PROCEEDINGS

"Geothermal Energy and the Utility Market - The Opportunities and Challenges for Expanding Geothermal Energy in a Competitive Supply Market"

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In his closing remarks at last year’s program review, Roland Kessler pointed out two critical questions that must be asked with regard to any program funding:

1. What specifically will be accomplished with the funds requested and why does it matter?
2. What important accomplishments have been made with the funds you have spent?

These seem to be good questions, whether in times of tight budgets or not. I kept these questions in mind as I reviewed the papers summarizing this year’s progress in the Energy Conversion Program.

The Materials research effort appears to be accomplishing useful results, some of which are already being tested by industry. In many ways, the past and present achievements of the geothermal industry are a direct result of materials problems overcome. The future growth of this industry will be facilitated by new and improved materials. It often follows from such developments that an industry will leapfrog itself. I therefore support the continuation of this work.

The Brine Chemistry research project is of great value. Plant designers and permitting agencies alike benefit from predictive modeling tools which are both accurate and easy to use. I am especially pleased with UCSD’s efforts at information transfer. The tutorials and free distribution of source code are to be commended. The preliminary models dealing with $\text{H}_2\text{S}$ gas/liquid distributions and acid-base properties should be tested and finished as soon as possible. The work in progress which will allow better prediction of gas-liquid distributions after flashing is valuable and it too should be expedited.

The Geothermal Waste Treatment research is important and necessary if we are to keep the industry from becoming another source of environmental disaster. Geothermal energy presently enjoys a reputation as a relatively benign power production technology. The nuclear power industry had that same reputation in its early days, but look at it now. Research on the neutralization and elimination of waste products must be given the highest priority. Success in this area is imperative. I recommend continued work at Brookhaven, perhaps even an accelerated program that assures successful results sooner than later.

The Heat Cycle research project has produced some interesting results, but I believe that some of the work being done is duplicative of work done long ago by engineers at firms such as The Ben Holt Company, Barber-Nichols, and many others. Plant and process engineers are well aware of the efficiency improvements that might be made if cost were no object. Most efficiency improvements are costly and financial concerns generally focus on first cost—not life cycle cost. Even when an engineering evaluation of competing alternatives is made, short payback periods are the rule, and many efficiency improvements just don’t measure up.

I therefore recommend that this research be redirected toward other energy conversion problems. For instance, the industry lacks general purpose design tools for two-phase flow problems. A public domain computer program that could be used to model and predict two-phase flow in gathering systems with uphill and downhill topography would be of great value to industry. Relief valve sizing and flow metering are two more areas relating to two-phase flow that warrant further research. Other possibilities include:

- basic research on heat transfer in ammonia/water mixtures.
- basic research on materials suitable for condenser tubes in ammonia/water cycles with wet cooling systems.
- basic research on non-CFC working fluids suitable for use in low temperature binary cycles (<125°C).

Finally, the transfer of knowledge developed through these programs is of concern to me. Too often the results are published in obscure journals and end up on too few library shelves. I would like to suggest a mechanism for improving the transfer of this valuable work to those working day to day in the geothermal industry. The National Geothermal Association sponsors workshops that are noticed to all active geothermal organizations, public and private, and generally well attended. I would like to see the principal investigators present their findings at workshops sponsored by NGA. NGA would need about $10,000 per workshop to cover expenses. Such an arrangement would insure maximum technology transfer directly to the geothermal industry.