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Decision 92-08-029 August 11, 1992

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Investigation on )  
the Commission's own motion to )  
implement the Biennial Resource Plan )  
Update following the California )  
Energy Commission's Seventh )  
Electricity Report. )

**ORIGINAL**

I.89-07-004  
(Filed July 6, 1989)

And Related Matters. )

Application 91-02-092  
Application 91-07-004

O P I N I O N

1. Introduction

Today's decision responds to a petition filed June 4, 1992, by the Independent Energy Producers Association and the Geothermal Resources Association (jointly, IEP/GRA) to modify Decision (D.) 92-04-045. We do not grant the petition, but we modify D.92-04-045 to further specify the price benchmark for geothermal resources that we have identified for bidding in auctions later this year.

2. Background

2.1 Derivation of Price Benchmarks

The Biennial Resource Plan Update (Update) concerns the long-run marginal costs and prospective resource choices of California's three largest investor-owned electric utilities.<sup>1</sup> Using data and projections from the California Energy Commission's (CEC's) 1990 Electricity Report (ER-90), the respondent utilities

<sup>1</sup> Specifically, Pacific Gas and Electric Company (PG&E), San Diego Gas & Electric Company (SDG&E), and Southern California Edison Company (Edison).

and other parties have litigated what new resources might reasonably be added to the respective systems through 1999.

In the resource plan phase, we determined, among other things, that SDG&E and Edison, consistent with sound resource planning criteria, would add substantial new generation sources and demand-side management programs through 1999. We also found that some of the desirable new generation should be subject to bidding by a class of nonutility sellers of electricity known as Qualifying Facilities (QFs). Among this generation subject to bidding ("identified deferrable resources" or "IDRs"), we included 500 megawatts (MW) of geothermal resources (300 MW for Edison and 200 MW for SDG&E).<sup>2</sup>

IDRs essentially provide a price benchmark, composed of capital and operating costs (including harm from air pollutants, if any, emitted by the plant). We are also considering for the first time in this solicitation the transmission costs (line losses and upgrades, if required) associated with the IDR. These costs together constitute the total costs of the IDR that bidders must meet or beat.

A winning bidder does not have to mimic the IDR against which it bids; for example, it could be in a different location, have a different capacity, and use a different generation technology. The auction protocol enables the utility to compare the differing capital, operating, and transmission costs of competing resources, so that bidders and the IDR are measured against a common economic yardstick and the ratepayer is assured

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<sup>2</sup> See D.92-04-045, slip opinion at pages 11-15, for background on the Update. Figures 2 and 5 of that decision show the type and timing of resource additions projected for SDG&E; Figures 3 and 6 show this information for Edison. For discussion specific to the geothermal capacity subject to bidding, see *id.*, pages 75-76 (SDG&E), 89-90 (Edison).

that the winning resource meets environmentally sensitive least-cost planning criteria.

The utility compliance reports herein contain capital and operating cost data estimated for the various resource options available. For most traditional generation technologies, the utilities have reasonable data in-house. For other technologies, especially renewables, the utilities rely on outside sources, including the CEC staff's technology characterization reports (prepared for each ER) and developers' responses to utility requests for proposals (RFPs). These data constitute the price benchmark when a particular option is shown to be cost-effective and becomes an IDR.

## 2.2 Analysis of Geothermal Costs in D.92-04-045

Parties disagreed over the geothermal price benchmark during the resource plan phase. Edison relied primarily on geothermal capital and operating costs developed by the CEC for ER-90, while SDG&E relied on generic data and geothermal developers' responses to the RFP issued by SDG&E in preparation for the Update. IEP/GRA and the Commission's Division of Ratepayer Advocates (DRA) criticized SDG&E's showing and recommended we adopt geothermal costs similar, but not identical, to those used by Edison.

There are two sources of disagreement: the absolute level of total costs (Edison showing a somewhat higher level than SDG&E), and the allocation of total costs among fixed and variable components (DRA and IEP/GRA arguing that a significant portion of a geothermal plant's operating and maintenance (O&M) costs should be treated as fixed).

The Administrative Law Judges (ALJs) proposed to resolve this disagreement by having SDG&E and Edison both use the complete

set of fixed and variable costs developed by the CEC in ER-90 for liquid-dominated flash geothermal technologies.<sup>3</sup> SDG&E, in its comments on the ALJs' Proposed Decision, suggested as an alternative that we rely on new geothermal cost data developed and approved for ER-92. SDG&E indicated the recent data resulted from a more thorough investigation, compared to ER-90, and a composite of different developers. The Commission adopted SDG&E's suggestion.<sup>4</sup>

D.92-04-045 contains one other direction that affects the total costs (in this case, transmission costs) imputed to the

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3 The CEC does not reproduce cost data in the ER itself. Instead, the committee of commissioners supervising development of an ER typically approves, through a series of committee orders, data sets on electricity supply, demand forecasts, resource assumptions, etc. The data sets are part of the ER record, which has submissions by CEC staff and other parties on a great many planning issues, including cost data such as we are discussing in today's decision.

The culmination of the ER process is its adoption by the full CEC, with directions on use of the ER. E.g., "The 1990 Electricity Report specifies supply, demand, and pricing assumptions and an integrated assessment of need. The [CEC] will use these assumptions and the integrated assessment to determine...whether a proposed electrical facility is needed. In making these determinations, the [CEC] will not reexamine its planning assumptions or integrated need assessments nor allow parties in siting case proceedings to rely on different assumptions or assessments, except as provided in this Order and approved in advance by the [CEC]." (Order Adopting the 1990 Electricity Report, Docket No. 88-ER-8, Oct. 17, 1990, p. 3 (emphasis added).)

4 However, D.92-04-045 erroneously refers to a draft report for ER-92. While the final report does not change the geothermal capital and O&M cost estimates, we will correct our discussion in D.92-04-045 (mimeo., p. 76 and Conclusion of Law 25) to refer to Technology Characterization - Final Report, November 22, 1991, approved by the ER-92 Committee in its Committee Order for Group 1 Resource Assumptions, January 10, 1992 (CEC Docket No. 90-ER-92). In the text of today's decision, we will hereafter refer to the final report as the Technology Characterization Report.

geothermal IDRs. For technical and economic reasons, geothermal plants can only be sited where fluids of sufficiently high temperature occur relatively near the surface. Areas where potential for geothermal development has been demonstrated are termed "known geothermal resource areas" (KGRAs). Several KGRAs are found in Southern California.

In D.92-04-045, we directed SDG&E and Edison to specify the KGRA where their respective geothermal IDRs would be located. Each utility was to make this specification using two criteria. First, the KGRA should have sufficient resource potential to accommodate that utility's IDRs. Second, the KGRA should be so situated, in relation to the utility's transmission system, that an IDR within the KGRA would have lower transmission costs than would an IDR in some other KGRA.<sup>5</sup>

### 3. Positions of the Parties

#### 3.1 IEP/GRA

IEP/GRA argue that our reference to the Technology Characterization Report does not by itself give utilities enough information to develop KGRA-specific cost estimates. According to IEP/GRA, capital costs (not merely transmission costs to the purchasing utility's load center) vary by KGRA. Although the Technology Characterization Report gives ranges for geothermal capital costs, it does not identify the ranges to particular KGRAs.

IEP/GRA suggest the way out of this dilemma is for this Commission to take note of the directions given by the CEC's ER-92

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<sup>5</sup> CEC studies have shown for many years that the geothermal resource potential in Southern California greatly exceeds the 500 MW of geothermal IDRs subject to bidding in this solicitation. Much of this potential is found in KGRAs inside or near the Edison and SDG&E service areas. Note, however, that we place no geographic or technological limitation on who can bid. The issue of where each utility would develop a geothermal IDR is relevant only for setting the appropriate price benchmark.

Committee in its Order (see note 4 above) addressing, among other things, resource assumptions for various technologies including geothermal. On page 36 of its Order, the ER-92 Committee says, "For geothermal technologies, parties should give great weight to the capital and [O&M] costs furnished by GRA in its November 18, 1991 filing and California Energy Company in its November 26, 1991 filing." IEP/GRA note that the referenced GRA testimony recommended approval of the Technology Characterization Report's range of capital costs, along with fixed O&M of \$150 per kilowatt-year and variable costs of 1.0 cents per kilowatt-hour (1989 \$).<sup>6</sup>

However, even the GRA testimony does not contain a breakdown of capital costs by KGRA. The IEP/GRA petition simply asserts that these values (all in instant capital costs per kilowatt) should be correlated to the Nevada (\$2400), Coso (\$2600), and Salton Sea (\$3100) KGRAs, "as experience dictates." (Petition at page 5.)

### 3.2 Responses to the IEP/GRA Petition

DRA, SDG&E, and Edison responded to the petition, all in opposition. The CEC did not respond to the petition.

As DRA reads D.92-04-045, the decision only requires KGRA specificity with respect to transmission costs, and not with respect to capital and operating costs. DRA is concerned that some of the KGRAs have much higher capital costs than those endorsed by DRA, Edison, and IEP/GRA during the resource plan phase. Thus, picking a KGRA solely on the basis of low transmission costs could

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6 The fixed and variable O&M costs supported by GRA testimony are higher than those listed in the Technology Characterization Report (\$90 per kilowatt-year and 0.4 cents per kilowatt-hour, respectively). Monetary values shown here and elsewhere in the text are expressed as 1989 dollars for convenience of comparison, since the Technology Characterization Report for ER-92 uses 1989 as the base year.

actually increase the price benchmark if that KGRA were at the high end of capital costs.

DRA recommends we use the O&M costs originally proposed by DRA in its resource plan phase brief. We note also that the low end of capital costs shown in the Technology Characterization Report is close to those proposed by Edison, and seconded by DRA and IEP/GRA, in the resource plan phase.

Edison is also concerned about the potential for misuse of the ranges of costs of shown in the Technology Characterization Report and referenced in the ER-92 Committee Order. Some of the costs are lower than the geothermal costs developed for ER-90, some are higher, and reliance on the higher end of the range in each cost category could significantly inflate the price benchmark.

Edison discounts the ER-92 Committee's direction to give "great weight" to costs furnished by GRA. In Edison's view, D.92-04-045 clearly signals this Commission's intent to rely on the CEC staff's Technology Characterization Report and referenced in the ER-92 Committee Order. Edison asserts, "It is incidental that the CEC itself decided that parties to the ER-92 should give great weight to the GRA's capital and O&M cost estimates...." (Edison Protest at page 7, note 11.)

SDG&E says IEP/GRA are essentially trying to testify now, when they should have made their showing on geothermal costs during evidentiary hearings in the resource plan phase. SDG&E also finds implausible IEP/GRA's attribution of capital costs by KGRA.

SDG&E believes the cost ranges represent statewide averages and argues that a reasonable approach would be to assume that each KGRA has an equal share of the total resource potential estimated by CEC staff and an equal proportion of resources available at each cost range. SDG&E would further assume that earlier IDRs would use the lowest cost resources at each KGRA. As we understand this proposal, it would result in a low price

benchmark for some geothermal IDRs and a higher benchmark for IDRs with later on-line dates.

#### 4. Discussion

We adopt DRA's proposed fixed and variable O&M costs, as set forth in DRA's opening brief in the resource plan phase. These amount to \$127.50 per kilowatt-year and 0.91 cents per kilowatt-hour, respectively. We also adopt DRA's proposed installed capital costs of \$2392 per kilowatt.

These costs should be used for all the geothermal IDRs. However, SDG&E and Edison should continue to follow our directions in D.92-04-045 regarding computation of transmission costs to be attributed to their respective IDRs.

We know from this record that geothermal costs show wide variation. What we do not know is how to combine these ranges of costs to determine the lowest total cost resource that is (1) realistically available, (2) in the quantity needed, (3) at the most desirable locations. Ideally, a KGRA could be developed at low capital and low O&M costs, but the record suggests, if anything, that there is a necessary tradeoff between these two major cost categories. For example, the Technology Characterization Report shows higher capital costs but lower O&M costs, compared to the data developed for ER-90.

Judging from this petition and the responses, it appears that QFs (through IEP/GRA) are arguing for a combination of high capital costs and high O&M costs, while the utilities are arguing for a combination of low capital and low O&M costs.<sup>7</sup> Each side

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<sup>7</sup> Edison claims IEP/GRA seek only to raise the O&M cost estimate while ignoring lower capital cost estimates, such as the \$2114 per kilowatt capital cost estimate given by a geothermal developer during the preparation of the Technology Characterization Report. Edison itself neglects to mention that the low capital cost

(Footnote continues on next page)



blames the other for the incompleteness of the record, and each cites this incompleteness as a reason for drawing inferences favorable to its own position.

The capital and O&M cost estimates we adopt today are all, taken together, at the low to moderate end of the range represented in the record. When these estimates are coupled with our instruction to the utilities to assume IDR development in the KGRA most favorably situated from the standpoint of transmission costs, we are confident that suitable price benchmarks will result.

We had anticipated the difficulty we experienced in this phase in setting the price benchmark for renewables: "QFs may be reluctant, for competitive reasons, to reveal detailed cost data. The utilities, on the other hand, have minimal experience with building non-fossil generation." (D.91-06-022, slip op., p. 37.) While we have accepted IEP/GRA's criticisms of SDG&E's testimony, we are also dissatisfied with IEP/GRA's showing (or lack thereof) on geothermal costs. IEP/GRA did not offer testimony of their own, before either this Commission or the CEC, upon which we could justify granting their petition.

SDG&E, in its response to the petition, indicates the parties have met informally to discuss use of the ER-92 data. The parties reached no agreement. We put this issue to rest by adopting DRA's original proposal for use of ER-90 data. That proposal is identical to the cost data in Edison's testimony, except DRA breaks down Edison's assumed variable costs into fixed and variable O&M components. Furthermore, although the ER-92 data

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(Footnote continued from previous page)

estimate it cites was accompanied by O&M cost estimates higher than those urged in the IEP/GRA petition (and far higher than those adopted in today's decision).

are more extensive, the ER-90 data are within the cost ranges considered by the ER-92 Committee.

For the future, we recommend the utilities consider obtaining "turnkey" quotes from developers for renewable IDRs, as PG&E did for its wind IDR.<sup>8</sup> As we have noted, "Turnkey projects may provide a way to lower the cost of renewable technologies and increase utility participation, both of which seem desirable. Moreover, the contractor in a turnkey projects bears the risk of developing the project at the contract price...." (D.92-04-045, slip op., p. 59.) In short, turnkey quotes may improve the reliability of IDR cost data and also provide appropriate accountability for price benchmarks based on IDRs using renewable and alternative generation technologies.

#### Findings of Fact

1. IDRs essentially provide a price benchmark, composed of capital and operating costs (including harm from air pollutants, if the plant emits such pollutants). In the coming auctions, the Commission plans also to consider transmission costs associated with the IDR. These costs together constitute the total costs of the IDR that bidders must meet or beat.

2. There is greater uncertainty over the capital and O&M costs of renewable generation technologies, compared to the costs of traditional generation technologies.

3. Turnkey quotes from developers for renewable IDRs have several advantages, compared to the composite approach for acquiring renewable generation cost data. First, turnkey quotes may lower the cost of renewable technologies, since such quotes rely on the utility's cost of capital, which is generally lower

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<sup>8</sup> A turnkey contract is one in which the contractor assumes total responsibility from design through completion of the project. (See D.92-04-045, slip op., p. 58, note 51.)

than that of a developer building a power project independently. Second, turnkey quotes may help solve the accountability problem that exists because utilities are not currently required to build the IDR at the benchmark price if the auction is undersubscribed. Third, a turnkey quote should provide a realistic combination of capital and O&M costs. This problem seems to underlie the dispute between IEP/GRA and SDG&E over the geothermal price benchmark in the coming auctions.

4. No agreement has been reached on how to use the geothermal cost data from the Technology Characterization Report (prepared for ER-92) to produce a geothermal price benchmark at this time.

5. Edison's testimony relies on ER-90 cost data to produce a geothermal price benchmark. The latter benchmark is within the cost ranges considered by the ER-92 Committee. DRA has endorsed this benchmark, except that DRA breaks down Edison's assumed variable costs into fixed and variable O&M components. The cost assumptions endorsed by DRA, when combined with transmission costs derived by assuming IDR development in the best situated KGRA, will yield a reasonable geothermal price benchmark for use in the coming auctions.

#### Conclusions of Law

1. The geothermal IDR price benchmark utilized by Edison and SDG&E should include the following cost elements (1989 \$): capital costs (installed) of \$2392 per kilowatt; fixed O&M of \$127.50 per kilowatt-year; and variable O&M of 0.91 cents per kilowatt-hour.

2. IEP/GRA's petition for modification of D.92-04-045 should be denied.

3. This decision should take effect immediately in order to allow for timely preparation of the utilities' respective requests for bids.

O R D E R

IT IS ORDERED that:

1. San Diego Gas & Electric Company and Southern California Edison Company, in their respective requests for bids prepared for the current Biennial Resource Plan Update, shall utilize a price benchmark for geothermal capacity consistent with the cost elements set forth in Conclusion of Law 1.

2. Decision 92-04-045 is modified as follows:

a. Page 76 (mimeo.), the last sentence of the first full paragraph is modified to read in full:

"We direct SDG&E and Edison, in their respective requests for bids prepared for the current Update, to utilize a price benchmark for geothermal capacity including the following cost elements (1989 \$): capital costs (installed) of \$2392 per kilowatt; fixed O&M of \$127.50 per kilowatt-year; and variable O&M of 0.91 cents per kilowatt-hour."

b. Page 76 (mimeo.), footnote 69 is deleted.

c. Page 111 (mimeo.), finding 62 is modified by addition of the following sentence:  
"DRA's breakdown of Edison's assumed variable costs into fixed and variable O&M components is reasonable."

d. Page 118 (mimeo.), conclusion 25 is modified to read in full:

"SDG&E and Edison should utilize a geothermal price benchmark including the following cost elements (1989 \$): capital costs (installed) of \$2392 per kilowatt; fixed O&M of \$127.50 per kilowatt-year; and variable O&M of 0.91 cents per kilowatt-hour."

3. The petition of the Independent Energy Producers Association and Geothermal Resources Association is denied.

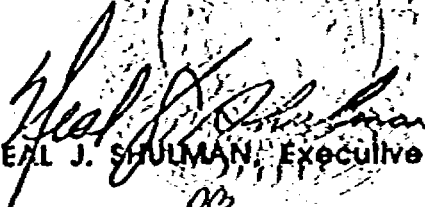
This order is effective today.

Dated August 11, 1992, at San Francisco, California.

DANIEL Wm. FESSLER  
President  
PATRICIA M. ECKERT  
NORMAN D. SHUMWAY  
Commissioners

Commissioner John B. Ohanian,  
being necessarily absent, did not  
participate.

I CERTIFY THAT THIS DECISION  
WAS APPROVED BY THE ABOVE  
COMMISSIONERS TODAY

  
NEAL J. SHULMAN, Executive Director  
PB