

National Assessment of U.S. Enhanced Geothermal Resources Base – A Perspective

Subir K. Sanyal and Steven J. Butler

GeothermEx, Inc., 5221 Central Avenue, Suite 201, Richmond, CA 94804-5829 USA

Key Words:

EGS, HDR, National Assessment, U.S., Enhanced Geothermal, Hot Dry Rock, Reserves, Resource Base, Recovery Factory, Desert Peak.

ABSTRACT

Two classes of enhanced geothermal systems (“EGS”), that is, reservoirs created by hydraulic stimulation of an impermeable or poorly-permeable formation, are recognized in this paper: non-convective systems and convective but tight hydrothermal systems, the former being the now classical “hot dry rock” systems. For each type, an approach to estimation of the resource base, simple and generalized enough to be applicable in a nationwide assessment, is proposed. The limitation of such an approach to resource base estimation is found to lie in the difficulty of estimating the appropriate recovery factor value, which depends on the resource characteristics, production/injection configuration and injection rate to be used. Nevertheless, it is shown that a resource base per square mile, or per unit stimulated volume, can be approximated relatively easily. For approximate estimation of resource base in a purely conductive EGS situation, we recommend using the recovery factor value expected in comparable hydrothermal systems, namely, in the range of 0.03 to 0.17. For non-convective EGS systems the above range of recovery factor would provide a minimum estimate of the resource base, for convective EGS systems the recovery factor can be much higher. For such a system, a recovery factor in the 0.3 to 0.6 range would be more reasonable. A dimensionless variable, named herein the “EGS Sustainability Coefficient,” is introduced to provide a possible conceptual framework for the nation-wide assessment of the EGS resource base. The resource base per unit area is the product of the conductive heat flow rate per unit area, recovery factor and EGS sustainability coefficient. The concepts involved and the quantitative relations derived are illustrated for the EGS demonstration project currently underway at Desert Peak, Nevada.

[For a copy of this paper please e-mail us at mw@geothermex.com](mailto:mw@geothermex.com)