COST OF ELECTRIC POWER FROM ENHANCED GEOTHERMAL SYSTEMS – ITS SENSITIVITY AND OPTIMIZATION

by

Subir K. Sanyal

GeothermEx, Inc.
3260 Blume Drive, Suite 220
Richmond, California 94806
e-mail: mw@geothermex.com

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Abstract

Based on a review of the Enhanced Geothermal Systems (EGS) developed to date worldwide, numerical simulation of idealized EGS reservoirs, economic sensitivity analysis, and practical considerations of some site characteristics, this paper shows that certain steps can be taken towards minimizing the levelized cost of electric power from EGS systems; these steps are as follows: (a) choosing the site with the highest possible vertical temperature gradient and for the thickest possible sedimentary cover on the basement; (b) choosing the drilling depth that maximizes a well's power capacity per unit drilling cost rather than reaches the hottest resource; (c) creating the largest possible stimulated volume per well; (d) increasing per well productivity by stimulating multiple, "vertically stacked" zones and/or increasing the pumping rate of production wells taking advantage of the evolving advances in pump technology; (e) improving stimulation effectiveness, and particularly, reducing the fracture spacing and heterogeneity in the hydraulic characteristics of the stimulated volume; (f) through reservoir modeling, optimizing well spacing and injection rates that minimize the rate of decline in net generation with time (g) reducing the power plant cost; (h) developing multiple, contiguous EGS units to benefit from the economy of scale; and (i) reducing the operations and maintenance cost. The basis for these conclusions is presented in the paper.

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