

Microgrid Services Tariff Working Groups Joint Meeting

January 17, 2020



Hawaiian Electric
Maui Electric
Hawai'i Electric Light

MGS Tariff WGs Agenda

Time	Duration (m)	Topic
8:00-8:30	30	Introductions / Jan 9 PUC Status Update
8:30-9:00	30	Presentations <ul style="list-style-type: none">C. Baird Brown – Microgrid Resources Coalition
9:00-9:15	15	Break
9:15-10:15	60	Microgrid Services Tariff Draft
10:15-10:30	15	Break
10:30-11:00	30	Rule 14H Modifications
11:00-11:30	30	Rule 24 Modifications
11:30-12:00	30	Closing / Next Steps



Review: Jan 9 PUC Status Update



Company Proposed Hybrid Microgrid Tariff Concept

Presented at Jan. 9 PUC Status Update

- ◆ Employ simplifying approach to expedite development & implementation of Hybrid MGS Tariff
 - ◆ Based on WG member suggestion from experience in other states
 - ◆ Enables hybrid microgrids to develop in Hawaii – WG suggested a focus on Hawaii specific opportunities recognizing that Hawaii Hybrid MG opportunities may be different than mainland
 - ◆ Limited industry experience with Hybrid Microgrids (only 2 examples identified by WG in development – simple hybrid microgrids in NY & CA)
- ◆ Proposed approach reflects feedback to focus on emergency situations and recognizes that emergency conditions are likely to be relatively rare and short in duration
- ◆ Within this context, the proposed approach simplifies the transactional relationships for all parties (i.e., customers MG developers/operators).
 - ◆ Existing DER tariffs and programs are in effect in normal and emergency (islanded) modes – simplifies the customer experience and minimizes the back-end accounting and settlement costs
 - ◆ The MG operator that may also be a DER aggregator during normal conditions continues any grid services provided during emergency conditions as needed
 - ◆ Allows MG Operator to provide resilience service relationship directly with Hybrid MG Customers independent of HECO/PUC
 - ◆ Enables opportunity for MG operator to provide HECO grid resilience service for if broad public benefit is provided
- ◆ Proposed approach avoids more complex issues that have little hybrid MG precedence in the industry, for example retail wheeling, regulatory issues associated with the microgrid operator being deemed a public utility, and grid operational responsibilities during emergency conditions.

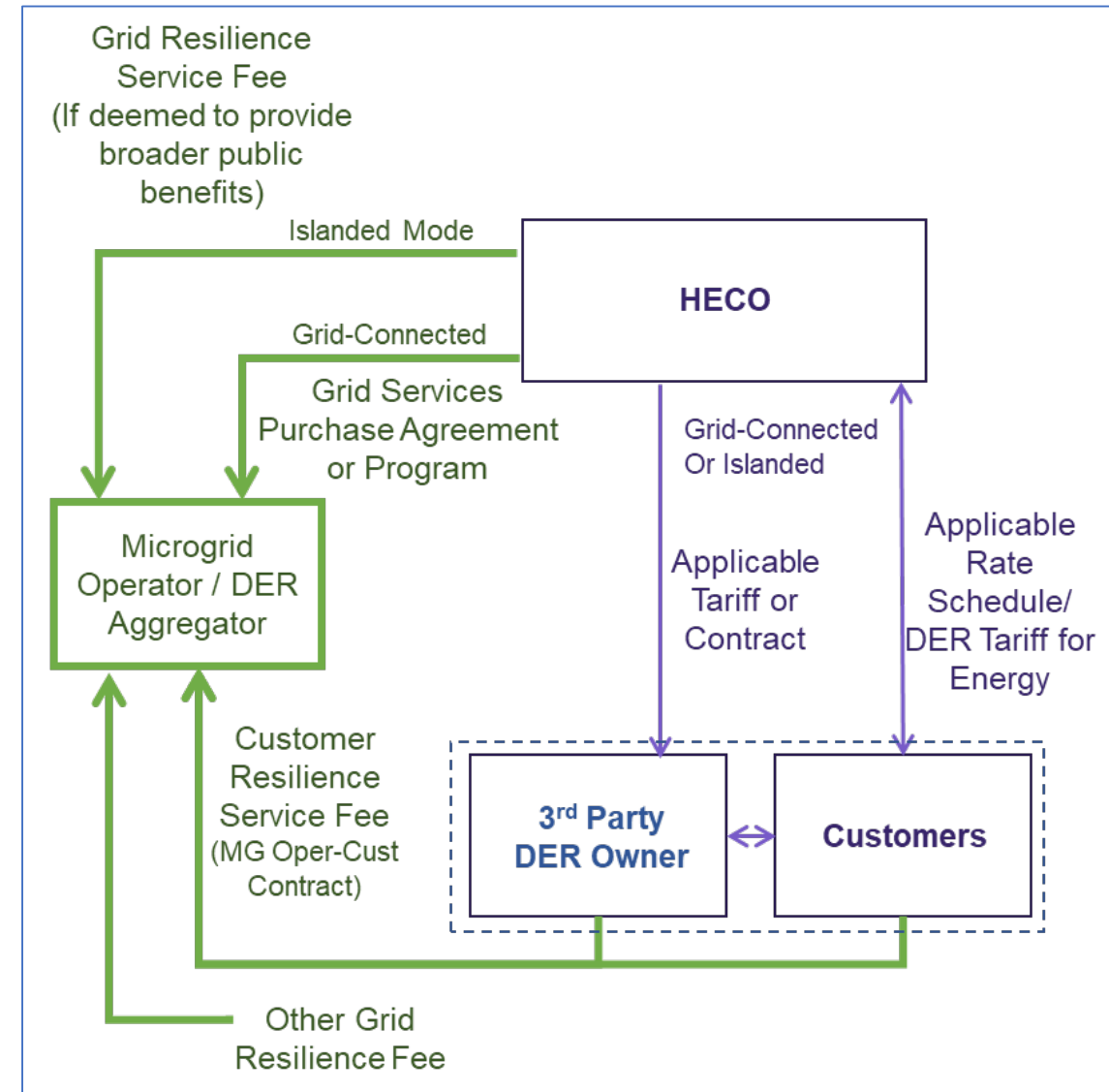
Company Proposed Hybrid Microgrid Tariff Concept

Presented at Jan. 9 PUC Status Update

Diagram illustrates financial transactions between parties during normal and emergency conditions

Roles & Responsibilities

- **Microgrid Operator:**
 - Provides any aggregated contracted/ programmatic grid services to HECO (incl. energy)
 - Provides grid resilience service, if applicable
- **Customer:**
 - Contracts with MG Operator to allow their DER to be used for grid services/ Hybrid MG formation and operation
 - Contracts with MG operator for resilience services
- **Independent DER Owner (may also be the MG Operator):**
 - Provides any contracted/ programmatic grid services to HECO (incl. energy under CBRE)
 - Contracts with MG Operator to allow their DER to be used for grid services/ Hybrid MG formation and operation
- **Hawaiian Electric:**
 - Responsible for T&D grid operations, repair and maintenance during normal and emergency conditions
 - Provides tariff services to customers during normal and emergency conditions
 - Selling and buying any tariff based energy under existing applicable tariffs
 - Providing grid delivery services and customer services as part of existing tariffs



Draft Tariff Comments / Guidance Requested

Presented at Jan. 9 PUC Status Update

- ◆ Received Comments from 3 WG Members
 - ◆ Comments from WG member:
 - ◆ Ability to arbitrage between different sources
 - ◆ Allow Non-Renewable Energy in Grid-Connected Mode
 - ◆ Customers within the MG do not need to have an account with the utility
 - ◆ Is a MG serving an electrically bounded area a Public Utility?
 - ◆ Guidance Requested
 - ◆ Should the WG address compensation (other than established tariffs) during grid-connected mode beyond the WG's focus to enable MGs that can disconnect from the grid to operate in island mode during emergency events or grid outages?
 - ◆ Are retail energy sales (competitive energy services over the grid) to HECO's retail customers during **normal conditions** part of the scope of the MGS Tariff? Is it more appropriate and can this issue be addressed more fully in a separate proceeding?
 - ◆ Should MGs operating in grid-connected mode support RPS? If not, who is responsible for RPS compliance for this portion?
 - ◆ Is it acceptable to consider more complex issues involving "Mini-grid" Hybrid MGs, such as establishing a PCC on the primary distribution system, customer opt-out, and retail wheeling operational coordination, regulatory, and consumer protection issues, specific terms and pricing during emergency conditions in a later phase as those development opportunities emerge in the appropriate proceedings?
 - ◆ Other comments received to be discussed at the next WG meeting

Jan. 9 PUC Status Update Summary

- ◆ No comments received on proposed hybrid concept.
- ◆ PUC Questions
 - ◆ Requested NELHA Update
 - ◆ WG Lead Response: NELHA unable to present (currently in procurement). No Regulatory Flexibility planned to be requested. Project will be requesting a Standard Interconnection Agreement (SIA) from HELCO.
 - ◆ Plan to address WG members that provided comments in the document
 - ◆ WG Lead Response: Will be discussed at Jan. 17 WG meeting.
- ◆ WG Member #1 Comments
 - ◆ Hawaii context needs to be taken into account. Princeton example is not likely, other than on UH campus.
 - ◆ MG must be able to island, and thus would likely include a power plant, and require utility involvement.
- ◆ WG Member #2 Comments
 - ◆ Scale of MG: as small as household with batteries to as large as installation like Princeton.
 - ◆ Contacts working on Customer MGs (not hybrid).
 - ◆ Important to have tariff that covers customer and hybrid MGs.
 - ◆ MGs should not be exempt from State Renewable Energy Goals.

January 16, 2020 Letter from PUC

- ◆ Compensation while grid connected
 - ◆ Commission does not believe it is necessary to address this issue
 - ◆ Issue may be more appropriate to explore within Dkt 2019-0323 – DER Policies
- ◆ Third Party Retail Energy Services
 - ◆ Intent of the initial phase is to establish a tariff that reduces regulatory barriers that may prevent microgrids from providing energy to consumers during an outage or emergency event.
 - ◆ Commission recognizes the simplified hybrid microgrid proposal may result in a more expedited offering, as it does not require retail wheeling.
- ◆ Renewable Energy Requirement While Grid Connected
 - ◆ The Commission expects that if the microgrid is a “customer” that is grid connected through any tariff, it is the HECO Companies’ responsibility to ensure compliance with the State’s RPS
 - ◆ In Order No. 36481, the Commission requested that the Working Group recommend a threshold for renewable energy within the microgrid and expects the MST will establish a RE requirement for MG generation. Established threshold could be a placeholder that can be adjusted at a later time.
- ◆ Additional Issues for Consideration
 - ◆ Supportive of addressing complex issues at a later date, or in separate proceedings.
 - ◆ Expects filed tariff will provide opportunities for the increased deployment of both customer and hybrid MGs.



C. Baird Brown
Microgrid Resources Coalition / eco(n)law LLC



Hawai'i Public Utility Commission

Microgrid Services Tariff

Working Group Webinar

Presentation on behalf of:

Microgrid Resources Coalition

C. Baird Brown
eco(n)law

Background

HB 2110

- “The purpose of this Act is to encourage and facilitate the development and use of microgrids through the establishment of a microgrid services tariff”
- “Any person or entity may own or operate an eligible microgrid project”
 - Not limited to utility customers, microgrid “residents”, or Hawai’i entities
- Development has been inhibited by: “a lack of standard terms regarding the value of services exchanged between the microgrid operator and the utility”
- A tariff designed to “provide fair compensation for electricity, electric grid services, and other benefits provided to, or by, the electric utility, the person or entity operating the microgrid, and other ratepayers”

Microgrid Motivations

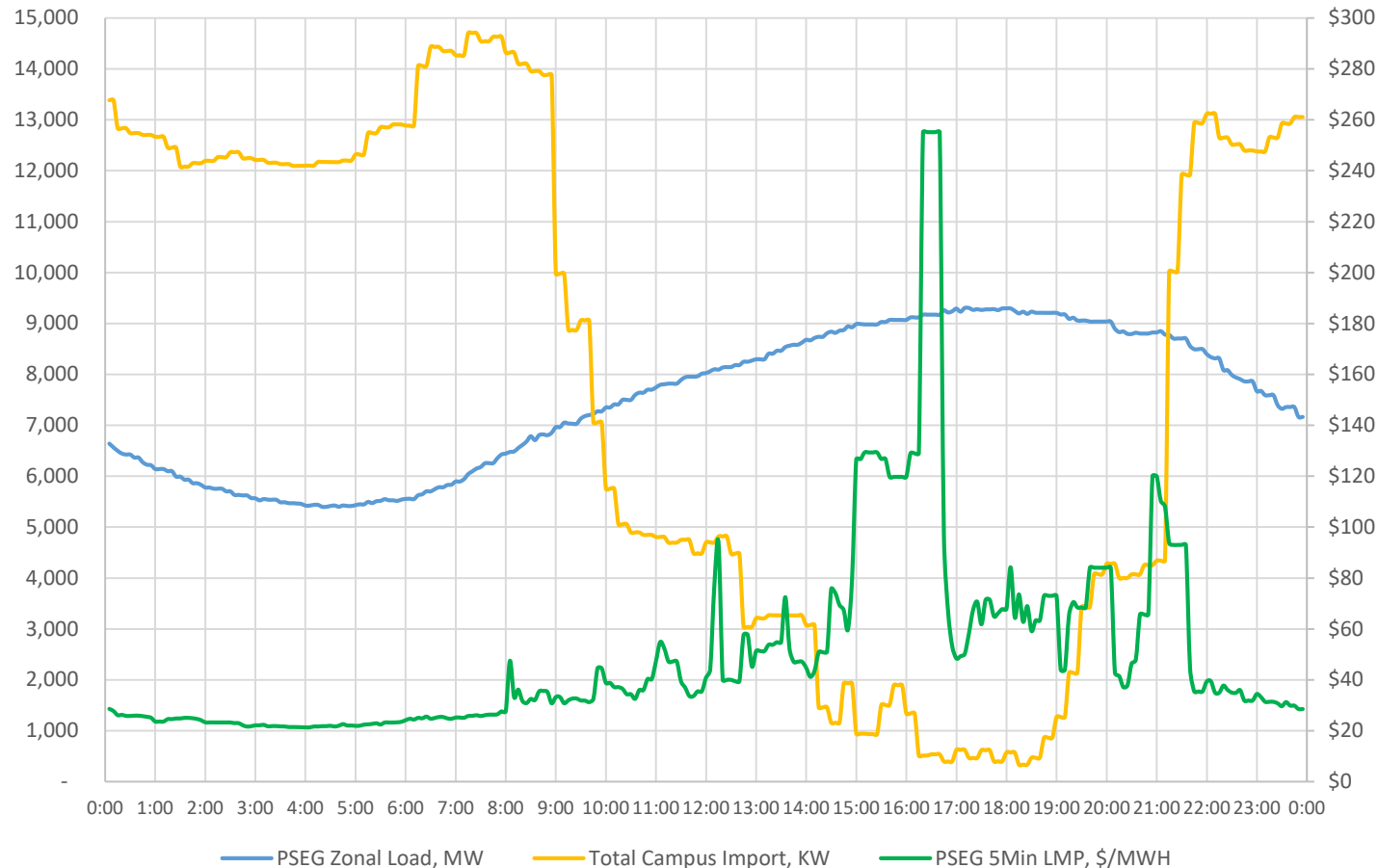
- Energy Cost Savings - optimize for customers across:
 - Infrastructure costs
 - Fuel and operating costs
 - Tariff revenues
- Resilience
 - For internal customers
 - For communities – by serving critical facilities
- Carbon Emissions Reductions
 - Implement stabilized, visible, grid friendly low carbon solutions
 - Will be better than grid and will evolve
- Empowers customers and communities

Optimizing for Microgrid Customers

- Energy Efficiency
 - Load reduction
 - Load control
- Distributed generation
 - Solar and other renewables
 - Cogeneration or fuel cells
 - Back up generation?
- Electric and thermal energy storage
- Fuel optionality
- Smart grid interface
- Scaled from household to major campus

Princeton Microgrid Performance

Princeton Campus Power Demand, PSEG Grid Demand, and Energy Price,
July 19, 2017



Note that system load and campus imports use the same left margin scale, but system load is in MW and campus imports are in kW.

Princeton purchased a substantial amount of electric energy in the early morning to charge its thermal storage – chilled water in an insulated tank. It then purchased almost no electric power at the time of peak usage and peak pricing on the PJM system. This result at peak was achieved by 15 MW of cogeneration and 3.75 MW of solar. Normal campus load of around 26 MW was reduced to around 19 MW through use of steam chillers supplied by heat from the cogeneration plant and discharge of chilled water from the thermal storage tank. Princeton avoided purchasing high priced power (the prices reached \$255.00), and reduced its obligation to pay transmission charges, which are allocated according to customer usage at system peak. Princeton paid a weighted average of \$34.06 per MWh for power that day compared to a system average price of \$50.17 per MWh.

Tariff Proposal

Microgrid Operator

“Microgrid operator” means an entity that

- is the single point of operational communication and control between a microgrid project and the utility grid operator
- acts as the single point of financial responsibility for purchases and sales of energy and other services on behalf of the microgrid
 - except in instances where a utility provides direct energy delivery and metering to customers of a hybrid microgrid during grid connected mode

Right to Establish Microgrids

- Any customer or group of customers or third-party developer acting on their behalf can form a microgrid subject to the interconnection requirements of the tariff.
- The owner and the operator of a multi-customer microgrid qualified under the tariff is not a public utility.

Renewable Energy Standard

- Microgrids must advance state renewable energy goals
 - As an example, require a microgrid to meet the standard to be in effect 10 years from the in-service date of the microgrid
- Microgrids can deploy a "mixed resource profile" to include renewable energy but able to provide "extended grid support if necessary"
 - Long term resilience will (today) require fossil fuel
 - Back-up generation is frequently unreliable
 - The microgrid should be able to internally balance renewables for its own benefit and the benefit of the grid

Sales of Services by the Microgrid

- Microgrids may provide services on a non-discriminatory basis under any available tariff, market, or procurement process now or hereafter operated by the utility for which they qualify
- Islanding at utility direction should be considered as a service separate from demand response.
 - It has different costs than typical demand response and may be provided in more limited circumstances
- May need a separate basis for delivering services in an emergency if the microgrid can help support a local portion of the grid
 - Requires the utility to create a more modular grid

Sales of Energy to the Microgrid

- Energy provided to the microgrid is sold to the microgrid operator acting on behalf of included customers in the aggregate
 - In certain hybrid types, the utility bills its customers in the microgrid at regular tariff rates
- A microgrid operator purchasing in bulk for included customers should be eligible for any tariff for which its aggregate purchases qualify
- Microgrids should be able to opt-in to a time-of-use tariff.
- Charges for standby service (if any) reflect low likelihood of:
 - Simultaneous outages of all internal microgrid resources
 - Outages of multiple microgrids due to any common cause

Interconnection

- Generally defer to the outline in the working group draft
- Consider requiring synchronous connection capability
- Treat the microgrid as a single controllable resource
 - Don't require separate standards for each included resource
 - Don't restrict resource combinations
- Address communication capability with the grid operator
 - May be addressed in individual service tariff requirements

Hybrid Microgrids

	Type	Wires Ownership	Customer Billing	Sales to Grid
1.	Customer Hybrid	<ul style="list-style-type: none"> • Utility in whole or in part. • “Lease” of wires. • Wire maintenance as agreed in lease 	<ul style="list-style-type: none"> • By Operator 	<ul style="list-style-type: none"> • By Operator
2.	Billing Hybrid	<ul style="list-style-type: none"> • Utility in whole or in part. • “Lease” of wires. • Wire maintenance as agreed in lease 	<ul style="list-style-type: none"> • By utility • Utility bill passes through operator charges 	<ul style="list-style-type: none"> • By Operator
3.	Utility Hybrid	<ul style="list-style-type: none"> • Utility in whole or in part. • “Lease” of wires. • Wire maintenance as agreed in lease 	<ul style="list-style-type: none"> • By utility • Full utility billing 	<ul style="list-style-type: none"> • By microgrid customers

Other Hybrid Microgrid Issues

- Liabilities in all cases attach to the responsible party
 - The utility maintains the infrastructure (unless responsibility is assigned in a lease) and would be responsible for failures due to maintenance
 - In types one and two the microgrid operator operates behind the point of common coupling and would be responsible for its operational errors
 - In Type 3, the microgrid operator only “operates” in island mode and would have liability then
- Need to establish a cost basis for a wires lease including maintenance services by utility, if provided (except in Type 3)
- Need to establish a mechanism and basis for billing services in island mode for Type 3

Resilience Payments

- Local governments and the Hawai'i Emergency Management Agency identify critical facilities for resilience
- Utility and PUC identify critical circuits that serve critical facilities
- Tariff provides scaled support for microgrids serving critical facilities and integrating with critical circuits based on level of criticality, level of threat, and size of microgrid, with credit for energy justice areas
- Can consider requiring microgrid to provide islanding services at direction of utility

Questions?

C. Baird Brown

eco(n)law LLC

230 S. Broad Street, 17th Floor

Philadelphia, PA 19102

p. 215-586-6615

baird@eco-n-law.net

“The economy is a subset of the ecology”

Microgrid Services Tariff Draft

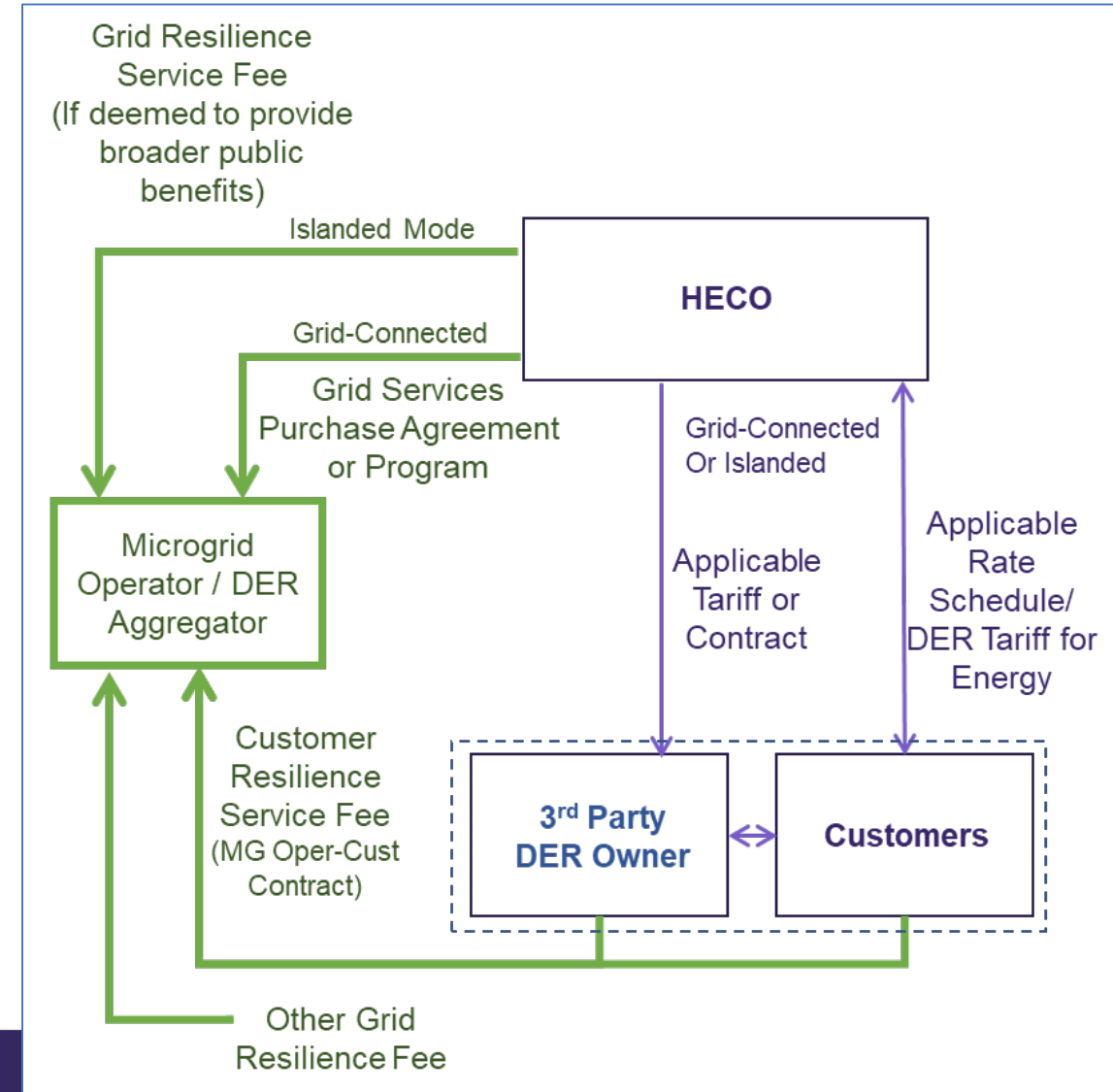


Revisited: Company Proposed Hybrid Microgrid Tariff Concept

Diagram illustrates financial transactions between parties during normal and emergency conditions

Roles & Responsibilities

- **Microgrid Operator:**
 - Provides any aggregated contracted/ programmatic grid services to HECO (incl. energy)
 - Provides grid resilience service, if applicable
- **Customer:**
 - Contracts with MG Operator to allow their DER to be used for grid services/ Hybrid MG formation and operation
 - Contracts with MG operator for resilience services
- **Independent DER Owner (may also be the MG Operator):**
 - Provides any contracted/ programmatic grid services to HECO (incl. energy under CBRE)
 - Contracts with MG Operator to allow their DER to be used for grid services/ Hybrid MG formation and operation
- **Hawaiian Electric:**
 - Responsible for T&D grid operations, repair and maintenance during normal and emergency conditions
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MG Svcs Tariff Draft Document Review – Sec. B&C

Red-lined

<p>located within the defined electrical boundaries of the Hybrid Microgrid.</p> <ul style="list-style-type: none"> While operating in grid-connected mode, all generating components of the Microgrid Facility shall contain a solar, wind turbine, biomass, or hydroelectricrenewable energy generating component (i.e. solar, wind turbine, biomass, hydroelectric, etc.)ie solar, wind turbine, biomass, hydroelectric, etc.) facility or a system consisting of two or more of these facilities.renewable energy facilitiescomponents. <p>C. INTERCONNECTION.</p> <p>A Customer Microgrid and/or customers within a Hybrid Microgrid through an aggregator may interconnect to the Company's system through existing programs and tariffs for Grid-connected Mode.</p>	<p>BK Bryant Komo What is a generating component? Why does there have to be a grid-tied generator?</p> <p>BK Bryant Komo If the generator portion of the system is not interconnected/non-parallel, will this still apply?</p>
<p>A Hybrid Microgrid will require a Standard Interconnection Agreement or other agreements with the Company, subject to the terms and conditions set forth in the Company's Rule 14, Section H and other applicable Company rules.</p>	

Clean

<ul style="list-style-type: none"> While operating in grid-connected mode, the Microgrid Facility shall contain a renewable energy generating component (i.e. solar, wind turbine, biomass, hydroelectric, etc.) or a system consisting of two or more of these facilities.renewable energycomponents. <p>C. INTERCONNECTION.</p> <p>A Customer Microgrid and/or customers within a Hybrid Microgrid through an aggregator may interconnect to the Company's system through existing programs and tariffs for Grid-connected Mode.</p> <p>A Hybrid Microgrid will require a Standard Interconnection Agreement or other agreements with the Company, subject to the terms and conditions set forth in the Company's Rule 14, Section H and other applicable Company rules.</p>

Original = WG Leads
Purple = HELCO
Blue = Energy Island



MG Svcs Tariff Draft Document Review – Sec. D

This tariff will provide for compensation to Customer Microgrids and Hybrid Microgrid Operators for providing resilience grid service for utility transmission and distribution infrastructure used to form the Microgrid Facility during an emergency ~~that provide clear, broad-based public benefits for to improve~~ resiliency, meeting the following criteria: Compensation may be proposed by developers identifying a public benefit, as identified through the utility planning process, or other identified need by others (e.g., State Policy, legislative, etc.). Compensation that differs from existing tariffs (i.e, riders, Grid Service Purchase Agreements, PPA, etc.) shall be subject to approval by the Public Utilities Commission.

[Note Commission guidance in Order No. 36481 at 54, "In cases with clear, broad-based public benefits, the commission may consider compensation through the MGS Tariff for resilience benefit, but the burden is on the Parties to justify this benefit."]

~~{Some of the criteria to consider from the ICP Resiliency Working Group}~~

- ~~• The description of the threat that the microgrid can meet.~~
- ~~• The description of the customer capability and need being met~~
- ~~• The description of the major vulnerability being met~~

~~Process for determining the amount of compensation.~~

Original = WG Leads
Red = WG Leads Revisions



Remaining Sections

- ◆ Additional Modifications Required?
- ◆ Topics to include within sections?
- ◆ Other sections required?
- ◆ Volunteers to provide verbiage? Or WG Leads to provide?

Current List of Remaining Sections:

- ◆ Customer Participation
- ◆ Credit Rate and Fees
- ◆ Microgrid Operator Participation
- ◆ Hybrid Microgrid Interconnection Facilities
- ◆ Operational Requirements
- ◆ Microgrid Services Operation Agreements



Remaining Sections – Sec. E&F

E. CUSTOMER PARTICIPATION.

- Participant required to enter into a model participant contract with Microgrid Operator. [Will we develop a model contract or at minimum, requirements that must be included/addressed in a participant agreement?]
- Any one time resiliency fee and ongoing O&M fees must be stated in the Participation agreement. Payments from the Customer/Participant are transmitted directly to the Microgrid Operator.
- Participant agreement shall not modify any rate schedule or charges. Hawaiian electric tariffs and rate schedules will remain subject to change by the PUC.

F. CREDIT RATE AND FEES.

- Participants/Customers will continue to be charged for electric service at their current applicable rate.
- All other incentives paid for grid services or other programs still apply

- Any other topics to be covered?
- Volunteers to provide verbiage?



Remaining Sections – Sec. G, H, I, J

G. MICROGRID OPERATOR PARTICIPATION.

- Demonstration of site control, certificate of good standing with the DCCA, incorporation/formation in Hawaii, etc.
- [Will there be any minimum requirements of on-going or one time fees that Microgrid Operators are allowed to charge Participants/Customers]
- A list of customers contained within the microgrid boundaries.
 - Provide proposed physical and electrical boundaries of the Microgrid.

H. HYBRID MICROGRID INTERCONNECTION FACILITIES.

- Additional facilities needed to enable the microgrid boundaries
- Facilities to be borne by the microgrid operator.

I. OPERATIONAL REQUIREMENTS.

J. MICROGRID SERVICES OPERATION AGREEMENTS.

- Any other topics to be covered?
- Volunteers to provide verbiage?



Rule 14H Modifications



Rule 14H Modifications Document Review

s. Microgrid Operation: A Customer Microgrid or Hybrid Microgrid [drafting note: add defined terms to definition section] may intentionally form an island ("Microgrid Mode") on a scheduled or unscheduled basis. A scheduled Microgrid Mode operation can be initiated through a manual action by the microgrid operator or the Company or other operating dispatch means (e.g., energy management system) that trigger the transition from operating in parallel and synchronized ("Grid-Connected Mode") with the Company's transmission and distribution system ("Company System") to operation as an islanded system.

Scheduled Microgrid Mode operation is normally initiated to test Microgrid Mode operation, or as a pre-emptive action ahead of impending weather events.

An Unscheduled Microgrid Mode operation is initiated autonomously in response to abnormal conditions present on the Company System. An automatic action will trigger the microgrid to transition from Grid-Connected Mode to Microgrid Mode.

The Generating Facility may disconnect from the Company System and transition from Grid-Connected Mode to Microgrid Mode, (1) if any of the Trip or Cease to Energize conditions as required by this Rule (e.g., Table 4A-1, Table-4A-4, and Table 4A-5) or (2) where anti-islanding conditions are present where the Generating Facility is required to Cease to Energize and Trip within two seconds where an island may be detected on the Company System. In either of these cases, the Generating Facility may transition to Microgrid Mode provided the Microgrid does not energize any part of the Company System that is outside the defined electrical boundaries of the Microgrid. [emphasize when grid connected need to RT.]

BK

Bryant Komo

Do all references to section 4A also apply to non-inverter generation?

Red = WG Leads
Blue = Hawaiian Electric



Rule 14H Modifications Document Review

<p>(i) <u>Transition from Grid-Connected Mode to Microgrid Mode</u> <u>If the Microgrid transitions from Grid-Connected Mode to Microgrid Mode while the Company System is operating within the Continuous Operating region defined in Table 4A-1 (Voltage Ride-Through), Table 4A-4 (Frequency Ride-Through for Oahu, Hawaii Island, Maui), and Table 4A-5 (Frequency Ride-Through for Molokai and Lanai), the act of transitioning shall not cause step or ramp changes in the voltage measured at the PCC exceeding 5% of nominal and exceeding 5% per second averaged over a period of one second. This Frequency Ride-Through requirement (regardless of whether the Company System has a disturbance) also ensures that the act of transitioning does not cause a frequency disturbance on the Company System. These limits also apply to frequent switching of capacitors, frequent tripping or misoperation of the Generating Facility, or frequent energization of transformers.</u></p> <p><u>(a) During a Scheduled Microgrid Mode event, the Microgrid additionally, shall ramp down such that the power export across the PCC to the utility is less than zero kW at the ramp rate defined</u></p>	
<p><u>in accordance with the Soft-Start Ramp Rate defined in Section 4A. of this Rule.</u></p> <p>(ii) <u>Reconnection of a Microgrid with the Company System</u> <u>A Microgrid operating in Microgrid Mode may reconnect and transition back to Grid-Connected Mode, when the voltage at the PCC satisfies the Return to Service requirements defined in Section 4A.g, and the system frequency satisfies the enter service criteria found in [UL-1741 Supplement SA Standard for Grid Support Utility Interactive Inverters and Converters using the applicable utility Source Requirements Document]. Upon reconnecting with the Company System, the requirements for Synchronization defined in Section 4.c shall be met and shall not cause step or ramp changes in voltage defined in (j), above.</u></p>	<p>BK Bryant Komo Hopefully, this should change to IEEE 1547-2018 using the applicable utility URP</p>

Red = WG Leads
 Blue = Hawaiian Electric



Discussion

- ◆ Other changes required?



Rule 24 Modifications



Rule 24 Modifications Document Review

F. CUSTOMER MICROGRIDS [Other DER tariffs to be modified similarly]

1. A Microgrid defined as a group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single controllable entity with respect to the utility's electrical grid and can connect to public utility's electrical grid to operate in grid-connected mode and can disconnect from the grid to operate in island mode, and that: (1) is subject to a microgrid services tariff; and (2) generates or produces energy.¹ ("Microgrid Facility")
2. Pursuant to Section A of this Rule, while operating in grid-connected mode, ~~all generating components of~~ the Microgrid Facility shall contain a ~~renewable energy generating component (i.e. solar, wind turbine, biomass, ~~or~~ hydroelectric, etc.)- energy generating facility~~ or a system consisting of two or more of these ~~renewable energy components~~ facilities.
3. During grid-connected mode, the Microgrid Facility will be operated in parallel with the Company's transmission and distribution facilities.
4. Customer Microgrids are defined as self-governed, acting as a single controllable entity normally operated in utility grid-connected mode² and can disconnect from the grid to operate in island mode for emergency operations or grid outages. Customer Microgrids may involve a single customer or multiple customers downstream of a point of common coupling with an electric utility, utilizing either (i) own, (ii) lease or otherwise obtain use of non-utility owned distribution

¹ HRS §269-46(c)

² define

wires and other internal infrastructure of the microgrid from non-utility third parties.

Blue = WG Leads
Red = Energy Island



Rule 24 Modifications Document Review

5. A Generating Facility that intends to operate as a Microgrid Facility shall indicate such operation in Section X of the Interconnection Agreement and comply with Rule 14, Paragraph H, Section 4, Operating Requirements for Microgrid Operation. [drafting note: modify Interconnection Agreement]

6. During the transition from grid-connected mode to islanded or microgrid operations, the Generating Facility or Microgrid Facility shall not at any time operate in parallel with the Company's transmission or distribution system for a duration of more than 100 milliseconds.

7. If a Generating Facility intends to operate in parallel with the Company for more than 100 milliseconds, the Eligible Customer-Generator must indicate such operation in Section X of the Interconnection Agreement. [drafting note: modify Interconnection Agreement]

8. Upon Technical Review of the Interconnection Agreement, the Company may require an Operating Agreement between the Customer-Generator and the Company to facilitate the operation of the Generating Facility in parallel with the Company's system for a duration exceeding 100 milliseconds.

9. The Operating Agreement is intended to enable the Generating Facility to operate as a Customer Microgrid during electrical power disturbances and to reconnect to the Company system when normal voltage-isoperating conditions are restored. The scope of the Operating Agreement is intended to establish mandatory operating procedures in connection with the operation of the Customer Microgrid to ensure it does not adversely affect the safety and reliability of , or otherwise interfere with, the Company's operations.

BK

Bryant Komo

Is this defined as only during a disturbance? Otherwise if it's a scheduled microgrid, how would we know if they're operating in parallel for 100 ms?

BK

Bryant Komo

Is this just saying the facility shall not backfeed the utility lines? During an outage, it's technically not operating in parallel since we are not operating at all during that time. Suggest rewording to "During the transition from grid-connected mode to islanded or microgrid operations, the Generating Facility of Microgrid Facility shall not at any time energize the Company's transmission or distribution system for a duration of more than 100 milliseconds"

BK

Bryant Komo

Are there conditions for reconnection? Should they be following IEEE 1547? Will a sync check relay be required for non-inverter based GF?

Blue = WG Leads
Red = Energy Island
Orange = Hawaiian Electric



Discussion

- ◆ Other changes required?
- ◆ Agreement to apply to other DER Rules (Smart Export, Customer Self-Supply)?



Closing / Next Steps



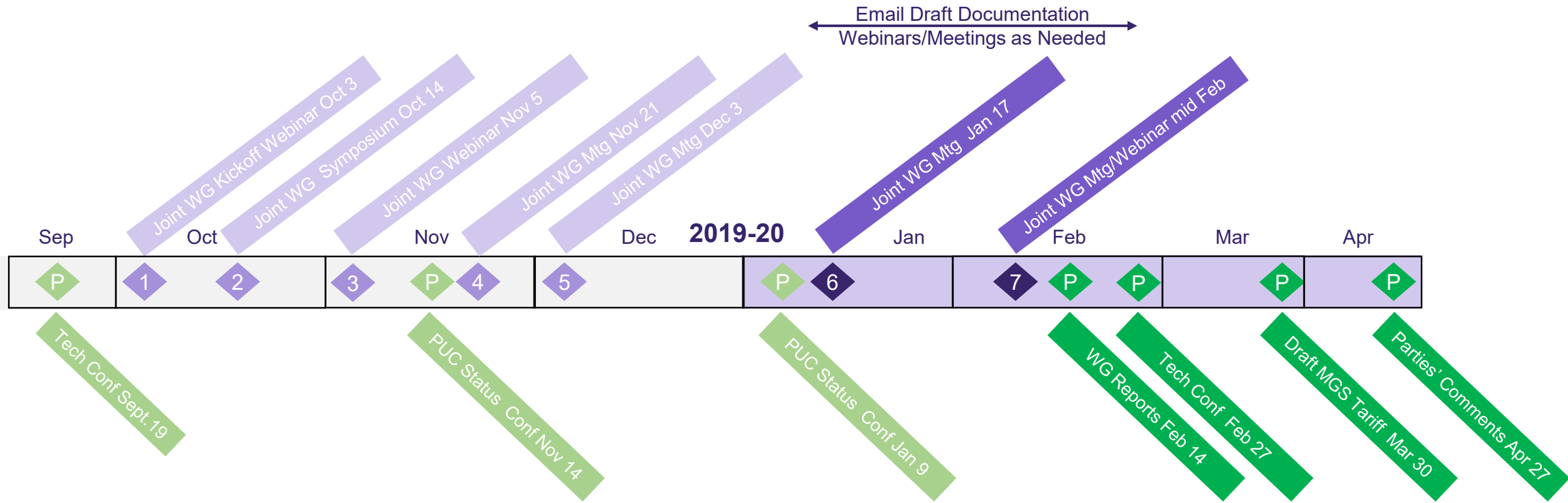
Parking Lot Topics To-Date

- ◆ Change of ownership of Microgrid
- ◆ Standby Charges or Exit Fees
- ◆ Customer protection-related considerations
- ◆ Microgrid/IGP procurement considerations
- ◆ Considerations of gaming between utility-owned and 3rd-party MGs
- ◆ Army/Military MG issues such as WG will consider nested microgrids, if appropriate
- ◆ Interactions with other dockets
 - ◆ DER Tariff/Programs
 - ◆ IGP Resiliency
- ◆ Consideration of societal, environmental value
- ◆ Development of PPA model for hybrid MGs
- ◆ Other types of microgrids that don't fit Act 200 definition
- ◆ Gap in tariff for customers greater than 100kW participation & compensation in non-normal, non-island scenarios. Eg, SIA
- ◆ Harmonize compensation with other grid service mechanisms
 - ◆ Expanded functionality from MG service and whether should be included in MST.



Timeline for MGS Tariff WGs

Adjust as needed based on stakeholders feedback & co-chairs' direction



Next Steps

- ◆ Feb ? : Meeting or over email?
- ◆ Feb 14: WG Report
 - ◆ Meeting Minutes
 - ◆ Presentations
 - ◆ Summary
 - ◆ Current draft tariff
 - ◆ WG Members to provide written comments
- ◆ Feb 27: Technical Conference

