

SB 1146



**DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM**

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Statement of
THEODORE E. LIU
Director
Department of Business, Economic Development, and Tourism
before the
SENATE COMMITTEE ON ENERGY AND ENVIRONMENT
Tuesday, February 3, 2009
2:45 PM
State Capitol, Conference Room 225

in consideration of
SB 1146
RELATING TO RENEWABLE ENERGY.

Chair Gabbard, Vice Chair English, and Members of the Committee.

The Department of Business, Economic Development and Tourism (DBEDT) supports the intent of SB1146, which would require the Department of Land and Natural Resources (DLNR), in cooperation with other state agencies, to conduct a study to identify potential ocean zones suitable for hydrokinetic energy facilities, but believes this bill is unnecessary and has concerns regarding the resources available within the Department of Land and Natural Resources to carry out this task.

DBEDT would like to note that this measure could complement efforts to develop the renewable energy zones proposed under the Hawaii Clean Energy Initiative (HCEI). The HCEI proposes the addition of the following to the duties of the Energy Resource Coordinator, §196-4, Hawaii Revised Statutes: "Formulate a systematic process, including the development of requirements, to identify geographic areas that are rich with renewable energy resource potential

which can be developed in a cost-effective and environmentally benign manner, and designate such areas as renewable energy zones.

It is the intention of DBEDT to coordinate with DLNR and other agencies in the establishment of Renewable Energy Zones for renewable resources including but not limited to ocean hydrokinetic resources.

Thank you for the opportunity to offer these comments.

LINDA LINGLE
GOVERNOR OF HAWAII



**STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES**

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**Testimony of
LAURA H. THIELEN
Chairperson**

**Before the Senate Committee on
ENERGY AND ENVIRONMENT**

**Tuesday, February 3, 2009
2:45 PM
State Capitol, Conference Room 225**

**In consideration of
SENATE BILL 1146
RELATING TO RENEWABLE ENERGY**

Senate Bill 1146 requires the Department of Land and Natural Resources (Department) in cooperation with other state agencies to conduct a study to identify potential ocean zones suitable for hydrokinetic energy facilities. The Department supports the intent of this bill in using our natural resources for renewable energy production when economically and environmentally prudent. The Department, however, believes this bill is unnecessary and has concerns regarding the feasibility of carrying out this task.

The Department does not have the expertise or resources to conduct a statewide study to identify potential ocean zones suitable for hydrokinetic energy facilities. The suitability of sites for hydrokinetic energy facilities is dependent on numerous factors that are often unique to the specific technology being utilized by a prospective hydrokinetic energy producer. Consequently, unless fully informed of the specific needs of a prospective hydrokinetic energy producer prior to seeking suitable sites, the most productive and effective use of State resources is the establishment of general guidelines and regulatory permitting information that assist such parties in obtaining the pertinent information that they many need in making an informed decision about prospective sites in the State. In December 2006, the Department and the Department of Business, Economic Development and Tourism compiled A Catalog of Potential Sites for Renewable Energy in Hawaii, pursuant to Act 95, Session Laws of Hawaii (2004). That catalog specifically addresses site identification issues involving ocean energy technologies. Consequently, this bill is unnecessary since the catalog providing the guidance sought already exists.

Additionally, renewable energy technologies, hydrokinetic energy facilities, are highly diverse and constantly evolving. If a site identification project based on currently known renewable energy technologies is approved, such a project would require considerable technological

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HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

expertise that would require the hiring of outside consultants at considerable cost to the State. Accordingly, the Department is concerned with incurring such consultant's costs during this period of economic decline and mandated deep departmental budget cuts. In these trying economic times, costs for such exploratory information seeking cannot be borne by State agencies that are struggling to avoid personnel reductions.



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COMMITTEE ON ENERGY AND ENVIRONMENT

Senator Mike Gabbard, Chair

Senator J. Kalani English, Vice Chair

DATE: Tuesday, February 3, 2009

TIME: 2:45 p.m.

PLACE: Conference Room 225

Aloha Chair Gabbard, Vice chair English and Members of the Committee,

My name is Henry Curtis and I am the Executive Director of Life of the Land, Hawai'i's own energy, environmental and community action group advocating for the people and `aina for almost four decades. Our mission is to preserve and protect the life of the land through sound energy and land use policies and to promote open government through research, education, advocacy and, when necessary, litigation.

SB 1146 Requires the department of land and natural resources in cooperation with other state agencies to conduct a study to identify potential ocean zones suitable for hydrokinetic energy facilities.

We strongly support this legislation, HOWEVER, we firmly believe that there must be a community component. We propose the following amendment:

SECTION 2. (a) The department of land and natural resources shall conduct a study of suitable locations in the State, in cooperation with other state agencies, and in consultation with Hawaii-based ocean energy users, ocean researchers, ocean advocates and cultural practitioners, to identify potential ocean zones or sites for hydrokinetic energy facilities, including ...

The Ocean Potential

Life of the Land Expert Witness Dr. Hans Krock (PUC Docket 05-0145):

"It's larger than oil and coal, everything. It is, in fact, the energy source that runs the world's weather system, whole hydrologic cycle. It's 10,000 times as big as human energy use. So it's the largest energy resource in the world. ... That's -- that's the ocean, the tropical ocean. And OTEC, it takes advantage of the same system that runs that world energy, namely, the difference in temperature between the surface layer and your cold area elsewhere. ...

The energy flowing through the surface layer of the tropical ocean is about 10,000 times greater than the energy used by human societies. As such it is the only energy resource on earth that is large enough to replace fossil fuel."

Dr. Hans Krock is Professor Emeritus of Ocean & Resources Engineering at UH and President of OCEES International, Inc. He has a BS in Civil Engineering from Arizona State Univ. in Tempe, MS and Ph.D. in Civil and Environmental Engineering with minors in Chemistry and Chemical Engineering from the University of California at Berkeley. Dr Krock is a registered Professional Engineer (Civil) in Hawaii, served as PI for numerous research projects at UH for twenty five years covering all aspects of ocean engineering, ocean dynamics, water quality, OTEC, and environmental effects, hold two US Patents related to gas exchange dynamics and open cycle OTEC, received letters of recognition from two Governors of Hawaii, served as visiting professor at two foreign universities, have been recognized as the leading authority on multi-product OTEC systems and OTEC/hydrogen at the World Renewable Energy Congress and by the Chinese Academy of Science. He has conducted professional engineering work in Hawaii and numerous other islands in the Pacific as well as in Arizona, California, Germany, the Indian Ocean, and the Caribbean. Served as Professor of Ocean Engineering and Director of J.K.K. Look Laboratory of Oceanographic Engineering and Ocean & Resources Engineering Departmental Chair at UH and established OCEES International, Inc.

Ocean Thermal Energy Conversion (OTEC)

"I think there is a clear choice that ought to be made by the American people, and especially U.S. environmentalists; namely, whether they prefer baseload nuclear, baseload fossil, or baseload OTEC."

Dr. Robert Cohen, via email correspondence. I met Dr. Robert Cohen at the Ocean Energy Council's EnergyOcean 2007 conference.

Robert Cohen, received a Ph.D. in Electrical Engineering from Cornell University in 1956. He left his career at NOAA in Boulder, Colorado and joined the staff of the budding U.S. solar energy program in the fall of 1973. His assignment as a program manager was to organize the U.S. ocean energy program. In the fall of 1981 he took early retirement from the federal government, then participated in ocean thermal energy conversion (OTEC) studies as a consultant in the private sector until 1985. That work included a contract to familiarize Alcan International Ltd. with OTEC technology and participation in a conceptual OTEC power plant design study for the Taiwan Power Company. From 1985 to 1990 he was on the staff of the Energy Engineering Board, National Academy of Sciences, engaged in energy policy studies. Since 1991 he is working as a consultant in Boulder, Colorado.

Sea Water Air Conditioning

LOL Expert Witness Dr John Harrison (BLNR Contested Case CDUA OA-2801 -- 2002)

"A Waikiki seawater air conditioning cold water circulation system could reduce Waikiki's entire energy economy by 40%"

Dr. Harrison has a B.A. in biological sciences, with a minor in mechanical engineering from Stanford University in 1974. His doctorate in zoology from the University of Hawaii in 1981. He worked as a post-doctoral marine scientist for the University of California at Berkeley where he administered the U.S. Department of Energy funded ocean thermal energy conversion (OTEC) environmental research program in Hawaii. Dr. Harrison wrote the Ocean Thermal Energy Conversion (OTEC) handbook for the U.S. Department of Energy's solar energy research institute. Dr. Harrison was hired by the United States Department of Commerce, National Marine Fishery Services to write the environmental analysis section of the federal environmental impact statement for the 40-megawatt ocean thermal energy conversion (OTEC) pilot plant that was intended to be installed at Kahe Point adjacent to and in combination with the Hawaiian Electric Kahe Point generating facility. Dr. Harrison has served as the Environmental Coordinator of the University of Hawaii's legislatively-mandated [Act 132, 1970] University of Hawaii Environmental Center since 1987. As the Environmental Coordinator he has functional responsibilities in review of environmental documentation, review of legislation, coordinating research, providing educational services to both students and to the state and the county and members of the general public and various other academic duties. Dr. Harrison currently serves on the energy income tax credit, energy efficiency policy task force, which is addressing the current energy income tax credit law and is intended to provide a report to the upcoming legislature.

Life of the Land Expert Witness Dr. David Rezachek (PUC Docket 05-0145):

"Well, seawater air conditioning is a very simple process. Basically what you do is you bring up cold seawater from a depth of anywhere from 1600 to 3,000 feet, at which point the temperature is 39 to 45 degrees Fahrenheit. Now, the seawater is brought to a shore-based station where you have heat exchangers. Typically, we use corrosion resistant materials such as titanium, heat exchangers, plate-type heat exchangers that have a low temperature difference across them. Then that cold -- or, actually, the heat is transferred from the chilled water loop that circulates to the downtown buildings. And then that heat from that loop is transferred to the seawater, raising the temperature slightly."

"We initially started with downtown Honolulu because of the high density of the cooling load and the close proximity to the cold water source. We've also identified Waikiki as a very good area and perhaps better than downtown with respect to the utilization of the pipe. There are other areas such as the airport, Hickam, and Pearl Harbor that could be developed into a system. And as the other areas within Honolulu, say Kakaako and Ko'olina, develop further and have a greater density need -- or cooling need, they -- they would be available or potential candidates for air -- seawater air conditioning."

Dr. Rezachek is Associate Development Director of Honolulu Seawater Air Conditioning, LLC. Dr. Rezachek received his Ph.D. in Ocean Engineering from the University of Hawaii at Manoa in 1991 (Dissertation Title: "Development of a Solar Pond System Design Computer Model"); an M.S. in Mechanical Engineering from the University of Hawaii at Manoa in 1980 (Thesis Title: "Application of Heat Pumps to Residential Water Heating"); a B.S. in Environmental Technology and Urban Systems from Florida International University in 1976; U. S. Navy Nuclear Power School and Nuclear Power

Plant Prototype (Nuclear Engineering) 1973; Ensign. U. S. Navy Officer Candidate School 1972; and a B.S. in Chemistry (with distinction) from the University of Minnesota in 1972.

Dr. Rezachek won the national Best Energy Education Program (BEEP) award in 1989 for Ka'ahale La (Tour of the Sun) Interscholastic Photovoltaic-Powered Vehicle Competition; was the Project leader for first high school solar car to complete the 1990 World Solar Challenge (a 1,900-mile solar car race from Darwin to Adelaide, Australia) in the second year of the Ka'ahale La (Tour of the Sun) Interscholastic Photovoltaic-Powered Vehicle Competition; and is a registered professional mechanical engineer in the State of Hawaii for more than 21 years (No. 5485)

Dr. Rezachek is the owner and principle at Rezachek & Associates (1993-), an Alternative Energy Specialist at the Hawaii Department of Business, Economic Development and Tourism - Energy (1987-2003), an Assistant Mechanical Engineer in the Sugar Technology and Engineering Department, Hawaiian Sugar Planters' Association (HSPA) (1980-87). Dr. Rezachek has made extensive presentations on SWAC and written numerous articles and reports.

Wave Power

DBEDT's Feasibility of Developing Wave Power as a Renewable Energy Resource for Hawaii (1992):
"Waves Power (buoys) could generate all (100%) of the state's electrical needs. As with any project, there are site specific conditions which must be examined. ... Siting a wave energy system is not unlike buying real estate, there are three key issues, location, location, location."

E2I/EPRI Offshore Wave Energy Plant Site Assessment - State of Hawaii (2004): "Oahu. ... Very good energy resources along its northeast coast from Kahuku to Makapuu Points. ... Honolulu is the best port harbor and port infrastructure in the Islands to support device fabrication and assembly. ... A unique opportunity for a wave energy pilot facility exists off the northeast coast of Oahu, just west of the humpback whale marine sanctuary boundary. The unique opportunity is the existence of Makai Ocean Engineering's fully instrumented pier and offices."

Oceanlinx Wave Energy System

Life of the Land Expert Witness Dr. Tom Denniss (PUC Docket 05-0145):

"In principle it is very similar to a Blowhole. It is the air pressure which drives the Energetech turbine. This pressure is increased by utilising the wave height in a chamber to displace and compress the air, driving it past a narrow aperture, at which point the turbine is housed. The turbine work in both directions. This is a vital requirement for wave energy turbines. The device is 35 meters by 30 meters in plan. ...

My estimate for wave energy production in Hawaii (at this stage of the technology) is about 8-10 cents per kWh. Improvements in the technology over the next few years, with accompanying economies of scale of larger plants, would likely see costs at below 5 cents per kWh. Once funding is available, a project could be commissioned within 18 months. ... The only moving part is the turbine, and this is totally isolated from wildlife about 8 meters above the waterline. No marine or avian life can be harmed at all."

Dr. Tom Denniss is Executive Director of Energetech Australia Pty Ltd. Dr. Denniss has a B. Math, B. Sc (1st Class Honours), Dip. Ed., Ph.D (in Mathematics and Oceanography). He is a member of the Global

Roundtable on Climate Change (which meets twice per year – recently in Iceland, prior to that in NY); a member of the Communications Committee for the Global Roundtable on Climate Change, and an Expert Reviewer of the United Nation’s Intergovernmental Panel on Climate Change Fourth Assessment Report; and an expert reviewer of the United Nation’s Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report, due out early in 2007. The International Academy of Science recognized the Energetech Wave System as one of the 10 Outstanding Technologies of 2006.

Underwater Pipes

Life of the Land Expert Witness Reb Bellinger (PUC Docket 05-0145):

"We've been involved in just about every major cooling project of this nature done anywhere in the world in the last 20, 25 years. ... We were involved with the Cornell project. We did all the engineering and design for that pipeline. And there is a real paranoid community. I mean, they are fussy about everything. And so their environmental requirements and reviews were intense. And even today they were re -- initially required to maintain a regular monitoring system for potential impacts in -- in that lake. And their system has been operating about six or seven years. And those monitoring systems are still in place, and they have found no adverse impacts at all."

Mr. Reb Bellinger is Vice President of Makai Ocean Engineering. Mr. Bellinger is a former State Representative and current President of the Ka`a`awa Community Association. Mr. Bellinger has worked on installation of ocean pipes from New York to Toronto to Bora Bora over the past twenty years.

Hawaii Ocean Energy meetings (2007)

Life of the Land participated in the HECO conducted ocean energy meetings in the summer of 2007, HECO released the "Ocean Energy Development Guidelines" in July 2007. The preface of the Final Report was written by LOL's Assistant Executive Director.

Federal Energy Regulatory Commission (2008-09)

We are the only Hawaii entity to intervene in the Federal Energy Regulatory Commission (FERC) regulatory docket re the Grays Harbor Ocean Energy Company's proposed wave/wind farm in Penguin Bank located southwest of Moloka`i.

Conclusion

We need to aggressively move past the fossil fuel era. Please pass this bill.

Mahalo,

Henry Curtis