INDONESIAN PARTICIPANTS REVIEW HAWAII'S PRACTICES FOR RENEWABLE ENERGY OPTIMIZATION

CLEAN ENERGY DEVELOPMENT EXECUTIVE EXCHANGE

Honolulu, Hawaii – As part of the PT. PLN – Hawaiian Electric Partnership, the U.S. Energy Association (USEA) conducted an executive exchange to Hawaii with representatives of the Indonesian national utility, P.T PLN (Persero) and the Ministry of Energy and Mineral Resources. The exchange was the third activity under the partnership to explore best practices for integrating clean energy projects into their energy portfolio.

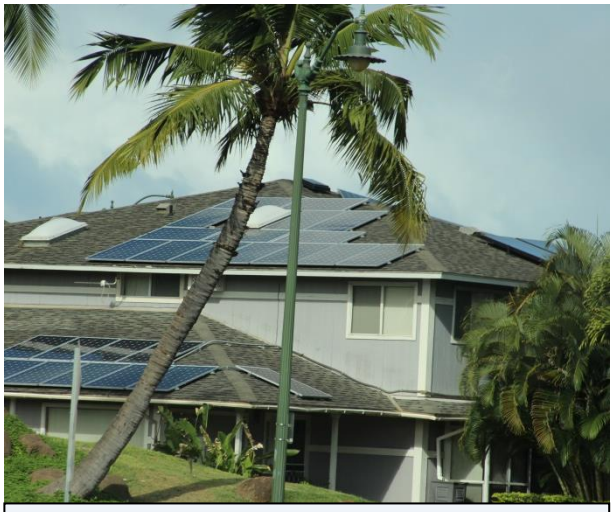
The exchange gave the Indonesian delegation a detailed view of Hawaii's initiatives in increasing their clean energy development with meetings with Hawaiian Electric, Hawaii Electric Light, Maui Electric, the Public Utilities Commission, and the State Energy Board.

Members of the delegation from the Ministry of Energy and Mineral Resources and PT PLN viewing a combustion turbine generating facility operating 100% on biodiesel.

BACKGROUND ON INDONESIA'S POWER SECTOR

PT PLN (Persero), Indonesia's national electrical utility, currently has an estimated total generating capacity of 28,500 MWs with the majority generated from coal facilities.

Indonesia is in the enviable position of having the potential for both geothermal and hydro generation development, with geothermal development accelerating because of more support for energy investment in the country with recent plans announced to diversify energy sources for the electricity sector.



Residential solar panels on a rooftop in Oahu.

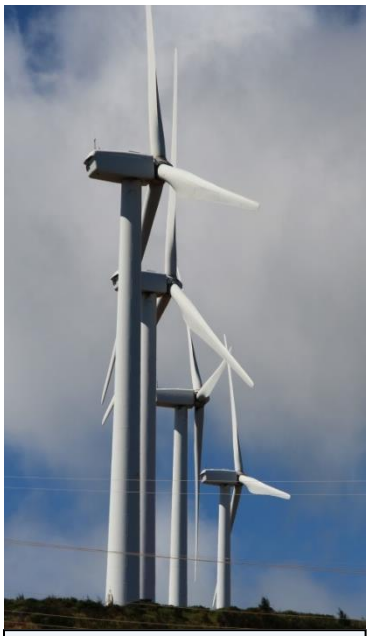
Coal is the primary generation source on Java Island, while other islands use primarily oil in small diesel plants. There is considerable hydro power potential in Indonesia, such as in Papua and South and Central Kalimantan. However, most potential capacity is located in areas not easily accessible and a great distance from sizeable markets.

The smaller hydro plants in the Outer Islands off Java are much smaller and at times experience shortages of water flow. PLN's plans to develop all of their renewable resources will allow them to optimize their operations and meet their ever increasing energy demand throughout the country.

BACKGROUND ON HAWAII'S POWER SECTOR

Hawaiian Electric has been very aggressive in increasing their energy generation to renewable sources on all of their islands. In 2014, they submitted a comprehensive Power Supply Improvement Plan (PSIP) to the State of Hawaii outlining plans for their energy future. The PSIP calls for 65% of electricity sales to be generated with renewable resources by 2030, an increase from the state mandated 40% by 2030. The Improvement Plan outlines how Hawaii Electric aims to meet the ambitious 65% goal by:

- Increasing their use of distributed solar power;
- Increased grid enhancements for rooftop photovoltaic panels;
- Additional proposed utility-scale solar facilities on Oahu—total capacity of 240+ megawatts;
- Increased use of natural gas and LNG to replace oil;
- Expanding energy storage systems to allow for renewables to be stored as a means of minimizing service disruptions;
- Building of additional wind farms;
- Increasing the usage of biofuels in power plants, especially those locally produced;
- And upgrading to smart grids to allow for better integration of renewable energy.



Kaheawa Wind Project on

Hawaii's utilities are not interconnected, each island having their own grid; there are three separate utilities with five separate grids, making it very important for Hawaii to develop strategies for distributed generation as there is no interconnection among the islands.

PRIMARY TOPICS OF THE EXCHANGE

The key topics discussed throughout the exchange included:

- **Renewable Energy**
- **Distributed Generation**
- **Energy Storage**
- **Geothermal Development**
- **Regulatory Oversight**

These topics were relevant to Indonesia's plan to increase their clean energy development while decreasing their reliability on diesel generation. The primary objectives of the utility exchange were for the Indonesian executives to:

- Be exposed to the issues and challenges facing renewable energy;

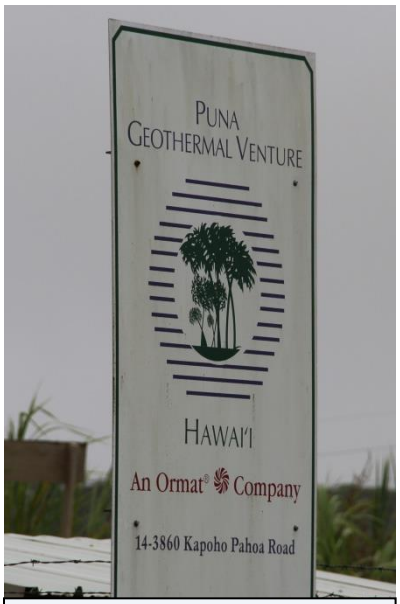
- Gain exposure to renewable energy technologies being successfully used in the power sector to include wind, solar, and geothermal;
- Learn policy, incentive and regulatory best practices for the promotion of renewable energy;
- Gain exposure to energy storage technologies being successfully used in the power sector;
- Learn best practices in renewable energy project development & financing;
- Learn utility best practices in interconnection of intermittent resources;
- And learn best practices in distributed generation.

Utility scale energy park on the island of O'ahu.

The presentations given by the Hawaiian Electric Company energy experts will be instrumental in assisting Indonesia with forming their policies and programs for integrating renewables into its system.

RENEWABLE ENERGY INTEGRATION

With the high cost of fuel prices encompassing more than 70% of an individual electricity bill, it is a major driver to Hawaiian Electric to obtain 65% from renewable energy sources. These sources will come from wind, solar, geothermal, and biomass with distributed solar expected to almost triple by 2030.



Puna Geothermal Ventures on the Big Island

There is proven geothermal potential on many of the Hawaiian islands, with the largest located on the Big Island. Located in the Puna district of the island, the Puna Geothermal Venture produces 38 megawatts of power to the Hawaii Electric Light Company (HELCO). This power is HELCO in stabilizing the grid due to fluctuations caused by other intermittent sources of renewable energy. Another spot with geothermal potential is located on the west side of the island near the East Rift Zone. Even with the increase in both solar and wind generation, geothermal is still a great source of alternative energy through the continuous heat supplied by the volcano. This stable flow of energy will allow HELCO to maintain grid stability and even out any fluctuations caused by other intermittent renewables.

Maui Electric's peak demand on the island is 195 MW with most of the generation coming from wind and solar facilities developed by IPPs. PLN discussed their plans to expand into both wind and solar generation and were most interested in who pays the cost for a wind project— the utility or the IPP? In Indonesia, the IPPs will pay for all of the costs up to the interconnection, while in Hawaii the cost is determined by which entity benefits the most.

ROLE OF REGULATION

The exchange ended with visits to Hawaii's State Energy Office and the Public Utilities Commission. The State Energy Office has the responsibility for energy planning, policy, and programs. Through the Hawaii Clean Energy Initiative, the Energy Board hopes to reach a goal of utilizing 70% clean energy through a combination of renewable energy and efficiency. This will be achieved through the diversification of the energy portfolio, island connectivity through grid integration, and energy innovation and technology.

The Hawaii Public Utilities Commission (PUC) is responsible for regulating public service companies operating in the State. They approve rates, tariffs, charges and fees as well as issuing guidelines for the management of utility businesses. A few months prior to the exchange, the Hawaiian Electric Companies (HECO) were asked to develop Action Plans for submission to the PUC. The Action Plans addressed how the HECO would develop programs to

address energy cost reductions, renewable energy integration challenges, solar PV interconnections, and customer demand response programs. Although these plans address the move to integrate more renewable energy generation, it was recognized that there will still be a need for thermal backup.

Through the course of the exchange, the presentations highlighted some of the following best practices:

- Make the rates charged to the customers cost effective.
- Expand choices for the customers to include electric vehicles, distributed generation, demand response, solar integration, and micro grids.
- Development of an Integrated Resource Planning (IRP) Portfolio is the key to rolling out an effective model integrating the various sources of renewable generation.

RECOMMENDATIONS

- ***Planning Strategy*:** Members of the PLN delegation stressed the need to update a planning strategy to incorporate renewable energy on a national scale.

- ***Increasing the use of biofuels*:** Evaluating the role of biomass in reducing the use of expensive oil on the islands.

- ***Rooftop Solar Program*:** PLN recognized the need to draft policies on the development of rooftop solar programs, including incentives on purchases and net metering. In Hawaii, all new homes constructed must have solar water heaters installed.

- ***Capacity Building:*** The need for preparing an analysis and evaluation of the development of renewable energy with the relevant departments at PLN and increasing the competency of the work force.

- ***Policies on Geothermal Generation Development:*** A review of the development of policies regarding geothermal projects to include pricing, IPPs or non IPPs option, negotiation, and risk on exploration.

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