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ISSUES RELATED TO  
GEOHERMAL DEVELOPMENT

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ABSTRACT

A number of potential barriers to geothermal development in Hawaii have been overcome but some remain. Efforts continue to address issues relating to transmission, project economics, the regulatory process, resource verification, and public acceptance.

A third developer started over 8 years ago to get approvals to explore at the upper end of the Kilauea East Rift Zone. After a prolonged permitting effort, this developer commenced drilling in the middle part of the rift zone in mid-November 1989. Private exploration data is considered proprietary for one year. So after four months of drilling at the one site it is uncertain whether or not this developer has reached a viable resource.

Exploration in the United States is usually considered a private sector responsibility. Nonetheless, in 1988 the Hawaii Legislature appropriated funds for a Scientific Observation Hole program. Additional state and federal funds are being sought to further stimulate private sector exploration.

Despite major recent government and private interest in exploration, verification of the resource is, and will probably continue to be for several years, a major issue in the large-scale geothermal development in Hawaii.

BACKGROUND

Geothermal provides Hawaii's best opportunity to significantly reduce its overdependence on imported oil for baseload electricity. For over 14 years the State government has aggressively worked with other levels of government, developers, utilities and the general public to identify and overcome barriers to geothermal developments.

GEOHERMAL RESOURCE VERIFICATION

Primarily with federal funding, the University of Hawaii brought in Hawaii's first producing well in the lower end of the Kilauea East Rift Zone in 1976. That success led to the drilling between 1980 and 1985, of seven exploration wells plus a sidetrack by two different developers in the general vicinity of the government well. The results of this exploration was mixed. Private wells north of the government well did produce a good resource. Although high temperatures were reached in private exploratory wells south of the government well, none were producers.

TRANSMISSION SYSTEM

Aerial and surface scientific investigations indicate that the youngest island in the Hawaii archipelago, the Island of Hawaii, contains sufficient thermal energy to make a significant contribution to the State's energy future. Oahu, with 80 percent of the State's population and electrical demand, represents the major energy market. While Maui, Hawaii and Kauai are 50 to 70 percent dependent on imported petroleum for their electricity, Oahu is almost totally dependent on oil. Critical to Hawaii's energy future is the transmission of geothermal energy over 240 kilometers of mostly ocean. Further, an ocean depth of 2,100 meters cannot be avoided in Alenuihaha Channel between the Islands of Hawaii and Oahu. The federal and state-funded Hawaii Deep Water Cable Program, 1981 to 1990, has successfully demonstrated that it is technically feasible to transmit 500

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megawatts of high voltage electricity between Hawaii and Oahu. Yet, lending institutions will categorize this first of a kind, inter-island transmission system, especially the submarine portion, as one with considerable risk.

In addition to the technical/financial risk associated with the transmission system, the corridors for the overland portion of the system will need to be selected with particular sensitivity to the environment and to the concerns of residents. Some preliminary overland corridor criteria were developed in the late 1980's under the Hawaii Deep Water Cable Program. However, ongoing overland transmission analysis, being performed with the project Master Development Plan and prior to preparation of the Environmental Impact Statement, will better ensure social and environmental acceptance.

## ECONOMICS

A matter of concern is the economic viability of the proposed 500 megawatt geothermal/inter-island transmission system. Even with today's depressed oil prices, geothermal development for use on the Big Island is economically competitive. However, the added cost of the inter-island transmission systems renders the 500 megawatt project marginally economic. In fact, the project probably could not deliver electricity to the Oahu grid at HECO's present cost. The economics of the project become viable only if the price of oil is escalated at a modest percent annually above inflation.

## REGULATORY REGIME

The regulatory process is a matter of concern for two reasons. There are a host of applicable laws, regulations and permits administered by three levels of governments and a project of the nature of the complex, three county, geothermal inter-island transmission project has never been permitted in Hawaii. Other papers today will discuss efforts to develop a permitting regime that will facilitate the permitting process yet ensure a project that is environmentally and socially acceptable. The Geothermal Resource Subzone (GRS) Assessment and Designation Law (Act 296, SLH 1983) stated that the exploration and development of Hawaii's geothermal resources is of statewide benefit and this interest must be balanced with preserving Hawaii's unique social and natural environment. The Board of Land and Natural Resources after evaluating a number of factors, including social and environmental impacts, designated 3 Geothermal Resource Subzones totalling 22,000 acres in the middle and lower Kilauea Rift Zone and a 4,000 acres GRS in the Haleakala Southwest Rift Zone on

Maui. Geothermal development activity including exploration is permitted only within a pre-designated GRS. The 1983 act required the counties to preparing administrative rules such as Hawaii County Planning Commission's Rule 12, for permitting geothermal development on lands whose use is managed by the counties. Act 301, SLH 1988 established a consolidated geothermal/cable development permit application and review process. The Board of Land and Natural Resources as lead agency, has developed a permitting regime with the mandatory participation of state and county agencies and the voluntary participation of federal agencies. An environmental assessment for the inter-island transmission system and a comprehensive environmental review of a generic 500 megawatt geothermal development have been completed. The ongoing Master Development Plan, overland transmission analysis and geothermal/cable Environmental Impact Statement will all contribute to facilitating the project permitting process. But an application for the 500 megawatt project has not yet been submitted so the permitting regime has yet to be fully tested.

## PUBLIC ACCEPTANCE

While the direction of this paper is to address the issue to geothermal development in Hawaii as seen by the developer, this section on permitting is an appropriate place to outline geothermal development issues as seen by those who are either against, or have major concerns regarding the project. Public acceptance is an issue facing development. The issues expressed include:

- o Interference with worship of the Goddess Pele.
- o Interference with certain Native Hawaiian practices.
- o Rainforest destruction.
- o Geologic hazards: seismic, lava inundation, subsidence
- o Disruption, including possible health and safety impacts, of the way of life for nearby residents: hydrogen sulfide and other air quality issues, water quality, noise, destroyed vistas, lights at night, traffic and increased strain on an inadequate infrastructure, transmission line health risks and visual impact, and decreased land values.
- o Impact on native fauna and flora.

The above issues have been and will continue to be addressed by the government and the developers. However, well organized groups such as the Pele Defense Fund, Rainforest Action Network and various community organizations will continue to express concern in various ways about the ability of the government and developers to provide a socially and environmentally sound project.

#### CONCLUSION

The State of Hawaii remains ready to work with all the parties involved to resolve the considerable issues facing the geothermal/inter-island transmission system project.