NATIONAL GEOTHERMAL POLICY AND REGULATION IN THE UNITED STATES

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ABSTRACT

The United States has a strong tradition of private development of both publicly- and privately-owned resources. Geothermal energy development followed many years of oil and gas development, and the policies and regulations are very similar. The U.S. judicial system has decided that geothermal energy used for electrical generation is part of the mineral estate, and ownership of the resource is part of the mineral rights for each parcel of land.

On publicly-owned lands of the federal or state governments, the geothermal resource is available for lease for a specified time period. During the term of a lease, the developer has exclusive rights to produce geothermal energy and sell hot water, steam, or electricity. Leases may be awarded to the company offering the highest initial bonus payment, or they may be obtained for only a filing fee. Royalties to be paid to the government are established prior to leasing.

On privately-owned lands, geothermal developers usually obtain a lease for their operations. Only on rare occasion is the land owned by the geothermal developer. Various royalty rates are negotiated for each lease, and different royalty rates can be collected by several land owners in a single geothermal field. If the surface rights have been separated from the mineral rights for a parcel of land, it is common for the developer to pay a surface occupancy fee to the owner of the surface rights.

Developers of geothermal energy are required to follow strict regulations in drilling and abandonment of wells, plant construction, and control of emissions. Many federal, state, and county government agencies control different aspects of geothermal development through requirements for permits and licenses. All geothermal developers are required to prepare a public statement of anticipated environmental impacts, and a single government agency is assigned the leadership in review of this statement. A development may be prohibited or stopped if the environmental impact is judged to be excessive.

Federal and state governments offer several incentives to promote geothermal development in the U.S. A complex set of tax laws and tax incentives control the profitability of geothermal development in different parts of the country. The 1992 National Energy Policy Act authorizes many new incentives. Federal funding for geothermal research is intended to lessen the financial risk of geothermal development.

1. INTRODUCTION

In the nineteenth century, the United States government had a strong policy to encourage people to emigrate to the western half of the country and to develop an agricultural economy in the area. To promote this movement, the U.S. Congress enacted a number of Homestead Laws which allowed individuals to obtain land by building a house and by living and farming in that location. Along with the ownership of the land went the rights to the surface water, but Congress retained to the federal government the rights to the minerals. At the same time, Congress wanted to encourage the development of the minerals in the Western United States, and laws were instituted to allow development of minerals on federal land by establishing a claim and expending a minimum amount of money on claim improvements each year.

The minerals on federal land were later separated by law into two groups that would be developed in different ways:

1. The locatable minerals that could be obtained by claim, such as gold, silver, and copper; and
2. The leasable minerals that required payment of a lease fee and royalties on production, such as petroleum, natural gas, helium, and salt.

The separation of the mineral rights from the surface rights for a parcel of land also became common for state and private land. This history of laws and the separation of ownership rights has led to much confusion and controversy concerning the ownership and regulation of geothermal resources.

2. LEGAL DEFINITION AND DETERMINATION OF OWNERSHIP

2.1 Resource Definition

Geothermal resources are similar to water, gas, and minerals; they pertain to both the surface and subsurface estates; and ownership may be assigned to the holder of the surface estate or to the holder of water or mineral rights. The way in which geothermal resources are defined affects other resource and development definitions as well as all aspects of regulation relating to exploration.

In defining geothermal resources, legislative bodies faced the tasks of: 1) describing the physical properties that distinguish geothermal resources from other natural resources, and 2) comparing geothermal resources to groundwater, subsurface minerals, and other established resources. The relative success of legislation in accomplishing these tasks has a profound influence upon the resolution of conflicts of ownership, upon the development of leasing procedures, and upon regulation of exploration and development. The federal Geothermal Steam Act of 1970 defined geothermal resources as follows:

> 'Geothermal steam and associated geothermal resources' means (i) all products of geothermal processes, embracing indigenous steam, hot water, and hot brines; (ii) steam and other gases, hot water, and hot brines resulting from water, gas, or other fluids artificially introduced into geothermal formations; (iii) heat or other associated energy found in geothermal formations; and (iv) any by-products derived from them.

The federal definition of geothermal by-products excludes the other leasable minerals: oil, hydrocarbon gas, and helium.

Each state has taken a slightly different approach to defining geothermal resources; however, most have some similarity to the federal definition. This is especially the case in the California Re-

sources Act of 1967 which predates the federal definition and defines geothermal as follows:

> 'Geothermal resources' shall mean the natural heat of the earth, the energy, in whatever form, below the surface of the earth present in resulting from or created by, or which may be extracted from, such natural heat, and all minerals in solution or other products obtained from naturally heated fluids, brines, and associated gas, and steam...

Washington's definition takes a somewhat different approach in that it restricts 'Geothermal resource' to only that natural heat energy of the earth from which it is *technologically practical* to produce electricity commercially. Alaska, in a manner similar to that of Washington, tried to separate the regulation of high-temperature geotherinal resources capable of electrical generation (greater than 120°C), from low-temperature resources that could be used directly and which were to remain under provision of water law.

2.2 Resource Characterization

As the legal definitions acknowledge, geothermal resources are similar in inany respects to water, minerals, and gas. This has caused considerable disagreement (including litigation) over the essential nature of the resource and corresponding ownership rights.

The federal government, in passage of the Geothermal Steam Act of 1970, avoided the question of how geothermal resources should be characterized. The Steam Act chose instead to direct the Justice Department to bring suit to quit title to geothermal resource ownership. The courts were asked to decide whether or not geothermal resources had been reserved to the federal government as part of the inineral estate. The action brought by the Justice Department (United States of America versus Union Oil Company of California) began in 1971, and, on appeal, a verdict in favor of the United States was reached in October 1977 (Ottoboni versus the United States of America). The courts decreed that geothermal resources are mineral in nature and belong to the mineral estate.

The California Legislature, as with the Congress, avoided the question of how geothermal resources should be characterized, and it was not until the case of Peroni versus California was decided (California Court of Appeal, 1981) that geothermal was declared to be a mineral resource for purposes of ownership and leasing.

Most state definitions have not been tested by the courts. In Washington State, the legislature declared that 'not withstanding any other provision of law, geotherinal resources are found and hereby determined to be *sui generis*, being neither a mineral resource nor a water resource' (Bloomquist, IYXO). In Wyoming and Utah, the states have characterized geothermal resources as water, while the state of Hawaii has chosen to characterize geothermal resources as mineral (Lienau and Lunis, 1989).

2.3 Ownership

After a site for geothermal resource development has been identified. surface and subsurface ownership must be determined. In inany cases, ownership of the surface and geothermal or mineral rights is the same; however, in some instances, the geothermal or mineral estate has been severed from the surface ownership. When the estates have been separated, the potential developer must negotiate with both owners (Blooinquist, 1985). A permit for surface occupancy must be obtained from the surface owner in order to exercise a lease obtained from the mineral owner to develop the geotherinal resource.

Over half of the land in the Western United States is owned by the federal government, and additional large areas of the remaining land are owned by the state governments. The American Indians, Eskimos, and other indigenous peoples, have ownership of inany areas (often called reservations) through treaties with the United States.

The federal governinent claims geothermal ownership wherever it holds the mineral estate, either jointly with the surface estate or as a mineral reservation where the estates have been severed. The states, on the other hand. have taken differing approaches to the assignment of ownership, depending on whether geothermal resources are characterized as water, mineral, or *sui generis* (unique unto itself). The State of California claims ownership whenever it owns the mineral estate; otherwise the resource is the property of the owner of the mineral estate. In Washington. geothermal resources are the property of the surface owner, and in Wyoming, where geothermal is characterized as water, geothermal resources are a public resource and available through appropriation. In Alaska, the state claims ownership of all geothermal resources. However, the owner of the surface estate has a priority right to a lease from the State of Alaska.

3. DEVELOPMENT OF GEOTHERMAL RESOIJRCES

3.1 Obtaining Access to Geothermal Resources on Federal Land

Federal agencies make major decisions about energy project development on federal lands. This is particularly true in the Western U.S. where much land is Federally owned. Two acts which have the greatest impact on geothermal development on Federal lands are: 1) the National Forest Management Act (NFMA) of 1976 administered by the U.S. Forest Service (USFS), and 2) the 1976 Federal Land Policy and Management Act (FLPMA) administered by the Bureau of Land Management (BLM). The NFMA requires assessments including resource inventories and analyses which are used in land management plans for each Forest Service unit. FLPMA requires BLM to inventory resources and prepare land use plans based on those resource inventories. When energy facilities specifically are included as an accepted use, federal agencies must develop a procedure to allow for private energy resource development. One option outlined in FLPMA authorizes sale of public lands for such developinent, but land for geothermal development is usually leased.

Limited exploration involving "casual use" activities, such as geologic mapping and spring sampling, may be conducted before securing a lease by notifying the local BLM District Office or the Forest Supervisor's Office. Prospecting permits are available to developers from the appropriate surface management agency. Prelease exploration activities may begin upon approval of a "Notice of Intent to Conduct Resource Exploration Operations" from the authorized officer of BLM.. Exploration under a Notice of Intent (NOI) gives a non-exclusive right to conduct operations on federal land, but no preference for a lease. A NOI allows geological, geochemical, and geophysical surveys, as well as the drilling of exploration or temperature gradient holes.

Surface access and the priority right to explore, develop, and use geothermal resources on Federal lands are acquired through an "Offer to Lease and Leases for Geothermal Resources" issued by the BLM for lands under BLM or USFS jurisdiction. Pursuant to the Geothermal Steam Act of 1970 (amended 1988), the Secretary of the Interior can issue leases for the development and use of geothermal resources on certain Federal lands. Lands excluded from leasing are those administered under the National Park System, within a national recreation area, withdrawn or restricted lands, or where utilization is reasonably likely to result in a significant adverse effect on a significant thermal feature within a unit of the National Park System.

Exclusive access to the geothermal resource is provided through either noncoinpetitive leases for lands of unknown potential or through competitive bidding for particularly valuable resource areas, designated by the Secretary of Interior as Known Geother-

mal Resource Areas (KGKA). The issuance of leases is contingent upon the completion of an environmental impact statement in accordance with provisions of the Geotherinal Resource Act of 1970, the National Environmental Policy Act of 1969, and the Endangered Species Act of 1973.

3.2 Obtaining Access to State and Private Lands

The states have primary responsibility for decisions relating to the development of geothermal resources on state lands. Where the. state has enacted environmental protection laws, all decisions relating to the leasing and development of geothermal resources on state lands must be in compliance with such statutes. If the state has not enacted such statutes, all the provisions of federal laws apply. On private lands, the state has primary responsibility for ensuring compliance with **all** federal and state environmental statutes.

Access to state-owned resources is usually provided through corn-petitive or non-competitive leasing provisions.

4. ENVIRONMENTAL PROTECTION

4.1 Federal Legislation

The National Environmental Policy Act of 1969 (NEPA) declares that all practical means will be applied to conduct federal activities in a way that will promote the general welfare and harmony of the environment. Section 102 of the Act directs that to the fullest extent possible: (1) the policies. regulations, and public laws of thr United State:; shall be interpreted anti administered in accordance with the policies set forth in this Act, and (2) all agencies of the federal government shall:

(C) include in every recoinmendation or report on proposals for legislation and other major Federal activities significantly effecting the quality of the human environment, a detailed statement by the responsible official on

(i) the environmental impact of the proposed action,

(ii) any adverse environmental effects which cannot be avoided should the proposed action be implemented,

(iii) alternatives to thr proposed action,

(iv) the relationship between local short-term use of man's environment and the maintenance and enhancement of long-term productivity. and

(v) any irreversible or irretrievable commitments of resources which would be involved if the proposed action should be implemented.

The Endangered Species Act of 1973 provides a means whereby the ecosystem upon which endangered and threatened species depend may be conserved, and the Act provides for the government to take such steps as may be appropriate to achieve the purposes of the related treaties and convention set forth.

The Geothermal Steam Act of 1970 made provisions for the leasing of Federal lands for geothermal exploration and development. Since these activities related to the leasing of federal lands would have a significant impact on the environment, a programmatic environmental impact statement (EIS) was required before provisions of the Act could be put into effect. The EIS was completed in 1974 and leasing was initiated.

The Bureau of Land Management (BLM) is responsible for administering leasing of federal lands under provision of the Geothermal Steam Act of 1970. In the case Conner versus Burford (Ninth Circuit Court of Appeals, 1988) the court concluded that the leasing of Federal lands required completing an EIS pursuant to provisions of NEPA and a comprehensive biological opinion considering all stages of activity. The court concluded that the purpose of an EIS is to apprise decision makers of the disruptive environmental effects that may follow from their decision at the time when they "retain a maximum range of options." Compliance with the need for an EIS for geothermal leasing and development can be accomplished either through the preparation of a new EIS or by. amending or supplementing an existing environmental analysis (Bloomquist. 1991).

5. DEVELOPMENT

5.1 Federal Lands

Development on federal land is carried out under a geothermal lease. All federal leases are issued for a primary term of 10 years. Non-competitive leases can be obtained for only a $75.00 filing fee and the first year's lease rental of $1.00 per acre. The lease rental for the first five years is $1.00 per acre per year. and the royalty on production is 10 percent. Competitive leases are offered in sealed-bid competitions, the lease rental for the first five years is $2.00 per acre per year, and the royalty on production is 12.5 percent. A geothermal lease cannot exceed 2,560 acres. The minimum lease size is 640 acres. No person or corporation may hold more than 5 1,200 acres within any one state.

Federal geothermal leases include a due diligence requirement to make sure thcre is active exploration during the primary lease period. The primary lease term can also be extended for two additional consecutive 5-year periods if the operator is making diligent etforts toward utilization and has drilled a well capable of producing commercial quantities of geothermal resource. When successful tievelopment has begun, the lease extends for the duration of commercial production up to 35 years.

After the fifth year of the lease, in addition to the per acre rental, an expenditure for exploration must be made at an increasing rate from $4.00 per acre in the sixth year to $12.00 per acre in the tenth and successive years.

Orderly development of a geothermal resource involves several major phases. All post-lease exploration activities on federal lands are carried out under a Plan of Operation approved by BLM and with the concurrence of the surface management agency. Permit applications for all such post-lease exploration activities require the completion of **an** environmental review by the surface inanagement agrncy before permit issuance (Feuer, 1990). Resource production on all federal lands, including road and pipeline construction. is regulated through a Plan of Production approved by BLM. Before a Plan of Production can be approved. the applicant inay be required to collect environmental baseline data describing the existing environment for one year. No Plan of Production can be approved by the BLM until after completion of an environmental review, and such approval must have the concurrence of the surface management agency if other than the BLM. A finding of significant environmental impact during the review process will require the preparation of an Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act of 1969.

BLM, as the lead agency for facility siting on federal lands, coordinates the processing of all applications to construct geothermal power plants on federal lands. The responsible surface management agency regulates construction of related transmission lines on federal lands. State energy facility siting authority may extend to power plant siting on federal lands, and the state may exercise authority over the construction of power plants or transmission lines on federal lands after all the necessary federal permits have been approved.

5.2 Indian Lands

In exchange for giving the United States title to most of their land, the American Indians retained reservations for homelands as well as a right to continue hunting and fishing at their usual and accustomed places, both on and off the reservation. U.S. Supreme Court rulings concerning Indian treaties have established that the rights retained by the tribes are reserved rights retained by the tribes at the time of treaty-making, and not given to them by the

United States. The Indian Tribes, as governinental entities, therefore, have a right to inanage their resources. This means that the tribes undertake all activities necessary to adequately inanage any and all resources, including protecting the environment necessai-y to sustain the resource.

Tribal or individually-owned Indian Trust or restricted lands within or without the boundaries of Indian reservations are not subject to leasing by the Federal government under provisions of the Geothermal Steam Act of 1970. Individual land (allotments) held in trust by the U.S. government, or tribal land held in trust by the U.S. government can be leased for geothermal developinent. The Bureau of Indian Affairs (BIA) is responsible for exploration permit and lease approval and administration. The BIA is responsible for operational supervision of prospecting and developinent.

Access to Indian land for non-disturbing surface exploration requires written agreement between operators and Indian land owners. Surface disturbing activities, including prospecting and development, require approval by BIA and BLM.

5.3 State Lands

A majority of the states have adopted an access syxtem similar to that of the federal government. Oregon, California. and Alaska all have provisions for the issuance of exploration or proxpecting permits (providing non-exclusive testing of geotherinal resources) in addition to having both competitive and non-competitive leases. Washington negotiates each lease separately. In Colorado, state lands are available through negotiation or by competitive bid

Most state leases have a primary term that varies from 5 to 10 years, and most leases also make provision for extending the primary term if the developer is actively engaged in exploration or drilling. All state leases make provision for an extension of the lease once production of the geothermal resource in commercial quantities begins. Most have a provision that allows for readjustrnents of the lease terms and conditions at from 10 to 35 years after commercial production commences.

All states require that developers submit exploration and development plans and acquire the proper permits before exploration and development activities begin. Requirements cover both state and privately held lands. All permits to conduct exploration activities and for construction of facilities require a thorough environinental review before the permit may be granted (Blooinquist, 1991).

5.4 Private Lands

Geotherinal resources are often found on private lands, and access to private land can be obtained by sale, lease, permit, option, or any other mutual agreement with the owner of the surface property and geothermal estate. Landowners may permit access prior to a lease or purchase option to allow the developer to conduct agreed upon preliminary exploration activities. Such activities could include geological, geochemical, and geophysical investigations that are non-surface disturbing and the drilling of temperature gradient holes. A state-issued well drilling permit is normally required for exploratory drilling on private land. Additional federal, state, and local permits are required for continued development and are contingent upon compliance with all state and federal environmental laws.

Geothermal development on state or privately owned land usually requires a series of permits from state or local agencies for road and pipeline construction, water and sewage disposal, air emissions, and solid waste disposal. Unlike geothermal development of federal land, there is no one plan of operations to document all stages of development. Usually, the environmental review process for initiating the geothermal operations will address all aspects of development and the needed permits and licenses.

6. TAXATION

Each geothermal development company will pay federal and state income tax on the profits of its operations. The royalties paid from production on federal or state land is similar to a severance tax, but there is no severance tax for production from private land in most states. In inany states, there is a property tax on the value of the geothermal resource in the reservoir, and local property taxes are imposed on the value of surface installations and power plants.

7. FEDERAL AND STATE INCENTIVE PROGRAM

Several federal and state prograins have been initiated to help reduce the cost and risk of geothermal exploration and development activities. These programs have been directed toward development of both direct use geothermal projects and electrical generation projects, and have been in the form of grants, loans, or cost-sharing with industry.

A number of grant prograins have been available through the U.S. Department of Energy (USDOE) and include Technical Assistance grants to developers of direct use projects and low-temperature binary well head generators; Program Research and Development Announcement fundx directed to engineering and economic feasibility studies for direct application geothermal resources; and the Program Opportunity Notice funds for demonstration of direct use or combined electrical and direct use projects.

The Federal governinent has also had a number of industry-coupled programs that provided for USDOE cost-sharing with industry the cost of exploration, reservoir assessment, and reservoir engineering, and with the release to the public of the data obtained in order to increase the understanding of geothermal resources (Blooinquist, 1986).

A nuinber of loan prograins have also been authorized by the federal government. The best known of these prograins was the Geothermal Loan Guaranty Program (GLGP) which was authorized under Title II of the Geothermal Research, Development, and Demonstration Act of 1974. The GLGP was designed to accomplish the following objective:

(a) to encourage and assist the private and public sectors to accelerate development of geothermal resources in an environmentally acceptable manner by minimizing a lender-financed risk;
(b) to develop normal borrower-lender relationships in order that financing he made available without guarantees at some time in the future; and
(c) to enhance competition and encourage new entrants into the geothermal market.

Under term of the Act, loan guarantees for up to 75 percent of project costs could be granted with the federal government guaranteeing up to 100 percent of the amount borrowed. The Act was amended in 1980 by Title VI of the Energy Security Act to allow for the granting of a loan for up to 90 percent of the total aggregate project cost, providing that the applicant was an electric, housing, or other cooperative, or a municipality. The GLCP guaranteed loans for energy projects and expired in September of 1990 (Kostant. 1991

The 1978 Energy Tax Act established a 10 percent energy tax credit (increased to 15 percent by the 1980 Windfall Profit Tax Act) for investment by a business taxpayer in property used to produce, distribute, or use energy froin a geothermal deposit. The original tax credit expired in 1990, but a 10 percent tax credit was reauthorized and now applies to all tangible assets of a project including the well field and power plant (Falcone, 1994).

Several states have also provided tax credits to encourage investment in geothermal resource development. In Oregon. for example, a 35 percent tax credit is offered to businesses after the in-

stallation of renewable energy facilities. Geothermal facilities that qualify include direct use, electrical generation, and groundwater heat pumps. Oregon also offers a residential tax credit of 25 percent of the first $4,000, or up to a maximum of $1,000, to Oregon taxpayers for the installation of eligible alternative energy devices. including a geothermal resource used as a source of space heating, water heating. cooling, electrical energy, or a combination thereof. Colorado, Idaho, and Montana have also provided income tax credits for investors in geothermal energy projects. Some states also provide low-cost loans to individuals or companies wishing to invest in geothermal systems (Bloomquist. 1986).

All of the above incentive programs have met with various levels of success. However, the single greatest incentive to geothermal development, at least for electrical generation, was the passage of the Public Utility Regulatory Policies Act of 1978 (PURPA). Its provisions benefited geothermal developments by guaranteeing, for the first time, that a market would be available for electric energy generation from geothermal power. PURPA directed the Federal Energy Regulatory Commission (FERC) to adopt rules requiring electric utilities to offer to purchase electrical energy from geothermal small power production facilities that meet certain size (XO MW), ownership, location, and efficiency criteria. The 1990 amendments to PURPA removed the 80 MW limitation, but that provision is slated to expire at the end of 1996.

In California and Nevada, where the State Public Utilities Commissions aggressively implemented PURPA, there was a dramatic growth in the development of renewable projects including geothermal. According to the U.S. Department of Energy, of the 2,000 MW of new geothermal capacity added during the 1980s, over 700 MW were from plants taking advantage of either California Public Commission Standard Offer Contract No. 4 or favorable contract terms promulgated by the Public Utilities Commission of Nevada. Unfortunately, no new standard offer contracts are now available, and although PURPA is still in effect, a majority of the new power that is being purchased is through a colicitation for competitive bid. Thus a guaranteed market for new geothermal power is no longer assured.

8. SUMMARY

The development of the legal and institutional framework that now regulates exploration and development of geothermal resources in the United State.; has been a difficult and often controversial process. The legal framework for other resources such ax water, petroleum, etc., had been established decades earlier and at a time when little attention was paid to the environmental implications of proposed activities. The Geothermal Steam Act of 1970 was the first major piece of energy resource legislation passed after the adoption of the National Environmental Policy Act of 1969. Geothermal was thus forced to fit into an already well-established legal framework on the one hand, while on the other hand there were few guidelines and no legal history to guide legislators in their attempt to develop rules and regulations for geothermal leasing and tievelopment that would be in compliance with provisions of NEPA.

The past 25+ years has seen the development of what is now a well-developed framework of laws and regulations for the development of geothermal energy in an environmentally responsible manner. In addition, many governmental programs have been established that encourage exploration and development by reducing or sharing risk, creating an accessible market, or minimizing tax burdens.

The above, by necessity, is only a brief summary of some of the most important features of the legal and institutional framework that now guides geothermal exploration and development on federal, state, and private lands in the United States. For more information, please contact either of the authors.

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