# DE 19-197 Statewide Multi-Use Online Energy Data Platform Scoping Comment Solicitation

**Amro M. Farid[1], Samuel Golding[2], April Salas[3]**

## I. Introduction

SB 284-FN (2019) amended RSA chapter 378 by adding a new subdivision entitled "Multi-Use Energy Data Platform," effective September 17, 2019. The Commission opened DE 19-197 on December 13, 2019 to determine the following aspects of the platform during DE 19- 197: (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. RSA 378:51, II. The Commission must also determine whether the costs associated with the proposed platform may be reasonable and in the public interest. RSA 378:51, III.

To better delineate the form that the statewide multi-use online energy data platform may ultimately take pursuant to the directives of RSA 378:51, II, and describe the potential benefits and costs associated with the platform pursuant to RSA 378:51, III, the Commission Staff solicits comment on the below-described aspects of the platform. Commenters are encouraged to cite quantitative data and qualitative approaches from other jurisdictions while addressing the following issues in their comments.

## III. Preliminaries

**Definition 1 – Meta-Data Model**: A meta-data model includes 1.) a set of data fields that are populated with instantiated numerical and textual data 2.) a set of classes which serve as containers of data fields and 3.) a set of relationships between the data fields and their classes.

**Definition 2 – Data Platform Implementation**: The governance, development, technical implementation, change management, and versioning of the meta-data model and its instantiated data.

**Definition 3 – Use Case**: A written description of how users will interact with and perform tasks on an information technology system or application. It outlines, from a user's point of view, a

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system's behavior as it responds to a request. Each use case is represented as a sequence of simple steps, beginning with a user's goal and ending when that goal is fulfilled[4].

## III. Functionalities

Q1: What functionalities should a statewide multi-use energy data platform offer to customers, Distributed Energy Resource (DER) providers, Competitive Suppliers, and other users, including any applications and business uses?

*A1: Prior to identifying the functionality of a statewide multi-use energy data platform, we must identify a set of requirements to which the functionality must adhere. Such requirements may be of a technical, legislative, regulatory, social, and/or economic nature. Achieving a consensus on these would greatly streamline the evolution of DE 19-197. We offer a necessary but not necessarily exhaustive list here.*

1. *The functionality of a statewide multi-use energy data platform must be* ***compliant*** *with all Federal and NH Laws. In particular, we note that the implementation of a statewide multi-use energy data platform must specifically adhere to the SB 286 (2019)[5] on community power aggregators ("CPAs"). This NH state law has several important and relevant provisions that must be incorporated into the design of the data platform:*

   A. *After a CPA is established in a particular jurisdiction, it becomes the default electricity supplier for any new customers. SB 286 states:*

      "[Such customer] shall be given a choice of enrolling in utility provided default service or aggregation provided default service, where such exists. New customers shall be informed of pricing for each when they apply for service. Such new customers may also enroll with a competitive electricity supplier. New customers who do not make such a choice shall be enrolled in the default service of any geographically appropriate approved aggregation, or, if none exists, the utility provided default service."

   B. *CPAs, as well as, municipal utilities are also*

      "… expressly authorized to aggregate other services commonly and regularly billed to customers" *[including]* "combining billing for any or all utility services".

   *These can include, for example, natural gas service in addition to CPA consolidated billing for regulated electric distribution utility service.*

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[4] Adapted from: https://www.usability.gov/how-to-and-tools/methods/use-cases.html

[5] The full text of SB 286 (2019 can be found at: https://legiscan.com/NH/text/SB286/2019

C. *CPAs further have the authority to:*

> "… … provide for the supply of electric power, demand side management, conservation, meter reading, customer service, other related services, [and] the operation of energy efficiency and clean energy districts...".

D. *CPAs have the authority to employ:*

> "… [the] use of revenue bonds pursuant to RSA 33-B and RSA 374-D and loans from other municipal enterprise funds as may be approved by the governing body and the legislative body of the municipality …"

E. *In regards to this last point, CPAs have the authority to work with the Commission and distribution utilities to contribute or provide for the cost of revenue grade meter upgrades. The law states:*

> "For the purpose of obtaining interval meter data for load settlement, the provision of energy services, and near real-time customer access to such data, municipal and county aggregators may contribute to the cost of electric utility provided meter upgrades, jointly own revenue grade meters with an electric utility, or provide its own revenue grade electric meter, which would be in addition to a utility provided meter, subject to commission finding in the public good and approval of the terms and conditions for such arrangements, including sharing or transfer of meter data from and to the electric distribution utility."

F. *CPAs may exercise their new authorities on an individual basis, or may choose to standardize the provision of any and all services across multiple jurisdictions by* "operating jointly pursuant to RSA 53-A".

G. *Regarding the use of individual customer data, CPAs are:*

> "subject to RSA 363:38 as service providers and individual customer data shall be treated as confidential private information and shall not be subject to public disclosure under RSA 91-A."

H. *CPAs are also authorized to use individual customer data during the period after the municipal legislative body approves of an Electric Aggregation Plan and prior to the enrollment of customers in CPA service. Individual customer data may be used during the CPA implementation period for two purposes: in order to meet statutory obligations inherent in customer education and notification, and to support retail product innovation prior to launch. Specifically:*

> "An approved aggregation may use individual customer data to comply with the provisions of RSA 53-E:7, II and for research and development of potential new energy services to offer to customer participants."

*The authority to use individual customer data for "research and development of potential new energy services" is a much broader authority, while the relevant provisions of RSA 53-E:7 more specifically relate to the notification by mail of (1) bundled service customers to be enrolled on an opt-out basis as well as (2) customers on competitive supply that must be offered CPA service on an opt-in basis.*

I. *In this regard, the law requires that such:*

> "Notification shall include a description of the aggregation program, the implications to the municipality or county, and the rights and responsibilities that the participants will have under the program, and if provided on an opt-out basis, the fixed rate or charges that will apply."

2. *Returning to the list of requirements, the functionality of a statewide multi-use energy data platform must be **interoperable** with NH stakeholders and beyond. Such an energy platform will naturally enable a plethora of information technologies (IT). Some of these will be existing legacy systems and others will be new. While it may be tempting to develop the data platform to conform with the particularities of specific IT systems of specific NH stakeholders, such an approach is far from the best industrial practice. Doing so risks 1.) unnecessarily high implementation costs as each NH stakeholder imposes the technical requirements of their specific systems 2.) unrealized economic and social benefits as NH stakeholders that have yet to actively participate (e.g. residents and consumers) do not voice their specific requirements and 3.) a potential collapse of the entire design process of the data platform as the cumulative technical requirements of all stakeholders may create the circumstances of an infeasible solution. To overcome such a highly undesirable possibility, the industrial best practice is to ensure that the data platform adheres to well-recognized national and international standards. The relatively familiar Green Button Standard, although highly limited in the scope of its data model and overly restrictive in its de-facto implementation, is one such standard. Indeed, the Green Button Standard is part of a larger group of technical standards called the "Common Information Model" (CIM) published by the International Electro-technical Commission. The Common Information Model is the group of data model standards that governs the complete description of the electric power grid end-to-end and is the basis for all technical communication between all grid stakeholders including wholesale market interactions and device manufacturers. These two types of data-driven interactions are of the utmost social and economic importance. First, the techno-economic coordination of the New Hampshire electric power grid with the broader New England electric power grid brings continued technical and economic benefits to all New Hampshire grid stakeholders. Second, because device manufacturers worldwide adhere to CIM standards, the development of a statewide multi-use energy data platform that conforms to CIM standards facilitates the provision of a wide variety of products and services to New Hampshire's grid stakeholders. It also spurs technological innovation from local energy and IT companies and the socio-*

*economic benefits found therein. Furthermore, failing to conform to CIM standards places New Hampshire on a trajectory of perpetual custom-developed grid technologies that will either be prohibitively expensive, or inferior quality relative to the broader market, or never developed at all given New Hampshire's relatively small market size. It is important to note that the Common Information Model was developed in cooperation with many of our nation's leading electric power utilities and is supported strongly by the Electric Power Research Institute (EPRI) as their leading R&D consortium. We refer the service list to EPRI's tutorial[6] on the common information model which includes the Green Button Standard as a "CIM Success Story".*

3. *The functionality of a statewide multi-use energy data platform must be* ***extensible****. As this DE 19-197 docket evolves, a consensus will emerge as to the functionality of the data platform. This consensus will be in light of a set of agreed upon use cases that depend on the products and services that grid stakeholders will provide and request at present and in the future. Naturally, these products and services will evolve and consequently a "future-proof" statewide multi-use energy data platform will have to be extensible; accommodating iterative revisions and additions to the data model in time. Again, the industrial best practice to "future-proofing" a data model is to tie its evolution to that of relevant standards; which in turn are revised every couple of years as technological advancements are made and new knowledge is gained. Indeed, the best way to achieve an extensible statewide multi-use energy data platform is to choose which parts of the CIM fulfill the desired set of use cases and their associated functionality.*
4. *The functionality of a statewide multi-use energy data platform must be* ***state-wide****. While this statement may appear obviously self-referencing, it is important to recognize that grid data, at present, is quite distributed amongst various types of grid stakeholders. Consequently, the creation of a data platform serves to centralize this distributed data and it must be designed with functionality to accommodate* ***the input and retrieval*** *of data from* ***all*** *of these stakeholders. As a simple example, the world is currently experiencing a "fourth industrial revolution"[7] that has enabled the development of the "Internet of Things" (IoT) in which all devices have the potential to be internet-enabled. The energy Internet of Things (eIoT)[8] allows for these internet-enabled devices to provide energy-related services. It is a difficult to conceive a near-future scenario in which eIoT does not play an indispensable role in the input and retrieval of data from a statewide multi-use energy data platform. Furthermore, the cost of implementing multiple multi-use energy data platform is much greater than the cost of implementing a single such data platform. There exist economies of scale in the size of a data platform but diseconomies of scale in the number of data platforms.*

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[6] The 5th edition of the EPRI CIM Primer can be found here: https://www.epri.com/#/pages/product/000000003002015918/?lang=en-US

[7] The fourth industrial revolution represents a technological revolution where are all physical technologies fuse with their informatic counterparts. This cyber-physical nature creates a revolutionary rather than evolutionary change in the value of the physical and informatic technologies when viewed alone.

[8] eIoT: The Development of the Energy Internet of Things in Energy Infrastructure. https://link.springer.com/book/10.1007%2F978-3-030-10427-6

5. *The functionality of a statewide multi-use energy data platform must be implemented by a* ***commercially-neutral grid stakeholder****. It is well-known in economic theory that the market power of a market participant grows increasingly with its access to market data. A statewide multi-energy data platform will house such large quantities of energy market data that a commercially-interested grid stakeholder has the potential to exercise greater than proportional market power for financial gain; potentially to the detriment of other grid stakeholders. Consequently, it is important the multi-use energy data platform be implemented by a non-for-profit entity with strict bounds on the governance of the data therein.*

*While these requirements are an incomplete set, they provide the basis for identifying a set of use cases that will drive the functionality of the statewide multi-use energy data platform. In this regard, we recognize that the best practice of identifying a set of use-cases is to "cast a wide net" of engaging a diversity of grid stakeholders with disparate voices. Again, the value of the platform grows greater than proportionately with the diversity of stakeholders engaged in the process of capturing use cases. In this regard, we recognize the extensive efforts of the New Hampshire Office of the Consumer Advocate. They have compiled a list of 38 candidate uses cases from a wide variety of grid stakeholders. We attach them in Appendix A as part of the intervention from the City of Lebanon and the Town of Hanover. We are also in agreement with the list of 2 candidate use cases identified by Greentel. We attach them in Appendix B as part of the intervention from the City of Lebanon and the Town of Hanover. We are also in agreement with the list of candidate use cases identified by Mission-Data. We attach them in Appendix C as part of the intervention from the City of Lebanon and the Town of Hanover.*

*Unfortunately, such a wide set of candidate use-set, in their current form, is not usable from from a software engineering perspective. A final set of candidate uses-cases must be mutually-exclusive and collectively exhaustive. Consequently, a technically-minded group must work to reframe these use cases so that do not overlap in their associated functionality. Furthermore, a technically-minded reader would recognize that the use cases do not strictly adhere to a technical definition of a use case. Consequently, a technically-minded group must translate the "stakeholder use-cases" (e.g. those in Appenices A, B, and C) to a set of "technical use-cases" that facilitate downstream technical implementation. We recognize that such a task is not necessarily straightforward and we offer a high-level approach here.*

*First, as the number of use cases proliferate, and the associated data complexity grows, it is important to organize these use cases by life-cycle stage. Use cases will often relate to operations, operations improvement, maintenance, and regulatory compliance.*



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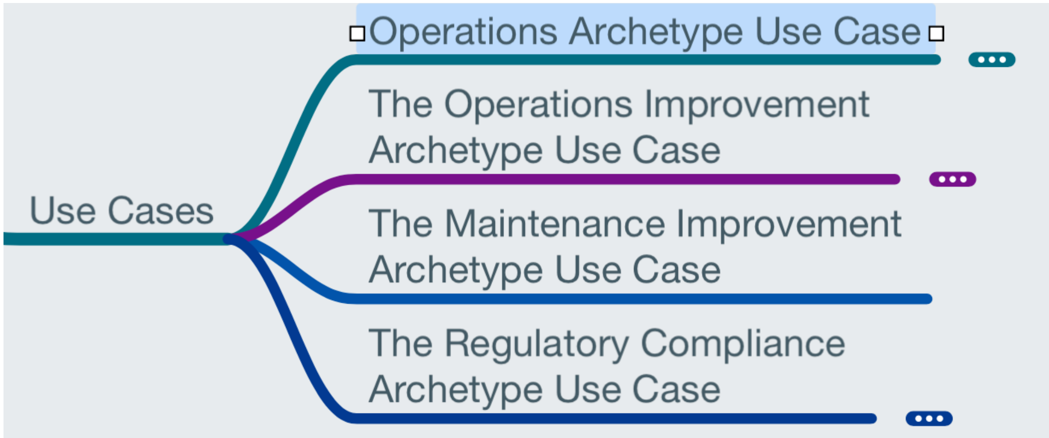
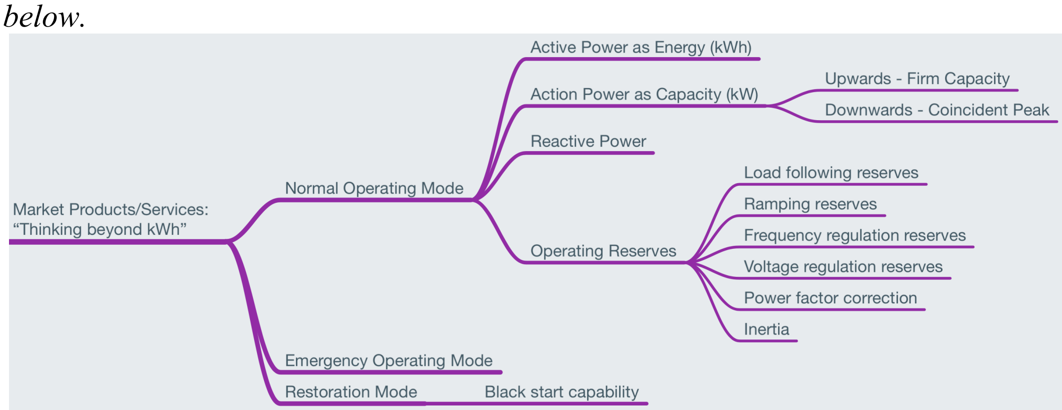



*Each of the use case categories above can be investigated individually. For the sake of greater clarity, we elaborate on the category of operations use cases. In this regard, we recognize that the electric grid is a market platform for exchanging electric services (or products as they are often called by independent system operators). Furthermore, the emerging consensus in the technical literature, be it academic or industrial practice, recognizes that as distributed energy resources in the form of renewable energy and eIoT proliferate, there will be a need to develop retail-electric grid services "beyond the kilo-watt hour" (kWh). These services will unbundle many electric services that already exist in wholesale markets. In other cases, given the technical complexities of the distribution system, retail electricity markets may need innovate well beyond existing wholesale electricity market services. A first, but not necessarily complete, taxonomy is shown below.*




*In effect, these operations use cases all have a common template:*

> **Who or what** exchanges **which electricity service** in **which mode of operation** for **what price/tariff** with **who**, **when** and **where**?

*For example, the default retail electricity service fulfills this template as follows:*

> **The Distribution Utility** exchanges **a number of kilo-watt hours (active power integrated over time)** in **normal operating mode** at **a flat regulated rate** with **self-**

> **scheduled electricity consumers**, **over a monthly billing cycle, in the distribution system utility's service territory (assumed as a copper plate[9]).**

*In contrast, a more futuristic electricity service based upon distribution locational marginal prices fulfills this template as follows:*

> **Dispatchable energy resources** exchange via distribution system operator **a number of kilo-watt hours (active power integrated over time)** in **normal operating mode** at a **time-varying market-clearing rate** with **self-scheduled energy resources (be they generators, storage resources or consumers)**, **for the duration of 5 minutes[10], on a given distribution system feeder.**

*These contrasting electricity market services are meant to indicate the breadth of desired use cases that the statewide multi-use energy data platform must enable. Furthermore, there is tremendous value in organizing these electricity services with an meta-data template. For each electricity market service, one simply needs to "fill-in-the-blanks" with each type of data: 1.) who or what exchanges 2.) which electricity service 3.) which mode of operation, 4.) what price/tariff 5.) with who, 6.) when, and 7.) where. We believe that this two step process of 1.) classifying use case and 2.) fitting them into relevant meta-use case template will greatly facilitate the identification of a mutually exclusive and collectively exhaustive list of use cases that are ready for further technical development.*

*Once such a set of use cases has been identified, the question of data platform functionality (originally posed several pages ago) can be answered. In this regard, Greentel has offered a partial list of functionalities. We attach them in Appendix D as part of the intervention from the City of Lebanon and the Town of Hanover. We are also in general agreement with the response to this question provided by Packetized Energy.*

*Stakeholders should consider how their combined application represents a new pathway to leverage the capacity of communities to help optimize the use of energy infrastructure across the state.*

Q2: What level of energy data granularity appropriately balances costs of collecting, storing, and transmitting energy data with the incremental benefits of increased granularity?

*A2: This question must be addressed carefully because it has many potential pitfalls. In light of Answer 1 above, it is important to recognize that data alone has no value. In the meantime, its collection, storage, and transmission always has its associated costs. The data itself gains value when it enables a set of electricity market services and use cases as described above.*

[9] The "copper plate" assumption is a well-known technical assumption that power systems engineers and economists use to refer to a grid that

[10] We define five minutes here because it is consistent with the frequency of the wholesale real-time energy market in ISO New England.

*Consequently, the cost of the data must be commensurate with the set of electricity market services and use cases. Here, it is important to state explicitly several important realizations. The benefit of a single use case should **never** be assessed alone. A given set of data often enables multiple use cases synergistically; and so the entire data set must be matched to its entire use case set. To assess the value of each use case independently is to neglect this fact, and consequently to overstate with bias the costs relative to the benefits. For example, municipalities that implement CPAs may well find that the business case for more granular data could be enhanced by using the communications, data management, consolidated billing and customer care systems IT system that are available on the open market. This case study[11] provides some insight in these regards. We offer these insights as context for how the data platform should be designed in a manner that enables this sort of bottom-up, cross-functional innovation.*

*Moreover, it is important to recognize that the set of electricity market services and use cases is likely to grow over time. The associated benefits will grow accordingly. The value of data grows in time as more is collected. The number of stakeholders that make use of these use cases will also grow as they become more aware of its potential use in their personal and commercial activities. In contrast, much of the cost of the data platform is born up front; before grid stakeholders have adopted a diversity of use cases and before the use cases have been implemented. In a sense, the certain up front costs are being weighed against the uncertain future benefits. Consequently, there is a tendency to overstate with bias the costs relative to the benefits.*

*Furthermore, in assessing costs and benefits, it is important to recognize that the cost of implementing a data platform will be incurred by a relatively small number of grid stakeholders; the implementers of the data platform. In the meantime, the benefits are likely to be shared by all grid stakeholders. Consequently, there is a need to identify the benefits shared by all grid stakeholders and not simply those implementing the data platform.*

*We must also be aware that there is a real and tangible cost to doing nothing. The Town of Hanover, as part of its move to real-time pricing and sustainability goals, has already spent tens of thousands of dollars in hiring contractors to support their data access needs. It has also contributed 4 senior town staff with in-kind time and salaries. For many towns across the state, especially small and rural ones, such investments of time and money are entirely unattainable. For the larger towns and cities, such efforts constitute a highly inefficient duplication of efforts. The development of a statewide multi-use energy data platform will create the economies of scale that will enable systemic state-wide benefits.*

*We are also in general agreement with the response to this question provided by Packetized Energy. They have several use cases that are at the cutting-edge of techno-economic distribution system coordination, and we support retail electricity marketplace that facilitates such use cases. The Laboratory for Intelligent Integrated Networks of Engineering Systems (LIINES) at the Thayer School of Engineering at Dartmouth has conducted leading research in the integration of variable renewable, energy storage, and demand side resources so as to enhance cost efficiency, grid reliability, and reduce carbon dioxide emissions. These works, as well as many other described*

[11] See here for the case study. https://new.abb.com/docs/librariesprovider92/default-document-library/corpus-christi-wifi-mesh-network.pdf?sfvrsn=2

*in the academic and technical literature, show that a temporal granularity of 1-5 minutes is needed. While it is possible to provide an enhanced set of electricity services with data with a temporal resolution to 15 minute to hourly resolution, the implementation cost of such a granularity is remarkably close to the 1-5 minute level of granularity. Indeed, technical solutions exist where 1-5 minute data is only cached for the period of a day, and less frequent data is stored for longer periods of time. Finally, real-time data at the individual meter level is also necessary.*

Q3: How often should the data be updated?

*A3: For a simplistic response, changing nothing current utility data collection practices and without advanced metering infrastructure, data should be updated at least monthy, in accordance with current distribution utility data collection meter reading practices for the purposes of billing. With a future move towards advanced metering infrastructure, we should aim for 15 min refresh cycles of the data.*

*For a more accurate reponse, the response to this consensus depends on the consensus on the uses cases that the data platform enables. In that regard, we are in general agreement with the response to this question provided by Rep. Kat McGhee.*

*That said, it is important to note that in any relevant data platform the data is not all updated at once with the same frequency. There is relatively static or structural data (e.g. unique identifier on a smart meter). There is data that evolves relatively slowly (e.g. the address of a given consumer). There is data that evolves relatively fast (e.g. how much power is being consumed at a given point in time.)*

*All technical efforts should be taken to make available data as fast as it is collected with minimal delay. For example, EKM and Sense Energy Monitors are able to provide their circuit panel measurements at a frequency between 1sec and 1minute for a low cost of several hundred dollars. The frequency of the data updates does not necessarily drive the cost of the data platform implementation.*

*In contrast, some distribution utilities choose to collect meter data once per month (i.e. by driving a truck past the meter to receive its signal) even though the installed meter (e.g. AMR) broadcasts individual customer usage data at frequent and regular intervals. Furthermore, this meter data is often only collected once per month because the utilities' data, billing, and customer information systems have not been upgraded to accomdate more temporally granular interval data. Consequently, when a Green Button services like "Download My Data" and "Connect My Data" are implemented, they are limited by the operating practices of the distribution utility and not the meter itself.*

*In light of Answer 1 above, a use case can emerge where CPAs, given their authorities found in SB286, CPAs can "jointly own revenue grade meters with an electric utility, or provide its own revenue grade electric meter" and consequently bypass the operational barriers identified above so as to offer real-time consumption and rooftop solar generation data not unlike the services provided by EKM and Sense Energy Monitors today on the open market. The CPA could then* *provide the requisite data management, consolidated billing and customer care services by contracting with vendors operating in competitive markets that have already developed the software and processes necessary to do so using interval data (e.g. the Texas market). The CPA can then work with ISO-NE and the distribution utility to ensure that load forecasting and settlement processes incorporate the use of this data. The CPA can also provide electricity services based upon real-time prices. All of these benefits have the potential to emerge when data is updated on the energy data platform as regularly as the meter will technically allows.*

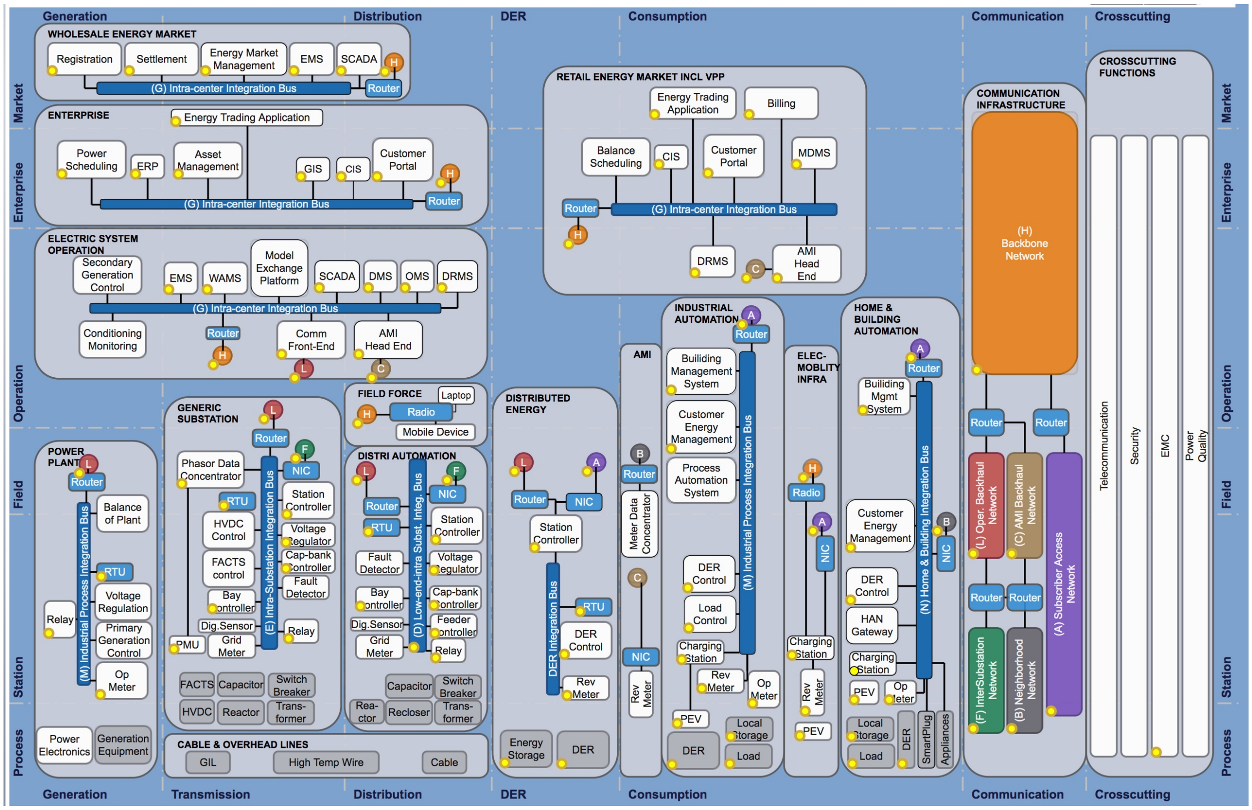
Q4: Should the customer data platform focus only on energy usage data as measured at the meter, or include other data and/or data sources? If other data sources, how should those sources be included and at what cost?

*A4: The question strikes as us inconsistent with the title of DE 19-197 Statewide Multi-Use Online Energy Data Platform. A customer data platform would clearly be a subset of a statewide multi-use online energy data platform. Consequently, the statewide multi-use online energy data platform should **not** only focus only on energy usage data as measured at the meter.*

*We agree that energy usage data as measured at the meter is an integral part of the of energy data platform. In that regard, the Green Button standard as a subset of the grid's Common Information Model (CIM) is a highly relevant part of the implementation.*

*That said, Green Button falls dramatically short of the use cases offered collectively by the intervenors in Appendices A, B, C, and D. Indeed, as the Greentel comments note, these use cases require customer, system, and market data. Consequently, there is a need to look beyond Green Button and instead at the entirety of the CIM. To that end, we refer the reader to the IEC Smart Grid Standards Map[12] below. It shows in a single and highly effective visualization the IEC CIM standards that pertain to relevant grid use cases. At a retail level, customer, system, and market data appear in the grey box labelled "Retail Energy Market Including Virtual Power Plants". Furthermore, these parts of the CIM interface are interoperable with the grey boxes labelled "wholesale energy market", "enterprise", and "electric system operation".*

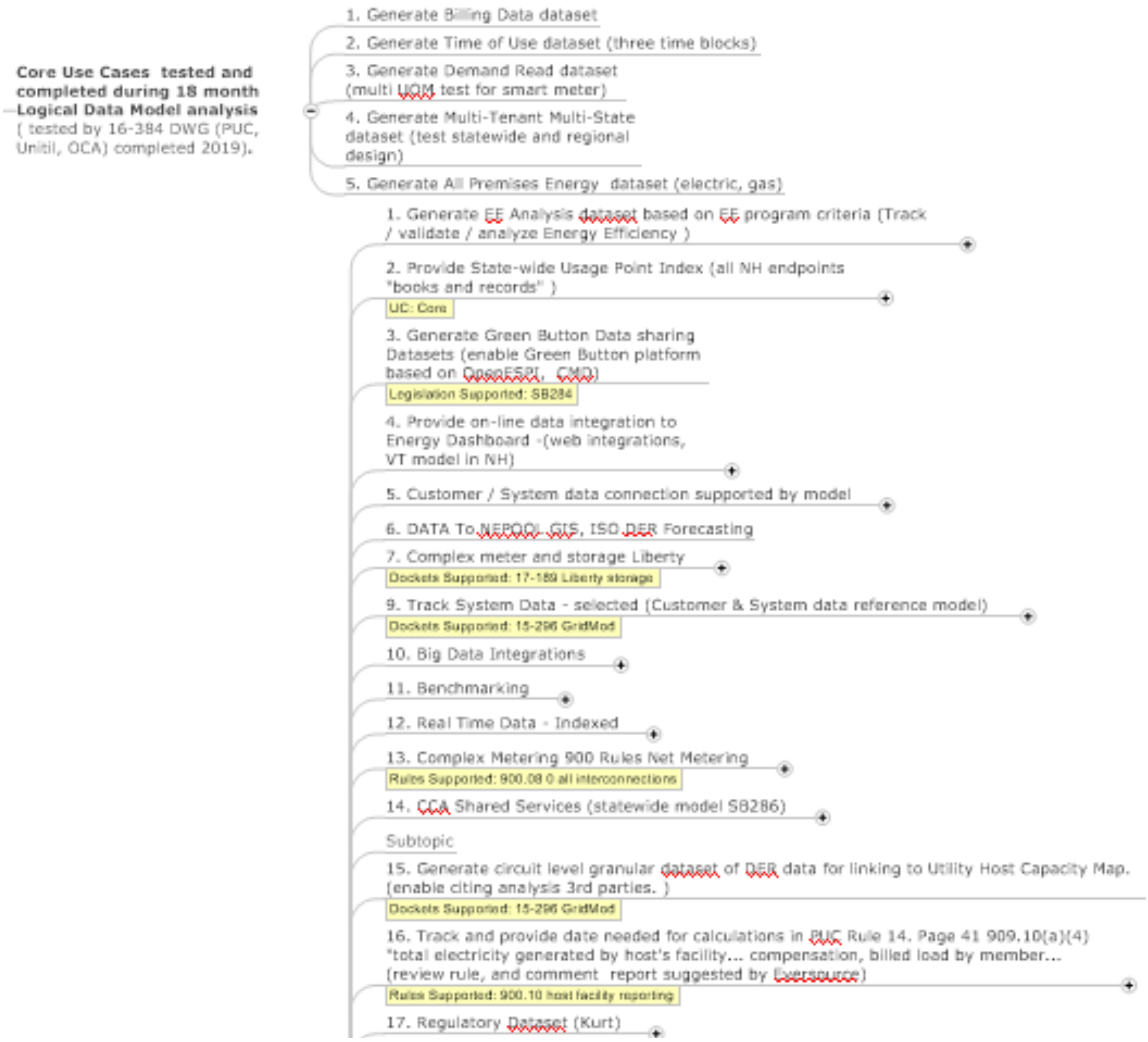
[12] The IEC Smart Grid Standards map can be found at: http://smartgridstandardsmap.com/

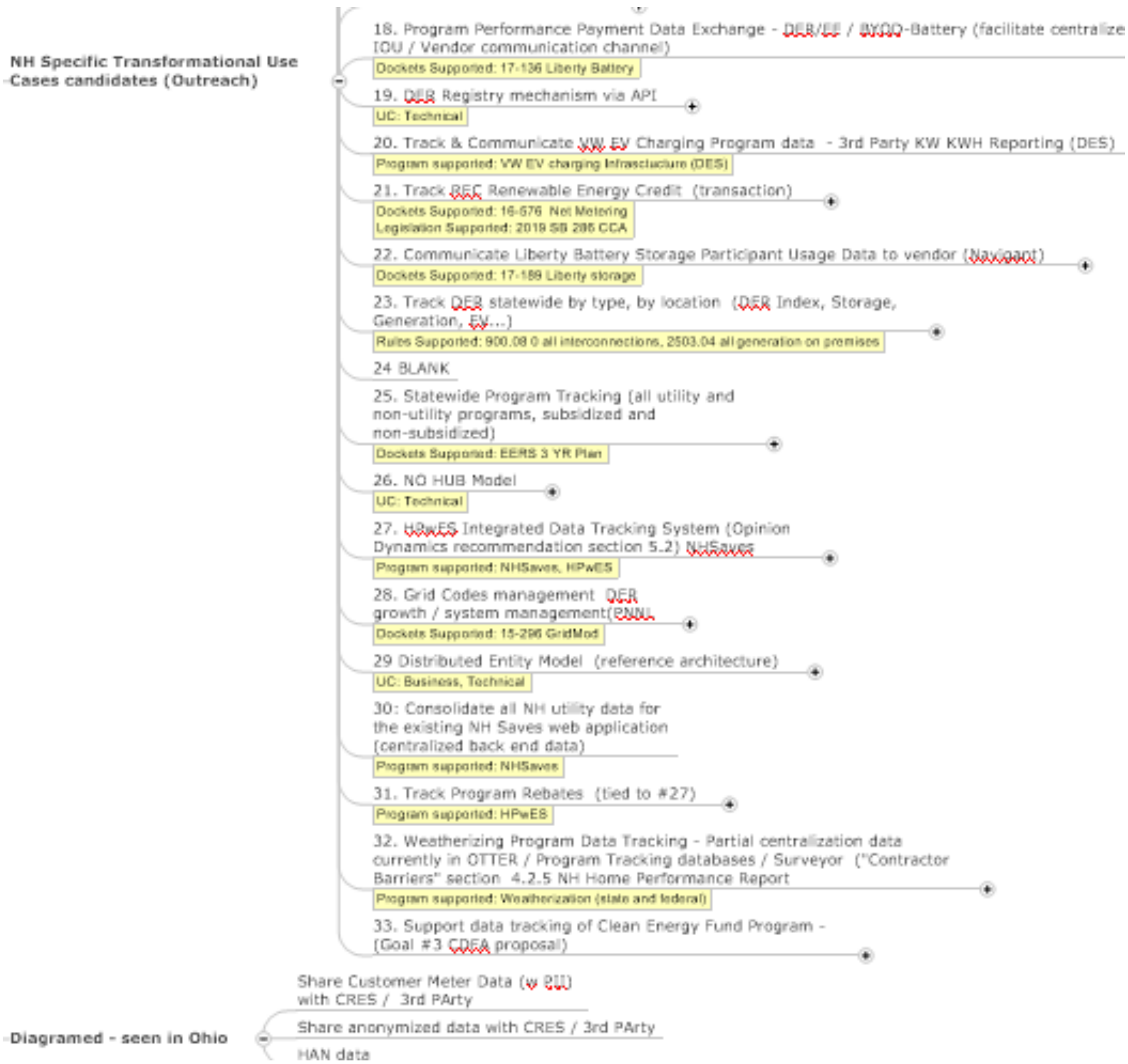



Q5: Is the energy data platform under consideration in this docket the appropriate mechanism to provide information on energy system data? Why or why not?

*A5: We are in general agreement with Rep. Kat McGhee on this question. Yes, the energy data platform under consideration in this docket is the appropriate mechanism to provide information on energy system data. New Hampshire is not alone in its commitment to the development of an energy data platform. The State of New York and Washington D.C. both have similar efforts. Furthermore, data portability and aggregation of energy data are recognized as prerequisites to enabling devices as part of the energy Internet of Things. Finally, the Electric Power Research Institute is likely to launch in 2020 a multi-stakeholder effort to support this need.*

## A. Candidate Use Cases Identified by the New Hampshire Office of the Consumer Advocate




NH Specific Transformational Use Cases candidates (Outreach)
18. Program Performance Payment Data Exchange - DER/EE / BYOD-Battery (facilitate centralize IOU / Vendor communication channel)
Dockets Supported: 17-136 Liberty Battery
19. DER Registry mechanism via API
UC: Technical
20. Track & Communicate VW EV Charging Program data - 3rd Party KW KWH Reporting (DES)
Program supported: VW EV charging Infrastructure (DES)
21. Track REC Renewable Energy Credit (transaction)
Dockets Supported: 16-576 Net Metering
Legislation Supported: 2019 SB 286 CCA
22. Communicate Liberty Battery Storage Participant Usage Data to vendor (Navigant)
Dockets Supported: 17-189 Liberty storage
23. Track DER statewide by type, by location (DER Index, Storage, Generation, EV...)
Rules Supported: 900.08 0 all interconnections, 2503.04 all generation on premises
24 BLANK
25. Statewide Program Tracking (all utility and non-utility programs, subsidized and non-subsidized)
Dockets Supported: EERS 3 YR Plan
26. NO HUB Model
UC: Technical
27. HPwES Integrated Data Tracking System (Opinion Dynamics recommendation section 5.2) NHSaves
Program supported: NHSaves, HPwES
28. Grid Codes management DER growth / system management(PNNL
Dockets Supported: 15-296 GridMod
29 Distributed Entity Model (reference architecture)
UC: Business, Technical
30: Consolidate all NH utility data for the existing NH Saves web application (centralized back end data)
Program supported: NHSaves
31. Track Program Rebates (tied to #27)
Program supported: HPwES
32. Weatherizing Program Data Tracking - Partial centralization data currently in OTTER / Program Tracking databases / Surveyor ("Contractor Barriers" section 4.2.5 NH Home Performance Report
Program supported: Weatherization (state and federal)
33. Support data tracking of Clean Energy Fund Program - (Goal #3 CDFA proposal)
Diagramed - seen in Ohio
Share Customer Meter Data (w PII) with CRES / 3rd PArty
Share anonymized data with CRES / 3rd PArty
HAN data

## B. Candidate Use Cases Identified by Greentel

**Use Case 1:** Accelerate Grid Modernization

| Stage 1: Jumpstart DERs penetration to develop projects that provide customer value |
|---|
| **Objective:** DERs solutions can provide immediate value to customers reducing their energy bills without necessarily providing grid value. In addition, accelerated penetrations of DERs is often a catalyst for policymakers to consider grid modernization initiatives - access to data can jumpstart DERs deployments and start this conversation. |
| **Value of Data:**<br>● **Customer Data:** Upon customer consent, interval usage data can be leveraged to accurately scope a DER solution that provides the most savings within a customers budget.<br>● **Market Data:** DERs can participate in existing markets such as demand response. Providers can work with customers to select the best available tariffs to save the most money.<br>● **System Data:** Providers can analyze the specific feeders (primary distribution and service), their current and planned infrastructure and their time dependent loading conditions to anticipate and avoid any grid constraints streamlining the interconnection process. |
| **Stage 2: Accelerate regulatory reform to create new DER markets to provide grid value** |
| **Objective:** Accelerating grid modernization requires regulators, utilities and DERs providers to innovate and work collaboratively on regulatory reform to enable DERs-supportive distribution planning, market operations and system operations. The most effective way to do this is to provide a common foundation on which they can work together - standardized sharing of specific data is this foundation. |
| **Value of Data:**<br>● **System Data:** DERs providers can support utility-led distribution planning in the development of advanced new methodologies such as hosting capacity analysis and locational value analysis.<br>● **Market Data:** DERs providers can support the development of market operations and grid services using the combination of system data analysis with current distribution investment plans to identify opportunities for grid services and calculate the value of such services. |
| **Stage 3: Participate in new markets and develop DER projects that provide both customer & grid value** |
| **Objective:** As distribution planning, market operations and system operations become more DERs-supportive via regulatory reform, this additional data can be made available via the platform and DERs providers can begin participation in these new markets. Market players can now identify high-value opportunities to provide grid value and develop the strongest business cases to acquire customers and ultimately deploy technologies. |
| ● **Data:** See example below |

**Use Case 2:** Participate in new DER markets created via grid modernization

| Stage 1: Identify specific locations where DERs can provide value via services to the grid |
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| **Market Data** | ● **Distribution Network Value (Market Pricing/Tariff/NWA):** Price Signals provide developers a starting point to identify locations with grid constraints, assess whether DERs can provide value and target customers accordingly.<br>● **Distribution Investment Plan:** Provides ability to anticipate future opportunities and propose solutions to meet both short- and long-term planning needs. |
| **Customer Data** | ● **Customer Class:** Ability to quickly screen location to determine whether it serves the developer's target customers (residential, commercial, agricultural, industrial). |
| **System Data** | ● **System Elements:** Provides context on the physical attributes of the grid, such as the rated capacity of transformers and circuits as well as topology of distribution feeders, which leveraged alongside the system data below can be used to determine what services can be provided.<br>● **Network Demand:** Used in tandem with system elements, developers can assess level of congestion and spare headroom which allows them to identify deferral opportunities to provide capacity services.<br>● **Hosting Capacity:** Used in tandem with System Elements, developers can 1) Screen out locations and operational profiles depending on available capacity by location and time and 2) Identify opportunities to provide services that increase hosting capacity.<br>● **Power Quality & Reliability Statistics:** Used in tandem with System Elements, developers can identify opportunities to provide services to improve power quality and reliability. |
| **Stage 2: Screen and identify potential customers, in a scalable and cost-effective way, that could benefit the most from DERs.** | |
| **Customer Data** | ● **Location:** Ability to determine if customers are on a particular location on a feeder, or in a certain zone where grid value can be provided in addition to customer value.<br>● **Interval Usage:** By analyzing anonymous interval usage data, developers can quickly screen potential customers to determine whether a DER solution is viable and if so, what DER solution would most benefit a customer. |
| **Stage 3: Accurately calculate and optimize business case to maximize customer and grid value, maximizing customer acquisition potential.** | |
| **Market Data** | ● **Distribution Network Value (Market Pricing/Tariff/NWA) & Bulk Power Network Value:** Ability to holistically determine value to the grid and potential revenue streams across all markets. |
| **System Data** | ● **All System Data:** Identify, anticipate and mitigate interconnection barriers and potential interconnection costs. |

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| **Customer Data** | • **Customer Bill & Tariff:** Ability to assess and compare potential customer value both current vs. available tariffs. |

## C. Candidate Use Cases Identified by Mission Data

Individual customer data for DERs/REPs/CCAs

Building level data for EE, EnergyStar

Communitylevel data for CCAs

Community level data for towns (for purposes other than CCAs)

DER registry

DER or utility data to NEPOOL, ISONE EE program analysis

Statewide energy dashboard

REC tracking



14 Engineering Drive
Hanover, NH 03755
http://engineering.dartmouth.edu/liines

## D. Potential Functionalities of a Statewide Multi-Use Energy Data Platform by Greentel.

### Functionalities

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| **Data Format** |
| Data is accessible to all platform users in API , electronic, machine readable format |
| Data is accessible to all platform users in downloadable machine readable format |
| **Data Type Availability** |
| Platform will make available **customer data upon customer consent** (see data points and elements below) |
| Platform will make available **anonymous aggregated customer data** |
| Platform will make available **system dat**a (see data points and elements below) |
| Platform will make available **market/financial data** (see data points and elements below) |
| Platform will make available **DER data** (see data points and elements below) |
| **Customers** |
| Customers can authorize 3rd parties to access customer data via 1-click electronic authorization |
| Customers can access customer data via both data formats stated above (downloadable/API) |
| Customers can access portal (app store) to access registered 3rd parties for energy services (Makes it easier for the customer to access the market aka DERs providers, Competitive Suppliers, EE/DR Providers and Utilities) |
| **Distributed Energy Resource (DER) providers** |
| DERs providers can access **customer data** upon customer consent |
| DERs providers can access **anonymous aggregated customer data** |
| DERs providers can access **system data** |
| DERs providers can access **market/financial data** |
| DERs providers can access **DER data** |
| **Competitive Suppliers** |
| Competitive suppliers can access **customer data** upon customer consent |

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| Competitive suppliers providers can access **anonymous aggregated customer data** |
| Competitive suppliers providers can access **market data** |
| **Community Choice Aggregators** |
| CCA aggregators can access **customer data** upon customer consent |
| CCA aggregators can access **anonymous aggregated customer data** |
| CCA aggregators can access **system data** |
| CCA aggregators can access **market/financial data** |
| CCA aggregators can access **DER data** |
| **Utilities** |
| Utilities can provide **customer data** to customers to inform EE programs (1-stop shop platform for customers) |
| Utilities can access **DER data** |