IGP Technical Advisory Panel Meeting

10/22/19

Hawaiian Electric
Maui Electric
Hawai‘i Electric Light

Agenda

- Review of comments received on the three planning criteria:
  - Addition of Resources
  - Regulating and Ramp Reserves
  - Transmission Planning
- Review of comments received on the Soft Launch RFP
- Discussion on considerations for unit retirement in the IGP
- Review of revised draft IGP sourcing process
- Topics for future TAP meetings

Stakeholder Comments on Planning Criteria and Soft Launch

Addition of Resources

- **Slide 56: Where do these ERM target percentage numbers come from?**
  - The Energy Reserve Margin target numbers were derived such that all hours should have enough generation to cover the loss of the largest generating unit as well as forced outages.
  - Because Energy Reserve Margin targets are inclusive of the loss of the largest unit, the Energy Reserve Margin target will vary depending on that island's largest unit size in comparison to the demand. For instance, Maui's generating fleet is more evenly sized, and its largest unit is expected to serve a smaller portion of the demand than does those of the other islands. Thus, a smaller reserve percentage would be needed to maintain a reliability level in alignment with other islands
- **Slide 60: It would help to have an example of the HDC calculation. Also, does HDC come from a book/paper/reference, or is it a new concept you are introducing?**
  - The hourly dependable capacity calculation was not taken from a reference source.
  - A simplified example of the hourly dependable capacity calculation is shown below. The calculation is repeated for each hour of the year. Readily available historical data from wind and photovoltaic resources were used in the company's calculation. In the example we have recorded hourly generation for 2017, 2018, 2019 available:
  - $X = \text{Hour } 1_{2017}$ $Y = \text{Hour } 1_{2018}$ $Z = \text{Hour } 1_{2019}$
  - HDC = Mean(X,Y,Z) – N x StandardDeviation(X,Y,Z)

Addition of Resources

- **Slide 60: What value are you using for "N" in the HDC calculation.**
  - The value for N is 2 for solar and 1 for wind resources. Each standard deviation subtracted from the mean increases the probability of occurrence but also reduces the energy output of that resource by that amount. Resources with higher variability such as wind will have a greater standard deviation, as the magnitude of the standard deviation is directly related to the variance. The number of standard deviations used were selected in an attempt balance the need for reliability of the resource with the reduction of energy production.
- **Slide 60: Does this bullet apply to a specific technology? Or is this a generic statement? It seems the hourly probability of availability would depend on the characteristics of the generator (type, age, etc).**
  - Resources will have an Hourly Dependable Capacity that is specific to resource type (Wind, Solar, Hydro) as well as location. The example in this bullet point is true for the resources for which N=2, such as the solar mentioned above.

Regulating and Ramp Reserves

- Slide 8: Do you think your estimates of DER power are accurate enough for the purposes of this study? Would it be useful to have better visibility into DER generation?
- Slide 8: How will you have data for utility PV when most of it is not built yet?
- Slide 13: Since most new DGPV is being installed with storage, how will you account for that in the ramping and reserve calculations? Do you need to separate DERs into systems that have only PV and those that also have storage, and account for those separately? (Maybe AMI data could be used to do this? Though of course only limited AMI data is available.)
- Slide 17: How do you plan to actually ramp controllable DERs in practice?
- Slide 25: Why are the "existing units" coming on during the middle of the day?
- Slide 40: Why do the new ramp and reg criteria have a much bigger impact on cost on Oahu than on Maui?

Transmission Planning

- Slide 46: Ensuring reliable service as the generation mix changes drastically to a new mix that is not present in any other interconnected power system will be challenging. (Understatement of the month?) The fundamental physics of the power system change as rotating generation is replaced with inverter-coupled generation. Hawaii is truly forging a new path in this regard, especially with respect to the maximum instantaneous levels of inverter-based generation. This will inevitably require significant investment, research/analysis, patience, and cooperation between stakeholders. I believe it will be possible with current technologies and near-term advances to ensure reliable service with very high levels of inverter-based generation, but it may not be an entirely smooth road to get there.
- Slide 46: How do you plan to maintain/ensure stability margins? What metrics do you use to evaluate stability margins? What tools do you plan to use to evaluate stability, given that existing tools are not sufficient to evaluate things like controller interactions, unbalanced fault responses, etc? These are all fairly difficult questions since Hawaii is pushing the limits of integration of inverter-based resources. A lot of work is needed in this area, as you probably know!
- Slide 47: How do you account for the additional costs to interconnect when proposed resources are not ideally located? Does this cost fall on the developer or the utility/ratepayers? Is there an opportunity to develop substations/switching stations in locations where costs could be spread across multiple projects?

Soft Launch RFP

- **Synergy** Sections 1.2.3.3, 3.11
  - Based on these sections and further comments at the technical conference, it appears that synergistic applications (i.e. energy infrastructure and/or applications that can provide more than a single service or value to the grid (both distribution and transmission), sometimes referred to as value stacking) will be excluded from this soft launch process. This may not allow for full utilization of cost-effective uses for DER and result in higher bid costs than necessary. HECO does not appear to have fully justified their decision for this limitation. If it is a matter of difficulty in designing an appropriate contract in a short time, HECO should consider reviewing methodologies from other jurisdictions, allowing bidders to propose synergistic applications and associated contracting methods, and incorporating them into future procurements. If there is some other reason to exclude such applications, HECO should make the reason clear. As a general matter the commission would like HECO to promote, enable, and, aggressively pursue synergistic opportunities. The commission expects the HECO Companies to allow projects to offer all of their potential value to the grid, or provide clear and compelling reasons why they cannot.

Soft Launch RFP

- **Technical specifications** Sections 2.4, Appendix J
  - The Soft Launch RFP needs to transparently explain certain technical specifications and associated inputs and assumptions.
  - (1) Generally:
    - (a) HECO should provide a more detailed explanation of the contingency scenario described as "[d]uring a contingency event, inverter-based resources will trip and remain offline until voltage and frequency are restored and remain stable for five minutes." HECO should explain what it will do to address this issue to ensure that inverter-based resources can contribute to meeting the needs identified in the RFP. HECO should clearly explain whether this five-minute requirement will be modified for resources participating in this procurement, such as by allowing inverters to come back online sooner, subject to maintaining safety and reliability of the grid.
    - (b) HECO should provide more detail regarding the specific proposed utility wires solution. Additionally, HECO should clarify if the proposed utility infrastructure can be sized smaller or larger to satisfy the needs not met by the NWA. HECO stated at the technical conference that procurement of transformers was limited to certain sizes (e.g. 10 MVA) but should clarify what degree of flexibility there is in equipment sizing. If equipment sizing is flexible, HECO should maximize traditional solutions deferral (i.e., maximize NWAs) if it is cost effective.
  - (2) For the Ho'opili site:
    - The inputs and assumptions leading to the determination of 17-hour (contingency) and 10-hour (normal) overload conditions need additional examination, analysis, and explanation. Further consideration of these inputs and assumptions could lead to more accurate overload specifications. The forecast for load growth reflects significant uncertainties. HECO should consider a more programmatic approach to reducing underlying load growth, through targeted DER programs for residential and commercial customers. HECO should develop a multi-pronged approach to address this risk. The soft launch RFP is one prong, but HECO's approach should also include programs, like Smart Export for the Ho'opili development, combined with energy efficiency upgrades, and DR/grid services ready equipment for residential and commercial customers. HECO should work with Ho'opili's developer and stakeholders to design programs that will reduce load growth. By addressing underlying load projections, HECO can make the RFP process more likely to succeed. Finally, HECO should consider what it would take to significantly reduce load growth projections with the multi-pronged approach discussed above. For example, widespread use of smart export, energy efficiency, and customized solutions for commercial customers might substantially reduce the 17-hour and 10-hour overload conditions and proposed need for wires solution.

Soft Launch RFP

- **Lack of an Independent Observer** Sections 1.2.3.2, 1.6.4-1.6.6, 4.4
  - An independent observer (I/O) could: (1) provide independent bid evaluation and scoring; (2) resolve potential disputes that may arise during the RPF process; (3) provide a neutral point of view on the requirement of an upgrade that might threaten the commercial operation date; and (4) and serve many more useful functions.
  - HECO should clarify whether they can engage an independent observer for the soft launch RFP. Without an I/O, the commission cannot offer dispute resolution as provided in the draft RFP, and any language that suggests otherwise should be modified or removed.
  - Relatedly, the RDG RFP process had guidance to make bid scoring available and transparent at the end. It would be good to align these processes and make bid scoring available at the end of the soft launch.

Soft Launch RFP

- **Site Control** Section 4.3
  - The site control requirements for in front of the meter solutions could have unintended consequences in small areas, e.g., developers competing for the only available space(s) and driving up the price of land as part of their bid development. HECO should consider potential solutions to mitigate these potential consequences, including either providing HECO-owned land for free (or at a transparent, fixed cost), or providing a fixed assumption for land cost that all developers would use. At a minimum, as the HECO Companies develop future NWA RFPs, they should plan to investigate potential site control issues as early as feasible, and work cooperatively with potential developers to reduce costs associated with site control/land acquisition.
- **RPS eligibility criteria.** Section 1.1.3
  - HECO should clarify whether the RPS eligibility criteria precludes (1) battery only solutions; (2) thermal storage; (3) fuel cells; or (4) combined heat and power.

Soft Launch RFP

- **Medium to longer term improvements** Section 3.11. 4.4.2.2
  - As discussed above, letting resources be compensated for the full value they provide, (e.g., letting them be part of other programs once they are up and running, but prioritizing dispatch optimally) should be the default direction of NWA procurements. Although HECO must ensure that there is no “double counting,” it is possible to fairly compensate resources for all the value they provide.1
  - HECO should also consider adding a score in the bid evaluation process for the various environmental attributes of the NWA. For example National Grid considers in its benefit-cost analysis framework for non-wires solutions, both quantitatively and qualitatively, net avoided CO_2, SO_2, and NO_x, avoided water and land impacts.

Soft Launch RFP

- Section 1.2.4.1
  - HECO should clarify the system integration data exchange requirements for behind the meter systems and discuss these requirements with developers to determine if they are prohibitive.
- Section 2.1
  - HECO should make clear why they chose a 5-year contract term. HECO should consider and explain if longer term would promote more/better bids. HECO should also consider if some sort of preferential renewal option would help promote better bids.
- Section 2.1 Table 3
  - HECO should clarify what the days in the table represent. If the maximum number of times the service can be called in the year is daily, the table should specify 365 days for all needs.
- Section 2.2
  - HECO should discuss with developers whether the ramp rate and time requirements would be prohibitive.
- Section 4.7
  - It looks as if HECO could use the disqualification, removal, or withdrawal of a single proposal to rescind the entire RFP. HECO should clarify that this is not the case, or otherwise limit its applicability.

Considerations for Unit Retirement in the IGP

Unit Retirement

Retirements will affect future resource and grid service needs:

- Capacity
- Regulation and Ramp
- FFR
- Inertia

Fundamental question: How will the generating fleet be modernized to continue to provide sufficient grid services as aging units are removed from service and retired?

Resource Procurement on the Horizon

1. Grid services RFP (MW):

- Capacity
- FFR

	Oahu FFR1	Oahu FFR2	Oahu Capacity	Maui FFR1	Maui Capacity	Hawaii Island FFR1	Hawaii Island Capacity
By Year 2025	50 MW	39 MW	119 MW	8 MW	21 MW	18 MW	4 MW

2. Stage 2 RFP (MWH):

- Energy

	Oahu	Hawaii Island	Maui	Lanai	Molokai
By Year 2025	1,300,000 MWH	70,000 - 444,000 MWH	295,000 MWH	13,300 - 20,800 MWH	8,500 MWH

Resource procurement ↑ ↓ **Thermal generation utilization**

Future Role of Thermal Generation

Thermal generation will continue to be needed to reliably operate the system

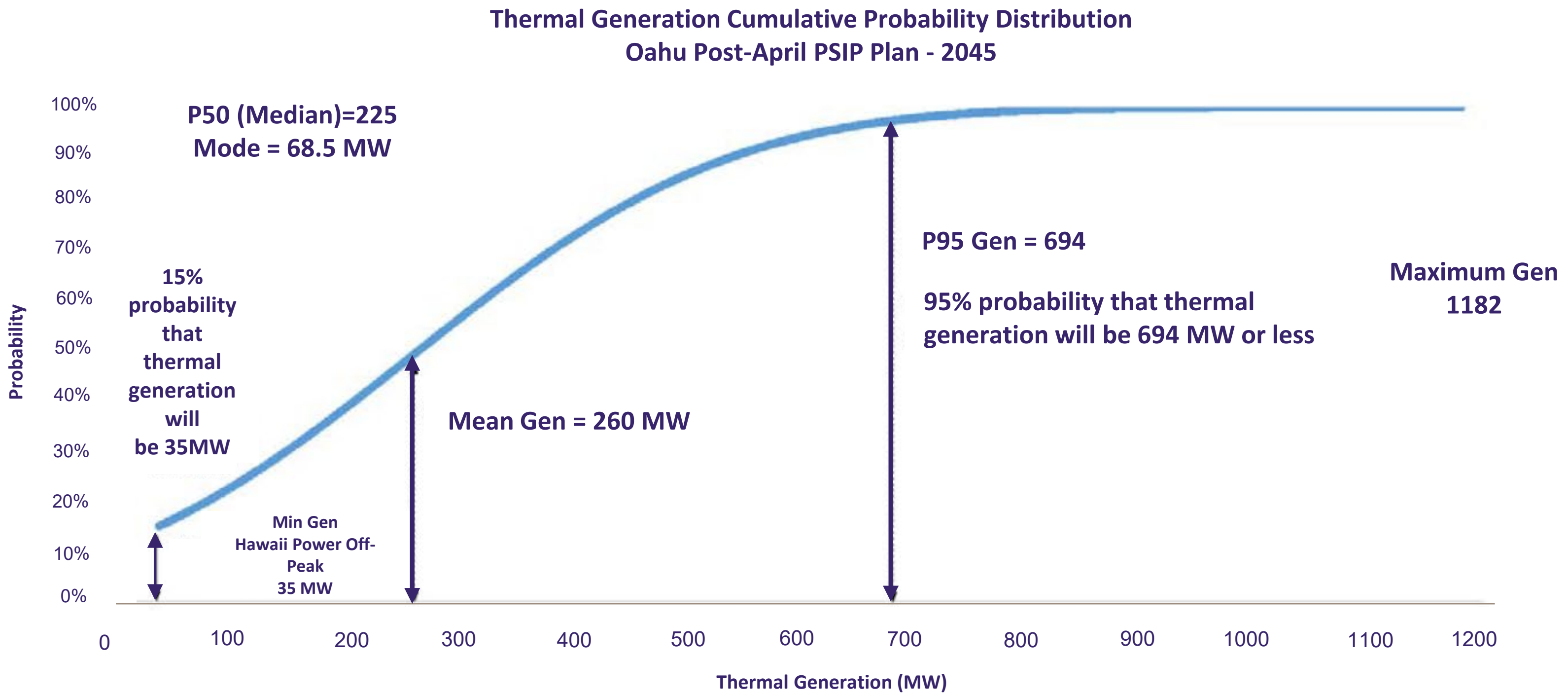


Figure 16: Probability distribution of thermal generation requirements over distinct weather simulations for the Oahu Post-April PSIP Plan (without optimized batteries)

Future Role of Thermal Generation

System reliability:

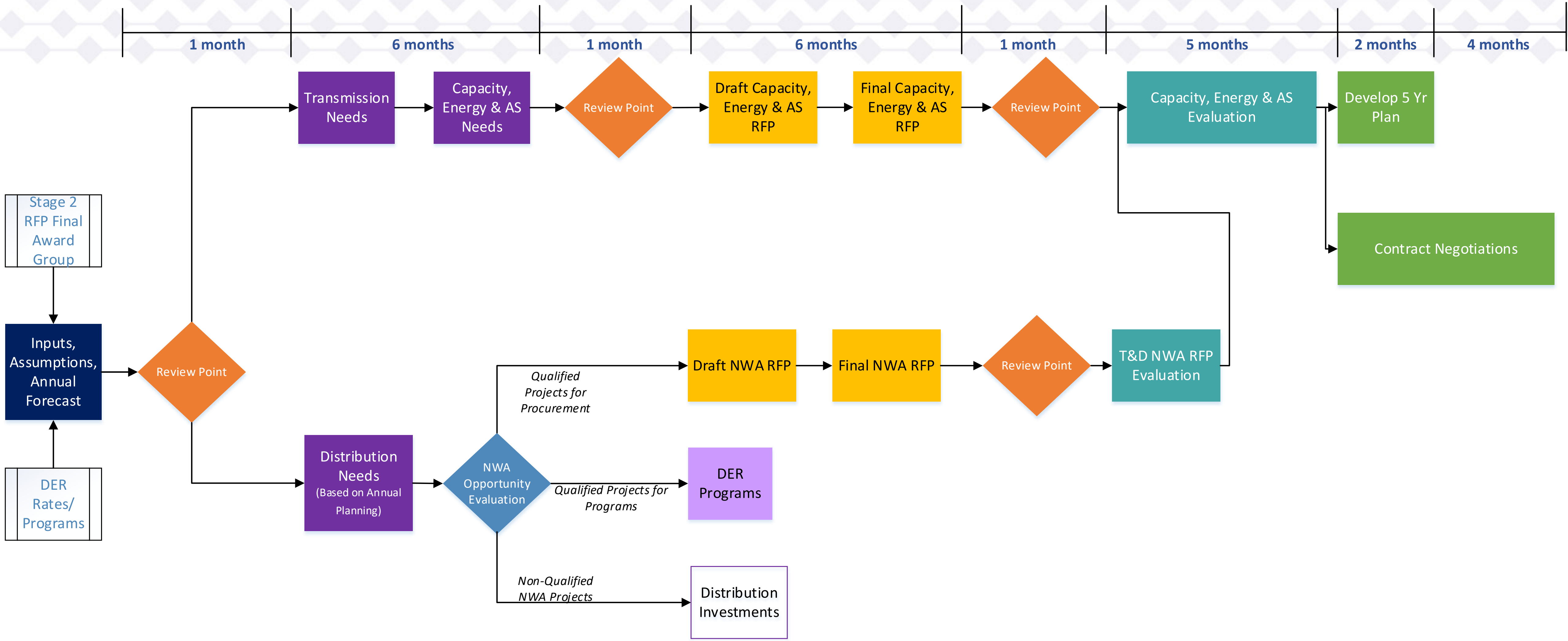
- Minimum thermal capacity
- Providing essential grid services

Alternative fuel sources:

- Biofuel / Biomass based generation
- Hydrogen or other future fuel considerations

Revised IGP Sourcing Process

Revised Draft IGP Sourcing Process



Next Steps for the TAP

Topics for Future TAP Meetings

- Review identification of system needs process (transmission, distribution, & resource)
- Review evaluation process for NWA and Capacity, Energy, Ancillary Services RFPs
- Review proposed evaluation process for Soft Launch
- Others?

Next TAP Meeting

- November 19
- WebEx?

Mahalo