

## New Hampshire Electric and Gas Utilities On-Line Multi-Use Energy Data Platform



Submitted by:

 **E Source**  
We know utilities.



Prepared for the:

**New Hampshire Energy Data  
Platform Governance Council  
and New Hampshire Utilities**



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## ■ Executive Summary

As part of the New Hampshire Public Utilities Commission Docket No. DE 19-197 (Development of a Statewide, Multi-Use Online Energy Data Platform), E Source (formerly Utilligent) assessed Eversource, Liberty, and Unitil designs and cost estimates for their respective backend software and utility API integration to the proposed data platform intended to serve New Hampshire market participants.

E Source conducted the assessment in an initial nine-week period from 9/13/23 through 11/22/23 and during an extended four-month period from 1/2/24 through 5/1/24, during which each of the utilities updated design and cost information to bring them to a preliminary design maturity level. E Source facilitated multiple design and cost estimate review sessions with each utility. In addition, the assessment identifies programmatic findings and recommendations intended to reduce end-to-end solution implementation risk. Over the six-month process, E Source provided status and findings updates to the Data Hub Governance Council.

The E Source utility-specific assessment includes:

- Design maturity evaluation.
- Cost estimate evaluation.
- Design recommendations.

The E Source assessment finds that each utility has a documented viable preliminary backend design using well-understood technology and has developed reasonable development and support cost estimates. The designs have acceptable implementation risks associated with a preliminary design phase. We expect further design maturation as details are obtained, and improved cost knowledge as utility projects are funded and enter each utility's standard project delivery process.

## Assessment Approach

The assessment approach included the following key steps:

- Reviewed available Platform Hub artifacts (RFPs, conceptual design) as guiding documentation for backend design requirements.
- Established a preliminary design maturity benchmark and checklist to assess relevant utility-provided design artifacts and cost estimates.
- Conducted multiple design reviews and other utility meetings to understand each utility's design as reflected in the utility's provided design documentation.
- Evaluated each utility's maturity against the benchmark and identified gaps and recommendations.
- Updated utility documentation provided over an extended time period to close maturity benchmark gaps and update cost estimates.
- Final cost estimates aligned to PUC-requested cost categories.



## Key Findings

1. **Design Viability.** All three utilities provided viable preliminary back-end technical designs. All preliminary designs utilize well-understood standard data architecture solutions such as data warehouses and standard integration technology to connect backend systems to the data warehouses. Final design work proceeds after formal PUC project funding approval.
2. **Security.** Security design follows standard industry requirements and good design practice.
3. **Platform Hub Data Availability.** Each utility's design accommodates electric and gas data provisioning for the initial platform hub deployment, with the most notable exception being Liberty's initial implementation, which does not accommodate electric commercial and industrial interval (MV90) data provisioning. This is because the data is currently collected manually and not uploaded to SAP. Integrating this data into SAP would be costly and unnecessary, as Liberty plans to implement AMI in the future, which will be able to provide the required interval data. The initial data hub information will only have limited interval data available from Eversource. Interval data is being provided for approximately 1,600 metered accounts, all large commercial and industrial customers. However this data is not readily available, and making the data available to the platform will require dedicated efforts by Eversource, which currently comprise a significant percentage of Eversource's overall cost estimate. These costs may decrease should Eversource install Advanced Metering Infrastructure ("AMI") and new billing systems that would be required to support AMI, because the new billing systems may be able to make interval data readily available with less effort and cost. Omission or delay justification is included in this document's individual utility discussion. The initial implementation provides variable data availability quantities and timing owing to inconsistent AMI interval capabilities among the utilities, with only Unital providing the most complete. Both Liberty and Eversource AMI programs are more than two years from implementation. Backend integration is custom designed to interface with Eversource's current billing systems. When Eversource replaces those two systems as part of AMI implementation, the backend integration work will become moot and need to be entirely redone as it will have to be reconfigured to interface with the new billing system.
4. **Key Resource Commitment.** The extended six-month design and cost estimate review cycle was hindered, with varying degrees among Eversource and Liberty participants, by the timely availability of key technical leadership (e.g. enterprise / solution architects). Key technical resource commitment is a go-forward implementation risk. This risk should be mitigated when the project is formally approved and funded.
5. **Cost Considerations.** Each utility provided cost estimates in line with proposed preliminary designs, including adequate cost contingency. Initial implementation development costs range from \$.75M to \$2.5M. Ongoing yearly support ranges from \$48K to \$238K for yearly support costs.

## Conclusions

- The collective designs, which vary by utility to reflect their own system portfolios, are feasible to proceed with, as the proposed functionality is not highly technical.
- Estimated cumulative benefits, as reported in the October 12, 2023 "Development of a Statewide, Multi-Use Online Energy Data Platform (DE 19-197) Update NH PUC Presentation," define initial Phase 1 "minimum viable product." However, the solution will evolve as the market, associated market opportunities and the utilities' technology platforms are upgraded and/or enhanced.
- Although not applicable to Eversource as an electric-only utility in New Hampshire, the Liberty and Unital backend data solutions accommodate electric and gas data based on the logical data model. This data is already available in their respective metering and billing systems.



- The development costs range from \$0.75M to \$2.5M and reflect variances in design approach due to significantly different utility enterprise systems (CIS, data architecture) age and capability. All utility estimates are reasonable for the scope of the backend development. The highest cost estimates from Eversource reflects that Eversource must modify two systems instead of a single system (Unitil and Liberty), and the significant age of those two systems – one that is sixteen years old and one over 40 years old. Older billing system integration often drives significant cost requirements and in this instance would result in duplicative backend integration costs once those older billing systems are eventually replaced. While Liberty is not providing AMI data prior to their AMI implementation program, Liberty's estimate includes provision for designing and building the required integration to support the future AMI implementation which will provide shorter interval data than is being provided with the MVP. On-going yearly support costs per utility are estimated at \$48K to \$238K annually and appear reasonable to maintain the required capability. Our assessment is based on similar system implementations.
- All utility backend projects could benefit from an approach that includes a centralized program management organization that is authorized and empowered by the governing council to coordinate and oversee activities across Platform Hub and backend system development and the three utility-led backend projects.
- To deliver the anticipated value to New Hampshire markets, ownership and support of the end-to-end solution must be clear at the program's onset. This is critical with possible future approved expansions of the platform as more advanced technologies such as AMI and grid modernization projects are introduced.



## Recommendations

- Consistently complete all preliminary designs as input to the development Platform Hub service provider selected during the RFP process. Ensure appropriate technical leadership is in place to complete utility design work.
- Strengthen existing program governance structure by establishing a PMO for detailed design, build, test, and support phases. The Governing Council should establish the proposed PMO function on behalf of the PUC.
- Establish clear ownership and decision-making rules for the Platform Hub program (joint development and operating agreement?) to ensure effective risk management, transparency, and accountability.

Figure 1 provides the assessment summary:



Figure 1. Assessment Summary

	<b>EVERSOURCE</b>	 <b>Liberty™</b>	 <b>Unitil</b>
Initial Cost	\$2.5 million	\$2.4 million <sup>1</sup>	\$.76 million
Yearly Cost	\$237K	\$50K <sup>2</sup>	\$48K
Design Maturity	Some Gaps	Some Gaps	Some Gaps
Cost Confidence	Medium	Medium	Medium
Available Data	Electric Monthly and Interval	Electric and Gas Monthly	Electric and Gas Monthly and Interval
Internal Investment	Limited, staff turnover	Limited, staff turnover	Most internal investment
Internal Data Architecture	Robust	Robust	Robust
Design	Reasonable at this stage	Reasonable at this stage	Reasonable at this stage
Costs			
Implementation	Highest	Middle	Lowest
Operate	Highest	Average	Average
Baseline Uncertainty	+/- 20%	+/- 20%	-10% to +50%

<sup>1</sup> The Liberty cost estimate includes development costs to accommodate both the initial data hub portal implementation (no AMI data) and the subsequent implementation which includes AMI data when Liberty completes their AMI implementation.

<sup>2</sup> Initial support costs will escalate yearly by 6 percent.



## ■ Assessment Approach

The E Source assessment team was staffed by experienced practitioners with, on average, over 30 years of system development and program management experience. The team's executive sponsor was Gerry Metzler, who has over 35 years of experience in complex systems. He has led and managed numerous AMI implementations in the past 18 years. He has an extensive background in software development and has direct experience with SmartMeter Texas and NYSERDA data portal implementations. Metzler led the has implemented a PV BTM solution (solar behind the meter) at both NYISO and ISONE in the past year that has improved solar forecast accuracy of each of the ISO's in excess of 25%.

Steve Hoefer, the project lead, has over 30 years of experience in system development and assessment with AMI and data programs throughout North America. The lead technical architects, Don Mak and Ben Meek, each having over 30 years of utility industry experience. Don led the implementation of the SmartMeter Texas portal while Ben led a similar commercial data hub in Australia. Each utility's assessment work was assigned an analyst which included John Nowostawski (Eversource), Patrick Metzler (Liberty) and Murali Gouda (Unitil).

The following section provides the design assessment evaluation methodology.

### Assessment Process

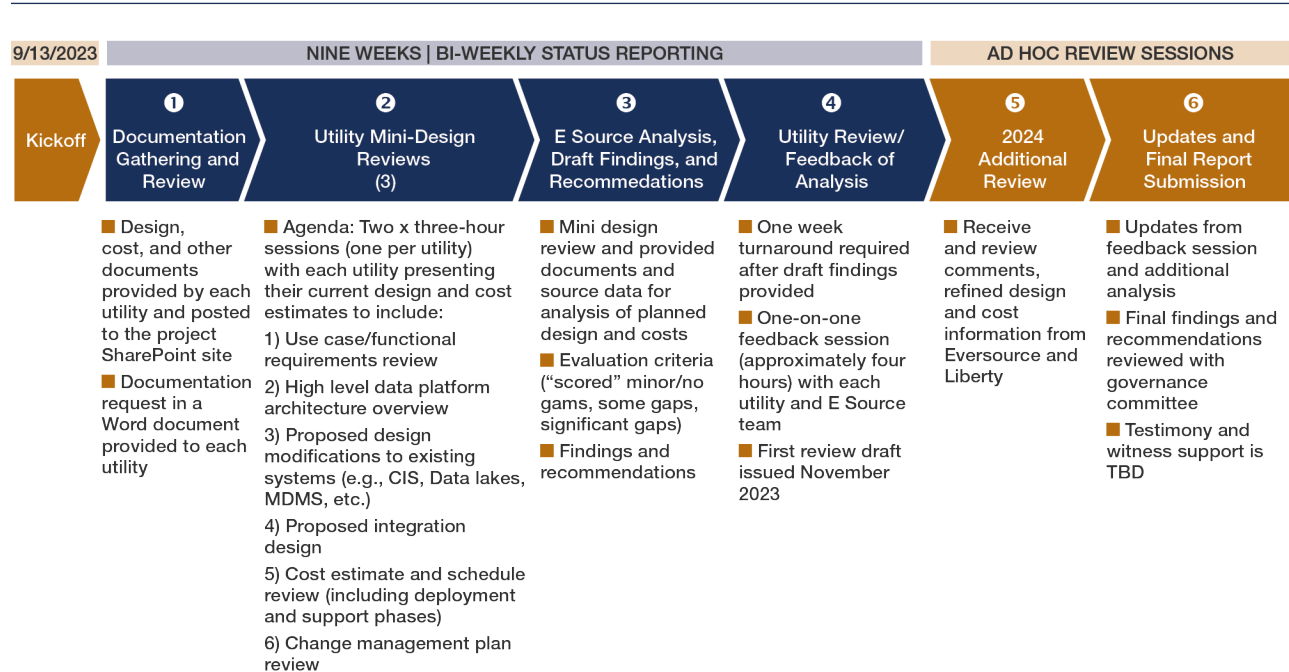
The assessment included:

1. **Documentation Request.** The design and cost documents requested are expected artifacts associated with a standard preliminary design level of maturity. The design includes artifacts related to the backend systems (e.g., CIS, MDM), the data architecture (e.g., data warehouse), and the Data Platform API. The list of requested documents can be found in the Appendix. This assessment phase was anticipated to be a two-week process, but due to document availability, this activity took longer than expected and stretched out through Q2 2024.
2. **Utility Design Review.** Each utility was requested to provide review sessions of their preliminary/conceptual designs. The requested review was to provide a use case, architectural design, backend system, data staging, integration design, cost estimates, and schedules. During this three-week period, design and cost estimation gaps were identified. Each utility was requested to address information gaps as best they could.
3. **E Source Analysis—Draft Findings and Recommendations.** During the analysis phase, design gaps were identified. A set of evaluation criteria for design maturity was based on the availability of the preliminary design-level documentation request and material discussed during the design reviews. In addition, a set of technical design criteria was utilized to evaluate the backend designs and provide specific recommendations. The individual utility evaluations can be found in the next section.
4. **Utility Review/Feedback of Analysis.** Draft findings and recommendations were provided to each of the three utilities. Each utility comment was reviewed and used as input for the final report. Several engagements were held with each utility to ensure that the cost estimates were as complete as possible and aligned with the requested PUC cost categories.
5. **2024 Additional Review.** Eversource and Liberty provided additional information in 2024. The additional information included updated designs and cost estimates. This information was reviewed, and the prior draft findings were updated to reflect the additional information.



6. **Final Updates and Final Submission.** All the inputs from each utility were considered for the final report and incorporated as appropriate. The Final Report was provided to the Governance Council in September 2024.

Figure 2. Assessment Process Overview



## Participants and Documentation

Tables 1 and 2 summarize the assessment participants for each utility. Table 1 lists the individual participants with their relevant activities, while Table 2 presents a complete list of documents provided to E Source for the assessment.

Table 1. Assessment Participants List

UTILITY	NAME	ROLE	NOTES
Eversource	Riley Hastings	Project Manager	Mini Session 1 (09/25) Follow up Session (10/13) Draft Report Review (10/23) Draft Report Review (4/24) Cost Estimate Review (4/24)
	Jessica Chiavara		Draft Report Review (4/24)
	Helen Gagnon		Cost Estimate Review (4/24)
	Samantha Pare		Cost Estimate Review (4/24)
	Joseph (Joe) Ballard	Digital Product Line Manager	Mini Session 1 (09/25) Mini Design 2 (10/02) Draft Report Review (10/23)
	Glenn Lithgow	IT Manager, Enterprise Data Platform	Mini Session 1 (09/25) Mini Design 2 (10/02) Follow up Session (10/13) Draft Report Review (10/23)



Table 1. Assessment Participants List

UTILITY	NAME	ROLE	NOTES
	Deepak Khetwal	IT Lead Software Engineer	Mini Session 1 (09/25) Mini Design 2 (10/02)
	Sean Remington	IT Security	Mini Design 2 (10/02)
	Samantha Pare	IT Business Solutions Analyst	Mini Design 2 (10/02)
	Ankit Manglik	IT Manager, Data Engineer	Follow up Session (10/13)
	Sridhar Bhayravavajhala	IT Solution Architect	Follow up Session (10/13)
	Orlando Esquivel Ruiz	IT Data Governance Lead	Follow up Session (10/13)
<b>Liberty</b>	Hanaa Chahdhi	Project Manager	Design Session (10/13) Draft Report Review (11/11)
	Stephen Adindu	Business Analyst	Design Session (10/13) Draft Report Review (11/11)
	Marty Bloomfield	Solution Architect	Design Session (10/13) Draft Report Review (11/11)
	Shon Collins	Cybersecurity Analyst	Design Session (10/13) Draft Report Review (11/11)
	Dahir Adam	SAP Solutions Architect	Design Session (10/13) Draft Report Review (11/11)
<b>Unitil</b>	Leslie Randlett	Project Manager	Draft Report Review (10/26)
	Jeremy Haynes	Director, Enterprise IT Systems	Design Session (10/04) Draft Report Review (10/26)
	Justin Eisfeller	CTO & VP- Information Technology	Draft Report Review (10/26)

Table 2. Documents Provided by Each Utility

UTILITY	DOCUMENTS
<b>All Utilities (Platform Hub Documentation)</b>	Data Platform Hub RFI
	DE 19-197 - MVP Field Definition
	Green Button Schema - Developers Guide
	New Hampshire Statewide Energy Data Sharing Platform - Hub RFP Working Doc
	New Hampshire Statewide Energy Data Sharing Platform - Security
	Utility APIs
	Utility ETL and the Logical Data Model
	Use Cases
<b>Eversource</b>	Communication Plan
	Copy of NH Data Cost Schedule and Basis of Estimate (1)
	EAP Data Flow Diagram and High-Level Lineage
	ES Back End RFP Estimate
	Eversource.com Architecture
	Eversource Backend Integration Cost Estimates
	Eversource Backend RFP Consultant Request
	Eversource Sync
	Feedback and Iteration Mechanism
	Green Button Connect Requirements v3
	Green Button Schema - Developers Guide (1)
	Key Conceptual Designs
	MVP NH Data Fields for Utility Logical Data Model
	NH Data Flow in EAP



Table 2. Documents Provided by Each Utility

UTILITY	DOCUMENTS
	NH Data Sharing Data Infrastructure Concept_20230925
	NH Energy Data Platform Documentation Request- General Response - Work Assignments
	RAID Log 20140822
	RFP - Eversource Backend
	MVP NH Data Fields for Utility Logical Data Model (Updated)
	Data Platform Cost Estimate
	Data Platform Cost Estimate with PUC category breakdown
	System Integration Diagram
	Data Flow Diagram
<b>Liberty</b>	1 - Business Requirements - Template 0_1
	3 - Solution Architecture - Template 0_2
	4 - Solution Design - Template 0_2
	Change Impact Template filterable. v3
	FSD-CIS_-SAP to NH DataHub Interfaces
	LIBERTY - NH Utility Green Button Enablement FINAL
	LIBERTY - NHLibertySection35
	Liberty back end architecture
	NH Data Hub - Cost Estimates Methodology and Work Packages - Oct 18 2023
	NH Data Hub Communications Matrix - Version 1.0
	NH Data Hub Costs Estimates - Oct 18 2023
	NH Data Hub Platform BRD
	NH Data Hub Project Communications Plan - Initial Draft
	NH Data Hub Resources Plan - Oct 03 2023
	NH Data Hub Risk Management Plan - Version 1.0
	NH Data Hub Schedule - Oct 18 2023
	Solution Requirements – NH DataHub
	Stakeholder Analysis Template
	Operational Plan_Data Contribution to Data Hub Utility's Perspective - Mar 27 2024
	IT Operational Readiness Checklist
	SAP to NH Data Hub Interface Specifications - Apr 02 2024
<b>Unitil</b>	GBC Test Cases with Meeting Comments
	Green Button Connect Functionality Requirements
	NH Energy Data Platform – use cases – presented on behalf of all utilities
	Unitil – Metering – Data Flows
	Unitil– Proposed Solution Overview – Diagrams
	Unitil – SWAG – Data Platform Cost Estimate Tracking template
	Unitil Back End Plan for RFP
	Unitil Data at Rest Security Requirements for Third-Party Vendors
	Utility APIs and Platform Usage Examples
	Copy of NH Data Cost Schedule and Basis of Estimate (1).xlsx
	Green Button Connect Requirements v3
	RE_ Cost Estimate (email)



## Individual Utility Assessments

A preliminary design maturity level was established as the benchmark to evaluate each utility's design. The figure below provides the overall framework associated with this maturity level.

Figure 3. Preliminary Design Framework



ASPECT	COMMENTARY
Purpose	Helps to align stakeholders, provides a vision of the solution, and sets the direction for further design and development efforts. It's also useful for early cost and time estimates.
Detail Depth	At this stage, documentation is generally at a higher level, focusing on the broad outline of the system, major components, and their interactions. The specifics about how each component will be built or integrated might be left for later.
Scope and Completeness	This is an exploratory phase, and while the documentation aims to capture the breadth of the solution, it might not delve into all possible scenarios, edge cases, or detailed requirements.
Specifications	Typically includes general system requirements, high-level architecture diagrams, and possibly some initial wireframes or mockups. It might also include broad technology stack recommendations.
Formality	While formal, the documentation is understood to be fluid and subject to change.

The following documents serve as a “typical” preliminary design benchmark to demonstrate the overall design maturity. The preliminary budget estimate for build and operate were requested in the categories provided by the PUC decision. Table 3 outlines the 15 design elements requested from each utility.

Table 3. Preliminary Design Elements

ID	KEY DESIGN ELEMENT	COMMENTARY
1	System Overview	Purpose and objectives of the data platform, including high-level functional and non-functional requirements.
2	Preliminary Architecture Diagram	High-level visual representation of the system, depicting primary components, such as data ingestion, processing, storage, and distribution mechanisms.
3	Data Flow Diagram	Shows the journey of data through the platform, indicating how data moves, is processed, and ultimately consumed.
4	Data Model Sketch	Initial draft of main entities, their relationships, and Main attributes, including preliminary database schema ideas.
5	Interface Specifications	Descriptions of expected interactions with external systems or data sources.



Table 3. Preliminary Design Elements

ID	KEY DESIGN ELEMENT	COMMENTARY
6	Security and Compliance Considerations	Highlighting major data protection and compliance concerns, such as GDPR or other relevant regulations and an overview of proposed security mechanisms.
7	Preliminary Scalability and Performance Analysis	An outline of expected data loads, traffic patterns, and thoughts on how the architecture can scale to meet these demands.
8	Technology Stack Recommendations	Suggested tools, platforms, and technologies that could be used in the data platform, based on initial requirements and research.
9	Operational Process Outline	High-level processes for tasks such as data ingestion, data quality checks, ETL/ELT jobs, monitoring, and maintenance.
10	Stakeholder Communication Plan	How the team plans to keep stakeholders informed, and how feedback will be collected and integrated during the design process.
11	Preliminary Budget Estimate	An initial budget projection, factoring in anticipated costs for software, hardware, services, and human resources.
12	Risk Assessment	Identification of potential risks and challenges, along with initial thoughts on mitigation strategies.
13	Glossary and Terminology	Defines terms and acronyms that are used in the documentation, ensuring clarity for all stakeholders.
14	Timeline and Milestones Draft	An initial projection of major project milestones, leading from the end of the preliminary design phase to the completion of the data platform.
15	Feedback and Iteration Mechanism	Documented process on how the design will be iterated upon, incorporating stakeholder feedback and evolving requirements.

In addition to design and cost maturity elements, each technical design was examined across eleven criteria, with findings and appropriate recommendations. The criteria are shown in Table 4.

Table 4. Examination of Technical Design

CRITERIA EXAMINED	FINDINGS/RECOMMENDATIONS
<b>1. Interoperability and Integration</b>	<ul style="list-style-type: none"><li>■ The design should allow seamless data flow between the centralized platform and the individual meter data management systems.</li><li>■ Ensure compatibility with existing standards or protocols.</li><li>■ Validate that different data formats can be converted and understood by the centralized platform.</li><li>■ The design should support integration with other systems or platforms if required in the future as approved by the PUC.</li></ul>
<b>2. Data Accuracy and Integrity</b>	<ul style="list-style-type: none"><li>■ There should be mechanisms to ensure that the data received is reflective of the data originating from the utility and has not been compromised during transmission.</li><li>■ Check for redundancy and duplication elimination processes.</li></ul>
<b>3. Performance, Scalability, and Latency</b>	<ul style="list-style-type: none"><li>■ The design should cater to growing numbers of users and increasing data volumes.</li><li>■ Ensure the system can accommodate the addition of more individual electric and gas utility meter data management systems.</li><li>■ Data should be transferred quickly without noticeable delays.</li><li>■ Assess the response time for data requests and transfers.</li></ul>
<b>4. Security</b>	<ul style="list-style-type: none"><li>■ Evaluate encryption techniques used during data transfer.</li><li>■ Access controls should be in place to restrict unauthorized access.</li><li>■ Regular vulnerability assessments and penetration testing should be feasible.</li></ul>



Table 4. Examination of Technical Design

CRITERIA EXAMINED	FINDINGS/RECOMMENDATIONS
<b>5. Reliability and Uptime</b>	<ul style="list-style-type: none"> <li>■ The design should guarantee a high percentage of uptime.</li> <li>■ Include fault-tolerance capabilities and redundancy to manage potential system failures.</li> </ul>
<b>6. Flexibility</b>	<ul style="list-style-type: none"> <li>■ The design should support modifications with minimal impact to existing functionalities. Unavoidable impacts will be resolved through the PUC governance structure.</li> <li>■ The interface should be adaptable to changes in any of the individual meter data management systems or the centralized platform.</li> </ul>
<b>7. User Experience</b>	<ul style="list-style-type: none"> <li>■ The interface should be user-friendly and intuitive.</li> <li>■ Documentation should be clear, detailed, and easily accessible.</li> </ul>
<b>8. Compliance Standards</b>	<ul style="list-style-type: none"> <li>■ The design should adhere to relevant industry standards and regulations.</li> <li>■ Look for features that ensure compliance with applicable laws and regulations such as New Hampshire customer data privacy and security laws RSA 363:37 and 363:38.</li> </ul>
<b>9. Maintenance and Support</b>	<ul style="list-style-type: none"> <li>■ The design should be easy to maintain and troubleshoot.</li> <li>■ Consider the availability of support from the vendor or community.</li> <li>■ Understanding that platform is not designed to store data transmitted from utilities, in the event that any data is stored, then ensure that data storage and retention requirements are met.</li> </ul>
<b>10. Data Storage and Retention</b>	<ul style="list-style-type: none"> <li>■ Ensure that there are data backup, storage, and retention provisions as per requirements.</li> <li>■ Data archival and deletion processes should be clear.</li> </ul>
<b>11. Feedback and Monitoring</b>	<ul style="list-style-type: none"> <li>■ There should be feedback mechanisms for errors or failed transactions.</li> <li>■ Monitoring and logging features should be available to track data flow and any anomalies.</li> </ul>

## Utility Design Maturity and Cost Comparison

Table 5 and Figure 4 on the following page provide a summary of the design maturity, Phase 1 (MVP) capabilities, and cost estimates for each of the three utilities.

Several design attributes were discussed and reviewed over the course of this engagement and included that considered the electric and gas data logical data elements being processed by the individual utility systems, the data architectures and design elements, and the associated implementation and maintenance costs. There is design work that needs input from the PUC to clarify requirements and assumptions in the upstream Platform Hub, and therefore there are still gaps within the collective utility designs. Examples of these common gaps include data aggregation assumptions and architecture, the registration process from Platform Hub through to the individual utilities, and the common security mechanisms. Table 5 indicates the areas of relative completeness across the 14 key design elements used to assess the maturity of the backend systems. It is acknowledged that items 1 through 6 were where the utilities focused and 7 through 14 (aside from 11 for costs) will likely leverage existing processes and standards rather than implement new artifacts for this program. Finally, the design maturity, as assessed in item 11, is a leading indicator to the range of costs seen across the utilities and the recommended next steps described in the individual utility assessments.

In addition, as shown in Figure 4, there are differences in the MVP (Phase 1)<sup>3</sup> capabilities designed for as shown in the reference logical data model fields to be implemented, with Unitil providing 33 of 33 data fields, Liberty 27 of 28, and Eversource providing 33 of 33 data fields.

<sup>3</sup> Data fields were described in the settlement agreement and are included in the appendix to this report.



Table 5. Preliminary Design Artifacts Examined

#	DESIGN ITEM	EVERSOURCE	LIBERTY	UNITIL
1	System Overview	Available	Available	Available
2	Preliminary Architecture Diagram	Available	Available	Available
3	Data Flow Diagram	Available	Available	Available
4	Data Model Sketch	Available	Available	Partially Available
5	Interface Specifications	Partially Available	Available	Available
6	Security and Compliance Considerations	Partially Available	Available	Partially Available
7	Preliminary Scalability and Performance Document	Partially Available	Partially Available	Partially Available
8	Technology Stack Recommendations	Available	Available	Available
9	Operational Process Outline	Partially Available	Partially Available	Partially available
10	Stakeholder Communication Plan	Partially Available	Partially Available	Partially available
11	Preliminary Budget Estimate	Available	Available	Available
12	Risk Assessment	Partially Available	Partially Available	Partially Available
13	Timeline and Milestones Draft	Available	Available	Available
14	Feedback and Iteration Mechanism	Partially Available	Partially Available	Partially Available

Figure 4. Phase 1/MVP Logical Data Model Implementation <sup>4</sup>

FIELD #	DATA FIELDS	UNITIL	LIBERTY	EVERSOURCE
1	Account Number	Yes	Yes	Yes
2	Premise	Yes	Yes	Yes
3	Customer Name	Yes	Yes	Yes
4	Customer Email Address	Yes	Yes	Yes
5	Customer Phone	Yes	Yes	Yes
6	Account Address	Yes	Yes	Yes
7	Customer Rate Code	Yes	Yes	Yes
8	Meter Number	Yes	Yes	Yes
9	Meter Reading Previous	Yes	Yes	Yes
10	Meter Reading Current	Yes	Yes	Yes
11	Overall Consumption Last Period	Yes	Yes	Yes
12	Overall Consumption This Period	Yes	Yes	Yes
13	Billing Period	Yes	Yes	Yes
14	Commodity	Yes	Yes	Yes
15	Bill Amount	Yes	Yes	Yes
16	Balance Forward?	Yes	Yes	Yes
17	Customer Charge	Yes	Yes	Yes
18	Delivery Charge	Yes	Yes	Yes

FIELD #	DATA FIELDS	UNITIL	LIBERTY	EVERSOURCE
19	Stranded Cost Charge	Yes	Yes	Yes
20	System Benefit Charge	Yes	Yes	Yes
21	Consumption Tax	Yes	Yes	Yes
22	Energy Service Charge Fixed	Yes	Yes	Yes
23	Service Supplier Kind	Yes	Yes	Yes
24	Service Supplier ID	Yes	Yes	Yes
25	Service Supplier Effective Date	Yes	Yes	Yes
26	Service Supplier Name	Yes	Yes	Yes
27	Peak Demand (for current bill period)	Yes	Yes	Yes
28	Quality of Reading	Yes	Yes	Yes
29	Interval Reading Start Date and Time	Yes	No*	Yes**
30	Interval Reading Value	Yes	No*	Yes**
31	Interval Duration	Yes	No*	Yes**
32	Interval Reading Quality	Yes	No*	Yes**
33	TOU	Yes	Yes	Yes

Total "Yes"	33/33	27/28	33/33
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## Notes to Figure 4:

\* Liberty (Granite State Electric) intends to utilize AMI to provide interval data to the platform in the future. The Company did not connect its MV-90 meter data system to the SAP system during conversion because the Company intends to convert its AMR meters to AMI over the coming years. The work and cost to link MV-90 to SAP would be redundant, only to be undone once AMI is installed. Liberty has also applied for GRIP funding to help with the cost of the AMI conversion. The concept paper was accepted in early 2024 and Liberty made a full application in May 2024. Notification of the award should occur in late fall 2024. Liberty has confidence that this path to providing interval data is prudent given that the platform GRIP application is moving forward in parallel to Liberty's GRIP application. Once the platform application is approved or denied, the utilities will move to provide the NH PUC with updated costs and timelines to complete the platform. In the event that the Company does not move to install AMI, Liberty understands that it may need to connect its MV-90 meter data system to SAP to meet the requirements of Order No. 26,589, which will entail additional cost.

\*\* \*\*Per Eversource: data includes approximately 1,600 metered accounts, all large commercial and industrial customers. All residential and small business meters will not include interval data.

<sup>4</sup> From DE 19-197 Settlement Agreement, Logical Data Model" (See Appendix).



For purposes of clarity, E Source offers the following refinement of the MVP meter reading and interval data fields identified in the Settlement Agreement Logical Data Model. The LDM meter reading data fields listed below relate to billing data that has been collected, verified, and used to calculate customer invoices, which are typically issued on a regular basis by billing period. This billing data will be verified against historical readings and may include estimated readings in the event actual readings are unavailable. This verification and estimating method is required by regulatory mandate.

■ LDM Meter Reading Fields (i.e., billing data)

- 9 Meter Reading Previous
- 10 Meter Reading Current
- 11 Overall Consumption Last Period
- 12 Overall Consumption This Period
- 13 Billing Period

On the other hand, the LDM interval data fields listed below are consumption data collected by each utility. This consumption data is typically “raw” data that has not been processed through the billing system that would include the verification and estimating calculations. This consumption data may also be recorded at different time intervals (e.g., hourly, daily) that is directly dependent upon the installed metering methods and technologies (e.g., manual, AMR, AML) at specific meter locations.

■ LDM Interval Reading Fields (i.e., consumption data)

- 29 Interval Reading Start Date and Time
- 30 Interval Reading Value
- 31 Interval Duration
- 32 Interval Reading Quality

For these reasons, the LDM meter reading data may not be the same as the LDM interval data. As a result, we believe that the Settlement Agreement included both sets of data fields in the MVP model - in anticipation of future uses of this data.

Finally, the cost estimates shown below were provided by each utility. Unitil provides the lowest development cost and the lowest ten-year ownership cost. The variance in cost estimates is due to differences in design maturity and utility technology cost allocations. Further design work, including vendor RFP responses and Platform Hub requirements/solution architecture finalization, will result in more accurate estimates.

*Table 6. Backend Implementation and Support Cost Estimates*

UTILITY	IMPLEMENTATION COST	YEARLY SUPPORT COST	TEN YEAR COST
Eversource	\$2.50M	\$238K	\$5.1M
Liberty	\$2.40M <sup>5</sup>	\$50K <sup>6</sup>	\$3.75M
Unitil	\$0.76M	\$48K	\$1.62M

Implementation costs include the following elements as “High Level Cost Components”, as identified in the DE 19-197 settlement agreement.

- Design and Architecture
- Software Development
- QA Testing and Remediation
- Project Management, Oversight and Coordination

<sup>5</sup> The Liberty cost estimate includes development costs to accommodate both the initial data hub portal implementation (no AMI data) and the subsequent implementation which includes AMI data when Liberty completes their AMI implementation.

<sup>6</sup> Initial support costs will escalate yearly by 6 percent.



- Licensing and Purchases
  - Development of Documentation and Support Materials
  - Platform Certification
  - Infrastructure Costs
    - Hardware and Storage
    - Networking
    - Cloud and Data Sharing
    - Provisioning and Maintenance of Test and Production Environments
    - Deployment
    - Performance and Load Testing
    - Platform Metrics
  - Customer Consent and Authorization
    - Including Tracking, Auditing and Reporting
  - Platform User Registration / Certification
  - Cybersecurity and Compliance
    - Including periodic vulnerability and penetration review
  - Utility Marketing and Communications
- 

Tables 7 through 15 summarize each of the individual utility assessments in the following categories:

- Design maturity assessment
- Technical criteria assessment
- Cost estimates



## Eversource

Table 7. Eversource: Design Maturity Assessment

DESIGN ITEM	EVERSOURCE	COMMENT
<b>System Overview</b>	Available	Updated System Integration Diagram presented in April 2024. Updated diagram illustrates use of cloud-based components and disaster recovery plans.
<b>Preliminary Architecture Diagram</b>	Available	Eversource systems and Azure environment diagrams are provided. Detail to describe the path from meter to API to Hub to customer/ 3rd party suggested.
<b>Data Flow Diagram</b>	Available	Interval data is being provided by Eversource for approximately 1,600 metered accounts, all large commercial and industrial customers. All residential and small business meters will not include interval data.
<b>Data Model Sketch</b>	Available	Field level compliance for MVP data model originally presented in April 2024. Model updated in August 2024 and includes approximately 1,600 metered accounts, all large commercial and industrial customers. All residential and small business meters will not include interval data.
<b>Interface Specifications</b>	Partially Available	Context and descriptions are needed for the preliminary list of activities provided in addition to the API interface points. Green Button website standards referenced. Specific Platform Hub-to-ES API interface spec to be described.
<b>Security and Compliance Considerations</b>	Partially Available	OAuth/B2C and Okta are listed, but additional design definitions are needed. High-level cloud application provider requirements are listed (e.g., ISO 27001, SOC 2 Type II) but not specific to the back-end solution. DataGuard described. Additional end-to-end security description needs to be developed. Design details needed for coordinating third-party enrollment and management amongst utilities.
<b>Preliminary Scalability and Performance Analysis</b>	Partially Available	Assumption: based on existing Eversource enterprise technology standards for the MVP. Future state development will have to accommodate higher performance and scaling requirements (e.g., MVP vs production). Expected data needs and documented performance testing description to be developed. Organizational HA and DR depicted with reference to Azure running across 2 regions with a load balancer provided.
<b>Technology Stack Recommendations</b>	Available	An initial list of services is provided, and an architecture diagram provides additional detail about the technology available. Additional description is needed to describe how the architecture will be applied to this project.
<b>Operational Process Outline</b>	Partially Available	Initial data transformation plans identified with the use of Azure microservices. Description of data quality checks, maintenance, and monitoring to be developed. Describe data access and quality support process for customer and aggregated data – backend and Hub.
<b>Stakeholder Communication Plan</b>	Partially Available	A preliminary high-level communication plan was provided. Further development demonstrating how an iterative feedback mechanism is built into the solution design – e.g., how customer feedback is received, internal focus groups, external power user partnerships
<b>Preliminary Budget Estimate</b>	Available	Preliminary cost estimate from external service provider and ES staffing provided that generally aligned with PUC cost categories. Project staffing plans indicate appropriate coverage for PUC identified costs.
<b>Risk Assessment</b>	Partially Available	Assumptions included in the updated cost estimate will need to be validated during the formal design stage. Additional risks may also be identified at that time.
<b>Timeline and Milestones Draft</b>	Available	Preliminary schedule based on agile methodology provided anticipating 5 program increments with key features (capabilities) identified over 12 months.
<b>Feedback and Iteration Mechanism</b>	Partially Available	Assumption: Use cases will be added to a backlog and the design iterated as part of the MVP build-out and stakeholder feedback. Prioritize functional requirements in initial stages of the MVP development. Intention to follow Eversource's Scaled Agile Framework.



Table 8. Eversource: Technical Criteria Assessment

DESIGN ITEM	BACKEND PRELIMINARY DESIGN TECHNICAL EVALUATION FINDINGS	RECOMMENDATIONS
<b>1. Interoperability and Integration</b>	<ul style="list-style-type: none"> <li>Enterprise integration tools (e.g., ESB) will be used to collect, format, and publish data via Platform Hub.</li> </ul>	<ul style="list-style-type: none"> <li>Clarify Platform Hub required standards and protocols during Platform Hub requirements analysis and ensure Eversource integration tools comply with these protocols, and support for other systems, when identified.</li> </ul>
<b>2. Data Quality and Integrity</b>	<ul style="list-style-type: none"> <li>No plans for additional data quality work.</li> <li>Assumption: the underlying data quality is sufficient for internal use but may not be valid externally.</li> </ul>	<ul style="list-style-type: none"> <li>Clarify data handling and packaging requirements during Platform Hub requirements analysis to ensure data quality consistency for Platform Hub end-user consumption.</li> </ul>
<b>3. Performance, Scalability and Latency</b>	<ul style="list-style-type: none"> <li>Eversource Platform Hub API performance requirements are unclear at this time.</li> <li>Assumption: Eversource will be able to support yet to be defined Platform Hub performance requirements.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure that Platform Hub requirements analysis identifies performance requirements and throttling mechanisms. Requirements should include approved users, concurrent users, request frequency, data volumes, data deltas, filtering, aggregation (e.g., where is the data aggregation and filtering of customer-specific information executed?) aspects.</li> <li>Eversource to assess Platform Hub performance requirements impacts on Kubernetes or OpenShift tool.</li> </ul>
<b>4. Security</b>	<ul style="list-style-type: none"> <li>Eversource will comply with Platform Hub security requirements.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure that Platform Hub requirements analysis addresses the following: <ul style="list-style-type: none"> <li>What internal standards and policies are being applied to the design?</li> <li>How will requirements for intrusions detection, DDoS, etc. be included?</li> <li>Where will customer data be transiting, residing, and processing, and how will it be protected?</li> <li>How is the Software Bill of Materials (SBOM) and the Vulnerability Exploitability exchange (VEX) being leveraged?</li> </ul> </li> </ul>
<b>5. Reliability &amp; Uptime</b>	<ul style="list-style-type: none"> <li>Eversource anticipates Platform Hub API uptime target of 99.5% excluding scheduled maintenance windows.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure the Platform Hub requirements analysis addresses the following: <ul style="list-style-type: none"> <li>RPO (Recovery Point Objective) – what is an acceptable data loss?</li> <li>RTO (Recovery Time Objective) – how long will it take to recover fully?</li> </ul> </li> </ul>
<b>6. Flexibility</b>	<ul style="list-style-type: none"> <li>Assumption: Platform Hub requirements analysis will specify API design to support required flexibility.</li> <li>Eversource will design Platform Hub API to meet identified requirements using existing integration tools.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure that Platform Hub requirements analysis addresses future requirements and assess how Eversource can support future requirements.</li> </ul>
<b>7. User Experience</b>	<ul style="list-style-type: none"> <li>As an API-to-API model, the user experience will be limited to determining user authentication and data privileges.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure that Platform Hub requirements analysis addresses the following: <ul style="list-style-type: none"> <li>Opt-in/out process, Vendor approval and removal, Notification mechanisms.</li> <li>Occasional vs frequent users – How does the MVP design differ from a full-production system? Consider light/heavy data and occasional/frequent requests.</li> <li>What will be the data limits and access rules?</li> <li>How will bulk/aggregated data transfers be executed?</li> </ul> </li> </ul>



Table 8. Eversource: Technical Criteria Assessment

DESIGN ITEM	BACKEND PRELIMINARY DESIGN TECHNICAL EVALUATION FINDINGS	RECOMMENDATIONS
<b>8. Compliance &amp; Standards</b>	<ul style="list-style-type: none"> <li>■ Eversource will comply with Platform Hub standards by using ESB and data warehousing tools to collect, format, and publish requested data to Platform Hub via the Eversource API.</li> <li>■ Platform Hub will provide the data to requesting end-user.</li> <li>■ Platform Hub, and it's operator, not Eversource, will be responsible for standards compliance (e.g., GB CMD, DataGuard, SOC2).</li> </ul>	<ul style="list-style-type: none"> <li>■ Ensure testing and verification methodology of Eversource published data to Platform Hub is developed and coordinated with the other utilities.</li> </ul>
<b>9. Maintenance and Support</b>	<ul style="list-style-type: none"> <li>■ Eversource will provide required support for Platform Hub APIs consistent with standard IT support policies and procedures.</li> <li>■ Assumption: the Eversource API design will follow existing observability standards for other web-facing apps.</li> </ul>	<ul style="list-style-type: none"> <li>■ Ensure that Platform Hub requirements analysis includes applicable SLAs and SLOs for Eversource Platform Hub API.</li> <li>■ Ensure that operational support tools (e.g., incident management, troubleshooting) are integrated between Platform Hub operator and Eversource.</li> </ul>
<b>10. Data Storage &amp; Retention</b>	<ul style="list-style-type: none"> <li>■ What are the data retention requirements? How is data history and management different and the same compared to the other utilities?</li> <li>■ What are the archival and backup requirements? Can backups be executed on a live system without impacting service?</li> </ul>	<ul style="list-style-type: none"> <li>■ Ensure that Platform Hub requirements analysis includes the following: <ul style="list-style-type: none"> <li>- Data retention – how is data history and management – are there differences among utilities providing data?</li> <li>- Backup and archival – how long must data packets/responses be retained per request?</li> </ul> </li> </ul>
<b>11. Feedback &amp; Monitoring</b>	<ul style="list-style-type: none"> <li>■ Eversource will actively participate in Platform Hub release planning activities. This participation will establish schedule and cost estimates for future requirements.</li> </ul>	<ul style="list-style-type: none"> <li>■ Eversource should participate in Platform Hub product roadmap activities to jointly set expectations and budgets, as needed.</li> </ul>



Table 9. Eversource Development and Support Cost Estimates

EVERSOURCE	ANALYSIS AND COMMENTS
<b>Estimated MVP Development Cost (One Time)</b>	\$2.5M for external provider and internal Eversource estimates
<b>Estimated Development Duration</b>	12 months duration. The impacted number of anticipated FTE in different functional areas will help identify business impacts on internal team members and resources. A preliminary, high-level schedule, describing implementation approach was provided.
<b>Development Procurement Approach</b>	A formal RFP design and development process for external support may need to be completed and to further refine costs.
<b>Development Estimate Completeness</b>	External provider estimate includes development and some testing. ES covers resources, UX, UI, Solution Architecture, Security Architecture, BSA, PMO, UNIT Testing, and performance testing. Delineation of work between ES and external provider is noted in the cost estimate. Impacted teams and FTEs identified.
<b>Development Estimate Quality/Reasonableness</b>	Although Eversource's development cost is the highest of the three utilities, integration estimates are correspondingly high because of the need to integrate with a legacy CIS platform for usage and billing data. Given the complexity associated with this integration, the Eversource costs are reasonable.
<b>Estimated Support Cost (Yearly)</b>	The latest support cost estimate is \$238K including external service provider and Eversource staffing and licensing. This estimate anticipates a 3% annual cost increase.
<b>Support Approach</b>	Assumption: the awarded external service provider for implementation will also provide support the with an SLA scope extension.
<b>Support Estimate Completeness</b>	Assumption. Limited anticipated ES effort outside of existing day-to-day roles and responsibilities.
<b>Support Estimate Quality/Reasonableness</b>	The estimated annual support cost is appropriate at approximately 10% of the initial development costs.



## Liberty Utilities

Table 10. Liberty Utilities: Design Maturity Assessment

DESIGN ITEM	LIBERTY UTILITIES	COMMENT
System Overview	Available	Business Requirements Document (BRD) is consistent with PUC requirements. BRD includes initial list of assumptions, dependencies, constraints, risks, business requirements.
Preliminary Architecture Diagram	Available	Overall Backend Architecture and Application Integration diagrams provided. SEW applicability still to be determined.
Data Flow Diagram	Available	Proposed data flows for user authentication and providing GB data via the Hub provided.
Data Model Sketch	Available	BRD includes PUC required data model. Liberty data warehouse will provide Hub data via API. Liberty data model is proprietary and not available. Data aggregation within and between utilities is needed to consider billing cycles and interval metering timing.
Interface Specifications	Available	Updated interface specifications documented presented April 2024.
Security and Compliance Considerations	Available	System access roles and privileges not identified. Design details needed for coordinating third-party enrollment and management amongst utilities.
Preliminary Scalability and Performance Analysis	Partially Available	BRD states target to support monthly uptime availability of 99.5%. This is consistent with other enterprise systems. Estimated transaction volumes will be low and will be revisited based on refined PH requirements that will affect system performance volumetrics.
Technology Stack Recommendations	Available	Application Integration Diagrams provided. Existing Liberty software development environments/tools (e.g., CI/CD, testing) not provided, but likely applicable to support backend requirements.
Operational Process Outline	Partially Available	Liberty provided an operational process support outline. This outline will be adapted to support Platform Hub APIs and incorporated into Liberty's incident reporting and response processes including customer service and IT software support.
Stakeholder Communication Plan	Partially Available	BRD includes list of Liberty stakeholders, but not external stakeholders. Communication Matrix and Stakeholder Analysis templates provided. Templates to be completed later in project.
Preliminary Budget Estimate	Available	Costing methodology and 13 work packages identified with ROM estimates for total effort and cost. 17 Resource types identified to support project, but estimated effort by type to be determined. Good preliminary cost estimate that includes contingency to address TBD external costs.
Risk Assessment	Partially Available	Initial list of risks identified in BRD. Liberty Risk approach template provided. Template to be applied later in project.
Timeline and Milestones Draft	Available	Initial list of activities with estimated durations and high-level assumptions provided. Project schedule TBD. Resource Plan includes deliverables and applicable phases without timeline.
Feedback and Iteration Mechanism	Partially Available	Assumption: Use cases will be added to a backlog and the design iterated as part of the MVP build-out and stakeholder feedback. Prioritize functional requirements in initial stages of the MVP development.



Table 11. Liberty Utilities: Technical Criteria Assessment

DESIGN ITEM	BACKEND PRELIMINARY DESIGN TECHNICAL EVALUATION FINDINGS	RECOMMENDATIONS
<b>1. Interoperability and Integration</b>	<ul style="list-style-type: none"> <li>■ Provided Backend Architecture and Application Integration was detailed describing how Liberty systems will interact with Platform Hub.</li> <li>■ Additional documentation – Solution Requirements, Interface Specifications, and Functional Specifications provided April 2024</li> </ul>	<ul style="list-style-type: none"> <li>■ Supplement the application view with a data integration view.</li> <li>■ Revisit the Long-Term Integration Slide in conjunction with data warehouse and data lake development.</li> <li>■ Validation and integrate additional requirements and design documentation (e.g., PH user authentication and data authorization) as PH requirements are defined.</li> </ul>
<b>2. Data Quality and Integrity</b>	<ul style="list-style-type: none"> <li>■ Liberty plans to use existing systems to populate data warehouse that will be used to “feed” Platform Hub. The existing systems provide appropriate data quality and integrity.</li> <li>■ Interval data – including commercial/industrial customers – will be provided through the PH when AMI is deployed and operational in NH.</li> </ul>	<ul style="list-style-type: none"> <li>■ Ensure proper mapping of Liberty data fields to be published via Platform Hub.</li> <li>■ Confirm timing for interval data requirement availability with PUC.</li> <li>■ Work with other utilities to ensure consistent data aggregation algorithms.</li> </ul>
<b>3. Performance, Scalability and Latency</b>	<ul style="list-style-type: none"> <li>■ Liberty is planning to support growth from current monthly reads (MVP requirement) to 15-minute reads (future state: 3+ years).</li> </ul>	<ul style="list-style-type: none"> <li>■ Design should specify scaling approach (vertical vs horizontal) and remain flexible w/ different latency scenarios.</li> </ul>
<b>4. Security</b>	<ul style="list-style-type: none"> <li>■ Stakeholders, including some users, identified in Business Requirements Document.</li> <li>■ Liberty to comply with NH PUC cybersecurity requirements as a data provider and user authenticator.</li> </ul>	<ul style="list-style-type: none"> <li>■ Clarify user roles (Liberty support, Platform Hub support, admin, Liberty users) and access privileges. This should be addressed during Platform Hub requirements analysis.</li> </ul>
<b>5. Reliability &amp; Uptime</b>	<ul style="list-style-type: none"> <li>■ Target uptime equal to other non-critical system standards.</li> </ul>	<ul style="list-style-type: none"> <li>■ To be determined Platform Hub requirements should specify fault tolerance and redundancy.</li> </ul>
<b>6. Flexibility</b>	<ul style="list-style-type: none"> <li>■ Liberty is mindful that the NH solution should also work for NY and CT, and these requirements are in flight.</li> </ul>	<ul style="list-style-type: none"> <li>■ Design for backend API was limited to NH.</li> </ul>
<b>7. User Experience</b>	<ul style="list-style-type: none"> <li>■ Liberty anticipates supporting Platform Hub through the API and therefore no direct user experience to access Liberty systems.</li> </ul>	<ul style="list-style-type: none"> <li>■ Will need to work with GC to define backend requirements to support Platform Hub including user types and authentication for all utilities.</li> </ul>
<b>8. Compliance &amp; Standards</b>	<ul style="list-style-type: none"> <li>■ Liberty complies with existing data handling standards mandated by regulators.</li> <li>■ Liberty will comply with applicable standards as a data provider for Platform Hub.</li> </ul>	<ul style="list-style-type: none"> <li>■ Integrate ESPI and NAESB requirements into the design.</li> </ul>
<b>9. Maintenance and Support</b>	<ul style="list-style-type: none"> <li>■ Liberty Platform Hub system is planned to integrate easily into existing IT support processes.</li> </ul>	<ul style="list-style-type: none"> <li>■ IT Support Model must be adapted to support Platform Hub Operations.</li> </ul>
<b>10. Data Storage &amp; Retention</b>	<ul style="list-style-type: none"> <li>■ Existing Liberty data storage and retention capabilities still apply.</li> <li>■ Platform Hub-specific requirements have not been identified.</li> </ul>	<ul style="list-style-type: none"> <li>■ To be determined Platform Hub requirements should specify data storage and retention capabilities for data providers.</li> </ul>
<b>11. Feedback &amp; Monitoring</b>	<ul style="list-style-type: none"> <li>■ Liberty plans to use existing customer feedback and PUC regulation support Platform Hub enhancements.</li> <li>■ Liberty will employ existing enterprise monitoring tools to monitor Platform Hub APIs.</li> </ul>	<ul style="list-style-type: none"> <li>■ Incorporate existing monitoring and logging features to monitor Platform Hub APIs.</li> </ul>



Table 12. Liberty Utilities Development and Support Cost Estimates

LIBERTY UTILITIES	ANALYSIS AND COMMENTS
<b>Estimated MVP Development Cost (One Time)</b>	\$2.4M estimate provided materially covering Liberty internal labor and licensing costs, but excluded expenses for cloud/data sharing and external some vendor services. \$0.4M contingency cost and 6% inflation factor included. The Liberty cost estimate includes development costs to accommodate both the initial data hub portal implementation (no AMI data) and the subsequent implementation which includes AMI data when Liberty completes their AMI implementation. Cost estimates (including contingency) are based on a +/- 20% "Baseline Uncertainty".
<b>Estimated Development Duration</b>	24 month duration. Assumes data warehouse is available and can be leveraged. Data warehouse is currently in early development stages.
<b>Development Procurement Approach</b>	Mix of internal and external resources, and Liberty plans to leverage existing service providers to supplement development.
<b>Development Estimate Completeness</b>	Mostly complete including effort and financial estimates and contingency costs, but some undefined external costs. Estimates assume only currently available data will be provided to PH. Subsequent data points will be estimated later.
<b>Development Estimate Quality/Reasonableness</b>	With the information provided, the cost estimates for only backend development are reasonable. The PH will require some form of customer validation for customers or backend CIS integration. These costs are included in the estimate. Additional clarity will be required as PH requirements are refined and additional cost factors (e.g., cloud/data sharing, external vendor support) are defined.
<b>Estimated Support Cost (Yearly)</b>	\$50K ROM estimate will escalate yearly by 6 percent.
<b>Support Approach</b>	Handle Liberty-related incidents through existing Contact Center.
<b>Support Estimate Completeness</b>	ROM estimate for planning purposes, will be refined later in the program
<b>Support Estimate Quality/Reasonableness</b>	PH will require some support backend CIS integration. These costs are included in the estimate. While an increase in call volumes is expected, but these calls should be absorbed into existing Contact Center staffing. These assumptions are reasonable.



## Unitil

Table 13. Unitil: Design Maturity Assessment

DESIGN ITEM	UNITIL	COMMENT
System Overview	Available	Unitil API design appears to be primary driver for the NH Platform Hub requirements and includes significant design details.
Preliminary Architecture Diagram	Available	Unitil back-end design is well documented given current state understanding of Platform Hub use cases.
Data Flow Diagram	Available	Data flows well documented from meter through billing system to integration with Platform Hub. Unitil plans to use Microsoft Azure Data Factory to populate Platform Hub-ready data repository.
Data Model Sketch	Partially Available	Logical data model is consistent with MVP requirements as documented. Further refinements likely as Platform Hub requirements solidify leading to physical data model. Data aggregation within and between utilities is needed to consider billing cycles and interval metering timing.
Interface Specifications	Available	Interface specifications are based on API-to-API model and well documented including sample pseudo-code for identified APIs.
Security and Compliance Considerations	Partially Available	Unitil's design includes use of OAuth and Unitil third-party authentication methods for Platform Hub users. Design details needed for coordinating third-party enrollment and management amongst utilities.
Preliminary Scalability and Performance Analysis	Partially Available	Estimated transaction volumes will be low and will be revisited based on refined PH requirements that will affect system performance volumetrics.
Technology Stack Recommendations	Available	Unitil uses Microsoft-based software change management technology stack to manage changes to software.
Operational Process Outline	Partially available	Operational support for Platform Hub APIs will be incorporated into Unitil's incident reporting and response processes including customer service and IT software support. The operational processes are expected to be similar to the approach planned for the in-progress CIS upgrade.
Stakeholder Communication Plan	Partially available	Communication plan from the in-progress CIS upgrade project was reviewed. The plan includes stakeholder analysis for internal and external parties and communications schedule/timing. The Unitil communications plan will be developed in concert with PH requirements analysis.
Preliminary Budget Estimate	Available	Estimates provided based on current design and provided per PUC categories. While Unitil effort estimates are consistent with E Source's given current design, cost estimates may be low due to market rate expectations.
Risk Assessment	Partially Available	Gas GB functionality to be validated, but low risk due to anticipated limited use and mature designs reflected in budget/plan estimates. Risk to be revisited during formal design validation.
Timeline and Milestones Draft	Available	Estimated 6-month project based on anticipated CIS upgrade completion, finalized design, and resource availability.
Feedback and Iteration Mechanism	Partially Available	Assumption: Use cases will be added to a backlog and the design iterated as part of the MVP build-out and stakeholder feedback. Prioritize functional requirements in initial stages of the MVP development.



Table 14. Unitil: Technical Criteria Assessment

DESIGN ITEM	BACKEND PRELIMINARY DESIGN TECHNICAL EVALUATION FINDINGS	RECOMMENDATIONS
<b>1. Interoperability and Integration</b>	<ul style="list-style-type: none"> <li>■ CIS Update and GB planned availability 3/2024</li> <li>■ VEE'd and bill-ready data will be provided to Platform Hub</li> <li>■ Unitil plans to use Capricorn APIs to provide GB to Platform Hub.</li> <li>■ Unitil will be provide APIs to publish aggregated data to Platform Hub.</li> </ul>	<ul style="list-style-type: none"> <li>■ Reconcile data model definitions (e.g., billing cycle, interval) and handling-across all utilities</li> <li>■ Validate Capricorn GB data availability 2/2024</li> <li>■ Validate API designs based on approved use cases.</li> </ul>
<b>2. Data Quality and Integrity</b>	<ul style="list-style-type: none"> <li>■ Data integrity controlled by MDMS and CIS processes and systems.</li> <li>■ Unitil APIs will be designed to guarantee complete and accurate data transmission.</li> <li>■ Unitil will provide the best available data in response to Green Button (GB) requests. If discrepancies, Unitil will transmit available data, ensuring that the response contains as much requested data as possible.</li> </ul>	<ul style="list-style-type: none"> <li>■ Confirm data aggregation methods.</li> </ul>
<b>3. Performance, Scalability and Latency</b>	<ul style="list-style-type: none"> <li>■ Unitil's Green Button (GB) data will be made available on a next-day basis.</li> <li>■ Consumption data is validated three times per day</li> <li>■ PLX meters also provide data three times per day, while TS2 and Telemeters are typically one day behind in data availability.</li> <li>■ Unitil utilizes Watchman, a monitoring platform. Watchman will monitor the health of services and provides alerts in the event of faults or failure conditions-which will include GB APIs</li> <li>■ Unitil plans to provide 15-minute interval data.</li> </ul>	<ul style="list-style-type: none"> <li>■ Validate transaction and data volumes during Platform Hub design and impacts on supporting infrastructure.</li> </ul>
<b>4. Security</b>	<ul style="list-style-type: none"> <li>■ Plan to use Unitil APIs for registration, authentication, and authorization.</li> <li>■ Plan to use OAuth for PH to access customer-specific and aggregated data.</li> <li>■ Unitil to use Capricorn GB API for customer-specific data for Platform Hub.</li> </ul>	<ul style="list-style-type: none"> <li>■ Validate design and implementation for 3rd party user authentication and authorization.</li> </ul>
<b>5. Reliability &amp; Uptime</b>	<ul style="list-style-type: none"> <li>■ PH APIs fall under Unitil's high availability systems, and they must meet a requirement of 99.5% uptime.</li> <li>■ Platform Hub APIs impact on capacity planning will be required as the project approaches implementation.</li> <li>■ The decision regarding the maintenance window for the Platform Hub APIs is pending.</li> <li>■ The inclusion of Platform Hub API incidents in the standard Unitil customer service call repertoire is yet to be decided.</li> </ul>	<ul style="list-style-type: none"> <li>■ Plan for integration Platform Hub API incidents into standard Unitil customer service processes.</li> <li>■ Integrate Platform Hub API logs into SIEM for monitoring .</li> </ul>
<b>6. Flexibility</b>	<ul style="list-style-type: none"> <li>■ In the analysis findings, it was observed that Unitil does not anticipate any further modifications required to support Platform Hub on enQuesta and Capricorn systems.</li> </ul>	<ul style="list-style-type: none"> <li>■ EnQuesta upgrade and Capricorn availability is 2Q2024</li> <li>■ Verify/expand Unitil and Capricorn API design in conjunction with Platform Hub design.</li> </ul>



Table 14. Unitil: Technical Criteria Assessment

DESIGN ITEM	BACKEND PRELIMINARY DESIGN TECHNICAL EVALUATION FINDINGS	RECOMMENDATIONS
<b>7. User Experience</b>	<ul style="list-style-type: none"> <li>The current plan is for the vendors to be registered with each utility and customer consent will be provided on the utilities customer engagement portal. As part of the consent process, the customer will explicitly allow/deny access to specific third parties for specifically requested data.</li> <li>Registered and approved third parties will retrieve aggregated and/or customer specific data from the hub.</li> </ul>	<ul style="list-style-type: none"> <li>Verify use cases and personas Platform Hub access and data.</li> </ul>
<b>8. Compliance &amp; Standards</b>	<ul style="list-style-type: none"> <li>The utilities have agreed that the platform will conform to the Dataguard privacy standards in addition to any and all applicable state, federal or regulatory rules. Customer specific data access will include customer confidential data per the agreed upon MVP Logical Data Model. Such data will be secured appropriately at the utility, platform and transit levels.</li> <li>Unitil will not pursue Green Button certification and expects that the Platform Hub will be certified.</li> </ul>	<ul style="list-style-type: none"> <li>Continue with plan to conform to standards compliant using OAuth and Green Button Connect My Data.</li> <li>Assumption that only Platform Hub requires Green Button certification.</li> </ul>
<b>9. Maintenance and Support</b>	<ul style="list-style-type: none"> <li>On-premise HW is on a 5-year replacement cycle.</li> <li>Rough estimate includes 15 hours per month support (@\$75-\$150/hr = \$13.5k-27k/year) as well as SWAG estimates for cloud data storage and DW services and compute.</li> </ul>	<ul style="list-style-type: none"> <li>Validate support requirements based on evolving Platform Hub design and impacts on Unitil components.</li> </ul>
<b>10. Data Storage &amp; Retention</b>	<ul style="list-style-type: none"> <li>Unitil will be providing 24 months of historical data. Unitil is developing a long-term archival strategy that will be applied to Platform Hub related data.</li> <li>GB data loss would be handled as a part of established and standard Unitil recovery procedures.</li> </ul>	<ul style="list-style-type: none"> <li>Verify Unitil data retention policies and plans.</li> </ul>
<b>11. Feedback &amp; Monitoring</b>	<ul style="list-style-type: none"> <li>Performance issues with any Platform Hub API will be reported through Unitil customer service.</li> <li>It was noted that Unitil is planning to implement a SIEM system in 2024. The planned SIEM will collect and aggregate logs from both the platform and Unitil APIs for enhanced security monitoring and analysis.</li> </ul>	<ul style="list-style-type: none"> <li>Verify that Platform Hub logs will be shared with Unitil SIEM for monitoring and troubleshooting purposes.</li> </ul>



Table 15. Unitil Development and Support Cost Estimates

UNITIL	ANALYSIS AND COMMENTS
<b>Estimated MVP Development Cost (One Time)</b>	\$756k preliminary estimate (-10% to +50%) with most PUC cost categories itemized. Cloud and infrastructure cost estimates of \$100k to be refined after final design. Estimates based on a blend of Unitil internal and external labor costs. Verify development staffing based on available internal and external resources.
<b>Estimated Development Duration</b>	6-month development project. Expected high reusability of planned APIs and associated development artifacts from EnQuesta and Capricorn upgrades are applicable. Organization change management (OCM) may require additional time.
<b>Development Procurement Approach</b>	Internal development staff planned and would be based on availability. External service providers may be also required if internal resources are unavailable.
<b>Development Estimate Completeness</b>	Preliminary development estimates based on similar projects and experience.
<b>Development Estimate Quality/Reasonableness</b>	4-5 FTE effort reasonable for IT development work based on high reusability. Other roles such as OCM and transition to operations may require additional effort.
<b>Estimated Support Cost (Yearly)</b>	15 hours/month @ \$125/hr = \$22.5k/year + \$25k cloud/infrastructure costs (based on 25% of development infrastructure). Revisit during Platform Hub requirements through implementation.
<b>Support Approach</b>	Handle Unitil-related incidents through Unitil Customer Service contacts.
<b>Support Estimate Completeness</b>	Rough order of magnitude based on anticipated usage patterns
<b>Support Estimate Quality/Reasonableness</b>	0.1 FTE estimate seems reasonable in steady state operation for monitoring and resolution. Labor effort may be higher upon roll-out. Cloud and infrastructure costs to be confirmed.

— End of Report —



**New Hampshire  
Electric and Gas Utilities  
On-Line Multi-Use Energy  
Data Platform**

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**Appendix**



# MVP Data Fields for Utility Logical Data Model

## MVP Data Fields for Logical Data Model

Billing Data Fields			
DE19-197 Field	Green Button Location	Enumerated / Allowed Values	Example
Account Number	Retail Customer Schema > CustomerAccount		1089999
Premise			
Customer Name			Bob Smith
Customer Email Address			<a href="mailto:smith@mail.com">smith@mail.com</a>
Customer Phone		Home / Mobile / Business	
Account Address	Retail Customer Schema > ServiceLocation	This should be multiple addresses: Contact and Service	123 Main Street Salem NH 03079
Customer Rate Code			D1 Res
Meter Number	Retail Customer Schema > ServiceLocation > Usage Point		234433
Meter Reading Previous		Register Read End KWH or KW at end of cycle "meter reading previous"	345678
Meter Reading Current		Register Read End KWH or KW at end of cycle "meter reading current"	345878
Overall Consumption Last Period	UsageSummary > OverallConsumptionLastPeriod		809
Overall Consumption This Period	UsageSummary > CurrentBillPeriodOverAllConsumption		784
Billing Period	UsageSummary > BillingPeriod > Duration and Start		
Commodity	UsageSummary > Commodity	Gas or Electric	"E"
Bill Amount	UsageSummary > Amount	Current bill total	106.5100
<b>Balance Forward?</b>			
Customer Charge	UsageSummary > CostAdditionalDetailLastPeriod (bill line item collection)		\$17.00
Delivery Charge	UsageSummary > CostAdditionalDetailLastPeriod (bill line item collection)	itemKind: 2 Energy Delivery Fee	0.0233
Stranded Cost Charge	UsageSummary > CostAdditionalDetailLastPeriod (bill line item collection)		0.0432
System Benefit Charge	UsageSummary > CostAdditionalDetailLastPeriod (bill line item collection)		0.00456
Consumption Tax	UsageSummary > CostAdditionalDetailLastPeriod (bill line item collection)	itemKind 5: Tax	0.00005

Energy Service Charge Fixed	UsageSummary > CostAdditionalDetailLastPeriod (bill line item collection)		0.0823
Quality of Reading	UsageSummary > QualityofReading	0 - valid 7 - manually edited 8 - estimated using reference day 9 - estimated using linear interpolation 10 - questionable 11 - derived 12 - projected (forecast) 13 - mixed 14 - raw 15 - normalized for weather 16 - other 17 - validated 18 - verified 19 - revenue-quality	valid
Service Supplier Kind	Retail Customer Schema > Service Supplier > Supplier Kind	Utility, Retailer, Other, LSE, MDMA, MSP	retailer
Service Supplier ID	Retail Customer Schema > Service Supplier > SupplierID		
Service Supplier Effective Date	Retail Customer Schema > Service Supplier > EffectiveDate		
Service Supplier Name	Retail Customer Schema > Service Supplier > Name		
Peak Demand (for current bill period)	UsageSummary > PeakDemand		
<b>Interval Data Fields</b>			
Interval Reading Start Date and Time	MeterReading > IntervalBlock > IntervalReading > TimePeriod		
Interval Reading Value	MeterReading > IntervalBlock > IntervalReading > Value		
Interval Duration	MeterReading > IntervalBlock > IntervalReading > TimerPeriod > Duration		
Interval Reading Quality	MeterReading > IntervalBlock > IntervalReading > Reading Quality	Valid, Manually Edited, Estimated Using Reference Day, Estimated Using Linear Interpolation, Questionable, Derived, Projected, Mixed, Raw, Normalized For Weather, Other, Validated, Verified, Revenue-Quality	
TOU	MeterReading > IntervalBlock > IntervalReading>TOU	TOU bucket for interval period	