

CURRICULUM VITAE

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SUMMARY

More than 35 years of experience in energy and environmental systems research, design, demonstration, analysis and engineering and project management. Registered professional mechanical engineer in the State of Hawaii for more than 28 years. Project manager for dozens of projects in the areas of renewable and conventional energy, energy efficiency and conservation, electric and hybrid vehicles, alternative fuels, energy and engineering education, and environmental engineering. Many of these projects were performed under severe time and funding constraints and required the close coordination of a number of individuals and tasks. Many of these projects also involved research, development, demonstration, and commercialization of new and relatively untested technologies, systems, and concepts.

PROFESSIONAL DATA

Education: Ph.D. 1991. Ocean Engineering. University of Hawaii at Manoa.
Dissertation Title: "Development of a Solar Pond System Design
Computer Model"

M.S. 1980. Mechanical Engineering. University of Hawaii at Manoa.
Thesis Title: "Application of Heat Pumps to Residential Water Heating"

B.S. 1976. Environmental Technology and Urban Systems. Florida
International University

1973 U. S. Navy Nuclear Power School and Nuclear Power Plant
Prototype (Nuclear Engineering)

1972 Ensign. U. S. Navy Officer Candidate School

B.S. 1972. Chemistry (with distinction). University of Minnesota

Language(s): English - write, speak and read; German - read

Professional

Registration: Mechanical Engineer, State of Hawaii, No. 5485 (1983)

Research and Work Experience:

- 1993 - Present **OWNER / PRINCIPAL CONSULTANT.** Rezachek & Associates. Energy and environmental engineering consultants. Provide consulting and project management services in a variety of renewable energy, energy efficiency, and environmental areas.
- 2003 - 2009 **ASSOCIATE DEVELOPMENT DIRECTOR / CONSULTANT.** Consultant to Honolulu Seawater Air Conditioning, LLC (HSWAC). Provided engineering consulting and project management services in all phases of development of the downtown Honolulu Seawater Air Conditioning (SWAC) District Cooling Project.
- 1987 - 2003 **ALTERNATE ENERGY SPECIALIST.** State of Hawaii - Department of Business, Economic Development and Tourism - Energy Division - Alternate Energy Branch. Conduct analyses of existing and proposed alternate energy programs and projects. Conduct the planning, development and implementation of alternate energy demonstration and commercialization projects. Project manager for more than fifty alternate energy- and energy-efficiency-related projects.
- 1980 - 1987 **ASSISTANT MECHANICAL ENGINEER.** Sugar Technology and Engineering Department, Hawaiian Sugar Planters' Association (HSPA). Alternate and conventional energy research and application, energy conservation and air pollution monitoring. Supervised two experimentalists for approximately 30 percent of their time.
- 1980 **GRADUATE RESEARCH ASSISTANT.** Hawaii Natural Energy Institute (HNEI), University of Hawaii at Manoa. Assisted in all phases of alternate energy research projects.
- 1979 - 1980 **JUNIOR RESEARCHER.** Hawaii Natural Energy Institute (HNEI), University of Hawaii at Manoa. Hawaii Ethanol from Molasses Project. Literature search team leader. Cost and energy analyses and preliminary process evaluation.
- 1978 - 1979 **GRADUATE RESEARCH ASSISTANT.** Center for Engineering Research (CER), University of Hawaii at Manoa. Various support services related to alternate energy and engineering research.
- 1976 - 1977 **GRADUATE RESEARCH ASSISTANT.** Department of Oceanography, University of Hawaii at Manoa. Research on the "Dissolution of Calcareous Nanoplankton Under Simulated Oceanic Conditions."

Determined the dissolution rate of calcium-45 tagged coccoliths under ocean pressure and carbonate (pH) concentrations.

- 1974 - 1976 **ASSOCIATE QUALITY ASSURANCE ENGINEER.** Quality Assurance Department, Design Group, Florida Power & Light Company, Miami, Florida. Responsible for the quality assurance aspects of engineering activities performed throughout the life of a nuclear power plant. Audit team leader for numerous quality assurance audits of groups and departments associated with nuclear and environmental engineering.
- 1974 **PROJECT ENGINEER.** Advanced Reactors Division, Westinghouse Electric Corporation, Madison, Pennsylvania. Coordinated projects in Liquid Metal Fast Breeder Reactor (LMFBR) development with other Westinghouse and Nuclear Regulatory Commission (NRC) projects.
- 1972 - 1974 **STUDENT/OFFICER.** United States Navy Nuclear Power Program. Officer training; nuclear engineering education; and operation of, and supervision of enlisted operators of, a nuclear power plant prototype.

PROFESSIONAL AND ORGANIZATION AFFILIATIONS

- Professional Mechanical Engineer, State of Hawaii, No. 5485 (1983)
- Affiliate Grad Faculty, Department of Ocean and Resources Engineering, SOEST, University of Hawaii at Manoa
- Member, American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)
- Member, American Society of Mechanical Engineers (ASME)
- Member, American Solar Energy Society (ASES)
- Member, American Wind Energy Association (AWEA)
- Member, International Solar Energy Society (ISES)
- Member, Life of the Land (Hawaii)
- Member, Union of Concerned Scientists (UCS)

ENGINEERING CONSULTING CLIENT SERVICES

General

- Provide high quality consulting and engineering services.
- Create multi-disciplinary teams tailored to each assignment.
- Apply energy industry expertise in multiple areas.

Business Planning

- Help organizations explore opportunities in renewable and energy efficiency energy technologies and markets.
- Assist in business plan development and strategic planning.

Communications and Public Outreach

- Increase public awareness of renewable energy and energy efficiency technologies.
- Assist clients in promotion of, and education regarding, renewable energy and energy efficiency technologies, projects, and policies.

Due Diligence

- Assist in determining technical, economic, and environmental feasibility of developer-proposed projects.
- Identify and evaluate specific project equity investment opportunities.
- Provide expert witness testimony.
- Critique opposition testimony for cross-examination and impeachment.
- Conduct and coordinate due diligence reviews with project developers and investor advisors.

Economic Analyses

- Determine project capital and O&M costs.
- Conduct financial evaluation and feasibility analyses.
- Conduct Benefit/Cost analyses.
- Conduct Life Cycle Cost (LCC) analyses.
- Conduct Electric Power Research Institute Technical Assessment Guide (EPRI TAG) modeling.
- Conduct Economic Impact Analyses, including Input/Output analyses.
- Conduct learning curve analyses.
- Conduct cost and energy pathway analyses.
- Conduct sensitivity analyses to changes in various economic analysis and system performance parameters.

Education and Training

- Organize and execute energy-related seminars, conferences, symposia, and presentations.
- Develop presentation materials.
- Develop and provide on-line and on-site energy education seminars and courses.
- Develop and conduct renewable energy and energy efficiency technology training programs.

Energy Efficiency Services

- Conduct energy audits and assessments.
- Identify appropriate energy conservation measures.
- Perform building energy system integration and commissioning.

Energy Rating System Analyses and Implementation

- Provide LEED and Energy STAR consulting.
- Help customers obtain Energy STAR and LEED ratings.

Greenhouse Gas Inventories and Reduction

- Assist clients in quantifying emissions of greenhouse gases (GHG).
- Assist companies with estimating and reporting GHG emissions, energy consumption, and criteria pollutant emissions.
- Identify evolving policies related to climate change and how such policy changes might impact clients.
- Help develop practical strategies to address greenhouse gas emissions.
- Work with companies and governments to reduce their carbon footprints.
- Assist with emissions trading under federal legislation and state implementation plans.

Marketing Studies and Analyses

- Advise on current financing energy and technology market conditions.
- Identify market impediments and ways to overcome these impediments.
- Conduct market research.
- Develop and implement marketing strategies.
- Evaluate market implications of various technology development and policy options.

Miscellaneous Energy-Related Services

- Develop custom energy software applications.

Policy Development and Legislative Initiatives

- Conduct in-depth technical and policy assessments.
- Predict and analyze policy trends.
- Advise policymakers and program managers.
- Provide critical guidance on how to meet policy objectives.
- Establish and manage relationships with elected officials, regulators and community opinion leaders to support project development.
- Provide research, testimony, reports and regulatory support to consumer advocates, environmental organizations, regulatory commissions, state energy offices, and others.
- Work collaboratively with businesses, public interest groups, and other organizations to promote renewable energy and energy efficiency technology development and deployment.
- Provide lobbying support for policy development and legislative initiatives.
- Assist in negotiations, formulation of climate law policy, and project development in the areas of carbon transactions, renewable energy and greenhouse gas reform.
- Assist in developing legislation to limit greenhouse gas emissions, establish renewable portfolio standards, and promote energy efficiency.

Pollution Control

- Conduct air and water pollution analyses and recommend management strategies.
- Promote renewable energy and energy efficiency as pollution reduction strategies.

Project Financing

- Conduct financial analyses and modeling of renewable energy and energy efficiency project economics.
- Conduct utility avoided cost analyses.
- Identify specific investment opportunities, and identify strategic and institutional equity investors.
- Assist in identifying prospective commercial term debt financing sources.
- Assist in developing power and renewable energy credit purchase agreements.
- Identify and apply for selected public sector financing support programs.
- Help projects to take advantage of tax, and other financial, incentives including tax-exempt bonds, Clean Renewable Energy Bonds, clean energy investment tax credits, new market tax credits, and renewable energy production tax credits.
- Identify and analyze Renewable Energy Credit (REC) Trading Programs.
- Help create Green Tag Energy Credits and other green pricing options for the producers of renewable energy.

Project Siting, Environmental Impact Assessment, Permitting, and Approvals

- Establish and conduct renewable energy resource assessment programs to determine temporal and spatial availability.
- Assist in site selection and acquisition.
- Assist in securing land and water rights.
- Assist in Environmental Impact Assessment, Environmental Impact Analysis, and environmental compliance support.
- Identify and advise on environmental, health and safety requirements and pollution control strategies.
- Assist in identifying and obtaining all necessary permits and approvals from federal, state and local governments.
- Assist in obtaining public acceptance and support.
- Advise on implementation of government programs and assist clients in formulating environmental management systems and policies.
- Provide operational and environmental testing start-up assistance.

Regulatory

- Conduct regulatory compliance studies.
- Identify regulatory requirements and performance measures.
- Assist in regulatory policy planning.
- Assist with utility integrated resource plans.
- Develop renewable portfolio standard compliance plans.

Research and Development Support

- Help establish renewable energy and energy efficiency R&D objectives.
- Assist in planning and execution of renewable energy and energy efficiency R&D activities.
- Assist in technology transfer for promising new renewable energy and energy efficiency technologies.

Sustainable Design and Green Building Services

- Provide sustainable development program design and implementation assistance.
- Promote whole-building, integrated practices.
- Assist companies manage issues of corporate social responsibility and sustainability.
- Provide project management for sustainable design and green building development and demonstration projects.
- Assist companies report publicly on their environmental practices and the sustainability of their business model.

System Design, Construction, and Analyses

- Assess the potential for developing renewable energy and energy efficiency projects.
- Prepare feasibility reports to allow project developers to determine project viability (technical, economic, and environmental).
- Advise and assist owners, contractors, engineers and suppliers on the design and construction of renewable energy systems and energy efficient facilities.
- Advise and assist customers in the design, construction and financing of their own renewable energy and energy efficiency systems.
- Develop project technical requirements.
- Provide design assistance for various phases of each project (conceptual design, preliminary design, and final design).
- Conduct design review and planning.
- Assist in system layout and technology selection.
- Assist in bid and proposal evaluation and construction and equipment procurement.
- Assist in drafting and negotiating procurement, engineering and construction agreements and operations and maintenance (O&M) agreements.
- Provide project planning, development, and management services.
- Provide system startup, performance evaluation, and reporting services.
- Provide project operations support, including project commissioning.
- Conduct system reliability assessments.

Technology Assessments

- Conduct technology characterizations.
- Conduct comprehensive studies to evaluate renewable energy and energy efficiency technologies.
- Analyze and compare competing conventional and renewable energy and energy efficiency technologies.
- Help government agencies and private sector companies determine the technical viability of various technologies or systems.
- Recommend the most cost effective and appropriate technologies for a specific application.

Utility Integration and Interconnection

- Identify interconnection and transmission access requirements.
- Assist in conducting transmission and interconnection studies.
- Conduct energy storage and power quality studies.

Note: Many of the following projects are multidisciplinary. Projects that involve more than one technology are listed under each technology category.

RENEWABLE ENERGY PROJECT EXPERIENCE

Renewable Energy - General

- Alternate Energy Technologies System Modeling Contest (AETSMC) (PM-D)
- Comprehensive Review and Evaluation of Hawaii's Renewable Energy Resource Assessments (PM-D)
- Department of Hawaiian Home Lands Waiohuli (Maui) Project Task Force (PM-D, Mem)
- Development of a Matrix of Permit Requirements for Various Renewable Energy Technologies as a Component of Permit Process Facilitation (Pro, PM-D)
- Development of a Renewable Energy and Energy Efficiency Project for the Mary, Star of the Sea Parish Complex (MSOS) (Con)
- Development of renewable energy and energy efficiency projects for 66 Parishes, including 43 Schools, located throughout the State of Hawaii, Catholic Charities and The Office of Social Ministry, Hilo (Con)
- Economic Analyses of Various Renewable Energy Incentive Programs (Pro, PM-D)
- Energy and Environmental Summit (Energy: Supply-Side and Transportation Committees) (Educ, Leg)
- Energy Awareness Month Displays and Demonstrations (Educ)
- Energy Efficiency and Renewable Energy Use in the Hotel Industry – Two Case Studies (Hawaii and Sweden) (Pre, Pub)
- Enhancing Renewable Energy Development in Hawaii (EREDH) Workshop (PM-D, Org, Pub)
- Evaluation of Avoided Cost Components for Intermittent Renewable Energy Resources (Pro, EA, PM-D)
- Green Enertopia International Network (PM-HN, former Secretariat)
- Prepared a manual for implementation of Act 77 - Relating to Energy Resources - Part II: Energy Efficiency in State Facilities (SB 2179, SD2, HD1, CD2 - Twenty-First Legislature, 2002, State of Hawaii) (PM-D, Leg)
- Integrated Electric Utility Program (PM-D)
- International Renewable Energy Conference (IREC) (Assist)
- Natural Energy Laboratory of Hawaii Authority (NELHA) Strategic Planning Committee (PM-D, Mem)
- Prepared and provided testimony in support of direct negotiations for State land leases for renewable energy projects (Leg)
- Prepared and provided testimony in support of legislation that requires the public utilities commission to develop and adopt a standard power purchase contract for the purchase of electricity by public utilities from non-fossil fuel producers (Leg)
- Renewable Energy for Sustainable Tourism (Pre)
- Renewable Energy Potential on Oahu (Con, Rep)

- Renewable Energy Research, Development, Commercialization, and Export Promotion Plan for Hawaii (PM-D, Rep)
- Renewable Energy Resource Assessment and Development Program (PM-D)
- Renewable Energy Resource Supply Curves Computer Model (PM-D)
- Technical and Economic Analyses of Proposed Renewable Energy Policy Initiatives (Pro, PM-D)
- Technical and Economic Analyses of Various Integrated Resources Planning (IRP) Supply-Side Alternatives (TA, EA)
- The Energy Express - Mobile Energy Education Demonstration Trailer (Pro, PM-D)
- The Natural Energy Laboratory of Hawaii Renewable Energy Systems Project (PM-D)
- Uila Kupono I Hawai'i (Natural Energy in Hawaii) Videotape (Assist)
- Utility Integration of Renewable Energy Resources (Pro, PM-D)
- Utility Load Matching Computer Model (PM-D)

Renewable Energy Project Due Diligence

- Independent Market Advisory Services to the Department of Energy (DOE) in Support of a Loan Guarantee Application from First Wind Holdings LLC (Con)

Seawater Air Conditioning (SWAC)

- Assisted in determining the benefits provided by SWAC towards meeting the United States Green Building Council's (USGBC) Leadership in Energy and Environment Design (LEED) and the Environmental Protection Agency's (EPA) ENERGY STAR rating standards (Con, TA)
- Assisted in the development of Private Placement Memoranda for the downtown Honolulu SWAC District Cooling Project (Con, TA)
- Assisted in the development of the Business Plan for the downtown Honolulu SWAC District Cooling Project (Con, TA)
- Assisted in the development of the sales and marketing plan for the downtown Honolulu SWAC District Cooling Project (Con, TA)
- Benefits of Seawater Air Conditioning (Fact Sheet) (Con, Pub)
- Business and marketing plan development for SWAC projects (Con)
- Conducted building analyses, building surveys, and present project information to building engineers, managers, and owners (Con)
- Conducted comparative performance analyses for conventional air conditioning systems and SWAC systems (Con, SA, TA)
- Developed community outreach programs (Con)
- Developed the original "heat map" for the downtown Honolulu SWAC District Cooling Project and assisted in development of subsequent heat map and associated chilled water distribution system (Con, TA)
- Drafted legislation, and prepared and presented testimony, to have SWAC included as an eligible technology for the State of Hawaii's Enterprise Zone Program (Con, Leg)

- Drafted legislation, prepared and presented testimony, and achieved passage of a Joint House/Senate Resolution stating the legislature's support for HSWAC and calling for a feasibility analysis for the use of SWAC in State buildings and which also stated that SWAC is recommended to be the preferred air conditioning system for State facilities where feasible and available if the analysis provides a lower life-cycle cost, including environmental costs (Con, Leg)
- Drafted, prepared and presented testimony, and achieved passage of legislation for exemption of SWAC systems from PUC regulation (Con, Leg)
- Drafted, prepared and presented testimony, and achieved passage of legislation to allow direct negotiation of leases/easements for SWAC systems for State and county property (Leg)
- Drafted, prepared and presented testimony, and achieved passage of legislation to require priority processing of State and county permits for renewable energy projects such as SWAC (Con, Leg)
- Drafted, prepared and presented testimony, and achieved passage of legislation which authorizes issuance of \$145 million in special purpose revenue bonds (SPRBs) to Honolulu Seawater Air Conditioning, LLC for the purpose of the planning, design, and construction of a seawater air conditioning (SWAC) district cooling system in downtown Honolulu (Con, Leg)
- Energy Savings and Demand Reduction Potential of SWAC Systems (Con, SA, TA, Rep)
- Environmental Impact Statement (EIS) preparation (Con)
- Feasibility Analysis of Using Seawater Air Conditioning in State of Hawaii Buildings (Con, Pub)
- Honolulu Seawater Air Conditioning (Con, Pre)
- Honolulu Seawater Air Conditioning Project (Con, Pre)
- Identified a number of federal, State, and county legislative initiatives that could be used to support SWAC development (Con, Leg)
- Identified requirements for specialty contractors (Con)
- Innovative Energy Systems Workshop (PM-D)
- Integration of Energy Storage With Seawater Air Conditioning (SWAC) Systems (PM-D, EA, SA, TA)
- Met with permitting agencies' staffs (Con)
- Obtained approval for HSWAC's partnership with the ENERGY STAR Service and Product Provider Program (Con)
- Participated in Integrated Resources Planning and energy planning processes on behalf of Honolulu Seawater Air Conditioning, LLC (Con, SA, TA)
- Participated in all phases of conceptual designs of the seawater distribution system, cooling station, chilled water distribution system and customer connections, as well as in identifying, characterizing, selecting, and negotiating for potential cooling station sites (Con, D&C, SA, TA)
- Participated in the due diligence processes conducted by various potential financing sources for the downtown Honolulu SWAC District Cooling Project (Con, TA)

- Participated in SWAC marketing process and was instrumental in obtaining Letters of Intent for the majority of the 7,840 tons of committed capacity (of the minimum 20,000 tons required). Prepared a draft proposal for commitment of an additional 3,480 tons of committed capacity for State of Hawaii buildings. Also prepared a request for a ruling by the U.S. Department of Energy that will formally designate SWAC as a renewable technology that will allow the GSA to count SWAC as part of its renewable energy requirements under EPACT 2005 and EO 13423 (Con, EA, TA)
- Potential and Benefits for District Cooling Using Seawater Air Conditioning (SWAC) Integrated with Thermal Energy Storage (TES) (Pre, Pub)
- Potential Applications of Seawater Air Conditioning (SWAC) in Hawaii (Pre, Pub)
- Preliminary Statewide Assessment of Seawater Air Conditioning for Hawaii - Phase 1: West Beach, Oahu, Hawaii (PM-D)
- Prepared and distributed newsletters and fact sheets (Con)
- Prepared and gave project-related presentations (Con)
- Prepared a number of detailed analyses, over the last 4+ years, to support HSWAC's case for raising the current HECO rebate for SWAC (This effort was successful) (Con)
- Prepared a preliminary feasibility study for a SWAC system in French Polynesia (Con, EA, SA, TA)
- Prepared a seawater air conditioning value analysis using nominal, real, and risk-adjusted discount rates that takes into account all benefits provided by SWAC (including externalities benefits) (Con, EA, SA, TA)
- Prepared an analysis of imported oil savings and greenhouse gas emissions reductions from 100,000 tons of SWAC as well as equivalents for other renewable energy and energy efficiency alternatives (Con, EA, SA, TA)
- Prepared an RFP and RFQ to select HSWAC's permit manager – The Environmental Company (TEC) and worked closely with TEC to identify permitting requirements, to participate in public outreach initiatives, and to participate in meetings with county, State, and federal agencies that deal with the Project (Con, TA)
- Prepared and presented testimony, and helped achieve passage of legislation that defines SWAC as a renewable energy technology (Con, Leg)
- Provided presentations to numerous environmental, engineering, and business groups, as well as the downtown Neighborhood Board, and Ala Moana and Kaka'ako Neighborhood Board. As a result, the Project has received considerable support from all groups. Personally met and/or communicated with at least 145 of the 150 agencies, organizations, and individuals consulted to date. Instrumental in achieving the strong support of the Sierra Club, Life of the Land, Hawaii Renewable Energy Alliance, Hawaii Solar Energy Association, and other energy and environmental groups for SWAC-related legislation, SWAC technology, and various SWAC projects in Hawaii (Con)
- Recommended and strongly lobbied for obtaining a “comfort letter” from the State of Hawaii Department of Taxation which resulted in a favorable ruling that HSWAC was eligible for high technology tax credits under Acts 221/215 (This comfort letter

was finally received and HSWAC is now eligible to receive, and is receiving, these credits) (Con, EA, TA)

- Sea Water Air Conditioning (SWAC) Atlas for Hawaii (Pro, PM-D)
- Sea Water District Cooling Feasibility Analysis for the State of Hawaii (PM-D, EA, SA, TA, Pub)
- Sea Water District Cooling Feasibility Analysis for the State of Hawaii – Preliminary Results (Pre)
- Seawater Air Conditioning – Cool, Green, and Clean (Con, Pre)
- Seawater Air Conditioning Cooling System for Downtown Honolulu and Waikiki (Con, Pre)
- Seawater Air Conditioning for Honolulu (Con, Pre)
- Seawater Air Conditioning in Hawaii – How to Make It Happen (Con, Pre, Leg)
- Seawater Air Conditioning System Performance (Con, SA, TA, Rep)
- Seawater Air Conditioning Value Analysis (Con, SA, TA, Rep)
- Update on the Downtown Honolulu Seawater Air Conditioning Project (Con, Pre)
- What is Seawater Air Conditioning (Fact Sheet) (Con, Pub)
- Worked with Hawaii's U.S. congressional delegation to obtain legislative and other support for SWAC and other renewable energy development in Hawaii (Con, Leg)

Ocean Thermal Energy Conversion (OTEC)

- Applications of OTEC-Related Technologies in Hawaii (Pre, Pub)
- Assessment of the Technical and Economic Potential for Hydrogen Production With OTEC Electricity and Desalinated Water (PM-D)
- Conducted a preliminary assessment of a 1.65-MW (gross)/1.04 MW (net) OTEC power plant for an application in French Polynesia (Con, EA, SA, TA)
- Coupling Ocean Thermal Energy Conversion Technology With a Floating Nuclear Island (TA, Pub)
- Demonstration OTEC Power Plant 'Demi-OTEC' for the Natural Energy Laboratory of Hawaii - A Concept Design and Economic Feasibility Study (PM-D)
- Feasibility Analysis for Establishment of NELHA [Natural Energy Laboratory of Hawaii Authority]-Type Facilities at Other Locations in Hawaii (PM-D, EA, SA, TA, Rep)
- Feasibility Study for the Application of OTEC in Puerto Rico (TA, EA, Pub)
- Incentives for the Development of Ocean Thermal Energy Conversion in Oceania (TA, Pub)
- NELHA-Type Facilities Project-Phase 2 (PM-D, EA, SA, TA)
- Ocean Thermal Energy Conversion Technology (Pub)
- Ocean Thermal Energy Conversion: A Review, Chapter II. OTEC Principle and Resource and Chapter III. Historic Development and Present Status of OTEC (TA, EA, Pub)
- Preliminary Design of a Kalina-Cycle OTEC Power Plant at the Proposed NELHA-Type Facility at Kekaha, Kauai, Hawaii (PM-D, EA, SA, TA)
- Preliminary Design of an NELHA-Type Facility at Kekaha, Kauai, Hawaii (PM-D, EA, SA, TA)

- State of Hawaii Request to Designate Hawaii (& U.S. Pacific Trust Territories) as a Specific Site for Favorable OTEC Property Tax Treatment (PM-D, Rep)
- Systems Optimization for an Integrated Ocean Thermal Energy Conversion (OTEC) Plant (Con, Pro)

Wave Energy

- ART OSPREY Hybrid Wind/Wave Energy System and Proposed Cost/Performance Study for Makapuu Point, Oahu, Hawaii (Pro, PM-D)
- Feasibility of Developing Wave Power as a Renewable Energy Resource for Hawaii (PM-D, Rep Pre)
- Wave Energy Resource Assessment for the State of Hawaii (PM-D)

Solar Thermal

- Analysis of the Potential Applications and Methods of Improving the Performance of Solar Ponds (TA, EA, Pub, Pre)
- Application of Heat pumps to Residential Water Heating (Evaluation of Solar Assisted Heat Pumps) (M.S. Thesis, TA, EA, Pub, Pre)
- Conducted a preliminary assessment of a large-scale solar water heating system for an application in French Polynesia (Con, EA, SA, TA)
- Critical Review and Analysis of the Hawaii County Economic Opportunity Council's (HCEOC) Concentrating (Fresnel Lens) Solar Thermal/PV System (SA, PM-D, Rep)
- Demonstration of Solarized Fish Jerky Manufacturing and Marketing (PM-D)
- Demonstration Solar-Powered Cogeneration System - Phases I and II (PM-D)
- Development and Application of a Computer-based Simulation Model for Solar Water Heating Systems to Predict Performance and Life-cycle Economics (Pro, PM-D)
- Development of a Solar Pond System Design Computer Model (Ph.D. Dissertation, Pub, Pre)
- Development of a Renewable Energy and Energy Efficiency Project for the Mary, Star of the Sea Parish Complex (MSOS) (Con)
- Development of renewable energy and energy efficiency projects for 66 Parishes, including 43 Schools, located throughout the State of Hawaii, Catholic Charities and The Office of Social Ministry, Hilo (Con)
- Hawaii Solar Energy Research Laboratory (Pro, PM-C)
- Molokai General Hospital Solar-Powered Absorption Air Conditioning System (PM-D)
- Preliminary Feasibility Study of Converting to Electricity the Waste Heat Generated During Raceway Production of Algae (SA)
- Prepared and provided testimony in support of State income tax credits for solar thermal, photovoltaic, and wind energy systems (Leg)

- Represented the Hawaii Solar Energy Association (HSEA) in Hawaii PUC, Docket No. 00-0209. This assistance was instrumental in obtaining a significantly higher rebate for solar water heating systems (Con)
- Solar Desalination Demonstration Project at NELHA/Milolii (PM-D)
- Solar Electric Generating System (SEGS) Assessment for Hawaii - Seminar (Org)
- Solar Electric Generating System (SEGS) Assessment for Hawaii (PM-D)
- Solar Electric Generating Systems - Seminar (Org)
- Solar Pond Thermal Energy Conversion (SPOTEC) (Pro)
- Solar Process Heat for Commercial Applications in Hawaii (Pro, PM-D)
- Solar Resource Monitoring Program for Hawaii (PM-D)
- Solar Water Heating Systems on the Island of Molokai (SA, EA)
- Solar Water Heating Systems Performance and Economic Analyses (SA, EA)
- Solar-Assisted Air Conditioning and Heat Pipe Dehumidification Demonstration Project (PM-D)
- Solar-Powered Absorption Air Conditioning and Hot Water Production Using the Barking Sands, Kauai, Hawaii Parabolic Trough Concentrating Solar System (Pro, PM-D)
- Transpired Solar Collectors for Agricultural Applications (PM-D, Pub)

Solar Electric - Photovoltaic

- A Proposal for Hawaii's Entry in the GM Sunrayce USA 1990 (Pro, PM-D)
- Comparative Technical and Economic Analyses of Two Candidate Companies (Energy Conversion Devices, Inc. and Chronar Corp.) for Special Purpose Revenue Bonds for the Construction of a PV Panel Manufacturing Facility in Hawaii (PM-D, TA, EA, Rep)
- Conducted a preliminary assessment of a 1.25 MW (DC)/1.03 MW (AC) PV system for an application in French Polynesia (Con, EA, SA, TA)
- Design, Install and Monitor PV-powered Lighting Systems at Ten Selected Remote Bus Stops on Oahu (Pro, PM-D)
- Development and Application of a Computer-based Simulation Model for Photovoltaic Systems to Predict Performance and Life-cycle Economics (Pro, PM-D)
- Development of a Renewable Energy and Energy Efficiency Project for the Mary, Star of the Sea Parish Complex (MSOS) (Con)
- Development of renewable energy and energy efficiency projects for 66 Parishes, including 43 Schools, located throughout the State of Hawaii, Catholic Charities and The Office of Social Ministry, Hilo (Con)
- Drafted legislation, and prepared and presented testimony, which authorizes the issuance of \$100 million in general obligation bonds for energy efficiency programs in state facilities (patterned after the "Vote Solar" initiative in San Francisco) (Leg)
- Electrical Energy by Means of Photovoltaic Power for the Hawaiian Fishing Village of Milolii on the South Kona Coast of the Island of Hawaii (PM-D)
- Hawaii Solar Energy Research Laboratory (Pro, PM-C)

- Ka'ahele La (Tour of the Sun) Interscholastic Photovoltaic-Powered Vehicle Competition - Pilot Program (PM-D)
- Ka'ahele La (Tour of the Sun) Interscholastic Photovoltaic-Powered Vehicle Competition - Year 2 (PM-D)
- Ka'ahele La Newsletter (Pub)
- Ka'ahele La Training Video (Assist)
- Large Residential Stand-Alone Solar Electric (Photovoltaic) Power System - Ke Ea o Ka La - The Life Force of the Sun (PM-D)
- Mini Solar Car Program (PM-D)
- Participated as a technology expert/consultant in the "Alternate Energy" Workshop held in Boston, MA, USA which focused on the development and viability of three selected technology areas (BioButanol, Green Coal, Solar Cell), and the implications of that on Client's Renewable Energy Roadmap (Con, EA, SA, TA).
- Participated as a technology expert/consultant in the "Future of Solar Cells" Workshop held in Munich, Germany to assist a multi-billion dollar international corporation to determine when and how best to enter the rapidly growing PV market (Con, EA, SA, TA)
- Participated in the 1990 World Solar Challenge, a 1,900-mile solar car race from Darwin to Adelaide, Australia. Led a team of high school students to become the first high school team to finish this race. Finished 18th out of 36 teams (PM-D, Educ)
- Photovoltaic Workshop - Small-Scale Applications and Consumer Products, (PM-D, Org)
- Photovoltaic/Wind-Powered Electric Vehicle Charging Station and Utility-Intertied Energy Storage System (Pro)
- Photovoltaic-Powered Water Pumping Using Treated Wastewater Effluent for Haleakala Ranch, Kihei, Maui, Hawaii (Pro, SA)
- Photovoltaics for Utilities (PV4U) Working Group (Mem)
- Photovoltaics for Utility Scale Applications (PVUSA) - Hawaii Satellite Project (20 kW), Kihei, Maui, Hawaii (PM-D)
- Photovoltaics for Utility Scale Applications (PVUSA) - Technical Review Committee (Mem)
- Preliminary Feasibility Study to Provide a Portion of the Electricity and Space Heating Requirements of the Haleakala Observatory on Maui, Hawaii (Pro, PM-C)
- Prepared and provided testimony in support of net energy metering for Hawaii (Leg)
- Prepared and provided testimony in support of State income tax credits for solar thermal, photovoltaic, and wind energy systems (Leg)
- Regulatory and Institutional Issues Affecting the Commercialization of Photovoltaics in Hawaii (PM-D)
- Technical Advisor to the Kauai Community College Sunrayce Solar Car Team (Assist, TA, SA)
- Two-Phase 10-kWp Photovoltaic Water Pumping System for the County of Maui Water Department (Pro, PM-D)

Wind

- ART OSPREY Hybrid Wind/Wave Energy System and Proposed Cost/Performance Study for Makapuu Point, Oahu, Hawaii (Pro, PM-D)
- Corrosion Assessment of the Molokai Wind/Diesel Electric Hybrid System (PM-D)
- Critical Review of Technical Data Concerning Natural Energy Corporation's (NEC) Venturi Rotor Wind Energy Converter (VR/WEC) and NEC's Business Development Plan (PM-D, EA, TA)
- Decommissioning of the State of Hawaii's Wind Resource Monitoring Network (PM-D)
- Demonstration of a Pumped-Hydro Energy Storage System at the HNEI/Kahua Wind (Renewable) Energy Storage Test Facility (PM-D)
- Development of a Renewable Energy and Energy Efficiency Project for the Mary, Star of the Sea Parish Complex (MSOS) (Con)
- Development of renewable energy and energy efficiency projects for 66 Parishes, including 43 Schools, located throughout the State of Hawaii, Catholic Charities and The Office of Social Ministry, Hilo (Con)
- Feasibility Study for a Wind-Powered 1,500-kW Hydrogen Fuel Cell (PM-D)
- Feasibility Study of Wind Farm Development in Hawaii - Consultant to ABAX Energy Services (Con)
- Hawaii Zuteck Rotor Project (PM-D)
- Independent Market Advisory Services to the Department of Energy (DOE) in Support of a Loan Guarantee Application from First Wind Holdings LLC (Con)
- Molokai Wind/Diesel Electric Hybrid Demonstration Project (PM-D)
- Photovoltaic/Wind-Powered Electric Vehicle Charging Station and Utility-Intertied Energy Storage System (Pro)
- Prepared and provided testimony in support of State income tax credits for solar thermal, photovoltaic, and wind energy systems (Leg)
- The Hawaii Windpower Workshop (Pre)
- Utility Wind Resource Assessment Program (U*WRAP) (Pro, PM-D)
- Wind Energy and Water Pumping for the County of Maui (PM-D)
- Wind Energy Technical Workshop and Field Practicum, Hawaii Natural Energy Institute, University of Hawaii - Manoa, Honolulu, Hawaii, July 26-31, 1982, Served as a panel member for two technical sessions: (1) Economics of Wind Energy Development, and (2) Agricultural and Mechanical Applications. Presented portions of the preliminary results of the Wind Energy for Irrigation Pumping study (conducted at HSPA) during each of these sessions (Pre).
- Wind Energy Use for Irrigation Pumping - A Preliminary Engineering Evaluation (PM-HS, Pub, Pre)
- Wind Resource Monitoring Program for Hawaii (PM-D)
- Wind/Diesel Electric Hybrid Power System for Pumping Water (PM-D)
- Wind/Pumped-Hydro Integration and Test (WPHIT) (PM-D)
- Wind/PV Hybrid Renewable Energy System for Water Pumping and Aeration for Molokai Fishpond (Pro, PM-D)

- Wind-Powered Pumped-Storage Hydroelectric-Plus Program for the Island of Maui (PM-D)

Biomass

- Demonstration of a Cost-effective Digester Gas Utilization System, Consisting of a Generator to Produce Electricity from Digester Gas, at the Kailua Municipal Wastewater Treatment Plant (PM-D)
- Demonstration of the Effective Utilization of Biogas Produced by Anaerobic Digestion of Animal Wastes at Happy Hula Hog Farm and M&H Kaneshiro Farm (PM-D)
- Determine Whether or Not Density Stratification Occurs with Fast Injection of Fertilizer, March 1983, Oahu Sugar Company, Ltd. Field No. 81 main irrigation water distribution line (PM-HS).
- Economic Analysis of the Substitution of Coal for Bagasse in Plantation Boilers and Alternative Uses of the Resulting Surplus Bagasse (EA, TA)
- Evaluate the Potential of Biogas Production and Waste Treatment Via Anaerobic Digestion of Stillage (a By-product of Ethanol Production) (SA, EA)
- Evaluation of Biomass Handling and Drying Processes (SA)
- Evaluation of the Effects of Bagasse/Biomass Dryers on Combustion Efficiency and Particulate Emissions (SA)
- Evaluation of Uniformity of Distribution of Fertilizer After Fast Injection Into a Drip Irrigation System, 1981 on Oahu Sugar Company, Ltd. Field No. 221A - Waipahu, Oahu, Hawaii (PM-HS).
- Hawaii Ethanol From Molasses Program (SA, EA, Pub)
- Heat Pumps for Drying Agricultural Products and Producing Process Heat (Pro)
- Preliminary Evaluation and Feasibility Study of the Production of Gaseous, Liquid, and Solid Fuels and By-products from Sugar Industry Biomass Feedstocks (Pro)
- Preliminary Evaluation of an Alternative to Field Burning of Leafy Sugar Cane Biomass (Trash) (Pro)
- Preliminary Feasibility Study of Converting to Electricity the Waste Heat Generated During Raceway Production of Algae (SA).
- Simulation of Fast Injection of Fertilizer and Evaluation of Fertilizer Distribution in a Single Lateral as a Function of Time (After) and Distance (From) Fertilizer Injection, HSPA, Kunia, May 6, 1983, (PM-HS)

Hydroelectric

- Demonstration of a Pumped-Hydro Energy Storage System at the HNEI/Kahua Wind (Renewable) Energy Storage Test Facility (PM-D)
- Development of a Hydro Power Business Development Plan for Hawaii (Con)
- Small Hydroelectric Plant on Molokai Located in Central Molokai (Assist)
- U.S. Hydropower Resource Assessment for Hawaii (PM-D, Pub)
- Wind-Powered Pumped-Storage Hydroelectric-Plus Program for the Island of Maui (PM-D)

- Wind/Pumped-Hydro Integration and Test (WPHIT) (PM-D)

GLOBAL CLIMATE CHANGE / GREENHOUSE GAS EMISSIONS

- Drafted, prepared and presented testimony, and achieved passage of legislation to require the government of the State of Hawaii to significantly improve its energy management in state facilities in order to save taxpayer dollars and reduce emissions that contribute to air pollution and global climate change (Leg)
- Prepared an analysis of imported oil savings and greenhouse gas emissions reductions from 100,000 tons of SWAC as well as equivalents for other renewable energy and energy efficiency alternatives (Con, SA, TA)
- Prepared and presented testimony, and helped achieved passage of legislation that establishes as state policy statewide greenhouse gas emissions limits at or below the statewide greenhouse gas emissions levels in 1990 to be achieved by January 1, 2020 and establishes greenhouse gas emissions reduction task force to prepare a work plan and regulatory scheme to achieve the statewide greenhouse gas emissions limits (Con, SA, TA, Leg)
- Preparing an alternative (to HECO's) Integrated Resource Plan which provides for more aggressive renewable energy and demand side management development and which will allow HECO to meet State of Hawaii 2020 greenhouse gas emissions reduction requirements (Con, EA, SA, TA)
- Presentation on "Renewable Energy Options and Strategies for Controlling Greenhouse Gas Emissions," to the HECO IRP Advisory Group Technical Sessions Climate Change / Global Warming, in Honolulu, Hawaii, on June 8, 2007 (Pre, Pub)

ENERGY EFFICIENCY / ENERGY CONSERVATION PROJECT EXPERIENCE***Cogeneration***

- Analyze and Evaluate Large-scale Industrial Cogeneration Systems Used on Sugar Plantations to Produce Process Steam, Mechanical Power, and Electricity (SA)
- Demonstration Solar-Powered Cogeneration System - Phases I and II (PM-D)
- The Natural Energy Laboratory of Hawaii Renewable Energy Systems Project (PM-D)

Energy Audits

- Computerized Residential Energy Audits (CREA) (TA, EA, Educ)
- R. L. Cushing Building Energy Audit (PM-HS)
- Sugar Industry Factory Energy Audits (SA)
- Sugar Industry Pump Test/Efficiency Program (PM-HS)

Energy Conservation / Efficiency

- Assisted in determining the benefits provided by SWAC towards meeting the United States Green Building Council's (USGBC) Leadership in Energy and Environment Design (LEED) and the Environmental Protection Agency's (EPA) ENERGY STAR rating standards (Con, TA)
- Development of a Renewable Energy and Energy Efficiency Project for the Mary, Star of the Sea Parish Complex (MSOS) (Con)
- Development of renewable energy and energy efficiency projects for 66 Parishes, including 43 Schools, located throughout the State of Hawaii, Catholic Charities and The Office of Social Ministry, Hilo (Con)
- Drafted legislation, and prepared and presented testimony, which authorizes the issuance of \$100 million in general obligation bonds for energy efficiency programs in state facilities (patterned after the "Vote Solar" initiative in San Francisco) (Leg)
- Energy Efficiency and Renewable Energy Use in the Hotel Industry – Two Case Studies (Hawaii and Sweden) (Pre, Pub)
- Energy Savings and Demand Reduction Potential of SWAC Systems (Con, SA, TA, Rep)
- Home Energy Rating Systems (HERS) Workshops - "Financing and Selling Energy Efficient Homes in Hawaii" (PM-D, EA)
- Innovative Energy Systems Workshop (PM-D)
- Integration of Energy Storage With Seawater Air Conditioning (SWAC) Systems (PM-D, EA, SA, TA)
- Preliminary Statewide Assessment of Seawater Air Conditioning for Hawaii - Phase 1: West Beach, Oahu, Hawaii (PM-D)

- Prepared a manual for implementation of Act 77 - Relating to Energy Resources - Part II: Energy Efficiency in State Facilities (SB 2179, SD2, HD1, CD2 - Twenty-First Legislature, 2002, State of Hawaii) (PM-D, Leg)
- Sea Water Air Conditioning (SWAC) Atlas for Hawaii (Pro, PM-D)
- Sea Water District Cooling Feasibility Analysis for the State of Hawaii (PM-D, EA, SA, TA, Pub)
- Solar-Assisted Air Conditioning and Heat Pipe Dehumidification Demonstration Project (PM-D)
- Sugar Industry Energy Conservation Guidebook (PM-HS, Pub [Draft])
- Sugar Industry Pump Test/Efficiency Program (PM-HS)

Heat Pumps

- Application of Heat pumps to Residential Water Heating (Evaluation of Solar Assisted Heat Pumps) (M.S. Thesis, TA, EA, Pub, Pre)
- Former member, Board of Directors, Essential Innovations
- Heat Pumps for Drying Agricultural Products and Producing Process Heat (Pro)

ENERGY STORAGE PROJECT EXPERIENCE

- Assessment of the Technical and Economic Potential for Hydrogen Production With OTEC Electricity and Desalinated Water (PM-D)
- Demonstration of a Pumped-Hydro Energy Storage System at the HNEI/Kahua Wind (Renewable) Energy Storage Test Facility (PM-D)
- Feasibility Study for a Wind-Powered 1,500-kW Hydrogen Fuel Cell (PM-D)
- Integration of Energy Storage With Seawater Air Conditioning (SWAC) Systems (PM-D, EA, SA, TA)
- Photovoltaic-Powered Electric Vehicle Charging Station and Utility-Intertied Energy Storage System (Pro)
- Potential and Benefits for District Cooling Using Seawater Air Conditioning (SWAC) Integrated with Thermal Energy Storage (TES) (Pre, Pub)
- Wind-Powered Pumped-Storage Hydroelectric-Plus Program for the Island of Maui (PM-D)
- Wind/Pumped-Hydro Integration and Test (WPHIT) (PM-D)

ELECTRIC AND HYBRID VEHICLE PROJECT EXPERIENCE

- 1991 Electric Vehicle Workshop (PM-D, Org)
- 1993 Pali Challenge - An Electric Vehicle Road Rally and Exhibition (PM-E, Org)
- A Proposal for Hawaii's Entry in the GM Sunrayce USA 1990 (Pro, PM-D)
- An Electric and Hybrid Vehicle Development Program for Hawaii - A Public Forum (PM-E, Org)
- Development of a Combination Electricity Generator/Exercise Bicycle (D&C)
- Development of Electric and Hybrid Vehicle Design Training Programs for Hawaii (Pro)

- Development of Electric and Hybrid Vehicle Maintenance and Repair Training Programs for Hawaii (Pro)
- Development of Extensive Safety Education and Driver Training Programs and a Comprehensive Manual (Guidebook) for Solar Car Programs (PM-D)
- Drafted, prepared and presented testimony, and achieved passage of legislation to allow enclosed, three-wheeled electric vehicles to be exempt from regulations that required motorcycle helmets and passengers to be over 18 years of age (Leg)
- Drafted, prepared and presented testimony, and achieved passage of legislation that provided for free parking for electric vehicles in State and county controlled parking, free registration, special electric vehicle license plates, and use of HOV lanes at any time (Leg)
- Electric and Hybrid Vehicle Development Plan - Hawaii EV 2001 (PM-E, Org)
- Electric Vehicle Association of Hawaii (EVAH) (Org, Mem)
- Electric Vehicle Association of Hawaii (EVAH) Newsletter (Pub)
- Electric Vehicle Demonstration Program (Pro)
- Electric Vehicle Development Program for Hawaii - A Public Forum (PM-E, Org)
- Electric Vehicle Initiatives Survey (PM-D)
- Electric Vehicle Public Advisory Committee (EVPAC) (PM-E, Org, Mem)
- Hawaii EV'93 - An Electric and Hybrid Vehicle Conference and Trade Show (PM-E, Org)
- Identification of Potential Applications of Electric and Hybrid Vehicles (Pro, PM-E)
- Ka'ahale La (Tour of the Sun) Interscholastic Photovoltaic-Powered Vehicle Competition - Pilot Program (PM-D)
- Ka'ahale La (Tour of the Sun) Interscholastic Photovoltaic-Powered Vehicle Competition - Year 2 (PM-D)
- Ka'ahale La Tour of the Sun Newsletter (Pub)
- Ka'ahale La Training Video (Assist)
- Mini Solar Car Program (PM-D)
- Operational Testing of Electric Vehicles (PM-C)
- Participated in the 1990 World Solar Challenge, a 1,900-mile solar car race from Darwin to Adelaide, Australia. Led a team of high school students to become the first high school team to finish this race. Finished 18th out of 36 teams (PM-D, Educ)
- Photovoltaic/Wind-Powered Electric Vehicle Charging Station and Utility-Intertied Energy Storage System (Pro)
- Preliminary Analysis of the Effects on Electric Power Supply and Distribution Systems of the Introduction of Large Numbers of Electric Vehicles in Hawaii and the Benefits of Load Shifting and Time-of-Day Electric Rates (SA)
- Preliminary Research on the Development of a Permanent State-wide Infrastructure to Support Electric and Hybrid Vehicle Use (Pro)
- "Straw Man" Pre-Proposal for the U. S. Dept. of Defense Electric Vehicle Technology Demonstration Program on behalf of the Electric Vehicle Association of Hawaii (Pro)
- Technical Advisor to the Hawaii Electron Marathon Program (Assist, TA, SA)

- Technical Advisor to the Kauai Community College Sunrayce Solar Car Team
(Assist, TA, SA)

ALTERNATIVE FUELS PROJECT EXPERIENCE

- Alcohol Transportation Fuels Demonstration Program (PM-D)
- Assessment of the Technical and Economic Potential for Hydrogen Production With OTEC Electricity and Desalinated Water (PM-D)
- Demonstration of a Cost-effective Digester Gas Utilization System, Consisting of a Generator to Produce Electricity from Digester Gas, at the Kailua Municipal Wastewater Treatment Plant (PM-D)
- Demonstration of the Effective Utilization of Biogas Produced by Anaerobic Digestion of Animal Wastes at Happy Hula Hog Farm and M&H Kaneshiro Farm (PM-D)
- Economic Analysis of the Substitution of Coal for Bagasse in Plantation Boilers and Alternative Uses of the Resulting Surplus Bagasse (EA, TA)
- Evaluate the Potential of Biogas Production and Waste Treatment Via Anaerobic Digestion of Stillage (a By-product of Ethanol Production) (SA, EA)
- Feasibility Study for a Wind-Powered 1,500-kW Hydrogen Fuel Cell (PM-D)
- Hawaii Ethanol From Molasses Program (SA, EA)
- Participated as a technology expert/consultant in the “Alternate Energy” Workshop held in Boston, MA, USA which focused on the development and viability of three selected technology areas (BioButanol, Green Coal, Solar Cell), and the implications of that on Client’s Renewable Energy Roadmap (Con, EA, SA, TA).
- Preliminary Evaluation and Feasibility Study of the Production of Gaseous, Liquid, and Solid Fuels and By-products from Sugar Industry Biomass Feedstocks (Pro)
- Production of Methane Utilizing Anaerobic Treatment of Sugar Industry Wastewater (PM-D)

SUSTAINABLE DEVELOPMENT / VILLAGE POWER PROJECT EXPERIENCE

- Department of Hawaiian Home Lands Waiohuli (Maui) Project Task Force (PM-D, Mem)
- Electrical Energy by Means of Photovoltaic Power for the Hawaiian Fishing Village of Milolii on the South Kona Coast of the Island of Hawaii (PM-D)
- Energy Efficiency and Renewable Energy Use in the Hotel Industry – Two Case Studies (Hawaii and Sweden) (Pre, Pub)
- Energy-efficiency and Conservation in Hotels – Towards Sustainable Tourism (Pub)
- Green Enertopia International Network (PM-HN, former Secretariat)
- Renewable Energy for Sustainable Tourism (Pub)

ENVIRONMENTAL PROJECT AND PERMITTING EXPERIENCE***General***

- Air pollution monitoring and control (PM-HS, Rep)
- Bachelor of Science Degree in Environmental Technologies and Urban Systems (emphasis on water quality) (Educ)
- Completed extensive undergraduate- and graduate-level coursework in environmental sciences and engineering, including waste water analysis and treatment and environmental impact assessment and analysis (Educ)
- Draft Environmental Impact Statement (DEIS) preparation (Con, SA, TA)
- Environmental Impact Statement Preparation Notice (EISPN) preparation (Con, SA, TA)
- Review and comment on Environmental Impact Assessments (TA, EA)

Air Quality

- Attended and successfully completed (3 Continuing Education Credits were given for each course) the following courses at the Environmental Protection Agency's Air Pollution Training Institute in Research Triangle Park, North Carolina. Course 450 - Source Sampling Particulate Pollutants - January 26-30, 1981 and Course 468 - Source Sampling and Analysis of Gaseous Pollutants - February 2-5, 1981 (PM-HS, Educ)
- Attended and successfully completed the State of Hawaii - Department of Health - Pollution Investigation and Enforcement Branch - Visual Emissions Evaluations Course ("Smoke School") - March 16-18, 1981. Qualified observer (opacity reader) in accordance with requirements set forth in Method 9 - Visual Determination of the Opacity of Emissions from Stationary Sources. Periodic recertification (every 5-6 months) is required (PM-HS, Educ)
- Boiler Emissions Source Test for The Lihue Plantation Company, Ltd., Bagasse Boiler Stacks - Lihue, Kauai, Hawaii, April 26-28, 1982 by OMNI Environmental Services, Inc. (PM-HS, HSPA test observer - April 27, 1982)
- Calibration of Stack Sampling Equipment (PM-HS)
- Design, Construct, Calibrate and Test a Low-cost, Light-weight, Simple-to-use, Portable, Isokinetic Stack Gas Particulate Sampling System (D&C, PM-HS)
- Determination of Stack Gas Velocity, Volumetric Flow Rates, and Composition for The Lihue Plantation Company, Ltd., Bagasse Boiler Stacks - Lihue, Kauai, Hawaii, April 30, 1981 (PM-HS)
- Determination of Stack Gas Velocity, Vorticity, Volumetric Flow Rates, and Composition for The Lihue Plantation Company, Ltd., Bagasse Boiler Stacks - Lihue, Kauai, Hawaii, July 14, 1981 (PM-HS)
- Evaluation of the Effects of Bagasse/Biomass Dryers on Combustion Efficiency and Particulate Emissions (SA)

- Final Performance Source Emissions Survey of Davies Hamakua Sugar Company - Haina Mill Bagasse Boiler and Drier Stacks - Haina, Hawaii, May 18-21, 1981 (PM-HS)
- Final Performance Source Emissions Survey of Hawaiian Commercial and Sugar Company - Paia Mill Bagasse Boiler Stack - Paia, Maui, Hawaii, May 24-26, 1982 (PM-HS)
- Final Performance Source Emissions Survey of Mac Farms of Hawaii, Inc., Macadamia Nut Shell Boiler Stack - Captain Cook, Hawaii, conducted March 2-4, 1982 (PM-HS)
- Final Performance Source Emissions Survey of Molokai Electric Corporation Biomass Boiler Stack - Palaau, Molokai, Hawaii, July 14-16, 1982 (PM-HS)
- Performance Test For Particulate Matter Emissions From Waipahu Municipal Incinerator Stacks 1/Ewa and 2/Honolulu - Waipahu, Oahu, Hawaii, February 14, 1983 (PM-HS)
- Preliminary Evaluation of an Alternative to Field Burning of Leafy Sugar Cane Biomass (Trash) (Pro)
- Preliminary Source Emissions Survey of Davies Hamakua Sugar Company - Haina Mill Bagasse Boiler and Drier Stacks - Haina, Hawaii, April 21-24, 1981 (PM-HS)
- Preliminary Source Emissions Survey of Hilo Coast Processing Company - Pepeekeo Mill Bagasse Boiler and Drier Stacks - Pepeekeo, Hawaii, September 16-18, 1981 (PM-HS)
- Source Emissions Survey of Ka'u Sugar Mill Company, Inc., Bagasse Boiler Stack - Pahala, Hawaii, August 24-25, 1981 (PM-HS)
- Source Emissions Survey of Olokele Sugar Company, Ltd., Mill Bagasse Boiler Stack - Kaumakani, Kauai, Hawaii, September 9-11, 1981 (PM-HS)
- Stack Emissions Skirmish Test of The Lihue Plantation Company, Ltd., Bagasse Boiler Stack - Lihue, Kauai, Hawaii, conducted March 26-27, 1981 (PM-HS)
- Stack Gas and Particulate Emissions Testing for Biomass- and Coal-Fired Boilers, Various (PM-HS, Rep)
- Stack Gas Vorticity and Velocity Determination for The Lihue Plantation Company, Ltd., Number 2 Scrubber - Lihue, Kauai, Hawaii, December 2, 1981 (PM-HS)
- Waialua Sugar Company, Inc., Bagasse Drier Evaluation Study - Waialua, Oahu, Hawaii, June 1981 (PM-HS for stack sampling portion of test)

Water Quality

- Bachelor of Science Degree in Environmental Technologies and Urban Systems (emphasis on water quality) (Educ)
- Demonstration of a Cost-effective Digester Gas Utilization System, Consisting of a Generator to Produce Electricity from Digester Gas, at the Kailua Municipal Wastewater Treatment Plant (PM-D)
- Evaluate the Potential of Biogas Production and Waste Treatment Via Anaerobic Digestion of Stillage (a By-product of Ethanol Production) (SA, EA)
- Production of Methane Utilizing Anaerobic Treatment of Sugar Industry Wastewater (PM-D)

Permitting

- Drafted, prepared and presented testimony, and achieved passage of legislation to require priority processing of State and county permits for renewable energy projects such as SWAC (Con, Leg)
- Met with permitting agencies' staffs (Con)
- Prepared an RFP and RFQ to select HSWAC's permit manager – The Environmental Company (TEC) and worked closely with TEC to identify permitting requirements, to participate in public outreach initiatives, and to participate in meetings with county, State, and federal agencies that deal with the Project (Con)

LEGISLATIVE- AND PUBLIC UTILITIES COMMISSION (PUC)-RELATED EXPERIENCE

- Drafted legislation, and prepared and presented testimony, to have SWAC included as an eligible technology for the State of Hawaii's Enterprise Zone Program (Con, Leg)
- Drafted legislation, and prepared and presented testimony, which authorizes the issuance of \$100 million in general obligation bonds for energy efficiency programs in state facilities (patterned after the "Vote Solar" initiative in San Francisco) (Leg)
- Drafted legislation, prepared and presented testimony, and achieved passage of a Joint House/Senate Resolution stating the legislature's support for HSWAC and calling for a feasibility analysis for the use of SWAC in State buildings and which also stated that SWAC is recommended to be the preferred air conditioning system for State facilities where feasible and available if the analysis provides a lower life-cycle cost, including environmental costs (Con, Leg)
- Drafted, prepared and presented testimony, and achieved passage of legislation to allow enclosed, three-wheeled electric vehicles to be exempt from regulations that required motorcycle helmets and passengers to be over 18 years of age (Leg)
- Drafted, prepared and presented testimony, and achieved passage of legislation for exemption of SWAC systems from PUC regulation (Con, Leg)
- Drafted, prepared and presented testimony, and achieved passage of legislation to allow direct negotiation of leases/easements for SWAC systems for State and county property (Leg)
- Drafted, prepared and presented testimony, and achieved passage of legislation to require priority processing of State and county permits for renewable energy projects such as SWAC (Con, Leg)
- Drafted, prepared and presented testimony, and achieved passage of legislation that provided for free parking for electric vehicles in State and county controlled parking, free registration, special electric vehicle license plates, and use of HOV lanes at any time (Leg)
- Drafted, prepared and presented testimony, and achieved passage of legislation to require the government of the State of Hawaii to significantly improve its energy management in state facilities in order to save taxpayer dollars and reduce emissions that contribute to air pollution and global climate change (Leg)

- Drafted, prepared and presented testimony, and achieved passage of legislation which authorizes issuance of \$145 million in special purpose revenue bonds (SPRBs) to Honolulu Seawater Air Conditioning, LLC for the purpose of the planning, design, and construction of a seawater air conditioning (SWAC) district cooling system in downtown Honolulu (Con, Leg)
- Identified a number of federal, State, and county legislative initiatives that could be used to support SWAC development (Con, Leg)
- Participated in numerous Integrated Resources Planning and energy planning processes on behalf of Honolulu Seawater Air Conditioning, LLC (Con, SA, TA)
- Prepared a number of detailed analyses to support HSWAC's case for raising the current HECO rebate for SWAC over the last 3+ years (Con)
- Prepared and presented testimony, and helped achieved passage of legislation that establishes as state policy statewide greenhouse gas emissions limits at or below the statewide greenhouse gas emissions levels in 1990 to be achieved by January 1, 2020 and establishes greenhouse gas emissions reduction task force to prepare a work plan and regulatory scheme to achieve the statewide greenhouse gas emissions limits (Con, Leg)
- Prepared and presented testimony, and helped achieved passage of legislation that defines SWAC as a renewable energy technology (Con, Leg)
- Prepared and provided testimony in support of direct negotiations for State land leases for renewable energy projects (Leg)
- Prepared and provided testimony in support of legislation that requires the public utilities commission to develop and adopt a standard power purchase contract for the purchase of electricity by public utilities from non-fossil fuel producers (Leg)
- Prepared and provided testimony in support of net energy metering for Hawaii (Leg)
- Prepared and provided testimony in support of State income tax credits for solar thermal, photovoltaic, and wind energy systems (Leg)
- Prepared and provided testimony on legislation in support of neighborhood electric vehicles (Leg)
- Preparing an alternative (to HECO's) Integrated Resource Plan which provides for more aggressive renewable energy and demand side management development and which will allow HECO to meet State of Hawaii 2020 greenhouse gas emissions reduction requirements (Con, Leg)
- Registered lobbyist with the State of Hawaii and City and County of Honolulu
- Represented the Hawaii Solar Energy Association (HSEA) in Hawaii PUC, Docket No. 00-0209 and this assistance was instrumental in obtaining a higher rebate for solar water heating systems (Con)
- Worked with Hawaii's U.S. congressional delegation to obtain legislative and other support for SWAC and renewable energy development in Hawaii (Con, Leg)

COMMUNITY OUTREACH AND EDUCATION PROJECT EXPERIENCE

- Affiliate Grad Faculty, Department of Ocean and Resources Engineering, SOEST, University of Hawaii at Manoa
- Alternate Energy Technologies System Modeling Contest (AETSMC) (PM-D)
- Developed community outreach programs (Con)
- Development of an Integrated Suite of Energy- and Environmentally-Related Distance Learning Courses (Educ, Pro, Under Development)
- Earth Day Displays and Demonstrations (Educ)
- Energy and Environment Course, Sustainable Energy Engineering International Master of Science Program, School of Mechanical and Materials Science, Swedish Royal Institute of Technology, Stockholm, Sweden - Delivered three lectures (Electric Vehicle Technology, Principles of Sustainable Development, and Energy Conservation Technologies), Spring 1999 (Educ, Con)
- Energy and Environmental Summit (Educ, Leg)
- Energy Awareness Month Displays and Demonstrations (Educ)
- Hawaii State Science and Engineering Fair, Junior Display Division, Chief Judge (Educ)
- Ka'ahele La (Tour of the Sun) Interscholastic Photovoltaic-Powered Vehicle Competition - Pilot Program (PM-D)
- Ka'ahele La (Tour of the Sun) Interscholastic Photovoltaic-Powered Vehicle Competition - Year 2 (PM-D)
- Ocean Engineering Design Courses - ORE 783, Department of Ocean and Resources, SOEST, UHM (Spring 2009 "Preliminary Design of a Cooling Station, Seawater Pipe System, and Chilled Water Distribution System for an Up to 20,000-ton Seawater Air Conditioning (SWAC) District Cooling System for Pearl Harbor/Hickam/Honolulu International Airport;" Spring 2005 – "Preliminary Design of a Cooling Facility and Seawater Pipe System for the 20,000-ton (nominal) Downtown Honolulu Seawater Air Conditioning District Cooling System;" Spring 2002 - "Preliminary Design of a Kalina-Cycle OTEC Power Plant at the Proposed Kauai Ocean Resources, Inc. Ocean Science and Technology Park (KOROSTP) at Kekaha, Kauai, Hawaii;" and Fall 2000 - "Preliminary Design of an NELHA-Type Facility at Kekaha, Kauai, Hawaii")
- Participated in the 1990 World Solar Challenge, a 1,900-mile solar car race from Darwin to Adelaide, Australia. Led a team of high school students to become the first high school team to finish this race. Finished 18th out of 36 teams (PM-D, Educ)
- Provided presentations to numerous environmental, engineering, and business groups, as well as the Downtown Neighborhood Board, and Ala Moana and Kaka'ako Neighborhood Board. As a result, the Project has received considerable support from all groups. Personally met and/or communicated with at least 145 of the 150 agencies, organizations, and individuals consulted to date. Instrumental in achieving the strong support of the Sierra Club, Life of the Land, Hawaii Renewable Energy Alliance, Hawaii Solar Energy Association, and other energy and environmental groups for SWAC-related legislation, SWAC technology, and various SWAC projects in Hawaii (Con)

- Renewable/Alternative Technologies Course, Sustainable Energy Engineering International Master of Science Program, School of Mechanical and Materials Science, Swedish Royal Institute of Technology, Stockholm, Sweden - Taught 4-credit course, Fall 1999 (Educ, Con)
- Review and Selection Committee, Sterling Scholar Scholarship Program
- Technical Advisor to the Hawaii Electron Marathon Program (Assist, TA, SA)
- Technical Advisor to the Kauai Community College Sunrayce Solar Car Team (Assist, TA, SA)

PUBLICATIONS, REPORTS, AND PRESENTATIONS

- Boston Pacific Company, Inc. 2009. "Independent Market Assessment for a Loan Guarantee Application from First Wind Holdings, LLC for the Development of a 30 MW Wind Facility in Kahuku, HI," Presented to Monique Fridell and Hai Duong, United States Department of Energy, Washington, DC, September 10, 2009 (Rep)
- Rezachek, David and Jackson, Harry. 2009. "Seawater Air Conditioning (SWAC) for Naval Station Pearl Harbor/Hickam Air Force Base/Honolulu International Airport," Presentation to Captain Muilenberg, et. al., February 5, 2009 (Pre)
- Rezachek, David and Oney, Stephen. 2009. "Seawater Air Conditioning (SWAC) for Naval Station Pearl Harbor/Hickam Air Force Base/Honolulu International Airport," Presentation to Gregory Gephardt, et. al., January 14, 2009 (Pre)
- Rezachek, David. 2009. "Development of a Hydro Power Business Development Plan for Hawaii," Honolulu, Hawaii, January 2009 (Rep)
- Rezachek, David. 2008. "The Downtown Honolulu Seawater Air Conditioning (SWAC) Project," USGBC Hawaii Chapter - Educational Presentation, E&O Trading Company, Honolulu, Hawaii, December 9, 2008 (Pre)
- Rezachek, David. 2008. "The Downtown Honolulu Seawater Air Conditioning (SWAC) Project," Society of American Military Engineers (SAME), Hale Ikena, Fort Shafter, Honolulu, Hawaii, December 9, 2008 (Pre)
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Note: The above list does not include numerous nuclear quality assurance audit reports, project progress reports, and other technical reports.

REFERENCES AND SALARY HISTORY

A list of personal references and a salary history are available on request.

Key:

- Assist Assisted in development
- Con Consulting work
- EA Economic analysis
- D & C Design and construction
- Educ Energy and/or environmental education and coursework
- Leg Legislative activity
- Mem Member
- Org Organized
- PM-C Project Manager for Center for Engineering Research, University of Hawaii at Manoa
- PM-D Project Manager for State of Hawaii, Department of Business, Economic Development, and Tourism - Energy Division
- PM-E Project Manager for Electric Vehicle Association of Hawaii
- PM-HN Project Manager for Hawaii Natural Energy Institute, University of Hawaii at Manoa
- PM-HS Project Manager for Hawaiian Sugar Planters' Association
- Pre Presentation
- Pro Proposal
- Pub Publication
- Rep Report
- Rep* Report. Property of Hawaiian Sugar Planter's Association. Private and confidential, intended only for the information of personnel of HSPA and its members in Hawaii only. Distribution or circulation to others or reproduction in any form is prohibited. Not for citation except as "unpublished HSPA data"
- SA Systems analysis
- TA Technical analysis