IGP Solution Evaluation and Optimization Working Group (Meeting #7)

Thursday, January 23, 2020
1:00pm - 3:30pm
American Savings Bank Tower, Training Room 1

Attendees

In-person

Christopher Lau, HE
Vladimir Shvets, HE
Dale Murdock, Newport Consulting
Roderick Go, E3
Nick Paslay, HE
Chie Reyes, HE
Marc Asano, HE
Hsun Jou, HE
Rebecca Dayhuff-Matsushima, HE
Greg Shimokawa, HE
Isaac Kawahara, HE
Christopher Kinoshita, HE
Collin Au, HE
Amanda Yano, HE
Sorapong Khongnawang, HE
Brian Lam, HE
Daniel Lum, HE
Jay-Paul Lenker, HPUC
Mike Wallerstein, HPUC
Gina Yi, HPUC
Kylie Wagner, Earthjustice dba Blue Planet Foundation
Robert Harris, Sunrun
Nohea Hirahara, HE

WebEx

Richard Wang, HE
Joanne Ide, HE
Dean Oshiro, HE
Isaac Lum, HE
Kenton Suzuki, HE
Marcey Chang, DCA
Nick Miller, HPUC
Rene Kamita, DCA
Robert Uyeunten, HE
Steven Rymsha, Sunrun
Therese Klaty, HE
Meredith Chee, HE
Jessie Ciulla, RMI
D. Noelani Kalipi, Progression Energy
Jennifer Baker, HE
Yoh Kawanami, HE

Objectives

- Develop a shared understanding of the process methodology and resource needs as well as review modeling & analysis for determining grid service needs within the IGP Process.
- Gain a shared understanding of the planning assumptions.
- Clarify stakeholder suggested modeling sensitivities and prioritize sensitivities to be considered.

Agenda

- Welcome & Ground Rules
    - SEOWG Deliverables and Schedule
    - Today's Objectives
- Planning Steps in Detail
    - Fuel Forecast
    - Resource Cost Forecast
    - Analysis and Modeling
    - Grid Service Definitions
    - Methodologies for Grid Services
- Proposed Sensitivity Analyses – Discussion and Prioritization
- Next Steps

Discussion

I. IGP Solution Sourcing Process

a. No comments

II. Planning Assumption Categories

a. Fuel Forecast
    i. Fuel forecast uses a linear regression.
    ii. FGE (Facts Global Energy) is the underlying data source for the forecast
    iii. Chart 1 – Example Historical Correlation for LSFO
        1. Grey line represents actual prices
        2. Orange line represents the Brent price from EIA
        3. Spiked values represent the earthquake in Japan
    iv. Chart 2 – Example Forecast for LSFO
        1. Blue line represents FGE forecast prices
        2. Grey line represents correlation pricing
    v. Stakeholder: What are the differences between the FGE and EIA fuel forecasts?
        1. HECO: They are quite similar, FGE has more monthly data , is closer to the industry and provides better insight.
b. Resource Costs

i. Stakeholder: Do the residential solar costs represent the cost to the customer?
    1. HECO: Yes
ii. Stakeholder: Does the grid-scale solar cost represent the cost to the utility, because you have in in $ / kWh on the graph?
    1. HECO: The $ / kWh is calculated by taking $/kW capital cost, divided by 8760 hours, divided by an assumed capacity factor and then converted to revenue requirements.

c. Question to Stakeholder: Are there additional resource options the Company should consider that:
    i. Have developable potential in Hawai'i?
    ii. Are technologically and commercially ready?
    iii. Responses:
        1. Stakeholder: Fuel cells have significantly dropped in price and can be a potential resource option if paired with PV and storage.
        2. Suggestion to include concentrated solar power.

III. Analysis and Modeling

a. Stakeholder: How accurate is the modeling in terms of curtailment? Are you able to see how resources respond and measure their ability to be curtailed?
    i. HECO: The PLEXOS model captures curtailment on an hourly basis. The resource dispatch accounts for the rate they can ramp up and ramp down.
b. Stakeholder: How do you use PLEXOS for new projects that have not been modeled before, for example, when you don't know how they're going to behave yet? For instance, offshore wind?
    i. HECO: We would tie the offshore wind to a similar wind profile based on the data that we have.
c. Stakeholder: How would you model co-located storage in PLEXOS?
    i. HECO: Storage can be modeled as a stand alone and paired resource in PLEXOS.
d. Stakeholder: In reference to the hourly dispatch PSIP chart: We don't see a DGPV storage component in the fleet of resources, it seems like it is only existing ramping units (thermal) on the graph shown for the dispatch.
    i. HECO: This chart is from the Dec 2016 PSIP update. At the time, distributed storage was not modeled as a separate resource on the

system. This would be a new approach that we could build into the model.

IV. Grid Services Definitions

a. Stakeholder: Are you anticipating that all the resources will respond to the AGC signal on that 3-second timeline? What do you mean by AGC, is that only data transfer?
    i. HECO: The resource would have to respond to an AGC signal, but not necessarily be pinged by it for every event.
    ii. Stakeholder: It would seem that an AGC is used more for minute-to-minute monitoring, is there any difference here?
    iii. HECO: We're looking at it from the perspective that the resource would respond to some dispatch signal, not only limited to AGC.
b. Stakeholder: What are you trying to capture between AGC and a simple signal?
    i. HECO: Grid-scale resources are on the SCADA system. It sounds like the question is are we going to send signals to the distribution projects, which would be through the DERMS system. It would likely be similar to what is being asked for in the Grid Services RFP. AGC signal is typically used with grid-scale resources, and therefore it might be different for distribution resources.

V. Regulating Reserve Methodology

a. Stakeholder: Could you please clarify changes in the load and renewables?
    i. HECO: Regulating reserve is to account for variability in both generation from variable renewables and load.
b. HECO: Positive values represent a downward reserve requirement and negative values represent an upward reserve requirement. The reserve is calculated for different types of resources, which when summed together represent the total reserve requirement on an hourly basis. Then, we can use this regulating reserve profile to scale for different types of projects and portfolios.
c. Stakeholder: Is there a known value for a resource that is less variable and can provide regulating reserve such as storage?
    i. HECO: As long as a resource can contribute to an upward or downward reserve, we want to let it do that. RESOLVE would select resources that have the capability to meet the reserve requirement.
d. Stakeholder: Would you consider a solar plus storage resource to have regulating reserve, what is the approach?

i. HECO: In terms of paired resources, the storage component provides the regulating reserve for the PV component. Therefore there wouldn't be an additional need for regulating reserves as the project can self-regulate.

VI. Sensitivities 1: Legacy NEM Self-Consumption Load Shift

a. Consultant: To clarify, is this sensitivity asking if there an existing resource on the system that can be utilized in a different way?
b. Stakeholder: Are you looking for a ranking of sensitivities because there is a time constraint and you can't model everything? Or is it to develop the assumptions for the modeling, because it sounds like two different things?
    i. HECO: The purpose of the ranking is to get an idea of which sensitivities to prioritize.
c. Stakeholder: Is the ranking on the worksheet trying to limit the number of sensitivities that can be done? How long would a typical sensitivity take?
    i. HECO: The purpose of this worksheet is to first understand what each of the sensitivities are and what can be learned from them. Then, once we have a firm understanding of what is being asked and assumed in each sensitivity, we can look at the modeling approach and come up with an estimated timeframe to complete the modeling. Let's ignore the ranking sheet, because we are not there yet. If we don't get to it today, it's okay, the intent was more to build out the sensitivities.
d. Stakeholder: For sensitivity 1, it's about how would you encourage NEM customers to add batteries to their systems to participate in an aggregated load build or load reduce system. It would operate like a Customer-Self Supply system.
    i. HECO: We would need to know the parameters around such a project, how many systems and when would it be available?
    ii. Consultant: Would it be a load modification assumption placed into the forecast?
    iii. Stakeholder: It is essentially a load modifying service done through a DER program. What is the marketable potential of a load modifying NEM service?
e. Stakeholder: What is the objective of this service, is it to meet RPS, or reduce GHG emissions?
    i. Stakeholder: Doesn't feel the utility's operations are completely optimized and the objective would be to ensure that the system is fully optimized especially using the NEM program.

ii. HECO: Are you asking us to create a modified DER load shape for NEM systems and run RESOLVE to see if the resource plan changes? Another way to do this is to take the existing NEM portfolio and freeze it at a certain year and pair them to batteries. In this sensitivity, are we trying to value a NEM system paired to a battery? It might not have a large enough impact to affect the resource plan.

f. Stakeholder: Is the purpose of this exercise to test the inputs to identify if the model is more sensitive to the changes of one input type and therefore be more specific and accurate with that input as opposed to an input that can be forecasted or estimated as it doesn't have a larger impact on the model. Are you seeking to make the model more robust?

g. Consultant: Are you only looking at the operational value of the programs? Are you looking at changing the load and seeing if there would be a change in the resource plan? We need to be clear what we are valuing because there's a lot of different ways to define value.
    i. Stakeholder: It's not just a cost component, it can be valued in different ways. What are you trying to maximize or minimize?

h. HECO: Are you trying to reduce system costs by doing this sensitivity?
    i. Stakeholder: Yes, but first we need to identify what is the baseline. Then build upon that in layers with different inputs and assumption changes.

i. Inputs and Assumptions
    i. Stakeholder: The NEM system would charge the battery and have the potential to export in the evening to nighttime period.

VII. Sensitivity 2: Transmission and Distribution Constrained: No New Substations, Poles, or Wires Except for Line Extensions

a. HECO: With a constrained T&D system, what provides the capacity expansion capability. What is the purpose of this?
    i. Stakeholder: Is it possible to live within our means to achieve our RPS goals? It provides an alternative way to look at our problems. Anything we build that is new presents the potential for public challenges. Is it possible to reshape load and generation locally? It might not be practical in every circumstance.

b. Stakeholder: This appears to be where non-wires alternatives could go.

c. HECO: An NWA is only a deferral capacity; it might still need to be addressed further down the line.
    i. Stakeholder: Wouldn't distributed self-supply be a way to impact the load in RESOLVE?

ii. Consultant: Every increment of new load has to be self-serving. This is an extreme constraint, taking away all new T&D infrastructure and operation on an as-is basis, it does create a self-serve environment.
iii. HECO: Is one way to approach this that all future DER programs must be paired with storage?
iv. Stakeholder: It could be approached from the idea of a microgrid, where not all systems have batteries, or are the same sizes, but have to work together within themselves. Suggestion to further load the distribution system.

d. Consultant: Additional resource growth, what does this mean?
    i. Stakeholder: It doesn't have to mean the growth of one type of resource, it could also be consideration for flexible resources, where it is managed when the resources come online. Matching the load to when the resource becomes available.
    ii. Stakeholder: This sensitivity wasn't envisioned for grid-scale resources, it was meant for distributed resources.
e. HECO: We were considering building the resources up to the existing transmission capacity. Anything beyond the available transmission capacity would have a cost adder.
f. Stakeholder: The objective is learning how to plan for a load shape, if we were constrained by no allowable T&D upgrades. It would change how we are planning and the values of resources.

VIII. Sensitivity 3 and 4: EV Low Load Factor and EV Optimized High Load Factor

a. Stakeholder: 95% of the year, the power for the EV is coming from the customer's battery. During the peak, is the PV charging the EV?
b. Consultant: In terms of the EV load, if we change it, what is the factor. How has the profile changed?
c. HECO: In the high and low load factor, we would need to know how much and the load shape.
d. Consultant: Is it a high charging rate, with a low impact or a low charging rate with a high impact? What are we looking at? There's two ways of looking at this, having the customer modify their own load or the utility controlling the load.
e. Consultant: Utility charging vs. battery charging. Optimizing would be the utility controlling the load, rather than letting the PV plus BESS plus EV system modifying its own load.
f. Stakeholder: There is a relationship between this sensitivity and the second with T&D upgrades, where the EV load factor would modify the load.

IX. Sensitivity 5: High Grid Defection

a. Consultant: What is the situation? Is it people installing self-supply or completely cutting the cord with the utility?
b. HECO: Is it simply reducing the load, and seeing what that does to the resource plan?
c. Stakeholder: This is an assessment of customer risk, if customer load goes away, can all these feeders maintain voltage? Is the grid robust enough, maybe there's no effect? In the PSIP there was an assumption, but what does that look like now?
    i. Consultant: This sounds highly location specific, however the issue is it keeping customers on the grid, or for whatever circumstance a large group of customers leaves, what is the cost to the utility?
    ii. HECO: Is this a distribution planning analysis, what if a group of customers left, would this create a distribution need?
d. Stakeholder: With a 25% reduction in load, what is the impact there? Are there benefits to reducing load on overloaded circuits? Or is there a negative impact with lost load on a distribution circuit? Not just loss in one area, but loss spread out everywhere, what is the impact.

X. Sensitivity 6: Grid-Charge Load-Shift Need for Extended Periods of Low Wind and Solar

a. Stakeholder: Would you consider resources that compliment grid-scale wind and solar resources?
b. Consultant: Is this directed towards grid-scale or distribution scale resources?
    i. Stakeholder: The question is are we modeling the scenario of low grid-scale wind and solar effectively? What does that do to my capacity need? Is there a level of grid charge needed?
c. HECO: If there is a low wind or solar day, what is going to be charging the battery, if fuel resources can't charge it? We also need to consider how long will the wind and solar be out? If the outage is too long, a longer-duration storage isn't going to supply it.
    i. Stakeholder: From the distribution level, there potential for the customer to shift their own loads with PV and storage and EV.
    ii. HECO: Is this a two-week timeframe?
    iii. Stakeholder: Yes. It would be good to think about weather changes for contingency.

XI. Sensitivity 7: Transmission Constrained (Land Only)

a. Stakeholder: This one was assuming that we couldn't get any more large-scale transmission on land, would we then go to offshore transmission options or stick with the existing infrastructure?
    i. HECO/Consultant: This seems like an offshore wind resource.
    ii. Consultant: Is this captured in RESOLVE?
    iii. HECO: Yes, we have pricing for offshore wind.
    iv. Consultant: How much offshore wind is there currently?
    v. HECO: None.
b. HECO: What is the amount of offshore wind we should model?

XII. Sensitivity 8: Load Shift Bring Your Own Device

a. Stakeholder: Is there a better way to integrate these resources in Sensitivity 1 to fully optimize the value of NEM systems with batteries.
b. Consultant: Are we asking, how do we dispatch and control these as load modifiers? Where the highest value occurs, I will dispatch these NEM plus battery systems to meet the needs?
    i. Stakeholder: Yes.
    ii. Consultant: Essentially, it's taking sensitivity 1 as a fixed load modifier and creating a flexible BTM resource?
    iii. Stakeholder: No, it's about how do you expand the flexibility of these resources through an easy opt-in program
    iv. Stakeholder: In the Grid Services RFP there was a value of services based on avoided costs.
    v. Stakeholder: The more demand response you have the more value and flexibility you have.
    vi. Consultant: An expanded demand response through a DER aggregator to provide multiple services.
    vii. HECO: Would it be appropriate to take existing programs without storage and count them as paired?
    viii. Stakeholder: What would be looked at as the base case?
        1. Stakeholder: Just need to know there's no incentives for existing BTM customers to add batteries to existing systems.

XIII. Sensitivity 9: DGPV Excess Energy Capacity Dispatch

a. Stakeholder: Assumes curtailable DGPV in the future. Unsure what is the curtailment hierarchy. What if you created a program where people could sign

up to be first curtailed? It's different in that customers are volunteering to be curtailed.

XIV. Sensitivity 10: Frequency Responsive Load Bank

a. Stakeholder: Having a dynamic resistor that can provide frequency response. Foresee multiple applications for load banks to be used. Is Molokaʻi an anomaly or what about Tasmania?
    i. HECO: Is this a resource planning or transmission planning kind of thing?
    ii. Stakeholder: This is specifically for Molokaʻi.
b. Stakeholder: Could be considered as a relatively inexpensive battery storage. In terms of Tasmania, they are able to model regulation on a microsecond response.
    i. HECO: It seems like this could be modeled.
c. Stakeholder: How is a load bank different from curtailment?
    i. Stakeholder: Speed, microsecond control with a load bank. Whereas curtailment will cause ramp rate changes. Storage alone would be an expensive resource.
    ii. Stakeholder: Curtailing a wind resource and bringing it back online is very slow. As opposed to keeping the wind resource on but sending the energy to a load bank, without having to pay for the ramp rate.
    iii. HECO: There would be ramp rate considerations.

XV. Sensitivity XI: DER Program Freeze

a. HECO: What is the market uptake of DER worth?
    i. Consultant: Is this taking out all DERs?
        1. HECO: No, it includes keeping the current DERs and stopping all future growth. We would then compare this case back to the reference to find the value of a market uptake of DER.
    ii. Stakeholder: Then, would the resource plans scale in the opposite direction with greater grid-scale build out vs greater distribution scale build out?
        1. HECO: Yes
        2. Stakeholder: This would also uncover the distribution needs to supplement load growth.

XVI. Sensitivity XII: No New Transmission Infrastructure

a. HECO: This would allow future grid-scale resources to be built out to the existing transmission capacity then rely on DER to meet future grid needs.

i. Consultant: Can this be enmeshed with the other transmission constrained sensitivities?
ii. HECO: We're not sure they are completely the same.

XVII. Additional Comments

a. Stakeholder suggestion to have offline follow up discussions on the modeling inputs and assumptions rather than waiting for the next meeting to clarify and answer any questions.
b. Stakeholder: Suggestion to do an Energy Efficiency Freeze sensitivity.

SEOWG Deliverables Due

1. Description of the process methodology to be used to identify capacity, energy, ancillary service needs
   - Presentation and discussion: Due 1/23/2020
   - Draft methodology documentation: Due 1/23/2020
2. Description of the evaluation methodology for T&D Non-wires RFP
   - Presentation and discussion: Due 2/12/2020
   - Draft methodology documentation: Due 2/12/2020
3. Description of the evaluation methodology to be used for Capacity, Energy and Ancillary Services RFP
   - Presentation and discussion: Due 2/12/2020
   - Draft methodology documentation: Due 2/12/2020
4. Description of the optimization methodology to be used for proposed solutions that may address multiple resource/grid needs
   - Due 6/1/2020 (to be informed by Stage 2 RFP)

SEOWG Upcoming Meetings Schedule

Meeting 8 – February 12, 2020 (tentative)	Review and finalize drafts of CEAS Needs methodology deliverable
Meeting 9 – March 18, 2020	Final Meeting – Final review of all deliverables Discuss any next steps

Next Steps

- Next Meeting
  - Date: Wednesday, February 12, 2020 (tentative)
  - Time: TBD
  - Location: American Savings Bank, Training Room 1, 1001 Bishop Street
  - Topic: Finalize documentation of the methodology used identify Capacity, Energy and Ancillary Service Needs.
- Feedback may be submitted to – IGP@hawaiianelectric.com, or Chris Lau christopher.lau@hawaiianelectric.com