

**IGP Stakeholder Council Meeting**  
**Friday, June 18, 2021**  
**9:00am - 12:00pm**  
**WebEx**

**Attendees**

**WebEx**

|                                      |  |
|--------------------------------------|--|
| Colton Ching, HE                     | Wren Wescoatt, Progression HI Offshore |
| Marc Asano, HE                       | Wind                                   |
| Christopher Lau, HE                  | Shelee Kimura, HE                      |
| Matthias Fripp, Ulupono              | Ken Aramaki, HE                        |
| Murray Clay, Ulupono                 | Christopher Kinoshita, HE              |
| Alex de Roode, Maui County Energy    | Collin Au, HE                          |
| Commissioner                         | Amanda Yano, HE                        |
| Barry Usagawa, Board of Water Supply | Brian Lam, HE                          |
| Dean Nishina, DCA                    | Rebecca Dayhuff Matsushima, HE         |
| Gerald Sumida, Carlsmith Ball        | Greg Shimokawa, HE                     |
| Henry Curtis, Life of the Land       | Isaac Kawahara, HE                     |
| Jacqui Hoover, HIEDB                 | Yoh Kawanami, HE                       |
| Jeremy Laundergan, EnerNex           | Robert Uyeunten, HE                    |
| Kirsten Turner, HSEO                 | Talin Sokugawa, HE                     |
| Kylie Cruz, Blue Planet              | Rick Pinkerton, HE                     |
| Melissa Miyashiro,                   | Riley Ceria, HE                        |
| Mike Wallerstein, HPUC               | Kurt Tsue, HE                          |
| Noelani Kalipi, Progression Energy   | Mahina Martin, HE                      |
| Paul De Martini, Newport Consulting  | Jennifer Zelko-Schlueter, HE           |
| Robert Harris, Sunrun                | Marisa Chun, HE                        |
| Robin Kaye                           |  |
| Rocky Mould, HSEA                    |  |

## Agenda

- Key Questions and Objectives
- Electric Power Grid 101
- Modeling Framework Overview
- Inputs and Assumptions Overview
  - Resource and Fuel Costs
  - Load and DER Forecasts
  - Solar and Wind Potential
  - Unit Retirements
- Putting it all together – What do the model outputs look like?
- Ulupono Presentation
- Discussion
- Next Steps and Key Questions

## Discussion

- I. Electric Power Grid 101
  - a. Stakeholder: Regarding the rubber band analogy, would you say that removing the AES coal plant is like removing the largest weight? Is removing the largest weight beneficial to the utility because there's less risk?
    - i. HE: Yes, removing the 180MW of AES coal plant reduces the single-largest point of failure (contingency) on the Oahu system.
    - ii. Stakeholder: Does having many smaller generators (weights) make the system more stable?
    - iii. HE: Yes, but we also need to consider the connections (rubber bands) holding those generators (weights) together, that they are not too thin. It's still important to have wide rubber bands.
  - b. Stakeholder: Why would the KES battery not then become the single largest contingency on the Oahu system?
    - i. HE: The battery is not treated as a generator. The purpose of the battery is to respond to system changes by charging and discharging. And under normal operation, it is only dispatched up to 135 MW; the other 50 MW are for contingency reserves.
    - ii. HE: After AES goes offline, the single point of failure is 135 MW for either K5/K6. It does impact online spinning reserves; we'd no longer carry 180 MW. The 50 MW contingency reserve from KES that provides frequency response also helps reduce the amount that needs to be carried.
- II. Inputs and Assumptions Overview
- III. Resource and Fuel Costs
  - a. Stakeholder: Who/What is AEG?
    - i. HE: AEG is a consulting group that was hired by the PUC to conduct an energy efficiency potential study. We are following up with them to

address the Commission's order to examine energy efficiency as a supply side resource.

- b. Stakeholder: Are these general resource costs? It's not tied to a specific location and assumes a constant capacity factor?
  - i. HE: Yes, these are general resource costs using an assumed constant capacity factor.
- c. Stakeholder: What are the upper bounds of the capacity factors used for LCOE? Are the capacity factor values averages?
  - i. HE: Yes, the capacity factors are based on the average production of that resource across the years.
  - ii. Stakeholder: For example, does Kahuku Wind vs. Kawaihoa Wind have different capacity factors? Would like to see offshore wind.
    - 1. HE: Yes, that is possible. The offshore wind capacity factor is from the study that NREL is conducting for Oahu.
  - iii. Stakeholder: It sounds like the question is more, what is the range of capacity factors for Hawaii?
    - 1. HE: In the NREL potential study, there is a heat map of the capacity factors across the island. The potential study is on the website for reference.
- d. Stakeholder: Regarding Slide 19, would it be possible to recolor the charts to make the colors stand out?
  - i. HE: Yes, we can change that.

#### IV. Solar and Wind Potential

- a. Stakeholder: Is there a plan to update these potential numbers? Because of climate change, I think this is something to adjusted annually.
- b. Stakeholder: Is there a hydro potential?
  - i. Stakeholder: Lake Wilson has potential and every time there is heavy rain, it floods. Could be beneficial to look at.
  - ii. HE: The NREL study did not look into hydro. At this point in the process, we're looking to identify the needs. We're not picking technologies or saying we want to build wind and not hydro. Procurement would be open to all technology. A long-term RFP could be an appropriate place for hydro development, we're not excluding it.
  - iii. HE: NREL is conducting an addendum to the study, based on comments from Ulupono. We are making adjustments and will update everyone when that is complete.

#### V. Putting it all together – What do the outputs look like?

- a. Stakeholder: Regarding the outputs, what timeframe are some of these services proposed for, 20 years?
  - i. HECO: We model based on a 30-year horizon. The procurement will be in the near term based on these targeted service needs. Then, we would need to run the model again to include the procured projects and see how the system needs change.

- b. Stakeholder: Reminder that projects with a longer lead-time (e.g., offshore wind, biomass, geothermal, etc.) to reach commercial operations need to be procured sooner.
- c. Stakeholder: On slide 33, it doesn't seem like the needs are truly technology neutral. It appears that the results are not based on weather data. In the near term we may need ramping, but in the long term it might not be necessary. The modeling should be shorter term. The RFPs should be broader to ask developers, under these weather timeseries, what can you produce? Then, in the model, input the weather conditions and the resource performance to measure the capabilities.
  - i. HE: The intent of the outputs shown on the slide are a high-level preview of what would come out of RESOLVE. We can go into more detail at our next meeting.
  - ii. Stakeholder: It seems like the bids should be tailored to meeting near-term needs based on the combination of weather and resource profiles to meet the system needs.
  - iii. Stakeholder: Be careful of over defining the grid needs. Recommend to only focus on the major concerns like reserves, short-circuit current. You don't want to procure for things you think you need, but actually don't need because you can get the service from existing resources.

#### VI. Ulupono Presentation

- a. Stakeholder: Was NREL looped in on the suggested modifications to see what their response/feedback on the reasonableness of the modifications? If so, what was their response?
  - i. HE: We have reviewed the changes with NREL, and they were okay with the updates.
- b. Stakeholder: In addition to Sea Level Rise (SLR), we also need to consider compounding factors such as king tides, coastal erosion, and SLR compounded by inland flooding. Therefore, we either need to model all of these compounding factors or use a more conservative 6ft SLR in our modeling to compensate for a lack of including these compounding factors in our modeling. Additionally, researchers, including Dr. Chip Fletcher of UH, have indicated that 3.2ft SLR may be an underestimate, particularly if we do not achieve global GHG reductions very quickly. As we know, we locally have very little influence on global behavior.
  - i. HE: For climate change we are modeling wind and flooding. This is a combination of tides, sea level rise, rainfall, and storms.
  - ii. HE: Regarding SLR, we've been looking at it more broadly by looking at different RCP scenarios, including RCP 8.5 through RCP 2.6 and different high/low cases for each.
- c. Stakeholder: Hearing the speaker say that more expensive solar on steeper slopes yields an overall cheaper resource plans because it delays more expensive generation (like biomass and offshore wind), I wonder how this delay squares with the statement about the 10+ year timeframe to develop such resources. In

other words, does SWITCH assume a faster timeframe for the more expensive resources, or does it assume a similar timeframe?

- i. Stakeholder: Resources are available on the same timeframe for all resources. When the speaker says, “later” it means “as you move to stricter land use limits”. So not later in time, but conceptually later as you consider the options. Switch will pick cheap resources earlier in time if they can save money relative to oil (as shown on this slide). Wind and solar are expected to get a little cheaper if you install them later, but the savings from not burning oil for a few years can outweigh the savings from waiting for cheaper equipment.
- d. Stakeholder: When you talk about protecting agricultural lands, do you mean lands currently in use or all lands?
  - i. Stakeholder: All lands available. Total of Class A, B, and C lands, but not necessarily considering land that is currently farmed.
  - ii. Stakeholder: The soil classifications also play a role, because on the Big Island, the soil classification can be lava rock.
  - iii. Stakeholder: Lands classified as C or D, might be good soil for growing agriculture, however due to the location – near roads – that land is not able to be utilized.
  - iv. Stakeholder: The quality of land does matter.
  - v. Stakeholder: Appreciated the discussion on agricultural land use.
- e. Stakeholder: In the higher sloped lands, is there more information about the lands that are privately-owned vs. state-owned?
  - i. HE: The project used publicly available data and maps.
- f. HE: For the higher slopes, were you able to look at proximity to transmission lines? Is there an assumption that interconnection would be relatively easy since there are no costs?
  - i. Stakeholder: We didn’t screen out lands without existing transmission infrastructure. If there is land that has a lot of potential, may need a dedicated renewable line.
- g. Stakeholder: SWITCH can apply a limit on the earliest date when a particular technology can be built, but we haven’t really needed to use that explicitly. We treat most of the construction before 2025 as predetermined (based on current plans), then allow free selection of resources to add after that. If available solar is very restricted, then offshore wind generally gets added late (in time and conceptually), when the RPS gets tighter and something more is needed but all cheaper resources have been exhausted.
- h. Stakeholder: Why a slope of 30% for solar PV?
  - i. Stakeholder: This started from NREL, which recommended slopes of about 10%. After speaking with developers, we were told they can build up to 15% slope without a significant change to resource costs. Beyond 15% slope, costs can increase.
- i. Stakeholder: Why were golf courses excluded?

- i. Stakeholder: We would be okay with solar on golf courses. However, it didn't see feasible to convert golf courses into solar farms. Golf courses could also have agricultural usage if the pesticide contamination isn't detrimental.
    - ii. Stakeholder: At one point, golf courses were allowed on agricultural land.
    - iii. Stakeholder: Our first land-use screen selects only agricultural and country-zoned land. Upon closer review, there were a few golf courses within those areas, and so those were excluded.
    - iv. Stakeholder: The Pali golf course does have solar on it.
    - v. Stakeholder: Solar canopies on parking lots could also be an option for the golf courses.
    - vi. Stakeholder: Technology improvements for bullet-proof panels is in the works.
    - vii. Stakeholder: Solar panels routinely survive hail on the mainland.
  - j. Stakeholder: If you told SWITCH that offshore wind was super-cheap, it might recommend adding it starting in 2025, as part of the cheapest-possible portfolio (i.e., instead of other options like continuing to burn oil). But offshore wind is expensive, so it doesn't generally get picked until later in time and later in the queue.
  - k. Stakeholder: It looks like rooftop PV is the same in all scenarios?
    - i. Stakeholder: Yes, rooftop was treated as a forecast.
- VII. Additional Comments
- a. Stakeholder: At the next meeting, are we looking for agreement on the resource cost scenarios? That way we can use it across the modeling initiatives.
    - i. HE: Yes, we will get back to you on that.
  - b. Stakeholder: When would there be a discussion about transmission infrastructure?
    - i. HE: Yes, we plan to schedule that meeting within the next few weeks. Please let us know your preference.
  - c. Stakeholder: This presentation suggests that offshore wind may not be the way forward. Interested in a counter-presentation on offshore wind.
    - i. HE: We will follow up on that.

## Summary and Next Steps

- Stakeholders may provide feedback on today's discussion to [IGP@hawaiianelectric.com](mailto:IGP@hawaiianelectric.com)