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Ford Dry Lake area. Coal-fired power plants built in the southwestern states by California utilities could also result in new high-capacity lines passing near the Imperial Valley (SCE, LADWP) or Honey Lake, Wendell-Amedee, Lake City-Surprise Valley, and Lassen (PG&E). PP&L is also planning a transmission line from the coal-fired Jim Bridger power plant in Idaho that might provide convenient interconnection for geothermal power plants in the Surprise Valley or near Glass Mountain. However, the utilities are facing strong pressures to delay or terminate their plans for these large plants. In particular, three bills signed into law in California in June 1976 put conditions on the approval of future nuclear power plants in the state; these conditions may result in substantial delays.[6]

7.2.2 Selling or Trading Power into Another System

If a utility builds a geothermal plant on the fringes of, or outside, its own service area and far from its own high-voltage network, the utility may want to sell or trade the power to another utility. Several opportunities for this type of arrangement exist in the Imperial Valley. SCE, LADWP, or SDG&E may try to sell the power from their initial pilot plants to IID. This arrangement is limited, however, by the fact that IID plans to add only 220 MWe of capacity in the next 20 years. LADWP also has the option of trading power with IID, since both IID and LADWP receive power from USBR dams on the Colorado River. LADWP could put 30 MWe of

power into the IID system and in return divert the 30 MWe of power IID would normally receive from the Bureau of Reclamation.[7] LADWP could also use the USBR lines that run between the Colorado River and the IID to transmit an additional 30 MWe from the IID area back to the LADWP lines at the Colorado River, thus reversing the normal flow of power on those lines. Using the diversion plus the reversal would create a total capacity of 60 MWe from Imperial Valley for LADWP (or Glendale, Burbank, or Pasadena) on existing transmission lines.

Under similar arrangements, PG&E could sell power to PP&L or the Surprise Valley Rural Electric Cooperative from pilot plants PG&E might build in the geothermal areas in northernmost California. SCE or LADWP could sell power to one of several Nevada power companies from small plants in the Mono Lake-Long Valley area.

While these examples are intended to represent the major transactions that are possible, arrangements involving other combinations of power producers and users could evolve. These other combinations, however, require not only the construction of transmission lines to tap into some power system, but also agreement among all the parties involved. For reasons discussed in the following sections, such agreement is often difficult to obtain.

7.2.3 Using Another Party's Transmission Facilities--"Wheeling"

While transmission lines of adequate capacity may exist near the site of a geothermal power plant, the lines may be

owned by another party. Situations similar to this have arisen before, in which the party operating a plant would like to avoid the expense of a duplicate transmission system by feeding his power into some other party's transmission network and receiving the comparable amount of power at another point on that system. The power is not necessarily physically transmitted from the point of production to the point of use, but an exchange of power is worked out for an agreed-upon fee--a service known as the "wheeling" of power. Wheeling arrangements are not uncommon in the United States, but there are certain long-standing tensions between some parties which make the cooperation necessary for wheeling difficult to achieve. The best-known instance is the tension that exists between the privately owned and the publicly owned electric utilities. Commonly, publicly owned utility systems do not have extensive transmission networks (TVA is one exception), and therefore have a reduced flexibility in siting power plants. Some observers suggest that the economic control of transmission lines by privately owned utilities acts as a compensation to those utilities to offset the tax-free status of the publicly owned utilities.[8] These observers predict that privately owned utilities will fight very hard to retrain this control in order to keep what they view as their competitive edge over publicly owned systems.

Another similar set of tensions exists between utilities and former big customers who are looking for an independent source of power, usually for industrial plants. A

utility cannot be expected to welcome the prospect of the loss of revenue from a big customer and to willingly co-operate in wheeling power from a remote plant. One would expect, instead, that the utility would deny the customer access to the utility line in order to make the option of an independent power source as economically unattractive as possible.

Wheeling arrangements between two privately owned utilities seem, in general, to be the easiest to achieve. However, if electricity from geothermal resources will be as relatively cheap as predicted, trading relatively low-cost geothermal power for relatively high-cost fossil-fuel power may run into difficulties because the trade can affect competition between neighboring private utilities.

Wheeling arrangements of all the types mentioned above have been suggested as possible approaches to solving transmission problems. The more important of the suggested arrangements are:

1. NCPA-PG&E. NCPA, a joint exercise-of-powers agency composed of 11 cities and one rural electric cooperative, wishes to build at least 220 MWe of capacity at The Geysers and to have the power distributed by PG&E to its member systems, which are spread throughout northern California. NCPA has been negotiating with PG&E for many years over wheeling arrangements. It has intervened in CPUC

proceedings concerning PG&E's application for permission to construct plants in The Geysers; it asked CPUC to take antitrust action against PG&E.[9] It also has sued PG&E in federal court in an attempt to gain access to PG&E's transmission lines.[10] At present, NCPA and PG&E have reached an "agreement in principle" concerning wheeling out of The Geysers but are still negotiating over price.

2. DWR. The California Department of Water Resources, in trying to obtain power to meet the requirements of pumping plants in the State Water Project, has been talking to PG&E and SCE about wheeling arrangements for power produced by plants DWR might build at The Geysers. At present, PG&E, SCE, SDG&E, and LADWP provide power to the pumping plants through a sales contract that is due for renegotiation in 1978. DWR, instead of continuing to purchase power, believes it could obtain power more cheaply if it owned its own plants. The utilities are naturally reluctant to agree to a wheeling arrangement, thereby losing a big customer. DWR reports that the negotiations have not been satisfactory from its perspective.[11]

3. Dow Chemical Company-PG&E. Dow Chemical is investigating the potential of building geothermal

plants either in the Geysers area or in the Surprise Valley. In either case it would need the PG&E system to deliver the power to Dow's plants in the Bay area town of Pittsburg. Again, PG&E would naturally be reluctant to make any arrangement that would result in the loss of so big a customer.

4. IID. SCE, SDG&E, or LADWP could enter into arrangements with IID to wheel power to a point of interconnection, as an alternative to selling or trading power to IID. Apparently no specific discussions of this possibility have been entered into with IID.

5. LADWP. The Los Angeles Department of Water and Power is looking as far north as The Geysers for potential sites for geothermal power plants[12] and would require the use of the PG&E transmission system as well as that of SCE. At this point, LADWP is investigating a broad range of options and is not committed to any one course of action.

6. SMUD-PG&E. The Sacramento Municipal Utility District is currently planning to add 300 MWe of geothermal capacity starting in the mid-1980s, probably at The Geysers. It probably would depend on PG&E to deliver the power. SMUD and

PG&E have entered mutually beneficial cooperative arrangements in sharing the output of a large nuclear plant owned by SMUD and in trading power between summer and winter peaks. These arrangements tend to indicate that SMUD may have an easier time reaching wheeling agreements with PG&E than others may have.

Other combinations are, of course, possible. Some parties, however, said they preferred to avoid wheeling arrangements entirely. The city of Burbank has said that it is only interested in developing geothermal power in areas near publicly owned transmission lines in order to avoid wheeling disputes. LADWP has also indicated that it did not consider fruitful a discussion of wheeling arrangements with SCE to bring power out of the Imperial Valley, especially since LADWP's existing system would be close enough to make new lines less of a major cost for geothermal development. DWR has indicated that, while it may be more expensive, new DWR-owned lines could be built out of The Geysers to connect with USBR's transmission system, which now ships power produced in the dams of the Central Valley Project. There is some chance SMUD would join in building such a line, but the chance is slim.

For some of the KGRAs with the highest potential for development at this time, there either appears to be sufficient slack capacity in nearby lines, or sufficiently good

prospects to sell or trade power, that demonstration or pilot plants in the new fields can probably be built up to a 30 MWe size with few transmission system difficulties. Additions beyond this level will probably require extensive new transmission lines. In order to justify the expense of new lines, utilities need confidence that the sufficiency and reliability of both the resource and the technology justify installing enough plant capacity to produce several hundred megawatts of electricity. Such confidence usually comes from the operation of the first few plants in a given area. There may be a considerable lag between the completion of the first plants and commitments to construct additional units, since the utilities need time to gain operating experience and to determine whether they can risk additional capital.[13] However, the transmission system is not equally accessible to all potential parties interested in producing electric power from geothermal resources. Those with transmission systems available may not be the parties most interested in development of a particular area of geothermal activity. To that extent, the institutional nature of the transmission system in California may result in delays in the most optimistic schedule of geothermal development. On the other hand, there is no guarantee that the parties with the most interest in geothermal development will, in fact, have the financial resources and the skill to implement their development plans successfully. In any

case, due to the site-specific nature of the geothermal resource, finding the means to transmit the power to load centers may be a significant friction point in the development process.

7.3 Interactions with Government

7.3.1 Federal

The federal government could be involved in this stage of the geothermal process for several reasons: (1) the power plant and/or the transmission facilities could be on federal land; (2) the power plant and/or the transmission facilities themselves could be owned by the federal government (USBR now owns some major transmission lines in California); and (3) the federal government supervises the public utilities' sales of electric power to other than final consumers and expansion of transmission lines.

At this point, the federal government's involvement as a landowner is not clear because it is not yet an issue. For example, transmission lines from coal-fired power plants crossing federal lands have been dealt with several times before so that the procedures have been worked out. However, the specific problems of transmission lines from geothermal areas have not been encountered. Transmission lines in wilderness areas would probably be controversial and federal landowning agencies would be involved in the dispute. For example, PG&E spokesmen believe it unlikely that they would be allowed to construct a transmission line over

certain portions of the Sierra Nevada Mountains to the Mono Lake-Long Valley region. The transmission lines would cross national forests and the approval of the Forest Service would be required. PG&E believes there are some acceptable routes for transmission lines into the region but all would involve some degree of controversy. Because other KGRAs are situated near wilderness, wildlife, or scenic areas as well as near national forests, disputes before BLM, the Forest Service, and other federal agencies may continually arise concerning approval of proposed transmission facilities.

The federal government as an owner of transmission facilities (through USBR) would be involved in negotiations over wheeling and access to these public lines. The federal transmission system in California is not extensive; some have suggested that the United States build more transmission lines to make geothermal plants (and other new power sources) more accessible to publicly owned utilities. Embarking on a major program to construct transmission lines would itself be a controversial undertaking and probably would involve interactions with many other governmental agencies and parties.

The involvement of the federal government as a supervisor of the wholesale transactions of utilities occurs through FPC. The commission must approve the interconnection of utilities and the rates charged in sales of electricity that will be resold.[14] Both wheeling and sales

from one utility to another would be subject to FPC jurisdiction. This situation need not create any particular problems, but it may make a development schedule that includes resale take longer than one in which the utility sells all the power produced to final users. If FPC chooses to apply its standard schedule of tariffs for sales between utilities, the utility wishing to sell power from a demonstration plant might not recover its higher-than-normal costs. FPC may be willing to add a special class to its tariff schedule to cover such situations, but considerable time and effort may be required to work out such arrangements.

7.3.2 State

The state government could be involved in the geothermal process for the same three reasons as the federal government: (1) the power plant and/or the transmission facilities could be located on state land; (2) a state agency could own the power plant or the transmission facilities (DWR owns both power plants and transmission lines now); and (3) the transmission line could be subject to CERCDC or CPUC jurisdiction.

State government involvement as a landowner would occur primarily through SLC. Although the specific case of a transmission line from a geothermal power plant across state lands has not yet been encountered, the placement of other transmission lines on state lands has been handled a few times before. No particular problems with transmission

lines from geothermal areas are expected; but again, if the lines must cross wilderness, wildlife, or scenic areas, controversy can be expected to focus on state agencies that must grant the right to build the line across state lands. There may be some delay if the agency is inexperienced in dealing with such controversies.

State government involvement as the owner of transmission lines is limited by the fact that, thus far, only one agency (DWR) owns any transmission line--and it owns a total of only 13 miles. However, DWR is interested in building its own lines out of the Geysers area to the Tesla substation on the USBR system as an alternative to wheeling arrangements with PG&E. Such a line would benefit other publicly owned utilities and large companies such as Dow Chemical that may need transmission facilities out of the same area. These other potential producers have discussed the idea of joint participation in the construction of a state-owned line in order to get what they consider to be easier and more favorable access to transmission facilities. Such a project would be a major undertaking for DWR and would be expected to encounter strong opposition from PG&E.[15]

CPUC and CERCDC share regulatory jurisdiction over transmission lines. The energy commission's jurisdiction is limited to lines that run from a power plant to a point of interconnection with a high-voltage transmission network.[16] If the power plant is less than 50 MWe in size, the energy

commission has no jurisdiction (unless the plant owner wishes to waive his exemption in order to take advantage of the procedures under the commission[17]), so any associated transmission line would also be exempt. CPUC jurisdiction is limited to privately owned utilities, but covers all high-voltage transmission line construction, not just construction directly related to new power plants. CPUC has been handling transmission line applications for many years and is not expected to encounter any new difficulties. CERCDC, however, is a new agency[18] and has not yet approved any transmission lines or power plants, so it may encounter ordinary start-up problems in the approval of transmission lines from geothermal areas until it acquires experience as a regulatory body.

7.3.3 Local

Local government can be involved in the process both as a regulator and as an entrepreneur. Whether local planning commissions and county boards of supervisors will be involved directly depends on exactly where the transmission facilities would be placed and whether CERCDC has jurisdiction over the transmission line. If CERCDC has jurisdiction, it will issue the sole state permit for the line.[19] However, local government is indirectly involved in the decision making by the commission because CERCDC must enforce local rules, regulations, and ordinances.[20]

Local government can participate as an entrepreneur by building power plants and/or transmission lines. The city of Burbank is actively engaged in planning for several geothermal units and associated transmission lines, and LADWP is also keeping the matter under investigation. If the plans of these agencies are controversial, the entire project is likely to be affected since it is improbable that a transmission line would be considered separately.

7.4 Interactions with Nongovernmental Participants

Nongovernmental participants interact at the transmission stage because of concerns over power line location and because of the special arrangements that may be necessary to deliver power from geothermal areas to customers long distances away.

The siting of transmission lines in California has been controversial in the past when the lines have passed near populated areas or regions of great natural beauty. Because geothermal resource areas are located in sparsely populated areas with some recreational and scenic value, the criticisms raised about transmission lines for geothermal power plants will no doubt mirror the concerns that have been raised before. The intervenors will probably be a mixture of local residents, and recreational and environmental interests. If government and corporate participants manage environmental impacts [illegible]ll and insure minimal disruption, complaints and

intervention will be considerably reduced. One major strategy for diminishing the objections to a particular power line has been rerouting it. For most transmission lines, route changes add little to the total cost, especially if it is a long line. In the geothermal case, where the attempt is to keep lines, initially, as short as possible, rerouting may add significantly to the overall cost. Therefore, there may be considerable friction in certain instances that might discourage a potential producer from proceeding with a geothermal development. Because the controversies will be very site-specific, little more can be said without discussing a particular place.[21]

The arrangements that must be made between nongovernmental participants to sell, trade, or wheel power add a new layer of complexity in comparison to what is necessary if a more conventional generating facility is built. With a conventional unit, the operator generally has to obtain only governmental approvals before he can produce power for his own needs, and he does not have to make arrangements with any other party. For many potential participants in geothermal development, this is still the case. PG&E needs agreement from no other nongovernmental party to transmit power from The Geysers into its system; SCE needs no one else to bring power from any plants it may build in Long Valley. In order to avoid making arrangements with others, a producer needs its own transmission line to an area. As

has been discussed, this situation limits the number of KGRAs and participants that could develop geothermal resources.

Making arrangements to sell, trade, or wheel power also involves standard contract negotiation. An added complication is that one or more parties may be reluctant to enter into such agreements. As already mentioned, privately owned utilities consider their economic and physical control of electric power transmission a valuable factor in their competition with publicly owned utilities, so they are not apt to grant publicly owned utilities easy access to transmission facilities. Some large corporations are seeking to control their own sources of electricity so they will not be subject to the rate increases imposed by privately owned utilities. The problem is particularly acute because CPUC has tended to raise the rates charged to large corporations much more than those charged to residential customers.[22] Consequently, the privately owned utilities are, understandably, reluctant to make this move by former large customers easier. A 1973 Supreme Court decision[23] somewhat strengthened the hand of publicly owned utilities trying to gain access to privately owned lines by requiring privately owned utilities at least to bargain in good faith over wheeling.[24] A bill now before the California Legislature (AB 4069) would interpose CPUC as an arbiter of wheeling negotiations, and would give it the authority to order interconnection and wheeling if an application for such an order is brought before it. The bill would limit this

authority of CPUC to electricity that is produced by unconventional energy resources (i.e., resources other than nuclear energy and fossil fuels). If enacted, this bill would further strengthen the hand of those in search of wheeling, including nonutilities such as Dow Chemical, but would not settle disputes with the privately owned utilities and could not guarantee full cooperation. Because wheeling is crucial to the plans of several potential participants, one can also expect that these participants would intervene in proceedings before federal and state agencies to request that any leases of state or federal lands for well-drilling or power plant construction require the lessee to make his transmission lines accessible for wheeling to others for a negotiated fee. The nature of this conflict probably guarantees that it will go on for some time.

Another source of the parties' reluctance to enter into sale, trade, or wheeling arrangements might be the desire of one of the parties to maintain control of a geothermal resource for its exclusive use. This situation would be especially true if it were clear that the resource would produce very cheap electricity. Because there is only one producing field in the state, cases of such reluctance to negotiate arrangements are probably rare at present, but as more areas are opened up, the problem could become more acute.

Transmission is a vital link in the development of geothermal resources for electricity production. The

existing network also forms the basis for potentially very powerful control over that development. Those that have the control now, naturally, do not wish to see their position weakened. Those now disadvantaged wish to see some sort of government intervention to improve their position. Until some mechanism is established to resolve this conflict, the institutional nature of the transmission system in the state may be very influential on the pace and pattern of geothermal development in California.

7.5 Proposals Made by Various Participants in the Process

7.5.1 Existing Lines

- Require privately owned utilities to deal with others who want to transmit power over the privately owned utilities' lines.
- Require privately owned utilities to carry others' power over the privately owned utilities' lines.
- Conduct antitrust actions against privately owned utilities that refuse to wheel others' power.
- Place all electric transmission lines in "common carrier" status.
- Have the state or federal power producers guarantee the power of the others who want to transmit power over privately owned lines.

7.5.2 New Lines

- Build new publicly owned lines to connect geothermal areas to load centers.
- Require that lines built to nuclear plants carry geothermal power as well.
- Have the state designate transmission corridors and assemble the "rights of way" across them.
- Allow accelerated depreciation for the cost of building transmission lines from geothermal areas.

Chapter 7

FOOTNOTES

1. New high voltage transmission lines operating at 69 kv cost on the order of $35,000-$50,000 per MWe mile according to discussions with various utilities. If a new 25 MWe geothermal plant, the first for a new hydrothermal field, cost $12.5 million and requires 100 miles of new lines, the lines would represent 28-40 percent of the total capital cost of the project. By comparison, the cost of transmission lines is typically 10 percent or less for a remotely sited fossil-fuel-fired power plant of about 750 MWe capacity.

2. Interview with John Dutcher of CPUC and also confirmed by Ed Terhaar of DWR.

3. Seven million to eight million dollars--telephone interview with Mr. H. R. Perry, Chief Planning Engineer, PG&E, July 23, 1976.

4. Telephone interview with M. D. Whyte, Manager, Electric System Planning, SCE, June 16, 1976. Interview with Peter G. Lowery, Power System Development Division, LADWP, July 6, 1976.

5. Information from same interviews listed in n. 4.

6. Chapters 194, 195, 196. California Statutes of 1976.

7. Lowery interview, see n. 4.

8. Discussion with former utility executive.

9. CPUC application #51892.

10. Discussion with NCPA.

11. Discussion with DWR.

12. Interview with Lowery, see n. 4.

13. Transmission is, of course, only a part of the reason the utilities will wait for experience to be accumulated before making investment plans.

14. Discussion with NCPA, referring to FPC regulations.

15. PG&E has opposed such a 13-mile line before. Discussion with DWR.

16. Public Resources Code Section 25107.

17. Public Resources Code Section 25120.

18. See Chapter 10.

19. With certain exceptions; see Chapter 10.

20. See Chapter 10.

21. For descriptions and issues likely to arise in each KGRA, see the JPL report.

22. Discussion with CPUC.

23. Otter Tail Power Company v. United States, 410 U.S. 366 (1973).

24. The NRC must now look at the antitrust aspects of a nuclear plant application, including the transmission network, before it can grant a construction permit.

CHAPTER 8

FINANCIAL ASPECTS OF GEOTHERMAL DEVELOPMENT

8.1 Overview

8.1.1 No Absolute Problem

Geothermal development faces no absolute financial problems. Obviously, geothermal projects must compete with other investments for capital resources, but there is no barrier apart from this competitive one.[1]

One reason for the absence of major problems is that geothermal power is a small part of the energy industry and is likely to remain so. For the foreseeable future, geothermal entrepreneurs are apt to seek a small share of energy capital. Moreover, geothermal projects are themselves small relative to other energy projects: development of a power plant and production field at The Geysers is much less expensive than building a nuclear plant. The point is not that small investments are generally easier to make than large ones; indeed, capital markets often prefer large ones. However, very large projects or attempts at major and rapid reallocations of capital within an industry are apt to run afoul of investor preferences for risk spreading, even though the large projects or reallocations may promise superior returns.

A second reason for the absence of major financial barriers is the strength of the principal geothermal

entrepreneurs. Within rather broad limits, large and sound companies like Chevron and PG&E can raise money for virtually any investment they care to undertake, so long as they are willing to pay the interest costs and provide collateral. Such entrepreneurs can also use their very substantial internal resources to finance geothermal investments.

Whether large or small, private or public, entrepreneurs evaluate geothermal investments on the basis of their likely returns. Projects will be undertaken to the extent that they offer better returns than alternative investments. Development at The Geysers shows very clearly that some geothermal projects are competitive and Chevron, at least, views geothermal development as roughly equal to present oil and gas development.[2] There are, however, problems that affect geothermal projects' attractiveness to investors. These problems and financial considerations related to them are the subject of this chapter.

8.1.2 Resource Needs for a Geothermal Field and Power Plant

In the earliest stage of geothermal development, that of obtaining leases, there may be substantial costs, but there are no prohibitive financial barriers to even small entrepreneurs. Leases at The Geysers have averaged $836 an acre, with much higher prices in some cases, but The Geysers is a proven and producing field.[3] Outside The Geysers,

leases have averaged $36 an acre. Apart from the first costs in obtaining leases, there are annual rents and occasionally small tax burdens. By and large, the costs of controlling geothermal land do not rise until a resource has been proven. While these costs may be relatively small, they are not trivial, and may amount to 10 to 20 percent of a firm's exploration budget.[4]

The initial investment is increased during the exploration stage roughly by the cost of drilling three wells. At The Geysers, the drilling of three wells presently costs about $1.5 million but is increasing each year; in the Imperial Valley, where drilling is easier, the cost per well will be somewhat less. Although variations in drilling conditions and in the number of test wells required may result in substantially higher costs, and allowance for unsuccessful exploration raises the ante still higher, it does not take a firm with enormous resources to raise the amounts of money necessary to lease and prove up a geothermal field. Diablo Exploration Company, a comparatively small operator, estimates that it has the wherewithal to lease and explore a minimum of three fields, and large companies of course can do more.

Finally, the developer needs to drill additional wells, generally 12, to reach the total needed for a power plant. To date, this has occurred <u>after</u> a sales contract has been negotiated; by this time, the original developer may have

sold his interest and left both production drilling and operations to another entrepreneur. In general, the developer will pay for the production wells and for the piping to carry the steam or hot water from them to the power plant, a total investment on the order of $8 million. However, the sales agreement, with whatever accompanying guarantees are given regarding the buyer's intention to construct and operate the power plant, provides an asset that can be used for raising the additional capital. Coal mines, for instance, are sometimes financed on the basis of long-term sales contracts. It seems extremely unlikely that a geothermal developer, large or small, would find it difficult to raise investment money for the purposes of field development once he has proved the existence of a resource and negotiated a sales contract.[5]

The geothermal energy user must, of course, raise money to build a power plant and whatever transmission facilities are needed. Once again, there is likely to be no major financial problem, since geothermal power plants are relatively small, costing on the order of $16 million to $20 million for a 110 MWe steam plant and perhaps $25 million or $30 million for a 55 MWe hot water plant.[6]

8.2 Principal Competitive Problems

The financial problems that concern geothermal entrepreneurs are those inherent in any major investment: the

relationships between costs and benefits, both within particular projects and between those projects and other potential investments. Some of the costs are obvious--for example, those costs involved in obtaining leases, exploring for resources, constructing and operating power plants, and transmitting power to final users. In addition, there are incidental costs such as environmental reports, appearances at governmental hearings, contract negotiations, and possible lawsuits. Such costs can reach a significant level by the time electricity reaches final users.

In assessing the costs and benefits, a number of uncertainties must be taken into account. First, major technical risks are involved. Since exploration techniques are not infallible, the risk of finding no resource always exists. In addition, the technology for power production from geothermal steam has had more use than that for other geothermal resources. Consequently, the developer faces the risk that, even if he finds a resource, it may be one for which the technology is uncertain.

Augmenting these two technical bases of uncertainty are those which stem from legal, institutional, and political problems. One, the lack of vertical integration in geothermal development, means that any one entrepreneur will have to negotiate with a variety of others before electricity reaches final users. Of course, the first set of participants might get money from the next set before electricity is

sold, but all returns stem ultimately from the production of electricity. If the production of electricity is uncertain, all participants may have to wait for production before any of them obtains a return. Thus any one entrepreneur is subject to the risks inherent in dealing with others. However, the number of participants, particularly at the stages of power production and transmission, are so few that the uncertainty to be faced is not the relatively well understood uncertainty of the marketplace. Instead, it is the relatively poorly understood uncertainty of activities by a very few organizations, some of whom hold significant monopoly or monopsony power.

A second basis of uncertainty arises because the federal, state, and local governments have not settled into standard treatments of the geothermal development process. Tax questions at the federal and state levels remain unresolved, as does the willingness of federal, state, and local governments to allow or encourage geothermal development. Not only will incidental costs mount, but potential returns will fade into the future as various government agencies try to resolve how they will treat particular issues.

Entrepreneurs face a third source of uncertainty because they have trouble predicting many of the incidental costs. Costs of environmental reports, appearances at governmental hearings, contract negotiations, and possible lawsuits are set by the joint activities of many participants and may vary widely among technically similar projects.

Even without delays from the uncertainties described above, exploration activities, field development, and power plant construction all take time. Expenses are high enough to exert significant borrowing or opportunity costs, so that a very high rate of return is necessary to compensate for the expenses and delay. What little evidence we have--the development of electricity from geothermal steam at The Geysers--suggests that the eventual geothermal returns can justify some investments. Nevertheless, the expenses, the delay, and the risks are significant and do lead some entrepreneurs to avoid or leave geothermal activities.[7]

The picture is not completely bleak, however. The process of geothermal exploration and development has enough technical similarity to the process of petroleum exploration and development that many entrepreneurs can develop fairly firm estimates of the major obvious costs involved and some idea of the incidental costs. Therefore, the costs of geothermal development are more predictable than the costs of developing energy sources that require less familiar technology (e.g., coal gasification).

8.3 The Role of Governments

8.3.1 Federal

The federal government is inevitably involved in shaping the geothermal financial picture. Its treatment of

costs and returns for income tax purposes can exert a marked effect on the financial attractiveness of geothermal development. In petroleum development, the federal government has allowed developers to deduct the intangible costs of exploration and drilling (e.g., labor costs) as a current expense rather than having to add them to the capital value of the well and deduct them as depreciation expenses over time. A court case has applied this practice to geothermal steam drilling that occurs in areas under the jurisdiction of the Ninth Circuit Court of Appeals (California, Oregon, Nevada, Montana, Washington, Idaho, Arizona, Alaska, Hawaii, and Guam) on the grounds that geothermal steam is a mineral resource rather than water.[8] The Internal Revenue Service has warned that it will attack this interpretation in other circuits, and its application to geothermal hot water wells is very much in doubt.

The federal government also may allow a taxpayer to deduct a percentage of his return from his taxable income as an allowance for depletion of the resource. Such a depletion allowance was permitted, although it has recently been restricted, for petroleum and minerals, but not for water wells. The court case mentioned above allowed a depletion allowance for geothermal steam wells in the Ninth Circuit, but left the same doubts as to its applicability both outside the Ninth Circuit and to geothermal hot water wells.

The federal government can obviously affect the financial picture of geothermal development in other ways. Most directly, it can provide money for geothermal development. It currently plans to do so in two ways: through loan guarantees and through demonstration grants.

Under the geothermal loan guarantee program, the federal government guarantees to the lender 75 percent of the amount of loans for geothermal development. This guarantee will presumably make banks and others more willing to lend for the purposes of geothermal development. Apparently, only the Wells Fargo Bank is involved in financing geothermal activity, but ERDA's loan guarantee program staff indicates that there is substantial interest in the program by potential lenders in California and elsewhere.[9] Some industry people, however, feel that the loan guarantees will not work very well. Many developers have a general preference for equity versus debt financing in risky ventures, and the loan guarantee program does little to change that preference. Also, the loan guarantee program will not make as much money available for geothermal development as the program sponsors might have thought, because the banks and other lenders are usually more interested in developing relationships that have long-term returns than in avoiding failure. Consequently, they are more interested in doing business with large, stable participants that have a long-term commitment to geothermal development than with newly formed organizations

just trying to break into the area. Unfortunately, the provisions of the geothermal development program make these newly formed participants more interested in obtaining loans than the larger, more stable participants, which have no trouble obtaining loans.

The federal government's second method of providing money for geothermal development--its demonstration grant program--pays a portion of the costs of some power generation facilities in order to demonstrate the attractiveness of geothermal development. Such grants might be a particularly appropriate way to absorb the risks of developing technologies for hot water resources.

The federal government also affects the financial picture of geothermal development in indirect ways. For example, the restrictions that the Securities and Exchange Commission (SEC) places on firms seeking public investment (the method of financing preferred by many developers) affect how easily firms can raise money from the public for geothermal investment and how easily one geothermal development firm can merge with another.

Another way in which the federal government affects geothermal finances indirectly is through its actions as a participant in the geothermal development process. As a lessor, it imposes costs for bonuses, rents, and royalties. As a regulator, it requires that developers take actions that cost money. As a research-supporting agency, it

supports studies that may reduce costs or risks of activities in the development process. Of course, the federal government may also take actions in other spheres, such as those of nuclear energy and petroleum energy, which affect the relative attractiveness of geothermal investment.

8.3.2 <u>State</u>

The state influences geothermal finances in many of the same ways as does the federal government. California can affect finances directly through tax provisions, securities regulation, and demonstration grants. For example, regulations preventing the public sale of high risk securities have hampered attempts to raise funds for geothermal activities. It can also sponsor research that might reduce the costs of geothermal activities: for example, CERCDC is sponsoring a baseline study of environmental conditions at The Geysers. Finally, the state's participation in geothermal development as a lessor and regulator can affect finances. For instance, its willingness to use a net-profits basis for competitive lease bidding reduces the immediate cash demand of geothermal development at the expense of the long-term return.

Note that both the federal and state governments, through their regulation of utilities and agencies, have another way to affect geothermal fi[illegible]es: they have the power to make utilities and agenc[illegible]ore or less risk-averse, and to directly encourage or discourage investment in geothermal development. How the federal and state

governments regulate utilities may thus have a relatively significant effect on the financial picture of geothermal development.

8.3.3 Local

Local governments have a slightly different set of influences on geothermal finances. Most explicit is the local property tax. In California, local governments are required to charge the "full market value" of property for tax purposes. When a developer has proven the existence of a resource to the satisfaction of a power producer, he has also proven it to the satisfaction of the County Assessor, even though the power plant may not be built nor revenue generated for several years thereafter. At least two developers in Sonoma and Lake counties are now facing severe tax bills even though they have no revenue from the resource they possess.

Perhaps the major financial influence of local governments, however, is their ability to affect the incidental costs of geothermal development. Local governments charge fees for producing EIRs; they have the power to require mitigation measures that increase the costs of various geothermal activities; and they choose how to conduct the hearings (and sometimes lawsuits) that accompany procedural matters. Since environmental reports, for example, can cost over $100,000, this power to affect incidental costs is significant.

8.4 Sources of Capital

8.4.1 Internal Sources

Governmental agencies are not the only participants that can affect the financial aspects of geothermal development. One source of money is the geothermal developer himself. He presumably starts with an initial amount of money that he wants to invest in geothermal development. His existing geothermal projects can thus play a crucial role in his decisions about any future project--either by absorbing his funds or providing new ones. For instance, if all of his projects are in the exploration stage, he may run out of money before he has done all the exploration and development work he wants to do. On the other hand, if at least one of the projects produces revenue, either from sale of the field or production of electricity, he will have funds for exploration and development elsewhere. Magma Power is apparently in this position. Revenue from the projects at The Geysers provides money to pay for exploration and development activities in the Imperial Valley and elsewhere. Consequently, an improvement in the return to geothermal developers will, under Magma's present plans, go directly into more geothermal exploration and development within the company.

Nongeothermal projects of a developer also play the same dual role: they can either take away money that the

developer would use for geothermal exploration and development, or they can provide revenue that he can apply to such activities. For various oil companies, petroleum projects have apparently worked both ways. Some have used revenue from such projects to invest in geothermal exploration and development; others have found that the opportunity to invest in petroleum development discouraged the use of these funds for geothermal development. Therefore, the internal funds available to a developer depend on the role of other projects immediately available to him.

8.4.2 External Sources

Other developers. Geothermal developers will sometimes get money, as well as other resources, from other developers. Occasionally, a small developer has obtained access to a leased geothermal area and some development capital by going into partnership with a large company that held geothermal leases. On other occasions, especially in The Geysers, two or three developers have merged their operations so that they can help each other pay the costs of operating the field and attending various governmental hearings and contract negotiations. Cooperative ventures are unlikely to be widely entered into because of the value of the fee for operating the field. However, there are theoretical advantages in small developers' working with large ones, such as a large firms' being better equipped to represent the joint venture in contract negotiations and governmental hearings.

Geothermal users. Another source of funds for geothermal development comes from power producers. Privately owned utilities have shown a willingness to invest in geothermal development. Some of this development has even occurred in stages of the process prior to construction and operation of a power plant. SCE and SDG&E have both formed subsidiaries: in some cases, to obtain leases; in others, to help developers test resources or technologies.

Publicly owned utilities are another source of resources for geothermal development. The city of Burbank went into partnership with Republic Geothermal at the beginning of the process, helping to obtain leases for geothermal development. NCPA, as noted above, has entered a development and purchase agreement with RFL, for which it paid $930,000. A few state and federal agencies, notably DWR in California, have expressed interest in geothermal development. This interest may include activities at all stages of the process, from obtaining leases to constructing transmission lines.

Private and public utilities obtain their financing from retained earnings, sales of bonds and issuance of both preferred and common stock, all of which are regulated by government. The general process has been analyzed extensively and is outside the scope of this report, except for the particular actions the state might take to encourage geothermal investment versus other investment.

Large corporations that use substantial amounts of electricity have also expressed serious interest in geothermal development and on occasion have contributed resources. Dow Chemical has invested money for geothermal development in one of the Magma companies in return for a good negotiating position when it tries to obtain resources for its own geothermal electric plant. AMAX has also expressed interest in arrangements like this one.

Outside investors. Of course, a wide range of investors outside the geothermal development process might also contribute resources. Most prominent among them are high-income individuals and groups seeking tax shelters. These taxpayers are going to be very sensitive to the treatment of geothermal costs for tax purposes. An increase in the certainty of their ability to deduct intangible expenses as a current expense or to use the depletion allowance would, according to most predictions, vastly increase the amount of money available from such sources.

A second source of outside investment might be middle-class investors. According to one analyst, these investors are not so much interested in steady returns as in a significant chance at a very big one. Therefore, they are not going to be so sensitive to the treatment of costs for tax

purposes, but they might be very sensitive to the treatment of returns--for example, changes in the depletion allowance. Another problem they face is the difficulty of obtaining enough information about developers to feel knowledgeable in picking one project for their long-shot investment. The developers also face a significant question: they must decide whether these middle-class investors represent enough money to justify the time and effort involved in contacting them and convincing them that a particular developer is a good place to invest money.

A third set of outside investors who might contribute substantial resources to geothermal development is institutional investors, such as trust funds, insurance companies, and educational institutions. These investors generally have enough financial stability to be able to stand the expense and delay of geothermal investment, if they can buy into the investment in small quantities. The federal and state governments could do a great deal to get them involved. A first step would be to write and interpret the trust laws so that the goals of investing in geothermal development would outweigh its technical and nontechnical risks; that is, so that the investment would be considered "prudent" by those who apply the laws requiring that trustees make only "prudent" investments. Other steps might include some form of tax break for investing in geothermal development--perhaps lighter taxation for returns from geothermal

investment. Models for such actions can be found in the Keogh plans for individual investors and in the treatment of insurance expenses in some foreign countries. In these cases, taxation on income that is invested (in this case, in geothermal development) may be deferred until a return from the investment is realized; then, when taxes are paid, the interest costs of waiting for the return may be deducted.

Lenders. Funds for geothermal development are also available in the form of loans from more traditional lenders, such as banks. Indeed, the federal loan guarantee program discussed above is designed to increase the availability of funds from such sources. A developer seeking a loan will probably have to provide about 25 percent of the total cost from other sources and provide assets as collateral.

8.5 Political Considerations

Many of the steps that the federal and state governments could take to improve geothermal finances will face serious political opposition. At present, the major actors in geothermal development are oil companies and utilities. The major investors are oil companies, utilities, large corporations that use significant amounts of electricity, and high-income individuals. None of these groups is politically popular at present. Consequently, measures that help these groups, even if they also help geothermal development,

may not be received with great acclaim in Congress. In fact, some of the people involved in geothermal development feel that the power to deduct intangible expenses as a current expense and the power to deduct a percentage of revenue as depletion allowance in geothermal development have both been held up only because Congress is afraid the public will perceive them as measures to help the oil companies rather than as measures to help geothermal development. Similarly, regulatory agencies sensitive to public outcry over electricity rate increases are going to be worried about measures that would allow the costs of geothermal development to be absorbed in electric utility rate bases. Measures to increase investment by rich individuals and large corporations face more of the same antipathy.

The provisions concerning institutional investors, which are not objects of the same antipathy at present, may be one way around this dilemma. Another way may be increased governmental activities, such as demonstration grants. Of course, demonstration grants often go to the same people (or public-private partnership arrangements) who would receive the benefits of the tax breaks described above, so these grants may or may not be perceived as less nefarious than the tax breaks.

8.6 Proposals Made by Various Participants in the Process

8.6.1 Tax

- Allow intangible costs of drilling geothermal wells to be deducted as a current expense for tax purposes rather than capitalized in the value of the well (i.e., treat geothermal wells like oil and gas wells).

- Allow the "expensing of intangibles" as above, but only to the extent that the tax benefit covers geothermal revenue or the tax savings go directly to geothermal expenditure.

- Allow revenue from geothermal wells to be subject to a 22 percent depletion allowance instead of cost depletion (i.e., treat it similarly to the way revenue from oil and gas wells is treated).

- Allow percentage depletion only to the extent of further investment in geothermal development.

- Allow geothermal developers to write off (deduct as current expense for tax purposes) 300 percent of the costs associated with dry holes.

- Use a biddable factor other than a cash bonus (such as a percentage of net profits or the level of royalties) in competitive lease sales.

- Allow rapid depreciation of capital expenditures for geothermal development.
- Defer the imposition of local property taxes until the wells start producing revenue.
- Replace the local property tax with a severance tax in the case of geothermal holdings.
- Eliminate the capital gains tax on sales of geothermal assets.

8.6.2 Loans

- Vigorously implement the federal loan guarantee program.
- Have ERDA make loans as well as guarantee them.
- Obtain loans from utilities and heavy users of electricity (with any necessary changes in utility regulations to allow these loans).

8.6.3 Other

- Relax California restrictions on selling risky securities.
- Promote more limited partnership agreements.
- Grant a higher rate of return for capital used in geothermal electricity than in other forms.

- Conduct state or federal government demonstration projects.

- Form more partnerships between utilities and developers.

- Lower bonding requirements for geothermal wells.

- Encourage utilities to do the development drilling of known fields themselves.

- Have California change its tax laws as a model for the suggested IRS changes.

- Have the federal government take a stronger position than the Tax Reduction Act of 1975 so investors would be more certain of the tax aspects of their investments.

- Enact provisions somewhat like those surrounding Keogh plans to encourage institutional investment in geothermal development.

- Legislatively set a time period for cost depletion purposes.

Chapter 8

FOOTNOTES

1. General comments on the analyses in this chapter range from a major utility's view that ". . . the statement of the problem and proposals represent a rather naive approach to the issues of financial risk . . ." to a major developer's view that "Chapter 8 on financing was well done and showed some keen insight into the workings of a free enterprise system of risk exploration." The reader is invited to make his own judgment. The authors hope that, in any event, the chapter is useful.

2. Interview with Dave Butler, of Chevron, January 13, 1976.

3. Christopher D. Stone, Geothermal Energy and the Law I: The Federal Lands Management Program, Draft Report, University of Southern California Law Center, September 30, 1975.

4. Chevron notes that these costs over a 10-year lease period for a full allotment of 20,480 acres of federal land can amount to nearly $1,000,000.

5. Indeed the NCPA-RFL contract's provision for payment of $930,000 to RFL in return for exclusive rights to the steam appears to be an example of the user's supplying capital at the exploration stage. There has been comment that PG&E paid $5,000,000 at the signing of its purchase agreement at The Geysers, although PG&E states that it has never advanced money for geothermal development.

6. Estimates of PG&E's Geysers Unit 14 and Chevron's predictions of hot water plant costs. Although there is considerable variation in the cost estimates for future plants, the important point is that individual geothermal plants are not apt to require large investments relative to other activities by major utilities.

7. There are reports that Shell may end its development activities.

8. Reich v. Commissioner, 52 Tax Court 700 (1969).

9. Telephone interview with Mark Silverman, ERDA, June 29, 1976.

CHAPTER 9

ENVIRONMENTAL IMPACT REPORTING

9.1 Introduction

The requirement for formal consideration of environmental impacts in governmental decisions has been the center of much attention in discussions of nontechnical barriers to geothermal development. From the developers' point of view, it is regularly singled out as the cause of significant delays. Consequently, a long list of proposals has been made to reduce these delays, up to and including exempting geothermal development from environmental reporting requirements. Government agencies, on the other hand, allege that much of the delay is brought on by the developers' negative attitude toward reporting requirements in the first place.

Environmental reports are required for both federal and state actions for geothermal development.[1] Consequently, there are hardly any discretionary permits that can be obtained without preparation of a detailed EIS (under NEPA) or EIR (under CEQA). Because of the sequential nature of geothermal development, at least two and perhaps as many as four separate impact reports are required: (1) for leasing federal or state lands; (2) for obtaining permission to drill; (3) for obtaining permission to build a power plant; and (4) for obtaining permission to build a transmission line, if the line is considered separately from any particular

power plant. Leasing private lands and consolidating any transmission facilities with the power plant decision can reduce the total reports to two. In theory, one comprehensive statement could be prepared that would be acceptable to all the agencies involved.

There is no question that the environmental impact reporting requirements have resulted in more lengthy approval processes and significant costs to the developers. At The Geysers, well-drilling EIRs can cost $10,000-$30,000, while power plant reports can cost on the order of $250,000.[2] In areas where the geothermal resource is confirmed, simply writing the EIR can add months to the permit approval time. On the other hand, there are legitimate environmental problems that were largely unaddressed until CEQA and NEPA forced agencies and developers to confront them, at least to the point of acknowledging their existence. These problems have involved soil erosion and disruption of the land during the preparation of well pads and during drilling; noise and odor associated with well and power plant operations; and the longer-term consequences of subsidence, air pollutant emissions, and the potential for discharges to lakes and streams.[3] Measures to mitigate these problems are now commonly included as conditions for obtaining required permits.

9.2 Problems in Applying NEPA and CEQA

To some extent the problems that have been encountered in applying NEPA and CEQA are the result of the newness of

the concept, the procedures, the issues, and some of the individuals and organizations involved. As experience has been accumulated, processes have begun to operate more smoothly.

However, because of the open-ended nature of some provisions in both NEPA and CEQA, the documents' required content is constantly changing. The evolution has generally been toward requiring more and more material and more detailed analysis. People in the industry often complain about these frequent changes in the "rules of the game."

9.3 New Procedures Under NEPA

The requirements of NEPA became effective in January, 1970, and BLM's geothermal steam leasing program was one of the first major federal actions to which they applied. As the EIS was being prepared on this program, a number of court cases set new standards on the content of such reports. Partially as a result of the rules set down by the courts and partially because of varying policies within BLM on the scope and content of the EIS, the statement itself was redrafted a number of times. Finally, after two and one-half years of gestation, the BLM geothermal leasing program EIS was issued. It appears that subsequent environmental documents on less extensive lease sale areas will be prepared more quickly. Nevertheless, the difficulties in producing an adequate EIS or related document have not all disappeared.

The environmental assessment process for federal lands begins with a prelease assessment performed by the land management agency, most likely BLM or the Forest Service. This assessment is accomplished by the preparation of an Environmental Analysis Report (or Record, if prepared by the USFS). This report usually encompasses an entire KGRA or even larger area and is general rather than site-specific in approach. Preparation time averages three to six months. From this report, a determination is made as to whether or not geothermal development would constitute a major federal action affecting the human environment of the area. If so, an EIS is recommended and a Department Task Force is formed to prepare it. An EIS is completed in one to two years. If the EAR shows that development will not affect the environment significantly, a negative declaration is made, and leasing can begin by the competitive or noncompetitive processes.[4]

Once a lease is issued, and prior to the commencement of operations on the lease, a plan of operation must be submitted to USGS for approval. This plan is evaluated for environmental impact by means of an Environmental Analysis (EA) prepared by USGS. It is site-specific and addresses in detail the proposed operations. The time involved in preparation of an EA is one to three months. From this analysis a decision is made as to whether or not the proposed operations would be a major action affecting the environment. If the decision is positive, an EIS must

be prepared. If the decision is negative, approval of the plan of operation is given with the concurrence of the land management agency.

Special lease stipulations can be added to leases prior to issuance as a result of an EAR, and special conditions governing operations can be added to the approval of a plan of operations as a result of an EA.[5]

No stages subsequent to exploratory drilling have been conducted on federal lands. It can be expected, then, that the initial decisions for each of these later stages will involve similar delays as the organization learns to cope with the new situation.

9.4 New Procedures Under the California Environmental Quality Act

Experience with CEQA has accumulated over a somewhat shorter time frame, but more decisions on various elements of geothermal development have been made in this period; consequently, the procedures of state, local, and regional agencies in geothermal development appear to be more mature than those of their federal counterparts. Although CEQA itself became effective in 1971, its application to geothermal development did not occur until 1973, after a California Supreme Court decision and an amendment to the original act itself extended the EIR requirement to apply to all discretionary decisions of government agencies rather than simply to projects carried out by them.[6] Complaints voiced by developers

about the delays caused by CEQA have focused almost exclusively on a few extreme cases, essentially the first ones to require EIRs after the 1973 revisions.

In Sonoma and Lake counties, the granting of use permits for the drilling of exploratory wells required one to two months prior to 1973 (see Figure 3). Between late 1973 and 1974, they required nine to 12 months. For one Lake County well, nearly 30 months was required before drilling was allowed to proceed. Planning Commission hearings alone were conducted over a period of nine months. When the use permit was finally granted, a lawsuit alleging EIR inadequacy was filed and resulted in an additional 11-month delay. But once citizens are given a chance to air their views; once guide-lines, both formal and informal, are established for the expected content of EIRs; and once the governmental agency acquires some understanding of the problems and issues raised by geothermal development, the permit approval process accelerates. For Lake and Sonoma counties, at least, the shock wave sent through the system by CEQA seems to have passed: recent approvals have been handled in three to five months.

For other agencies, particularly SLC, the process has had a similar evolution. Prior to passage of CEQA, SLC staff approval was required for wells drilled on state leases.[7] Now that CEQA is in effect, well approval requires some type of environmental review, usually an EIR. As an added

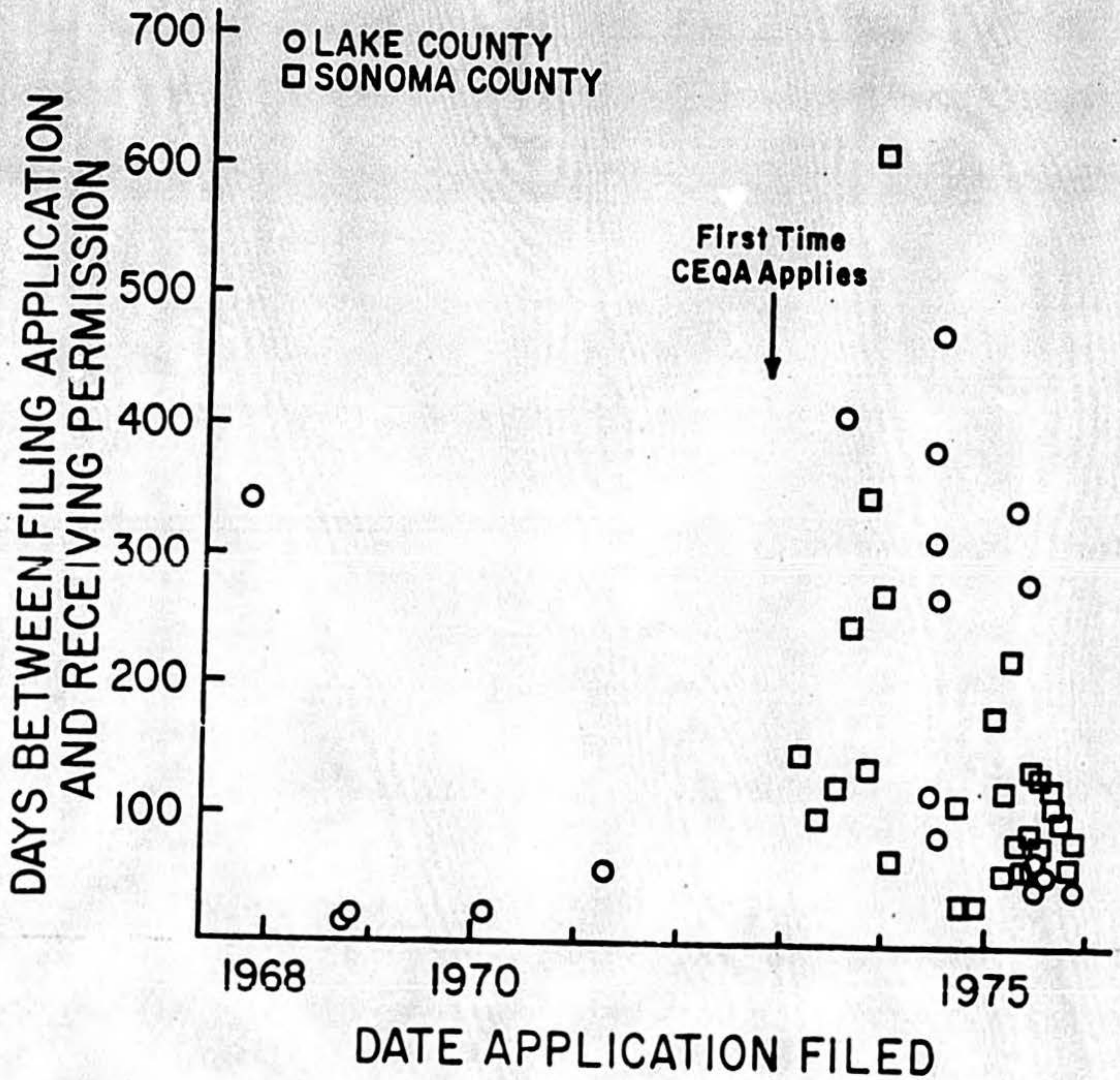

Fig. 3. Time required to obtain permission from counties to drill wells in The Geysers.

complication, the developer must comply with all county requirements, which usually means that he must obtain a county use permit. In most cases SLC has been able to adopt the environmental documents prepared by the county. Because the commission meets only once each month, 30 to 45 days are required for well approval in addition to the time required for county approval. The counties and SLC work closely together and have been able, in most cases, to process environmental documents concurrently. In addition, SLC must prepare or adopt an existing environmental document before a leasing decision can be made. SLC estimates that the preparation and certification of EIRs take from four to six months.

Experience with geothermal power plants in the environmental impact reporting process is even more limited than for other stages. Only three plants (PG&E Geysers Units 12, 14, and 15) have completed the review process and Unit 13 is approaching final approval (see Figure 4). Although the total approval process for Unit 12 took three and one-half years, the delay was partly due to a dispute between CPUC and the county over which agency was lead agency for the project. Once this dispute was settled, CPUC hearings were further delayed until the county had prepared a draft EIR on the entire Geysers leasehold of Union Oil. Other Geysers units required slightly less time: Units 14 and 15 took approximately two and one-half years, and Unit 13 is expected

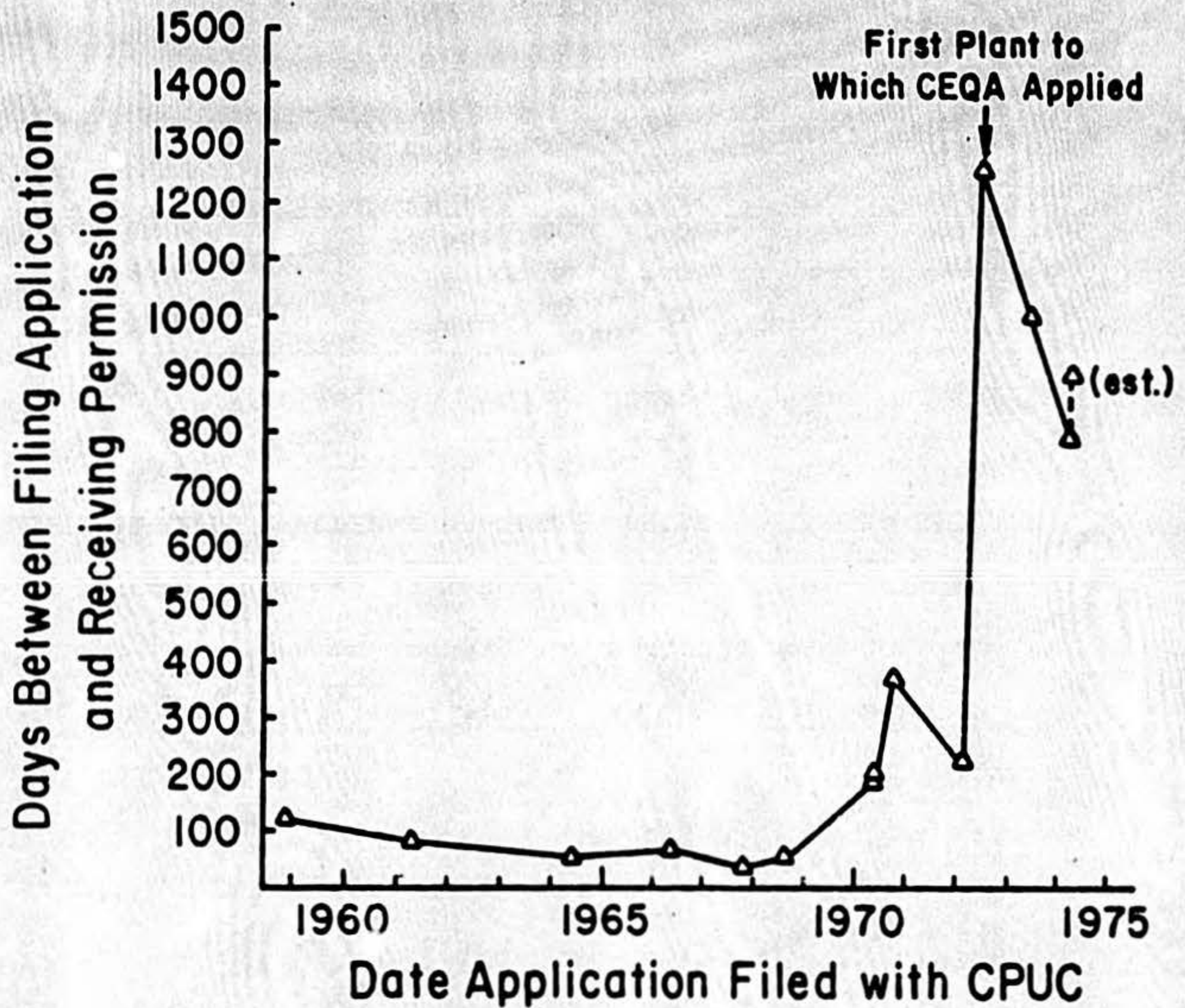

Fig. 4. Time required to obtain permission from CPUC to build a geothermal power plant.

to take a similar amount of time. Not all of the delay, however, is attributable to EIR processing. For Unit 12, only 12 months were spent on processing the EIR; the other 30 months were taken up with preparing for and holding hearings on the EIR. Of the expected two-and-one-half-year processing time for Unit 13, only 11 months were spent on meeting EIR requirements, and much of this time was spent investigating possible harm the plant might do to a Peregrine falcon habitat. Therefore, pre-CEQA plants at The Geysers gained approval in as little as three months; the EIR process is only one element in delays experienced since 1973. Increased controversy over geothermal development at The Geysers is another element, as is diversion of both CPUC and PG&E attention to rate changes and other matters.

While the EIR procedures have begun to be ironed out within CPUC, jurisdiction for Geysers Units 18 and beyond, and perhaps for 16 and 17 as well, will involve a new state agency, CERCDC.[8] Because of its broad mandate concerning environmental protection and conservation, CERCDC is faced with the task of working out a new set of accommodations with interested parties, as well as routinized procedures for handling geothermal power plant EIRs.

9.5 New Issues, New Faces

As has been implied, the first time an environmental report is required for a particular decision, delay is

inevitable. Over time, the handling of these reports becomes more efficient. This initial sluggishness is often the result of inexperience--the inexperience of the agency issuing the permit; of the developers, who are anxious to proceed; and even of the consultants or staff engaged to prepare the environmental report.

For all these participants, a certain amount of learning is required. The agency must learn about the controversial impacts of a proposed project and possible techniques for mitigating adverse impacts in order to make reasonable decisions in light of both opponent and proponent arguments. It must also determine the threshold between adequate and inadequate environmental documents so that they will withstand judicial scrutiny and perhaps even preclude serious challenge. The developer must learn what information the agency wants and which actions the agency will feel are unacceptable. He must learn to anticipate the response of the agency and to alter his plans accordingly. He must also learn tactics (such as applying for a number of permits at a time) that will offset the time required to issue permits. These who actually prepare environmental reports, whether agency staff or private consultants, must learn the overall environmental setting of a proposed project and the issues that will be of most concern, both to the agency reviewing the project and to the public. They must also be able to assemble people experienced in either the

geographic area or the type of project involved, in order to bring together sufficient and accurate information quickly.

As new areas are opened to geothermal development, it can be expected that a pattern of learning will emerge and will be replicated in each agency faced with its first geothermal-related decision. Accordingly, if means could be found to expedite this learning process or to provide an incentive for agencies to share information and experiences, some of the initial delays could be overcome. The learning described above will eliminate neither opposition nor controversy about geothermal projects. It will, however, enhance agency decision making and perhaps hasten the resolution of related conflicts.

9.6 Irreducible Minimum Requirements

Hastening the learning process is no panacea. The environmental impact reporting process, even when functioning smoothly, still requires a certain amount of time for data collection, report circulation, and public hearings. In addition, controversial projects are apt to require more time for preparation of environmental documents than others. The same maxim will also apply to other aspects of public agency decision making. Agencies that must solicit public input or incorporate explicit consideration of environmental values into their decisions face a process that is necessarily more complex and protracted.

9.6.1 Baseline Data

The environmental statutes and their guidelines for report preparation require certain fundamental information--on geology, soils, watercourses, flora, and fauna. If this information has not been previously collected over a wide area, bringing in qualified experts to provide the necessary data can be very time-consuming. Frequently, identical information is collected on two adjacent parcels of land for which applications for some type of permit were filed at disparate times. Had it been known that the data were needed for both parcels, they could have been collected simultaneously at a significant savings. Coordinated and broad-scale collections of baseline information, then, can be of great help in speeding up the reporting process, but only if the following two conditions are met:

1. The information collected will be sufficiently detailed for the needs of individual environmental reports. (Often baseline data are collected at too coarse a level to be useful; efforts spent in this type of endeavor would be wasted.)

2. Several individual environmental reports, encompassing a large contiguous area, are expected in the near future. (If it appears that reports will be required on a patchy basis, it makes no sense to gather finely detailed data on a huge area. It is more economical to collect the data only as

needed; otherwise, projects could be delayed pending completion of a needless survey.)

9.6.2 Circulation of Draft Environmental Reports

Definite minimum times are set for the review of a draft environmental report.[9] The time required beyond the minimum is largely controlled by conflicting time commitments and interest in the subject, especially in public agencies. In the state, an EIR Clearinghouse was created to ensure adequate and rapid circulation of draft reports to relevant agencies. However, for portions of geothermal development in which the lead agency processing times are short (mostly exploratory well drilling), some have complained that the clearinghouse procedures result in delay rather than acceleration. The reason for this complaint appears to be that the clearinghouse function is adapted to handling large projects and is inappropriate for small projects. It has been suggested that in these cases, agencies should be allowed the option of doing their own circulating. But even with the fastest methods of circulation, a minimum of 30-60 days must be allowed for review. It is, of course, possible to establish maximum circulation periods as well; indeed this approach governs CERCDC's review of all power plant siting decisions.

9.6.3 Public Hearings

While not specifically required by NEPA or CEQA themselves, public hearings are required to be held for nearly all

geothermal decisions for which EIRs and EISs are prepared. In some cases these hearings have dragged on for months; for example, hearings for one well application in Lake County lasted nine months. Developers become impatient with such incidents and plead for the establishment of arbitrary limits on the hearing process. However, for many agencies, extended hearings are the price to be paid for obtaining information, keeping the political peace, and to some extent resolving conflicts over controversial projects. In any case, extended public hearings on geothermal projects are unlikely to become a routine occurrence. More commonly, after an initial venting of feeling by the public, fewer and fewer persons show up at hearings as particular types of projects are repeated--unless there has been an event on an existing project which has upset the public, or a particular proposal is especially controversial. Arbitrary limits in these cases would probably be counterproductive.

9.6.4 Agency Schedules

One fact often overlooked in discussions of delays before government agencies is that these agencies have crowded agendas. In some cases, the time lag between application for a permit and the holding of the first public hearing on an environmental report is not so much a function of the time required to prepare the report as of the lack of

open slots on the agency agenda. In recognition of these constraints, agencies themselves have often set up mechanisms to improve the decision-making flow:

1. Special purpose environmental councils have been set up to evaluate the need for environmental reports, screen them, and/or receive public comments (e.g., the Environmental Protection Council in Sonoma County, and the Conservation and Environmental Quality Committee in Napa County). These councils attempt to serve as a focus for controversy so that reviews of the report by other agencies can be handled quickly.

2. When several agencies are involved in issuing permits on a proposed project, one becomes lead agency; that is, one shoulders the burden of receiving public comments and shepherding the environmental report along, thereby lessening the pressure on other agencies. This lead agency concept was specifically established by CEQA.[10]

3. Subsequent development is handled as an addendum to an initial broad environmental report. Anticipating that a developer asking for permission to drill a few exploratory wells may be back to get permission to drill a dozen or so developmental wells, Sonoma County asks that the first EIR on a leasehold be quite comprehensive. Additional

drilling is then handled in a brief addendum to the full EIR. This process results in a substantial decrease in total processing time. However, if the geothermal resources do not turn out to be commercially valuable in the near future, the time spent in preparing an EIR in a manner that assumes ultimate commercial production will have been wasted. Therefore, this approach would probably not be workable in areas with a low chance of success in finding a geothermal resource that is immediately commercially valuable. This would be the case almost anywhere outside The Geysers at present.

Not all agencies have managed to pare their processing times down to the minimum; such agencies could profit from adopting some of the schemes that have worked elsewhere. Again, the sharing of information seems to be crucial.

9.7 Summary

Overall, the environmental impact reporting process has been subjected to considerable criticism--some deserved, some not. The comparison is commonly made between the time required to obtain drilling permits at The Geysers (up to 30 months) and in Imperial County (two to three months). This comparison appears to be invalid. There is no power production from geothermal resources in the Imperial Valley. Consequently, the problems that may be encountered--noise,

subsidence, odor, consumption of scarce fresh water for cooling--have not yet been the subject of much public concern. Once power production begins in the Imperial Valley, opposition will probably begin to materialize, and the permit-granting time will increase accordingly. In contrast, the problems at The Geysers are publicly recognized, procedures are becoming smoother, and mitigation measures are being applied. Therefore, the average approval time at The Geysers should decrease. This is not to suggest that there will be no problems at The Geysers, but merely that conditions at The Geysers are relatively mature and settled, whereas other areas have yet to enter their unsettled period with regard to geothermal development.

9.8 Proposals Made by Various Participants in the Process

9.8.1 Eliminating Some Reports

- Allow initial EIRs to be amended for subsequent wells on the same leasehold.

- Allow geothermal wells to receive a negative declaration.

- Grant geothermal wells a categorical exemption.

- Make drilling geothermal wells an allowable use under local zoning ordinances in KGRAs and other potential areas.

- Prepare an EIR for the entire potential area in the county and let all wells be permitted on the basis of that "generic" EIR.

- Allow EIRs for wells to omit consideration of power plant impacts if the leasehold has no pre-existing producing wells.

9.8.2 Changing Procedures

- Insist on a broad scope in the first EIR on a leasehold and allow subsequent permits to be granted by amendments to the first EIR.

- Set time limits for the preparation and consideration of an EIR.

- Eliminate the role of the State Clearinghouse.

- Speed up the State Clearinghouse.

- Allow EIRs to be sent directly to the local offices of state agencies.

- Require each lead agency to draw up a set of uniform requirements for geothermal EIRs.

- Have applicants apply for permits well ahead of the time they will need them.

- Have the lead agency, instead of the applicant, hire the consultant who will prepare the EIR.
- Hire consultants with experience in the area and sensitivity to the issues likely to be raised by the public.
- Include more than one well in each permit.
- Require uniform, reasonable steps for complying with laws such as the Antiquities Act and the Endangered Species Act.
- Set boundaries on the scope of each EIR.
- Require those who appeal decisions on the grounds of EIR inadequacy to post bonds.
- Establish an administrative board to hear appeals based on the alleged inadequacy of EIRs.
- Have the federal and state governments help collect baseline data in areas most likely to be sites of geothermal development.
- Have potential applicants help collect baseline data on areas likely to be sites of geothermal development.
- Increase staff of lead agencies to give them more time to review EIRs before public hearings.

- Have the staff in lead agencies attempt to predict the conflicts that will be of concern to the public and propose solutions where possible.
- Require EIRs for any disturbance of vegetation.
- Write county land use plans that set aside zones in which geothermal development will be excluded.

Chapter 9

FOOTNOTES

1. For federal actions, these are required by NEPA, 42 USC 4321 et. seq. For state and local ones, by CEQA, California Public Resources Code, Section 21000 et. seq.

2. Discussions with planning officials in Lake and Sonoma counties, geothermal developers, and PG&E.

3. Some have commented that no such discharges have thus far occurred.

4. As noted in Chapter 3, BLM policy about using EARs instead of EISs for leases in areas covered by the EIS for the geothermal leasing program is at present the subject of litigation.

5. The procedures are described in a letter from USGS, June 8, 1976.

6. Friends of Mammoth v. Board of Supervisors of Mono County, 8 CAL 3d 247 (1972).

7. Description of SLC procedures is from an SLC comment in a letter of June 3, 1976.

8. See Chapter 10 for a discussion of the CERCDC.

9. An example of intense developer concern with the environmental reporting process is the following comment on minimum review periods: "This is dumb and a typical example of the problem that exists. It says no matter how short a time it could be done in, by golly you are going to have to cool your heels for this long a period."

10. California Public Resources Code, Section 21067.

CHAPTER 10

THE CALIFORNIA ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION

10.1 Introduction

The entrance of California's newly created CERCDC into the process of geothermal development significantly affects both the drilling and the power plant construction stages of the process and may well have ripple effects in all stages.[1]

CERCDC creates effects in two major dimensions--as a new participant and as a state participant. As a new participant, CERCDC poses the questions of how well and how fast it will learn to fulfill its mandate. CERCDC's task is somewhat simplified, since it is responsible for handling old concerns. In part, its success will depend on how much it learns from the experiences of other agencies and how much it disturbs the accommodations that have developed among existing parties. As a state participant, CERCDC poses questions of the state's relationship to local governments and to others that might be involved in regulating geothermal development.

It appeared as this report was written that both the commissioners and their staff understood the problems facing them and were taking steps to fashion solutions. How effective they will be cannot be determined. Hence the discussion

below is primarily intended to underscore the actual and potential issues facing the commission in geothermal development.

10.2 The Authority of CERCDC

CERCDC is granted authority over possibly the most important stage in the process--building power plants.[2] Its authority to approve power plants and sites supersedes all other permits required by state, regional, or local agencies, with three exceptions. For one, the Certificate of Public Convenience and Necessity is to be obtained from CPUC, a step that will involve a review of the economic, reliability, safety, and rate base implications of the proposed plant. Second, for any plant proposed to be located in the 1,000-yard coastal permit zone, a construction permit is required from the California Coastal Zone Conservation Commission (CZCC) or a regional commission (provided such a commission is still in existence). Finally, permits required by state, regional, or local agencies administering federal statutes are still required.

Certification of sites and plants will occur in two stages: the Notice of Intent (NOI) and the Application for Certification (AFC) processes. A party wishing to build a power plant must first submit a Notice of Intent to file an

application. The commission's deliberations on the NOI are for the purpose of preliminary screening of proposals.

Approval of an NOI allows a party to file an AFC, a detailed application for specific location and plant design. For geothermal plants, the combined NOI-AFC review process is required to be limited to 18 months, clearly a more rapid process than the previous one. However, with the inexperience of the commission and its staff and the shakedown problems that inevitably occur in a new agency, the 18-month deadline may be difficult to meet.

In addition to its regulatory responsibilities, CERCDC is also able to parcel out R&D funds to geothermal development and a broad range of other technical energy questions. CERCDC can thus play a role in stimulating geothermal development by reducing risk in advanced technological ventures.

10.3 CERCDC as a Conflict Focal Point

CERCDC was created to resolve serious disputes that the legislature felt were not being adequately addressed in the existing process.[3] These disputes were focused in the areas of:

1. The rationality of a continually rapidly growing need for energy.

2. The role of conservation as an alternative to building power plants.

3. The protection of the environment.

4. The adequacy of existing decision-making processes and attitudes toward utilities vis-à-vis the general public.

All of these concerns are now thrust upon a single agency. Additionally, new decision criteria are brought into the plant approval process. First, CERCDC is to make an independent forecast of the 10-year and 20-year demand for electricity. No plant that would provide power in excess of that forecast may be approved. The forecast thus will become the focus of extended debate, especially since there is no precedent for this type of activity. In particular, conservation is to be considered an alternative to increased generating capacity in producing the demand forecast.[4]

One should expect, therefore, that a good deal of time will be required to find solutions that are acceptable to all parties in the controversy. This may mean that the decisions made by CERCDC on its first power plant applications will require considerable time, perhaps even in excess of statutory deadlines.

10.4 CERCDC Inexperience

A likely source of difficulty in the processing of the first few NOIs and AFCs is the newness of the agency itself. This newness is reflected in the inexperience of the staff

in carrying out the mandates of a new law and that of the commission itself in dealing with the actors and issues which come before it. In the process of organizational learning, formal and informal mechanisms for dealing with disputes and problems will evolve, along with a set of workable rules and regulations and a staff knowledgeable of the context in which the commission operates. But such evolution inevitably requires time and, generally, some mistakes along the way.

Currently, the planning commissions of Sonoma, Lake, and Imperial counties, CPUC, DOG, SLC, BLM, and USGS appear to have had the most regulatory experience with geothermal development. Many participants in the process were worried about how much CERCDC could learn from their experiences and how much they actually would.[5] CERCDC has initiated formal and informal contacts with various agencies for that purpose. To date, the emphasis has been on laying the groundwork for agreements with the relevant federal agencies and with state and local agencies that administer federal laws.[6]

Some means to transfer the experience of existing agencies to CERCDC would probably reduce the total learning time for the commission.

10.5 CERCDC and the Existing Regulatory Process

For a number of reasons, the relationship of the commission to existing regulatory processes is also a sensitive

point. Most important is the nature of the preemptive authority of CERCDC. While the law grants the commission nearly exclusive authority, it also mandates the commission to apply and enforce the relevant rules, regulations, ordinances, and standards adopted by other state, regional, and local agencies.[7] While the commission may adopt more stringent standards than those applied by other agencies, it does not have a free hand to violate such standards, except in unusual circumstances. Moreover, CERCDC has no authority to change standards set by federal law, even though they may be applied by state agencies. Thus, while the commission is granted the ultimate decision-making authority in approving a site and power plant, substantial discretion in standard-setting remains with other agencies of government.

Shared responsibility for standard-setting and the independent permitting powers retained by CPUC, CZCC, and others are constraints on CERCDC's freedom of action. How the commission will deal with them is a significant issue. Avoidance of conflict both with the other agencies and with intervenors over the exercise of shared powers can greatly enhance geothermal development, particularly in the short run. CERCDC's options for accommodating the other agencies range from minimal compliance with the procedural requirements for notification and solicitation of comments, combined with its own interpretations of their standards, to very extensive consultation limited only by the requirement that

the commission itself rule on NOIs and AFCs.[8] Presumably the probability of conflict falls as consultation increases, although the same increases may of themselves consume significant time and energy. The tradeoffs between conflict and consultation costs represent important decisions for CERCDC.

One possible solution may be to supplement the requirements for notification and consideration of comments by conducting joint hearings at both the NOI and AFC stages. Through this approach, the commission could allow other agencies a direct role in eliciting information from those testifying as well as asking each agency directly for its findings as to whether proposed plants and sites conformed with its requirements. The other agencies would then be involved essentially as partners in the decision-making process.

The minimal approach seems to remove many participants from the approval process, while the second, very expansive method appears merely to add one new "umbrella" participant to the scene. However, the political costs of attempting to exclude an actor whose expertise in the matter is legitimized by the required acceptance of his standards and criteria must be considered. Approval of NOIs and AFCs is likely to be more expeditious to the degree that CERCDC can obtain agreement beforehand among all the interested parties as to how the preemption will work. Allowing agencies the most

direct possible role may be necessary to facilitate such agreements.

The question of the relationship of CERCDC to existing processes comes up again in considering the potential jurisdiction of CERCDC over the drilling of geothermal wells. Under the existing system, the agencies involved in regulating geothermal development have reached a series of agreements on the limits of their regulatory jurisdiction. In general, the counties have jurisdiction over all surface impacts (with the exception of any permits required from a regional water quality control board), and DOG regulates everything below ground, although it also controls the surface effects that directly result from drilling (e.g., the installation of mufflers). The county, furthermore, in approving power plants, evaluates the environmental impact of the associated wells and piping, and CPUC evaluates the construction and operation of the power plant. This particular arrangement was the product of a lengthy dispute between the counties and CPUC, a dispute that could be headed for a reprise. The potential controversy centers both on whether CERCDC has preemptive authority over well drilling and on the extent of its exercise.

The Warren-Alquist Act, which created CERCDC, grants the commission jurisdiction over thermal power plants "and any facilities appurtenant thereto."[9] Since (1) geothermal wells are drilled in areas that as yet have no power plants

installed nor seriously planned, and (2) three or more exploratory wells are drilled in a field, even at The Geysers, before a utility will agree to purchase the steam and build a plant, there is a question whether the wells are in fact "appurtenant facilities."

Moreover, an exercise of jurisdiction by CERCDC over exploratory wells might substantially delay development. The NOI filed with the commission must include preliminary power plant specifications and site description, even though the utility may not know if the resource will be found in that field. The more formal AFC must contain detailed plant and site specifications, again without being sure of the existence or characteristics of the geothermal resource. Were the law strictly interpreted, no wells could be drilled until, first, CERCDC had reviewed and given preliminary approval for an entire power plant, as outlined in an NOI; second, an AFC had been reviewed; and third, the plant had received commission certification for construction. This process may require less than the statutory 18 months, but it is likely to take more than the 90 days in which counties can often issue conditional permits.

There are two other possible solutions to the question of the extent of CERCDC jurisdiction. First, the commission could take jurisdiction over only the dozen or so developmental wells normally drilled after the resource has been confirmed by exploratory drilling and after the utility has

obtained all the necessary permission to construct a power plant. Jurisdiction over exploratory wells could remain with the counties (as lead agency), DOG, and others. Second, CERCDC could take jurisdiction over only the actual power plant, and leave jurisdiction over all wells to the agencies that have regulated them thus far. This arrangement would, in effect, continue the one worked out previously between CPUC, the county, and other agencies.

Consideration of the interface between CERCDC and other regulatory agencies also poses a sharp question about which level of government will regulate environmental concerns. At present, the environmental effects of geothermal development differ greatly by type of resource and location. Support or opposition to geothermal development differs according to the political economy of the region. The technical and political measures that serve to mitigate local concern also differ from place to place.

Thus, the question CERCDC poses is whether the state's concerns will change the agreements that local concerns produce and, if so, how much. CERCDC will have to know not only the way in which proposed development would fit into the general environmental protection and energy resource conservation concerns, but also the specific measures that help to produce agreement in that area. Since local measures differ so much, operating from a statewide base will be very difficult. If CERCDC misperceives the importance of prior

arrangements between the developers and the regulators and tries to override those arrangements, it may encounter substantial resistance that will result in delays.

It should be noted that CERCDC has not as yet defined the extent to which it will exercise control over geothermal exploration or production wells. It is clear that CERCDC will control the siting of power plants, it appears likely that it will exert some control over production fields, and it seems unlikely that it will regulate exploration.

10.6 CERCDC in Flux

The problems noted above are a function of the fact that CERCDC is still largely untested 20 months after its creation. There has been the personnel uncertainty usual in any new agency; some regulations have been amended a number of times, and others--for instance, AFC procedures--have yet to be defined. Such uncertainties have necessarily been confusing to the utilities and to other groups that intend to build geothermal power plants. Until this activity settles down, little can be said about the effect of the commission as a regulator, particularly for situations where CERCDC jurisdiction is ambiguous.

10.7 CERCDC and Special Situations

Several special situations in geothermal development may confront CERCDC with problems that are exceptionally

challenging because they are not dealt with explicitly in its enabling act. The question of jurisdiction over geothermal well drilling itself, discussed above, falls into this category.

10.7.1 Grandfather Clause Exemptions

An equally knotty problem is the extent of CERCDC jurisdiction over geothermal plants that are exempted by law from CERCDC authority because they were planned for construction before CERCDC was in operation and could reasonably have been expected to process the application for their construction. The exemption meant that approvals could be obtained through the previous process, which involved CPUC, the counties, and other state agencies. Many of these plans have since changed, and the jurisdiction over the plants is clouded. Units 16 and 17 at The Geysers, proposed by PG&E, are likely to be the plants most directly affected by this situation, but an additional 220 MWe of capacity originally planned by Burbank is also involved, as are NCPA plans.[10] The commission, by regulation, has chosen to consider exemptions on a case-by-case basis.[11] Its proposed procedures establish a maximum of nine months for deliberating on each claim of exemption. There are objections to these procedures on the basis that they eliminate the statutory right of the utilities to exemptions and impose additional delays. In all likelihood, these procedures have been designed around exemption disparities on very large thermal

power plants, and the commission may have less trouble expeditiously deciding a claim on a geothermal power plant.

10.7.2 Exemptions Due to Size

In addition to the question of those plants exempted from commission jurisdiction by "grandfathering," geothermal plants can also escape commission jurisdiction because of size. The law exempts from CERCDC review thermal power plants of less than 50 MWe size.[12] The commission itself may also choose to exempt geothermal power plants of 100 MWe or less if it determines that plants of this size pose no significant adverse environmental impact.[13] Again, exemption in either case means that separate permits must be obtained from the set of state, regional, and local agencies with previous responsibility for such approvals. An applicant has the choice of waiving the exemption and choosing CERCDC jurisdiction if he believes it in his best interest to do so.

While most recent power plants have been in the size range of 55 to 135 MWe, it is conceivable that initial units in hot water fields would be less than 50 MWe capacity. For potential plant owners, the threshold in CERCDC jurisdiction may cause confusion, but it also provides them with the opportunity to choose their own regulatory path, avoiding either CERCDC (by building a plant less than 50 MWe in size) or other state, regional, and local agencies (by

waiving exemption or building a plant greater than 100 MWe). For CERCDC, this may create problems in keeping track of power plant construction plans. Eventually, CERCDC may find it necessary to revise its regulations in order to avoid the construction of a large number of 49 MWe plants that are outside its jurisdiction. But the greatest difficulty may be for state, regional, and local agencies to preserve, and in some cases create, the rules and procedures to handle the occasional non-CERCDC plant approval in an expeditious manner.

10.7.3 Plants Built by Nonutilities

Heavy users of electricity, such as Dow Chemical Company and AMAX, are now considering the construction of their own power plants to stabilize energy costs, which have been rising rapidly and are likely to continue to do so. There are two reasons for this cost increase: (1) utilities have been forced by rising oil prices and capital costs to increase the cost of delivered power, and (2) there has been a growing feeling that rate structures should be revised so that heavy users bear a large proportion of the increased burden in order to correct for perceived inequality in the past. For such users, geothermal energy promises a long-term source of supply at a low and stable cost. Since they are not traditional utilities, however, obtaining permission from CERCDC to construct plants may be difficult. As noted

above, the commission's approval must involve a finding that the proposed plant is scheduled in a manner consistent with the service area forecast of demand adopted by the commission. A heavy user has no "service area" in the traditional sense but is a part of the area served by another electric utility. The heavy user and the utility may then become explicit competitors before the commission. Any capacity built by the heavy user would subtract from that which the utility could build, and vice versa. While this is not an insoluble problem, there will probably be very few applications from heavy users and, thus, little or no opportunity for a workable procedure to evolve over time. Instead, each application by a heavy user to build a geothermal plant may involve a great deal of conflict and delay, sufficient perhaps to discourage the heavy user from proceeding. This situation may provide one of the most compelling reasons for building plants with a capacity of less than 50 MWe, thereby avoiding CERCDC jurisdiction.

10.7.4 Geothermal Plants on Federal Land

Because much of the highest-potential geothermal land is owned by the federal government, it is likely that someone will eventually propose to construct a power plant on federally owned land. A question can be raised whether the CERCDC has any jurisdiction in this situation and from which federal agencies approval would be required. Potentially, plants could be built on federal land with a minimum of

administrative processing time if few federal, and no state or county, approvals were required. For a utility that must deal with CERCDC regularly for a series of plant approvals, it may be good politics to ask CERCDC for its approval of a plant on federal land, despite the fact that this action may not be required by law. But circumstances may arise (e.g., if a heavy user wishes to build a power plant) in which the question of CERCDC jurisdiction over plants on federal land could be a central dispute and cause significant delays. There is also a question as to whether federal agencies have considered how to handle a proposal to build a plant on federal land. Advance planning, both by CERCDC and by federal agencies, could be useful in reducing delays in the first such proposed plants.

10.7.5 Role of CPUC with Regard to CERCDC

In addition to obtaining a certificate from CERCDC, privately owned electric utilities (but not publicly owned utilities or heavy users) must secure a Certificate of Public Convenience and Necessity from CPUC. By law, this commission is to consider the "economic, financial, rate, system reliability, and service implications" of proposed power plants.[14] To a large extent, however, both agencies will need the same information to make their decisions. The law allows an applicant to file simultaneously with CPUC and CERCDC but requires the CERCDC permit to precede that of CPUC.[15] It is conceivable that the CPUC process could

follow CERCDC's instead of running simultaneously. This would be especially true if CPUC felt that significant changes in plant design and equipment might be required by CERCDC. In this case, the plant approval process could become very lengthy. It could be smoothed out, however, by efforts of CPUC and CERCDC to reach accommodations on sharing information and establishing sufficient interaction to ensure that the actions of one commission do not come as a surprise to the other.

10.7.6 Role of CERCDC with Respect to CZCC

No permit may be obtained from CERCDC for building a power plant in the 1,000-yard coastal "permit" zone unless a permit has first been obtained from the CZCC or a regional counterpart.[16] This situation is analogous to the one between CPUC and CERCDC. A major difference is the uncertain future of the CZCC. According to the initiative which created it in 1972, CZCC is to go out of existence in January 1977. The role of CZCC was to develop a coastal plan and recommend to the legislature a scheme to implement it. Because of the complexity of the issue, the legislature may not be able to enact the proposed legislation before the agency expires. While there is a growing sentiment for extending the life of the CZCC 18 months while legislative deliberations continue, the future regulatory status of California's coastline is still highly uncertain.

10.7.7 CERCDC as a Promoter of Geothermal Development

CERCDC may, in the exercise of its powers over the siting of power plants, exert considerable influence to promote geothermal development. In some sense such influence is mandated by the commission's statute. For instance, geothermal NOIs do not need to list three sites, as others do.[17] More importantly, the periods for consideration of geothermal NOIs and AFCs total 18 months, half the time allowed for other power plants.[18] While the commission probably cannot legally adopt explicit policies giving further preference to geothermal plants, it can exert pressure in that direction by various means. One might be to require the consideration of geothermal energy as an alternative project in the EIR required before certification decisions can be made. Similarly, CERCDC concern with environmental impacts and its choice of mitigation measures to reduce them could favor the geothermal alternative. Finally, there is obviously considerable leeway in such procedural matters as scheduling of hearings and assignments of staff to review document submissions.

In addition to the power plant regulatory duties assigned to CERCDC, the commission is mandated to conduct an R&D program that, among other things, is to accelerate the development of geothermal energy. The commission has several million dollars to devote to this program, but it cannot match the commitment made by ERDA. In fiscal year 1976-77, CERCDC proposes to spend $655,000 in state funds