

Hawaiian Electric Companies
Technical Advisory Panel (TAP)
 Sep 25-26, 2018 • Meeting Summary

TAP members attending:

Rick Rocheleau, Director, Hawaii Natural Energy Institute (Chair)
 Elijah Pack, Australian Energy Market Operator
 Jeff Burke, Arizona Public Service
 Jeff Smith, Electric Power Research Institute
 Andy Hoke, National Renewable Energy Lab
 Julia Matevosjana, Electricity Reliability Council of Texas

HECO Participants/Presenters:	HNEI Participants
Colton Ching	John Cole
Lisa Giang	Terry Surles
Earlynn Maile	Derek Stenlik, GE Energy Consulting
Marc Asano	
Keith Kobuke	
Dean Arakawa	
Joann Ide	
Chris Lau	
Paul De Martini, Newport Consulting	

Agenda Day 1

Time	Topic	Presenter
1:00-2:00p	IGP Process & Critical Planning Issues Discussion	Lisa Giang
2:00-2:15p	Break	
2:15-3:15p	Discussion of IGP Stakeholder Engagement	Lisa Giang
3:15-4:15p	Integration of Distribution Planning Review	Marc Asano
4:15-4:30p	Wrap-up	Lisa Giang

Note: TAP members attended the IGP public workshop held in the morning of Sept 25th to hear stakeholders’ interest as background and context for the technical discussions.

Day 1: Key Discussion Points

IGP Process & Critical Planning Issues

Overview of the IGP process and evolution of the thinking from the 2016 PSIP to the process in the IGP report filed March 1, 2018 (refer to slides). General discussion was interspersed, the following are summary highlights:

There were initial discussions of the challenges regarding the proposed Integrated Grid Planning process. This included observations from several TAP members that attended a recent RMI eLab session in New Mexico that focused on integrated system planning. The takeaway shared by a wide range of planners, regulatory and stakeholders at the RMI session was that efforts like IGP are very desirable, but have not been done. It was noted by the RMI participants that they are looking to HECO's IGP and further development as a guide for their respective efforts.

Several TAP members inquired about the role of energy efficiency (EE) in IGP. With background provided on the structure and roles in Hawaii for energy efficiency, TAP members asked about the potential alignment of energy efficiency programs to system needs in a high renewable (especially solar PV) system. One member noted that they are retooling EE to demand side management (DSM) to better align to system needs and optimize value (i.e., EE is not only about reducing energy use but managing load which could also mean building load in the middle of the day). HECO shared that they've had initial discussions with the new EE administrator in Hawaii on the results of the 2016 Power Supply Improvement Plan (PSIP) and improvements for optimizing the EE portfolio in the IGP.

TAP members also asked how resiliency will be considered in IGP. The challenge shared by the group was that there are many views across the US and in Hawaii on the definition, scope and criteria for resiliency. Also, the distinction between resiliency and reliability (which has different meanings at system, transmission and distribution levels) is not commonly defined in the industry. The group agreed that resiliency (and reliability) parameters are needed for planning and to support prioritization and trade-off discussions with policymakers and the public regarding alternative solutions. On reliability planning criteria – members suggested looking at the Australian Energy Market Operator (AEMO) technical planning criteria as well as the ERCOT reliability standards for comparative purposes.

TAP members inquired how other factors such as carbon and climate issues are incorporated into planning. There was agreement that transparency was needed in the planning process to educate and engender confidence in the resulting analyses of alternative solutions as there will likely be trade-offs between potentially competing goals.

Stakeholder Engagement

Overview was provided on the IGP stakeholder engagement structure, roles and engagement process (refer to slides). General discussion was interspersed, the following are summary highlights:

A Stakeholder Council (SC) question was raised regarding the interaction between the SC and TAP. The TAP members agreed that Rick Rocheleau as TAP Chair would represent the TAP members on the SC. The chair will act as an intermediary to gather questions/comments from SC members to share with TAP. HECO will also share any SC and stakeholder questions/comments with the TAP members (SC independent facilitator capturing questions/comments). Further, the TAP chair will share key takeaways and information from the TAP discussions. TAP meeting summary notes will also be publically available.

Another SC question was about the participation of SC members or other non-TAP, HECO or HNEI participants in TAP meetings as observers. The TAP members discussed this and concluded that it would impede the openness of the discussions as members would be less likely to provide candid feedback. The independent chair, along with other HNEI representatives should be sufficient to ensure transparency to the discussion and facilitate interchange of information between the SC and TAP.

Integration of Distribution Planning

Detailed presentation on HECO's distribution planning process, methods and proposed enhancements was provided for technical peer review (refer to slides). General discussion was interspersed, the following are summary highlights:

There was group discussion on the nature and issues with reverse power flow on HECO's system. HECO shared that reverse power flow is occurring on most distribution to subtransmission substation transformers and occasionally from subtransmission to transmission. A TAP member asked if the magnitude of reverse power flows exceeded peak load demand on any feeders or substation transformer – answer was yes it was beginning to occur. That is, the peak loading on certain distribution feeders is now being set by reverse power flow from DER as opposed to customer energy consumption. Group briefly discussed several technical issues related to managing N-1 contingencies given the level of reverse power flows. This is an item that will be a follow-on discussion item in subsequent TAP meeting/s.

TAP members asked about how top down and bottom-up forecasts and analysis are reconciled in the current planning process and proposed in the IGP. The group discussion centered on the challenges and need to resolve, but recognized there are no current modelling tools available to do the required iterations automatically. The group conclusion was that manual iterations would likely be required in the near-term, but that the data exchange between different models for resource, transmission and distribution maybe simplified to reduce the iteration effort. A TAP member suggested promising techniques for resource planning to transmission planning and another for distribution to transmission that will be shared on follow-up with HECO.

A TAP member asked how solutions get assessed for each of the resource, transmission and distribution needs in a holistic optimization as proposed by IGP. For example, what is the objective function/s and how would you define it? The discussion recognized that this hasn't been done before in the industry (globally) and was a key area of further discussion with the TAP in the development of the IGP. TAP members suggested that the goal of optimizations in the early stage of IGP development should focus on achieving a "good result, and not perfect" as a reasonable target. More discussion needed on what is "good".

TAP member raised the criticality of time and location based analysis on distribution as essential given DER net load and export variability. There was follow-on suggestion that sensitivities on DER forecasts would be useful. HECO shared the approach using LoadSEER to do time-series analysis as well as the potential for assessing various DER sensitivities. This led to a discussion of the merits of 8760¹ vs 576² hourly based analysis. The group recognized that while more granular hourly data analysis is desirable, the complexity of the analysis is daunting. The example provided by a TAP member related to California's challenges with implementing 576 hourly analysis. The central issue is that to properly conduct the analysis multiple distribution operating scenarios need to be run based on different circuit configurations and other conditions. This in turn requires each of the multiple different scenarios to be run for each circuit. This exponentially increases the planning complexity and time. HECO shared that

¹ Hourly profile for all hours in a year (24 hours x 365 days)

² Hourly profile for average weekday and weekend for each month (12 months x 24 hours x 2 days)

this challenge, while problematic, may be manageable given the smaller number of circuits (than CA utilities) and their composition.

Day 1 Wrap-up

Throughout the Day 1 afternoon discussion, TAP members asked and offered feedback on aspects of the role of the TAP. In summary, the role of the Technical Advisory Panel centered on three aspects as agreed by the members:

- Technical expert peer review on methods, models and reasonableness of analysis
- Sounding board on best and emerging integrated planning and solution sourcing and evaluation practices globally
- Technical advisors on the IGP process development

Day 2 Agenda

Time	Topic	Presenter
8:30-9:45a	Transmission Planning Review	Dean Arakawa
9:45-10:00a	Break	
10:00-11:30a	Forecasts, Assumptions & Sensitivities - Stochastic Analyses in PLEXOS	Joanne Ide Christopher Lau
11:30-12:30p	Lunch	
12:30-2:30p	IGP Workplan Discussion	Lisa Giang
2:30-2:45p	Break	
2:45-4:00p	TAP Member Topics	
4:00-4:30p	Summary of Key Takeaways & Action Items	Lisa Giang

Day 2: Key Discussion Points

Transmission Planning Review

Detailed presentation on HECO’s transmission planning process, methods and proposed enhancements was provided for technical peer review (refer to slides). General discussion was interspersed, the following are summary highlights:

TAP member initiated discussion regarding planning implications for a transmission system with reductions in system inertia. Specific issues include, a reduction in system inertia will create requirements that “fast frequency response” won’t be able to fully resolve. The significant increase in the rate of change in frequency due to loss of inertia creates several problems. For example, a TAP member shared that certain manufacturers currently installed inverters will trip on rate of change in frequency as the inverter perceives the frequency change as an islanding situation. New IEEE 1547-2018 standard addresses this issue, but will take time for manufacturers to incorporate changes into new inverters for installation.

TAP members raised questions regarding reliability criteria for system security analysis and had a comparative discussion of their respective criteria and approaches regarding planning for N-1, N-2 and N-1-1 contingencies. References were cited for follow-on discussions.

TAP members briefly explored issues involving iterative resource and transmission planning involving process effort and modelling time duration and state of tools. TAP participant suggested potential data streamlining methods to address non-standard data formats employed by commercial resource (e.g., Plexos), transmission (e.g., PSEE) and distribution modelling (e.g., Synergi) tools.

Forecasts, Assumptions & Sensitivities

Detailed presentation on HECO's forecasting process, methods and challenges was provided for technical peer review (refer to slides). General discussion was interspersed, the following are summary highlights:

TAP members discussed how long-term potential climate changes, such as increases in temperature and cloud cover, and other aspects, such as technological advancement may be incorporated into long-term forecast performance of certain DER. HECO did not incorporate these factors into the 2016 PSIP, but would look to incorporate into IGP.

TAP discussion of the need to better understand gross load profiles and forecasts as well as net load with DER. The impact of trade wind reduction and increasing humidity may have an impact on peak power demand. Agreement that typical meteorological year (TMY) approach, used by HECO, is best practice. HECO's proposed AMI deployment to DER customers will enhance the ability to understand gross and net load profiles needed for planning as customer use of energy changing.

TAP discussion revisiting the importance of alignment of EE with planning identified needs and related value.

TAP group discussion on forecasting identified the following key issues to consider in future forecasts:

- Need to consider energy efficiency in integrated planning and vice versa to realize value potential
- Changes in underlying customer gross load profiles
- Locational forecasts for DER needed for effective distribution planning and links to transmission planning given reverse power flows
- Customer behavior changes in relation to various tariff designs/program options
- Large-scale resource, storage and DER technology advancements

IGP Workplan Discussion

Overview presentation on required scope of IGP workplan was provided for discuss (refer to slides). General discussion was interspersed, the following are summary highlights:

TAP members suggested the following high level sequence for IGP development:

1. Start with addressing the process of integrating of resource, transmission and distribution planning and the related iterations needed. TAP participants offered to support with prototype methods they've been developing.
2. Define the multi-step procurement process for resource and T&D services
3. Define the multi-solution evaluation/optimization process and methods

Overarching recommendation was to target “good” as opposed to “best” in the first IGP planning cycle given that this has not been done before and there many aspects that need development and the level of complexity involved in the IGP process. There are a number of details that will need identification and prioritization in order to effectively work through to develop IGP.

TAP members agreed to provide technical advisory support to HECO in the development both 1:1 and as part of the TAP meetings.

TAP members asked about the interrelationship regarding the IGP long-term plan and near-term plan such that the near-term plan is directionally aligned to the long-term plan and goals. Discussion about the length of a long-term plan to 2045 given the large amount of uncertainty beyond 15 years. Potential use of 2030 goals as a more tangible long-term alignment point was discussed. Agreement that key policy issues need to be considered as well as identifying key planning constraints (e.g., land use) in long-term planning.

TAP Member Topics

Action Items and Next Steps

- Create a site where data can be shared among the TAP members
- Schedule webinar for November following next IGP SC meeting and prior to the filing of the Workplan
-