GridSTART
Hawai'i Natural Energy Institute | University of Hawai'i
Grid System Technologies Advanced Research Team

Capacity Building on Renewable Energy Integration in Pacific Island Countries

31st Pacific Power Association Annual Conference
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Sr. Energy Regulatory/Policy Analyst
HNEI Grid***START***

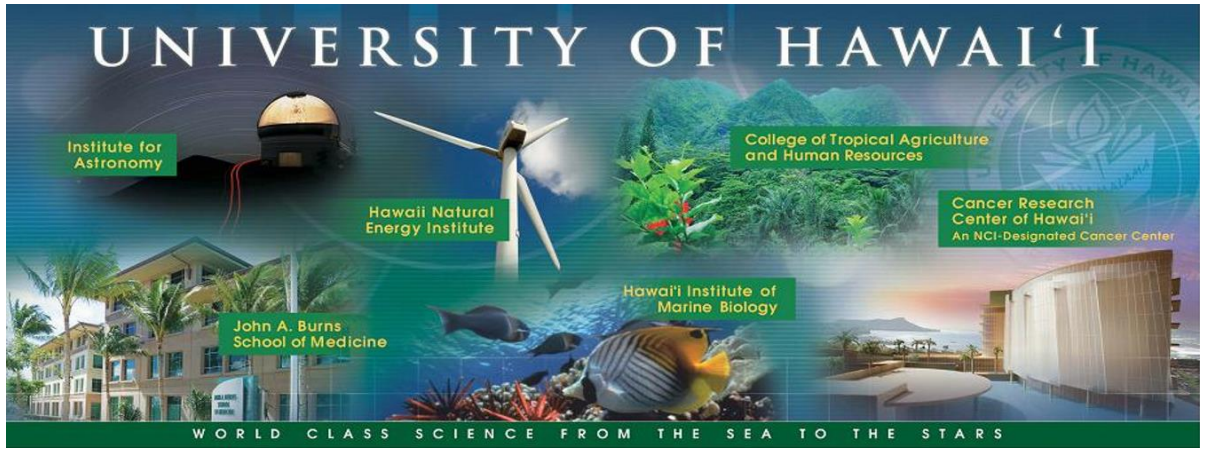
HNEI Hawai'i Natural Energy Institute
University of Hawai'i at Mānoa

UNIVERSITY of HAWAI'I MĀNOA

Hawai'i Natural Energy Institute
School of Ocean & Earth Science & Technology
University of Hawai'i at Mānoa
1680 East-West Road, POST 109
Honolulu, Hawaii 96822

University of Hawai‘i

- Founded in 1907, the ***University of Hawai‘i System*** includes 3 universities and 7 community colleges with approximately 50,000 students.
- ***University of Hawai‘i at Mānoa*** is the flagship campus (the largest and oldest) of the system.
  - 14,576 undergraduate student enrollment
  - 4,680 graduate student enrollment
- ***School of Ocean and Earth Science and Technology (SOEST)*** is the largest research unit on the Mānoa campus.
  - Brings in more than $100 million extramural funding per year



UNIVERSITY of HAWAI‘I SYSTEM

UNIVERSITY of HAWAI‘I MĀNOA

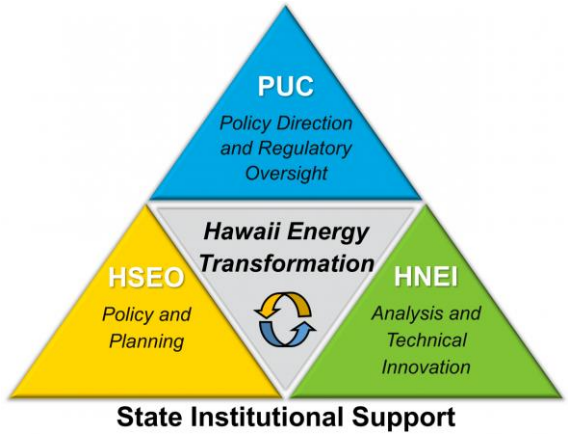
SCHOOL OF OCEAN AND EARTH SCIENCE AND TECHNOLOGY
UNIVERSITY OF HAWAI‘I AT MĀNOA

Hawai'i Natural Energy Institute (HNEI)

SOEST, University of Hawai'i at Mānoa

- Organized Research Unit in SOEST.
- Founded in 1974, established in Hawai‘i statute in 2007 (HRS § 304A-1891).
- Conduct research, development, test and evaluation to accelerate and facilitate the use of resilient alternative energy technologies and reduce Hawai‘i's dependence on fossil fuels.
- Diverse staff includes engineers, scientists, lawyers, students, postdoctoral fellows and visiting scholars.

HNEI
Hawai‘i Natural Energy Institute
University of Hawai‘i at Mānoa



Areas of Focus

- **Grid Integration (Grid*START*)**
- Energy Policy and Analysis
- Electrochemical Power Systems
- Alternative Fuels
- Advanced Materials
- Ocean Energy

Core Functions

- State Energy Policy Support
- Testing and Evaluation
- Education and Capacity Building
- Research and Development
- Modeling and Validation

Grid System Technologies Advanced Research Team (Grid*START*)

HNEI, SOEST, University of Hawai'i at Mānoa

Grid***START*** delivers comprehensive power system solutions through a unique blend of technical expertise and industry insights.

We excel in:

- **Grid Modernization**: Integrating renewable energy (RE), developing smart grid technologies, and modernizing power systems.
- **Scalability**: Addressing challenges across diverse project scales, from grid-edge solutions to grid-wide modeling and analytics.
- **Applied Research**: Bridging the gap between research and real-world applications to solve pressing power grid issues.
- **Regional and Global Impact**: Providing specialized technical support, energy policy and regulatory guidance and energy sector advisory services with a focus on the Asia-Pacific region.

Lead for many public-private demonstration projects!

Established to develop and test advanced grid architectures, new technologies and methods for effective integration of RE resources, power system optimization and resilience, and enabling policies

Expertise & Focus:

- Energy Policy and Regulation
- RE Grid Integration
- Smart Grid Planning & Technologies
- Power Systems Planning
- RE Resource Procurement
- Power Systems Operation
- Power Systems Engineering and Standards
- Communications Design and Testing
- Project Management and Execution

Grid*START* Core Team Members, Sponsors, and Partners

Core Team Members

❖ Leon Roose *	Specialist & Chief Technologist
❖ Marc Matsuura *	Senior Smart Grid Program Manager
❖ Damon Schmidt *	Senior Energy Regulatory/Policy Analyst
❖ Quynh Tran	Power System Engineer II
❖ Sawyer Poel	Power System Engineer
❖ Saeed Sepasi	Assistant Researcher – Power systems
❖ Sarah Demsky	Junior Researcher
❖ Brian Griswold	Junior Power System Engineer
❖ Adam Hu	Junior Power System Engineer
❖ Ai Oyama	Research Technical Writer/Translation Specialist
❖ Harun Or Rashid Howlader	Post-Doctoral Fellow
❖ Md Musabbir Hossain	Post-Doctoral Fellow
❖ Nattapat Praisuwanna	Post-Doctoral Fellow
❖ Abrar Shahriar Pramanik	Graduate Research Assistant
❖ Spencer Kerkau	Graduate Research Assistant
❖ Adewale Adegboyega	Graduate Research Assistant
❖ Jamilyn Mooteb	Graduate Research Assistant
❖ Ismum Ul Hossain	Graduate Research Assistant
❖ Richville Fagaragan	Graduate Research Assistant

* Prior electric utility company senior management

Team members combine for 75+ years of utility and regulatory experience!

Sampling of Sponsors & Partners

Grid*START*'s 2024-2025 Asia-Pacific Engagements

Palau

PEWA/PPUC

Background:

- In 2022, Palau increased its RE target to 100% by 2050.
- In 2023, a new 15.3 MW solar PV plus 12.9 MWh battery energy storage system (BESS) project became the largest of its kind in the Western Pacific region.
- Additional RE projects are already underway or being planned, including:
  - Additional utility-scale BESS; and
  - Substantial amounts of customer-sited rooftop PV.

Technical and Regulatory Support:

- September 2023: Conducted a three-day capacity building session in Honolulu for PEWA and PPUC staff.
- October 2023: Spreadsheet-based **technical and financial analysis of PPUC's grid operations** with both existing and planned PV generation using Grid***START***'s home-grown generation resource mix spreadsheet modeling tool.
- February 2024: Developed a **new grid code** for PPUC that includes updated requirements for the interconnection of inverter-based resources (IBRs), which has been adopted by PEWA.
- June 2024: Conducted a three-day training on RE integration at PPUC's offices on Koror.
- Ongoing/planned:
  - In-person training on Palau's new grid code, including processes for customer-sited PV applications and interconnections
  - Designing **new programs/tariffs for customer-sited PV+BESS** interconnections
  - Performing **hosting capacity analysis** to integrate more RE, including updating/building new grid models using DIgSILENT and HOMER
  - Capacity building on **system planning**, including training on various grid modeling tools

Rarotonga

TAU

Te Aponga Uira

Background

- Cook Islands Economic Development Strategy 2030 has a RE target of 60% by 2030.
- Approximately 15% of TAU's electricity is generated from RE, including utility-scale PV+BESS projects and a significant number of rooftop PV systems.
- Once placed in service, the utility-scale projects currently in the queue will increase TAU's RE contribution to approximately 30%.

Technical and Regulatory Support

- September 2023: Conducted a one-day training program in Honolulu for senior management and board members of TAU, focusing on experiences and lessons learned from Hawaii's energy transition.
- July 2024: Conducted a **week of capacity building** presentations and meetings on Rarotonga with TAU management, as well as the TAU and Cooks Islands Investment Corporation (CIIC) boards of directors.
- Ongoing/planned:
  - Distribution feeder analysis to determine the **"hosting capacity"** for distributed PV
  - Sharing Hawaii's experience with customer programs to enable **customer choice**
  - Strategic measures to support and improve utility **financial integrity**
  - **Planning** for and procurement of future RE projects

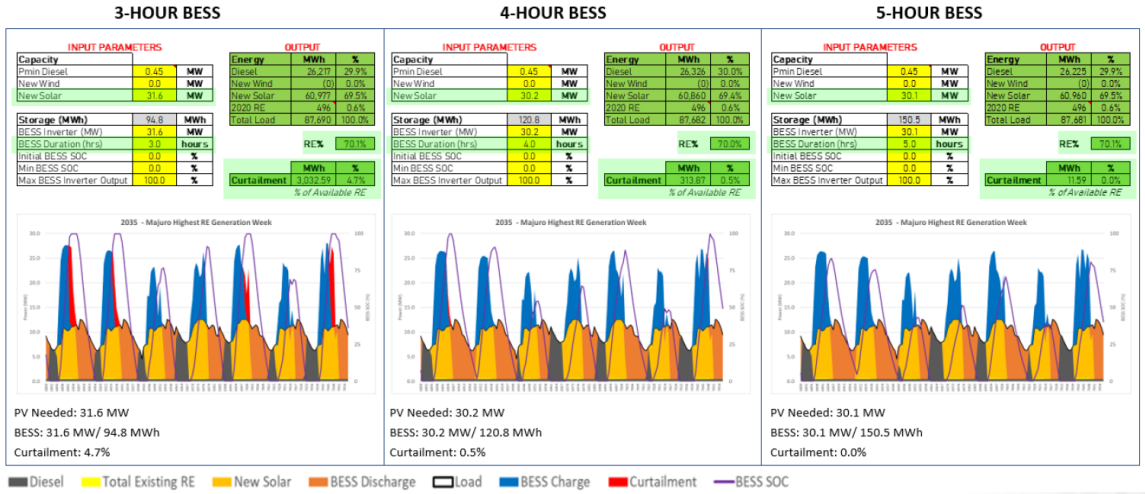
Yap

YSPSC

Background

- Grid***START*** has been in discussions with PPA to develop regional capacity building opportunities since TAU introduced us to them in 2023.
- A significant proportion of Yap's electricity currently comes from RE sources.
- However, significant increases in both load, variable RE (VRE) penetration and BESS are expected in the near future.

HNEI Spreadsheet based model for the PIC's



Technical and Regulatory Support

- With coordination support from PPA, Grid***START*** will be on Yap later this month to provide two days of training to YSPSC on RE integration.
- Topics to be covered during the training for YSPSC include:
  - Hawaii's clean energy transition
  - Discussion on the current state of YSPSC's energy transition, including **priority support needs**
  - **Planning for and managing high levels of VRE penetration**
  - Role of **BESS** in energy transformations
  - RE **procurement**
  - **Grid modernization**
  - Climate adaptation and **resiliency**
  - YSPSC-focused **training on Grid*START*'s generation resource mix spreadsheet modeling tool**
- Ongoing/planned:
  - Discussions between Grid***START*** and PPA regarding additional similar **regional trainings in 2025** are ongoing.

Majuro

USAID FROM THE AMERICAN PEOPLE

PACIFIC INTERNATIONAL INC. TRADING COMPANY

GridSTART

USAID/DFC/PII

DFC U.S. International Development Finance Corporation

Background

- Grid***START*** was contracted to design a reliable, resilient, cost-effective and scalable power solution to support dramatic increases in the transshipment of skipjack tuna through the Pacific International, Inc. (PII) dock on Majuro.

- The microgrid simulations performed in connection with this project considered fixed costs, energy bill savings and other variables (e.g., resiliency) to derive optimized microgrid designs, including optimized quantities of PV generation potentially including a BESS.

Technical and Regulatory Support

- At a high level, the results indicate that there is an opportunity for PII to significantly reduce its operating costs and mitigate its business risks by maximizing self-generation, including **solar PV panels on the roofs of its facilities**.

- Additional measures such as the installation of a **cold storage** facility and/or **more frequent transshipments of tuna** off of the Dock could reduce operating costs even further. Such cost reductions could improve RMI's competitiveness in relation to the foreign vessels that currently transfer their tuna inventories at offshore locations in the Majuro lagoon (with little or no benefit to the local economy).

- Grid***START*** has also provided regulatory support to RMI's National Energy Office (NEO) by reviewing and providing comments on the Marshall Islands' first energy bill.

- Ongoing/planned:
  - In 2024, Grid***START*** discussed additional opportunities for technical and regulatory support of other energy stakeholders in the Marshall Islands, and will seek to continue those discussions in 2025.

Mahalo!

(Thank you)

For more information, contact:

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Damon L. Schmidt

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Mr. Schmidt is a Senior Energy Regulatory/Policy Analyst with Grid***START***. He has over 15 years of experience in the energy sector. Prior to joining HNEI, he served as the Director/Manager of Hawaiian Electric Company's Regulatory Non-Rate Proceedings group. He also worked in outside regulatory counsel and financial consulting roles for Hawaiian Electric, both as a solo practitioner, and with the law firm of Goodsill Anderson Quinn & Stifel. Mr. Schmidt delivered key regulatory and financial guidance to shape Hawaiian Electric's positions in numerous proceedings before utility regulators.

Mr. Schmidt is a licensed attorney in the State of Hawai'i. He holds a B.S. in Finance from the University of Hawai'i, an M.B.A. with an international business focus from Pepperdine University in California, and a J.D. from the University of Hawai'i William S. Richardson School of Law.