



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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May 29, 1990

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Noa Emmett Aluli, M.D.
Pele Defense Fund
Post Office Box 404
Volcano, Hawaii 96785

Dear Dr. Aluli:

Thank you for your April 9, 1990, letter to Governor Waihee and to me, relating to geothermal development. I am responding in sequence to your numbered and lettered questions.

1. The State's intent is to determine the feasibility of delivering geothermal electricity to Oahu, and possibly Maui. We will not support geothermal development for export from the Big Island at all costs.

2. The Department of Business and Economic Development (DBED) estimate of \$1.676 billion was based on 1986 dollars. Northwest Economic Associates' (NEA) March 1, 1990, report escalated that figure up to \$1.745 billion in 1990 dollars. If we were to use an annual inflation of 3 percent, the earlier DBED estimate would currently total almost \$2 billion (1990 dollars). We note that the low range of NEA's estimate is \$2.221 billion (1990 dollars). At this early stage of project scope definition, a 10 percent variation in the cost estimate between your consultant and the State's consultant is not considered a significant discrepancy.

a. Until the project scope is better defined and negotiations between a potential developer and the Hawaiian Electric Company (HECO) are near completion, we see no significant reason to dismiss the DBED estimate adjusted to 1990 dollars.

b. No irrevocable decisions have been made regarding geothermal energy development for export from the Big Island to Oahu and possibly Maui. We are encouraging exploration to determine if sufficient geothermal resource exists; these resource questions need to be answered regardless of whether geothermal is used for intra-island or inter-island electricity. We are engaged in planning such as the preparation of a Master Development Plan, overland transmission corridor analysis and an Environmental Impact Statement. We are participating with HECO in the process of firming costs by negotiating with developers to finance, develop and operate the project. Until exploration, planning and negotiations activities provide more definitive information, it would not be prudent to make any decisions regarding geothermal energy development for export.

3. This Administration is aware of the situation at the Geysers in California apparently caused by overproduction. In a recent comprehensive letter to the chairman of the advisory board on the geothermal/cable project, Governor George Deukmejian did not allude to the Geysers problem. He stated, "Overall California's experience with geothermal development has been quite positive." The State wants to prevent a situation like the Geysers from occurring in Hawaii, so we are committed to a substantial investment in resource research so that our geothermal resource can be managed effectively.

4. It is unlikely that a developer will enter into a long-term Power Purchase Agreement (PPA) with HECO before that developer is satisfied of reliable, long-term geothermal resources. One way to address resource concerns is to develop a PPA to require the delivery of electricity in increments leading to full scale delivery after the turn of the century.

a. The State has assumed that 500 megawatts of (net) geothermal energy can be sustained for at least 30 years for commercial development purposes. Experience elsewhere (e.g., Italy) has shown that the resource is available for much longer periods. However, the 30-year service life is currently an assumption that must be proven before major irreversible capital commitments are made by the private sector.

b. The U.S. Geological Survey has estimated almost 33,000 MW-Centuries (thermal resource) in the Kilauea Southwest and East Rifts. The 1978 report (Geological Survey Circular 790) indicates an identified accessible geothermal resource base of over 3,000 MW-Centuries in Hawaii with an additional undiscovered accessible geothermal resource base of over 15,000 MW-Centuries. The report states, in part, "Many uncertainties exist concerning the subsurface geology as it relates to the development of geothermal reservoirs on these (Kilauea and Mauna Loa) volcanoes, but undiscovered reservoirs are likely to exist."

In 1980, the Director of the Hawaii Institute of Geophysics estimated that the Kilauea East Rift Zone has a geothermal potential from 100 MW-Centuries to more than 3000 MW-Centuries. While these estimates do not provide commercial certainty, our development plans to prove out the resource will.

5. State planners have considered the impact of consumer costs for geothermal electricity on the State's economy. Economic considerations and energy security have been the primary impetus for the State's efforts to promote energy conservation and indigenous energy resources, including geothermal. Despite major efforts since the oil dislocations of the 1970s our economy is still 90 percent dependent on imported oil for its electricity. This extreme oil dependence will render us less able to control our own economy when the inevitable escalation of worldwide oil prices occurs.

a. The rate payers will indirectly pay for the capital cost of any electric generating capacity including geothermal energy development.

b. Until the scope of the geothermal/cable project is better defined, and the Public Utilities Commission has approved a Power Purchase Agreement between HECO and the geothermal/cable developer, we cannot predict the per capita cost to the rate payer.

c. It is conceivable that the State could suffer from a lower bond rating if we developed a poor record on default of special purpose revenue bonds (SPRB), whether they be issued for geothermal or any other project. SPRB authority is conferred by the Legislature, and this Administration will not endorse projects that are not meritorious or are overly risky to the State.

d. The State has invested the following sums to support geothermal. About \$2.1 million was expended on the demonstration HGP-A wellhead generator; \$4.8 million on geothermal resource evaluation including the HGP-A well; \$2.6 million on planning and impact assessment; \$400,000 on Noi'i o Puna (Puna Research Center); and \$400,000 on various small studies and demonstrations not fitting into the preceding categories. No direct support has been expended on current efforts being conducted by the private sector to drill wells, or proposed to HECO for the export project.

6. A PPA between an independent power producer and an electric utility provides the same degree of reliability for the purchased power (which is usually the same reliability standard for the utility itself). The PPA also addresses the penalties the independent power producer will pay for not meeting these standards, or for failing to deliver power. The financial risks for the geothermal project fall primarily on the developer.

We generally agree that a consumer of any product, including electricity, will attempt to stabilize his/her cost for that product. When the cost of that particular product rises, some consumers may use less of the product or switch to alternatives. A review of electricity costs and consumption per customer show a clear inverse relationship over the past 15 years. If electricity prices escalate, whether that escalation is due to increasing oil prices or other causes, some consumers are likely to shift to do-it-yourself alternatives such as direct solar, or reduce their consumption.

As noted earlier, a major impetus for geothermal and other alternative energies, as well as conservation, is to stabilize the future cost of electricity by regaining local control over its production in Hawaii. The State is much more concerned about our 90 percent dependence on oil for electricity generation than the effect of consumers shifting to lower cost alternatives because of the price of electricity. We believe price escalations are riskier with continued dependence on oil, rather than conversion to a locally available, dependable source of power.

7. The local refineries do not produce all of the low sulfur fuel oil (LSFO) required by the utilities, so over 168 million gallons of LSFO are imported annually, without local refining, for the generation of electricity. A reduction in the generation of petroleum-fired electricity will reduce the direct import of LSFO. Our refineries also have a couple of management alternatives to further reduce the net import of crude. First, they can import different grades so that the residual fraction that remains is less; and second, recently installed hydrocracking units can further refine the crude feed stock to produce less residual and a greater fraction of naptha, jet fuel, diesel, and gasoline to meet the changes in market demand dictated by a reduction in the need for residual.

8. The data on the economics of large scale geothermal development will be made available to the public when that information is definitized by HECO and the prospective developer.

a. HECO's present schedule calls for negotiation of a draft PPA in October, 1990, with the successful geothermal developer. The PPA must be filed with the Public Utilities Commission (PUC) which will open a docket and hold a hearing(s). Details of the contract will become public at that time because the PPA becomes a public document when it is filed with the PUC. Based on the present schedule, we foresee that the PPA will not be filed with the PUC until very late in 1990 or early 1991.

b. The economic information has not been shared with the public for several reasons:

1) HECO is negotiating with more than one developer so the confidentiality of the business proposals of each developer is being respected.

2) Each developer has requested that HECO consider all or portions of its proposal as proprietary.

3) The original economic data provided by the successful developer is likely to be changed during the course of negotiations.

4) The proposals and subsequent negotiations are primarily between private parties and, therefore, there is no requirement to disclose that information to the public. Because there may be policy matters and requirements of importance to the State before a PPA is entered into between HECO and the selected developer, the State has been and will continue to be a participant. With the concurrence of the Attorney General because of the requirements of the Uniform Information Practices Act, we have entered into a process with HECO, and through HECO with the developers, toward allowing the State to participate, yet protect the confidentiality of most matters between the private developers and HECO. However, should the State's direct involvement be necessitated, this information would have to be made public.

9. The current Energy Functional Plan presents a number of objectives, policies and actions, each action with its own timetable, and each leading to greater energy self-sufficiency. However, the actions and their timetables are not integrated, nor does the Energy Functional Plan provide a forecast of energy demand. Therefore, the Energy Functional Plan does not provide a timetable or other means for establishing how well at any given future date we have realized our energy self-sufficiency goals. Two efforts are underway that will lead toward an integrated plan. The Public Utilities Commission has mandated Integrated Resources Planning (IRP) for the State's energy utilities. The results of IRP will be integrated within a broader process, sponsored by the Department of Business and Economic Development, for the Hawaii Integrated Energy Policy Development (HEP) Program.

Both IRP and HEP have started. Both involve public input, and this Administration is fully supportive of both efforts.

The Hawaii Integrated Energy Assessment, prepared in 1981, was designed to aid decision-makers in Hawaii to plan the transition from 90 percent dependence upon oil to a mix of renewable, indigenous energy resources during the succeeding 25 years. That plan assumed three different future scenarios of world oil price escalations and levels of energy demand. Overall the plan predicted that in the year 2005, about 42 percent of Hawaii's total electricity capacity would be based on petroleum, 20 percent on geothermal, and 38 percent on other renewables such as wind, OTEC and direct solar. However, oil prices did not escalate in the 1980s as was assumed in the plan, so the commercialization of renewable energy resources lagged because of the lack of economic incentives. Today, renewable energy developers appear more willing to assume that future oil price escalation will make their projects economically competitive.

10. An agency of the State, the Public Utilities Commission, has directed that the energy utilities participate in a least cost energy plan known as Integrated Resources Planning (IRP). Another agency of the State, the Department of Commerce and Consumer Affairs through its Division of Consumer Advocacy, is a party representing the consumers to the IRP. The Department of Business and Economic Development has requested to be a party to the IRP. You can be assured that these three State agencies have the same energy objectives which are spelled out in the Hawaii State Plan: (1) The provision of dependable, efficient and economical Statewide systems capable of supporting the needs of the people; and (2) increased energy self-sufficiency.

11. Conservation is aggressively pursued by the State. The Energy Division of the Department of Business and Economic Development has the primary responsibility to promote and implement energy conservation programs in the State. Their efforts to date have largely focused on voluntary efforts. We are now fully behind the effort to implement demand-side management programs in Hawaii to elevate our energy efficiency programs to beyond the voluntary. Funding for Hawaii conservation programs for the period July 1, 1984 through December 31, 1989, has totalled almost \$19 million, a significant amount, much of which went to direct retrofits of institutional facilities which achieved direct savings.

12. We believe that an energy conservation program can be truly effective if it is administered by the same agency whose primary purpose is business and economic development. Energy conservation and renewable energies are not only compatible but an important strategy in improving business and economic development. The key to maximizing success is to effectively integrate both renewable energy development and improved energy efficiency.

We will continue to strive for the best mix to meet our two primary energy objectives: dependable, efficient and economical energy; and self-sufficiency. We will continue to devote our resources to those specific programs which offer the best chance of achieving these objectives. While we have sought increased funding for geothermal exploration and planning in the past few years, we have not done this at the expense of our conservation programs. We do not see these as either/or choices.

13. The State is participating in a program to provide an asset fund to compensate those directly impacted by geothermal development. It is our intent that the asset fund will be administered at the county level. For this reason, it would be inappropriate to commit to a statement that "the State (will) require compensation...."

Concerning your last three questions on the State's energy policy:

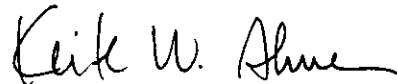
1. Geothermal energy will continue to compete with other indigenous energy resources for State funding. The State will continue to assist development of all resources that can significantly contribute to our two primary energy objectives.

2. We acknowledge that there are significant questions yet to be answered regarding the economic feasibility and social and environmental acceptability of large scale geothermal development. Our programs are designed to provide definitive answers to these questions, so we will not suspend funding and permitting for planning, impact assessment and exploration related to the geothermal program.

3. The ongoing Integrated Resources Planning by the Public Utilities Commission and the Hawaii Integrated Energy Policy Development Program sponsored by the Department of Business and Economic Development are designed to address concerns about various energy technologies, including cost/benefit comparisons. Any decision to consider additional studies should await the outcome of these processes.

The Governor has designated Mr. Keith Ahue, Deputy Director of the Department of Land and Natural Resources, to be the liaison between his Administration and the Pele Defense Fund. Mr. Libert Landgraf will be available to assist during the transition period. Your request to have Ms. Norma Wong serve as liaison cannot be accommodated due to the extremely heavy workload already being placed on her.

Sincerely,



 SUSUMU ONO
Geothermal Energy Coordinator

bcc: Hon. Roger A. Ulveling
Hon. William W. Paty
Mr. Libert Landgraf
Ms. Norma Wong
✓ Mr. Keith Ahue



THE PELE DEFENSE FUND
POST OFFICE BOX 404 • VOLCANO, HAWAII 96785

April 9, 1990

Governor John Waihee
Hawai'i State Capitol
Honolulu, Hawai'i 96813

VIA

Mr. Susumu Ono
Geothermal Energy Coordinator
Office of the Governor
Hawai'i State Capitol
Honolulu, Hawai'i 96813

Dear Mr. Ono:

I am writing in follow-up to the meeting of March 8, 1990 in which the Pele Defense Fund and Northwest Economic Associates presented findings from "An Economic Analysis of the Kilauea Geothermal Development and Inter-Island Cable Project" to members of the Governor's cabinet. At the end of the meeting you agreed to respond, by May 15, 1990, to questions about the state's support for largescale geothermal energy which arose out of the findings of the report. Most of these questions were raised in our meeting, however, we have included additional questions as a result of our discussions with the cabinet members. We suggested that Greg Pai from the Office of State Planning assist in analyzing the report and providing a response to our questions.

Specifically, we would like a response to the following questions:

- (1) Does the governor's office acknowledge that geothermal electricity delivered on Maui and O'ahu from the Big Island will cost more than electric energy generated locally from fossil fuels?
 - (a) What will be the difference in cost per kilowatt hour on those islands?
 - (b) What is the assumed cost per barrel of oil that this difference is estimated upon?
- (2) Specifically, what accounts for the discrepancy between the \$1.7 billion estimate out of the Department of Business and Economic Development for geothermal development and our \$3.4 to \$4.3 billion estimate?
 - (a) Do you disagree with the reasons for the difference? Why?
 - (b) Are decisions regarding geothermal energy development still based on the \$1.7 billion estimate?
- (3) Is the governor's office aware of the situation at The Geysers in California where the geothermal resource has gone into unexpected decline causing a reduction in output, an idling of power plants which must still be paid off, the cancelling of new plants, lawsuits between investors over who should bear the loss of income, and the potential loss of several billion dollars in investments?

(4) Since the California experience at The Geysers indicates that geothermal resources can be depleted if they are initially overestimated and subsequently overused, and, since no reliable or verifiable estimate of the usable geothermal potential exists for Kilauea, how, exactly, is a 500 MW geothermal project seen to be a reliable, long term renewable source of energy?

(a) How long does the state assume base line power (500 mw) will be available once geothermal is on line?

(b) On what scientific basis and on whose opinion do you rely for these estimates?

(5) Have state planners analyzed or considered the impact of higher consumer costs for geothermal electricity on the state's economy? If not, why not? Shouldn't an attempt be made to quantify the impact that higher consumer rates will have on the state's economic growth?

(a) As the state has already provided a mechanism by which the utility and the developer are guaranteed rate hikes to consumers to cover geothermal project cost increases, won't either the rate payers or the taxpayers ultimately have to pay for the capital cost of geothermal energy development?

(b) What will be the per capita cost of either the rate payer or the taxpayer?

(c) If geothermal fails after special purpose revenue bonds have been issued, can the state suffer from a lower bond rating or credit standing even without being directly liable for a default on those bonds?

(d) How much has the state already spent to support geothermal development?

(6) In the Pacific Northwest a large power project which began in the 1970's overestimated future demand and underestimated the impact of conservation and market forces. When these factors came into play the large power project went into default costing the state, its rate payers, and investors billions of dollars. Is the governor's office in agreement with the assumption that if the geothermal project causes rates to consumers to increase greatly there will be a strong incentive for major consumers to reduce their consumption or even leave the system and find and use lower cost alternatives available to them, such as conservation or solar? Will the remaining rate payers then suffer even higher rates in order to pay off the project costs?

(7) Since crude oil is brought into the state primarily to be refined into transportation fuel with the residual oil (the waste oil remaining after refining) being used to generate most of the electricity currently produced in the state, and since the addition of 500 MW of generating capacity will only promote development and increased use of transportation fuels, will the state specifically explain how geothermal development will reduce crude oil imports into the state?

(8) Will the state and Hawai'i Electric Industries share their data on the economics of largescale geothermal development with us and the public?

(a) At what stage of the project and by what date?

(b) Why has this information not been shared with the public?

(9) What are the specific objectives and timetables for the state's energy self-sufficiency policy?

(a) Are these objectives and timetables specifically part of the current State Energy Plan?

(b) Have any conditions changed, such as the cost of oil, which calls any part of plans to develop geothermal energy into question?

(10) What specific commitments will the state make to working with the public utility to implement a least cost energy plan ?

(11) Since conservation is recognized by the federal government, many state and local governments, and utilities as the keystone of sound energy planning and policy, why is conservation not pursued as aggressively and at the same funding levels as the 500 MW geothermal project?

(12) Can an energy conservation program be truly effective if it is administered by the same agency whose primary purpose is the promotion of business and economic development programs? Can an energy conservation program and a 500 MW geothermal project be compatible? If so, how will that compatibility be achieved? Which one will take priority?

(13) Will the state require compensation be paid to individuals whose quality of life or property values are diminished by geothermal development, or will it abandon them as necessary sacrifices to "progress?"

For the record, we also asked the following questions relating to the state's energy policy. You indicated that we would have to pursue discussions at another level to get answers to these questions:

(1) Why shouldn't geothermal energy be required to compete without subsidies with all other sources of electric energy?

(2) Is the state willing to suspend its funding and permitting of geothermal activities until a thorough re-examination of the economic feasibility and social and environmental impact of largescale geothermal energy is completed?

(3) Is the state willing to conduct a detailed cost/benefit comparison, including social and environmental costs of all energy options, including the LUZ system; decentralized solar thermal promoted by tax credits and legislation; energy conservation promoted by state financial assistance and mandatory requirements such as solar water heating, heat pumps, and energy-efficient light bulbs; and centralized solar and wind generation?

In pursuing a re-examination of the state's policy regarding geothermal energy by the governor, we would like to have Norma Wong replace Libert Landgraff as our liaison. Thank you for your assistance in arranging for the meeting with the cabinet and for providing us with a response to our economic analysis of largescale geothermal development by May 15, 1990.

Sincerely,

Noa Emmett Aluli, M.D.

Noa Emmett Aluli, M.D.
Pele Defense Fund

cc. Representative Mark Andrews
Senator Richard Matsuura
Senator Daniel Inouye
P.U.C. Chairman Yukio Naito
Consumer Advocate, Richard Totto
U.S. Secretary of Energy James Watkins



THE PELE DEFENSE FUND
POST OFFICE BOX 404 • VOLCANO, HAWAII 96785

STATEMENT FOR IMMEDIATE RELEASE -
March 6, 1990

For Additional Information:
Pele Defense Fund, Hilo, Hawaii (808)
935-1663

The Pele Defense fund continues to oppose the development of geothermal energy on religious and cultural grounds. We do not expect the broader public to share our unique point of view. However, our research into geothermal energy, has led us to the conclusion that geothermal energy not only violates Hawaiian spiritual beliefs, customs and practices, it is, in fact, economically and technically, infeasible as a major source of electricity for the state of Hawaii.]

We ask the proponents of geothermal energy in the state and with the public utility, to re-examine the logic of developing geothermal energy for Hawaii in open dialogue with the public on Hawaii's energy policy.

As we understand the state's policy, there are four possible objectives for pursuing geothermal energy:

- (1) To produce energy at a cheaper cost.
- (2) To reduce the vulnerability of the state to disruption in oil supply.
- (3) To attain self-sufficiency in energy generation.
- (4) To reduce the greenhouse effect.

The statistics, data and findings that will be presented today show that geothermal energy cannot be produced at a cheaper cost than oil or certain other renewable sources. The development of geothermal energy at

a cost of \$4.6 billion will place a great financial burden on the general public.

With regard to the issue of the greenhouse effect, the amount of energy used by Hawaii contributes very little to that problem, given that we are surrounded by the ocean. In addition, this is not the major reason for the state to pursue geothermal energy.

Pursuing self-sufficiency in electric generation in order to reduce the vulnerability of the state to a disruption in oil supply are the primary remaining objectives.

While self-sufficiency in energy generation is an ideal and perhaps even admirable goal for the general public, we have to say that this is not realistic, viable or feasible.

The state is not pursuing the goal of self-sufficiency in other essential areas such as food, transportation fuel, technology or capital. This is because it is an unfeasible goal in a modern industrial economy. Rather than a goal of self-sufficiency in energy generation, the state should seek to maintain an uninterrupted supply of energy at the least cost for our islands.

Finally, geothermal energy is not a self-sufficient form of energy. Even if the steam is indigenous, it can only be transformed into electricity with imported technology, capital and expertise. By committing massive resources into the development of geothermal energy at this time, the government is making irretrievable commitments of irreplaceable resources. The government is limiting its flexibility to develop other cheaper, more efficient, indigenous sources of truly renewable energy.

We pose the following questions to those who are setting the energy policy for Hawaii:

- (1) Do the energy policymakers acknowledge that geothermal electricity delivered on Maui and O'ahu from the Big Island will cost more than electric energy generated from fossil fuels?
- (2) How does the government respond to the discrepancies in their \$1.7 billion estimate for geothermal development and our \$4.6 billion estimate?
- (3) How exactly is geothermal seen to be a renewable source of energy?
- (4) Have state planners analyzed or considered the impact of higher consumer costs for geothermal electricity on the state's economy? If not, why not?
- (5) Is the state willing to re-examine and reconsider its commitment to geothermal development of energy?
- (6) Why doesn't geothermal energy compete with other sources of energy without subsidies?
- (7) Will the state and Hawai'i Electric Industries share their data in open dialogue with the public on energy policy?
- (8) What are the specific objectives and timetables for the state's energy self-sufficiency policy?
- (9) What commitment is the state making to working with the public utility to implement the least cost energy plan that is being considered for funding in this legislative session?
- (10) Is the state willing to suspend its funding and permitting of geothermal activities until a thorough re-examination of the economic feasibility and social and environmental impact of largescale geothermal energy is completed?

NEA - PRESS RELEASE

February 22, 1990

A study by NEA completed in April 1987 showed that a large scale (500 MW) geothermal development on the big island of Hawaii and the inter-island power transmission cable is economically infeasible. This updated report, utilizing additional information available since 1987, reaches to the same conclusion:

- The state estimate of \$1.7 billion for the geothermal construction and capital cost is low and extremely optimistic. More realistic capital costs are shown to be in the range of \$3.4 to \$4.3 billion and could go as high as \$4.6 billion.
- Compared to alternative sources of power generation, geothermal can be 1.6 to 2.2 times as costly as oil, and 1.2 to 1.7 times as costly as a solar/oil generating system.
- Yearly operation and maintenance costs for the large scale geothermal project are estimated to be 44.7 million, 72% greater than a solar/oil generating system.
- Over a 40-year period rate payers could pay, on average between 1.9 and 2.7 cents per kWh per year more for electricity than they are currently paying (even with oil prices stabilizing at \$45 per barrel in 2010).
- A comparable solar/oil thermal energy development project is feasible, could be island specific, and would cost 16% to 40% less than the proposed geothermal development.
- Conservation is still the cheapest alternative of all, can significantly reduce demand, and provides the greatest return to rate payers.

There are options other than geothermal. Before the State commits the people of Hawaii to future indebtedness and unnecessary electricity rate increases,

more study should be conducted on the economic feasibility and timing of the project, the potential risks and hazards of volcanic disturbances, the degree of environmental damage that could occur, the future demand for electricity, and the potential of supplying electricity from alternative energy sources, conservation and small scale power units. As we stated in the April 1987 study, to move ahead with rapid large scale geothermal development on Hawaii without thoroughly studying these aspects of its development is ill-advised and economically unsound.