracking systems, etc.) so that up-to-date metrics are available on a monthly basis. This ensures that any systemic issues can be quickly identified and addressed, and that the utility has a clear incentive to do so.

In keeping with other models for utility compensation, the PBR could be structured so that utilities were able to recover their implementation and maintenance costs if they meet the basic requirements established by the Data Platform Council and remained a Data Source in good standing. If they also meet other goals that measure the ratepayer value and impact of the platform, such as number of datasets delivered, that would be factored into additional compensation that would benefit utility shareholders. This creates both a disincentive (stick) for allowing the platform to fail, as well as an incentive (carrot) for making it not just functional, but effective and valuable to ratepayers.

VII. CONCLUSION

Q. Please summarize the key recommendations of your testimony.

A. I recommend the Commission direct for the implementation of a virtual Data Platform, one that allows for Data Sources to remain distributed, and allows for Data Sources to implement standard-compliant systems as they see fit.

I recommend the Commission require that the Data Platform and its Data Sources adhere to a shared logical data model.

I recommend the Commission direct for the creation of a Data Platform Hub, defined as: a centralized web-based directory of approved and available data sets, the location of various Data Sources, documentation for APIs, and the shared logical data model on which they are based. The Commission should also identify a funding mechanism to allow the Hub to be hosted independently of any of the Data Sources.

I recommend the Commission establish a Data Platform Council to serve as the governance body tasked with: (1) Approving standards for the Data Platform Hub, including shared logical data model, API standards, and standards for authentication and authorization; (2) Ensuring that new Data Sources meet established standards in order to be included in the Data Platform Hub; and (3) Evaluating the ongoing performance of Data Platform to ensure it is meeting its goals (e.g., enabling priority user stories listed in Exhibit CENH-1.).

I recommend that the Commission direct for the design and operation of the Data Platform in such a way that allows for a diversity of Data Sources (beyond regulated electric and gas utilities) to provide data through the Platform, so long as they are in compliance with the logical data model and other standards.

I recommend creating a performance-based regulation framework for compensating utilities if their participation in the Platform meets performance metrics, which could include: Platform traffic or amount of use; timely responsiveness to requests for third-party authorization and data delivery; prevalence of reported bugs (and ability to fix quickly); ability to keep the API services online with minimal downtime; or other metrics. These metrics should all be quantifiable through automated means (such as logging server activity, bug-tracking systems, etc.) so that up-to-date metrics are available on a monthly basis.

I recommend the Commission include in its ruling a listing of user stories to capture the intended outcomes and establish clear, testable goals for what the Data Platform will enable (i.e., if any of the required user stories are not made possible by the Data Platform, the Data Platform is not accomplishing its intended purpose). (See Exhibit CENH-1.)

Exhibit List

Exhibit CENH-1	User Stories Narratives

Exhibit CENH-1

User Stories Narratives

BACKGROUND & INTRODUCTION

User stories illustrate the desired outcomes of major user groups (defined below) utilizing the statewide Energy Data Platform. As part of the agile software development process, we suggest the following major user groups, their use case premises and user stories for the consideration of the Commission. This list of user stories is not intended to be comprehensive or final, but is offered as a starting point for further discussion. This format was deemed useful by the DE 19-197 intervenors during the technical sessions and informal discussions of the past several months as a means of documenting outcomes in a specific, succinct, and non-technical manner so that all parties could participate in productive discussions about the goals and priorities for the Platform.

We propose that a finalized set of user stories be included in the final ruling by the Commission so that the intended outcomes for the Platform are documented in an accessible and testable fashion. This will allow the Commission and intervenors to ascertain whether or not the completed Data Platform is effectively meeting all of the desired outcomes.

This exhibit of User Stories was compiled through a collaborative process that included discussions and engagement with many of the intervenors in DE 19-197. This document is an attempt to capture as many as possible of the desired outcomes that were articulated through various channels during this collaborative process that preceded the filing of testimony. We are open to the possibility that, through the remainder of this adjudicative proceeding, these user stories may be refined and improved upon further by way of input from and collaboration with other parties to this proceeding.

DEFINITIONS

- **Major user groups** are the individuals, groups or entities that will use the Energy Data Platform. We organize users into six major user groups: customers (C); third parties (TP); Community Power Aggregations (CPA); government (PUC); utilities (U); and Electric Grid Modernization (GM).

- **User story premises** are the broad goals of a major user group.

- **User stories** are specific achievable outcomes enabled by the Data Platform, which were identified by various intervenors in DE 19-197. Each user story is prioritized in this narrative as "high priority" (meaning it should be part of the Platform from the outset or as soon afterwards as possible), "low priority" (it can be delayed to a later iteration of the Platform if necessary), or "future" (it will not be needed until other aspects of New Hampshire's energy landscape mature further).

Customers User Stories (C-)

Customer User Story Premise: A customer needs to be able to access energy solutions that provide energy usage savings, revenue opportunities, and environmental benefits.

High Priority Customer User Stories:

C-1 A customer needs to be able to share his/her historic energy information (usage, cost/billing info, etc.) held by a utility with a Third Party (any non-utility entity such as distributed energy resource (DER) provider, CPA, non-profit, competitive supplier, etc.) in order to determine whether a certain service or product is a good fit for the customer. For example, this could include sending energy information to (i) a rooftop solar provider for getting a price quote; (ii) a competitive supplier to receive a price estimate; (iii) to a storage provider to determine the appropriate size of behind-the-meter battery storage; and many other examples.

C-2 A customer needs to be able to share his/her ongoing energy information (usage, cost/billing info, etc.) held by a utility with a Third Party (any non-utility entity such as DER, CPA, non-profit, competitive supplier, etc.) in order to use a service, such as a DER. Some examples include, but are not limited to, monitoring of post-retrofit energy efficiency; gathering residential or commercial and industrial (C&I) usage data for demand response settlement and ongoing management; verifying performance of behind-the-meter battery storage over time. This use case might be combined with User Story C-1 – for example, a customer might execute requests for both historic and ongoing information at the same time.

C-3 An individual customer needs to be able to download their historical data so they can analyze it for opportunities or get customized recommendations about the potential energy and economic impacts of changing energy suppliers or rate plans, installing PV/batteries/other DERs, or making other changes to their energy use. This might not involve an explicit relationship with a third party if the customer is using a software tool directly.

C-4 A customer needs to know that their personally-identifiable information will not be released to any party without their consent so that they can use the platform without concern for their privacy. That consent may be granted to a CPA by virtue of not opting out from a municipal aggregation initiation, or as part of an opt-in service initiation with another third-party provider.

Future Customer User Stories:

C-5 A customer needs to be able to share historic and ongoing energy information for multiple fuels in addition to electricity. This includes the ability to share gas information per the same requirements as electric information.

Third Party User Stories (TP-)

Third Party User Story Premises:

- A third party, such as a CPA or competitive energy supplier, can provide customers different choices for energy suppliers and rate structures to reduce energy bills.
- A third party, such as a DER or energy service provider, can provide customers custom energy solutions not requiring grid interconnection (energy efficiency, demand response) that reduce energy bills.
- A third party can provide customers custom with energy solutions requiring grid interconnection (solar, storage, electric vehicles, electric vehicle chargers etc.) that reduce energy bills while minimizing grid constraints and interconnection costs.
- A third party can provide customers with custom energy solutions requiring grid interconnection (solar, storage, electric vehicles, electric vehicle chargers etc.) that reduce energy bills, minimize grid constraints and interconnection costs, and create new revenue opportunities by both bidding and settling transactions for grid services such as capacity, demand reduction, hosting capacity, power quality, reliability etc.
- A third party can participate in the wholesale energy market as a load serving entity for the purpose of procuring or selling electrical energy or capacity on behalf of its participating retail electric customers, including itself.
- A third party can provide visibility into deployed solutions to the utility, communities, government agencies, and other entities for the purposes of maintaining reliability, tracking and meeting energy goals, etc.

- A third party provides customer service to answer customer questions about bills to support the energy solutions it provides.

High Priority Third Party User Stories:

TP-1 A third-party energy service provider needs to be able to access energy data so that it can offer services to customers across the state of New Hampshire in multiple distribution utility territories without incurring multiple costly data integration efforts with every individual utility provider.

TP-2 A third party needs to be able to convey customer authorization and request billing data from a utility through a fully-automated interface and receive at least three years 15-minute interval data (or the finest resolution available, if 15-minute is not supported by their meter) in a standard format such as Green Button within 30 minutes of making the request.

TP-3 A customer with multiple buildings across different utility territories needs to be able to access data from all of their buildings in a common format in order to view and analyze the data.

TP-4 A competitive energy supplier, Community Power Aggregation (CPA), or authorized third-party provider needs to be able to access a customer's updated electric and/or gas meter reading data as soon as that data has been collected from the meter and verified appropriately so that they are able to make fully-informed decisions on the best energy solutions to use, save, store, generate, or export energy in their homes and businesses.

TP-5 A customer or third-party needs to be able to access standardized representations of all available tariffs for a given meter service point so that they can accurately calculate hypothetical bill costs for a historical or proposed future monthly and hourly energy and demand profile.

TP-6 A third party needs to know how much its customers' energy use costs to deliver at different times of day and year so that it is able to offer its customers time-varying-rates (TVR, such as time of use (TOU) and real-time pricing (RTP)) and bill them accurately so that it can procure low-cost energy, generate their own energy and/or reduce their energy usage at the appropriate times of day and year and distribute those costs equitably among its members.

TP-7 A third-party customer service representative needs to be able to access customer bills and supporting data in a timely fashion (minutes, not days or hours) in order to answer customer questions over the phone or in an online interface.

TP-8 An individual customer, authorized aggregator, or a CPA serving a customer needs to be able to access both raw meter reading and billing determinants and how that customer's incurred cost is broken down by various fixed and variable components, including energy, fuel surcharge, Renewable Energy Credits (RECs), demand, capacity, etc. so that they can plan relative to expectations about how those cost components might change in the future.

<u>Low Priority Third Party User Stories:</u>

TP-9 A customer or third party needs to know whether they will be able to site a distributed energy resource (DER) behind their meter, whether there will be utility fees associated with the

interconnection, and how much that DER's grid services will be worth at that location, in order to make a decision about whether that DER is a good investment.

TP-10 A third party needs to be able to respond to price signals and requests for proposals (RFPs) with robust DER solutions that can provide grid services to support the distribution planning process. A third party needs to understand the system conditions including system topology, the rating of assets, their relative relationship of assets to each other and the specific grid characteristics of those assets (capacity, hosting capacity, power quality, reliability etc.).

TP-11 A third party needs to access near-real-time, highly granular data in order to participate in wholesale power markets, including engaging in settlements. This requires access to granular interval usage data of a customer at the interval required for settlement.

Future Third Party User Stories:

TP-12 An independent system operator (ISO) such as ISO-NE can access information for any market settlements. This requires granular interval usage data for participating resources at the interval required for settlement.

TP-13 A third party needs to be able to provide utilities, communities, and government agencies up to date information so that they can demonstrate the value of their services. Utilities can leverage this information for distribution planning including procuring services from deployed solutions while communities and governments can track solution deployments to meet energy

objectives. This includes information on the operational characteristics and location of deployed solutions.

Community Power Aggregation User Stories (CPA-):

CPA User Story Premises:

- A community (municipality or county) wants to manage their energy on behalf of its residents for purposes including saving resident's money, meeting local climate & energy goals, and developing innovative and competitive retail electricity markets.
- A community needs to be able to onboard and manage energy services for individual customers who do not opt out of or who consent to being included in an aggregation program.
- A community needs to provide customer service to individual community residents to support any energy services provided including providing accurate energy bills and access to customer service representatives.

High Priority CPA User Stories:

CPA-1 A community needs to be able to access anonymized, but not aggregated, energy use data from all accounts in their jurisdiction in order to analyze the options for procuring different energy supply or demand reduction and flexibility resources that will lower costs and/or environmental impacts of all the residential, municipal, and business energy use in their jurisdiction, regardless of which distribution utility is currently serving that customer. This process

examines the most cost-effective options for each individual load-shape in the population and then aggregates those options to explore policies at the community level.

CPA-2 A community needs to be able to access hourly (or better) energy data that can be aggregated by rate class in order to measure the retail cost, CO_2 and other impacts of its energy use on an hourly, marginal basis. This analysis will allow the community to determine if it is meeting its goals for reducing the energy burden and climate impact goals set by the community.

CPA-3 A CPA needs to be able to access the full list of names, physical addresses, and contact information for all customers in its service territory from each distribution utility that is currently serving them so that it can communicate with them and notify them of the upcoming opt-out decision they need to make. Note that the contact information for customers (ratepayers) is not necessarily the same as the contact information that the municipality may have for the taxpayer listed for a building, as tenants often pay their own utility bills.

CPA-4 A CPA needs to be able to receive utility meter data promptly after the distribution utility reads the meter so that it can issue a bill to an individual customer and collect payment. The CPA also needs to know past energy use, which tariff(s) the account is on, and past payment history of the customer.

<u>Low Priority CPA User Stories:</u>

CPA-5 A CPA needs to be able to conduct consolidated billing so that it can present the customer with a streamlined bill.

CPA-6 A CPA needs to be able to access load data with adequate granularity and latency to allow it to settle with all load-serving entities that supply its members, based on the hourly load and other grid services its members participated in.

Future CPA User Stories:

CPA-7 A CPA needs to be able to add and update customer records to the platform so that it can support customers with adding or changing service.

CPA-8 A community wants to analyze the options for taking actions to lower costs and/or environmental impacts of all the residential, municipal, and business energy use in their jurisdiction. This process examines aggregated gas usage in addition to electricity usage.

Government (PUC-):

PUC User Story Premises:

- The Public Utilities Commission (PUC) can review utility rate case proposals and ensure any approved proposals meet the least-cost planning framework and consider alternatives to traditional capital investments when those alternatives may be capable of satisfying a grid need at least cost.
- The PUC can conduct rate design to meet the evolving needs of the grid.

High Priority PUC User Stories:

PUC-1 The PUC can conduct independent demand studies to verify the analysis provided by utilities. This will require access to system topology, asset ratings and historical network demand.

PUC-2 The PUC can conduct an analysis to identify various rate design scenarios to encourage customers to change their energy use to relieve grid constraints. This will require customer interval usage data and existing tariff structures.

PUC-3 The PUC can conduct an analysis to identify various rate design scenarios to develop Performance Based Ratemaking to realign utility incentives with additional outcomes besides cost and reliability.

Utility User Stories (U-)

Utility User Story Premises:

- The regulated electric and gas utilities maintain the systems of record for meter and billing data systems.
- The utilities are also responsible for participating in distribution system planning, maintenance and expansion.

- The quantity and size of distributed energy resources (DERs) is rapidly growing to the point that it impacts distribution grid planning, but the distribution utilities do not own or control these resources in many cases.

High Priority Utility User Stories:

U-1 A utility needs to be able to satisfy data requests from multiple authorized parties, including customers, third-parties, CPAs, and others, using a standard format and transfer mechanism so that these requests do not place an undue burden on their IT resources.

U-2 A utility needs to receive updated customer name and contact information via a consistent format and transfer mechanism from CPAs and other competitive suppliers so that it can perform maintenance on poles, wires, meters, and other distribution system equipment that might require communication with all affected customers.

Low Priority Utility User Stories:

U-3 A utility needs to know the location and specifications of DERs that are operating on its distribution network so that it can integrate the expected performance of those DERs into its distribution planning.

U-4 A utility needs to receive interval sub-metered energy performance data from DERs that are operating on its distribution network via a consistent format and transfer mechanism so that the utility can integrate the actual performance of those deployed DERs into its distribution planning.

Electric Grid Modernization User Stories (GM-)

Grid Mod User Story Premises:

- The Grid Modernization Stakeholder Working Group (GMSG) can review information on each utility's progress on hosting capacity analysis and presentation, locational value initiatives, and interconnection procedures.
- The GMSG and the Independent Professional Engineer (IPE) can participate in a collaborative planning process including the evaluation, selection, and prioritization of investments in a manner that accommodates changing customer expectations while also minimizing customer bill impacts.
- The GMSG and IPE can participate in a collaborative distribution planning process including considering alternatives to traditional capital investments when those alternatives may be capable of satisfying a grid need at least cost.
- The GMSG and IPE can participate in a collaborative distribution planning process including prioritizing and maximizing the use of energy efficiency and demand side resources investments when proposed options have equivalent cost, reliability, environmental, economic, and health-related impacts.
- The GMSG can examine and develop metrics for measuring system performance consistent with the Commission's statutory mandate and the distribution system planning objectives.

High Priority Grid Mod User Stories:

GM-1 The GMSG and IPE can access Utility Baseline System Data in a timely manner and in a format that can be easily digested and analyzed. This data is required to support their respective functions per the Commission grid modernization order.

Future Grid Mod User Stories:

GM-2 The GMSG can review hosting capacity analysis and locational value initiatives to ensure they provide the most accurate and up to date information while considering all the value streams that alternatives to capital investments can provide. The GMSG needs the inputs, assumptions and methodologies used for such analysis and also needs to understand the system conditions including system topology, the rating of assets, their relative relationship of assets to each other and the specific grid characteristics of those assets (capacity, hosting capacity, power quality, reliability etc.).

GM-3 The GMSG needs to understand the system conditions including system topology, the rating of assets, their relative relationship of assets to each other, the specific grid characteristics of those assets (capacity, hosting capacity, power quality, reliability etc.) and locational value so that they can consider alternatives to capital investments to meet grid needs and determine whether they are technically feasible.