

Leon R. Roose

Chief Technologist, Grid**START**
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**May, 2012
- Present**

Specialist, Hawaii Natural Energy Institute, University of Hawaii at Manoa

Tenured faculty. Chief technologist, founder and managing member of Grid**START**, a program team conducting research in advanced grid control architectures, new technologies and methods, and enabling policies for effective integration of renewable energy resources and power system optimization, specializing in islanded power systems and advanced micro-grids.

EDUCATION

Law School Univ. of Hawaii, William S. Richardson School of Law
Juris Doctor, May 1993

Undergraduate Univ. of Hawaii, College of Engineering
B.S. in Electrical Engineering, May 1988

PROFESSIONAL EXPERIENCE

2009 – 12 Manager, System Integration Dept., Hawaiian Electric Company

Directed transmission planning, distribution planning, renewable energy planning and integration, system protection, smart grid development, and advanced metering infrastructure for Hawaiian Electric Company (Oahu), and its subsidiaries, Maui Electric Company, Ltd. (Maui, Lanai, and Molokai) and Hawaii Electric Light Company, Inc. (Hawaii). Responsibilities included developing distribution and transmission resource plans, expansion and grid interconnection of renewable energy resources, relaying and system protection, and management of major programs across all three companies, including its advanced metering infrastructure and smart grid initiatives, and Hawaiian Electric's plan to integrate large-scale wind energy resources located on the islands of Lanai and Molokai via a proposed HVDC undersea cable system to Oahu.

2007 – 09 Manager, System Planning Dept., Hawaiian Electric Company

Management responsibility spanned transmission system and generation resource planning, renewable energy planning and integration, and generation resource competitive bidding for all three Hawaiian Electric utility companies.

2004 – 07 Manager, Power Supply Services Dept., Hawaiian Electric Company

Management responsibility spanned transmission system and generation resource planning, the negotiation and administration of power purchase contracts for the utilities, and the procurement and distribution of fuel supply to utility generating plants on all islands in its service territory and operational management of fuel storage facilities and pipelines. Directly responsible for approximately \$1 billion in annual operating expenses for energy purchases and fuel for the utilities.

1998 Legislative Intern – Senate Committee on Commerce, Consumer Protection, and Information Technology

Served as legal counsel to the Senate Committee Chair. Advised on legal issues, drafted legislation, prepared committee reports, and performed legal research.

1996 – 04 Associate General Counsel, Hawaiian Electric Company

Advised senior management and advocated Company's position on a wide range of legal matters including operational compliance issues, contract negotiations and drafting, new business opportunities, venture capital investments, intellectual property, tort and contract litigation defense, land use and environmental matters, new legislation, and project development and permitting, among others.

1993 – 96 Attorney – Damon Key Bocken Leong Kupchak

Private laws practice in the areas of business and corporate law, intellectual and real property law, and general civil litigation. Director of hiring and law clerk committees.

1992 – 93 Law Clerk – Damon Key Bocken Leong Kupchak

1991 – 92 Analyst – Hawaiian Electric Company, Regulatory Affairs

1988 – 91 Electrical Engineer – Hawaiian Electric Company, System Planning

1986 – 88 Engineering Analyst – Naval Ocean Systems Center

PROFESSIONAL AFFILIATIONS & ACTIVITIES

- Hawaii State Bar Association - Licensed Attorney (member since 1993)
- Institute of Electrical and Electronic Engineers (member since 2013)
- Utility Executive Course, Univ. of Idaho (June 2005)
- Experienced witness before the Hawaii Public Utilities Commission in numerous proceedings

PATENTS

- Dynamic reactive compensation – L.R. Roose, S.TC.L. Sadoyama, H. Jou, M.M. Matsuura - US Patent App. 15/644,262, 2018
- Distribution grid monitoring – K.L. Davies, T. Tran, S. Sepasi, L.R. Roose – US Patent App. 0870004.U UH18-0007

SELECT PUBLICATIONS

Howlader, A.M., S. Sadoyama, L. Roose, and S. Sepasi. 2017. Distributed voltage regulation using Volt-Var controls of a smart PV inverter in a smart grid: An experimental study. *Renewable Energy* 127 (2017) 145-157.

Sepasi, S., E. Reihani, A.M. Howlader, L. Roose, M. Matsuura. 2016. Very short term load forecasting of a distribution system with high PV penetration. *Renewable Energy* 106 (2017) 142-148.

Sepasi, S., A.M. Howlader, E. Reihani, L. Roose. 2016. A Coordinated Approach for Frequency Control of Zero Emission Based Smart PV-Wind-Battery Power System. *The 9th International Conference on Electrical and Computer Engineering (ICECE 2016)*. Dhaka, Bangladesh. December 20-22, 2016.

Reihani, E., S. Sepasi, L. Roose, M. Matsuura. 2016. Energy Management at the Distribution Grid Using a Battery Energy Storage System (BESS). *International Journal of Electrical Power and Energy Systems* 77 (2016) 337-344.

Sepasi, S., L. Roose, M. Matsuura. 2015. Extended Kalman Filter with a Fuzzy Method for Accurate Battery Pack State of Charge Estimation. *Energies* 8, no. 6 (2015) 5217-5233.

Sepasi, S., L. Roose, M. Matsuura, H. Jou. 2015. Universal State of Charge Estimator for Battery Packs of Battery Energy Storage Systems. *41st Annual Conference of the IEEE Industrial Electronics Society*. Yokohama, Japan, November 9-12, 2015.

Roose, L., M. Matsuura, S. Sadoyama. 2015. Development and Demonstration of Smart Inverter Controls for High Penetration Distributed PV. Renewable Energy World Asia 2015 Conference. Bangkok, Thailand, September 1-3, 2015.

Roose, L., M. Matsuura. 2015. High Penetration Renewable Integration Case Study for an Island Power System in Hawaii. Renewable Energy World Asia 2015 Conference. Bangkok, Thailand, September 1-3, 2015.

Schuerger, M., H. Johal, L. Roose, M. Matsuura, R. Piwko. 2013. Catching Some Rays: Variable Generation Integration on the Island of Oahu. IEEE Power & Energy Systems Magazine, Special Edition. 11(6) (2013) pp. 33-44.

Corbus, D., M. Kuss, R. Piwko, G. Hinkle, M. Matsuura, M. McNeff, L. Roose, A. Brooks. 2013. All Options on the Table: Energy Systems Integration on the Island of Maui. IEEE Power & Energy Systems Magazine. September/October (2013), pp. 65-74.

Piwko, R., L. Roose, K., Orwig, M. Matsuura, D. Corbus, M. Schuerger. 2012. Hawaii Solar Integration Study: Solar Modeling Developments and Study Results. 2nd International Workshop on Integration of Solar Power into Power Systems. Lisbon, Portugal, November 12-13, 2012.

Periodical Publications

Roose, L., 2013. Securing Paradise in Hawaii: A Japan-Hawaii Partnership to Develop Smart Technologies and Unlock a Renewable Energy Future. Hitachi Hyoron, Vol. 95, No. 4, 2013.

Major Project Reports

Roose, L., H. Jou, M. Matsuura, N. Liang, M. Goo, S. Sadoyama. 2016. Task 3 Summary Report - Navy Hawaii Infrastructure Modernization and Renewable Integration Project, Task Description Number 5101002. Prepared by HNEI on behalf of the Applied Research Laboratory at the University of Hawaii, for the Office of Naval Research and Naval Facilities Engineering Command (NAVFAC) Hawaii. Under Contract No. N00024-08-D-6323.

Roose, L., H. Jou, M. Matsuura, N. Liang, S. Sadoyama. 2016. Summary Report - Navy Marianas Infrastructure Modernization and Renewable Integration Project, Task Description Number 5101003. Prepared by HNEI on behalf of the UH Applied Research Laboratory for the Naval Facilities Engineering Command (NAVFAC) Pacific and NAVFAC Joint Region Marianas. Under Contract No. N00024-08-D-6323.

Roose, L., H. Jou, M. Matsuura, N. Liang, S. Sadoyama. 2015. Task 1 Summary Report - Gather Electrical Supply, Distribution System Infrastructure, and Operational Information on the Existing Electrical Systems at Joint Base Pearl Harbor-Hickam, Task Description Number 5101002. Prepared by HNEI on behalf of the Applied Research Laboratory at the University of Hawaii, for the Office of Naval Research and Naval Facilities Engineering Command (NAVFAC) Hawaii. Under Contract No. N00024-08-D-6323.

Roose, L., E. Noma, N. Liang, M. Matsuura, T. Tran. 2014. Final Technical Report - Development and Demonstration of Smart grid inverters for High-Penetration PV Applications. Prepared for the U.S. Department of Energy, Sun Shot Program Under Award No. DE-EE0005338.

Roose, L., E. Noma, N. Liang, M. Matsuura, E. Reihani, S. Sepasi, C. Reynolds, R. Ghorbani. 2014. Final Technical Report - Maui Smart Grid Demonstration Project: Managing Distribution System Resources for Improved Service Quality and Reliability, Transmission Congestion Relief, and Grid Support Functions. Prepared for the U.S. Department of Energy, Office of Electricity Delivery and Energy Reliability Under Award No. DE-FC26-08NT02871. See (<https://www.smartgrid.gov/files/HNEI-MSGP-Final-Tech-Report.pdf>)

Orwig, K., D. Corbus, R. Piwko, M. Schuerger, M. Matsuura, L. Roose. 2012. Hawaii Solar Integration Study: Solar Modeling Developments and Study Results. National Renewable Energy Laboratory. NREL/CP-5500-56311.