

**Hawaiian Electric Companies
Integrated Grid Plan Stakeholder Council (IGPSC) Meeting
May 8, 2019**

Meeting Agenda
❖ Welcome/Introductions
❖ Recap of Resiliency Session & IGP Resources
❖ https://www.hawaiianelectric.com/clean-energy-hawaii/integrated-grid-planning/stakeholder-engagement/stakeholder-council
❖ Elijah Pack Presentation- Power System Planning Challenges & Opportunities (“Energy Trilemma”)
❖ Break (lunch provided)
❖ Elijah Pack Presentation- Integrated System Plan
❖ Break Considerations/Discussion
❖ Working Group Status Updates
❖ Next Steps and Closing

I. STATUS UPDATE

- A. Stakeholder Council:** updated list of IGPSC members, including those present at the meeting (in-person or via WebEx) denoted with an asterisk:

Stakeholder	Name	Affiliation
HPUC	Dave Parsons*	Chief of Policy & Research
Consumer Advocate	Dean Nishina*	Executive Director, Division of Consumer Advocacy
DBEDT	Carilyn Shon*	Hawai'i State Energy Office, Energy Administrator
Office of State Planning	To be determined	Office of Planning
DOD	Keith Yamanaka*	USAG-HI, Directorate of Public Works
Large CI&I Customer	Barry Usagawa*	Board of Water Supply
Community Delegate (Hawaii)	Jacqui Hoover	President of Hawai'i Leeward Planning Conference and Executive Director & COO of Hawai'i Island Economic Development Board (HIEDB)

Community Delegate (Maui)	To be determined	
Community Delegate (Moloka'i)	Barbara Haliniak*	Owner, The Business Depot, Inc., and President, Moloka'i Island Foundation
Community Delegate (Lana'i)	Alberta DeJetley	Publisher and Editor of Lana'i Today, Owner, Albert's Farm, member of Lana'i Chamber of Commerce
Community Delegate (O'ahu)	Pono Shim	President & CEO at O'ahu Economic Development Board
Local Gov't (Hawaii)	Ron Whitmore *	County of Hawai'i Deputy Director, Dept. of R&D
Local Gov't (Maui)	Alex de Roode*	County of Maui Energy Commissioner
Local Gov't (O'ahu)	Robert "Rocky" Mould*	County of Honolulu, Energy Program Manager, Office of Climate Change, Sustainability and Resiliency
Sustainability Advocate (Local)	Murray Clay*	Ulupono Initiative
Sustainability Advocate (National)	Merrian Borgeson	Natural Resources Defense Council (NRDC)
Small Solar & Storage	Chris Debone*	DERC
Demand Response	Yvette Maskrey	Honeywell
Energy Efficiency	Brian Kealoha	Hawaii Energy
Electric Vehicles	Melissa Miyashiro*	Blue Planet
Environmental Advocate	Henry Curtis	Life of the Land
IPP (utility-scale resource)	Gerald Sumida*	Carlsmith Ball LLP
Chair of TAP	Rick Rocheleau*	Hawai'i Natural Energy Institute (HNEI)

B. IGPSC Meeting 2/20/19:

1. **Resiliency:** IGPSC discussed the topic of resiliency, its definition, and the many factors that may be considered in planning for resiliency. The Stakeholder Council (SC) members participated in various exercises to deliberate and debate the process for identifying potential hazards and how to prioritize needs during such situations. The SC members also explored critical facilities during such hazards, how to prioritize such facilities, and what factors were considered in their decision-making processes.

2. **Resilience Working Group (WG)**: The SC discussion and feedback was provided to the Resilience WG. The Resilience WG will be considering the findings and suggestions of the SC members as it continues its work.
3. **Summary Notes**: All meeting notes from WGs and summary notes from IGPSC are posted on the website for your review at: <https://www.hawaiianelectric.com/clean-energy-hawaii/integrated-grid-planning/stakeholder-engagement/stakeholder-council>. You can also search IGP on the Hawaiian Electric website at: <https://www.hawaiianelectric.com/>

II. **AEMO**: Australia Energy Market Operator

- A. **Background**: AEMO is owned by the Australian government and industry participants, fully funded by participant fees. It runs the National Electricity Market, the largest electricity grid in the world, as well as operates the wholesale electricity and gas markets. AEMO's key focus is to provide energy security for all Australians. AEMO has recently completed an Integrated System Plan, which is akin to our version of the IGP and they are now moving into the implementation phase.
- B. **Elijah Pack**: Manager of National Planning for AEMO. He has a wealth of experience and knowledge in electricity markets, power system operations, power system planning, and Australian regulatory frameworks. Mr. Pack also serves on the Technical Advisory Panel (TAP) and lends his knowledge and experience from the ISP process to inform the IGP process.
- C. **Power System Planning Challenges & Opportunities (“Energy Trilemma”) & Integrated System Plan**

See related slides in Presentation Materials from May 8, 2019

III. **Key Discussion Points**

- A. **Integrated System Plan (ISP) as an example**- Because the IGP process is still difficult to fully grasp and understand, today's presentations provided the opportunity to learn from the example of Australia's ISP and think about the processes, methodologies, and concepts, and what makes sense for Hawai'i. The IGPSC should consider the challenges that AEMO faced in the development of their ISP and whether Hawai'i will also face similar issues or not given the differences in geography, market size, and energy mix.
 1. **Transmission & Distribution (T&D) Demand charges**- In Australia, T&D charges are a largely fixed component, although some of the larger consumers have different agreements compared to households/residential customers. Because of the large and diverse geography of Australia, T&D

costs are usually on the high side, i.e. there is a large surface area to cover with low density of customers.

2. **Carbon intensity-** No concrete numbers but Australia is slightly worse than the U.S. in terms of sustainability. However, the country is currently in the middle of a struggle between the will of opposing political parties, one side pushing for 50% renewable energy by 2030, the other wants to continue the coal power stations.
3. **Renewable Energy Zone (REZ)-** Areas or zones that have been identified for potential renewable energy development with consideration for a host of other external factors
4. **Cost of Land/Population Density-** Australia did not consider the cost of land in the weighting determinations for each REZ but did consider population density. There is some correlation because in general, land is more expensive where more people live.
5. **Resiliency-** Australia did not initially consider this factor in its planning; however, resiliency is an issue that many globally are trying to address/resolve, though none have solved it yet. AEMO uses a probabilistic planning standard for reliability to incorporate the cost of an outage. However, it is difficult to predict when a high impact, low probability event will happen.
6. **Indigenous people-** The challenge of dealing with the cultural concerns or native land issues raised by indigenous people in making plans to build out facilities was raised. For Australia, they tried to identify at an early stage which areas to be developed and reached out to indigenous people but have not had much contact with such groups. However, there is a process for dealing with what they refer to as “traditional landowners.” There was an example on one site where aboriginal artifacts were found and the project was delayed. While they haven’t received much feedback from indigenous groups in the ISP process, such groups usually do not get involved until later stages of these matters, which can be difficult to accommodate issues at the later date.
7. **Microgrids-** Microgrids have been looked at in many situations in Australia, but not something that was considered for the ISP. While there are areas where it would make sense, this is not actively being worked on now.
8. **Government Subsidies-** The need for and importance of government subsidies for low income residents was raised, with the example of Molokai and the large number of residents on welfare or who receive subsidies for rent. Australia similarly has low income areas. There are a number of paths for subsidies for people struggling with their bills.

9. **Load Demand Profile-** Demand shape is very steep. It used to be in the middle of the day demand is high, in the evening, demand is low. Over time, this shifted with rooftop solar increases, such that now peak demand is high in middle of the evening instead, around 7pm. Struggle is having to retire power stations as they get replaced with more flexible gas plants.
10. **Timeframes to build transmission-** Construction may take 4 years for new transmission lines but there have been delays out to 10 years. In general, renewable generation can be build much quicker than transmission lines. For example, a solar farm can be built in 1 year, wind farms in 2 years, while transmission lines can take 4 to 5 years to build. Regulators and customers are risk averse when it comes to potentially overbuilding transmission capacity in anticipation of new generation resources.
11. **Optimizing rooftop batteries/solar distributed energy resource (DER) -** Approach each by scenario. Have a specific plan to address a scenario with a lot of DER versus a scenario where there is little DER. Trying to flatten out the load to find where more investment is needed. Planning is primarily concerned with DER offsetting demand though there are some aggregators that participate in the market.
12. **Developing New Products-** Australia is constantly reviewing the power system requirements, how they're changing and how different resources can be provided to meet those requirements. In Australia, they also like to make sure a market exists for everything that can drive additional investment. They work with the industry to help understand where markets could be created and any participant in the market can suggest a new market service, which will then go through a process to determine whether a new market rule is needed.
13. **PV Incentives-** Australia provides government incentives for PV installation, roughly 25% of rooftops have solar currently. Installation costs are published on website, as well as how they predict those costs will change over time.
14. **Battery Storage-** Battery storage for homes have had some trials, but battery uptake in houses is extremely low. At one point, Australia could claim the world's biggest battery when it was built and now at the utility scale, larger batteries are being built. Batteries are heavily subsidized at utility level, but at some point they will also see this industry flourish like the rooftop solar industry. Batteries can defer a large network investment, but more of what has been seen is that private investors have installed them to participate in the frequency control market.

15. **Coal plant operating life-** Most important element of the ISP was examining the operating life of coal plants to determine when they could be retired. It was determined that replacement was necessary after 50-60 years. These power stations are all privately owned and in the ISP, AEMO assumed a 50-60 year life, but know that some leeway exists. We are now required to signal three years out that the expected operating life is coming to an end, and coal plant owners make the announcement of the plant closure to the public. Some plants may be retired earlier than the 50-60 projection of life cycle.
16. **Production Cost Modeling and Optimization-** The first stage of optimization uses a load duration curve then moves into a load block approach, which splits a day into a few periods to determine whether the resource is available during those time periods, then finally an hour by hour simulation to test what those earlier models determined. The model is a least cost model that is bound by constraints on renewable energy targets.
17. **Geothermal energy-** No interest in recent years to develop geothermal energy, although it is an available option.
18. **Optimization for REZ-** For each REZ, there's a resource profile that indicates what a particular renewable resource will generate at any given time. There's also an associated cost and network hosting capacity i.e. how much you can connect at the moment. Once it reaches the hosting capacity limit, then there is a penalty cost. For each REZ, AEMO has a plan to augment that zone and then translate that augmentation cost down to dollars per kilowatt.
19. **Optimizing behind the meter resources-** No attempt was made to fully optimize the system including behind meter resources; however, there has been feedback that they should try to do that. Australia tried to flatten the demand curve and found there is a lot of value in having high DER. The challenge they have is knowing how much a coal power station costs, how much a wind farm or solar farm costs, but aggregation of DER is already there, but it is very difficult to understand how much it will cost and how flexible it is.
20. **Unbundled frequency control markets-** It has proved to be a promising approach to unbundle frequency control markets. In the past for someone to participate in frequency control, they had to participate in the energy market as well. Therefore, only power stations were competing in the energy and frequency control markets. After unbundling, they started to see aggregators for DER provide a service where they could decrease or increase consumption or generation to compete in that frequency market.
21. **Incorporating Distribution Planning-** Have been trying to understand hosting capacity of each distribution network. Trying to understand how much DER can be accommodated in their network and then how much would

it cost to increase that hosting capacity. Because the network is so vast, it would increase complexity of the process exponentially. Currently relying on high level information at this time to understand what's the limit. Moving forward, working towards next iteration of the ISP in December, which will be a struggle. Working with a new DER team that was set up in the organization to try to facilitate and promote engagement in existing markets and understanding how the existing markets should be changing.

22. **Distribution value from ISP to IGP process-** Benefit that Hawai'i has is it's the one singular utility looking after the distribution network and how much rooftop solar gets connected and is integrated into the system. In Australia it's been too complex to approach. Because of the regulatory environment combined with the scale of the Australian system, AEMO can't really perform parallel or project planning. Hawai'i benefits from being a smaller scale and one utility, so it doesn't involve coordinating planning across segments and different entities, etc. Hawai'i's smaller scale is a more manageable size compared to Australia for integrating the distribution system with the resource and transmission system planning.
23. **Contributors to high cost of electricity in Australia-** Distribution and transmission companies are building network for forecasted increases in demand that never materialized. The cost for maintaining those networks ended up being higher because the customers never came. On the wholesale energy market side, there have been massive increases in the cost of gas and coal and now starting to see different carbon taxes arise.
24. **Impact of natural disasters on the grid-** In Australia, bushfires and drought became more abundant and severe and have negatively impacted transmission. Now when planning new corridors, AEMO is very cognizant of potential for brushfires.
25. **End of life recycling options for batteries and PV-** Two different approaches to asset life models (1) operational maintenance cost; and (2) cost of replacement over time. While AEMO initially started with the first approach, now moving towards the latter approach, which also allows for a decision to be made whether the same resource should be built in that area or if something else should be built, especially with the changing technology costs. Recycling costs is not something that has been considered. There are costs associated with decommissioning a plant, but that's more around large power stations. For example, a coal power station may have rules for rehabilitating the area after decommissioning.
26. **Standards of communications with DERs-** In Australia, what they've seen is organizations enter the marketplace to provide frameworks for DER. They are trying to create a framework for network companies and aggregators to then use their system to optimize their DER and enter it into the market.

There are people creating devices to orchestrate DER and to have them work with each other through radio, internet, etc., but still in early stages in Australia. For the U.S., all DERs are required to speak one of three languages at the interface of DER, but doesn't tell you what the rest of the network looks like, only that they need to be capable to interface.

IV. Working Group Status Updates

- A. Standard Contract Working Group (SCWG)**- Model GSPA was filed on March 29, 2019 for commission approval.
- B. Competitive Procurement Working Group (CPWG)**- Next meeting June 25, 2019, will make deeper dive into competitive bidding framework.
- C. Solution Evaluation and Optimization Working Group (SEOWG)**- First meeting to be held on May 9, 2019 to address challenges and key issues and prioritize topics.
- D. Forecast Assumptions Working Group (FAWG)**- Second and third meetings to be held on May 22-23, 2019, to discuss DER, EoT, energy efficiency and demand response to support the development of assumptions.
- E. Resilience Working Group (RWG)**- First meeting will be held at the end of May or beginning of June to discuss challenges and key issues and prioritize topics.
- F. Distribution Planning Working Group (DPWG)**- Third meeting to be held May 30, 2019, to review the soft launch RFP with stakeholders.

All meeting materials and notes are available on the Hawaiian Electric website:
<https://www.hawaiianelectric.com/>

V. Next Steps/Action Items

- Next IGPSA Meeting is tentatively scheduled for **August 21, 2019.**
- A copy of today's presentation will be provided to the SC members
- Potential topic for next meeting include:
 - Forecasting (FAWG) briefing
 - Soft launch briefing
- Please feel free to suggest topics for next meeting
- IGPSA members can direct questions to IGP@hawaiianelectric.com or reach out directly to Colton Ching or Lisa Giang.