THE DESIGNATION OF GEOTHERMAL SUBZONES IN HAWAII

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ABSTRACT

The issue of maintaining a balance between economic development and preservation of the environment is a major concern in Hawaii, which in 1961 became the first state in the nation to adopt sweeping statewide land use controls. Hawaii suffers from a very high dependence upon imported petroleum as its primary energy source, and has declared a policy of accelerating the transition to alternate energy sources. Geothermal energy is believed to exist in abundant quantity, especially on the Island of Hawaii. In order to ensure that geothermal development occurs in the most appropriate areas, the State in 1983 adopted legislation to establish geothermal resource subzones where geothermal activities may take place. Six subzones have subsequently been established.

BACKGROUND

The State of Hawaii consists of approximately 4.1 million acres of land on 132 islands, with most of the land and population contained on only six. The Island of Oahu is the most densely populated with 78 percent of the State's one million population.[1] The largest island, Hawaii, is approximately 200 miles southeast of Oahu and is the only island which is presently volcanically active.

Public concern over the proper management of Hawaii's limited land area, including the need to preserve its unique and pristine environment, has for many years been an important issue for the people of this State. Hawaii became the first in the nation to adopt sweeping statewide land use legislation and has now in place one of the most complex and conservative land use regimes in the world.[2]

In 1961, the State Legislature passed Act 187-61 which provided for the classification of all lands within the State into four use categories, namely urban, rural, agricultural, and conservation. A nine member Land Use Commission ("LUC") was authorized and empowered to classify land into one of the four categories.[3] Ultimately, Land Use Districts were drawn by the LUC and the area of land devoted to each use is as follows: urban - 156,400 acres; rural - 9,200 acres; agricultural - 1,971,300 acres; and conservation - 1,975,500 acres.[1] Specific regulation of the uses and activities within urban, rural and agricultural districts were left to the counties to administer and enforce, with regulatory responsibility for the conservation district assigned to the Board of Land and Natural Resources (BLNR), an appointed body attached for administrative purposes to the State Department of Land and Natural Resources (DLNR), an executive agency.

GEOTHERMAL ENERGY

Hawaii is presently dependent on imported petroleum for more than 90 percent of its energy supplies, making the State highly vulnerable to adverse economic and social consequences which may result from any shortage in supply or escalation in the price of oil.[4] Early reductions in the use of oil and a shift to indigenous renewable sources have been made a matter of State priority.[5]

Geothermal energy has been found to exist in potentially large quantities in Hawaii, primarily on the Island of Hawaii, and is now considered the State's best near-term prospect for producing baseload quality electricity in large quantity from an indigenous source.

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The development of geothermal energy in the State dates back to exploration efforts begun as early as 1961 with the drilling of the first exploratory wells. The Hawaii Geothermal Project, begun in 1972 under the direction of the University of Hawaii, led to the drilling of the first successful well in 1976, and to the construction of the 3 megawatt HGP-A operating plant in 1981.[6] Funding for these efforts was provided primarily by grants from the National Science Foundation and the U.S. Department of Energy, with the State also making a sizeable contribution. After over 3 years of successful operations, the HGP-A plant has demonstrated the technical and economic feasibility of geothermal energy in Hawaii. Largely as a result, there are now three private firms or consortia actively involved or interested in developing the State's geothermal resources. Puna Geothermal Venture, consisting of Thermal Power Company, Dillingham Corporation, and Amfac Energy, has initiated exploration in the Lower Kilauea East Rift Zone on the Island of Hawaii. Barnwell Industries, through its subsidiaries, Barnwell Geothermal Corporation and Geothermal Exploration and Development Company, has also initiated exploration in the Lower Kilauea East Rift Zone. True/Mid-Pacific Geothermal Venture has indicated its intent to explore in the Upper Kilauea East Rift Zone as well as in the Haleakala Southwest Rift Zone on the Island of Maui.

The prospect of large-scale geothermal development has raised public concerns over its possible environmental effects, including the use of land. Geothermal development does not fit neatly into any of the existing land use categories since the resource cuts across district boundaries and must be developed where it occurs. Any developer interested in working in a conservation zone would be faced with an especially difficult and time-consuming task of establishing a right to develop geothermal resources located on such lands in the face of strong views held by some that conservation lands were intended to be preserved at all cost and that geothermal development would be inconsistent with that objective.

It is against this background of the urgency to develop an indigenous energy resource, while at the same time preserving the quality of the environment, that Hawaii's State Legislature in 1983 enacted the Geothermal Resource Subzone Assessment and Designation Law (Act 296-83), determining that the development and exploration of Hawaii's geothermal resources is of statewide concern, and that this interest must be balanced with interests in preserving Hawaii's unique social and natural environment.[7]

THE LEGISLATION

Act 296-83 mandated the creation of "geothermal resource subzones" within which geothermal development could take place, regardless of the existing land use classification. The intent of the Act was not to overhaul or displace the existing land use system, but to add to it the requirement of a subzone procedure applicable to geothermal activities. Another tier was added to the existing regulatory process, while keeping intact the site-specific land use review process which existed before passage of the Act. The counties would continue to maintain jurisdiction and authority to approve site-specific activities on agricultural, rural and urban lands, while the BLNR would continue to exercise these responsibilities on conservation lands.

Act 296-83 requires the BLNR to establish geothermal resource subzones on the basis of an assessment which would examine a number of factors, including but not limited to the following:

a. Potential for production of geothermal energy.

b. Use of geothermal energy in the area.

c. Geologic hazards.

d. Social and environmental impacts.

e. Compatibility with present and permitted land uses.

f. Potential economic benefits.

g. Compatibility with conservation policies where a subzone falls within a conservation district.

Other applicable existing statutes were to be considered and public hearings were to be held in close proximity to each proposed subzone area. Lands covered by existing geothermal mining leases were declared subzones under a "grandfathering" provision contained in an Act passed by the State Legislature in 1984 (Act 151-84).

In accordance with established procedures, a report "Proposed Rules for the Designation and Regulation of Geothermal Resource Subzones" was issued and public hearings on the rules held in all the counties by the BLNR. The rules, formally adopted in July 1984, set forth the criteria for designating the subzones, and provided for the modification and withdrawal of the subzones once established.[8]

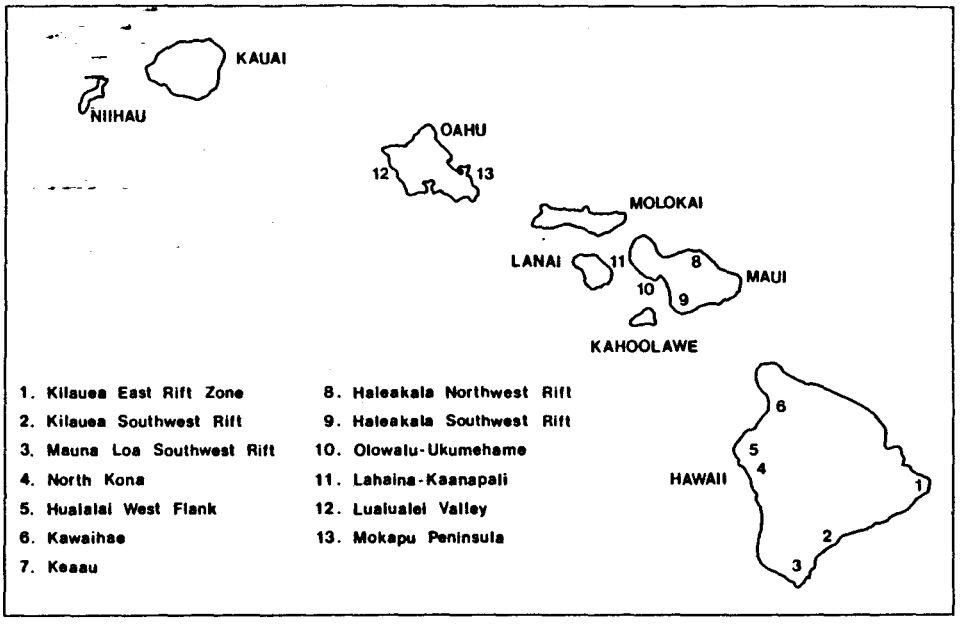

Figure 1. Potential Sources of Geothermal Energy in Hawaii

STATEWIDE ASSESSMENT

With timely financial assistance provided by the U.S. Department of Energy and the Department of Planning and Economic Development, the task of conducting the necessary assessment was undertaken by the DLNR.[9] It enlisted the assistance of local physical and social scientists to review available information and advise the BLNR concerning the merits of each potential subzone.[10] An assessment of the geothermal potential in each county was conducted by the Geothermal Resource Technical Committee, which reviewed several regional surveys conducted in Hawaii during the past 20 years.[11]

In all, 20 geographical areas showed some previously documented indication of a geothermal resource: one on Kauai, two on Oahu, two on Molokai, one on Lanai, six on Maui, and eight on Hawaii. The assessment process resulted in the identification of seven areas with a probability of at least 25 percent of having a high temperature (greater than 125°C at a depth of less than 3-kilometers) resource. Haleakala Southwest Rift Zone (25%) and Haleakala East Rift Zone (25%), both on Maui; and Hualalai (35%), Mauna Loa Southwest Rift Zone (35%), Mauna Loa Southeast Rift Zone (35%), Kilauea Southwest Rift Zone (greater than 90%) and Kilauea East Rift Zone (greater than 90%), all on the Island of Hawaii. Five additional areas that had a probability of at least 15 percent of containing a low temperature resource were also considered: Waianae on Oahu; Olowalu-Ukumehame on Maui; and Kawaihae, Mauna Kea Northwest Rift Zone and Mauna Kea East Rift Zone, all on the Island of Hawaii.

Seven geographical areas with at least a 25 percent probability of containing a high temperature geothermal resource were selected for further assessment using the criteria provided.[12-16] The assessment resulted in the identification by the BLNR of the following four areas as proposed geothermal subzones:[17]

a. Two subzones in the Kilauea Lower East Rift Zone on the Island of Hawaii, consisting of one parcel of 5,939 acres in the Kapoho Section and another parcel of 5,519 acres in the Kamaili Section. These areas are located in agricultural and conservation land use districts.

b. One subzone in the Kilauea Upper East Rift Zone on the Island of Hawaii, consisting of 5,300 acres in a conservation land use district.

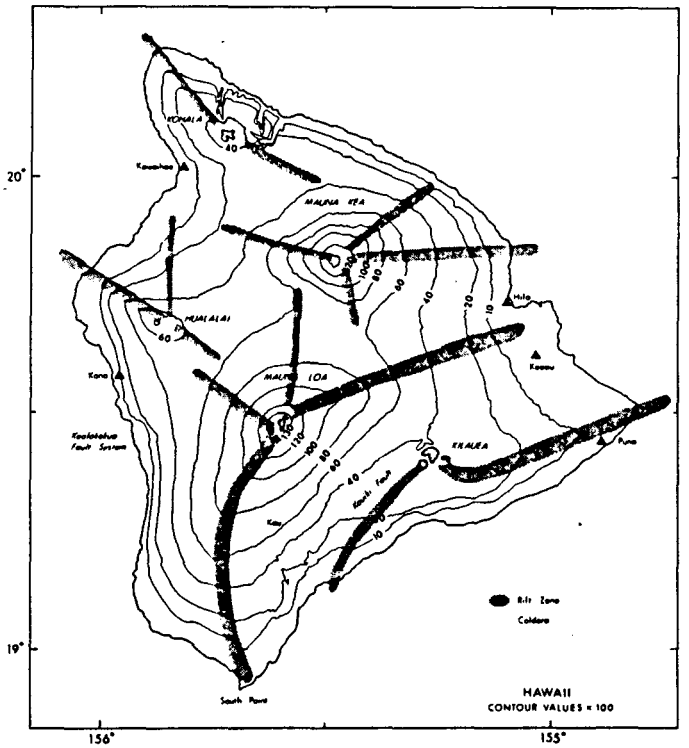

Figure 2. Rift Systems on Hawaii

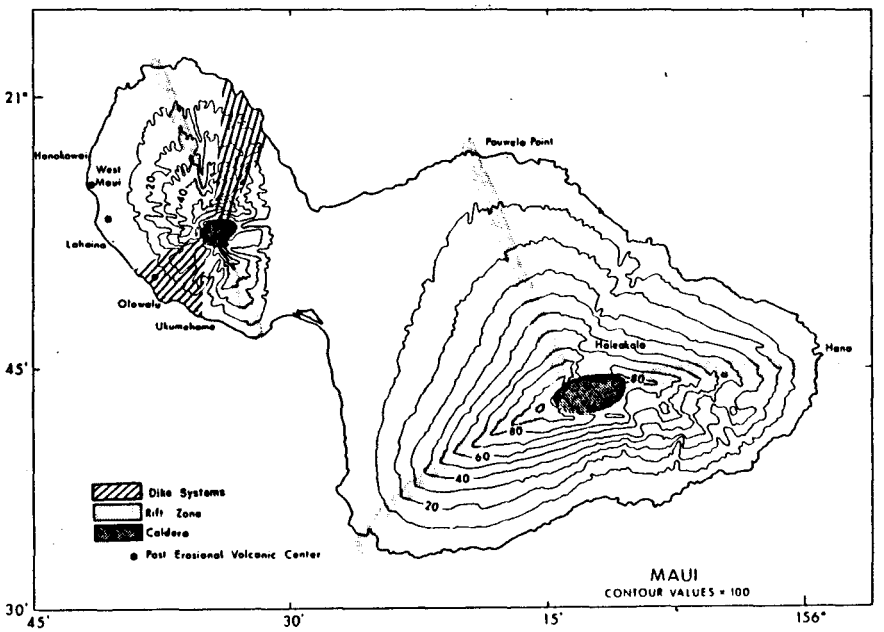

Figure 3. Rift Systems on Maui

c. One subzone in the Haleakala Southwest Rift Zone on the Island of Maui, consisting of 4,154 acres in a conservation land use district.

DESIGNATION OF GEOTHERMAL SUBZONES

After conducting public hearings on the proposal, BLNR issued its decision on November 16, 1984, which designated the above-described areas in the Kapoho and Kamili Sections in the Kilauea Lower East Rift Zone, and a modified area in the Haleakala Southwest Rift Zone as geothermal subzones. They were in addition to two parcels totalling 1,585 acres in the Kapoho Section of the Kilauea Lower East Rift Zone which were designated as subzones under the grandfather provision of Act 151.

Final decision on the designation of a subzone in the Kilauea Upper East Rift Zone was withheld pending the conduct by the BLNR of a contested case hearing as requested by an opposition group. Following the hearings, the BLNR modified its initial proposal by designating an 800 acre parcel of land as a subzone, with the condition that no new activity would be permitted within this subzone until a further determination was made that geologically hazardous and eruptive activity in the area had ceased. In addition, the BLNR requested the land owner to consider a land exchange of the contested lands in the zone with State-owned land in the Kilauea Middle East Rift Zone. If a resource assessment indicated a lack of geothermal resources in the new area, or if a land exchange was not consummated, the remainder of the 5,300 acre parcel initially proposed in the Upper East Rift Zone would then be designated as a subzone. If the land exchange was agreed upon, the entire 5,300 acres in the Upper East Rift Zone would be withdrawn from further consideration as a subzone.

CONCLUSION

The designation of geothermal resource subzones marks an important milestone in the history of land use policy and regulation in the State of Hawaii. The designation requirement establishes clear State policy with respect to geothermal energy by allowing for its development in support of the State's goal of achieving energy self-sufficiency, and in areas which are compatible with the social, economic and environmental concerns of the State. Although another tier has been added to the existing regulatory system, the ultimate effect of the subzone designation will be the encouragement of geothermal energy development in an orderly and acceptable manner.

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