

Attn: Geothermal Proposal 2003

1.) There is a need for modified or new royalty valuation approaches particularly for direct use, non sales applications.

We now have hundreds of direct use projects in operation across the West and though our office has been involved in direct use for 25 years, we were only able to identify 3 direct use projects using resources on public lands. The project developers are out there and so are the Federal resources but almost no one is using them. It seems apparent that there is something wrong and many in the industry believe that it is excessive royalty costs and poorly conceived royalty calculation methods. At the state GeoPowering the West summit following this years Geothermal Resources Council Annual Meeting meeting (Reno NV, September 2002), the high cost of direct use royalties was one of the most discussed issues.

The current royalties calculation for federal lands geothermal resources fails to acknowledge the fact that the value of a geothermal resource is a strong function of its temperature. Higher temperature resources are easier and less costly to develop and use than are lower temperature resources. There is the obvious difference that electricity can be generated with higher temperature resources and it cannot with lower temperature ones. But even in the direct use temperature range there is a great difference between, say heating a greenhouse with 120 F water and with 200 F water. At the lower temperature the heating equipment must be approximately 100% larger and the geothermal fluid flow requirement would be approximately three times higher - both translating into much higher costs for the operator. A Btu at 450 F does not have the same value to the developer as one at 150 F and the royalty calculation should allow for this.

Beyond this there is the fact that certain direct use applications would not be undertaken using conventional heating methods since they would be cost prohibitive. Thus basing the royalty calculation on avoided fuel cost is a questionable procedure.

Two of the past users of federal resources were the two gold mines in Nevada (Round Mountain and Florida Canyon). Both of these have shut down their geothermal systems. The reasons are reported to be a combination of market situation and high royalty costs. The gold mines are a perfect example of a situation where the application would never be avoided with conventional fuel because it would be cost prohibitive. Basing the royalty on the incremental benefit (the additional gold produced by running the operation in the colder months) the company receives would be a much more reasonable approach. Aquaculture applications represent the single largest application of low temperature resources in the US and another example of a use that would not be developed using conventional heating. The use of the resource however does allow the development of a profitable business and it seems only reasonable that the royalty should be based on that economic benefit - the sales of the product of the entity.

The only other direct use project which we are aware of that is using a federal resource is a large greenhouse complex in New Mexico. This facility is an example of the problems with the current system. The owner has been in a disagreement with the MMS concerning the royalty, metering methods etc for at least 10 years. In fact due to the disagreements I do not believe any royalty has been payed in many years in this case. MMS has required very costly and sophisticated metering equipment that is evidently difficult to maintain. An additional issue here is that there is no industry consensus standard in the US for energy metering accuracy. There are standards for the components (temperature and water flow measuring devices) but nothing covering the system - rendering the use

of such equipment questionable as a basis for royalty calculations. Again, as in the case of the gold mines the use of the gross revenue of the entity using the geothermal would be simpler, less costly to implement and most important of all a much more accurate measure of the benefit that the resource provides.

2.) I would be happy to participate in a public workshop to discuss alternative valuation procedures.

3.) The following would be one option for an alternative valuation method for direct use applications.

A direct use royalty paralleling the arrangement for electric applications would seem to be appropriate with the royalty based on the gross sales of the entity using the heat. This eliminates any confusion and complexity that would arise over the issues of flow and energy metering, temperature value etc. associated with the resource. There is a major difference between electric and direct use in terms of annual load factor however. Power plants typically operate at close to 100% load (capacity) factor whereas direct use applications, particularly greenhouses are more in the range of 15 to 25%. Using a value of 20%, and prorating from the 3 1/2 % cited for power (in the recently proposed Federal legislation), this would suggest a royalty of 0.7% of gross sales for direct use applications. This basic figure could then be reduced for the initial years as in the case of the proposed arrangement for power.

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