

**HECO IGP Technical Advisory Panel
Summary and Feedback from May 2022 Meeting
06/05/2022**

This feedback and summary was delivered by the IGP Technical Advisory Panel (TAP) to Hawaiian Electric (HECO) based on HECO's slides and presentation at the full TAP meeting on May 4 and 5, 2022.

TAP members present:

- Andy Hoke (NREL, Chair)
- Aidan Tuohy (EPRI, Vice-Chair)
- Kevin Schneider (PNNL)
- Matthias Fripp (UH)
- Elaine Hale (NREL)
- Debbie Lew (ESIG)
- Vishal Patel (SCE)
- Deepak Ramasubramanian (EPRI)
- Rick Rocheleau (HNEI)
- Derek Stenlik (Telos)
- Gord Stephen (NREL/UW)
- Terry Surles (UH)

HECO participants:

- Marc Asano
- Ken Aramaki
- Colton Ching
- Alan Hirayama
- Chris Lau
- Henry Lee
- Steve Sano
- Talin Sokugawa
- Robert Uyeunten
- Li Yu

TAP summary of discussion and feedback

HECO provided an update to the TAP, based on slides sent in advance, on recent TAP subgroup activity and HECO's actions and plans in response to TAP feedback.

- HECO agreed with previous TAP feedback on the UFLS study plans. No significant new discussion.
- HECO summarized work underway in response to TAP feedback on the system stability study. The TAP asked about changes in fault current availability in high-IBR scenarios. HECO and the

TAP discussed, and agreed to [take this to the TAP transmission and/or distribution subcommittees for further discussion](#).

- HECO summarized the TAP distribution subcommittee meeting related to net load forecasts and their use in NWAs. An RFI for an NWA related to the retirement of Waiiau generators generated some questions from outside parties. There was no new TAP feedback.

HECO then provided a summary of near-final results of the system stability study. The TAP and HECO had a preliminary discussion and agreed to discuss further in the transmission subcommittee; that discussion was completed the following week and feedback delivered separately by the TAP. The most important discussion item was the system stability issue posed by momentary cessation (MC) of DERs below 0.5 per unit voltage, as required by default in 1547-2018. HECO intends to ask DER manufacturers to move the MC threshold to 0.15 per unit. The TAP noted this may be costly or difficult for some of them. **HECO will need to work with DER manufacturers to address this**; more detailed comments can be found in the transmission subcommittee feedback.

Next, HECO summarized recent meetings of the TAP resource adequacy (RA) subcommittee. They stated that most of the TAP's proposed changes to the grid needs assessment (GNA) had been implemented or were in the process of being implemented, including the inclusion of probabilistic resource adequacy methods.

HECO announced that the draft Stage 3 RFP has been released and requested the TAP's feedback on the MWh and MW targets. The TAP RA subcommittee will provide feedback on this. [The TAP suggests that the stage 3 RFP interconnection requirement details be discussed with the transmission subcommittee because the technical requirements for generators will impact transmission system stability](#).

Finally, HECO presented the updated results of the grid needs assessment (GNA). HECO and the TAP discussed these results, and the discussion later continued in the TAP RA subcommittee (captured in a separate document delivered by that subcommittee). Key points were:

- The TAP and HECO agreed that the results indicate a need to build a lot of PV+BESS capacity in the coming years.
 - This is not a surprising result given project economics, but highlights that economics will likely not be the determining factor for future plans. Instead, land use, community engagement, and reliability concerns will likely drive portfolios. [Further analysis is needed on these topics \(outside of RESOLVE\)](#).
- **TAP members internally disagreed on the best way to capture capacity value of non-firm renewable energy (PV and wind) in RESOLVE, whether or not paired with BESS. This topic will be taken into the TAP RA subcommittee for resolution.**
- **HECO agrees to gather a summary of the GNA process, inputs, and assumptions in one place.**
- [The TAP and HECO will focus on distinguishing what questions we need to answer now before procuring the next round of resources, versus what can we improve in the future to guide future procurements \(without slowing down near-term procurements\).](#)

Finally, the TAP and HECO discussed the status of Stage 1 and 2 RFP projects and SB2510.

The TAP suggests HECO and the TAP leadership work together to identify topics that crosscut TAP subcommittees prior to the next full TAP meeting.

TAP feedback and comments are divided into three categories:

1. Informational, no action needed
2. Action required, expected in coming months
3. Concern or suggestion, for future discussion or consideration
4. Clarification needed

HECO topics presented, TAP comments, HECO responses, and TAP feedback

HECO summary of plans in response to previous TAP feedback on UFLS study proposal

- HECO generally agreed with TAP feedback
- HECO will be adding adaptive UFLS on Maui, and will look at it for Oahu. (Already present on Hawaii)
- PSCAD simulations will not be focus of the UFLS study, but will be included, in accordance with TAP feedback
- HECO is conscious of a potential equity issue with adaptive UFLS (tends to trip circuits with less DER)
- The March meeting TAP feedback is on HECO's website
- No further TAP comments
- See HECO slides for additional summary.

Summary of HECO actions in response to TAP transmission subcommittee feedback on system stability study

- HECO looked at lower amounts of sync gens than originally planned, per TAP feedback.
- HECO is running a sensitivity study on DER momentary cessation, per discussion with TAP.
- TAP asked HECO to compare today's system stability with future stability.
 - HECO will provide info on recent events. Not sure of form of output.
- HECO is discussing how to address TAP concern on negative sequence voltage and potential for tripping of existing system protections.
- HECO is basing ROCOF analysis on PSCAD and not PSSE, per discussion with TAP.
- HECO is already requiring DER performance beyond IEEE 1547-2018
- More detailed load models will be considered for future work, per TAP feedback
- Regarding UFLS model uncertainty: HECO is studying this (along with DER transient response) to inform near-future PSCAD studies.
- HECO is looking at converting Phase 1 IPPs to GFM, per TAP feedback.
- The TAP suggested looking at a 0% synchronous generation scenario. The study gets close, but does not get to 0 in this study. HECO will address this in future work.
- Synchronous condensers: The study has not found hard evidence to require syncons. HECO is looking at protection requirements for short circuit current.

- TAP: Is that related to distribution protection?
- HECO: Transmission planners are running PSCAD models. A 3-phase fault is assumed to clear in 2 seconds. A high-impedance SLG fault is assumed to clear in 20 seconds.
- TAP: Have you tried to make sure the protection will clear in worst-case fault current scenarios?
- HECO: Relays can be adjusted to improve clearing with low fault current. Fuses are harder to adjust. Could reduce distribution transformer impedance to increase fault current.
- TAP member: If you have sufficiently high voltage during faults, does that mean you have sufficient fault current for protection?
- Other TAP member: Not necessarily. Others agree.
- HECO: In the transmission study, voltage dips for distribution faults remain local.
- TAP feedback: [Protection needs for very high-IBR systems are a difficult question. We can take it to the TAP T or D subcommittees for further discussion.](#)
- See HECO slides for additional summary.

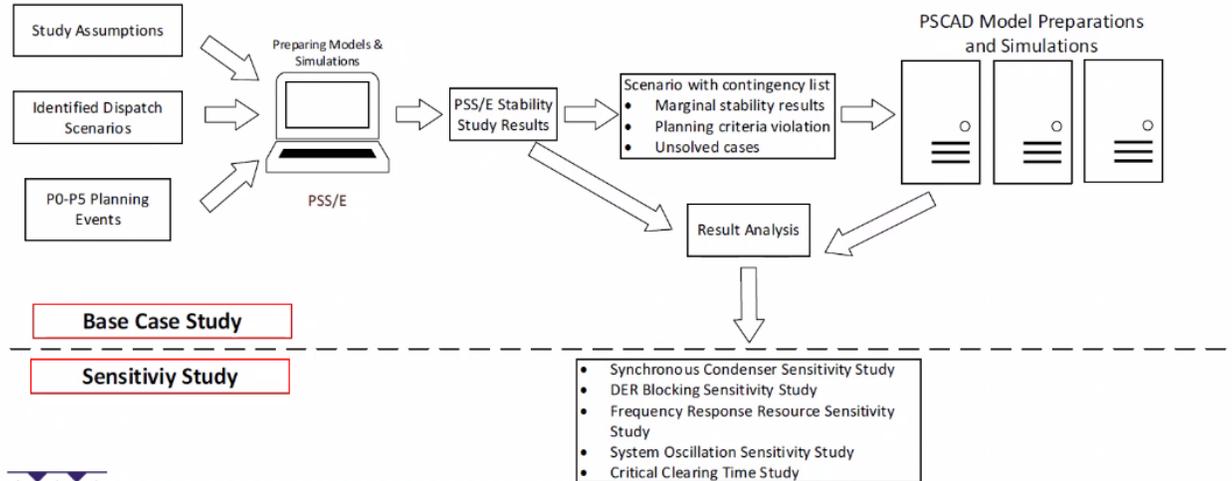
Distribution subcommittee activity summary

- The TAP had asked how the three load planning scenarios (low, base, and high) on net load growth are used.
- In reply, HECO asked if there's an accepted methodology for how to use the load planning scenarios. The TAP does not know of an accepted methodology.
- HECO and the TAP discussed possible scenarios for NWAs driven by Waiiau requirement.
 - HECO requested expression of interest in NWAs. Open till mid-May
 - TAP: Has there been much interest? HECO: A few questions. No obvious solutions presented so far.
 - This NWA has a very high MW requirement and a very short timeframe, making it particularly challenging. (An NWA would need to defer a 40 MW wires solution.)
- See HECO slides for additional summary.

System stability study – summary of new results

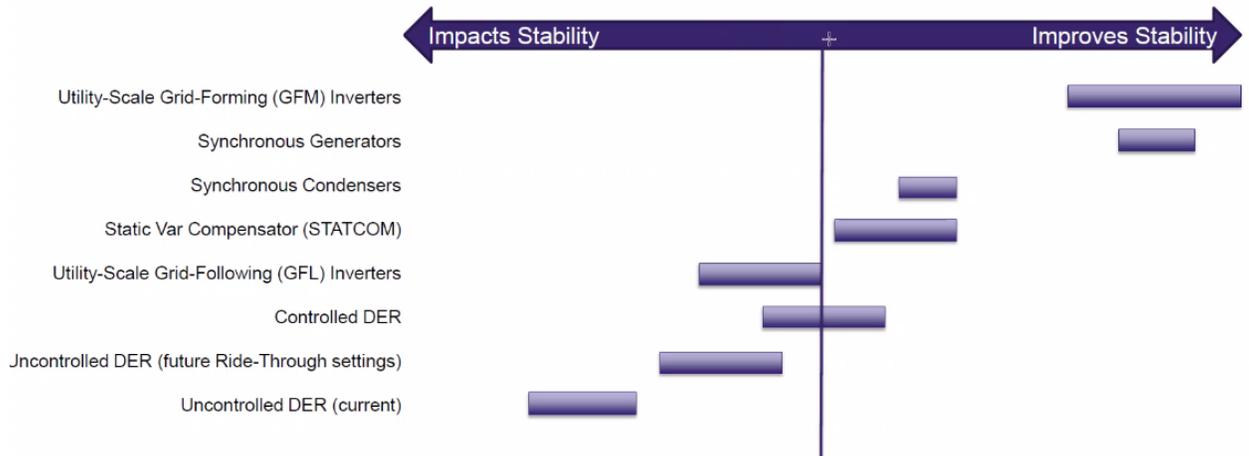
- HECO presented a summary of the system stability study and its conclusions so far. Selected slides are pasted below for context. Text below each slide summarizes discussion related to that slide.
- The TAP and HECO had some initial discussion mentioned below. The TAP transmission subcommittee will subsequently review in more detail.

General Study Review - Methodology



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- Consultant still working on study

Relative Range of Stability Support by Resource Type



- - The first GFM project will likely be KES (on Oahu). The others are likely delayed.
 - The PSCAD study shows that syncons only provide good voltage support close to the syncon.
 - TAP: Let's look in more detail at this chart in T subgroup.
 - TAP: Surprised to see SC has much less stability benefits than SG. HECO: The PSCAD study shows that active power is needed for system recovery following DER MC and trip events.
 - TAP: Please define grid-forming and grid-following along with this chart.
 - HECO: Here, "GFM" means the specific dynamic behavior of stage II projects in this study.

- TAP: A GFM inverter could also use momentary cessation (MC).
 - HECO: MC has not been seen from GFM in the PSCAD study. MC is not allowed per the stage 2 PPA. However, models are known to sometimes miss MC.
 - HECO: Field data shows a big MC issue with large GFL projects.
 - TAP: Does PPA for GFLs prohibit MC? Probably a GFL could also be designed to avoid MC.
 - HECO: Older PPAs allowed MC in limited circumstances. The models for these IBRs don't show MC, but the real projects do use MC in field. So, we don't fully trust the models.
 - TAP: Yes, lack of accurate IBR models is an industry-wide problem.
 - HECO: This diagram is very generalized, and linked to this specific PSCAD study.
- HECO: We have seen ROCOF up to 7 Hz/s on 100 ms windows in the PSCAD study. We are concerned about DER responses to that.
 - TAP: We agree this is a system stability concern, and DER behavior at very high ROCOF is unknown. The NREL study that HECO is sponsoring will shed some light on how DERs will respond to high ROCOF and other transients.
 - HECO: We will update the PSCAD DER models based on that study when results become available.

Study Results Summary - Recommendations (1/3)

1. Operation of GFM IPP
 - a. When GFM IPP resource offline, certain operational mitigations should be used to make sure system has enough frequency response resources to avoid excessive UFLS.
 2. Can't solely rely on GFM to solve all system stability issue. Results have yet to be validated in operation. Other recommendations to support stability.
 - a. Updating DER Rule 14h SRD
 - a. Modifying UV blocking limit from 0.5 pu to 0.15 pu, adding ride-through time.
 - b. Increasing ROCOF ride-through requirement to 5 Hz/s.
 - c. Align Rule 14h SRD with IEEE 2800-2022.
 - b. Zone 2 fault clearing time can't be more than 24 cycles, to avoid tripping DER.
 - c. Procuring synchronous machine-based generation in future RFP.
- HECO: We are experiencing supply chain issues with planned GFM plants.
 - TAP member: Why do you need to procure new sync gens? (Further discussion on this topic appears in a later portion of this document.)
 - TAP: It is likely that some residential scale DER inverter manufacturers will have trouble complying with a 0.15 pu MC threshold using products they are currently certifying since this is allowed but not required in 1547-2018, and is not required anywhere else for small-scale inverters. This will need to be discussed with the DER inverter manufacturers.
 - HECO: At least one vendor has stated they can do it.
- HECO: How feasible is it to design a GFM inverter to provide overcurrent capability?
 - TAP: You can certainly design an inverter for that. There will be some cost. Or you can just put more/bigger inverters on the system, also for extra cost.
 - HECO: Our consultant is reaching out to inverter vendors on this. Some are willing.

- TAP: Do you know how much overcurrent you want and for how long? HECO: We are working on that.
- TAP member: Can you get extra current from other inverters that are not producing at the time?
 - Other TAP members: GFM inverters should inherently do this without a design change. So that would already be captured in the PSCAD models.
 - HECO: We can write the next RFP to make sure that they do.
- TAP: We will discuss these system stability results more when HECO presents them in more detail at the upcoming transmission subcommittee meeting.

HECO summary of recent TAP resource adequacy committee activity and HECO responses

HECO summarized TAP resource adequacy (RA) subcommittee feedback and HECO actions:

- Areas of agreement:

TAP Sub-Committee Meetings Feedback Summary – Resource Adequacy & Modeling

The following TAP feedback summarizes items where the TAP reached agreement with the Company.

Energy Reserve Margin and Hourly Dependable Capacity

- ◆ Energy reserve margin is sufficiently justified for first use in the current IGP, provided that additional consideration is made for HDC and probabilistic RA
- ◆ 30% ERM seems appropriate for now but need to revisit as the system changes

Probabilistic RA

- ◆ 250 samples is a reasonable start for probabilistic RA
- ◆ In the near term, outage draws are more important. In the future, may need to think about additional weather years.

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- Areas HECO is working on over the coming months:

TAP Sub-Committee Meetings Feedback Summary – Resource Adequacy & Modeling

The following TAP feedback summarizes items where action is required over the next few months.

Hourly Dependable Capacity

- ◆ Clarify the calculation of the HDC for 1 sigma and 2 sigma, including the historical production years
- ◆ Use a 30-day sliding window instead of 3-day sliding window in the calculation of the HDC to increase the sample size
- ◆ Use percentiles for the HDC calculation instead of 1 or 2 sigma, wind and solar should use the same assumption
- ◆ Review California's exceedance method
- ◆ Clarify the treatment of DR in RESOLVE

Probabilistic RA

- ◆ Conduct a full resource adequacy analysis using a probabilistic method similar to HNEI/Telos analyses
- ◆ Use historical production profiles for existing plants, NSRDB for new plants without historical data
- ◆ Use the probabilistic RA as a check on the portfolio, not as input into RESOLVE (Both ERM and RA should be used)
- ◆ Clarify the use of the calibration factor database to characterize the reliability metrics for the existing system

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- HECO stated they are developing a Stage 3 RFP at the PUC's direction.
 - The TAP asks that the Stage 3 RFP details be discussed with the transmission subcommittee as technical requirements for generators will impact transmission system stability.

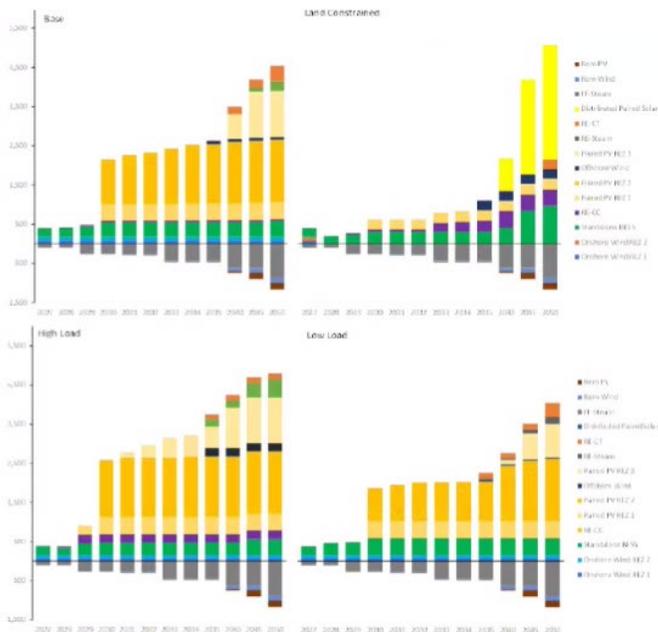
Grid Needs Assessment Updates - Oahu

HECO summarized recent results of the Grid Needs Assessment (GNA) for Oahu. Selected slides are copied below for context. Text below each slide summarizes HECO and TAP discussion. (For conciseness, not all slides are shown.)

Assumptions

- ◆ August 2021 IGP Inputs & Assumptions
 - Sales, resource cost, and fuel price forecasts
 - Costs for REZ enablement also included
 - ◆ Energy Reserve Margin
 - 30% target
 - 1 sigma HDC, similar to the 80th percentile HDC discussed with TAP RA subgroup
 - ◆ Planned Resources Additions / Removals from Normal Service
 - S1/S2 resources: Hoohana, Mililani 1, Waiawa, AES West O’ahu, Barbers Point, Kupono, Mahi, Mountain View, Waiawa Ph 2, KES
 - Existing thermal resources: 110 MW in 2027, 170 MW in 2029, 170 MW in 2033
- HECO: The thermal units mentioned above are removals, not additions
 - TAP: Which actual units are removed?
 - TAP: Are the removals increments or cumulative? HECO: Increments. Also AES is retiring, but is not listed.

Capacity Expansion Modeling



- ◆ Significant capacities of paired PV+BESS are built in the near-term in all cases, 1,300 – 1,600 MW, except Land Constrained where it is assumed to be limited based on stakeholder feedback
- ◆ Greater amounts of thermal capacity are built as the assumed load forecast increases (Low Load < Base < High Load), to be confirmed in ERM testing of the resource plans
- ◆ Some offshore wind is built, up to 250 MW in the Land Constrained case where onshore resources are limited
- ◆ Resource mix consistent between bookends, changes are due to timing and load.

- TAP: This confirms that the details of the RESOLVE inputs aren’t as important – the system just picks all the PV+BESS it can. This is why “bookends” make sense. That’s also why the land-constrained case is the most important. HECO: Agree. TAP: Societal issues are one of the biggest constraints.
- TAP: Conclusion is that for 8-10 years, we need to build as much PV+storage as possible and that near-term investments in PV+storage do not close the door on future options. HECO: Agree.

- HECO: The stakeholder council says the minimum size for offshore wind is 400 MW and portfolios with smaller amounts (i.e. 50 MW) are not reasonable. Will re-run with that constraint: TAP: Agree
- TAP: In the land constrained case, basically every single roof needs PV. This shows the most sensitivity of all the portfolios, and likely the biggest limitation for Oahu in particular.
- TAP: In the land constrained case, very little is added until 2040. Why?
 - HECO: Resources are selected for energy economics. TAP: Do you see less emissions in less-constrained cases? HECO: yes.
- TAP: What is the energy breakdown between biofuels vs wind/PV? HECO: We don't have that number exactly, but the total energy from biofuels is low.
- TAP: Are biofuels imported? HECO: The land-constrained case excludes locally-produced fuels, so yes.
- TAP: Why does PV take off in 2030: HECO: it was allowed earlier. Its driven by cost, not by an RFP constraint.
- TAP: Does all new PV need transmission? HECO: After 2027-2030 (?)

ERM Sensitivity to Remove the Largest Thermal Generator and PV+BESS Project

Year	Base	Base with KPLP and Mahi Removed	
Stage 1 and 2 Projects	Hoohana Solar 1 Millilani Solar 1 Waiawa Solar AES West Oahu Solar Barbers Point Solar Kupono Solar Mahi Solar Mountain View Solar Waiawa Phase 2 Solar Kapolei Energy Storage	Hoohana Solar 1 Millilani Solar 1 Waiawa Solar AES West Oahu Solar Barbers Point Solar Kupono Solar Mahi Solar Mountain View Solar Waiawa Phase 2 Solar Kapolei Energy Storage	♦ Given that many projects from the recent procurement efforts are facing supply chain issues, a sensitivity was conducted to remove the largest O'ahu project from the portfolio (120 MW, 480 MWh).
2027	Install 82MW of Group 1 Onshore Wind Install 82MW of Group 2 Onshore Wind Install 231MW 434MWH of Standalone Battery Remove 108 MW Firm Generation	Install 82MW of Group 1 Onshore Wind Install 82MW of Group 2 Onshore Wind Install 231MW 434MWH of Standalone Battery Remove 108 MW Firm Generation	♦ An Amended and Restated Power Purchase Agreement is before the Commission to extend Kalaeloa's contract term 10-15 years. KPLP was removed to assess the capacity need based on the eventual expiration of any extension.
2028	Install 14MW 26MWH of Standalone Battery	Install 14MW 26MWH of Standalone Battery	
2029	Install 42MW 79MWH of Standalone Battery Remove 165 MW Firm Generation	Install 42MW 79MWH of Standalone Battery Remove 165 MW Firm Generation Remove 208 MW KPLP	
2030	Install 428MW of Group 1 Paired PV 1488.5 MWh Install 1148MW of Group 2 Paired PV 2972.56 MWh Install 93MW 174MWH of Standalone Battery	Install 428MW of Group 1 Paired PV 1488.5 MWh Install 1148MW of Group 2 Paired PV 2972.56 MWh Install 93MW 174MWH of Standalone Battery	

- TAP: What is the goal of the scenarios where Mahi or KPLP go offline? HECO: These are sensitivities because these units have PPAs that are expiring.
- TAP: This re-emphasizes the need to build as much PV+BESS as possible.

Probabilistic Resource Adequacy Results

Year 2029	LOLE (Days/Year)	LOLEv (Events/Year)	LOLH (Hours/Year)	EUE (GWH/Year)
Existing (2021)	1.18	1.30	2.90	0.13
Base_200	1.69	3.10	8.22	0.80
Base_508_Staggered	0.22	0.38	0.86	0.07
Base_607_Staggered	0.00	0.00	0.00	0.00
Base_688_Staggered	0.00	0.00	0.00	0.00
Base_Accel	0.52	1.05	2.01	0.44
Base_Accel_508_Staggered	0.00	0.00	0.00	0.00
Base_688_Staggered_HiLd	0.22	0.41	0.94	0.08
LC_200	2.68	4.51	12.44	1.16
LC_508_Staggered	0.30	0.49	1.11	0.09
LC_607_Staggered	0.01	0.03	0.03	0.00
LC_688_Staggered	0.00	0.00	0.00	0.00
LC_Accel	29.55	56.92	159.10	22.16
LC_Accel_508_Staggered	0.00	0.00	0.00	0.00
LC_688_Staggered_HiLd	0.38	0.68	1.31	0.11

- ◆ In Base_508_Staggered, 300 MW of new CT results in similar LOLE as LOLP standard (0.22 days / yr)
- ◆ Similar LOLE as Base_688_Staggered_HiLd (0.22 days / yr) where additional thermal capacity may be needed to serve higher loads due to EV growth
- ◆ Accelerating 1,600 MW PV+BESS in Base_Accel does not provide the same reduction in LOLE as new thermal generation
- ◆ If future development of onshore renewables is limited in a Land Constrained case, more thermal capacity may be needed

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- TAP: Are you concerned you won't be able to get bids for PV+BESS? HECO: Possibly.
- TAP: You shouldn't mix results that use the 2021 outage rates with scenarios that use future rates. It is good to show a range of potential outage rates, but you need to be consistent with the "Existing" scenario and other ones for comparison, otherwise it is hard to tell if the change in resource adequacy is due to outage rates or changes in resource mix
 - HECO: Correct, we're assuming much lower outage rates than the observed 2021 outage rates.
- TAP: Are you looking at running cases with increased forced outage rates? HECO: Yes, we're working on that; we will report on it later, as discussed in last week's TAP RA subcommittee meeting.
- TAP member: I'm concerned about the reliance on new thermal capacity. The table doesn't actually show the need for so much thermal. I would like to see more reliance on PV+wind fully explored:
 - HECO: What specific case should we look at?
 - TAP: Suggest adjusting RESOLVE to give more capacity credit to renewables and less than 100% capacity credit to thermal. (This topic been taken into the TAP RA subcommittee for further discussion.)
 - HECO: We will keep discussing this, and are running more cases.
- <End of first day meeting here. Content below picks up same discussion on next day.>
- HECO announced the issuance of a draft procurement for new resources, known as the Stage 3 RFP. This applies to all 3 major islands and is driven by the RESOLVE analysis presented above.
 - For Oahu, HECO is targeting more PV+BESS (or similar) plus firm renewables. The magnitude of need for the latter is less certain.
 - HECO requests TAP feedback on RFP on target values for renewable and firm generation.

- TAP: We have enough information to work on feedback on this from an RA subcommittee perspective.
- Here the TAP and HECO had an extensive discussion about the amount of firm capacity needed. The TAP and HECO decided to continue the discussion in the TAP RA subcommittee. Some key points were:
 - A key question in the GNA is the tradeoff between energy storage and firm (i.e. thermal) capacity.
 - TAP members internally disagree on the best way to capture capacity value of non-firm renewable energy (PV and wind) in RESOLVE, whether or not paired with BESS. This topic will be taken into the TAP RA subcommittee for resolution.
 - Reliability of thermal resources is a key assumption; they have more maintenance outages and unplanned outages. HECO’s existing units have been very unreliable recently. This needs to be captured in RESOLVE.
 - It’s become hard to follow the inputs and assumptions in RESOLVE, how they’ve changed, their temporal resolution, etc. It’s great to see the detailed outputs, but the TAP requests more clarity on the inputs too.
 - HECO agrees to gather a summary of GNA process, inputs, and assumptions in one place
 - HECO agrees to add the ERM to the table on slide 47

Probabilistic Resource Adequacy Results

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Base_508_Staggered	0.22	0.38	0.86	0.07
Base_607_Staggered	0.00	0.00	0.00	0.00
Base_688_Staggered	0.00	0.00	0.00	0.00
Base_Accel	0.52	1.05	2.01	0.44
Base_Accel_508_Staggered	0.00	0.00	0.00	0.00
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LC_688_Staggered	0.00	0.00	0.00	0.00
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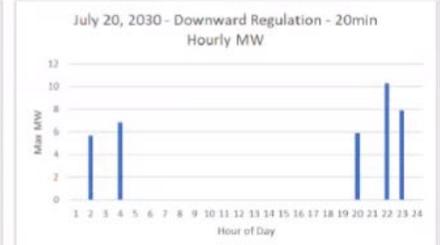
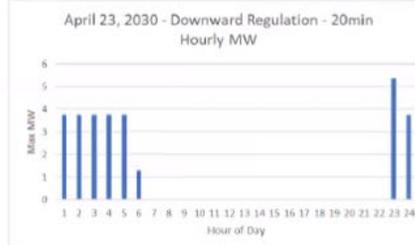
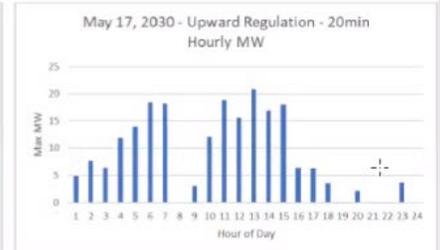
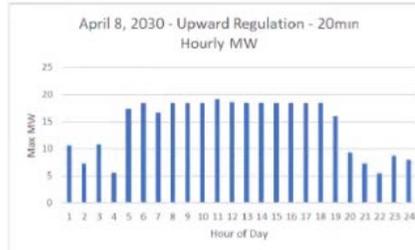
- The TAP and HECO agree there is no correlation between weather and thermal forced outages in HNEL analysis or HECO’s analysis because Hawaii does not have extreme high or low temperatures.
- The TAP and HECO need to focus on distinguishing what questions we need to answer now before procuring the next round of resources, vs what can we improve in the future to guide future procurements.

Grid Needs Assessment Updates – Hawaii island

HECO summarized recent results of the Hawaii island GNA. These were driven by withdrawn Stage 1/2 projects and PUC-approval of inputs and assumptions.

Regulating Reserve Needs

- Although the regulating reserve needs are defined as the max reserve that may need to be provided by the new resources selected by RESOLVE in each hour, on most days, the typical reserve needed will be much less and, in many hours, may be zero.
- On April 8 and May 17 (see daily charts on Slide 22), regulating reserve needs during the day are driven by DG-PV; the production simulation shows that firm renewable generation (green bar) and new standalone BESS may be dispatched less or standing by to provide regulating reserve – the paired PV+BESS and wind can then be dispatched for energy.
- With the abundance of existing flexible resources on the system that can quickly reduce their output, downward regulating reserve needs are minimal.
- This reinforces that the portfolio of resources selected in the Stage 3 RFP will need to be flexible in their dispatch for energy and provision of regulating reserve.



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- HECO and the TAP discussed the needs and assumptions related to regulating reserve.
 - TAP: PV+BESS plants such as those from Stage 1 and 2 RFPs should be able to provide regulating reserve.
 - HECO: We'd like to gain operational experience with that.
 - TAP: There's no reason PV+BESS plants can't provide regulating reserve.
 - HECO: Agreed, we don't plan to procure resources for regulating reserve if PV+BESS plants can provide it.
- HECO: The next steps include running probabilistic RA assessments for Hawaii and Maui, to be shared with the TAP.

Closing discussion

- The TAP requests details of stage three RFP targets for each island, for renewables and firm capacity.
- The TAP asks about the status of Stage 1 and 2 RFP projects.
 - HECO: Supply chain issues are affecting Stage 2, raising prices. The PUC may not approve price increases. Energy from any dropped-out projects would go into the Stage 3 RFP.
 - Some transmission studies may need to be redone.
- TAP asks about the new proposed law (SB2510) on firm renewables.
 - HECO: The law would require a minimum of 33% of generation (energy) come from firm renewable energy. No single source of renewable energy can be more than 45%.
 - TAP member: The amount of biomass energy that this bill seeks to obtain from local agriculture far exceeds the capacity of local agriculture.

- TAP: The implementation of this law would imply a restart of much of the recent work by HECO and the TAP.
- The TAP suggests HECO and the TAP leadership work together to identify topics that crosscut TAP subcommittees prior to the next full TAP meeting, which may be held in August.