

Integrated Grid Planning

Solution Evaluation &
Optimization Working Group Meeting

February 12, 2020



Hawaiian
Electric

Meeting Agenda

- Welcome and Ground Rules
 - SEOWG Deliverables and Schedule
 - Today's Objectives
- Modeling Sensitivities in the Grid Service Needs Analyses
- Proposed Methodology for NWA Evaluation Developed for Soft Launch
- Next Steps



Ground Rules

- Chatham House Rule will apply – no personal or organizational attribution will be made to any comments/feedback provided during the meeting by any participant nor in written documentation.
- Working group meetings, and other information exchanges are intended solely to provide an open forum or means for the expression of various points of view in compliance with antitrust laws.
- Under no circumstances shall engagement activities be used as a means for competing companies to reach any understanding, expressed or implied, which tends to restrict competition, or in any way, to impair the ability of participating organizations to exercise independent business judgment regarding matters affecting competition or regulatory positions.
- Proprietary information shall not be disclosed by any participant during any industry engagement meeting or information exchange. In addition, no information of a secret or proprietary nature shall be made available to industry engagement participants.
- All proprietary information which may nonetheless be publicly disclosed by any participant during any industry engagement meeting or information exchange shall be deemed to have been disclosed on a non-confidential basis, without any restrictions on use by anyone, except that no valid copyright or patent right shall be deemed to have been waived by such disclosure.

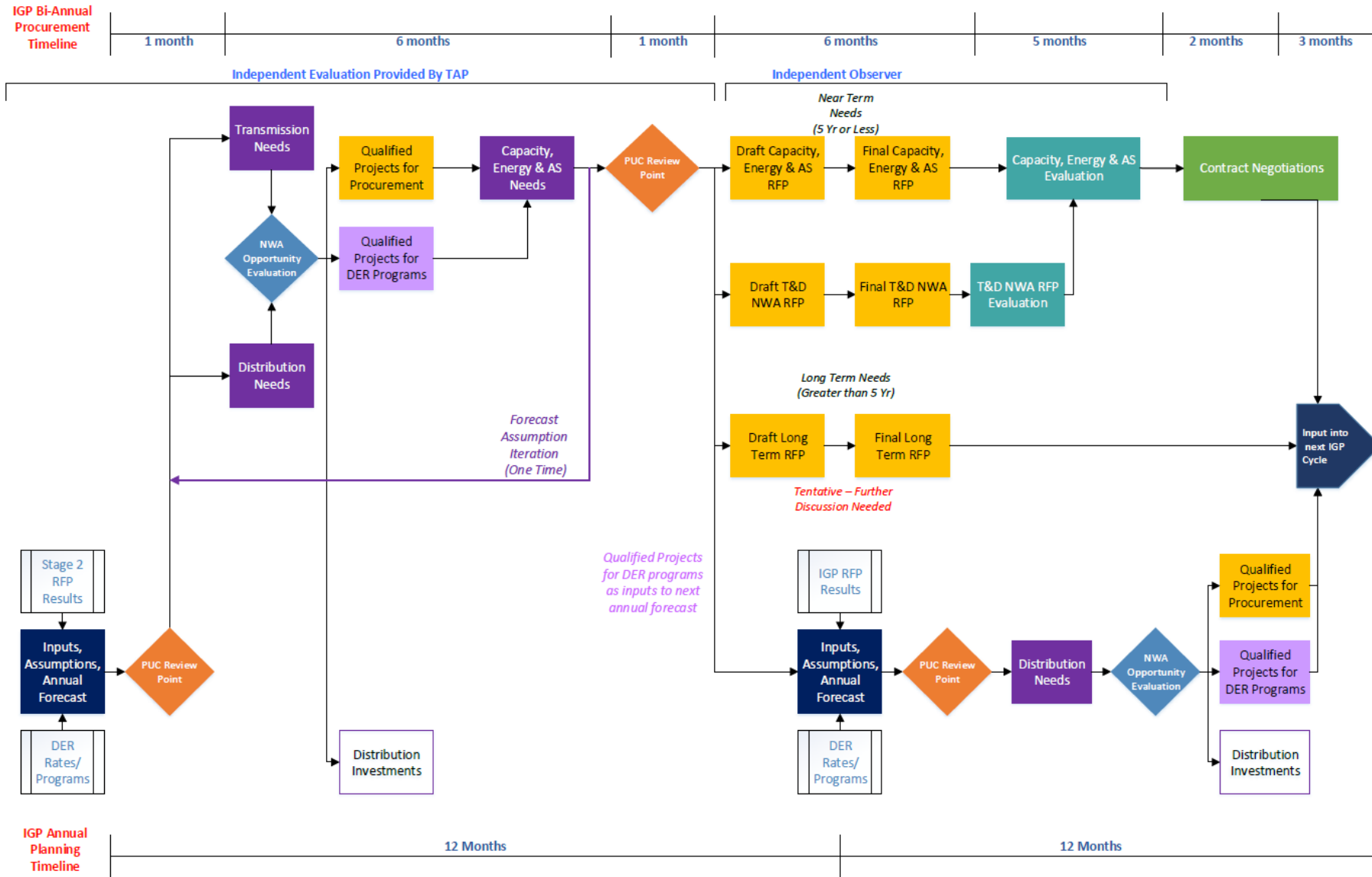
SEOWG Deliverables and Schedule

1. SEOWG deliverable draft sent to stakeholders for review
 - Awaiting comments on draft
2. 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)

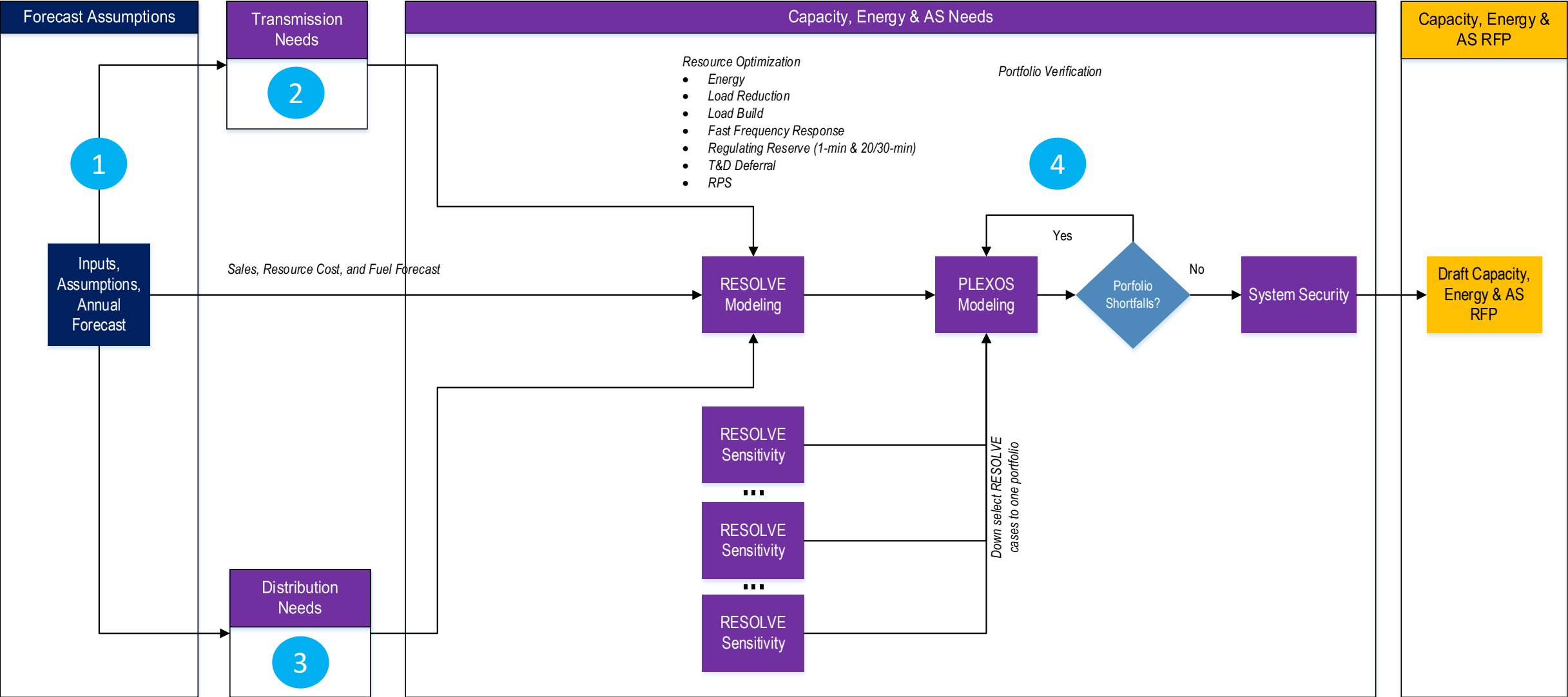
Objectives for Today's Meeting

- Clarify how the sensitivities discussed in the previous meeting will be modeled
- Discuss proposed modeling information with stakeholder input
- Introduce NWA evaluation that was developed for IGP Soft Launch

IGP Solution Sourcing Process



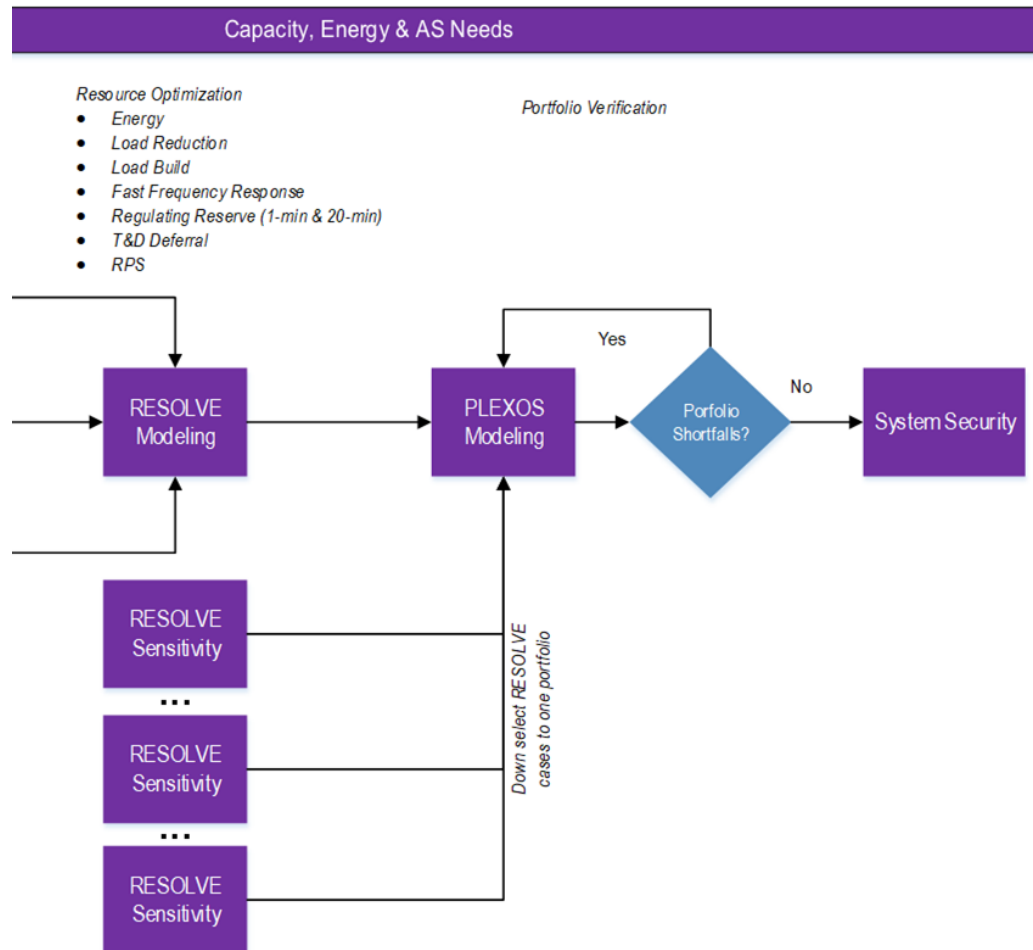
Process Steps In Detail



Modeling Sensitivities for Discussion and Stakeholder Feedback



Modeling Sensitivities Discussion



- Stakeholders provided 10 potential sensitivities for consideration as part of the CEAS needs analysis.
- For each of the sensitivities, we would like to better understand:
 - Objective(s)
 - Expected outcome
 - Clarification of terms
 - Specific data/inputs
 - Appropriate place in the CEAS needs process to test the sensitivity



Modeling Sensitivities Discussion

- Each sensitivity will require the:
 - Development of input data
 - RESOLVE case setup (multiple model iterations may be required)
 - Calculate plan costs and analyze model results

Proposed Process

1. Hawaiian Electric proposes sensitivities to inform the grid service needs
2. Stakeholders provide feedback on sensitivities
3. Hawaiian Electric incorporates feedback into sensitivity refinement
4. TAP reviews the grid service needs assessment and sensitivities
5. Stakeholder Council reviews the grid service needs assessment and sensitivities



Hawaiian Electric Proposed Sensitivities

Sensitivity 1: DER Program Freeze

- The intent of this sensitivity is to show the value of future DER assumed in the market forecast.
 - Develop a resource plan assuming DER uptake at year end 2019 is held constant.
 - Remove all future increases to DER.

Sensitivity 2: No New Transmission Infrastructure

- The intent of this sensitivity is to show the value of future DER above the market forecast.
 - Develop a resource plan that relies upon grid-scale resources up to the existing transmission capacity and future DER.



Stakeholder Proposed Sensitivities for Consideration

Sensitivity 3: Legacy Net Energy Metering (NEM) Self-Consumption Load Shift

- The intent of this sensitivity is to show the value of having DER customers pair their systems with storage.
- Pair ~10% of the net energy metering program capacity with energy storage
 - O'ahu: 32 MW
 - Hawai'i: 7 MW
 - Maui: 8 MW
 - Moloka'i: 0.2 MW
 - Lāna'i: 0.07 MW

Sensitivity 4: Load Shift Bring Your Own Device

- The intent of this sensitivity is to show the value of residential PV paired with storage.
 - Is this addressed by sensitivity 3 (above)?



Stakeholder Proposed Sensitivities for Consideration

Sensitivity 5: DGPV Excess Energy Capacity Dispatch

- The intent of this sensitivity is to show the value of curtailing DGPV first.
- Move a block of DER to be first in the curtailment order, ahead of grid-scale resources.
 - O'ahu: 32 MW of NEM
 - Hawai'i: 7 MW of NEM
 - Maui: 8 MW of NEM
 - Moloka'i: 0.2 MW (200 kW) of NEM
 - Lāna'i: 0.07 MW (70 kW) of NEM



Stakeholder Proposed Sensitivities for Consideration

Sensitivity 6: EV Low Load Factor Analysis

- The intent of this sensitivity is to show the value of charging EVs with residential PV.
- What is the hourly load shape for a low load factor EV?
- Assume 10% percent of the night time EV charging load is moved to the day time.
 - Should additional battery capacity (MWH) be assumed?

Sensitivity 7: EV High Load Factor Analysis

- The intent of this sensitivity is to show the impact of EV charging coincident with system peak.
- High load factor may already be assumed in the sales forecast.



Stakeholder Proposed Sensitivities for Consideration

Sensitivity 8: Transmission Constrained (Land Only)

- The intent of this sensitivity is to show the value of offshore wind.
 - Develop a resource plan that relies on offshore wind to meet RPS goals and system needs.
- If onshore transmission is constrained, what circumstances allow for offshore wind to be developed instead?

Sensitivity 9: Frequency Responsive Load Bank

- The intent of this sensitivity is to show the benefit of incremental load that can be added to the system.
 - Model the load bank using an incremental load of 20 MW on O‘ahu



Stakeholder Proposed Sensitivities for Consideration

Sensitivity 10: Grid Charge Load-Shift Need For Extended Periods of Low Wind and Solar

- The intent of this sensitivity is to show the value of long duration energy storage systems over a period of low renewable production.
 - De-rate wind and solar profile to 10% of hourly potential for one week
 - Consider benefit of longer duration storage (4+ hours)



Additional Information

DER aggregator resource cost for modeling

- \$/kW and \$/kWh pricing is needed for a DER aggregator resource block
- Does combining 20 MW of residential PV with 20 MW of residential storage, plus 10% for customer acquisition cost seem reasonable?



IGP Soft Launch



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IGP Soft Launch

- Introduce NWA evaluation method developed for the Soft Launch to illustrate how the NWA evaluation could be conducted
- Evaluation of other grid services needs will be discussed in more detail at later meetings



Overview of Evaluation

There are four different circuit needs that must be solved to defer the Ho'opili Substation

AA:

Ewa Nui 2

- Loss of Kaloi 1 + Kaloi 2

BB:

Kaloi 1 + Kaloi 2

- Loss of Kaloi 3

CC:

Kaloi 3

- Loss of Kaloi 1

DD:

Kamokila 4

- Loss of Kaloi 2



Resource Buckets

1. Demand based solutions
2. Inverter based solutions that appear similar to a demand based solution
 - ◆ Able to mitigate 5 minute outage due to anti-islanding issue; modifying anti-islanding setting not an acceptable solution
3. All other inverter-based solutions



Initial Evaluation

Category	AA: Ewa Nui 2 (Loss of Kaloi 1 + Kaloi 2)	BB: Kaloi 1 + Kaloi 2 (Loss of Kaloi 3)	CC: Kaloi 3 (Loss of Kaloi 1)	DD: Kamokila 4 (Loss of Kaloi 2)
1. Demand based solutions	Bucket AA – 1	Bucket BB – 1	Bucket CC – 1	Bucket DD – 1
2. Inverter based solutions – (Mitigates 5min issue)	Bucket AA – 2	Bucket BB – 2	Bucket CC – 2	Bucket DD – 2
3. All other inverter based solutions	Bucket AA – 3	Bucket BB – 3	Bucket CC – 3	Bucket DD – 3

The solutions proposed for each need (AA, BB, CC, DD) will be ranked by NPV cost for each solution type (1, 2, 3). In total, there will be 12 separate rankings covering the range of needs and solutions.



Detailed Evaluation

- The detailed evaluation will be structured to account for the two-fer value of solutions on Kaloi 1, Kaloi 2, or Kaloi 3
 - ◆ Because need BB accounts for the same two circuits that affect needs AA, CC, and DD, a demand based solution (Type 1) or inverter based solution that can mitigate the 5 min issue (Type 2) on Kaloi 1 or Kaloi 2 can potentially reduce the needs at AA, CC, and DD.
 - ◆ Similarly, need CC accounts for the same circuit that affects need BB so a Type 1 or Type 2 solution on Kaloi 3 can potentially reduce need BB.



Detailed Evaluation

1. Type 1 and Type 2 solutions for need BB will be evaluated
2. Type 1 and Type 2 solutions for need CC will be evaluated after accounting for any qualified solutions that address need BB on the Kaloi 1 circuit
3. If need BB was not fully met by Type 1 and Type 2 solutions in step 1, need BB will be reassessed to include any qualified solutions that address need CC on the Kaloi 3 circuit
4. Type 1 and Type 2 solutions for needs AA and DD will be evaluated after accounting for any qualified solutions that address need BB on Kaloi 1 and Kaloi 2 circuits
5. Type 3 solutions for needs AA, BB, CC, and DD will be evaluated



Detailed Evaluation

Category	AA: Ewa Nui 2 (Loss of Kalo 1 + Kalo 2)	BB: Kalo 1 + Kalo 2 (Loss of Kalo 3)	CC: Kalo 3 (Loss of Kalo 1)	DD: Kamokila 4 (Loss of Kalo 2)
1. Demand based solutions	3	1	2	3
2. Inverter based solutions – (Mitigates 5min issue)				
3. All other inverter based solutions	4			

High level overview of the detailed evaluation process:

1. Evaluate type 1 and type 2 solutions for need BB
2. Evaluate type 1 and type 2 solutions for need CC
3. Evaluate type 1 and type 2 solutions for needs AA and DD
4. Evaluate type 3 solutions for needs AA, BB, CC, and DD



Next Steps

- Next meeting March 18 2020 – (tentative)
 - Revise deliverable draft to provide additional description of the methodology used to identify Grid Service Needs and evaluate solutions based on working group feedback
- Feedback may be submitted to Chris Lau at christopher.lau@hawaiianelectric.com and IGP@hawaiianelectric.com.



Thank you!



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