Hawaiian Electric

Microgrid Services Tariff (MST) Phase 2: Working Group Meeting #7

Docket No. 2018-0163

September 28, 2022

Agenda

1:00 – 1:05	Review of Objectives & Ground Rules
1:05 – 1:35	Guest Speaker: Rosanne Ratkiewich, California Public Utilities Commission
1:35 – 2:05	Utility Operated Hybrid Microgrid Case Study: North Kohala Microgrid
2:05 – 2:10	BREAK
2:10 – 2:50	Discuss Draft Working Group Report Outline
2:50 – 2:55	HSEO IIJA Webinar recap
2:55 – 3:00	Confirm Next Meeting/Topics

MST Phase 2 Objectives

PUC Phase 2 Objectives:

1. Continue development of the Tariff
   - ❖ Promote self-sufficiency and resiliency among microgrid project operators
   - ❖ Streamline MST
2. Enhance Tariff to support broader use of microgrids in non-emergency situations
   - ❖ At minimum, enable voluntary islanding
3. Further explore opportunities to support resilience through microgrid development
   - ❖ Encourage development of microgrids that can provide power to remote communities and critical facilities such as schools, shelters, and hospitals
4. Identify grid services that can be provided by microgrids
   - ❖ Explore ways related exchanges between the utilities and microgrid operators could happen

Working Group Objectives:

1. Coordinate and align with other Dockets to leverage resources and streamline efforts
2. Focus on resiliency
   - ❖ Microgrids and/or other tools/programs
   - ❖ “Low-hanging” fruit, with such considerations as Act 200 goals, practical implementation, “real-world” goals, technical, costs, etc.
3. Understand how the tariff could support microgrid operations in non-emergency situations
   - ❖ Existing microgrid operations
4. Keep costs to all customers in mind (cost equity)
   - ❖ Compensation (e.g., rates, standby rates, exit fees, etc.)
5. Encourage development of grid services

Meeting Objectives

- Understand how California is approaching the ‘Value of Resiliency’ for microgrids
- Review the North Kohala Energy Storage RFP as a case study for a utility-operated Hybrid Microgrid
- Discuss the draft outline for the Working Group Final Report and identify any remaining open issues

Ground Rules

- Members will maintain an open mind and be respectful of all views
- Members will review meeting agenda in advance and complete any pre-reads prior to the meeting
- Discussion will be kept on agenda topic

Guest Speaker: Rosanne Ratkiewich

California Public Utilities Commission

Topic: Value of Resiliency

California Public Utilities Commission Microgrids and Resiliency Proceeding R.19.09.009, Track 5 – Value of Resiliency

A Scalable Approach to Exploring Resiliency Evaluation and Planning

Resiliency and Microgrids Team, Energy Division

Rosanne Ratkiewich, Sr. Regulatory Analyst

September 28, 2022

California Public Utilities Commission

Equitable Resiliency Evaluation and Planning (EREP) Framework

- Resiliency Valuation Guidelines
  - Problems to solve in our approach to resiliency
  - Resiliency planning needs analysis
  - 4-Pillar approach to understanding resiliency evaluation and planning needs
- Track 5 Scoping Issues and schedule
- EREP Framework – Development and Studies
  - Understanding indirect impacts of electrical disruption on local communities
  - Multi-jurisdictional, bi-directional communication and data exchange between local communities and utilities
  - Metrics reflecting equity, income and resource disparities during electrical disruption
- Cross-proceeding policy areas: standardization of resilience definition, risk-assessment, community engagement, climate adaptation

Mechanisms to Measure Improved Resiliency

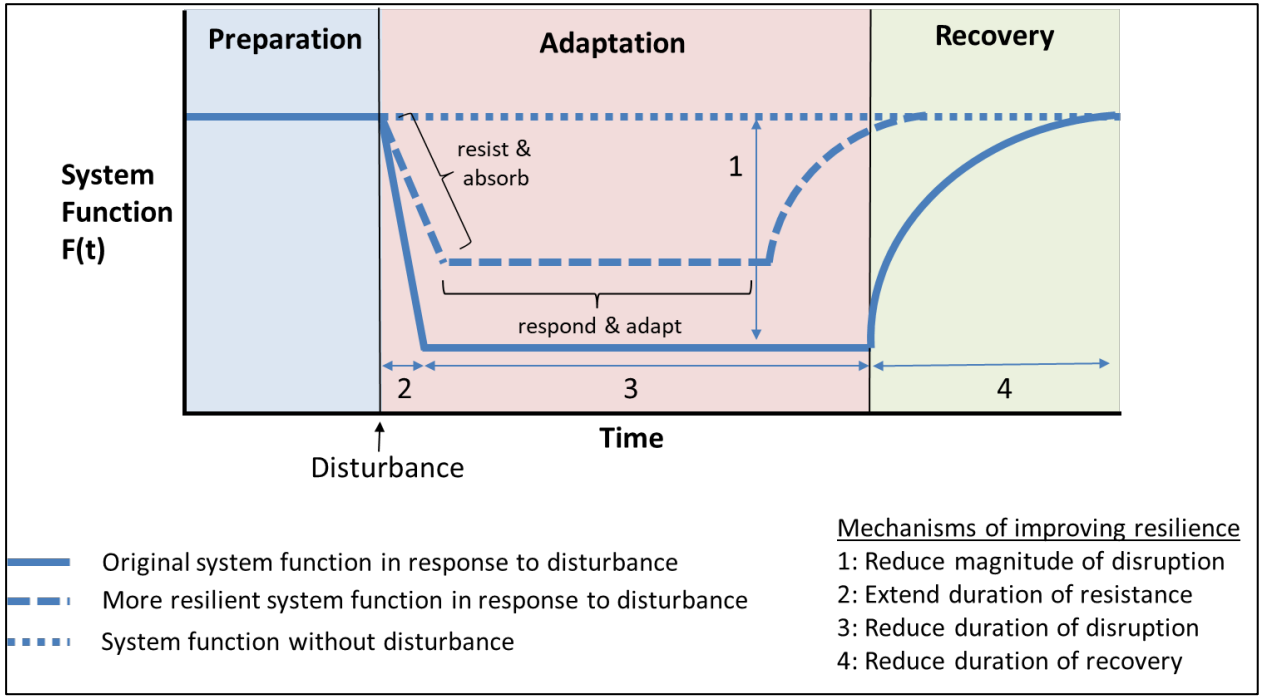
ENERGY System Function:
- **operating** levels –
  - MW, MW/hrs, MW * hours
- **infrastructure** levels
  - # lines/circuits functional, # lines/circuits tripped, # lines/circuits restored

INTERDEPENDENT System Functions:
- Water/Wastewater
- Gas
- Communications
- Transportation

ECONOMIC System Function:
- Revenue and productivity due to power disruption
- Income and perishable losses due to power disruption

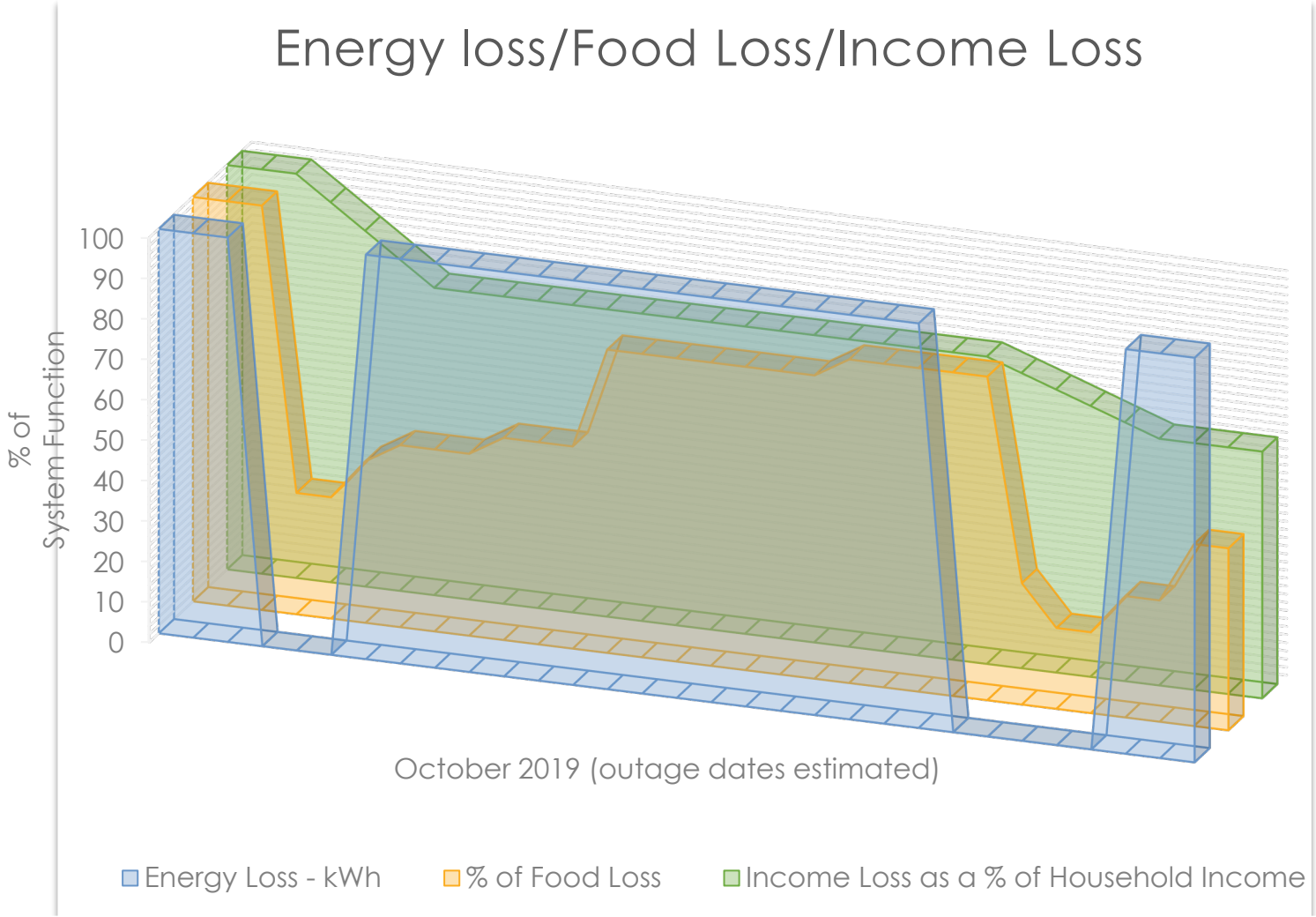
SOCIAL/EQUITY System Function:
- # of vulnerable or disadvantaged population in area served
- # of Critical Facilities

ENVIRONMENTAL System function:
- GHG, Criteria Air Pollutant Emissions



Resilience Trapezoid (adapted from Panteli, et al. (2017); T. Ding, Y. Lin, G. Li, et al. (2017); T. Ding, Y. Lin, Z. Bie, et al. (2017))

Resiliency Measures to Reflect Accumulated Impacts



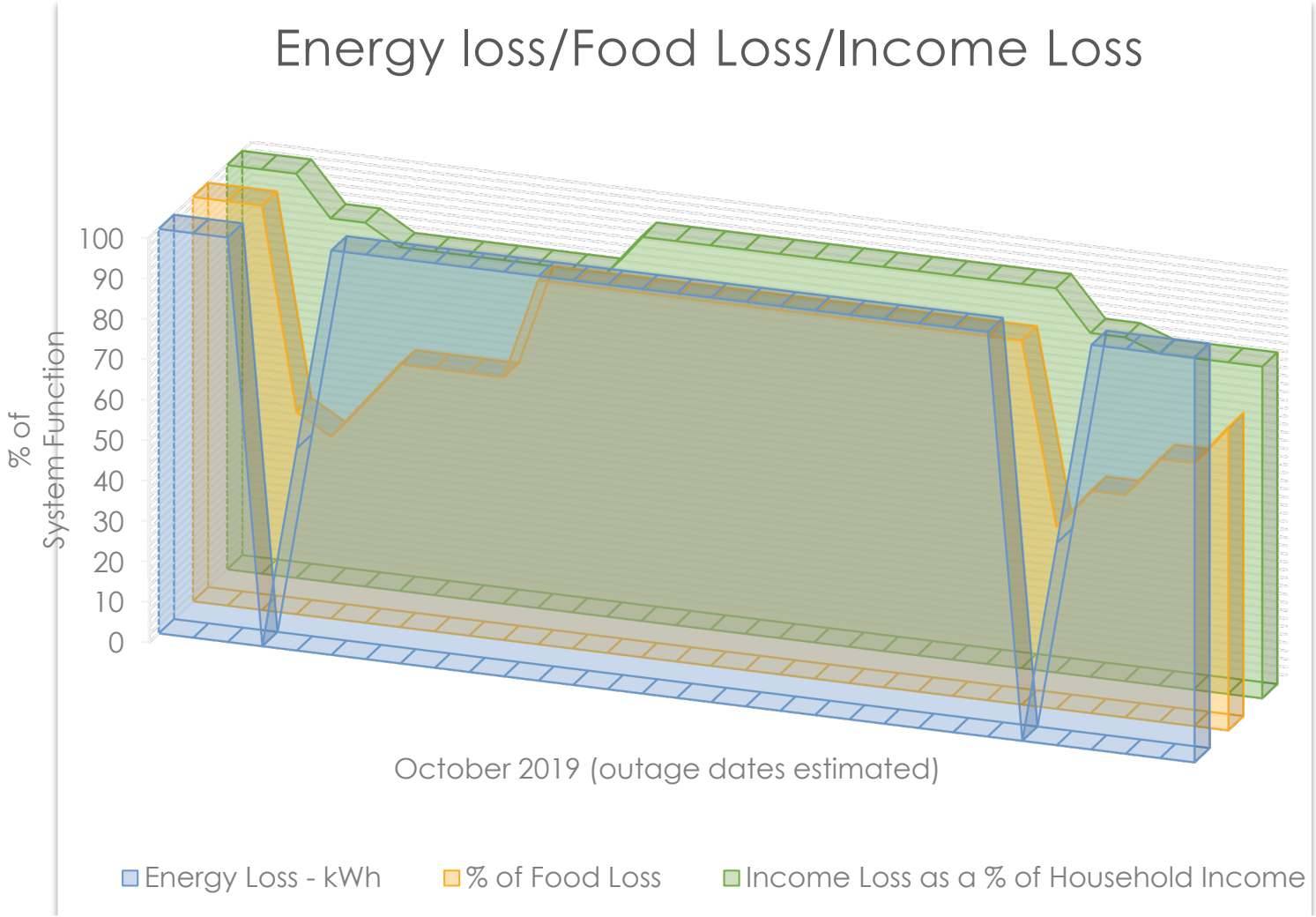
Case study:

- PG&E turned off power to Ana Patricia Rios' neighborhood in Sonoma County for eight days in October -- **three at the beginning of the month and five near the end**.
- She threw out at least **$500** worth of meat, fruit, vegetables, salsas and other food that would have supplied her family with months of meals.
- Similar losses occurred throughout Rios' wooded, hilly neighborhood, which is mostly home to Hispanic families. Many are **vineyard and hospitality workers, and sometimes several families share a house.**
- Rios family brings in about **$3,500 each month --** $1,000 above the federal poverty level for a family of five.
- Rios **missed eight days of work due to the outages.**
- Her husband **lost four days of work** because of the smoke from the Kincade Fire 40 miles north
- Rios family has **relied heavily on food bank distributions to feed the family since**.

Jackie Botts, CalMatters, https://www.davisenterprise.com/news/local/state-government/we-need-the-food-that-we-lost/

Being able to assess the impact of these indirect impacts of electrical energy outages is a key component to determining the value of resiliency.

Resiliency Measures to Reflect Accumulated Impacts



Note: The following scenario is hypothetical and is not meant to imply that PG&E has undertaken any work in this instance. It is only being used to illustrate how the reduced scope of outage events after mitigation measures have been taken could reduce customer impact.

AFTER Mitigation Measures:

- PG&E implemented Resilience Mitigation Measures that **reduced the duration of the power outage** in their neighborhood and **allowed nearby grocery stores to provide ice** for the community.
- While Ana Patricia Rios' neighborhood still lost power, **it was restored more quickly after 1 ½ days**
- Ana Patricia Rios' **workplace was able to stay powered**, allowing her and her husband to **maintain their income** during the outage.
- While still having to throw out at least **$250** worth food, maintaining their income meant they could replace their food losses more quickly.
- **A second outage** at the end of the month resulted in again losing some food supplies, but again they were able to **recoup their losses more quickly** because they did not loose work and nearby ice supplies were again available.

Resiliency Planning Needs Analysis

1. Currently minimal reflection of **electrical outage indirect impacts on community** (social, economic, emergency operations, other critical infrastructure or essential services) in grid planning and investment decision making.
2. **Historical inequities** may play a role in **grid planning resiliency issues**.
3. Currently no systemized way for **local emergency plans, hazard mitigation plans, or resiliency plans** reflecting locally identified electrical energy needs/priorities to be considered in grid planning and investment processes.
4. Multi-Attribute Value Function (MAVF) attributes are safety, financial and reliability. **Should "Resilience" be an additional factor?** (SDG&E is now adding "Stakeholder Satisfaction".)
5. Resilience planning and reliability planning may have **differing solutions, costs and needs.**
6. Currently undetermined how **Climate Vulnerability Assessments will be integrated into grid planning processes.**

4 Pillars of Equitable Resiliency Evaluation and Planning Framework

I. Baseline Assessment

I. What/Whom do we want to protect and where is it/where are they?
II. What threatens it/them?
III. How well are we doing now to protect it/them?

II. Mitigation Measure Assessment

I. What protection options do we have?
II. What does the best job at protecting the most?
III. What does it cost?

III. Resiliency Scorecard – scoring resiliency configuration characteristics including those that support State policy goals

IV. Resiliency Response Assessment (post-disruption or modeling) –

I. How well did the investments do in reaching resiliency targets?
II. Did the investments reduce impacts on the community?

Resiliency Planning and Evaluation – Pillars I & II

I. Baseline Assessment:

1) Define Geographical area of study
2) Define Load Tiers or Consequence Categories (Critical, Priority, Discretionary)
3) Identify Resiliency Targets within Load Tiers
4) Define Hazards to consider (All-Hazard assessment, analysis, ranking, weighting)
5) Conduct assessment of current Resiliency when disrupted from Hazard 1, Hazard 2, Hazard 3 (according to Hazard assessment)
6) Results of Resilience Assessment – Identify Resiliency deficits and priorities and Resiliency Metric Reporting of Baseline levels

II. Mitigation Measure Assessment

1) Identify potential mitigation measure options
2) Assess ability of each mitigation option to reach Resiliency Targets for Hazard 1, Hazard 2, Hazard 3
3) Compare costs of each mitigation option to reach Resiliency Targets for Hazard 1, Hazard 2, Hazard 3

Resiliency Planning and Evaluation – Pillars III & IV

III. Resiliency "Scorecard"

1) Resiliency Scorecard is a suggested tool that provides a basic benchmark of achievement but recognizes that more can be done.
2) Scoring reflects resiliency configuration characteristics.
3) Scoring system provides for different areas of improvement (e.g. 100% resilience targets are met, but configuration uses 70% fossil fuel resources to meet those targets, improvement would be to decrease fossil fuel resources while maintaining targets. Would result in a higher "score."

IV. Resiliency Response Assessment (computer modeling or post-disruption approach):

1) Conduct Baseline Assessment (1-6).
2) After implementation of chosen mitigation measure option, conduct annual data collection of Resiliency Metrics,
3) Assess achievement of Resiliency Targets and any changes in Community Impacts

Microgrids Proceeding R. 19-09-009, Track 5

Track 5: Value of Resiliency in the Microgrids proceeding R.19-09-009 identifies the following specific key issues to be considered in the proceeding:

- **Economic and Equity Impacts** – direct and indirect economic and equity impacts on customers experiencing major disruptive events that may impact delivery of energy services
- **Resiliency Standards** – standard definitions, metrics, tools or methodologies to assess impacts of major disruptive events and evaluating the efficacy of ratepayer investments in mitigating those impacts
- **Grid Planning and Investment** – how direct and indirect economic and equity impacts on customers should inform grid planning and investment decision making
- **Coordination Across the Public Entities** – whether to adopt or modify rules to enhance bi-directional, multi-jurisdictional collaboration between utilities, Tribes and government agencies on emergency plans, all-hazard mitigation plans, resiliency plans or grid investments
- **Environmental and Social Justice** – what extent should resiliency valuation decisions explicitly support ESJ communities including the extent to which resiliency valuation could support achievement of any of the nine goals of the Commissions ESJ 2.0 plan

Microgrids Proceeding R. 19-09-009, Track 5

❖ Some Tools to Determine a Value of Resilience

- ❖ Interruption Cost Estimate Calculator (ICE), Lawrence Berkeley Laboratories
  - ❖ An estimate of the economic cost of short duration electric power disruption (< 16 hours) (Value of Lost Load per Customer Minutes Interrupted)
- ❖ Power Outage Economic Tool (POET), Lawrence Berkeley Laboratories
  - ❖ Economic cost of long duration electric power disruption (> 16 hours to many days), as well as regional economic impacts; takes into account supply chain disruption and customer class differentiation
- ❖ Resilience Node Cluster Analysis Tool (ReNCAT), Sandia National Laboratories
  - ❖ Social Burden Index (SBI) reflecting how much effort and ability is required to get basic needs met during large scale electric power disruption
- ❖ Resilience Analysis and Planning Tool (RAPT), FEMA – over 100 preloaded layers

Microgrids Proceeding R. 19-09-009, Track 5

- **Some Approaches to Determine a Value of Resilience**
  - Evaluative "Heat Map mode" (baseline) - how social burden is distributed. Provides community awareness for potential siting and/or investment decision-making
  - Portfolio evaluation for IOU grid-planning - Optimization of portfolios of mitigation measures indicating most cost-efficient to reduce social burden, increase community resilience, decrease economic costs
  - Project evaluation – how well is resilience addressed by the project?

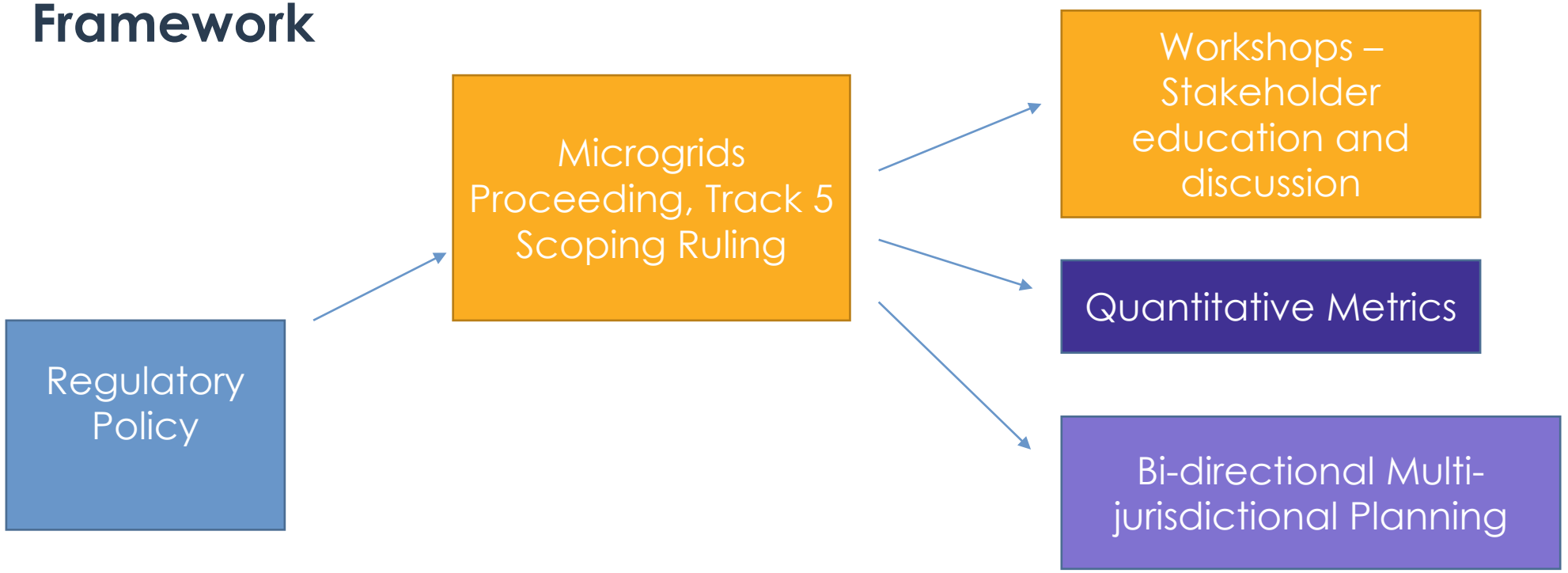
Development of the Equitable Resiliency Evaluation and Planning Framework – 3 Subject Areas to Explore

Policy - Developing and integrating EREP in current regulatory policy

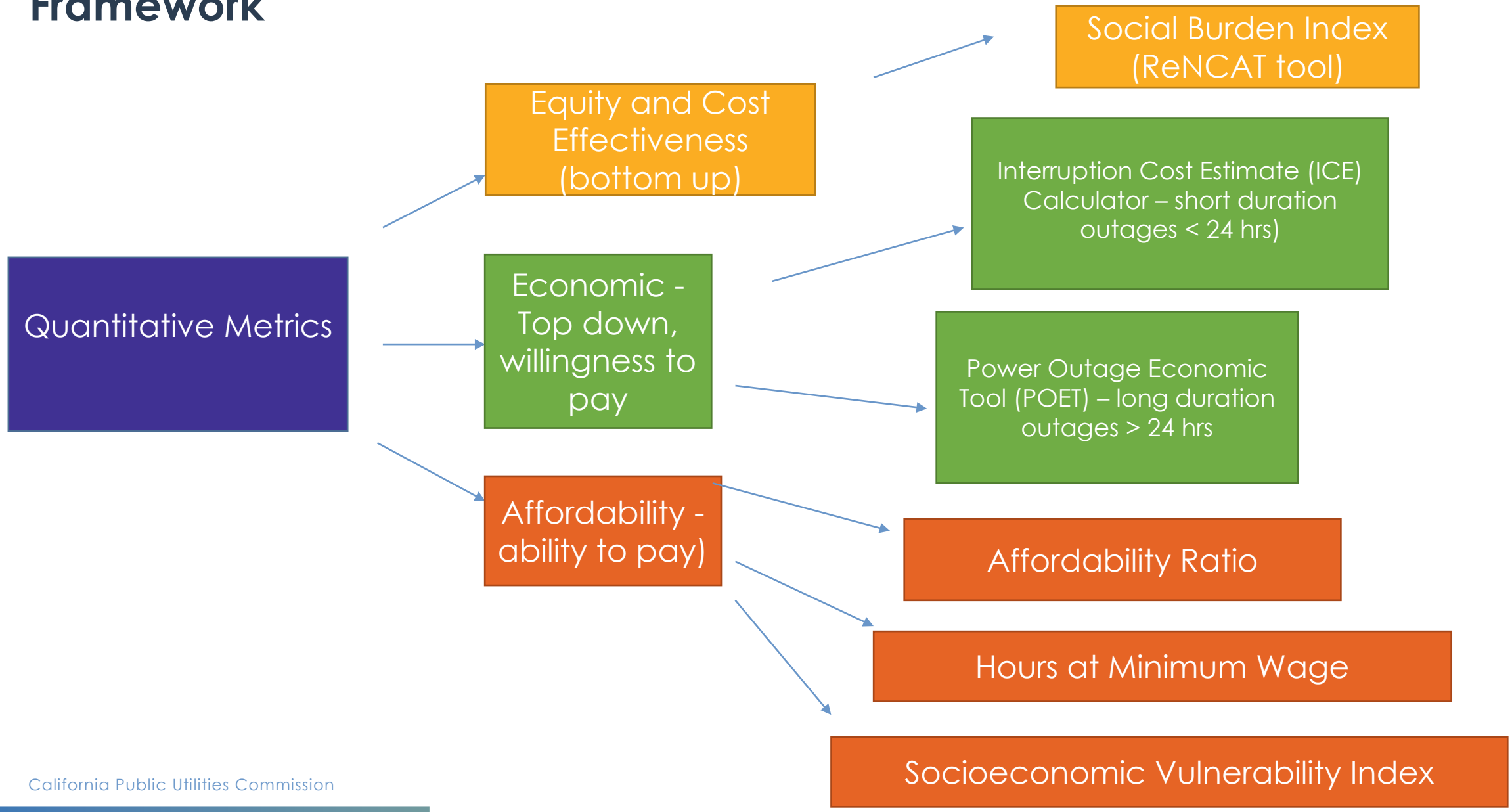
Metrics – Quantitative Metrics

Planning – Bi-directional multi-jurisdictional coordination data portal

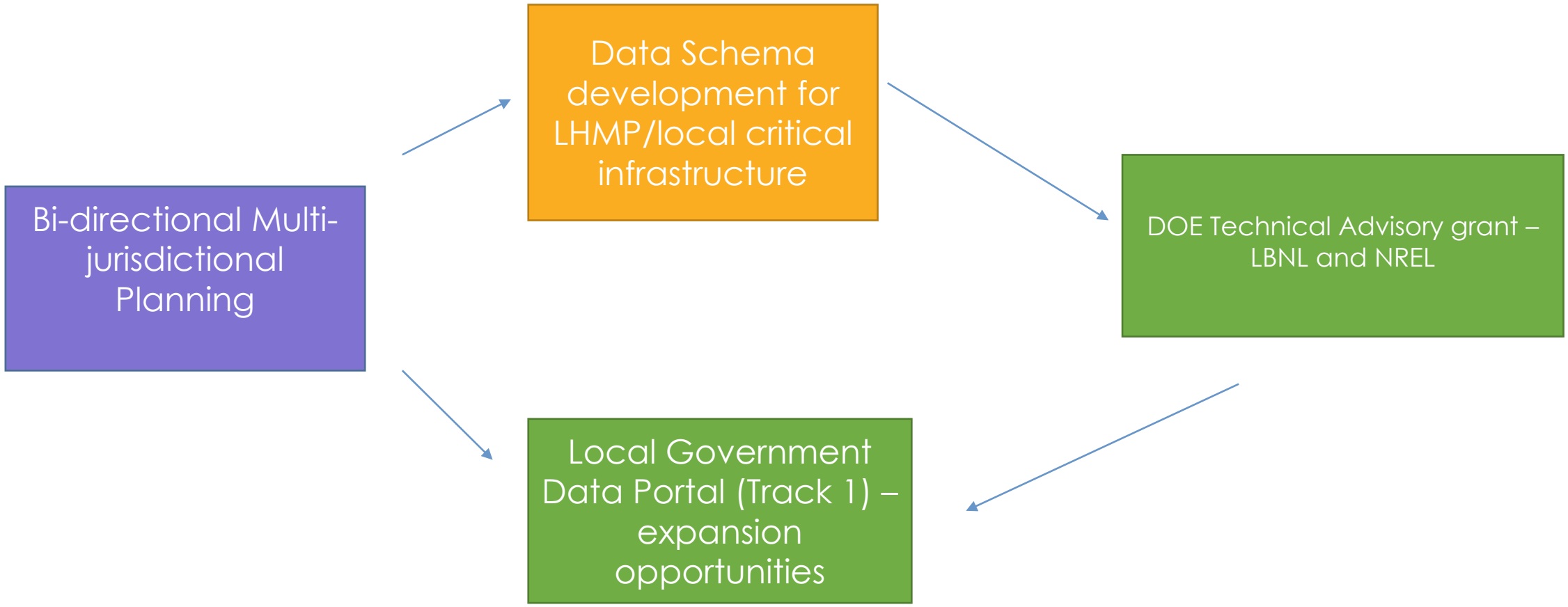
Development of the Equitable Resiliency Evaluation and Planning Framework



Development of the Equitable Resiliency Evaluation and Planning Framework



Development of the Equitable Resiliency Evaluation and Planning Framework

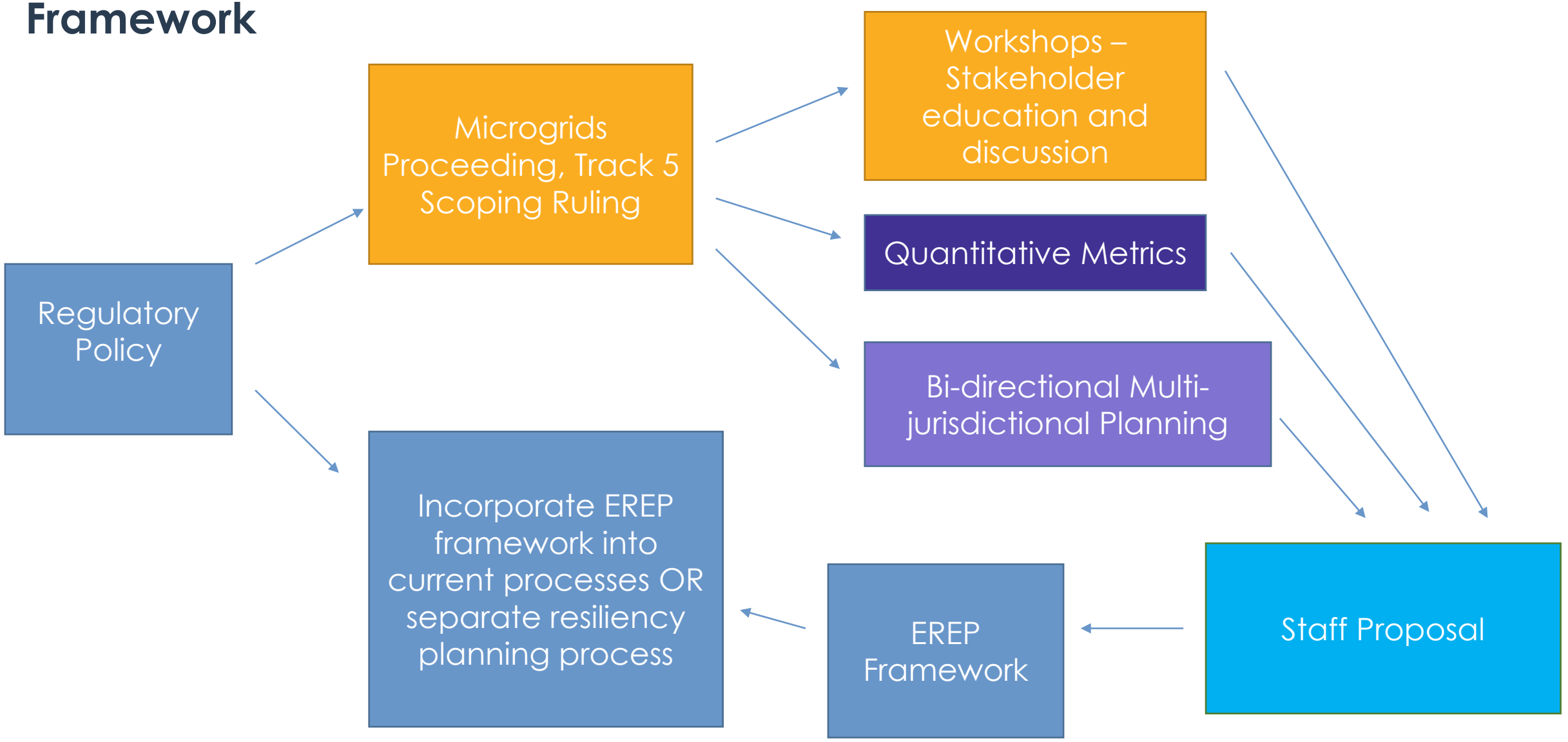


Development of the Equitable Resiliency Evaluation and Planning Framework

- **Cross-proceeding policy areas: standardization of resilience definition, risk-assessment, community engagement, climate adaptation, infrastructure and procurement planning**
  - Microgrids proceeding
  - General Rate Case (GRC proceeding)
    - Risk Assessment Mitigation Phase of planning
  - Climate Adaptation proceeding
    - Vulnerability Assessments
    - Community Engagement Plans
  - Risk-Based Decision-making Framework (RDF) proceeding
  - Integrated Resource Planning
  - High DER proceeding
  - DER Action Plan

- **Separate Resiliency Planning Process or Multi-objective Planning process**
  - Balancing resilience data with reliability data as well as equity, decarbonization, affordability and safety concerns, integrating data into GRC processes (IRP, RAMP and other points of inflection)

Development of the Equitable Resiliency Evaluation and Planning Framework



Questions and Discussion

California Public Utilities Commission

Rosanne.Ratkiewich@cpuc.ca.gov
https://www.cpuc.ca.gov/resiliencyandmicrogrids/

Additional Slides

Resiliency and Reliability Overlap

- Reliability metrics are defined in IEEE 1366 and are the generally accepted way to describe average systemwide outage duration and frequency for utilities.
  - Major Event Days (MEDs), which are outage events with a duration that exceeds a statistically defined threshold, can be either included or excluded in these metrics. MEDs tend to be caused by high impact, low frequency events, and inclusion in the metrics accounts helps the metric reflect more outage types.
- However, **describing system resiliency solely using reliability metrics is problematic** for the following reasons:
  - **Reliability is generally a measure of overall system performance and does not capture the consequences of outages on customer.**
  - **Reliability metrics used for system planning purposes often intentionally exclude Major Event Days** (MEDs) to avoid the utilities "chasing" low probability events (that are likely random in nature) with expensive upgrades. **This excludes the types of large-scale disruptive events that resiliency investments are focused on mitigating.**
- However, important insights about the duration and frequency of high-impact, low-frequency disruptive events can be gleaned from the current metrics with the inclusion of MED because they reflect customer experience of outages. This can be coupled with tools like the Interruption Cost Estimator (ICE) and the Power Outage Economic Tool (POET) to assess the consequence of outages.

Resiliency Planning and Evaluation Meta Process
Indirect Impacts of Electrical Energy Disruption on Local Communities

Equity, Income and Resource Disparity Considerations in Resilience Metrics

- Sandia National Laboratory's Resilient Node Cluster Analysis Tool (ReNCAT) uses various geographically specific data layers to indicate where resilience resources are lacking, and what kind of portfolios of resilience resources give the most cost-effective return on increasing resilience in those areas.

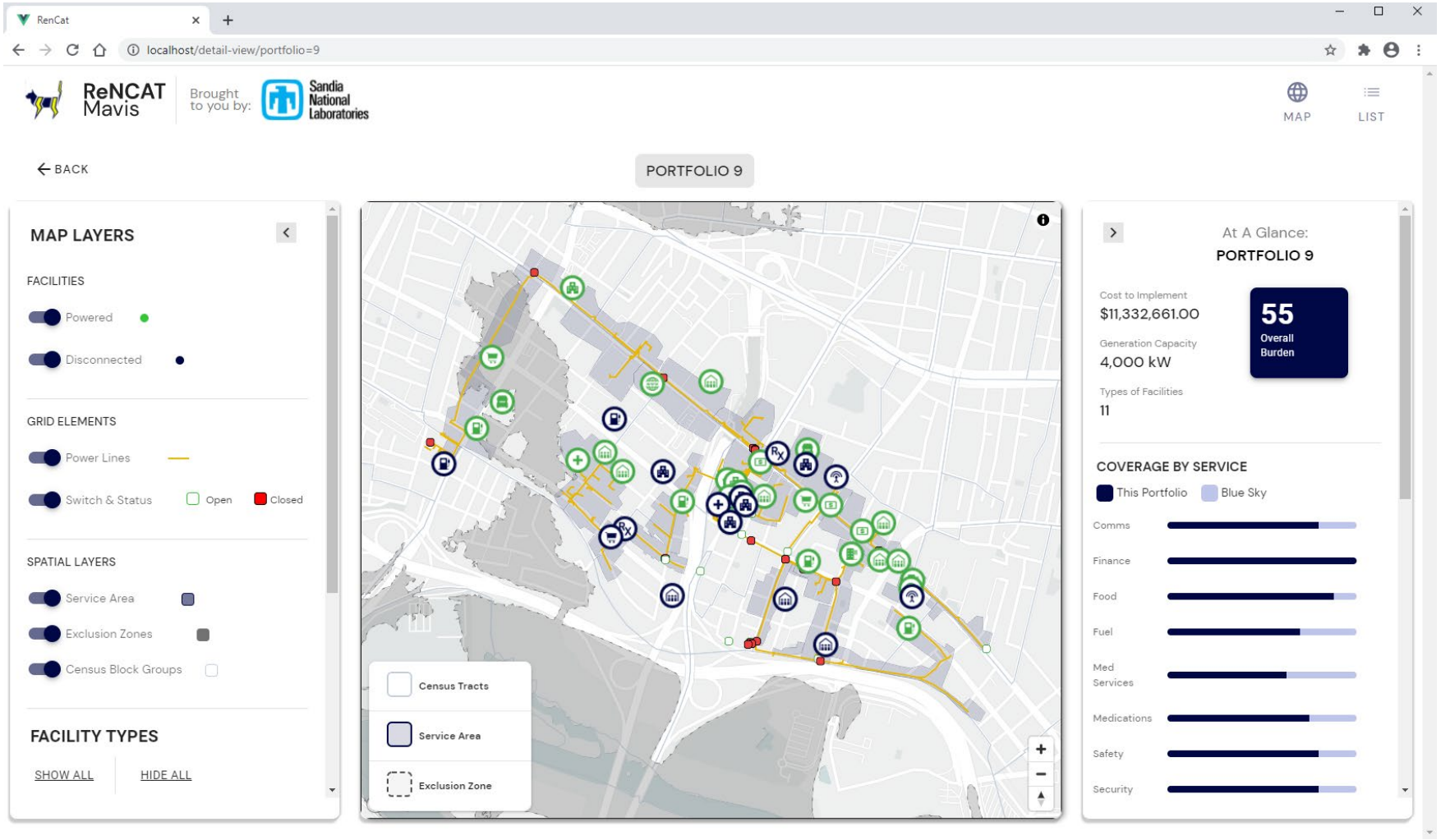
- Social Burden Index – "Social Burden" is the measure of effort people expend to get their needs met.
  - High Social Burden indices are in areas that lack resilience resources resulting in high levels of indirect impacts from electrical disruption
  - Integrates data layers such as census block data, load data, local hazard data, local community infrastructure and essential service data layered with utility infrastructure (Pillar 1) information in an algorithm that calculates effort over ability reflecting social burden.
  - Can be used to evaluate resilience "deserts" or as guiding component to optimize siting of resiliency resource portfolios (Pillar 2).

- Long-duration outage economic costs – Power Outage Economic Tool (POET) developed by Lawrence Berkeley National Laboratories

Social Burden Applied to Grid Planning

Resilience Node Cluster Analysis Tool (ReNCAT)

- Uses genetic algorithm to site and size resilience solutions across a broad landscape
- Creates portfolios of resilience solutions that optimize for social burden vs. cost
- Grid and other critical infrastructure are explicitly modeled



Utility Operated Hybrid Microgrid Case Study:

North Kohala Microgrid[1]

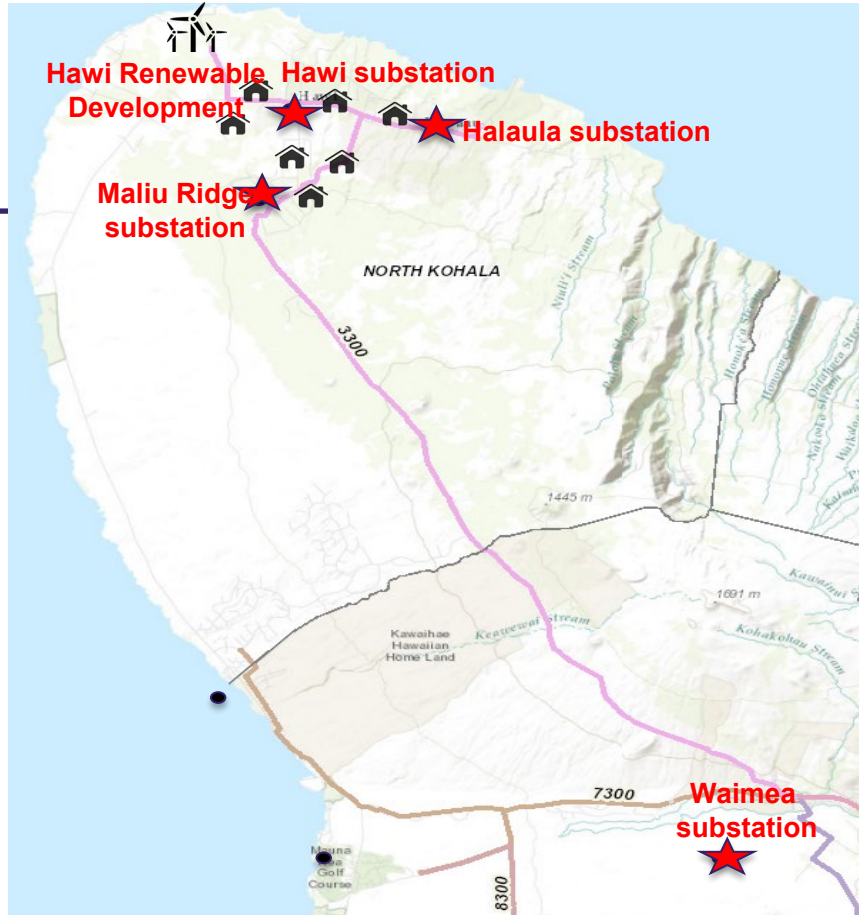
Presented by:

Kale Nakata, Hawaiian Electric

[1] This case study discussion is virtual, hypothetical development of a Microgrid for North Kohala, generally based on HE's pending North Kohala Energy Storage RFP as detailed in open Docket No. 2022-0012, but not meant to inform or otherwise in any way be related to that RFP or docket.

North Kohala

- ~2,000 customers out of ~89,000 total HELCO customers
- 3300 Line built in 1950s
- ~24 miles between Waimea and Halaula/Hawi
- Line capacity 13MVA
- Transformer capacity 10MW



Objectives

- To improve reliability and resilience for customers in North Kohala by providing energy when 3300 line is out
  - 3300 Line Rebuild Needed (requires outage)

Options Considered

OPTION 1

- New 2nd line and transformer

OPTION 2

- Microgrid with Diesel Generators

OPTION 3

- Microgrid with Battery Energy Storage System (BESS)

Community Outreach and Engagement

COMMUNITY

- Major land owners
- Hawi Renewable Development
- Residential and business customers
- Non-profit organizations
- Schools and churches

GOVERNMENT

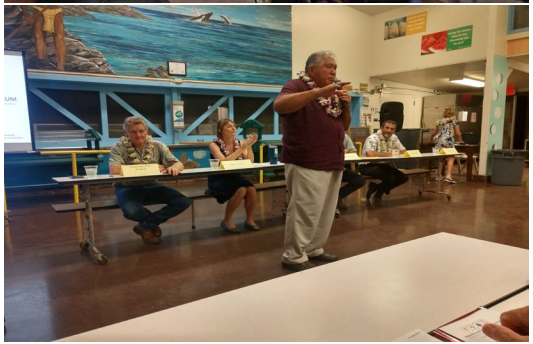
- Briefings with Hawai‘i Island Legislators
- Town halls with elected officials
- Focus groups with community leaders

PARTNERSHIPS

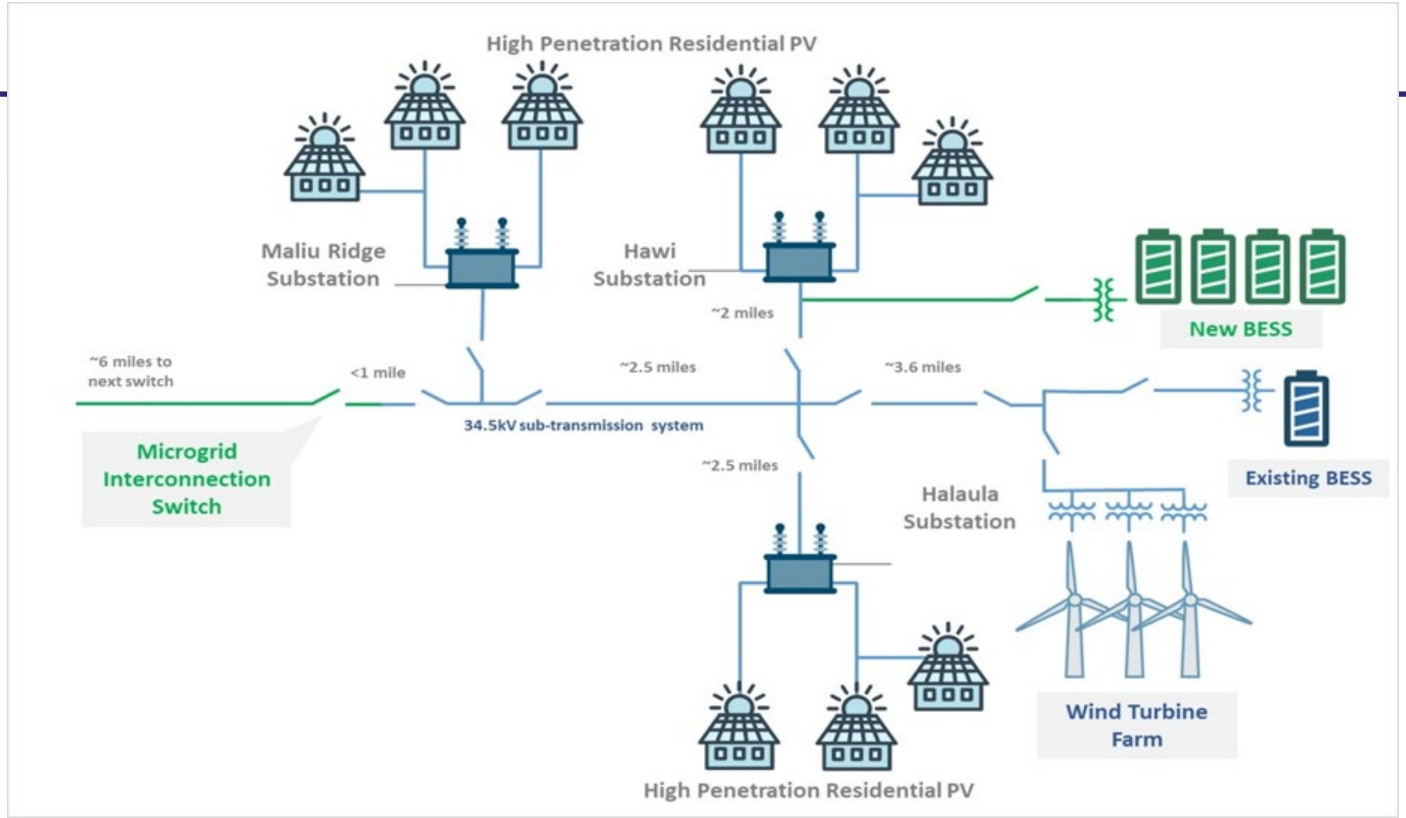
- Hawaii Energy
- North Kohala Community Development Plan Action Committee
- County of Hawai‘i first responders (Civil Defense, police, fire, hospital)

EVENTS

- Resilience and Sustainability Forum
- Fairs and festivals
- Community association meetings
- Virtual community meeting



North Kohala Microgrid Concept Drawing



BREAK (5 min)

Return at 2:18 PM

Microgrid Services Tariff (MST) Phase 2: Working Group Report

Draft Outline as of 9/26/22

Foundational Assumption	Working Group Learnings
1) The overall purpose of Phase 2 of this MST proceeding was to explore **how microgrid development could be increased** in Hawaii through the tariff **to achieve greater grid resiliency** per Act 200. Unlike Customer Microgrids, Hybrid Microgrids have varying factors (e.g., technical, geographic, etc.) differences that make each Hybrid Microgrid unique. (see below) *- PUC prioritized third-party operated Hybrid Microgrids first, then utility-operated Hybrid Microgrids, and Customer Microgrids last*	• Due to the specific nature of each Hybrid Microgrid, it is **unclear how third-party Hybrid Microgrids would be developed and operated in Hawaii**, so it is difficult to identify how to encourage their development • May need to focus in on clearer definition(s) of the different types of Hybrid MGs structures
2) Microgrids **are DER resources** *- Customer MGs are DER resources that are individually interconnected to the grid and operate as an aggregation that has islanding capability* *- Hybrid MGs that are utility-owned/operated would have utility infrastructure and may incorporate existing DER owned by MG participants*	• **Existing compensation, grid services, and customer protections developed in MST Phase 1 and DER Docket are sufficient** for Customer and Hybrid MGs
3) Microgrids are **not built to meet 100% of load** due to high costs	• Islanding during non-emergency conditions is **not technically and practically feasible**
4) Hybrid MGs are **economically and financially difficult to develop and maintain** due to their **complex and unique** nature	• The **resiliency value of each microgrid is project-specific** • **Implementation would be slow** (3-5 years for development cycle based on current interconnection, permitting, and construction timelines)
5) **California is a leader of microgrid policy** *- Note that California has different and more urgent needs due to wildfires risk and frequent public safety power shut-off events, and that California microgrids, especially community microgrids, are owned and operated (directly or indirectly) by the utility and incorporate DER of participants in the microgrid*	• California is still working through **open issues related to equity, safety, technical operations, and customer protections** in their Microgrid Incentive Program
6) Microgrids are **one tool of many** to support resiliency goals	• The IGP Resilience Working Group will cover the identification of critical facilities, community needs, and holistic resilience planning along with the Company's Resilience Program Application • There should be **clear needs** identified to be met by the MG, and resulting **goals and criteria established before ratepayer funds are utilized and tariffs are updated** to ensure effectiveness and equity, especially when subsidizing or incenting a small

Phase 2 Objectives	Docket Parties Areas of Consensus
1. Continue development of tariff • *Promote self-sufficiency and resiliency among microgrid project operators* • *Streamline MST*	• **The current MST** rule and changes to the interconnection operating agreement addressed in Phase 1 appear sufficient to **enable Customer and Hybrid MG development** in the Company's service territory • **The Parties don't believe any changes to the MST are necessary at this time**
2. Enhance Tariff to support broader use of microgrids in non-emergency situations • *At minimum, enable voluntary islanding*	• **Customer microgrids may voluntarily island during normal conditions at any time under current rules.** - If a large customer were to island during normal conditions, it could create **operational issues and service quality (e.g., voltage issues) problems** for other customers. • As customers of Hybrid MGs are utility customers during normal conditions, **Hybrid MGs should not be allowed to island voluntarily during normal conditions** because it could: 1) Create a **significant service quality issue** for other customers 2) Require **customer load shedding** that could be disruptive to their lives/business
3. Further explore opportunities to support resilience through microgrid development • *Encourage development of microgrids that can provide power to remote communities and critical facilities such as schools, shelters, and hospitals*	• Promoting microgrid development is best addressed through: 1) **Resilience planning** and **microgrids as a potential solution** to identified needs 2) **Potential program(s) designed to address urgent and specific societal needs**, and related criteria, as identified in state policy and has been pursued in other states
4. Identify grid services that can be provided by microgrids • *Explore ways related exchanges between the utilities and microgrid operators could happen*	• Customer and Hybrid MGs are **eligible for all current and future grid services** as applicable during normal conditions under the MST and related operating agreement • There are **practical limits to the services** that may be provided by the microgrid to the power system while in island mode and thus disconnected from the grid

Phase 2 Priority Issue	Docket Parties Areas of Consensus
a. Microgrid Compensation and Grid Services *i. Harmonization with other programs' grid services mechanisms* • *Fair compensation for grid services*	• There are **no existing conflicts** with the MST and grid service mechanisms and tariffs and programs • Microgrids may receive the same compensation as other DER for grid services under existing applicable tariffs, and rules
ii. Customers with existing DER/DR grid service agreements • *Relationship to related contractual obligations*	• **Microgrid participants with DER/DR would be under utility tariffs/programs or PPA** for front of the meter resources or DER aggregations • There are **no issues during normal conditions and the tariff/program/PPA should remain intact**, except for those specific services that are interrupted when the microgrid is in island mode and thus disconnected from the grid.
iii. Resilience services and compensation, including societal and environmental value, to inform development of a resilience tariff • *Contribution of microgrid to resilience* • *Include resiliency services with MST* • *Revise MST to include resiliency, or develop separate resiliency tariff*	• Value of Resilience (VOR) may be approached in two ways: 1) **a value to society** related to the extended loss of load and related customer and community's adverse economic and financial impacts that is used in a planning process to assess cost-benefits of measures to mitigate those risks, in large part by guaranteeing power to microgrid participants during an emergency condition requiring the microgrid to effect an island mode, and 2) **an administrative value** that provides a program incentive or compensation for a resilience service (i.e., guaranteeing a prescribed level of power during island mode) • Methods for assessing an administrative value of resilience are at an **early stage of research and development** - National labs are working on potential solutions but may not be ready until 2024 (see EPRI report) - California has recognized this issue and is not addressing VOR in a planning context until Track 5 of their Resilience and Microgrid proceeding (expected to start Jan 2023) - Other parties (e.g., Clean Coalition) have calculated and use a resiliency adder equal to about 15-20% of the facility's electricity bill, which guarantees delivery of a prescribed level of energy to the microgrid participant during island mode

Phase 2 Priority Issue	Docket Parties Areas of Consensus
b. Utility Compensation • *Consider standby charges, exit fees, other charges, re equitable allocation of grid costs across all ratepayers, avoid cross-subsidies and non-participating customers to customers with microgrids* • *Consistency of messaging to customers re these charges*	• Based on the other areas of consensus, there are **no practical issues related to standby charges, exit fees for microgrids** in Hawaii. If voluntary islanding is allowed, standby charges, as well as customer protections will need to reviewed. Based on the current operations of microgrids in Hawaii, exit fees is not an issue. - Some of the issues raised in Phase 1 were related to commercial and institutional customer microgrids in other jurisdictions that use natural gas based combined heat and power systems to serve substantially all the operational load with high availability and have very different rules and retail competition
c. Customer Protection and Related Considerations • *Are existing customer protections sufficient for new microgrids?*	• **Based on the other areas of consensus, sufficient customer protections were established** for Hybrid MGs under the current MST and operating agreement. - If indiscriminate independent voluntary islanding of Hybrid MGs were allowed, customer protection issues are raised as the level of service is impacted to customers as these microgrids are not designed to meet 100% of the load.
d. Interconnection	• There have been **no issues raised regarding interconnection of microgrid DER** in Phase 2, beyond those issues that may have been raised in the Interconnection docket. • Any unique issues related to interconnection of microgrid related DER should be addressed in the **Interconnection Docket** (2021-0024)

Priority Issue	Docket Parties Areas of Consensus
e. Coordinate with related microgrid and resilience initiatives at HECO and government agencies: *i. Identifying critical facilities* *- Identify disadvantaged community's (with HECO)* *- Propose how HECO should define and identify critical facilities, disadvantages areas and customers that could benefit from microgrids*	• The Parties recommend that identifying critical facilities should be through the following existing venues: - **Hawaiian Electric's Resilience Working Group** (part of IGP) will identify critical facilities that will include a broad range of community interests' - **HSEO currently leading an effort in conjunction with federal Infrastructure Investment and Jobs Act (IIJA) grant program** to identify resilience objectives and criteria that include disadvantaged communities
ii. Identify funding mechanism for microgrids, including state, federal funds to support pilots and/or demonstration projects	• There are significant funding mechanisms available for DER developers: - Recent federal government legislation (e.g., **IIJA and Inflation Reduction Act**) provide funding for resilient MG development for disadvantaged communities along with pre-existing federal DER loan programs and tax credits - Existing **battery storage incentives**, **DER bill credit** tariff programs, and **grid services opportunities** (Battery Bonus, Grid Supply Plus, Smart Export, Demand Response, etc.). Battery Bonus establishes upfront and monthly incentives, in addition to the compensation associated with the DER program. • **The Parties recommend the PUC evaluate the result of the federal funding opportunities before considering any further ratepayer funds** to promote MGs
iii. Identifying community needs *-discuss current processes, methods to identify community needs, propose improvements or alternative strategies where appropriate*	• The **HSEO effort** related to the federal IIJA funding opportunity is identifying these community needs • **Hawaiian Electric's resilience planning effort** including the Resilience WG continue to examine in more detail the implications and solutions for the electric grid, including MGs - The planning effort includes a proposed utility-operated hybrid MG procurement in North Kohala and a Hybrid MG mapping study in partnership with NREL (ETIPP)

Priority Issue	Docket Parties Areas of Consensus
iv. Better understanding barriers to microgrid development and what would make the microgrid tariff more attractive for developers *-discuss existing barriers* *-discuss, propose incentives, policies, and/or programs to make MST more attractive to developers*	• Based on information provided by developers, **no barriers were identified to customer or hybrid microgrid development in Hawaii under the current MST**, pro-forma operating agreement, DER tariffs, programs and grid services contracts • The issues for hybrid microgrid development involve primarily three issues: **1) Technology Costs**: Costs for control and monitoring systems to operate microgrids are currently very expensive. This is especially true for microgrids using renewable generation resources, which are very challenging to economically and financially justify due to the lower capacity factor of the generation resource and the size of the battery storage (kWh) to support long-duration outages (i.e., 24-96 hours). Note that most Mainland microgrids using wind or solar generation coupled with energy storage also have backup generation, usually diesel or natural gas. **2) Land Costs**: MGs often require relatively large space for its generation resources, energy storage, and possible substation requirements. This is especially true for renewable-based Hybrid MGs, which require a relatively large space for the solar, storage, switchgear and balance of system controls building (approx. 400x space compared to diesel) **3) Lifecycle Costs**: The full lifecycle costs typically involve a targeted needs assessment, conceptual study, feasibility study, engineering designs and interconnection studies, permitting, construction, testing and ongoing operations over a 10-20 year life. The focus to-date has been on addressing incentives/compensation for part of the engineering and construction costs (first costs), but significant development issues arise well before engineering and construction and afterwards. Preliminary studies for a hybrid microgrid can cost $100,000 to $1 million that are often beyond the reach of communities. Also, post construction operational costs over the 10–20-year life of a project are often not addressed. • All of these considerations are very complex and specific to each potential hybrid microgrid project. As such, these issues cannot be effectively addressed in a MST. These require a more detailed discussion of what specific costs may be suitable for an incentive under specific criteria aligned to statute or regulation. California's Microgrid Incentive Program is an example of the thoughtful consideration that is required to implement public policy and regulation.
v. Customer education and outreach *-offer proposals for customer education and outreach strategies to help reduce barrier* *-consider speaker program, PUC staff*	• **Unclear if customer education and outreach would reduce barriers** to MG development - Customer awareness of various solutions is already high with commercial technology firms actively marketing residential and commercial customer solutions - MGs are a more expensive solution that fits a narrow set of customers as described by MG developers - Hybrid MGs may be independently developed, but more often are done in conjunction with the utility • **ETIPP effort will include community outreach** (to be led by HNEI)

HSEO IIJA Aug 30 Webinar Recap
(Hawaii State Energy Office Infrastructure Investment and Jobs Act)

- $2.5B formula/$2.5 competitive funding administered by the U.S. Department of Energy for building resilience in the electric grid
  - Competitive funds **pending further guidance** from US DOE
- **HSEO** is the designated sole entity for the state to apply for, receive, and distribute **formula** funds
  - Eligible projects include microgrids, but must "**mitigate a disruptive event**…which operations of the electric grid are disrupted, prevented shut off, or cannot operate safely due to extreme weather, wildfire, or a natural disaster"
  - Requires HSEO to submit a plan to US DOE *(original due date September 30, 2022 extended to March 31, 2023)*[1]
- Hawaii to receive **$3M annually** for the next **five years**
  - Years 1-2: Oahu (Advance Assistance project)
  - Years 3-5: Kauai, Maui, Hawaii
  - HSEO anticipates being able to fund 1-2 projects each year
- HSEO currently receiving public comment on preliminary objective, metrics, and selection criteria
  - HSEO intends to issue a competitive solicitation for project proposals pending US DOE approval of plan and allocation of funding to states

[1] Section 40101(d) Formula Grants to States & Indian Tribes | netl.doe.gov

HSEO IIJA Timeline

(Hawaii State Energy Office Infrastructure Investment and Jobs Act)

- **July 6, 2022:** Funding Opportunity Announcement Issued by US DOE for IIJA Section 40101(d) Formula Funds

- **August 30, 2022**: HSEO Public Stakeholder Briefing on Grid Resilience Funds Plan
  - Recording: Resilience Project Funding - IIJA Section 40101(d) - Hawai‘i State Energy Office (hawaii.gov)
  - Presentation: https://energy.hawaii.gov/wp-content/uploads/2022/08/HSEO-Grid-Resilience-Funding-Plan-Stakeholder-Briefing-8-30-2022.pdf

- **September 30, 2022**: Deadline for Public Comment on HSEO Grid Resilience Funds Plan
  - Comment Form: https://energy.hawaii.gov/40101d-comment-form

- **March 31, 2023:** Due Date to U.S. Department of Energy for Grid Resilience Funds Plans

Remaining Work Plan

Meeting / Deadline	Date	Priority Issues
WG Mtg #8	Wednesday, Oct 19, 2022 10AM-12PM	• ***Identifying critical facilities*** *– Hawaiian Electric update on Resilience Application Filing / IGP RWG Next Steps* • Review and discuss draft report and tariff revisions
Status Conference	Thursday, Oct 27, 2022 Time TBD	
WG Mtg #9	Wednesday, Nov 9, 2022 10AM-12PM	• Discuss open items for WG report and tariff revisions
Parties to file Phase 2 WG Report	Wednesday, Nov 23, 2022	
Technical Conference	Thursday, Dec 8, 2022 Time TBD	

Mahalo for your time.

Any questions?

Case Study Evaluation Framework

- Motivation for Hybrid Microgrid
  - Situational context for initiating microgrid study
  - What were the primary factors? (e.g., resilience, economics, research, other)
- Proposed Hybrid Microgrid Scope
  - Number of critical facilities
  - Number of customers
  - Disadvantaged population
- Proposed Hybrid Microgrid Design
  - Generation resources
  - Storage resources
  - Microgrid Controller (who owns, controls?)
  - Configuration
  - % load served when islanded and duration capability
- Ownership Model (examples below)
  - Private owner/operator – City/County or Customers resilience service counterparty
  - Private owner/operator – Utility resilience service counterparty
  - City/County owner/3rd party operator - Customers resilience service counterparty
  - City/County owner/3rd party operator - Utility resilience service counterparty
  - Utility owner/3rd party operator - Utility resilience service counterparty

Case Study Evaluation Framework

- Economics (as available)
  - Revenue Model(s)
    - Energy sales
    - Avoided retail tariff charges (e.g., demand charges)
    - Bulk power and distribution grid services
    - Resilience service contract between microgrid operator (third party or utility) with customers
    - Resilience service contract with grid operator (third party or utility)
  - Expenditures (lifecycle)
    - Project development (incl. feasibility studies and preliminary design)
    - Project Implementation (incl. equipment & installation, land acquisition, system testing, operational training, etc.)
    - Microgrid Operations (incl. ongoing maintenance and operations)
  - Funding
    - Project Revenue
    - 3rd Party Financing
    - Federal & State Grants
    - City/County funds
- Enabling Regulatory Mechanisms
  - Applicable tariffs, rules, markets, programs
  - Barriers identified
- Decision Considerations & Outcomes
  - Key considerations for Hybrid MG decision makers (developer/owner/off-takers)
  - Proposal outcome(s)
- Applicability to Hawaii
  - Relevant takeaways for Hawaii & MST Ph2 issues
    - Are there any tariff improvements that would further support this project?
    - Is there a benefit for voluntary islanding during non-emergency situations?
    - How could the tariff further promote resiliency for remote communities and critical facilities?
    - What grid services are being provided?

Open Questions

Phase 2 Priority Issue	Questions
a. Microgrid Compensation and Grid Services	• Who should get compensation and why? • Aside from resilience service, are there any energy and grid services not already available to MGs through PPA, tariff or program?
c. Customer Protection and Related Considerations	For Hybrid MGs that may island voluntarily: • Who is protecting the customer if 100% of load not met during blue-sky conditions (MGs typically are not designed for 100% of load, or long duration if renewable energy based)? • What is the benefit of voluntary islanding for customers and how does this support the original intent of Act 200 to promote microgrids for resiliency purposes?
e. ii. Identifying a variety of funding mechanisms for microgrid development, including possible state and federal funds that can be leveraged to support pilots and/or demonstration projects	• State access to IIJA funding potential for hybrid MG, what is the potential? Also, DOE's Loan Program Office funding potential. • How much funding would be needed to support Hawaii's community resilience goals (how many projects)? • Should there be a focus on disadvantaged and vulnerable communities at risk to address equity issues? • How to address preliminary engineering, implementation costs and ongoing operational costs for a third party owned & operated Hybrid MG?
e. v. Customer education and outreach	• What types of Customers are interested in Customer MGs or Hybrid MGs and why?
Overall	• What are the "low-hanging fruit" that can result in a tangible Hybrid MG project to help critical infrastructure and vulnerable communities as soon as possible?

Procedural Timeline