



**Hawaiian
Electric**

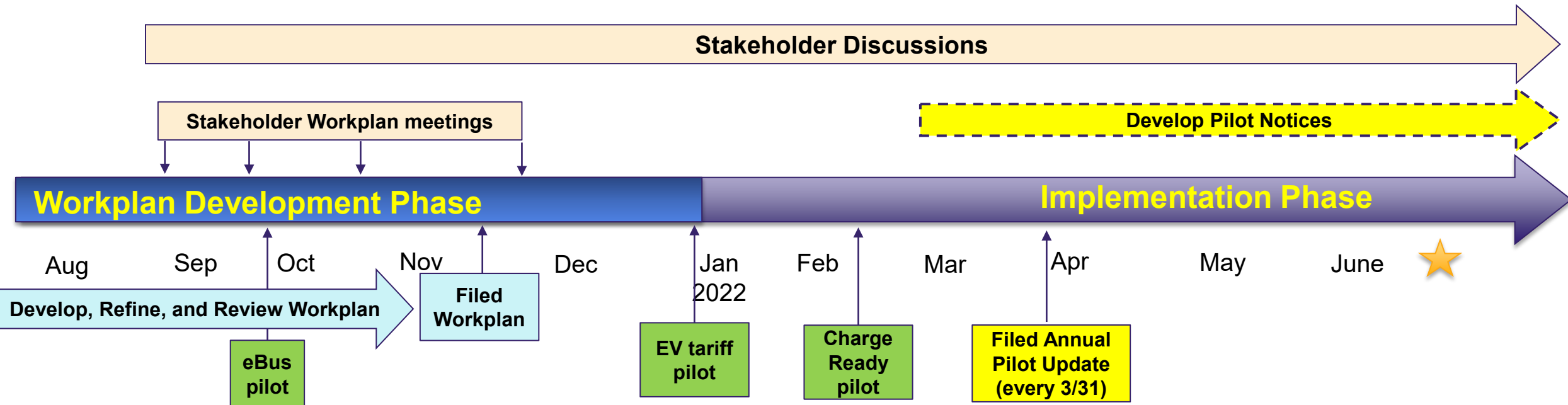
Data Analytics Clearinghouse (DACH)

Potential project for Innovation Pilot process



Welcome back!

A “Workplan” is required by the PUC’s PBR D&O to “...identify an initial set of 5-10 areas of collaboration” that will “...lead to the development of a portfolio of pilot concepts that may be refined and introduced as specific pilot proposals as part of the Implementation phase.”



Implementation phase

- Pilots are intended to be flexible and have a goal of reducing uncertainty by trialing solutions and measuring outcomes.
- We will continue to reach out to stakeholder groups for specific pilot concepts
- We also plan to have these types of ad hoc meetings when a pilot concept is coming into focus and we think we are nearing an NOI.
- We are all still learning together, so please give us feedback

Agenda for today:

- Discussion of Data Analytics Clearinghouse pilot concept – feedback welcome!



Current Situation

- HECO customers and partners need **seamless access to large volumes of Big Data** to generate meter-level insight including detailed usage patterns, load patterns, EV modeling, PV modeling, time of day use, and energy intensity.
- This detailed data is available in HECO's EDAP (Enterprise Data Analytics Platform) environment today, but the **volumes are too high and can't be analyzed** seamlessly by core partners
 - *Hawaii State Energy Office (HSEO)*
 - *Division of Consumer Advocacy (DCA)*
 - *Public Utility Commission (PUC)*
 - *University of Hawaii*
 - *County resiliency & sustainability offices (Hawai'i, Maui, Honolulu)*
- Enabling data-driven integrated grid planning, grid modernization, and electrification of transportation (EoT) initiatives **requires high-fidelity data** instead of statistical inference and heuristic methods used today



Pilot Concept

- Meet **active interest** in smart-meter data by partners and close gaps in their analytical capabilities
- **Information sharing and collaboration** with our partners and customers for energy consumption decision making
- Enable **evidenced-based policy making** that consider a holistic view of energy needs balanced with Hawaii's climate, clean energy and energy independence goals
- **Provide on-demand fulfillment** of external data requests (C&C/State Benchmarking)
- Provide an environment where our partners **can consume** and **collaborate** with data and insights



Clearinghouse address key Areas of Collaboration (AOC) **DRAFT**

“Data acquisition and analytics, and the safe sharing of this data, is a cross-cutting area of need that will impact a multitude of projects, programs, and pilots.”

Directly Addresses AOC 4

- ✓ **4. Data Sharing, Access, and Analytics**
 - Forecasting & modeling
 - Grid reliability & DER tariff and interconnection needs
 - Sharing data across multiple separate and distinct stakeholders
- ✓ Directly addresses **key Strategic Areas** in PBR:
 - Grid Planning/Modernization
 - Customer Energy Resources
 - Electrification of Transportation

Foundational support for all AOCs

- ✓ **1. Decarbonization**; rate/billing mechanisms; Energy Efficiency; holistic cost-effective options; demand/availability measures
- ✓ **2. Customer Resources** and Services; DER program improvements & value measures
- ✓ **3. Beneficial Electrification**; M&V Ebus & Charge Ready Pilots; EV customer behavior
- ✓ **5. Technology** Innovation and Cyber Security: Digitization-digital twin, ML/AI
- ✓ **6. Resilience** and Innovative **Reliability** Approaches; Microgrid support and renewable penetration
- ✓ **7. Equity**, Access, Affordability, Sustainability; technology adoption for LMI programs;

Direct **stakeholder impact** for data access, transparency and useability
Indirect **customer impact** through rate design and data informed decision making



Partner Survey and discussion conducted in March

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- **Strong support for multiple services** being offered with priority on Packaged Data Sets & API Gateway.
- Key uses include **monthly & annual** access to
 - Customer targeting & analysis of customer characteristics
 - Load profile analysis
 - Impact towards decarbonization
 - Weather & operations optimization
 - Forecasting & optimization modelling
 - Program & Policy impact evaluation
 - Pricing Tariffs
- **Prioritize broader access to data**, see what makes sense based on usage
- Challenges include: storage capacity, resources-staffing availability, accessing Big Data outside and also specific to Hawaii
- Specific data sets desired include:
 - Generation Data
 - Installed Capacity
 - PV Data (Net Generation)
 - EV Load Profiles
 - Customer energy usage
 - Billing Data
 - Tariff Type
 - Weather
 - Demographics Data (Census, American Communities Survey, DBEDT Economic Data)
 - Health related datasets (e.g. social vulnerability index)



Self-Services Data and Analytics

A **cloud-based clearinghouse** of published HECO data and analytical insights

Built upon **existing HECO investments** in a modern, secure Enterprise Data Analytic Platform (EDAP)

Usable in a **self-service and collaborative manner** by public agencies, external customers, and consumer interest partners

Support **benchmarking, compliance, energy utilization decision-making**, and other data analysis & reporting needs

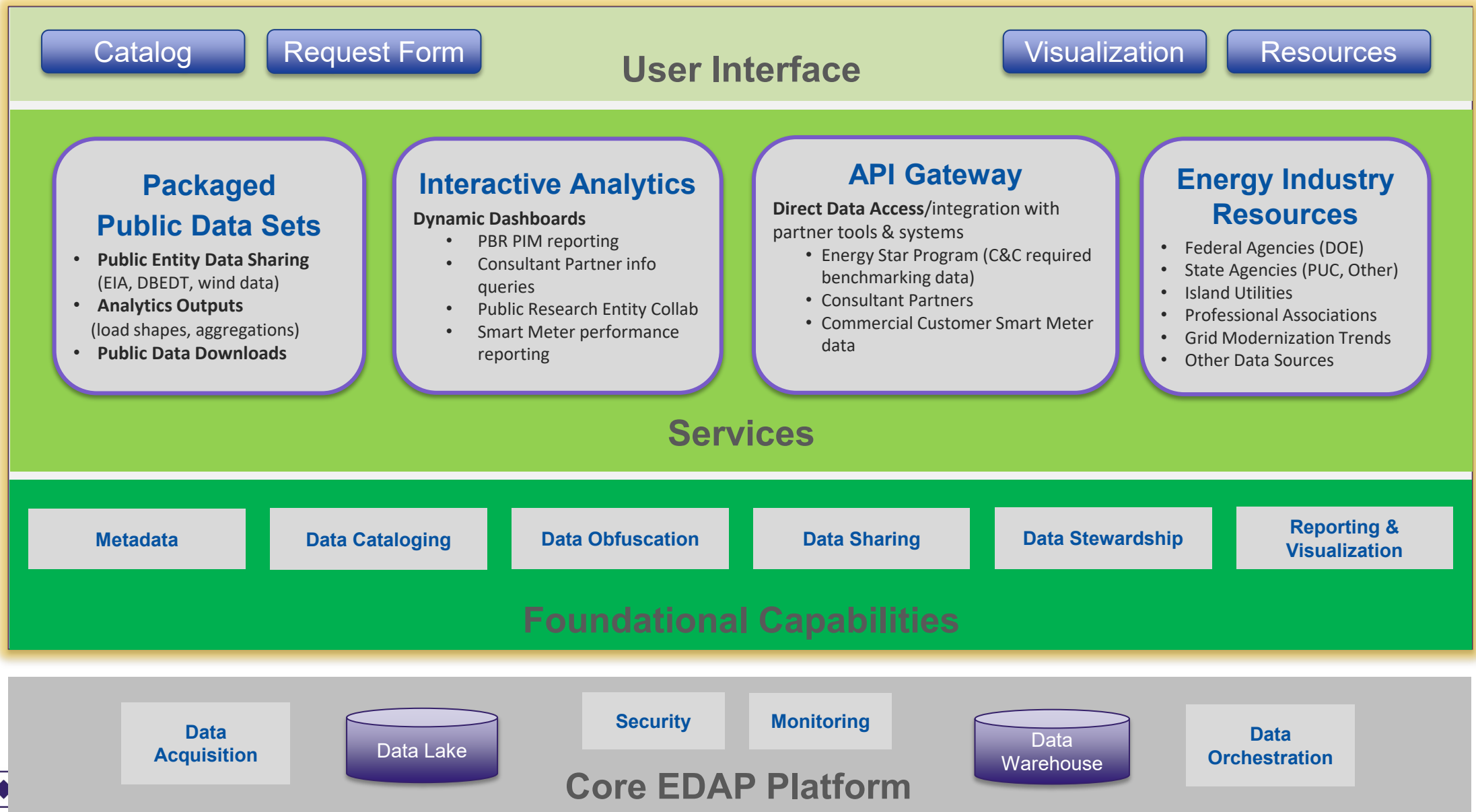


Support Multiple Use Cases

- **Meter data sharing and analysis for all stakeholders**
 - Partners can access high value time-series data that is tagged with census tract location, load shapes, DER, EV, etc.
- **Electrification of Transportation (EoT)**
 - EV adoption, load studies, Public charging infrastructure expansion simulation
 - Monitor adoption of EV and identify opportunities emerge to invest in expansion (i.e., parking lots, MDUs, public transportation)
- **Customer renewable (PV and DER) program operations and evaluation**
 - Use smart meter data to ensure compliance to the program
 - Use meter data to generate load profiles to simulate grid reliability



What Needs to be Done: Clearinghouse Components



Examples of a Clearinghouse User Experience



PG&E Energy Data Request Program

Public Data Sets | Data Request Log | Contact Us

PG&E Energy Data Request Program

Download your usage data

There are many ways to access energy usage data, including historical data or real-time data. You can conveniently share energy usage with third parties you may be working with for energy efficiency or other purposes.

Data is provided free of charge and may be viewed online, shared automatically on an account, or to send to a third party. You can designate how much or how little data is shared.

View the usage data downloading options for customers or authorized third parties.

Find the data-sharing tools and programs available to you, based on account type.

- RESIDENTIAL >
- SMALL OR MEDIUM-SIZED BUSINESS >
- LARGE COMMERCIAL OR INDUSTRIAL BUSINESS >
- AGRICULTURAL >
- BUILDING OWNERS AND PROPERTY MANAGERS >

LARGE COMMERCIAL OR INDUSTRIAL BUSINESS

Large commercial or industrial businesses can access their energy usage data through a variety of programs and tools. The programs are designed to share your data with third parties, but only after you grant authorization.

Find the data access tool or program to best serve your needs

Use these tools to access your own usage data or to share it with third parties.

| Data available | Best for customers who want to... | How data is shared with a third party |
|---|---|--|
| Electric and gas meter interval data, customer data, billing data | Automatically share ongoing account, usage or billing data with an authorized business of their choice, or receive data themselves. | One-time authorization through Your Account to allow ongoing access to a registered third party of your choice. Data is transferred through Application Programming Interfaces |

Access to Energy Usage Data

PG&E provides energy usage data to third parties in a number of ways.

Energy usage data available to the public

PG&E provides non-confidential, aggregated usage data that are available to the public and updated on a quarterly basis. These public data are monthly consumption aggregated by ZIP code and by customer segment: Residential, Commercial, Industrial and Agricultural. The public data are subject to the standards for aggregating and anonymizing customer data pursuant to CPUC Decision 14-05-016, as follows: a minimum of 100 Residential customers, with no single Non-Residential customer in each sector accounting for more than 15% of the total aggregation standard is not met, the consumption will be combined with a neighboring ZIP code until the aggregation requirements are met.

Our public datasets can be viewed or downloaded from the link below.

[View or download a public dataset >](#)

Greenhouse Gas Inventory Data for Climate Action Planning

PG&E offers municipal governments in PG&E's service territory access to standardized information on community energy use. These reports provide community energy use details and can assist with sustainability planning and greenhouse gas inventories. These reports are the Community Inventory Reports.



Municipal governments can request their own municipalities' Community Inventory reports directly through PG&E's Residential and Partnership Programs. Contact us at CommunityReports@pge.com.

Learn about data-sharing programs and tools for third parties

| |
|---|
| RESIDENTIAL |
| SMALL OR MEDIUM-SIZED BUSINESS |
| LARGE COMMERCIAL OR INDUSTRIAL BUSINESS |
| AGRICULTURAL |
| BUILDING OWNERS AND PROPERTY MANAGERS |

For more information on PG&E's customer data access programs, see pge.com/data

Share My Data

Download My Data

Business Energy Checkup

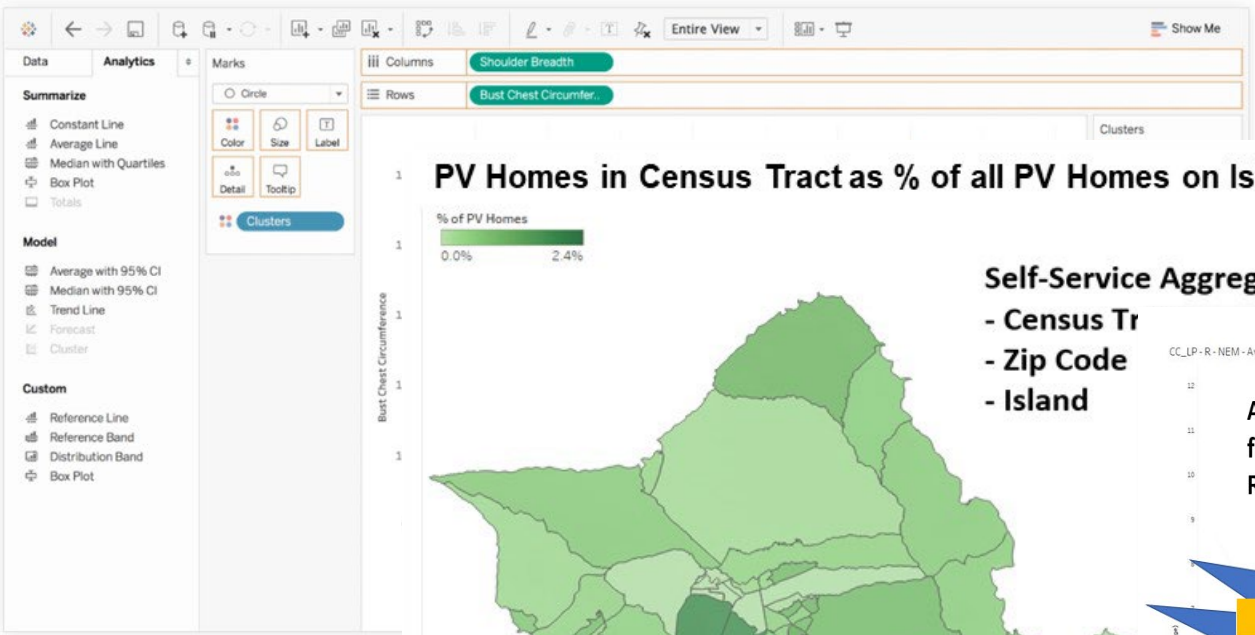
AGGREGATED ENERGY USAGE DATA FOR LOCAL GOVERNMENTS

ENERGY USAGE DATA FOR QUALIFYING THIRD PARTIES

PUBLICLY AVAILABLE ENERGY DATA

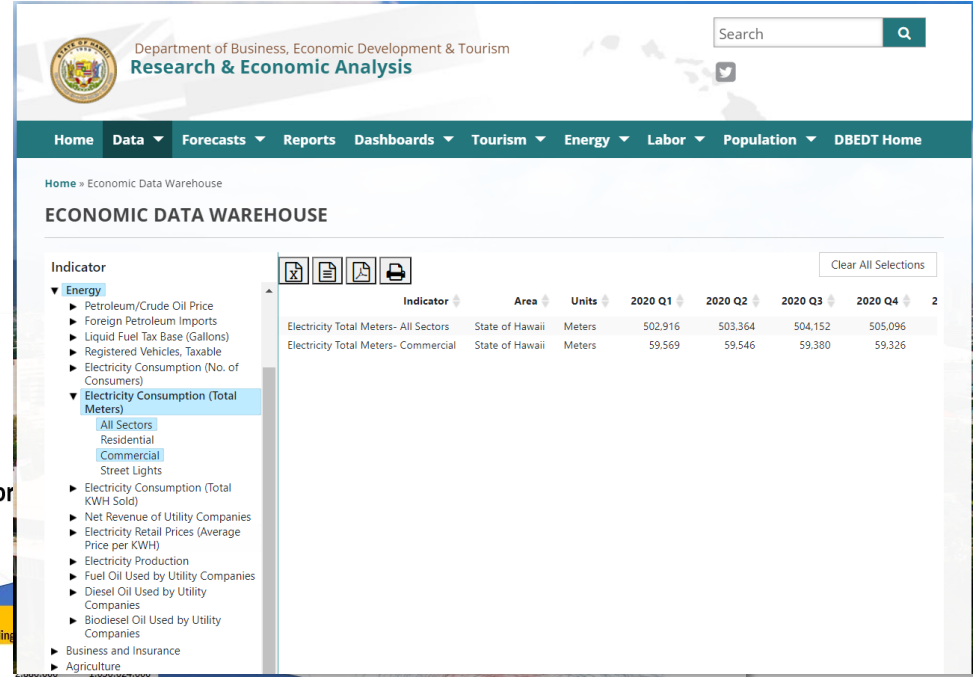
| | Website | Available data | Website owner |
|---|---|--|--|
| PG&E Energy Consumption Public Datasets | Visit the PG&E Energy Data Request Program | Quarterly updates of monthly aggregated electric and gas consumption by ZIP code and customer sector. | PG&E |
| CPUC Energy Efficiency Statistics | Visit California Energy Efficiency Statistics Opens | California utility and non-utility program administrator Energy Efficiency Program performance data, including EE measure savings, budgets, expenditures and emissions | California Public Utilities Commission |
| CPUC Data Dashboard | Visit CPUC Data Dashboard Opens | Residential Electric Usage and Bill Data by Climate Zone | California Public Utilities Commission |
| California Solar Statistics | Visit California Distributed Generation Statistics | California Distributed Generation Statistics and Program Information. Downloadable PV interconnection data by category. | California Public Utilities Commission |
| Proposition 39 Publicly Searchable Database | Visit the California Energy Commission | Searchable database for K-12 and college energy-efficiency projects. | California Energy Commission |

Examples of a Clearinghouse User Experience



Self-Service Aggregations

- Census Tract
- Zip Code
- Island

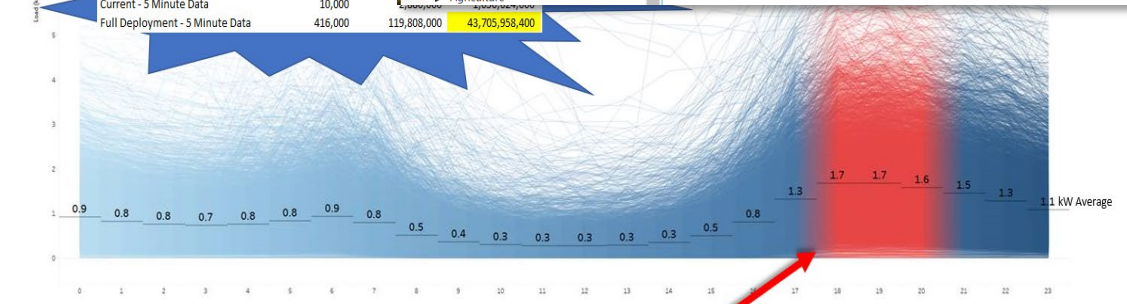


Ability to Develop Insights from Big Data

Residential = 43 Billion Records

Residential "R Schedule" Load Profile Data Types

| Load Profile Data Types | Installations | Reading |
|---------------------------------|---------------|----------------|
| Current - 15 Minute Data | 1,200 | |
| Current - 5 Minute Data | 10,000 | |
| Full Deployment - 5 Minute Data | 416,000 | 43,705,958,400 |



Range of On-Peak Residential Usage by NEM Customers



Benefits

- ✓ **Seamless use of growing data assets** to deliver reliable, safe and affordable energy to HECO customers AND enable HECO to transition to 100% Renewable Energy by 2045
- ✓ **Evidence-based policies and funding decision support** for integrated grid planning, grid modernization, and electrification of vehicles strategies and roadmaps

Pilot Deliverables

- ✓ Prove the **demand for smart-meter data by key partners** in support of key initiatives towards a clean energy future
- ✓ **Learn the required collaboration**, critical data sets, visualizations and analytics needs
- ✓ **Learn the organization and support** model required to support the data and insights needs
- ✓ **Identify potential market interest** for data
- ✓ Refine the Clearinghouse Solution content and capabilities for self-service, collaboration, and data sharing, maximizing its value impact
- ✓ Develop an iterative approach to feature releases and data sharing in a cloud native environment



Pilot Timeline is estimated at 30 months

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Clearinghouse Pilot with three releases over 24-30 months starting ~July 2022 and Early Life Support phase ending 2024

| 2022 | | | | | | | | | | 2024 | | | |
|--------------------|-----|-----|-----|-----|-----|-------|----|-------|----|------|----|----|----|
| July | Aug | Sep | Oct | Nov | Dec | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| FOUNDATION & MVP 1 | | | | | | MVP 2 | | MVP 3 | | ELS | | | |

| Duration | Release | Description |
|---|-----------------------------------|---|
| 6- 8 Months | Foundational Capabilities & MVP 1 | First release of Minimal Viable Product which includes foundational capabilities and user interface with a minimal data set of AMI smart meter data |
| 3 - 6 Months | MVP 2 | Controlled release to a stakeholder of minimal viable product |
| 6 Months | MVP 3 | Full release to all stakeholders of minimal viable product |
| 12 Months | Early Life Support | Early life support and maintenance of DACH capabilities and continued stakeholder feedback |
| Continuous feedback will be used to assess value throughout the pilot and during early life support | | |



Summary of Pilot Costs

Estimated costs is **\$2.76M**

Project: Data Analytics Clearinghouse

| | | 2022 Total | 2023 Total | 2024 Total | Grand Total |
|---------------------------------|----------------------|-------------------|---------------------|-------------------|---------------------|
| Outside Services | Non-Labor O&M | | | | |
| | Foundational & MVP 1 | \$ 917,873 | | | |
| | MVP 2 | | \$ 568,030 | | |
| | MVP 3 | | \$ 568,030 | | |
| | ELS - Maintenance | | | \$ 381,302 | \$ 2,435,234 |
| Software Maintenance | Non-Labor O&M | \$ 45,881 | \$ 121,891 | \$ 155,439 | \$ 323,211 |
| TOTAL PILOT COST | | \$ 963,754 | \$ 1,257,951 | \$ 536,741 | \$ 2,758,446 |
| Estimated Internal Labor | Labor O&M | \$ 142,829 | \$ 263,341 | \$ 142,829 | \$ 548,998 |

- Fair balance in value of pilot vs cost is to split across three service territories in a 70/15/15% split
- Operational Support costs estimated through 2024 - Pilot will be used to estimate future O&M requirements
- HECO will absorb Internal labor costs and estimates are not included in the Pilot budget
- Total costs of the portfolio will be managed to stay below the \$10M cap
- In accordance with the pilot process costs will be treated as deferred



Key Partner Benefit

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| Key Partner / Stakeholder | Objectives | Clearinghouse Objectives - efficient and secure transfer of the "Big Data" files and compute environment to enable |
|--|--|--|
| Hawaii State Energy Office (HSEO) | Evidence based policies and guidelines to achieve 100 percent clean energy by the year 2045 reducing dependency on fossil fuels | Clearinghouse data analysis to provide evidence on policy effectiveness . "Assessing and planning for an integrated energy ecosystem involves rigorous analysis and modeling on both sides of the energy supply and demand equation and across sectors to provide clarity around embedded issues that will move important metrics such as costs, energy security, and environmental impact that can be used in assessing and comparing the key decision points on the clean energy roadmap." - https://energy.hawaii.gov/energy-ecosystem |
| Division of Consumer Advocacy (DCA) | The DCA emphasizes keeping rates low while ensuring that the utility provides safe, reliable, and adequate service to consumers. Beyond this, DCA also plays an active role in promoting and advancing the state's energy policies | Evidence based policies and time-of-use based rates that are in the interest of consumers based on load profiles and the ability respond to consumer preference incent customer preference towards clean energy use "...aggregated, anonymized customer usage data available to interested third parties...would present...exceptionally valuable opportunities for data mining and associated analyses and research which would aid in distribution planning, non-wires alternative assessments, distributed energy resource interconnection analyses, and demand side management research, among other benefits." - https://dms.puc.hawaii.gov/dms/DocumentViewer?pid=A1001001A20E21B44345C00621 |
| Public Utility Commission (PUC) | Oversee regulatory and ensure safe, reliable, and economical electric utility energy | Ensuring the effective rate design for EV and DER using data analytics from the clearinghouse and align to grid modernization aligned to integrated grid planning . "Focus on delivering immediate value and benefits to customers with installation of smart grid infrastructure. Examples would include offering web portals for customers to access and view energy consumption data; improving outage response and power quality; and supporting rapid adoption of innovative rate structures." "Development of an Enterprise Data Warehouse ("EDW") to serve as the central repository of the large amounts of data gathered over the AMI network and other Company data" - https://dms.puc.hawaii.gov/dms/DocumentViewer?pid=A1001001A17A05B01613H26476 |
| University of Hawaii (UH) coordinated through Hawaii Natural Energy Institute (HNEI) | Support research and decision support in advising PUC on energy policies and integrated grid planning | Data and analysis capabilities to support a broad set of studies that evaluate and test the impacts of incorporation of PV, potential of storage options, and EV and the effect of stability and reliability on the grid . "A core part of HNEI's mission is to support Hawai'i in its clean energy transformation by focusing on cost effective and practical solutions to help deliver commercially viable renewable energy for the state and its citizens. HNEI robustly supports analysis to inform energy policy and decision making in Hawai'i" - https://www.hnei.hawaii.edu/wp-content/uploads/2022-HNEI-Annual-Report.pdf |
| Hawaii, Maui, Honolulu County energy, resiliency & sustainability offices | Substantially reduce greenhouse gas (GHG) emissions from ground transportation, electricity, and waste sectors | Data analysis and transparency on electric energy load patterns for benchmarking, policy considerations and energy equity metrics. |
| Hawaii Energy (HE) | Our mission is to empower island families and businesses to make smarter energy choices to reduce energy consumption, save money, and pursue a 100% clean energy future | Efficient and secure transfer of the "Big Data" files and compute environment to enable Hawaii Energy to develop energy efficiency programs that promote ratepayer savings, advance the State's environmental and greenhouse gas policies , and help support economic recovery . |





Mahalo for your time!

