



October 27, 2025

The Honorable Chair and Members of the
Hawai'i Public Utilities Commission
465 South King Street, First Floor
Kekuanaoa Building
Honolulu, Hawai'i 96813

Dear Commissioners:

Subject: Docket No. 2022-0212 – Innovative Pilot Process
Hawaiian Electric Companies' Data Analytics Clearinghouse Pilot Final Report

In accordance with Decision and Order No. 37507 (“D&O 37507”), issued on December 23, 2020 in Docket No. 2018-0088, the Hawaiian Electric Companies¹ respectfully submit their Data Analytics Clearinghouse Pilot Final Report.²

Sincerely,

/s/ Peter C. Young

Peter C. Young
Director, Regulatory Rate Proceedings

Enclosure

c: Division of Consumer Advocacy

¹ The “Hawaiian Electric Companies” or “Companies” collectively refers to Hawaiian Electric Company, Inc., Maui Electric Company, Limited, and Hawai'i Electric Light Company, Inc.

² See D&O 37507 at 176.

Hawaiian Electric Companies' Data Analytics Clearinghouse Pilot Final Report

Introduction

In accordance with Decision and Order No. 37507 (“D&O 37507”), issued on December 23, 2020 in Docket No. 2018-0088, the Hawaiian Electric Companies¹ respectfully submit this final report on the Data Analytics Clearinghouse Pilot (“DACH” or “Clearinghouse Pilot” or “Pilot”).² To facilitate the Commission’s and Consumer Advocate’s³ review, the Companies are submitting this report in a format similar to the Annual Pilot Update filed March 24, 2025,⁴ but with additional discussion on challenges and lessons learned, process improvements, a determination of the success of the pilot, and any future permanent implementation plans based on an evaluation against the metrics established.^{5,6}

The Clearinghouse Pilot was approved in D&O 38753 in December 2022 and formally commenced on February 27, 2023. With the completion of the final Program Increment and associated work activities, the Pilot officially ended in February 2025. Pilot project costs continued to be recorded after February 2025 as invoices for outside services continued to be received and paid. This report summarizes the accomplishments and use cases for the Pilot as well as details the Pilot activities and actual costs, which are summarized by Program Increment in the Costs and Revenues section.

¹ The “Hawaiian Electric Companies” or “Companies” refers collectively to Hawaiian Electric Company, Inc., Maui Electric Company, Limited, and Hawai‘i Electric Light Company, Inc.

² See D&O 37507 at 176.

³ Division of Consumer Advocacy of the Department of Commerce and Consumer Affairs.

⁴ See *Hawaiian Electric Companies’ Annual Pilot Update Report*, filed March 24, 2025, in Docket No. 2022-0212, for a list of annual pilot update reporting requirements. Although not strictly required, to facilitate the Commission’s and Consumer Advocate’s review, the Companies are herein submitting much of the same information included in the March 2025 Annual Pilot Update.

⁵ See D&O 37507 at 176.

⁶ In accordance with Decision and Order No. 38753 (“D&O 38753”), filed on December 8, 2022, in Docket No. 2022-0212, the Companies are also including specific discussion on: (1) use cases, (2) efforts to expand participation, and (3) participant usage metrics, consistent with the three conditions set forth in D&O 38753.

The Clearinghouse Pilot has delivered a secure, collaborative analytics platform that has enabled public research entities to access and analyze anonymized utility data at unprecedented scale. By providing curated dashboards, collaborative workspaces, and streamlined data sharing, the Pilot has fostered a vibrant peer network and stakeholder collaboration. Stakeholder feedback confirms that the Pilot has enhanced analytical capacity, introduced new tools and workflows, and laid the foundation for more informed decision making and community impact.

While the Pilot has concluded, the Companies will maintain the current Data Analytics Clearinghouse stakeholder access to the Databricks Collaboration Workspace and Power BI dashboards and continue monitoring usage trends. Importantly, the Companies plan to continue regular collaboration sessions with participating agencies to support ongoing learning, feedback, and shared innovation. Potential future enhancements are under evaluation, however, enhancement work beyond the Pilot is not currently budgeted for due to competing priorities and further development will be evaluated in connection with the Companies' ongoing budget prioritization efforts.

Pilot Implementation Schedule

In the Pilot Notice, the Companies anticipated an approximate fifteen (15) month implementation schedule, with an additional nine (9) months Early Life Support ("ELS"). Upon the Pilot's approval by the Commission in December 2022, the Statement of Work with the primary vendor was finalized on February 6, 2023, and the formal project kickoff and beginning of the first Program Increment commenced on February 27, 2023.

Consistent with the Pilot Notice, the Companies have completed the key work activities and objectives of the Pilot within the originally anticipated twenty-four (24) month duration, with implementation ending in May 2024 and ELS ending in February 2025.

The following program increments were completed as scheduled:

- Preliminary work and project initiation was conducted January to February 2023
- Program Increment 1 started in March 2023 and completed in May 2023;
- Program Increment 2 started in June 2023 and completed in August 2023;
- Program Increment 3 started in September 2023 and completed in November 2023;
- Program Increment 4 started in December 2023 and completed in March 2024;
- Program Increment 5 started March 2024 and completed May 2024;
- Program Increment 6 started June 2024 and completed August 2024;
- Program Increment 7 started September 2024 and completed December 2024;
- Program Increment 8 started January 2025 and completed February 2025.

The Pilot participants began onboarding in February 2024 through guest accounts, with group engagement sessions and utilization of the Clearinghouse Databricks Collaboration Workspace starting at the end of February 2024 and continuing bi-monthly throughout 2024 and into 2025.⁷ The Companies will continue collaboration sessions throughout the remainder of 2025 and intend to continue collaboration sessions on a periodic basis in 2026.

Pilot participants include the Consumer Advocate, the Honolulu, Maui, and Hawai‘i County Sustainability and Resiliency offices, Hawai‘i Energy, the University of Hawai‘i through Hawai‘i Natural Energy Institute (“HNEI”), the University of Hawai‘i Economic Research Organization (“UHERO”), the Hawai‘i State Energy Office (“HSEO”), and the Commission.⁸

Summary of Results of Pilot Program Increments:

During the Pilot, the Companies have:

- 1) released and maintained the following two core capabilities:
 - a. Collaboration Workspace
 - b. Clearinghouse Portal (modified from a Bespoke webpage to a Power BI Service)

⁷ The Companies filed a status update on September 5, 2024 in Docket No. 2022-0212 to provide a status update and to confirm that the Companies will not request an extension of the Pilot.

⁸ For purposes of this report, the Consumer Advocate, the Honolulu, Maui, and Hawai‘i County Sustainability and Resiliency offices, Hawai‘i Energy, HNEI, UHERO, and HSEO are collectively referred to as “Public Research Entities.”

- 2) released packaged products to Pilot participants including:
 - a. Consumption Patterns
 - i. Rooftop Solar Program Customer Profile
 - ii. Rooftop Solar vs. Non-Rooftop Solar
 - iii. Pre & Post Rooftop Solar
 - b. Equity and Inclusion
 - i. Quarterly Energy Burden Report
 - c. Benchmarking Consumption Patterns
 - i. Site Type Load Pattern Shape
 - ii. Site Type Energy Use Index
- 3) hosted Pilot participant workshops
- 4) performed periodic Pilot assessments
- 5) collected participant feedback through consistent engagement with Pilot participants

The first core capability released to Pilot participants is the Collaboration Workspace supported by an Azure Databricks cloud-based application. The Pilot participants have been provided credentials, training guides, and invitations to regularly scheduled workshops to ensure that they have been able to access the workspace and have had the opportunity to use the application to review, interact and download data from an anonymized Advanced Metering Infrastructure (“AMI”) dataset.

The second core capability released was the Clearinghouse Portal that provides Power BI interactive dashboard visuals of the AMI dataset enhanced with additional descriptive features, such as descriptions of the site type that are accessed from a website portal providing high-level insights to the data without the need for query and visualization. All participant groups have been provided access and demonstrations of the curated products which include Consumption Patterns, Equity and Inclusion, and Benchmarking Consumption Patterns. In 2024, the Companies decided to archive the website portal and alternatively provide the core dashboard content directly through the sharing of Power BI workspaces.

The Companies tested the Delta Sharing⁹ capability and found that the tool is relevant for Pilot participants who want direct access to the data and who are also able to provide their own storage for the AMI dataset and compute resources for analytics. To date, no participant has developed a specific use case for this functionality.

The Pilot has successfully demonstrated the functionality of a shared collaborative platform¹⁰ capable of performing queries on the AMI anonymized dataset enhanced with useful research features of island, census tract, rate schedule, and photovoltaic (“PV”) programs of public research interest.

The majority of the Pilot participants have demonstrated the ability to access the Pilot products within the Databricks and Power BI applications and have discussed their potential use cases to utilize the AMI data. Pilot participants have expressed to the Companies that the Pilot has been a valuable introduction to the skills, knowledge, systems, and data augmentation for their agencies to effectively work with extremely large data sets for public research (e.g., training and examples on Structured Query Language (“SQL”) queries to summarize data, training and example code to perform regression analysis, and training on anonymization testing).

Detailed descriptions of Pilot work activities are included in the Cost and Revenues section.

⁹ Delta Sharing is a REST-based open protocol designed to facilitate easy data sharing with external and internal partners without being tied to any specific vendor or platform. REST, or Representational State Transfer, is an architectural style for building web services. It is based on a set of principles that define how web resources should be defined, accessed, and manipulated.

¹⁰ Platform generally refers to the collection of all applications, data, and services within the Enterprise Data Analytics Platform (“EDAP”). The term platform for the Pilot refers to the Clearinghouse which is the component of the EDAP which provides the collaboration capabilities including the Databricks application (Collaboration Workspace) and Power BI Service (Clearinghouse Portal).

Costs and Revenues

Figure 1 details the actual Pilot costs incurred during the project (inclusive of excise tax).¹¹ Consistent with the Pilot Notice, all Pilot costs incurred are non-labor expenses. No internal labor or capital costs have been charged to the Pilot. As shown in Figure 1, the total actual Pilot costs are \$2,580,525, which is \$177,921 less than the originally proposed Pilot budget of \$2,758,446.¹²

Figure 1. Actual Expenses Incurred by Company (\$)

	Hawaiian Electric	Hawai'i Electric Light	Maui Electric	Total
2023	\$1,151,286	\$246,704	\$246,704	\$1,644,694
2024	\$472,794	\$101,313	\$101,313	\$675,420
2025	\$182,287	\$39,062	\$39,062	\$260,411
Total	\$1,806,367	\$387,079	\$387,079	\$2,580,525

The following sections detail significant accomplishments, work that was completed, and the associated expenses incurred during the project, organized by Minimum Viable Products (“MVPs”) and completed Program Increments.¹³ In accordance with Order No. 37865 approving the Pilot Process,¹⁴ the actual 2025 expenses incurred will be requested for recovery in the 2026 Spring Revenue Report.

Cost share was provided by Microsoft through \$50,000 in End Customer Investment Funds (“ECIF”) which supported usage of Microsoft products in the initial development of the Clearinghouse. These ECIF funds reduced expenses incurred and were applied to invoices through TEKsystems Global Services, LLC (“Tek Systems”), as a Microsoft-approved partner

¹¹ In the Companies’ Annual Pilot Update Report filed on March 25, 2025, the Companies provided estimated 2025 Pilot costs.

¹² Data Analytics Clearinghouse Pilot, Notice of Intent, filed October 26, 2022, in Docket No. 2022-0212, at 20.

¹³ Development of the Data Analytics Clearinghouse was conducted in MVPs. The purpose of MVPs is to deliver business functional capabilities that can be used by people to do their work. The MVPs are delivered incrementally in phases called Program Increments. This method is common in the agile delivery framework, which was adopted as part of this Pilot.

¹⁴ See Order No. 37865, issued July 9, 2021, in Docket No. 2018-0088, at 10 (“total annual expenditures” for each pilot will be deferred and recovered the following year).

during Program Increment 2. Tek Systems also provided an estimated \$376,432 of additional business development services in MVP 1, which included research, development, and testing of new tools and functionality for use in the Clearinghouse, at no charge.

The Pilot did not generate any revenues.

Pilot Activities and Costs

Program Increment 1

Phase	Accomplishments
<p>MVP 1 & Program Increment 1 from Mar 2023 to May 2023 – total cost of outside services: \$545,895</p>	<p>Established architecture for the Clearinghouse Portal & Collaboration Workspace with key architectural decisions and technology evaluations</p> <ul style="list-style-type: none"> • Developed User Experience design for the Clearinghouse Portal • Completed Data Governance Charter for the EDAP to support the Clearinghouse • Developed solution architecture to enhance EDAP to support the Clearinghouse • Completed Fit-Gap Analysis for the Clearinghouse Portal • Completed remediation tasks to security policies in development environment • Completed evaluation of Microsoft Purview ability to support Data Catalog <p>Aligned on priority use cases and drafted requirements for timeseries data sharing, load profile analysis pre/post PV, and energy burden</p> <ul style="list-style-type: none"> • Developed use case Load Profile Analysis Pre/Post PV and underlying data • Developed use case Time Series Data Sharing • Developed use case Energy Burden and underlying data - first iteration <p>Defined processes and procedures to deliver on external stakeholder demand for Clearinghouse data, reporting, and governance services</p>
	<ul style="list-style-type: none"> • Defined services delivery model and maturity curve roadmap (based on Unified Artificial Intelligence (“UAI”) model) • Aligned ways of working based on agile principles <p>Reporting on velocity and capacity to meet demand for both use cases and architecture enablers</p>

Program Increment 2

Phase	Accomplishments
MVP 1 & Program Increment 2 from Jun 2023 to Aug 2023 – total cost of outside services: \$720,047	<p>Technical release of Clearinghouse Portal & Collaboration Workspace for MVP 1</p> <ul style="list-style-type: none"> • Developed Clearinghouse Portal prototype • Completed User Experience design for the Clearinghouse Portal • Completed data governance operating model and metadata playbook • Completed solution system design • Developed terms of use policy <p>Developed first iterations of Clearinghouse use case interactive reports</p> <ul style="list-style-type: none"> • Developed first iteration of AMI data for publishing to the Clearinghouse • Developed first iteration of load profile analysis pre/post PV <p>Stakeholder engagement meeting to receive feedback, clarify requirements, and set priorities</p> <ul style="list-style-type: none"> • Held external kick-off meeting with all external stakeholders (over 60 attendees) • Conducted first survey to capture feedback (9 responses) • Completed stakeholder analysis to assess readiness of external stakeholders • Completed communication plan for external stakeholders • Released first measurement & valuation survey to external stakeholders

Program Increment 3

Phase	Accomplishments
MVP 2 & Program Increment 3 from Sept 2023 to Nov 2023 – total cost of outside services: \$378,752	<p>Released Clearinghouse Pilot & Collaboration Workspace MVP 2 ready for user provisioning</p> <ul style="list-style-type: none"> • Production release of the Clearinghouse (https://clearinghouse.hawaiianelectric.com/) for initial feedback • Developed onboarding procedures for external stakeholders • Released anonymized data to support publishing of use case data and reports • Published PV Load Profile use case reports to the Clearinghouse Portal • Published Energy Burden use case reports to the Clearinghouse Portal • Published business glossary to the Clearinghouse Portal • Published terms of use policy • Implemented system design and automated infrastructure deployment • Refined metadata playbook for Microsoft Purview • Developed system security plan <p>Stakeholder engagement to support adoption & Measurement and Valuation</p> <ul style="list-style-type: none"> • Held multiple sessions with external stakeholders to provide overview and solicit feedback
	<ul style="list-style-type: none"> • Measurement and Valuation framework with metrics to report on project metrics, system metrics, usage metrics, and business function metrics • Developed interactive reports for both project metrics and system metrics • Released second survey to external stakeholders (18 responses)

Program Increment 4

Phase	Accomplishments
<p>Measurement & Evaluation & Program Increment 4 from Dec 2023 to Mar 2024 – total cost of outside services: \$182,999</p>	<ul style="list-style-type: none"> • Clearinghouse: Successfully released the Clearinghouse Portal¹⁵ and the Databricks Collaboration Workspace¹⁶ to production, onboarding both internal and external users. • Measurement and Valuation: Developed a System Metrics Power BI dashboard to track usage and access. • Data Catalog: Implemented a data glossary and designed data asset approval workflows. The AMI data has been augmented with Census Tract location, Rate Schedules and PV programs that provide contextual data of like groups of customers and allows U.S. Census and other demographic information to be applied to each group. • Data Engineering: Established a new Databricks Production workspace, migrated production workspace objects, and provided ongoing support to the pilot participants. Completed the production migration of Power BI¹⁷ reports (Consumption Patterns and Equity & Inclusion). • Use Case Development: Defined participant requirements for additional Use Cases and data needs, conducted data discovery sessions with pilot participants, and created Power BI report wireframes for a new use case for Site Type (e.g., multi-dwelling units, businesses, schools, hospitals). Improved data analytics capabilities by integrating new data sources and refining existing algorithms. Developed a System Metrics Power BI dashboard to track usage and access. • DevOps & Infrastructure: Completed Infrastructure as Code, Continuous Integration and Continuous Deployment (“CI/CD”), website dashboard portal, and most environment cleanup and technical design completion.

¹⁵ The Clearinghouse Portal is one of the primary products of the Clearinghouse Pilot and is generally referring to the user-friendly interface that contains packaged data products, such as dashboards. The original portal was a web-based application, but for ease of maintenance and based on participant’s needs was converted to a direct interface in the Companies’ Power BI Service.

¹⁶ The Collaboration Workspace is one of the primary products of the Clearinghouse Pilot and refers to the shared environment (i.e., user interface) in Databricks where multiple users can work independently or together on data projects. The user interface allows participants to access, edit, and manage notebooks, data, and other resources in a centralized location.

¹⁷ The Power BI Service is a cloud-based service, separate from the Collaboration Workspace, that allows users to create, share, and consume business insights in the cloud. It enables users to connect to various data sources, combine and shape data, and create reports and dashboards that can be shared with others. For the Clearinghouse, Power BI is used as the primary interface for the dashboards and packaged data products.

	<ul style="list-style-type: none"> • Platform Security: Implemented 175 of 181 (or 97%) of total National Institute of Standards and Technology (“NIST”) cybersecurity controls¹⁸ identified in the EDAP security plans. • Operating Model: Completed reviews and refinements of the maturity assessment, roles, responsibilities, analytic factory model RASCI,¹⁹ and updated ways of working to support ELS phases.
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Program Increment 5

Phase	Accomplishments
<p>MVP 3 & Program Increment 5 from Mar 2024 to May 2024 – total cost of outside services: \$174,087</p>	<ul style="list-style-type: none"> • Portal User Interface: Application trace logs were captured from the User Interface Portal and stored in a centralized Log Analytics Workspace. Both frontend apps and backend Application Programming Interface (“APIs”) were modified to capture and route application trace logs and exception logs to app insights. Feature sets, functionalities, high-level wireframes, and the design approach for System Administrators in the DACH portal were finalized. Content management for the topic of interest page was implemented with API changes and integration work. • M&V (Measurement & Verification): Phase II enhancements on the Power BI Usage Metrics Dashboard were completed. The DACH_M&V_System Metrics Reports – Phase II, covering Usage, Databricks Unit pricing, Azure Cost Management, SQL History, and Production Migration. • Infrastructure: Environment cleanup, documentation, and diagrams were finalized. Terraform updates completed in the test environment and pushed into other environments. Firewall bypass and pip manual install procedure documents were created to allow pilot participants to use Python libraries (Geopandas, OpenYXL, PlotNine, and SparseSC), and architecture diagrams were revised with changes. Migrated Databricks production to new workspace for cost optimization. • ADF Framework: An Azure Data Factory (“ADF”) Ingestion Framework prototype and demo was conducted. Logic App Code and SQL Scripts were uploaded to the GitHub Repository, and the pipeline was tested with the ADF Framework. • UC_DACH_Site Type Load Patterns Benchmarking: Approval for the Site Type Load Patterns Benchmarking Portal Page wireframes completed. Data engineering and enrichment with MV90 and Site Types datasets completed in data lake. • Data Catalog: Approval workflows for Glossary/Terms were developed and productionized, and a Playbook for these workflows was created.

¹⁸ Based on NIST 800-53 Rev 4 Controls Baseline.

¹⁹ RASCI (Responsible, Accountable, Supportive, Consulted, and Informed) is a project management tool that businesses use to assign roles to individuals and teams during a project.

Program Increments 6 – 7

Phase	Accomplishments
<p>ELS & Program Increments 6 and 7 from Jun 2024 to Dec 2024 – total cost of outside services: \$318,335</p>	<ul style="list-style-type: none"> • Portal UI: Based on user feedback, the Companies decided to focus on dashboard functionality and migrated the definitions (Data Catalog, DACH Glossary) and dashboards (Consumption Patterns – Rooftop Solar Customer Profile, Rooftop Solar vs. Non-Rooftop Solar, Pre and Post Rooftop Solar, Equity and Inclusion – Quarterly Energy Burden Report, Benchmarking Consumption Patterns – Site Type Load Pattern Shape, and Site Type Energy Use Index) portal content and enabled access to the Power BI Service directly. Collapsed web interface to save on maintenance costs. • Continued infrastructure modifications for efficiency and cost savings. • Data Catalog: Completed installation and configuration of Purview Self Hosted Integration Runtime and developed Purview classifications for DACH assets. • Support Activities: Modified use cases and data schemas based on requests and feedback. Set up Python Package Index (PyPi) installation approaches on Databricks Collaboration workspace. Performed Proof of Concept spatial joins and provided Power BI Databricks connection approaches.

Program Increment 8

Phase	Accomplishments
<p>ELS & Program Increment 8 from Jan 2025 to Feb 2025 – total cost of outside services: \$260,411</p>	<ul style="list-style-type: none"> • Program Increment 8 included ongoing support and additional infrastructure work to close out the Pilot. Ongoing support included developing an Effective Rates Use Case. Infrastructure work included modifications to the Azure Data Factory ingestion framework, Meta Data Management Framework, and change control (CI/CD) process to provide better data pipeline management.

Use Cases Implemented Under the Pilot

The use cases, including data models and curated data sets, implemented under the Pilot include the following:

Use Case Name: Anonymized AMI Meter Interval Data for Public Entities

- **Data Source(s)**
 - Advanced Meter Data
 - PV Program Participation Data
 - Rate Schedule Data

- United States Census Bureau Data
- **User Access**
 - Databricks
 - Access provisioned for each research agency researcher
 - Queries and analytics can be performed on the data in-place within application
- **Description of Data Metric(s)** - (Data through 3/31/2025)
 - 15-minute interval energy (kWh) data with segmentation fields
 - Data contained for the month of March 2025 (see Figures 2, 3, 4)
 - ~84% of total billed meters (400,038 meters)
 - ~35% of the total net billed energy for all customers (239,769,494 kWh)
 - ~313 gigabytes (“GB”)
 - ~30 billion rows
 - 13 data fields
 - Reading Start Date Year Month
 - Reading Start Date Datetime
 - Location Unique ID
 - Island
 - Rate
 - PV Program Name
 - PV Interval Flag
 - Census Tract Long Code
 - Energy - kWh Net
 - Energy - kWh Delivered
 - Energy - kWh Received
 - Data Quality – Delivered
 - Data Quality – Received

Figure 2. Anonymized AMI Dataset Completeness

for March 2025

Meter Category	Meter Count	Net Energy
Traditional Meters	5%	39%
AMI Meters Excluded	10%	26%
AMI Meters Included	84%	35%

Figure 3. Anonymized AMI Dataset – Meter Counts

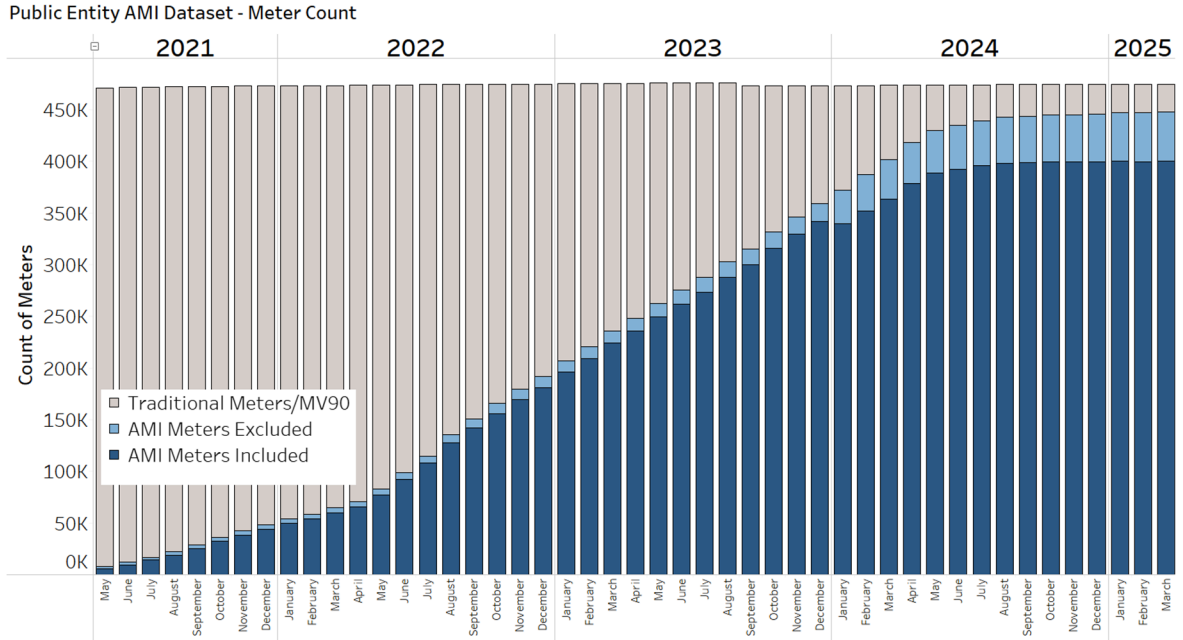
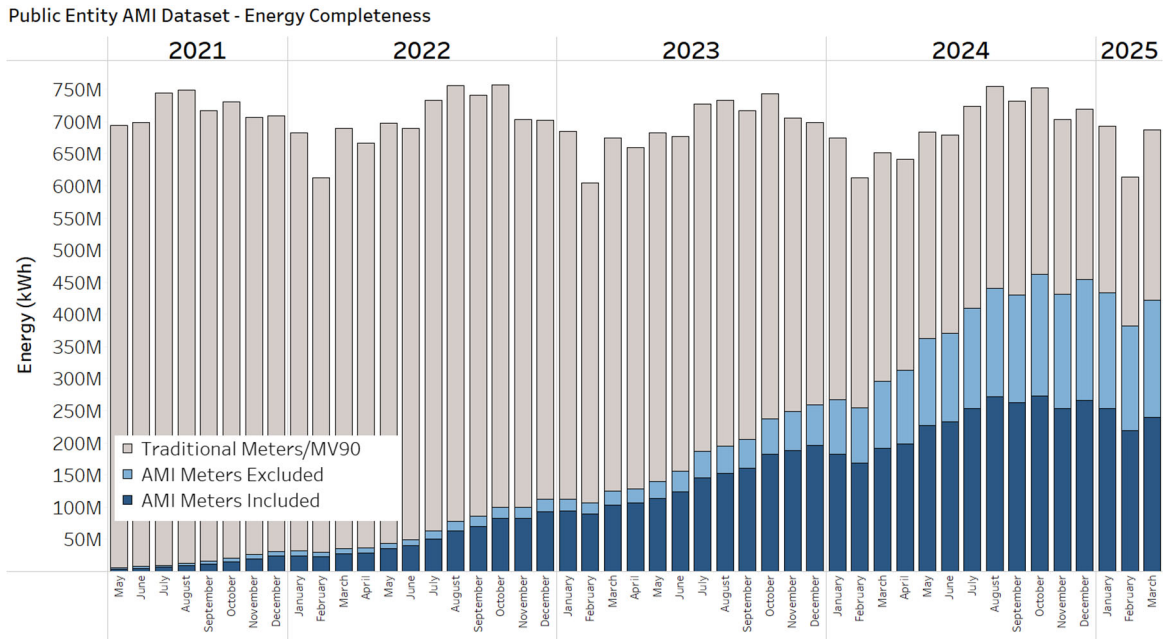


Figure 4. Anonymized AMI Dataset – Meter Energy



- **Purpose:**
 - The energy data provides critical electricity use market information that provides meter level 15-minute detail to the historically available total monthly electrical energy use by island and rate schedule.
 - The energy use patterns/load shapes and total energy use at an individual meter level may be used to identify patterns of use that have the potential for being targeted for programs to change energy use behavior for operational, efficiency and renewable energy improvements.

- The aggregation of meters into segments of like groups provides information about the customers such as being residential or commercial, presence of a PV system, and the of the census tract demographics where the meter resides.

Use Case Name: Anonymized AMI Meter Interval Data for Hawai‘i Energy

- **Data Source(s):**
 - Advanced Meter Data
- **User Access:**
 - Databricks
 - Data is available through the open-source Delta Sharing feature. This requires the system capability to ingest and store the data. Leidos will host the data in their own cloud environment and the Companies will work to incorporate the data into their new platform.
- **Description of Data Metric(s):** (Data through March 2025)
 - 15-minute interval energy (kWh) data
 - ~966 GB
 - ~95 billion rows
 - 8 data fields
 - Reading Start Datetime
 - Contract Number
 - Installation Number
 - Energy - kWh Net
 - Energy - kWh Delivered
 - Energy - kWh Received
 - Data Quality – Delivered
 - Data Quality – Received
- **Purpose:**
 - Non-anonymized AMI data table created to provide data to Hawai‘i Energy as ordered by Order No. 37146, issued May 21, 2020, in Docket No. 2018-0141 and under the Revised Amended Protective Order 2009-PO-18, issued November 5, 2010 (Non-Docketed)
 - The identification fields of Contract Number and Installation Number allow the AMI data to be combined with the standard billing and customer data to provide greater resolution of energy use behind each meter.
 - The data is useful for the purposes of program planning for the identification, size market assessment, and to estimate potential for program impacts.
 - The data is useful for the consultation with customers on existing energy use as input to energy audits and for verification of performance results after implementation.

Use Case Name: Consumption Patterns Dashboards

- **Dashboards:**
 - Rooftop Solar Program Customer Profile
 - Rooftop Solar vs. Non-Rooftop Solar
 - Pre & Post Rooftop Solar

- **Data Source(s):**
 - Advanced Meter Data
 - PV Program Participation Data

- **User Access:**
 - Power BI Service Application
 - Access provisioned for each research agency researcher
 - Filtering within the dashboard can be performed

- **Description of Data Metric(s):**
 - Data includes
 - Number of AMI Meters
 - Demand in kW during the Evening Peak (in relevant form for each image)
 - Average of Net Energy per month
 - PV Program
 - Hourly Net Demand (kW)
 - Hour of the Day
 - Pre and Post PV Program Flag
 - Filters include
 - Island
 - Year
 - Quarter
 - Month
 - Rooftop Solar / Non-Rooftop Solar / All
 - Rooftop Solar Program Names

- **Dashboard Visualization Examples:**
 - The dashboard reports are presented on a single page with a navigation link to the individual dashboards. Dashboard examples are provided below as follows:
 - Rooftop Solar Program Customer Profile in Figure 5
 - Rooftop Solar vs. Non-Rooftop Solar in Figure 6
 - Pre & Post Rooftop Solar in Figure 7

Figure 5. Consumption Patterns Dashboards – Rooftop Solar Program Customer Profiles

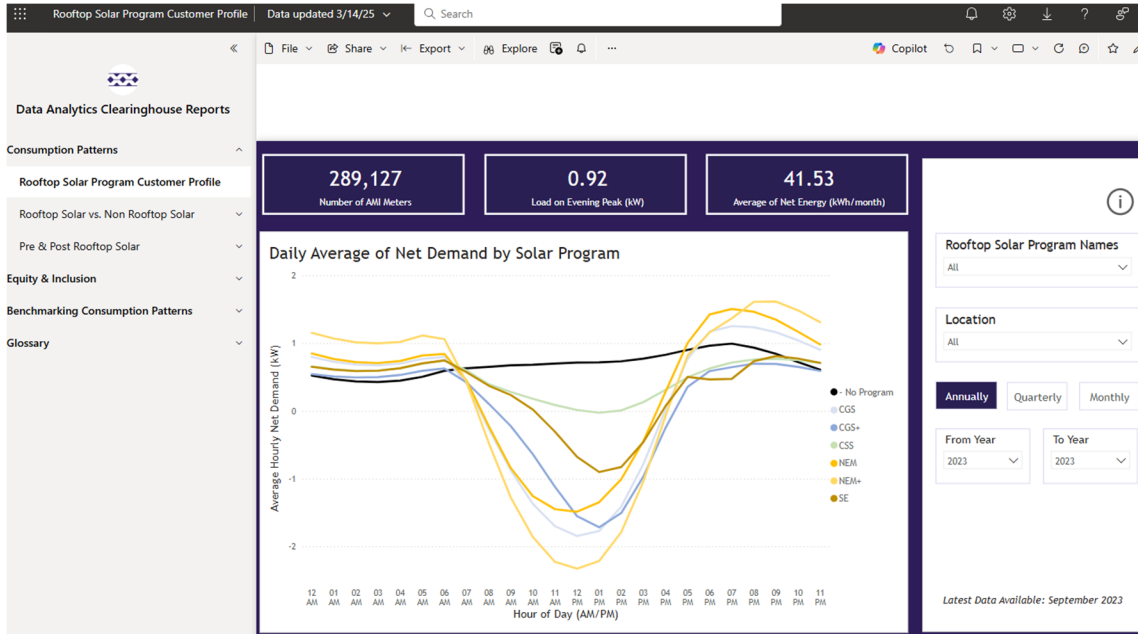


Figure 6. Consumption Patterns Dashboards – Rooftop Solar vs. Non-Rooftop Solar

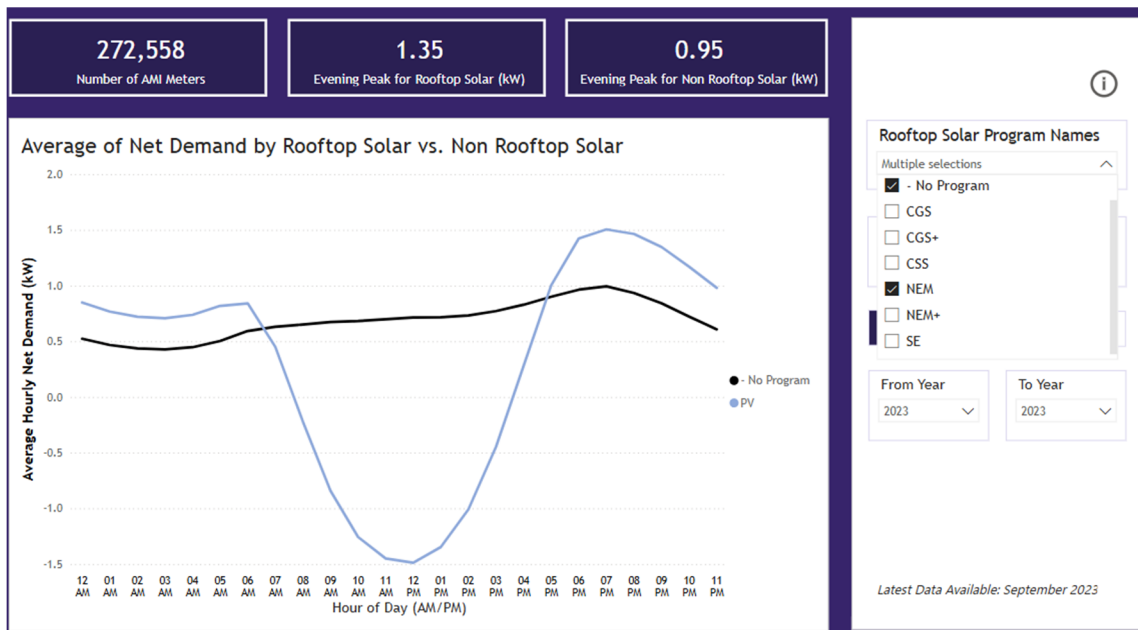
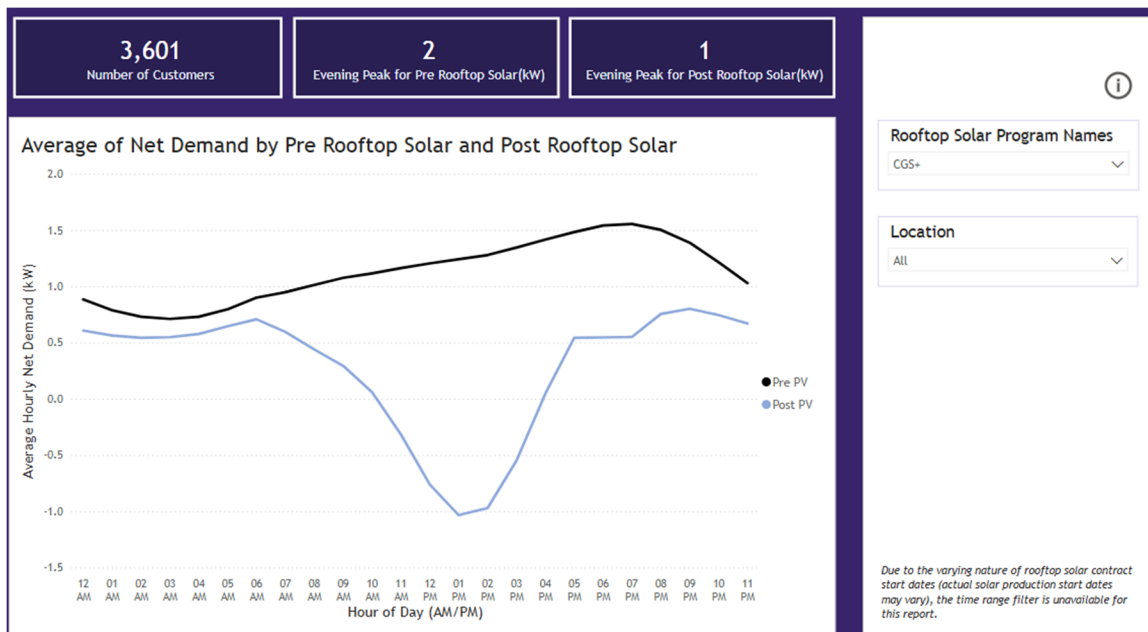


Figure 7. Consumption Patterns Dashboards – Pre & Post Rooftop Solar



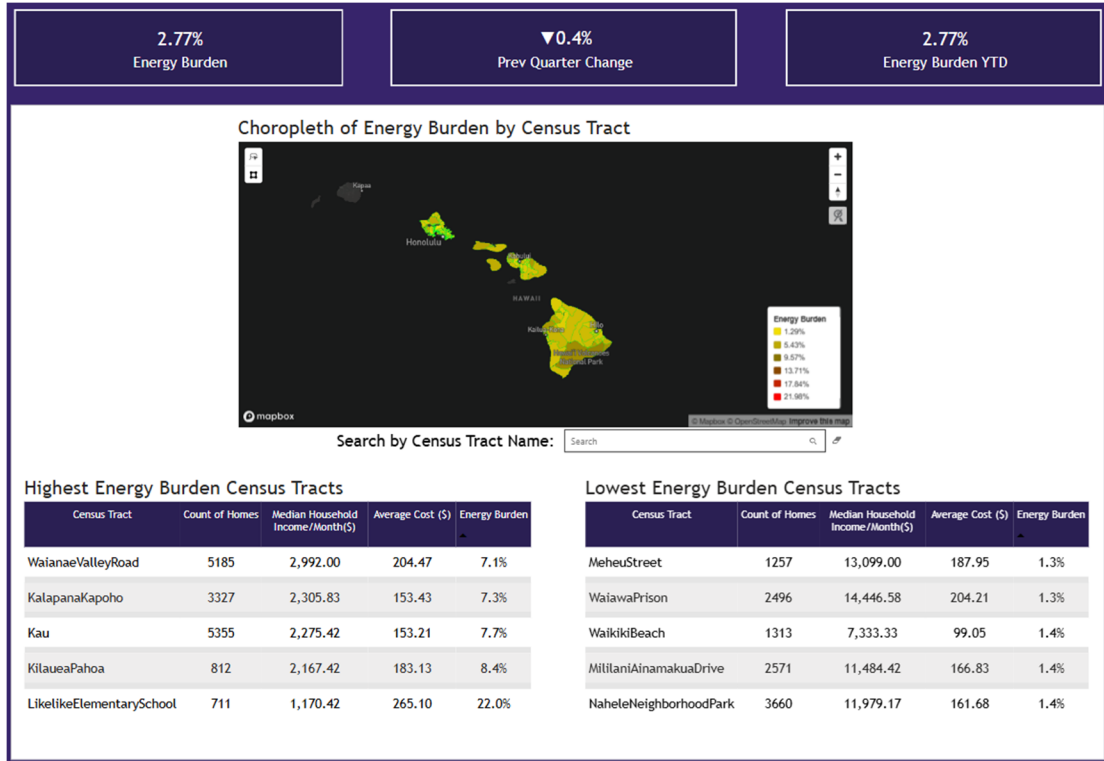
- **Purpose:**
 - The Rooftop Solar Program Customer Profiles dashboards provide a quick view of the large volume of AMI data to develop initial insights into the energy consumption patterns between various PV programs.
 - These load profiles can infer the financial impacts of rooftop solar installations on residential properties as well as visualize the change in behaviors that may be occurring as a group.
 - These charts can direct the detailed queries that can be performed within Databricks, facilitating a deeper analysis of the data.
 - Pre-configured dashboards provide insight through graphs into the load profiles of various groups of residential customers with and without PV.
 - The use of curated and pre-queried datasets provides faster presentation, with no query language skills required of the user.
 - Drop-down filters to allow the data to be changed to see different views.
 - Each individual dashboard provides different views of the AMI dataset
 - *Rooftop Solar Program Customer Profiles* - This view displays the differences between each PV Program individually and allows for the comparison of load profiles vs. customers without PV.
 - *Rooftop Solar vs. Non-Rooftop Solar* – This view rolls up the PV programs selected in the filter and presents a single load profile that is compared to customers without PV.
 - *Pre & Post Rooftop Solar* – This view provides a comparison of the load profiles before and after enrolling in a PV Program.

Use Case Name: Equity and Inclusion

- **Data Source(s):**
 - Monthly billing data

- United States Census Bureau Data - 2020 American Community Survey
- ***User Access:***
 - Power BI Service Application
 - Access provisioned for each research agency researcher
 - Filtering of census tracts within the dashboard
- ***Description of Data Metric(s):***
 - Quarterly Energy Burden Report provides statistics of the electrical bill burden created as the percentage that the average total electrical cost per residential customer within a census tract is of the Median Household Income per month for the census tract.
 - The top and bottom five census tract locations
 - Data includes
 - Average Energy Burden (electricity only) for current quarter of the year
 - Percentage Change Average Energy Burden from previous quarter
 - Average Energy Burden (electricity only) for year-to-date
 - Census Tract
 - Count of Homes
 - Median Household Income per Month
 - Average Electrical Bill cost for residential homes in the Census Tract
 - Energy Burden for the Census Tract
 - Filters include
 - Island
 - Year
 - Quarter
 - Rooftop Solar / Non-Rooftop Solar / All
- ***Dashboard Visualization Examples:***
 - An example of a dashboard visualization of Energy Burden by Census Tract is provided in Figure 8.

Figure 8. Equity and Inclusion – Quarterly Energy Burden



- **Purpose:**
 - Quarterly Energy Burden Report – provides insight as to census tract areas where the financial impact of their monthly electricity costs may be of greater concern than other areas.
 - This information could be used for actions such as the development of outreach, in the application for grants, and to focus attention on further research for program development.

Use Case Name: Benchmarking Consumption Patterns

- **Dashboards:**
 - Site Type Load Pattern Shape
 - Site Type Energy Use Index
- **Data Source(s):**
 - Advanced Meter Data
 - Site Type Segmentation Data
 - Square Footage and Number of Units Behind the Meter Data
 - PV Program Participation Data
- **User Access:**
 - Power BI Service Application
 - Access provisioned for each research agency researcher
 - Filtering of census tracts within the dashboard

- **Description of Data Metric(s):**

- Data includes
 - Number of Sites
 - Demand in kW during the Evening Peak (in relevant form for each image)
 - Average of Net Energy per month
 - PV Program
 - Hourly Net Demand (kW)
 - Hour of the Day
 - Median Energy Use Index (kWh per Sq. ft.)
- Filters include
 - Island
 - Year
 - Quarter
 - Month
 - Site Type (Agriculture, Education, Entertainment and Recreation, Healthcare, Housing, Industrial and Warehouse, Lodging, Office Buildings, Public Safety, Retail and Shopping, Telecommunication and Data Centers, Transportation/Roads and Terminals, Undeveloped Construction, Utilities Infrastructure)
 - Weekday or Weekend
 - Rooftop Solar / Non-Rooftop Solar / All

- **Dashboard Visualization Examples:**

- Dashboard examples are provided below as follows:
 - Site Type Load Pattern Shape in Figure 9
 - Site Type Energy Use Index in Figure 10

Figure 9. Benchmarking Consumption Patterns - Site Type Load Pattern Shape

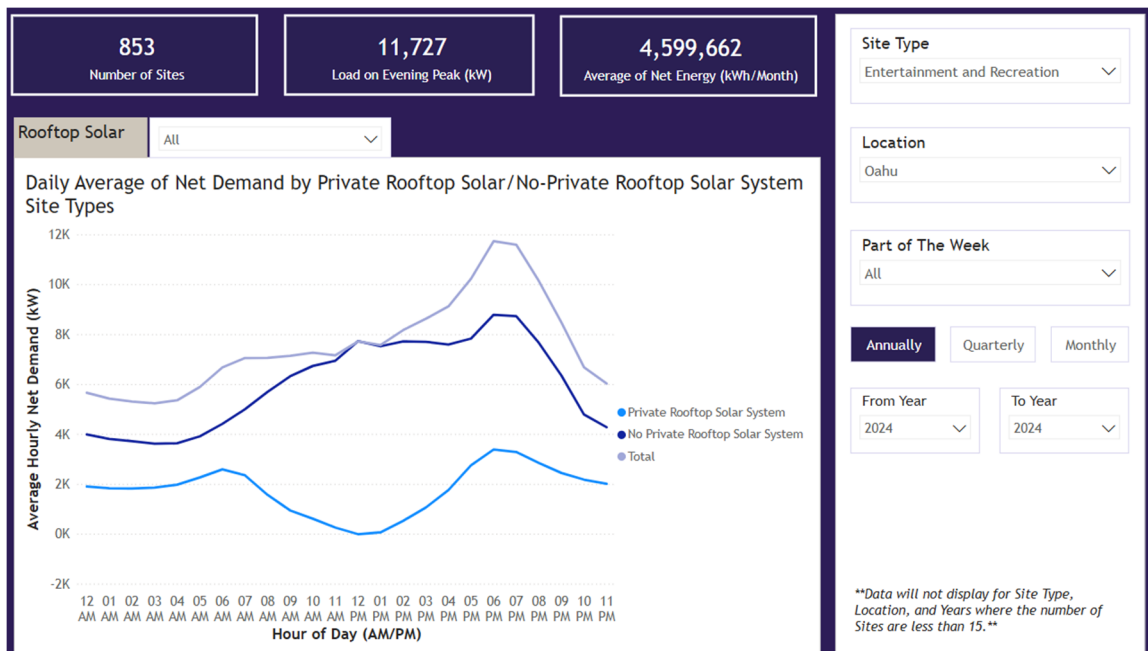
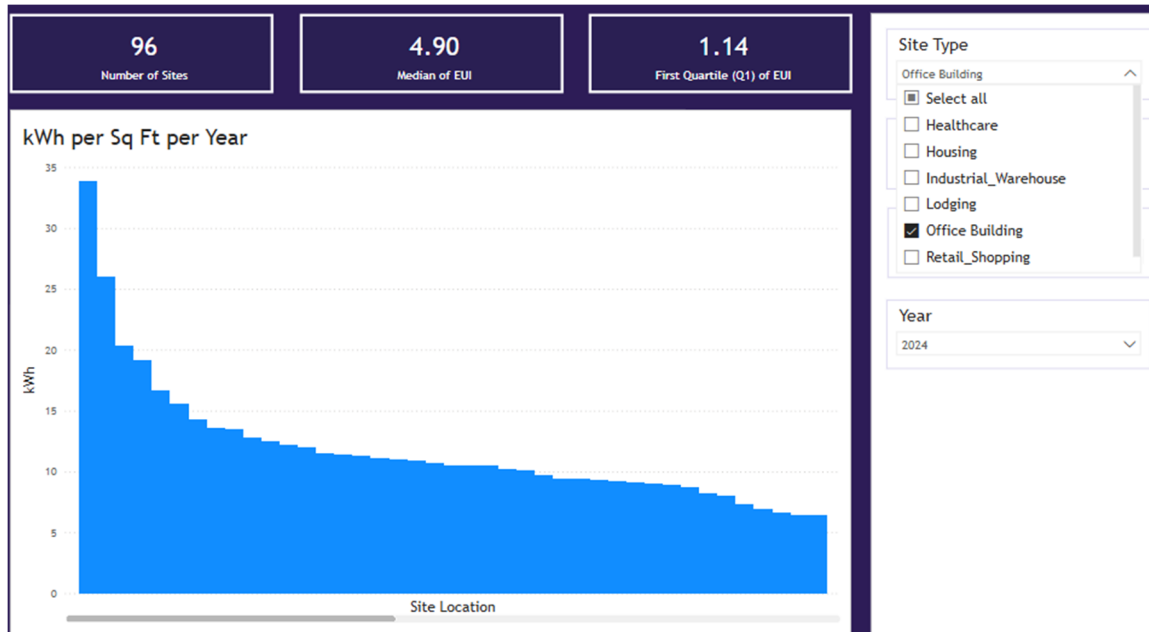


Figure 10. Benchmarking Consumption Patterns - Site Type Energy Use Index



- **Purpose:**
 - Pre-configured dashboards provide insight through graphs with different views of the AMI dataset.
 - *Site Type Load Pattern Shape* - This dashboard adds segmentation information for the Site Type, describing the primary function of the facility. Users can see load data within the selected group, displayed as three lines showing the differences in load profiles for PV and non-PV customers, as well as the total group load profile. Viewing by Site Type can help identify potential sites with specific load profile changes.
 - *Site Type Energy Use Index* – This dashboard uses the benchmarking metric of kWh per square foot per year to compare energy performance between buildings and locations of various site types. This method allows for the comparison of different building sizes and shows the full range of energy use density for all metered locations within the site types. The view quickly highlights performance ranges and reveals outliers, offering opportunities for improvement or showcasing high performers. This is a local, electricity-only version of the benchmarking work that ENERGY STAR Portfolio Manager does to show where individual buildings’ energy use performance ranks. This view contains greater detail in some aspects by showing each location within the comparison group, allowing the full distribution of energy performance compared to Hawaii-specific buildings (comparisons to locations outside of Hawai‘i are less useful due to our temperate weather). Refinements to this view would make it well-suited to identify opportunities for load shaping and energy efficiency. The major difference between this view and what is provided by ENERGY STAR is that the latter captures all energy types in thousands of British thermal units (“kBTU”) per square foot per year Energy Use Intensity

(“EUI”) metric, whereas this view provides electricity-only data (excluding other fuel types).

- The use of curated and pre-queried datasets provides faster presentation, and no query language skills required of the user.
- Drop-down filters to allow the data to be changed to see different views.

Use Case Name: EV Telematics Table

- In support of the data sharing component of the EV Telematics Pilot, the telematics data has been loaded to the Data Clearinghouse with a view created and a process executed to provide public research entities access to the full dataset.
- Clearinghouse participants have indicated interest in the EV Telematics data as it could enhance AMI data and other Clearinghouse data with the location of electric vehicle (“EV”) charging sessions and could be used to train models to identify other EV charging locations, as well as inform decisions on future projects or programs.

Benefits and Lessons Learned

The Pilot provided benefits to the participants by providing access to, and the ability to analyze, Hawaiian Electric utility datasets of public research interest. These benefits are provided through the following components.

- **Analytics Platform (Collaboration Workspace)** – The Databricks Azure cloud-based application provides the analytics tools and computing resources necessary for the storing, querying and analyzing of smart meter data (both billing and non-billing meters).
 - The smart meter data used to create the public research dataset includes 5-min interval data from 447,977 customers. In March 2025, the dataset was growing by 129 million rows of data each day. As of September 2025 the source dataset had accumulated approximately 1,673,788,188,292 = 1.67 Trillion rows and is continuously growing. By comparison, if Excel was used to analyze the data, the researcher would be limited to a small subset of the data that would be able to fit within the limits of 1,048,576 rows and 16,384 columns per sheet.
- **Processed Dashboard Visualizations (Clearinghouse Portal, Power BI Service)** – The Clearinghouse Portal concept provides analytics visualizations using datasets for research use cases. These curated views provide an approachable no-code review of large datasets providing a more accessible method to review and access the data.

As the Companies mature in data analytics, the Power BI Service is becoming more widely adopted for analytics, reporting and dashboards. With growing expertise, it was discovered that sharing visualizations directly from the Power BI Service is less expensive to maintain and modify than hosting them through the originally proposed web portal. After discussions and testing with stakeholders, the original customer

designed web portal was retired, and the Power BI Service was activated. Since the activation of the Power BI Service, further optimizations in data management and transformation have reduced costs and improved dashboard performance.

As demonstrated through this Pilot, the capability to share interactive dashboards with external entities unlocks opportunities to optimize the process and user experience. Besides the use cases described in this report, other potential opportunities are current and future recurring reports and metrics such as the Decoupling Reexamination Schedule A key performance metrics, Performance-Based Regulation metrics, and Customer Energy Resource interconnection data reports.

- Collaboration Process (Engagement Experience)** – The engagement of Pilot participants (see calendar of meetings in Figure 11) through the Databricks application has facilitated the sharing of analytics work between agencies through the exchange of queries and notebooks. This capability, combined with ongoing collaborative meetings, has enabled teams to gain experience with new tools and datasets. Additionally, it has guided the development of new work and datasets that will benefit the public through data-driven program development.

Figure 11. Calendar of Meetings

Date	Meeting Type	Organizations
2/29/2024	Training	All public research entities
3/14/2024	Office Hours	All public research entities
3/28/2024	Office Hours	All public research entities
4/11/2024	Office Hours	All public research entities
4/25/2024	Office Hours	All public research entities
5/9/2024	Office Hours	All public research entities
5/23/2024	Office Hours	All public research entities
6/6/2024	Office Hours	All public research entities
6/20/2024	Office Hours	All public research entities
7/12/2024	Use Case Gathering	County of Hawai‘i
7/17/2024	Use Case Gathering	Hawai‘i Energy
7/18/2024	Office Hours	All public research entities
7/18/2024	Use Case Gathering	City and County of Honolulu
7/25/2024	Use Case Gathering	Consumer Advocate
8/1/2024	Office Hours	All public research entities
8/15/2024	Office Hours	All public research entities
9/12/2024	Office Hours	All public research entities
10/10/2024	Office Hours	All public research entities
10/24/2024	Office Hours	All public research entities
11/7/2024	Office Hours	All public research entities
11/21/2024	Office Hours	All public research entities
12/11/2024	Use Case Gathering	County of Hawai‘i
1/16/2025	Office Hours	All public research entities
2/20/2025	Office Hours	All public research entities

4/17/2025	Office Hours	All public research entities
6/19/2025	Office Hours	All public research entities
6/20/2025	Data Segmentation	University of Hawai‘i

Challenges and Lessons Learned

Several valuable lessons have emerged during the Clearinghouse Pilot, documented through regular retrospectives conducted by the core Pilot team and feedback from external stakeholder surveys. The core Pilot team and external stakeholders have reached a general consensus on the following:

- ***Enterprise Data Analytics Platform capabilities are critical for Big Data analysis work*** – The Databricks Collaboration Workspace is critical to overcome desktop personal computer limitations for handling data of this size. The platform has inherent scalable compute abilities and can be used to perform advanced analytics functions with model creation and management functionality.
- ***There is some demand for full data transfer capabilities*** – Through the Pilot, it was determined that there is a demand for direct data sharing tools that can handle the size of the data and the requirement to store extremely voluminous datasets into an agency analytics system. The exceptions are Hawai‘i Energy and HSEO who now have their own Databricks cloud-based environment with similar capabilities to the Companies’ EDAP. They are now both capable to host the full dataset(s) and perform analytics. Hawai‘i Energy testing was completed and is now functional. HSEO’s connection to a different hosting service (Amazon Web Services (“AWS”) instead of Azure) is being reviewed for technical operation and cost to transfer data.
- ***Dashboard visualizations can support initial reviews*** – The desire for initial review and communication with non-analysts using a pre-built dashboard providing simplicity with minimal demand for pre-processing of advanced analytics was a key learning from the Pilot participants.
- ***Data skillsets vary with ongoing development of capabilities*** – Pilot participants have a wide range of data skillsets and experience. Participants have acknowledged the significance of recruiting new analysts with experience in big data and collaborating with analysts within their agencies or outside services such as University of Hawai‘i (“UH”) researchers. Pilot participants are working to develop their capabilities with ongoing learning and skill development.
- ***Collaboration between the agencies help determine what questions to answer*** – Feedback from an agency highlighted the value of collaboration meetings to generate ideas on what questions should be asked by each agency that apply to their work with the current data and identify additional data needed.

- ***Dedicated research time is needed*** – A common challenge for all agencies is the ability to dedicate time to use the Clearinghouse data and participate in collaboration discussions. Other work priorities often prevent individuals from participating or applying the lessons learned through the Pilot efforts.
- ***There is a desire for additional datasets and features for analysis*** – During workshops, Pilot participants identified a desire for additional weather, property value bin, billing data such as costs, rate data for scenario analysis, and census demographic data.
- ***Capacity and budget can be barriers to implementing identified improvements*** – The quantity of improvement ideas exceeds the capacity and budget to develop and implement the work. This includes time-consuming efforts to link data together (e.g., Tax Map Key (“TMK”) Parcel Data to Hawaiian Electric service addresses) to provide additional features and the ability to make timely changes to existing data views (e.g., separating Commercial and Residential accounts into two anonymized AMI data views to address meter records that are removed due to failing privacy tests).

The Companies and Pilot participants have benefited from the Pilot as the work has emphasized the need for support from diverse discipline areas and ongoing collaboration with external partners and specialized vendors, such as Databricks and Microsoft. This underscores the need for continuous deployment and effective support for evolving technologies. Overall, these lessons emphasize the significance of adapting processes, enhancing skills, and maintaining targeted external support to ensure the successful deployment and evolution of data analytics technologies.

Process Improvements

Collaboration: Regularly held collaboration sessions were established with participating agencies, including bi-monthly group engagement meetings and ongoing workshops. These sessions enabled agencies to share best practices, discuss use cases, and jointly address challenges. The collaborative approach fostered a peer learning environment and ensured that feedback from participants directly informed platform enhancements and future planning.

New Analytics Environments, Technology & Data Sharing: The Clearinghouse Pilot introduced a significant process improvement by deploying a modern, cloud-based analytics

infrastructure using the Databricks Collaboration Workspace and Power BI Service. This transformation streamlined data access, analysis, and collaboration across participating agencies.

Key enhancements included:

- **Centralized Access & Onboarding:** All participants received credentials, training guides, and onboarding support, enabling consistent and secure access to shared analytics environments.
- **Scalable Data Processing:** Agencies were empowered to analyze large volumes of anonymized utility data using scalable compute resources, improving efficiency and reducing manual data handling.
- **Technical Upgrades:** The infrastructure was continuously improved through migration to production environments, enhanced security controls, and automated deployment, ensuring reliability and performance.
- **Interoperability via Delta Sharing:** Two entities implemented their own Databricks instances, enabling direct integration with the Clearinghouse through Delta Sharing, which supports secure, real-time data exchange.
- **Self-Service Analytics Enablement:** The platform supports interactive reporting, curated datasets, and metadata governance via Microsoft Purview, fostering transparency and accelerating policy and program evaluation.

This process improvement has laid the foundation for a scalable, secure, and collaborative analytics ecosystem, aligning with goals to modernize data sharing and enhance stakeholder capabilities.

Curated dashboards and reports were developed and distributed through the Power BI Service, replacing the original web portal for improved accessibility and lower maintenance costs. Standardized templates and automated data refreshes were implemented, and user feedback was regularly collected to refine dashboard content. These dashboards provided actionable insights tailored to the needs of diverse stakeholders and supported rapid, no-code data exploration.

Feedback & Survey Summary

The Clearinghouse Pilot introduced new approaches to collaborating, data sharing, and utilizing the latest cloud technology to enhance capabilities for Hawai'i. The Pilot team engaged with participants and collected feedback through emails, one-on-one meetings, collaborative group meetings, and surveys. This section summarizes the four (4) stakeholder surveys that were conducted during the Pilot.

Each survey invitation was emailed to approximately 45-50 stakeholders across the eight (8) Public Research Entities. Survey reminders were also communicated in scheduled meetings around the time of the survey initiation. The count of responses for each survey are provided below:

- July 13, 2023 (after project kick-off meeting): 9 responses
- December 8, 2023 (start of Program Increment 4): 19 responses
- April 1, 2024 (during Program Increment 5): 3 responses
- February 28, 2025 (completion of Program Increment 8): 5 responses

The surveys focused on attendees' awareness, direction, communication, engagement or takeaways from the Pilot based on Pilot experience to date. The final survey focused more on takeaways and future direction.

Survey Responses

Each of the Public Research Entities have different requirements and expertise in working with the data. The comments received were insightful and pointed out positive areas such as the Collaboration Workspace, self-service dashboards, and potential areas of improvement such as providing more datasets that can be merged with the raw interval data and empower agencies to act on the pre-fabricated reports. Based on Pilot feedback received, there is

consensus among stakeholders that the Pilot delivered meaningful value and should be extended beyond its initial phase.

The following are survey questions concerning perceived value and awareness of the Pilot. The scores correspond to the percentage of respondents agreeing with the question.

1. I see the value of the Data Analytics Clearinghouse Pilot:
 - a. Survey responses range from 83 to 89 percent for the question of “I would like to see the Data Analytics Clearinghouse continue past the close of the pilot.”
2. I am aware of the goals of the Data Analytics Clearinghouse Innovation Pilot:
 - a. Survey responses range from 78 to 88
3. I am clear on Hawaiian Electric’s plans to solicit feedback during this phase of the Data Analytics Clearinghouse Innovation Pilot:
 - a. Survey responses range from 73 to 100

Summary of Feedback and Requests for Consideration

The feedback items below have been captured within the Pilot engagement and the Companies will use the information to guide potential future work and will continue to be evaluated for execution in connection with the Companies’ ongoing budget prioritization efforts and for compliance with Customer Information Privacy Policies. Resources and funding to support future work will be evaluated with potential cost recovery mechanisms.

Feedback from external stakeholders include the following:

- *Access to Non-Anonymized Data to Allow Merging with Other Datasets* – The anonymized dataset provides limited ability to merge the AMI data with datasets that use common keys such as street addresses, property parcel data, and vehicle registration data for EV analysis. The current dataset allows connections to other data that are aggregated at the island, census tract, rate schedule and PV program levels. Work is needed to determine options for the Companies to perform the desired dataset integration, enabling the sharing of derived data fields with public research agencies while maintaining privacy (such as providing a range of property value for each meter derived from TMK parcel data for each customer service location.) There are privacy challenges that need to be addressed, and actions are being taken outside of the Pilot to review options.

- *Agency Specific Data* – Participants also requested access to government electrical account data through the Clearinghouse for their own facilities energy analysis.
- *System Value for Modern Data Research* – The UH College of Engineering has applied for funding to utilize Large Language Model Architecture to be applied to learning the language of time-series load data (versus the learning of written language) in the AMI dataset. These models should be able to find relationships between more features than prior regression statistical models. The Clearinghouse platform is capable to perform this work.
- *AMI Data Use for Docket Support and Evaluation of Performance* – The AMI data’s initial and highest value for the Public Research Entities use is in their research work for ongoing docketed proceedings, such as the Advanced Rate Design (“ARD”) Track ongoing in the Distributed Energy Resource Policies proceeding (Docket No. 2019-0323), and the evaluation of current and new programs, particularly in areas including Distributed Energy Resources (“DER”), customer renewable programs, and Time-of-Use (“TOU”) initiatives.
- *AMI Data Use for Program Evaluation* – There is a desire to use the AMI data and Clearinghouse platform to review programs being implemented by the Companies and Hawai’i Energy. This includes the desire to use the AMI data to independently review the ARD TOU pilot or other programs and efforts. This would require further work be performed to release the value within the AMI data by aggregating into like groups in a manner that provides safeguards to ensure that customers cannot be identified and that the data remains confidential.
- *Effective Platform and Community of Researchers* – The Pilot has been effective in providing a state-of-the-art platform and developing a peer group of researchers and analysts through a collaborative process.

Expanded Participation

In accordance with D&O 38753, Condition No. 2,²⁰ during the implementation of the Clearinghouse Pilot, the Companies have made efforts to expand participation and use of the Pilot interface to additional interested entities. Support for new participants included providing access credentials, training guides, and invitations to workshops to ensure that participant’s new staff can access and utilize the Clearinghouse Databricks Collaboration Workspace.

²⁰ D&O 38753, Condition No. 2 (at 19): Where relevant and to the extent feasible during the implementation of the Data Clearinghouse Pilot, Hawaiian Electric will make efforts to expand participation in and/or use of the Pilot interface to additional interested entities, including parties in Commission proceedings, commercial entities, and the general public, as appropriate.

Additionally, the Companies have released a new streamlined version of the Clearinghouse Portal, which offers Power BI interactive dashboard visuals. This portal has been modified based on participant feedback to enhance its functionality and accessibility. Functionality developed during the Pilot was used to efficiently share data with third parties contracted to provide studies on TOU and battery bonus programs. The Companies are also evaluating future expansion of the sharing mechanisms with commercial accounts to enable greater access to their time series data for operational reporting, monitoring and improvement, possibly to enable other interested parties such as PV contractors to support DER activities, and broader access to other dashboards such as the pending Customer Energy Resource Interconnection dashboard.

Metrics

The Companies have implemented a comprehensive measurement and valuation framework, aligning quantitative project metrics and system metrics with survey data to capture the business value perceived by external stakeholders when utilizing data for research, analysis, advocacy, and decision-making purposes. This entails tracking and reporting the frequency of participants visiting and using Clearinghouse data, along with details on participants' data usage, access methods, query frequency, and volume. These metrics, described further below, satisfy D&O 38753, Condition No. 3.²¹

Project metrics were utilized to monitor work progress and completion, including the percentage of work estimated and completed within two-week sprints. These metrics encompass planned work, completed work, and trends in newly generated work versus planned work.

²¹ D&O 38753, Condition No. 3 (at 20): As a metric of the Data Clearinghouse's efficacy, in addition to the metrics identified by Hawaiian Electric – number of visitors and volume of data being analyzed – the Companies shall also track and report on the frequency of participants visiting and using the DACH data and participants' use of data (e.g., times and ways participants use data gained from the Data Clearinghouse Pilot and for what purpose or outcome), which can be gained through the Companies' feedback cycle (e.g., participant surveys). Use Cases implemented through the Pilot are described above.

System usage metrics have been established through reports generated in Power BI, leveraging system audit logs within the core platform supporting the Clearinghouse Portal. These metrics track and report the frequency of participants' visits and data usage, along with compute resource utilization. Compute resource workload within the Clearinghouse workspace is measured using a normalized unit of processing power known as a Databricks Computational Unit ("DBCUs") on the Databricks Lakehouse platform. The number of DBCUs consumed by a workload is determined by processing metrics, which may include compute resource usage and data processing volume. As an example, in 2024, approximately 88,000 DBCUs were consumed for the Clearinghouse Pilot with an estimated cost of \$38,254. The cost for the Public Research Entities' use includes compute costs of the Clearinghouse with an approximate run rate of \$10,000 annually or \$834 monthly, though this is dependent on actual usage. Additional indirect costs for ongoing platform maintenance – such as base infrastructure – exist but have not been separately itemized or included in the Clearinghouse-specific cost breakdown. Internal labor supporting the Pilot can be estimated, but was not charged to the Pilot or included in cost metrics.

In contrast to project and system metrics, which are quantifiable and discrete, business metrics are derived directionally through surveys. As part of the Pilot, the Companies have conducted surveys to gain insight into the specific purposes or outcomes for which participants have been utilizing the platform. The consistent message has been that the agencies see value in using the Clearinghouse data to:

- Use TOU energy summations for large numbers of customers to quantify potential changes in rates or designs.
- Use the information of location provided by Census groupings and PV program information to identify impacts to underserved and vulnerable customers.

There is also the use of the Clearinghouse data for academic research, where application of new modeling techniques may reveal insights.

The metrics for the Clearinghouse include the following:

- System Metrics for Year to Date as of September 30, 2025:
 - Number of external user groups: 7
 - Number of Users: 50
 - Number of SQL Queries Executed: 750,815
 - Average Duration of SQL Queries: 39.28 sec
 - Total Data Volume in Clearinghouse: 1.42 TB
- User Frequency:

Figure 12. User Frequency by Quarter

Quarter	Total Queries	Average Queries Per Day	Average Unique User Logins Per Day²²
1Q 2025	6,031	151	3
2Q 2025	17,200	189	2
3Q 2025	6,015	123	2

- Direct Public Research Entity Maintenance Costs:²³
 - System Costs directly associated to the Public Research Entities use of the Clearinghouse is estimated at \$10,000/year or \$834/month.

The Future of the Clearinghouse

The Companies will continue to provide access to the Data Analytics Clearinghouse for Public Research Entities. However, enhancements identified through stakeholder feedback and lessons learned during the Pilot, such as expanded data access and improved user interface functionality, are not currently budgeted due to other competing priorities. Future requests for new features or improvements will be evaluated in connection with the Companies’ budget prioritization efforts. At this time, no additional funding has been allocated for further development of the Clearinghouse. As a result, any future development or expansion will

²² Login frequency data may include automated system-generated logins in addition to actual user activity.

²³ Additional direct costs not estimated include costs for new development and enhancements and costs for support staff to maintain the Clearinghouse and support functionality.

proceed only as resources permit. The Companies will continue to support users through group and individual collaboration meetings, which will provide training, facilitate access, and serve as a forum for identifying potential future improvements. The Companies also commit to maintaining the current functionality of the Clearinghouse and will monitor usage trends to inform future planning.

In addition to the core objectives of the Clearinghouse Pilot, the Companies successfully delivered several enhancements requested by participating agencies. These accomplishments demonstrate commitment to continuous improvement and responsiveness to stakeholder needs, even as future development is subject to budget prioritization. These included:

- Hawai'i Energy – Non-Anonymized Data – The Companies assisted Hawai'i Energy in establishing data sharing with their Databricks cloud environment, enabling them to ingest and analyze non-anonymized AMI data for energy efficiency program purposes. This support included consulting on Delta Share setup and ensuring agencies are responsible for their own cloud environments.
- Training and Analytics Support – The Companies are providing maintenance of access permissions for each agency, ongoing training for new analysts, and helping to build capacity and ensure effective use of the Clearinghouse platform and its analytics tools through one-on-one and monthly collaboration meetings.

The above enhancements were completed in direct response to agency requests and reflect the Companies' proactive approach to supporting public research entities. Highlighting these enhancements and support underscores the value delivered by the Pilot – beyond its original scope – even as the Companies acknowledge that further enhancements will depend on available resources and future budget decisions. To support transparency and inform future planning discussions, the following potential enhancements are shared. These items represent

opportunities for continued improvement but are not currently committed for near-term implementation due to budget constraints.

- Pre-Built Visualization Dashboards – Power BI Service accessible for aggregated high-level population statistics to supplement anonymized dataset.
- AMI Anonymized Refinement Housing and Commercial Meters – Databricks accessible with split of grouped data into housing and commercial sets.
- Binned Property Values – Provide UH with an additional segmentation feature of property value bins for their review of income/property value rate design/energy usage research.
- Agency Data Provision – Provide the County of Hawai‘i and the City and County of Honolulu with their non-anonymized AMI and billing data within the Clearinghouse.
- Effective Rates Table – Rate values for longitudinal comparison analysis using both historical rate change impacts to energy usage and what-if analysis for future rate values and designs.
- Weather Data Table – Physical values of temperature, humidity, heat index, and cooling degree days for analysis of relationships between environmental conditions and energy usage.
- Solar Irradiation Table – Physical values of solar energy for various locations for calculating nominal PV system production to estimate the actual energy consumption by end users as self-consumed behind the meter PV energy (not measurable from utility service meters).
- PV and Battery System Size Table – Individual system information connected to a meter for analysis of nominal PV system production.
- Property Value Binned Table – A range of values (e.g., \$650,000 to \$750,000) for each group to determine energy use relationships and program participation with property values.
- AMI Time Series 15-Minute Load Research Data – Databricks Accessible
 - Commercial data aggregated into larger groups of site type, rate and island, but with housing data to remain in current grouped form.
 - Addition of MV90 data to provide greater coverage of time-series data.
 - Addition of program participation beyond the current PV programs provided (Battery Bonus, Bring Your Own Device, etc.).

- Pre-Built Visualization Dashboards – Power BI Service Accessible
 - Total billing population statistics (customer count, kWh).
 - Total AMI population statistics.
 - Total Anonymized Dataset population statistics.
- Riders – Addition of rider indicators (Rider T, Rider I, Rider M, Rider PA, Rider SSP, etc.).
- Vulnerable Populations – Addition of indicators for vulnerable populations (Hawai‘i Home Energy Assistance Program (“H-HEAP”), Hawaiian Homes, Affordable Housing, etc.).
- Billing Data Table – Table providing anonymized billing data (kWh and cost). This data provides the researchers with full population values that are essential to derive insights from the partial AMI dataset. The new data would comply with the same aggregation and anonymization rules applied to the AMI 15-min data.
- Research Organization Specific Table – Complete agency specific AMI metered data that would be provisioned for each research organization to perform research, analysis, review, dashboard reporting, renewable energy project and energy engineering for their own facilities. The metered data for the agency accounts would require authorization provided by each agent/department and require adherence to the Companies’ privacy policy and procedures. This is intended to address access authorization challenges, tedious individual record downloads, and the need for large storage and compute resources.

Conclusion

The Companies extend their sincere appreciation to all Pilot participants for their time, collaboration, and commitment over the past two years. Despite staffing limitations and evolving operational demands, participants have played a critical role in shaping the Clearinghouse Pilot and demonstrating the value of shared data analytics capabilities for public research and policy development.

The Pilot has successfully met its objectives – delivering a secure, collaborative platform that has enabled access to anonymized AMI data and curated dashboards. These tools have supported a wide range of use cases, from rooftop solar analysis to energy burden tracking, enabling agencies to explore new insights and applications. Participation from a diverse group

of public research entities has fostered stakeholder engagement and helped to surface valuable feedback that has guided platform improvements. As a direct outcome of the Pilot, Hawai'i Energy and HSEO have established Databricks as peer analytics environments, enabling more efficient data sharing and scalable analysis of utility data – advancing the use of energy data for public benefit across the state of Hawai'i.

Stakeholder feedback confirms that the Clearinghouse has enhanced analytical capacity, introduced new tools and workflows, and laid the foundation for more data-informed decision making across agencies. The Pilot has also demonstrated the feasibility of cross-agency collaboration using modern cloud-based analytics infrastructure.

While the formal Pilot has concluded, the Companies remain committed to supporting continued access to the Data Analytics Clearinghouse. To ensure ongoing value for participants, the Databricks Collaboration Workspace and Power BI dashboards will be maintained in the near term, enabling stakeholders to continue leveraging the tools and data products developed during the Pilot as they advance their data analytics capabilities.

Looking ahead, the Companies are encouraged by stakeholder interest in expanding the Clearinghouse's capabilities and enhancement of the datasets to provide segmentation features that assist analysis and decision making. Although current budget constraints and the absence of dedicated funding present challenges for immediate development, the Companies will explore opportunities to align future enhancements with available resources and strategic priorities. Requests for expanded datasets and improved user interface features are subject to the Companies' available resources and will be considered as part of ongoing planning and budget prioritization efforts.

The Companies look forward to continued collaboration with stakeholders in support of data analytics for public research interest.

From: noreply@salesforce.com on behalf of [PUC CDMS](#)
To: [Mounthongdy, Christine](#)
Subject: Hawaii PUC CDMS eSERVICES - E-Filing F-333074 FILED Confirmation
Date: Monday, October 27, 2025 3:06:41 PM

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E-Filing Filed Confirmation

Aloha Christine Mounthongdy,

Your electronic filing to the Hawaii Public Utilities Commission has been **FILED**. You will receive an email when the filing is public.

Please note that filings submitted after 4:30 p.m. Hawaii Standard Time will be deemed "FILED" the next business day. The mere fact of filing shall not waive any failure to comply with Hawaii Administrative Rules Chapter 6-61, Rules of Practice and Procedure Before the Public Utilities Commission, or any other application requirements.

E-Filing Confirmation Number: F-333074

Account: Hawaiian Electric Company, Inc., Hawaii Electric Light Company, Inc., and Maui Electric Company, Limited

Date and Time Submitted: 10/27/2025, 3:06 PM

Case or Docket Reference Number: PC-20247

Case or Docket Number (if applicable): PC-20247

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