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THE ROLE OF GAS AND ELECTRIC UTILITIES  
IN DIRECT APPLICATIONS OF GEOTHERMAL ENERGY

Diana King

Earl Warren Legal Institute  
University of California  
2941 Telegraph Ave., Suite B  
Berkeley, California 94705

ABSTRACT

The establishment of geothermal distribution systems may be an essential next step in the development of direct applications of geothermal energy. One possibility is that existing utilities will play a major part in geothermal distribution. This paper reports the results of a study which surveyed gas and electric utilities on their probable role in direct heat applications.

Among the major findings of this survey is that most large utilities have little interest in direct applications, primarily because they do not presently see a potential for geothermal operations on a scale that is large enough to be attractive to them as a new business opportunity or to significantly improve the efficiency of their existing systems. The smaller utilities, and particularly municipal utilities, in contrast have a more active interest in developing local geothermal resources and are not deterred by the prospect of relatively small-scale projects.

INTRODUCTION

Increasing interest in geothermal direct heat potential brings to the forefront questions of how resources for direct uses will be developed and supplied. Some applications will occur at a single site and involve a single user. Other uses will in all likelihood depend upon the availability of geothermal heat supplied to multiple users through some type of distribution system. Recent studies on the potential for geothermal development and utilization by firms in several industries indicate that few firms are interested in developing geothermal resources for their own use but that almost all would consider using geothermal energy if they could hook up to a distribution system as they do now for other types of energy (Bressler et al, 1980). What kinds of entities might undertake to set up and operate such distribution systems then becomes an important area of inquiry.

It has been commonly assumed that existing utilities will play a central role in geothermal distribution. Until recently, however, the utilities' own views on this subject had not been systematically examined. This paper summarizes the results of a survey of utilities on their role in geothermal direct applications. It is based on

in-depth interviews with 34 utilities, including most of the major gas and electric companies and representative smaller private and publicly-owned utilities serving the western geothermal areas.

UTILITY SYSTEM CONSIDERATIONS

One basis for the belief that utilities will be motivated to undertake geothermal distribution is the assumption that such projects will relieve demand pressures on their gas and electric systems or will defer the need for expensive new power generation capacity. The survey responses show that this assumption does not accurately reflect current utility perceptions.

The greatest system pressures are being experienced by electric utilities, whose need for generating capacity is determined by the highest level of daily and seasonal electricity demand. Increasing costs, more stringent regulation and public opposition have made it difficult for utilities to meet rising peak demand by constructing new power plants. In most western states where gas is the primary fuel for space heating, peak demand for electricity is on summer afternoons. The use of geothermal for winter space heating would not affect this peak or the need for new generating capacity to meet it. On the other hand, the use of geothermal for space cooling would impact peak electricity demand. However, because they do not foresee cost-effective geothermal space cooling as a near-term prospect, utilities in this region do not view direct uses as an answer to their electric system pressures.

The demand picture differs in the Northwest. Washington and Oregon electric utilities have winter peaks, largely due to electric space heating demand. In these states geothermal use for space heating would reduce peak demand. Nevertheless, these utilities are no more interested than those in other regions. They do not look to geothermal to relieve system pressures because most doubt that direct applications will ever be large enough to have a significant impact on their power generation capacity requirements.

The gas utilities surveyed generally view geothermal as direct competition to gas sales with no offsetting system benefits. Although many experienced supply shortages during the past decade,

most gas systems now have ample supplies. However, they are facing reduced markets caused by sharply rising prices, conservation and the loss of industrial customers. Geothermal direct uses might therefore interest them if they appeared to offer a means of retaining or regaining the business of large industrial energy users who are converting from gas to other fuels. Even where customers cannot be regained, where a geothermal resource is identified local gas utilities may be forced to choose between undertaking geothermal distribution or losing additional gas markets to others who will exploit the resource.

Another assumption has been that electric utilities involved in geothermal power generation will be interested in developing downstream direct uses for spent power plant fluids. This interest was confirmed. Most of the utilities are enthusiastic in principle about downstream uses as a way to improve the economics of geothermal power production. However, a number of potential problems raised by utilities may in actuality limit the early development of downstream uses. One is the remote location of many of the electric-quality resources. Although the utilities hope that industries will be willing to move to take advantage of this energy source, other indications are that relocation to remote areas is fairly unlikely. The studies referred to above conclude that very few firms will relocate to take advantage of the availability of geothermal energy, and that the siting of new plants will be based much more strongly on access to raw materials, markets, labor and transportation than on particular energy sources (Bressler et al., 1980).

Another problem is that power plant engineering considerations may dictate that no usable heat will remain for other uses. In any case, many utilities believe that downstream uses should not be developed until the recharge requirements of the power plant reservoir have been fully determined. In addition, there is uncertainty about whether the utility which is generating power will control the spent fluids, or whether they will remain the property of the resource producer.

#### RESOURCE DEVELOPMENT

Most privately-owned utilities are unlikely to play an important role in resource development for geothermal direct heat applications. They consider high-risk investments in basic exploration to be inappropriate, since regulatory commissions would not allow the costs to be passed on to the rate-payers, and utility shareholders are traditionally interested only in very safe investments.

Some of the companies which have in the past invested in exploration for electric-quality geothermal resources have since withdrawn from resource development because of the high risks. They now contemplate building power plants only where a resource has been proved by others. On the other hand, Pacific Gas & Electric, which has been the pioneer in geothermal power production but has not previously participated in resource development,

has now decided to explore for geothermal resources outside of The Geysers. Nevertheless, though some electric utilities are willing to participate in exploration for resources suitable for their basic business of power generation, few would consider taking these kinds of risks for direct applications. Gas companies, with experience in exploration and development of natural gas resources, appear somewhat more willing in principle to consider resource development for direct uses.

However, only one among the investor-owned utilities surveyed reported that it would initiate and carry out geothermal exploration on its own. This was Northwest Natural Gas, which for some years has been actively seeking a resource on Mt. Hood to serve a planned large industrial heat system in Portland, Oregon. The others would most likely participate in geothermal resource development, if at all, only in joint ventures initiated by resource companies which would carry a major part of the risk and the financing.

Some companies that would not actively explore for geothermal for direct uses might still invest in field development of a known resource. One reported that it might develop a hot water resource discovered during its exploration for oil and gas. Similarly, electric companies that are seeking electric-quality geothermal resources might consider developing a low-temperature resource that is discovered during the course of their exploration. However, because of the remote locations of most of the drilling, this is unlikely to lead to significant development for direct applications. In addition, much of the exploration for electric-quality resources is outside the utility service areas; most utilities are not interested in developing resources for direct applications outside their service areas (even though they might consider developing downstream uses for the spent fluids of power plants located outside of their territories). Even inside its service area, a utility might prefer to encourage potential users to develop the resource rather than to develop the field itself for direct applications.

The publicly-owned utilities surveyed had a more positive attitude toward participation in geothermal resource development, but only where a local resource has been clearly identified on the basis of past exploratory work. None expected to go far outside its service area or to seek new resources. The public districts and municipal utilities were also more willing than the private companies to consider acting alone in resource development. While some would look for development partners among other public entities or potential users, only a few would limit their participation to joint ventures with resource companies (and many of the municipal utilities would reject such an arrangement).

However, development financing may be a constraint for these public utilities. Normal tax-supported bond financing may not be feasible,

given present constitutional and political limitations. Many utilities also have the authority to issue revenue bonds, but it is questionable whether there would be a market for revenue bonds issued to finance the resource development aspects of a geothermal distribution project.

#### DISTRIBUTION

In contrast to their hesitation to participate in resource development, almost all of the utilities surveyed would be willing to consider becoming retail distributors of geothermal heat if an independent resource producer could supply hot water near a populated section of the utility service area. All utilities see their experience and facilities for delivering energy, billing and servicing customers and operating under regulation as relevant. They point out that gas companies in addition have useful technical expertise relating to underground pipelines, as do a number of utilities which operate steam or hot water systems serving downtown areas or large building complexes.

For privately-owned utilities, a geothermal distribution proposal would be evaluated as a new business venture. Most large companies would find such a proposal attractive only if they could see the prospect of large geothermal operations, on a scale that fits the size and centralized management perspectives of the company as a whole. These companies are unlikely to undertake a small distribution project, no matter how cost effective it might appear as a separate venture, unless they have first made a company-wide decision to enter the field of geothermal direct applications on a large scale.

Smaller utilities, both privately and publicly-owned, would generally be willing to consider any proposal without regard to questions of overall scale, and could undertake even small local projects if they appeared cost-effective.

Financial evaluation of a direct heat project would also differ between privately and publicly-owned utilities. Most investor-owned utilities would find a geothermal project attractive only if it could be expected to earn a higher return than conventional utility investments. This is both because they need an incentive to undertake a new line of business and because they anticipate serious operational problems and risks in working with geothermal. However, the ability to earn such a premium may be limited. Utilities generally expect that geothermal distribution will be subject to public utility regulation; some believe that their state utility commissions may not recognize the need for a higher return on geothermal investments and may restrict the return on utility operated geothermal systems to the rate allowed on utility gas and electric facilities.

Publicly-owned utilities, on the other hand, would tend to require only that a direct use project meet the financial standards applied to other utility investments, which may range from earning

a substantial return to operating at break-even. Since municipal utilities are departments of local government, evaluation and decisions on geothermal projects will be made on the basis of more than strictly business concerns. Many communities may be willing to accept lower returns on investment for the use of local, alternative energy resources, or for projects that can aid local economic development.

#### SALES CONTRACTS

When geothermal distribution is based on hot water supplied by an independent producer, the terms of the sales contract between the producer and the utility purchaser will be important. Utilities have definite views on how this contract should be structured in several important respects. Most of the investor-owned utilities would accept a purchase price based on market value and pegged to the price of alternative fuels. Most of the publicly-owned utilities would strongly prefer a price based on the costs of production which would not escalate with the price of OPEC oil. But they would expect the price to include a substantial "risk rate of return" on the producer's investment. For many utilities certainty of price is even more important than the beginning level: they would want a provision limiting the allowable price escalation during the course of the entire contract.

Among other contract terms, almost all utilities would accept a take or pay provision under which they would guarantee a level of minimum purchases. Some would also want the contract to contain specific provisions for exclusive dedication of the resource or requiring the producer to continue exploration and development of the geothermal field.

The issue raising the most concern among utilities is the risk of premature reservoir depletion. Some utilities would require the producer to guarantee the delivery of fluids, at least for a certain period of time, with liability to reimburse the utility for any unrecovered investment if the quality or quantity of the fluids falls below the contract levels. Others see the possibility of reservoir depletion as more of an "act of God," and would accept a part of the risk. Most would pass on the risk to the geothermal customers through rapid amortization of the utility investment. A few utilities expect that the government must bear the risk through reservoir insurance or non-recourse loans in order to facilitate geothermal development.

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