

Decision No. 93035 MAY 19 1981

ORIGINAL

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

In the matter of the application)
of SOUTHERN CALIFORNIA EDISON)
COMPANY for a certificate that)
the present and future public)
convenience and necessity require)
or will require that Applicant)
construct and operate a)
geothermal electrical generation)
facility located in the State of)
California, County of Imperial)
near Heber, California.)
_____)

Application No. 59512
(Filed March 10, 1980)

Hobart D. Belknap, Jr., Attorney at Law, for
Southern California Edison Company,
applicant.

Ellen Levine, Attorney at Law, William Thompson,
and Martin Bracen, for the Commission
staff.

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O P I N I O N

Summary

Southern California Edison Company (Edison) requests Commission authority to construct and operate a 41.1 megawatt (MW) dual-flash geothermal facility near Heber, California. The Heber Geothermal Project (Heber) will be a commercial baseload resource using a demonstrated technology and will be operated and relied upon as a firm capacity resource from the beginning of operation.

The facility proposed by Edison is technologically feasible and commercially viable; however, the cost of the power that would be produced is not competitive with other forms of electrical generation. This is largely because the steam or brine contracts with the producer, Chevron, peg the brine prices to oil prices. The result is that while the facility is commercially viable, it is not commercially competitive. When terms are renegotiated so that the facility would be competitive with more reasonable brine contract terms, we think it would be extremely worthwhile for Edison to pursue. We must ensure new energy sources are cost-competitive as we exercise our duty to protect Edison's customers from bearing unreasonable costs through their rates. Our decision denying Edison the certificate to construct Heber at this time means Edison should either renegotiate its contract with Chevron or explore with other potential producers the possibility of obtaining a brine supply.

If Heber is in operation, it would reduce dependence on uncertain supplies of imported oil by up to 400,000 barrels yearly, improve air quality, and, finally, increase the diversity and reliability of the fuel supply available in the Edison system.

Heber relies on relatively simple and reliable technology. A similar plant operating in Japan has recently achieved a capacity factor of 90 percent. It has been shown that the anomaly from which the geothermal fluid will be produced is quite capable of supplying enough heat to fuel the 41.1 MW plant for 30 to 35 years. The Heber project rests on a very sound technical base.

Based upon preliminary engineering, the capital costs borne by Edison for the Heber project total \$69 million. The other major cost component associated with Heber is the geothermal fuel expense. Under a Sales Contract, with its various provisions explained in the body of this opinion, Chevron Resources Company (Chevron) will supply and Edison will purchase heat contained in the fluid to operate Heber for a 30-year period. Edison feels that the Sales Contract, including the pricing mechanisms, is fair and equitable to both parties. Staff, on the other hand, concludes that the Sales Contract is unfavorably skewed to Chevron's advantage and requests that any Commission authorization be conditioned to more equitably protect the interests of Edison's ratepayers.

Given projected capital costs and fuel expenses, Edison presented cost comparisons of Heber with a coal-fired alternative and an alternative burning oil in an existing facility. Edison's projections indicate that through 1994 the revenue requirement for Heber is greater than that for a coal-fired or existing oil-fired alternative. On a levelized basis for the year 1982, the cost of delivered power from Heber is 17.9¢/kWh, as compared to 11.0¢/kWh for a coal-fired alternative and 16.6¢/kWh for existing oil-fired generation. Using assumptions most favorable to Edison, the average impact on rates in 1994 would be as follows: .052¢/kWh for Heber; .033¢/kWh for an alternative coal project; and .048¢/kWh for existing oil-fired generation.

Edison quite candidly acknowledged that Heber would not be cost-competitive with alternatives through the first 12 years of the project. Further, Edison presented no evidence from which the inference could be drawn that the Heber Project would become cost-competitive with alternatives at some point in the future. If anything, the record evidence supports the inference that geothermal energy, produced under contracts similar to the Sales Contract, will not be cost-competitive at any point in the future.

The staff considered the Sales Contract the major impediment to obtaining electricity from Heber at costs lower than from oil generation. Staff argued that Edison has significantly underestimated the cost of geothermal brine under the Sales Contract. Staff contends that Heber will cost as much as 30-40 percent more than coal or oil alternatives in 1982 and 7 percent more in 1994. Staff projects that on a levelized basis for the year 1982 the cost of delivered power from Heber will be 24.3¢/kWh, as compared to 11.0¢/kWh for a coal-fired alternative and 16.6¢/kWh for an existing oil-fired alternative.

Based upon Edison's showing alone, Heber's lack of cost competitiveness prompts numerous questions about the prudence of undertaking such a project. The staff showing only serves to further increase the doubts about Heber.

Are the economic risks imposed upon ratepayers by Heber outweighed by the significant benefits to be derived from the development of the Heber geothermal resource? We do not think that the record evidence can support such a conclusion.

Edison failed to provide the Commission any meaningful basis for determining that costs incurred pursuant to the Sales Contract are reasonable. Edison concluded that the price charged for brine is in an appropriate range on the basis of the negotiations and analysis of industry literature, reports, and confidential and proprietary contracts. Since fuel expenses are a major reason why Heber will not be cost-competitive, Edison's mere conclusory statements that the pricing mechanisms are equitable must fail as inadequate.

We are asked to approve Heber and ignore notions of cost-competitiveness and cost-effectiveness. Yet, cost is a fundamental tool in making decisions regarding the most efficient way to develop sufficient energy resources. Cost is a primary measure by which we judge the worth and reasonableness of a project. Heber, as currently structured, is not cost-competitive and therefore fails the test of reasonableness. Heber does not represent a prudent and reasonable investment to be ultimately borne by the ratepayer. Accordingly, Application No. 59512 is denied.

Introduction

By Application No. 59512, Edison requests Commission authorization to construct and operate a 41.1 MW dual-flash geothermal generation facility near Heber, California. Heber is five miles south of El Centro, California, in the southern portion of the Imperial Valley.

Heber, as proposed, will provide an additional source of electrical generation, using geothermal brine as a primary fuel. Geothermal fluid used in the plant will be produced by Chevron at facilities adjacent to Edison's site and delivered to Edison in accordance with the Geothermal Energy Contract (Energy Contract) and the Geothermal Sales Contract (Sales Contract) executed between Edison and Chevron in November 1978.

Notwithstanding the Commission's General Order No. 131 which exempts plants of Heber's generating capacity from any requirement to obtain a certificate of public convenience and necessity (certificate), Edison filed the subject application in order to secure "preliminary" assurances from the Commission that projected costs associated with Heber are prudent and reasonable.

Public hearings were held in Los Angeles on December 4 and 5, 1980, at which time Edison and the Commission staff presented testimony and exhibits. The matter was submitted on January 20, 1981, upon receipt of concurrent briefs.

I. Edison's Showing

In support of its application, Edison sponsored the testimony and exhibits of seven witnesses during the public hearings. These witnesses presented evidence regarding the following aspects of the Heber project: (1) its policy implications, (2) its technical feasibility, (3) its economic costs, and (4) its environmental impacts.

1. The Policy Implications of Heber

Edison testified that Heber will be a commercial baseload resource using a demonstrated technology and will be constructed to satisfy a system need. The plant will be operated and relied upon as a firm capacity resource from the beginning of operation.

Edison forecasts that it will require more than 6,000 MW of additional generating resources by 1990. Six thousand MW of additions will be required to meet anticipated increases in peak demand between 1980 and 1990, to provide a normal reserve margin, and to account for the termination of capacity purchase entitlements. To meet part of the anticipated increase in demand, Edison will require the use of the 41.1 MW capacity of Heber.

Edison views Heber as a crucial step in the implementation of its announced policy to accelerate development of alternative and renewable energy resources. To achieve such accelerated development, commercialization of each of the alternative and renewable energy resources is a necessity. For Edison this application represents an initial step toward commercialization of geothermal as an energy resource.

Edison underscores its commitment to development of alternative and renewable energy resources with its latest electric supply forecast in which approximately 30 percent of Edison's new generation capacity planned during the 1980s will derive from such resources. According to the resource plan, geothermal energy represents 420 of the 1,900 MW of alternative energy Edison will develop under its new policy. Edison feels that realization of its 420 MW goal requires approval of this application which will mark the first critical step toward commercialization of geothermal energy.

Although well aware of the applicability to the Heber project of General Order No. 131's exemption provision, Edison seeks preliminary Commission assurances that it will support Edison in the way project costs will be treated for ratemaking purposes. Edison does not propose unusual or extraordinary ratemaking treatment for Heber. Rather, Edison requests normal rate base treatment for a commercial plant although it cautions that some of the costs associated with Heber may be higher since certain technologies will be used for the first time on a commercial basis. However, Edison firmly believes the costs and risks involved in constructing and operating of a first-of-a-kind commercial geothermal plant are reasonable in view of long-range benefits gained by ratepayers through development of geothermal energy.

Numbering among the long-range benefits of commercializing the Heber geothermal resource are: (1) reduced dependence on increasingly uncertain supplies of imported oil by up to 400,000 barrels yearly, (2) improved air quality, (3) increased generation resources for the ratepayer, and (4) increased diversity and reliability of the fuel supply available in the Edison system.

Finally, Edison takes the position that without a certificate and its preliminary assurances or with a certificate unduly burdened by staff-proposed conditions it would find it difficult, if not impossible, to proceed with the Heber project.

2. The Technical Feasibility of Heber

Discussion of the technical feasibility of Heber focuses on two components: (1) the reliability of existing geothermal processing technology and equipment and (2) the reliability of the geothermal anomaly as an adequate heat source.

The first component, the equipment and process necessary to convert geothermal energy to electricity, can be described in the following manner:

Geothermal fluid used in the proposed dual-flash power plant cycle will be produced by Chevron. The site for Chevron's production facilities will be contiguous to the power plant site making the production pipelines as short as possible. At full plant load, approximately 8,000,000 lbs/hr of geothermal fluid will enter the first stage flash (or separator) tank wherein steam is separated and flows to the throttle of a steam turbine generator. Cold brine from the bottom of the first stage tank flows to a second tank where additional steam is separated for use at a lower pressure region of the steam turbine. Spent brine from the second stage tank is returned to Chevron for reinjection into the Geothermal Reservoir.

Exhaust steam from the turbine will go to a steam condenser and the condensed steam (condensate) will be used for cooling water makeup to the cooling tower. This cycle arrangement obviates the need for large quantities of cooling water from another source. However, in order to comply with the 100 percent reinjection objective of Imperial County's Geothermal Element, a water treatment plant will be designed, constructed, and operated by Chevron on the New River. A quantity of New River water equivalent to the condensate flow will be treated and injected into the Geothermal Reservoir. For miscellaneous power plant service water requirements, it is contemplated that water will be taken from the Dogwood Canal. Estimated average daily requirement is 80,000 gallons.

The plant's heat rejection load is dissipated in a mechanical draft evaporative cooling tower consisting of ten cells each 42 feet long and each with one induced draft fan. The cooled water passing down through the tower is collected in a concrete basin below the tower. Circulating water pumps convey the water from the basin through the steam condenser and back to the top of the cooling tower.

Specific areas to be constructed in order to operate a geothermal facility at Heber are the production island, the power plant, the brine injection pumps and injection pipeline, the injection island, the water treatment plant, and its injection well. The production island is a group of wells that will be drilled into the Heber geothermal reservoir. Chevron is totally responsible for the cost of construction and operation of the production island and its facilities. Adjacent to the production island is the power plant which Edison will fund, engineer, construct, operate, and maintain. The brine injection pipeline system, which includes the desander, brine injection pumps, and approximately 7,000 feet of

30-inch pipeline will be engineered, constructed, operated, and maintained by Chevron. Edison, however, will pay for the construction and operation and maintenance of that line. This line, approximately one and a half miles in length, ends up at the injection island; which will be totally funded, constructed, operated, and maintained by Chevron. The injection island consists of a group of wells to reinject the spent brine back into the geothermal reservoir.

The remaining principal area of work is a water treatment facility which will be located approximately three miles southwest of the plant site on the bank of the New River. This facility will clarify New River water and reinject it into the geothermal reservoir to make up for water consumed by the power plant. This facility will provide 100 percent reinjection of fluid (brine) into the reservoir. It will be designed, constructed, operated, and maintained by Chevron with Edison funding the total facility costs. The water injection well, however, will be drilled, constructed, and funded by Chevron. It is necessary to reinject water into the reservoir because Edison will use the condensate from the plant condenser as makeup water to the cooling tower instead of using external sources of plant cooling water.

In concluding that it is reasonable to expect that the Heber plant should operate at a capacity factor of 75 percent, Edison's witness stated that the process and equipment associated with a dual-flash plant such as Heber is relatively simple in terms of its operation. He further testified that the equipment to be used at Heber is the same equipment used in a 55 MW dual-flash unit which has been in operation at Hatchobaru, Japan, for the past three years. The same vendor, Mitsubishi, who supplied the equipment for the Hatchobaru plant will provide equipment to Edison. Since Hatchobaru is essentially a carbon copy of the Heber plant and since the Hatchobaru

plant has approached a 90 percent capacity factor in recent operations, Edison expresses a high degree of confidence in the process and equipment associated with Heber.

With respect to the second component of Heber's technical feasibility, Edison presented testimony regarding the nature of the geothermal anomaly at Heber. After his analysis and evaluation of the anomaly, Dr. Brigham of Stanford University concluded that enough hot water can be produced from the anomaly at high enough temperatures to support a 500 MW development for 30 years. He expressed with a high degree of confidence that enough heat can be recovered from the Heber geothermal anomaly to supply fuel to the initial 41 MW net power plant for 30 to 35 years. He further concluded that the failure of the wells to produce the geothermal brine or the pumps to operate is about as likely as occurrence of an earthquake of 8.5 magnitude.

3. The Economic Costs of Heber

a. Capital Costs

Based on preliminary engineering, cost estimates were developed for the power plant portion of the project. The estimated cost, including contingency and overheads, amounts to \$51,400,000. Chevron, which will receive payment from Edison for construction, operation, and maintenance of the brine injection facilities and water treatment facilities, estimated costs for those facilities amounting to \$17,600,000. Thus, the capital costs borne by Edison for the Heber project total \$69 million.

HEBER GEOTHERMAL
CAPITAL COST BY ACCOUNT

(Dollars in Thousands)

<u>FERC Account Code</u>	<u>Description</u>	<u>Direct Expenditures</u>	<u>Overheads</u>	<u>Total Cost</u>
341	Structures and Improvements	\$ 4,700	\$ 1,200	\$ 5,900
342	Fuel Holders, Producers, and Accessories (Chevron)	14,000	3,600	17,600
343	Prime Movers	12,600	3,200	15,800
344	Turbogenerator	16,000	4,100	20,100
345	Accessory Electric Equipment	6,140	1,520	7,660
346	Miscellaneous Power Plant Equipment	1,340	340	1,680
347	Transmission-Station Equipment (Switchyard)	120	30	150
397	Communication Equipment	<u>100</u>	<u>10</u>	<u>110</u>
	Project Total Cost	\$55,000	\$14,000	\$69,000

b. Brine Supply Contracts and Costs

Under the Sales Contract, Chevron will supply and Edison will purchase heat contained in the fluid to operate Heber for a 30-year period. Under the Energy Contract, Edison has the first and prior right to purchase all geothermal energy for electric generation use from Chevron's share at Heber in excess of Chevron's existing commitments to San Diego Gas & Electric Company.

Edison testified that the Sales Contract executed between Chevron and Edison in November 1978, is the product of intense negotiations which spanned two and one-half years. It is Edison's sworn testimony that the contract cannot be renegotiated and reflects Chevron's final position on price. The contract price is significantly better than Chevron's original proposal and prompts Edison to conclude, upon consideration of other contracts for geothermal energy as well as industry publications, that the Sales Contract price is reasonable and competitive as now negotiated.

The terms and conditions of the Sales Contract address the sharing of costs and risks between the parties, such as pricing and escalation mechanisms, each party's obligations, and damages and penalties associated with failure of the reservoir or power plant to perform to the level expected. In aggregate, the intent of these terms and conditions is to provide substantial incentives for each party to perform to expectations, since a failure to do so will benefit neither of the contracting parties, no matter what the fault or cause.

The major terms and conditions, especially as they relate to costs and risks, are summarized below.

(1) Pricing and Escalation Mechanism

The fuel price formula, the primary mechanism for calculating a fair and equitable monthly fuel cost, consists of a demand component and a commodity component. The demand component, which is a fixed price subject to escalation, is intended to provide for recovery of fixed costs incurred by Chevron to meet its "supply obligation" to Edison. This supply obligation involves Chevron's capability to provide sufficient usable heat to continuously operate the plant at its generating capacity. The commodity component provides Chevron recovery for a portion of the market value of the usable heat from the brine. The commodity charge is therefore proportional to the amount of usable heat supplied to Edison.

In conjunction, the two components are intended to represent the value of the usable heat from brine as an electrical generating fuel and to compensate Chevron for development, operation, and maintenance costs, as well as to provide Chevron a return on its investment. The total monthly charge is the sum of the demand charge and the commodity charge. Each of these charges is tied to a base price and individual escalator indices.

The base price for heat delivered is \$.60 per million usable British thermal units (Btu). If Chevron is required to use pumps in more than 50 percent of the wells used for providing brine to the initial plant, the base price will become \$.65/mm Btu. ✓

Currently, the demand index, which governs escalation of the demand charge, corresponds to changes in the Consumer Price Index (CPI), a general economic index reflecting costs for consumer items. The commodity charge is tied to the commodity index which corresponds to changes in the Producer Price Index for Funds and Related Products (PPI05). The PPI05 is a composite fuel indicator reflecting the price changes in coal, coke, natural gas, electricity, crude oil, and petroleum products, with oil and petroleum products constituting approximately 50 percent of the fuel mix. ✓

The Sales Contract provides for the intent of each index to be carried out for the life of the project. The specified contractual intent of each index is as follows:

- (a) The demand index shall be an independent indicator of changes in the costs of geothermal development and production.
- (b) The commodity index shall be an independent indicator of changes in the costs of energy supplied to base-loaded electric generating facilities on a national basis. (Sales Contract, § 14.5.)

The contractual terms provide for either or both of the escalation indices to be subject to review after five years from initial plant operation at the request of either party. If the parties

cannot agree on the future escalation indices, then they shall be determined by arbitration. Any resulting new index may then be reviewed five years after the change. Edison thus concludes that the contract provides assurance that over the term of the contract the parties will adhere to the intent of each index.

With respect to the commodity index, Edison testified that there is no readily available government-produced index that tracks the price of fuel to base-loaded electric generation in this country. Selection of the PPI05 as the commodity index resulted from negotiations and reflects the best efforts of Edison and Chevron to find a government-published indicator that meets the intended purpose of relating changes in the cost of fuel supplied to base-loaded generation. Edison stated that the commodity index will be changed in accordance with the contract if the PPI05 does not accomplish its intended purpose.

Edison presented evidence demonstrating that the current fuel mix for base-loaded electric generation is weighted approximately 55 percent coal, 17 percent natural gas, 15 percent oil, and 13 percent nuclear, with the trend being away from oil. On this basis, Edison concludes that the intent of each index, including the commodity index, minimizes the impact of oil on the fuel price.

On the basis of the Sales Contract provisions, Edison projects net fuel expenses for each of the first 12 years of the project as follows:

Heber Annual Fuel Expenses

(Dollars in Thousands)

<u>Year</u>	<u>Amount</u>	<u>Year</u>	<u>Amount</u>
1982	\$ 3,015	1989	\$21,880
1983	\$12,766	1990	\$23,260
1984	\$14,164	1991	\$24,707
1985	\$16,423	1992	\$26,259
1986	\$17,831	1993	\$27,888
1987	\$19,184	1994	\$29,637
1988	\$18,984		

(2) Risks and Damages Associated with Plant or Reservoir Failure

Chevron is obligated to provide Edison the quality and quantity of brine that is necessary to meet the Demand Fuel Requirement, i.e., sufficient usable heat to operate the initial power plant at full capacity. Failure of Chevron to produce to specification will result in a "Reduced Demand Charge" and "Liquidated Damages," or at Edison's option, under specific circumstances, to reversion to operations in which Chevron is reimbursed only for its direct cost of operating the field. If Chevron is unable to deliver any fluid meeting specifications, and Edison does not accept the out-of-specification fluid, Edison makes no payment to Chevron, and Chevron at its option incurs liquidated damages of \$3.6 mm/yr. or operates the field for Edison with reimbursement only for its costs of operation.

In the event Edison is responsible for failure to operate at full capacity, Edison will continue to pay the full demand charge to Chevron even though the plant is operating at reduced

capacity. In the event of total plant failure occasioned by action or inaction of Edison, Edison must continue to pay a full demand charge to Chevron for the entire 30-year life of the contract.

It is Edison's position that significant incentives exist for Chevron to produce to contract quality and quantity specifications. Furthermore, the contract is structured so that neither party benefits from a failure to perform.

(3) Termination

The Sales Contract is intended to bind the parties for the entire term of the contract, with two exceptions. One exception has to do with Edison's return of the remaining fluid to Chevron for reinjection. If this fluid does not meet specifications and damage cannot be prevented to Chevron's reserves and facilities, then Chevron has the option to terminate the Sales Contract, giving 60 days' notice. However, if Edison does meet reinjection fluid specifications, then Chevron assumes full risk of reinjection, i.e., potential problems associated with reinjecting fluid such as clogging of wells. The other exception involves fluid specification reduction. If fluid specifications cannot be restored by Chevron, Edison has the right to terminate the Sales Contract giving 60 days' notice.

The risks associated with the obligation to actually produce acceptable brine in adequate quantities fall directly upon Chevron under the Sales Contract. Furthermore, the Sales Contract is a requirements contract; Edison is not obligated to take all the brine Chevron produces but only amounts up to and including the supply obligation. Additionally, there are no price reopeners due to any financial hardship suffered by Chevron. If Chevron incurs unanticipated costs, such as drilling a large number of replacement wells, it is still locked into the pricing formula specified in the Sales Contract.

Finally, one of the most substantial benefits Edison has under the Sales Contract involves potential future plants. Edison has the first and prior right to purchase all geothermal energy from specified portions of Chevron's share of the Heber geothermal energy. Edison also has the right of first refusal for Chevron's heat at no worse terms than Chevron offers to anyone else. Edison believes that this benefit could pave the way for future plants using geothermal energy from the Heber reservoir. Edison contends that this right of first refusal for additional MW of geothermal energy is one of the most valuable aspects of the contract and will likely increase in value. Edison claims that any effort to reopen the contract might cause Edison either to lose or to pay a significantly increased price for its future right of access to the additional 150 MW of geothermal energy at the Heber field.

In sum based upon review of all terms and conditions, Edison concludes that the fuel supply contract does not impose uncertain or unlimited financial burdens on the ratepayer, does not force the ratepayers to pay for anything which does not directly benefit them, and assures that Edison can limit its financial exposure if the field or the plant does not perform as expected. Edison also notes that it thinks the Sales Contract does not set precedent for any subsequent contracts covering future development at Heber between Edison and Chevron.

c. Rate Impact

In support of its application, Edison presented an analysis comparing the anticipated effect on ratepayers given construction and operation of Heber with the effect on ratepayers given generation of comparable electricity by a coal-fueled and an existing oil-fueled alternative.

Through 1982, the revenue requirement for Heber is less than that for the alternatives due to the flow through to the ratepayers of tax savings during the construction period. Thereafter, Heber has the highest revenue requirement. Edison's analysis shows that Heber would not be cost-competitive with coal-fired and existing oil-fired alternatives in the first 12 years. However, Edison's witness was willing to state that geothermal has a very good chance of being cost-competitive with alternative at some point in the future. There was no further elaboration of this contention.

Edison also presented an analysis comparing the economics of Heber on a levelized basis with existing oil and a coal-fueled alternative.

ECONOMIC COST COMPARISON OF ALTERNATIVES
1982 COMMON YEAR LEVELIZED DELIVERED POWER COST
(13 Percent Cost of Capital)

	<u>Heber-Case I</u>		<u>Coal</u>		<u>Existing Oil</u>	
	<u>\$/kw</u>	<u>c/kwh</u>	<u>\$/kw</u>	<u>c/kwh</u>	<u>\$/kw</u>	<u>c/kwh</u>
Generation Facilities	1,744	5.2	1,352	5.0	-	-
Initial Fuel Inventory	-	-	45	.3	-	-
Related Facilities	51	.2	90	.3	-	-
Operating & Maintenance	-	2.4	-	1.4	-	.3
Fuel	<u>-</u>	<u>10.1</u>	<u>-</u>	<u>4.0</u>	<u>-</u>	<u>16.3</u>
Total	<u>1,795</u>	<u>17.9</u>	<u>1,487</u>	<u>11.0</u>	<u>-</u>	<u>16.6</u>
Capacity Factor (%)		75		65		65

Finally, the average effect on rates for the three alternatives was derived.

	Cents Per kWh		
	<u>Heber</u>	<u>Alternative Coal</u>	<u>Alternative Oil</u>
1982	.004	.008	.008
1983	.051	.035	.036
1984	.051	.038	.039
1985	.053	.041	.041
1986	.053	.040	.043
1987	.053	.042	.045
1988	.050	.036	.042
1989	.052	.038	.043
1990	.052	.037	.044
1991	.052	.036	.045
1992	.052	.035	.046
1993	.052	.034	.047
1994	.052	.033	.048

Rates in 1994 would be expected to be .019 cents less per kWh if the alternative coal project were built instead of Heber or .004 cents less per kWh if existing oil-fired generation were relied upon.

4. Environmental Impacts of Heber

The parties stipulated to admission of Edison's testimony regarding the environmental assessment performed in conjunction with the Heber project. A conditional use permit to construct the Heber facilities was obtained from Imperial County. The application for the conditional use permit was filed with the county of Imperial on or about January 16, 1979. In order to comply with the requirements of the California Environmental Quality Act the "Final Master Environmental Impact Report" (EIR) was prepared by the County prior to the issuance of the conditional use permit on January 22, 1980.

Based upon analysis and review of the EIR as well as Proponent's Environmental Assessment (PEA) prepared in compliance with the Commission's Rules of Practice and Procedure, Edison's witness

concluded that the Heber project will not produce an unreasonable burden on natural resources, aesthetics of the area in which the project is to be located, public health and safety, air and water quality in the vicinity, or parks, recreational and scenic areas, or historical sites and buildings or archaeological sites.

II. Staff Showing

In presenting the testimony of two witnesses during the public hearings, the staff took the position that geothermal resources should only be developed when they are cost-competitive with other resource alternatives. The staff iterated its support for Edison's development of geothermal resources but opposed the unconditional grant of authority sought by Edison by this application.

Staff concluded that conditions on geothermal development must be imposed in cases, such as the proposed Heber project in which the costs of geothermal fuel unreasonably escalate the total cost of the project. Accordingly, the staff, in an apparent effort to assure that geothermal development is cost-competitive with other alternatives, proposes to base escalation of fuel costs on indices other than those tied to world oil prices. Staff urges conditional approval of the application and recommends that Edison either renegotiate its fuel supply contract with Chevron or agree that its shareholders will absorb a portion of fuel costs based on unreasonable cost escalators and contract provisions.

1. The Policy Implications of Application No. 59512

The Legal Division challenges the propriety of Edison's application for Commission authority to construct and operate a facility which does not require a certificate under current law and Commission orders. Legal Division feels that such efforts to seek an advisory opinion or preliminary assurances from the Commission regarding the

reasonableness of the project constitute an unappropriate shift of the project's entire risk from the shareholders to the ratepayers.

Legal Division argues that ratepayers should not become guarantors of a project before the utility plant is built and operational. Conversely, shareholders should not be automatically and totally insulated from project risks even when the associated risks are ostensibly greater than those of more conventional projects. Legal Division contends that in light of Edison's optimistic characterization of the limited risks associated with Heber there is even less justification for shifting all risks to ratepayers by prior Commission approval of the project. Despite these contentions, the Legal Division simply recommends that Edison and other utilities be informed that future applications for prior approval of projects for which no certificate is required will not be entertained.

2. The Economic Costs of Heber

Staff accepts Edison's projections that the capital cost of Heber will total approximately \$69 million. However, staff does feel that Edison's projected prices for geothermal fluid and replacement oil are too low. This analysis prompts staff to conclude that the estimated cost of Heber to the ratepayer would be significantly more than equivalent generation using oil in existing steam generation plants or coal in new large plants. Staff does acknowledge that implementation of Heber could provide operating data for development of larger and more efficient geothermal plants with associated economies of scale.

Staff considers the Sales Contract the major impediment to obtaining electricity from Heber at costs lower than from oil. Staff recognizes that the capital costs associated with geothermal plants typically exceed costs for other energy sources due to the need for construction of generation facilities, pumps, water treatment plants, etc. However, the Sales Contract, which will allegedly

escalate the price of geothermal fluid at nearly the same rate as the price of oil increases precludes Heber from being cost-competitive with other alternatives. Staff emphasizes that Edison itself has acknowledged that Heber would not be cost-competitive with coal and oil projects in the first 12 years. More specifically, staff contends that Heber will cost as much as 30-40 percent more than coal or oil alternatives in 1982 and 7 percent more in 1994.

The staff presented testimony in support of its cost contentions and its conclusion that Edison has significantly understated the expense of geothermal fuel under the Sales Contract.

As previously explained in Edison's showing, the Sales Contract divides the price of geothermal energy into a commodity and a demand component. Escalation of the commodity component is tied to the PPIO5 (see p. 13), while the demand component is escalated by the CPI. Staff argues that the PPIO5 is dominated by petroleum products and thus escalates with increases in world oil prices. Staff strongly challenges Edison's claim that only 50 percent of the PPIO5 is keyed to oil products.

For December 1978, staff demonstrated that the relative importance of commodities in the PPIO5 was as follows:

<u>Commodity</u>	<u>Percent Weight</u>
Coal	6.2
Coke	0.8
Gas Fuels	15.1
Electricity	21.1
Crude Petroleum	8.8
Refined Petroleum	<u>48.0</u>
	100.0

The weighted influence of refined and crude petroleum products by themselves is 56.8 percent of the index. Further, staff assumed that oil-generated electricity for baseload and peaking facilities influences the PPIO5 by 10.6 percent. Finally, an estimated 20 percent of gas fuels is petroleum gas which adds 3 percent to the weighted

percent of the PPIO5 attributable to oil production. Staff concludes that approximately 70 percent, rather than 50 percent, of the PPIO5 is a function of the price of oil.

Staff also claims that it is equally important to note the relative weight given to each of the two pricing components in determining the ultimate cost of the geothermal fuel. With Heber operating at a 75 percent capacity factor, application of the pricing formula under the Sales Contract results in the commodity component having a 75 percent influence upon the price of geothermal fluid while the demand component has only a 25 percent influence. As a consequence of the different weighting factors ascribed to each component, staff calculations show that the PPIO5 is given four times the weight of the CPI in calculating fuel costs. In the event Heber operates at 100 percent capacity factor, staff figures illustrate that the influence of the PPIO5 on the price of geothermal fuel is 100 percent; the CPI would have no effect.

Based upon this analysis, staff concludes that the price of geothermal fluid will escalate at nearly the same rate as world oil prices. Staff maintains that Edison's failure to recognize the close correspondence of the price of geothermal brine to the price of world oil seriously undermines the validity of Edison's cost projections.

Using its own projections, staff estimated Edison's fuel expense obligations for 1985, 1990, and 1995, under three different scenarios. Staff's low scenario assumes high supply of oil, low demand, and low price. The medium scenario assumes medium supply, demand, and price. The high scenario assumes high demand, low supply, and high price.

FUEL COST AT 75 PERCENT CAPACITY FACTOR
LOW, MEDIUM, AND HIGH SCENARIOS

(Dollars in Thousands)

<u>Scenario</u>	<u>1985</u>	<u>1990</u>	<u>1995</u>
Low ^{1/}	18,043	27,234	35,507
Medium	20,919	35,803	51,283
High	25,054	41,646	67,837

1/ Edison's projected cost increases for geothermal fluid approximate the same rate of increase as staff's low projection which is based on the Department of Energy's low price oil scenario (cf. Edison's fuel expense projections, p. 12).

Staff presented its own estimate of realistic fuel escalation rates for Heber. Using the assumption that the cost of Heber fuel would increase at the same rate as Edison's escalation rate for the use of oil, staff had Edison recalculate the levelized annual cost, and compared the result with Edison's calculations.

1982 COMMON YEAR LEVELIZED DELIVERED POWER COST
(¢/kwh)

	<u>Staff</u> <u>Heber</u>	<u>Edison</u>		
		<u>Coal</u>	<u>Oil</u>	<u>Heber</u>
Generation Facilities	5.9	5.0	-	5.2
Initial Fuel Inventory	-	.3	-	-
Related Facilities	.2	.3	-	.2
Operation & Maintenance	2.5	1.4	.3	2.4
Fuel	<u>15.7</u>	<u>4.0</u>	<u>16.3</u>	<u>10.1</u>
Total	24.3	11.0	16.6	17.9
Capacity Factor	75%	65%	65%	75%

Staff draws the conclusion that Heber geothermal energy is clearly not cost-competitive with alternative projects available to Edison.

The staff paints an even grimmer picture of Heber's lack of cost-competitiveness in the event certain conditions are triggered under the Sales Contract.

1982 COMMON YEAR LEVELIZED DELIVERED POWER COST
(¢/kWh)

<u>Cases</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Generation Facilities	5.9	8.9	12.6	11.1	11.1
Related Facilities	.2	.3	.4	.4	.4
Operation & Maintenance	2.5	3.8	5.4	4.7	4.7
Fuel	<u>15.7</u>	<u>18.9</u>	<u>23.1</u>	<u>14.1</u>	<u>12.5</u>
Total	24.3	31.9	41.5	30.3	28.7
Capacity Factor	75%	50%	35%	40%	40%

Cases 2 and 3 indicate levelized project costs to Edison in the event that Edison is responsible for failure to operate at full capacity.^{1/} In these circumstances, Edison continues to pay the full demand charge even though it is operating at reduced capacity. Since the fixed demand charge for fuel will consequently be spread over fewer units of production, Edison's ratepayers will correspondingly realize higher energy costs until the production problem is corrected. If Edison cannot correct the problem, Edison is contractually bound to pay a full demand charge to Chevron for the entire 30-year life of the Sales Contract. The contract contains no termination clause for either party on grounds of economic hardship.

Cases 4 and 5^{2/} illustrate project costs in the event of Chevron's failure to provide the specified quantity and quality of geothermal fluid. In this circumstance, Edison is entitled to pay a

^{1/} It should be noted that staff concurs with Edison that the probability of achieving a 75 percent capacity factor at Heber is quite high.

^{2/} Case 5 costs are less than those in Case 4 since it assumes a reduction in fuel deliveries for more than 365 consecutive days and payment of liquidated damages by Chevron to Edison pursuant to the contract.

reduced demand charge to Chevron. If its failure continues for 365 days or more, Chevron, at its sole option, may either pay Edison liquidated damages or elect to continue field operations with Edison liable only for Chevron's operating costs. Total project costs for Cases 4 and 5, which assume failure of Chevron rather than Edison, nevertheless exceed costs under Case 1 which assumes Heber operating at the projected 75 percent capacity factor. In the admittedly unlikely event that Chevron fails to provide any geothermal fluid, Edison stands to lose most of its investment.

Staff argues that the foregoing analysis illustrates the unreasonably high cost of geothermal energy when it is substantially pegged to the world price of oil. Staff disputes the need to index geothermal fuel prices to the PPIOS. Such indexing negates any economic advantage of turning to geothermal as an alternative energy source. While Heber may replace the actual use of 400,000 barrels of oil a year, it will not reduce Edison's dependency on world prices.

Staff recommends that geothermal prices should not be tied in any way to fuel prices for baseload generation which are pegged to world oil prices. In support, staff argues that geothermal is provided by one supplier at one fixed location. Accordingly, staff contends that a competitive market which controls fuel prices for other resources does not exist for geothermal. Further, staff proposes that only fuels which are direct substitutes for oil should be tied to the price of oil. Geothermal fluid is obviously not a direct substitute for oil and staff finds no justification to escalate geothermal fuel prices with world oil prices.

Therefore, the staff concludes that if geothermal energy is to compete economically with other energy alternatives, the Commission should condition approval of the application by requiring that the total fuel price for geothermal energy escalate no faster than the CPI.

Staff expressed reservations about the equity of certain other provisions of the Sales Contract and requests the Commission to impose additional conditions upon any authorization in order to protect the interests of Edison's ratepayers. Though Edison has characterized the Sales Contract as a "requirements" contract, i.e., a contract by which Edison is obligated to take only as much geothermal fluid as it needs to operate at a required capacity factor, staff is concerned that Edison will be obligated to reimburse Chevron for fluid produced beyond Edison's requirements. Staff fears that this situation could arise in circumstances where Chevron must produce fluid to prevent subsidence or protect its wells. Staff presented no evidence respecting the plausibility or likelihood of such a situation occurring in which Chevron would find it necessary to provide Edison more than its requirements in order to prevent subsidence. Nevertheless, staff seeks a blanket condition insulating Edison's ratepayers from the costs of handling any geothermal fluid beyond its requirements.

The Supply Contract outlines various conditions and options for Chevron given Chevron's failure to deliver contracted volumes. Staff feels that ratepayers should not realize increases in unit fuel costs if Chevron fails to meet its supply obligations. Once again, staff presented no evidence that such an event could occur under the proposed Sales Contract. However, staff requests that the Commission condition its authorization to require that unit fuel costs should not exceed fuel costs at full capacity in the event of reduced deliveries by Chevron.

Finally, staff maintains that since the consequences of project failure are so substantial, the risk of such failure should be equitably shared between Edison and its ratepayers. Therefore, staff recommends that if the project operates below 35 percent capacity at any given time, Edison's shareholders shall absorb depreciation expenses for that fiscal year.

3. Environmental Impacts of Heber

As indicated in Edison's showing, Imperial County prepared an EIR for the Heber project prior to its issuance of a conditional use permit on January 22, 1980. Rather than prepare its own environmental document, staff proposes that the Commission adopt the EIR prepared by Imperial County in accordance with Section 21166 of the Public Resources Code. Section 21166 reads as follows:

When an environmental impact report has been prepared for a project pursuant to this division, no subsequent or supplemental environmental impact report shall be required by the lead agency or by any responsible agency, unless one or more of the following events occurs:

- (a) Substantial changes are proposed in the project which will require major revisions of the environmental impact report.
- (b) Substantial changes occur with respect to the circumstances under which the project is being undertaken which will require major revisions in the environmental impact report.
- (c) New information, which was not known and could not have been known at the time the environmental impact report was certified as complete, becomes available.

Staff testified that there are no substantial changes proposed in the project. Further, there are no substantial changes in respect to circumstances; and there is no new information concerning the project. Upon this basis, staff concludes that there is no need for preparation of an additional EIR.

The Draft EIR prepared by Imperial County for Heber was circulated on September 17, 1979. Comments were made by several public agencies including this Commission. Changes in the EIR were made in response to comments; and the Final EIR was adopted by Imperial County on February 11, 1980. On October 23, 1980, all adjacent and affected property owners and concerned public agencies were notified of the staff's proposal to use the above-referenced EIR as the completed environmental document for the subject application.

III. Discussion

1. Should Application No. 59512 Be Entertained?

While the language of the exemption provision in General Order No. 131 is manifestly clear, its intent and purpose is as equally apparent. The provision allows the construction and operation of generating facilities of 50 MW or less capacity without the delay inherent in the governmental permitting process. Its intent was not to preclude or prohibit the filing of an application for authority to construct and operate a similar facility. If an applicant does not wish to avail itself of the benefits of the exemption provision, that is the applicant's prerogative.

In determining whether or not to entertain an application which is not prescribed by law, the Commission can exercise wide discretion in weighing the importance of the subject matter, the availability of its resources, time constraints, etc. In Application No. 59512 Edison seeks preliminary assurances from the Commission that its initial project to produce geothermal energy on a commercial basis as an alternative energy source is structured in a manner which reasonably allocated the risks and benefits of geothermal development between Edison and its ratepayers.

There is no issue more important to California ratepayers than the accelerated development of alternative and renewable energy resources. Since the ratepayer will ultimately fund such development, it is incumbent upon this Commission to protect the ratepayers' interests as well as to provide some practical guidance to utilities, such as Edison, which have publicly announced commitments to these new energy sources. Heber apparently represents a fundamental step in the implementation of Edison's announced policy and may well set a pattern for future development. Therefore, since Application No. 59512 poses such critical questions respecting the development of alternative energy sources, we chose to entertain the filing.

2. Is Heber a Reasonable and Prudent Investment?

Edison contends that the record amply supports the conclusion that Heber constitutes a reasonable and commercially viable project which provides significant benefits and does not impose unreasonable technical or economic risks on either its shareholders

or its ratepayers. Therefore, let us carefully examine the record to determine if it does indeed support the following constituent points of Edison's conclusion: (a) Heber provides significant benefits, (b) Heber does not pose unreasonable technical risks, (c) Heber does not involve unreasonable economic risks for Edison's shareholders, and (d) Heber does not impose unreasonable economic burdens upon Edison's ratepayers.

a. The evidence demonstrates certain definite long-range benefits resulting from commercialization of the Heber geothermal resource. Its availability will reduce dependence on uncertain foreign sources of oil in the amount of 400,000 barrels a year. Use of the Heber geothermal resource in lieu of oil will improve air quality to some unquantifiable degree. Its operation will demonstrate the commercial viability of a new generation source and will serve to increase the diversification and reliability of fuel sources available to Edison.

Finally, and perhaps most importantly, the Sales Contract contains an option which entitles Edison to purchase from Chevron enough brine from the Heber reservoir to support a total generating capacity of .200 MW. Since geothermal energy is limited, the value of this option, while unquantifiable, is significant. Further, the value of access to the geothermal resource should grow as demand increases for alternative resources.

Aside from the annual backout of 400,000 barrels of oil, the benefits associated with development of Heber have not been objectively determined or economically quantified on this record. Although not quantified, the benefits are real; and the record supports the conclusion that the Heber project provides significant benefits to Edison and its ratepayers.

✓

b. The testimony indicates that the technology used in a dual-flash plant is relatively simple and has been commercially demonstrated by similar units in Japan and Mexico. A carbon copy plant in Japan, which has achieved a 90 percent capacity factor, uses equipment manufactured by the same company, Mitsubishi, which will provide the equipment at Heber; and the brine used for heat production is of comparably low salinity. Additionally, both the Japanese plant and Heber use reinjection.

The evidence further indicates that extensive analysis was made of the geothermal reservoir and confirms that the anomaly can amply sustain 41 MW of production at the plant. The record also shows that reinjection is technically feasible and poses no significant risk to the project. The testimony, supported by engineering studies, amply supports the conclusion that Heber does not impose unreasonable technical risks.

c. In its application Edison seeks unconditioned approval of Heber, as proposed, and requests conventional rate base treatment. Edison thinks that such treatment would equitably allocate risks and benefits between present and future ratepayers and shareholders. Their rationale is simple. Since ratepayers receive all the benefits of the project including both added capacity and experience gleaned from operation of the first commercial geothermal facility, all reasonable project costs should be included in rate base and all reasonably incurred expenses should be recovered as with any other commercial plant. Edison argues that disallowance of any costs would penalize shareholders without providing any corresponding benefits to them.

If Heber is approved, as requested, and given conventional rate base treatment, the only risk borne by Edison shareholders is the possibility that the Commission will disallow expenses on grounds that they were unreasonably incurred. Since Commission

approval would allow rate base treatment and would inherently sanction the terms of the Sales Contract, only limited expenses associated with Heber, such as operation and maintenance costs, would be subject to ratemaking review. Thus, given approval of Edison's application, there is considerable support for the conclusion that Heber involves no economic risks for Edison's shareholders, much less unreasonable economic risks.

d. Does the record support the conclusion that Heber does not impose unreasonable economic burdens upon Edison's ratepayers? The economic impact on ratepayers is the crux of this matter and the ultimate determinant of whether Heber is a prudent and reasonable investment. Our conclusion respecting this most critical issue must be based upon the record we have before us.

By Edison's own showing, Heber will not be cost-competitive with coal-fueled or existing oil-fired alternatives through the first 12 years of the project. In fact, no evidence was presented that Heber would ever be cost-competitive with these alternatives over the 30-year life of the Sales Contract. The firmest evidence offered in support of Heber's economic viability was the statement of Edison's policy witness that "[O]ur analysis of geothermal is that it has a very good chance or it, quote, 'will be cost competitive with alternatives at some point in the future'."

Edison did acknowledge that the geothermal energy resource would have to become economically competitive with alternatives at some time in the future in order to warrant its continued development. Yet, the evidence presented fails to demonstrate in any way how and when such an eventuality can or will occur. In fact, the evidence of record, if anything, prompts the conclusion that geothermal energy produced under contracts similar to the Sales Contract will not necessarily be cost-competitive at any point in the future.

The capital cost of this geothermal project appears to exceed capital costs for coal projects. Edison also acknowledges that Heber represents a commercial rather than research and development project. Capital costs associated with geothermal facilities are relatively fixed, and there is no evidence to support a conclusion that future geothermal projects can take advantage of information gleaned from Heber to reduce their capital costs.

There are other questions relating to the capital cost of the project which Edison has not addressed. It is commonly known in financial markets that the nation's electric utilities are experiencing severe economic distress. While Edison is performing above the norm, it still is no exception. On the other hand, the major oil companies have substantial capital reserve, much of it internally generated. Under the circumstances, we are concerned that Edison has assumed responsibility for an estimated \$17.6 million in capital expenditures for brine delivery, brine reinjection, and water treatment facilities. This increases Edison's capital costs for the project by over 30% at a time when it is capital short. The capital cost for brine delivery and reinjection may more properly be assignable to Chevron in that they are associated with the use and maintenance of the geothermal reservoir rather than operation of the power plant. We are not presently persuaded that this part of the project is a reasonable and prudent investment for Edison; further exposition is required. Proper responsibility for the cost of water treatment facilities is also unclear and requires further exploration on the record.

The second component which accounts for Heber's costs exceeding coal and oil-fired alternatives relates to fuel expenses under the Sales Contract. Edison feels that the contractual pricing provisions with Chevron fairly and equitably protect the interests of the two parties. We must ask how such a determination is made.

Nothing in the Sales Contract indicates that Edison felt constrained in any way to limit its offer to a price which would allow it to produce electricity from geothermal brine at a cost-competitive with other sources of energy. Since Edison is requesting the ratepayer to underwrite and guarantee its contractual obligations, we are compelled to ask what limit Edison placed on its offer if it was not constrained by notions of relative cost. If cost-competitiveness was not a constraint, what factor or factors served to operate as a price ceiling on Edison's offers? What standard did it apply, other than a subjective feeling, to determine that the pricing mechanism is fair and reasonable?

Edison presented extremely limited testimony in support of its conclusion that the price for brine under the Sales Contract compares favorably with other projects of Heber's type. Edison noted that few comparisons are available due to lack of any publicly available contracts involving liquid-dominated systems. Edison

testified that as a consequence of the limited availability of relevant information their conclusion that the price charged for the brine is in an appropriate range was formed on the basis of the negotiations and analysis of industry literature, reports, and confidential and proprietary contracts.

This type of vague and conclusory testimony hardly meets Edison's burden of proof. Edison has provided the Commission no basis for making a determination regarding the reasonableness of the Sales Contract. To this extent Edison has failed to sustain its burden of proof; and since fuel expenses so largely contribute to the total costs of a project which is admittedly not cost-competitive, the failure becomes critical. This failure to provide proof or sufficient explanation leads to endless questions about the actual provisions of the Sales Contract. For example, the demand component of the fuel price formula is intended to provide for recovery of fixed costs incurred by Chevron to meet its "supply obligation" to Edison. However, the capital costs incurred by Chevron in participating in Heber constitute proprietary information. How can Edison, much less the Commission, know if the demand component corresponds in reality to the costs actually absorbed by Chevron?

It is apparent that Chevron felt constrained in its negotiations by some notion of relative cost. Chevron negotiated a demand component which relates to capital costs ostensibly incurred by Chevron in constructing and operating its portion of Heber. Chevron further negotiated a commodity component which relates to the cost of fuels used for baseload electric generation. Why did Edison fail to consider relative costs, such as the incremental cost to Edison of producing a similar amount of electricity, as a limit upon its price offer?

Based upon Edison's showing alone, Heber's lack of cost-competitiveness prompts numerous questions about the prudence of undertaking such a project. The staff showing only creates more profound and disturbing doubts regarding Heber as currently structured. If Edison's cost projections are actually underestimated, as alleged by staff, Heber's lack of cost-competitiveness will only be exacerbated and the economic burden on the ratepayer increased.

An additional concern with the Sales Contract relates to provisions in clauses dealing with "Reduced Demand Charge" and "Liquidated Damages". Edison will be obliged to pay the full demand charge to Chevron even if the power plant must operate at reduced demand or fails to operate at all. On the other hand, Chevron's failure to produce to specifications can, at Chevron's option, result in Edison having to pay Chevron its cost of operating the field.

This imbalance in remedies is untenable and cannot be accepted by this Commission. Even worse, no evidence has been presented regarding Chevron's cost of operating the field. Thus, there is no way to evaluate the exposure of Edison's ratepayers. If Chevron's operating expenses are high in relation to the contract price, this safety valve in the contract will become a bargain with no benefit. In essence, it appears that Chevron is asking Edison's ratepayers to assume all the risks while Chevron will assume all the profits.

Our final concern with the Sales Contract relates to the index to be used to escalate the cost of brine to Edison. Our staff has clearly shown that it relies excessively on the price of oil. While the price of oil may be one factor in determining the value of an alternative energy resource, excessive reliance on this factor is unacceptable to this Commission. A primary reason for our interest in alternative energy resources is to produce rates

lower and more stable than are possible through reliance on oil. If prices for alternative energy resources are closely tied to world oil prices by contract, a primary value of the alternative is lost. ✓

Is there any rational basis to approve the Heber project despite its economic unattractiveness caused by the Chevron contract? Edison argues in its brief that many of its assumptions were conservative and that Heber could prove prudent based on economics alone. For example, operation over the projected 75 percent capacity factor would not increase capital-related costs nor would it increase the demand portion of the brine cost. The unit costs of Heber generation would therefore be reduced when these costs are spread over a larger number of kWhs. However, such statements are not evidence; rather they are arguments. Edison is responsible for its own showing and is bound by the evidence of record.

In making these difficult decisions, economics has always played a critical role. We have previously implemented programs that have provided benefits as well as been cost-effective or cost-competitive. For example, the ZIP program - by which homeowners can receive zero interest loans to improve the energy efficiency of their homes - is cost-effective in that it is cheaper to save energy by subsidizing home insulation improvements than it is to build new power plants to generate a similar amount of energy. Cost-effectiveness prompted our decision to require Pacific Gas and Electric Company to pay "avoided cost" for any energy provided by cogenerators to the utility. In the implementation of each program, the concept of "cost-effectiveness" was used by the Commission as a ceiling on how much the utility should expend.

In Decision No. 91272 (Demonstration Solar Financing Program) and Decision No. 92653 (PGandE ZIP), we discussed at length the question of cost-effectiveness tests. We must again note the limitations of various cost-effectiveness tests that have been proposed. In the present case, a decision must eventually be based on cost-effectiveness criteria. The Concurring Opinion of Commissioners Grimes and Gravelle offers one possible approach on which to base such a decision. Today, however, we are not faced with this issue. Problems relating to the Sales Contract are so serious as to render the project unacceptable strictly on the basis of the contract alone.

In light of our disposition, there is no need to address the environmental issue.

Findings of Fact

1. Heber involves construction and operation of a 41.1 MW dual-flash geothermal generation facility near Heber, California.
2. Operation of Heber will reduce Edison's use of oil by 400,000 barrels a year, improve air quality, and increase the diversification and reliability of Edison's fuel supply sources.
3. Heber is a commercial facility using relatively simple and reliable processes and equipment which have previously been successfully operated in Japan and Mexico.
4. The geothermal anomaly at Heber can produce enough hot water at high enough temperatures to support a 500 MW geothermal development for 30 years.
5. The capital costs borne by Edison for Heber are estimated to be \$69 million.
6. In addition to capital costs, the expenses incurred by Edison in purchasing geothermal fuel from Chevron under the Sales Contract constitute the two major components of Heber's ultimate cost.
7. Through 1994, the revenue requirement for Heber is greater than that for a coal-fired or existing oil-fired alternative.
8. On a levelized basis for the year 1982, the cost of delivered power from Heber ranges from 17.9¢/kWh to 24.3¢/kWh, as compared to 11.0¢/kWh for a coal-fired alternative and 16.6¢/kWh for an existing oil-fired alternative.
9. Using assumptions most favorable to Edison, the average impact on rates in 1994, is as follows: .052¢/kWh for Heber, .033¢/kWh for an alternative coal project, and .048¢/kWh for existing oil-fired generation.

10. Heber is not cost-competitive with the coal-fired or existing oil-fired alternative.

Conclusions of Law

1. The benefits associated with Heber of reduced reliance on oil imports, improved air quality, and diversification of fuel supply sources do not outweigh the negative economic impacts imposed on ratepayers by construction and operation of Heber.

2. Construction and operation of Heber, as currently structured, does not constitute a reasonable and prudent investment for Edison or its ratepayers and is not in the public interest.

O R D E R

IT IS ORDERED that Application No. 59512 is denied.

The effective date of this order shall be thirty days after the date hereof.

Dated MAY 19 1981, at San Francisco, California.

*We concur;
see attached.
Richard D. Grogan
[Signature]*

[Signature]

President
[Signature]

[Signature]

[Signature]

Commissioners

A.59512
D.

LEONARD M. GRIMES JR., Commissioner
RICHARD D. GRAVELLE, Commissioner

We concur that the Sales Contract for geothermal fluid renders Edison's application unacceptable. Nevertheless, we commend Edison for approaching this Commission with its application. The Heber project could become an important step in the pioneering transition toward the greater use of alternative resources which Edison and other California utilities have begun.

In order to expedite the transition to alternatives, this Commission must soon establish clear criteria for determining the cost-effectiveness of proposed generation projects. In Decision No. 91272 (Demonstration Solar Financing Program) and Decision No. 92653 (PGandE ZIP), we addressed this question; but because of circumstances unique to each case, a firm decision on cost-effectiveness criteria was not required. Decision No. 91272 dealt with a demonstration program. Decision No. 92653 offered a program that is cost-effective by any criteria.

In OIR-2, now submitted for decision, clear guidelines will be established for the prices utilities will be authorized to pay for energy and capacity purchased from small power producers. In the present case, upon renegotiation of the Sales Contract, we will be faced with the first utility proposal to construct an advanced alternative which is not a demonstration. To assist the parties in developing a thorough record regarding the cost-effectiveness of utility proposed alternative energy projects, we offer our views on this issue today.

We believe that our regulated utilities have a strong obligation to seek and bring to fruition projects that produce energy at below their avoided cost. We also recognize that such projects are not always available. We believe that full avoided cost is a proper benchmark to determine the cost-effectiveness of a project. Regrettably, the determination of a true avoided cost has been elusive. While economists and policy makers continue their debate, the value of displacing oil fired generation has been used as a proxy for avoided cost. In Decision No. 91272 and Decision No. 92653, we pointed out that many elements of value are not taken into consideration by this proxy. We believe that until a more inclusive picture of avoided cost is developed, the avoided cost as represented by oil may be exceeded if a showing of particular value is made on the record.

Such a showing should not, standing alone, be persuasive in permitting purchases of energy above the avoided cost. We have a responsibility to the ratepayers to determine not only that there is economic value to exceeding the avoided cost of oil but also that there is an economic necessity to do so.

In the present case, we are faced with a record which contains nothing more than a negotiated price. A claim that the best possible price has been obtained through negotiation may suffice to justify the purchase of energy at below the avoided cost. However, when a proposed project would produce energy at or above the avoided cost, greater scrutiny is necessary to protect the interests of the ratepayers. This Commission should investigate such proposals to determine whether there is an economic necessity to equal or exceed the avoided cost. The burden of proof rests on the proponents of the project.

This burden entails demonstrating the particular value

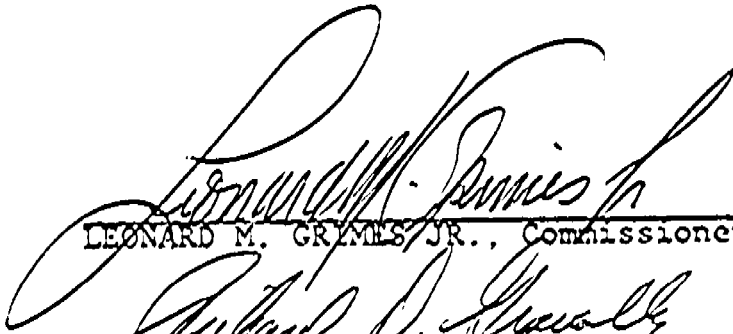
of the project to the ratepayers. Particular value may include, but should not be limited to:

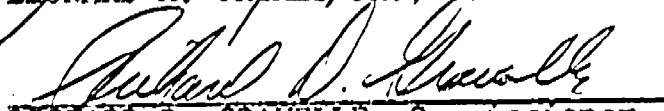
1. A likelihood that energy from the project will cost less than the avoided cost for a significant part of the life of the project.
2. Promotion of a demonstrated and promising technology in which early investments entail a high risk to the utility.
3. Promotion of a demonstrated and promising technology which has not achieved economies of scale from mass production and appears likely to produce energy below avoided costs when such economies are achieved.
4. Reduced air or water pollution as measured by the value of trade-offs that would be necessary to generate comparable energy with oil.
5. Reliability or security of the fuel supply being greater than that for oil or, at a minimum, being domestically controlled.
6. Demonstrable benefit to the ratepayers caused by recycling of energy expenditures in the California economic.
7. More rapid return on investment of the utility due to shorter construction lead times.
8. Reduced or avoided capital requirements for the utility.
9. Greater diversity of energy resources.
10. Broader dispersion of generating stations.

Thus, the avoided cost should not serve as an absolute ceiling but remains a bench mark for evaluation. Proposals for projects producing energy substantially below the avoided cost may be presumed to be the product of an open market. Proponents of such projects should be able to limit their showing to matters of technological viability. Proposals for projects producing energy at or above the avoided cost, on the other hand,

should be required to show both that there is particular value to the ratepayers to pay the avoided cost or more.

In the present case, such a showing has not been made. We recognize that this is a case of first impression. We invite the proponents to resume negotiations on the Sales Contract, and on submission of a new application, more thoroughly address the issue of cost-effectiveness.


LEONARD M. GRIMES, JR., Commissioner


RICHARD D. GRAVELLE, Commissioner

San Francisco, California
May , 1981