

GEOTHERMAL DIRECT HEAT APPLICATION POTENTIAL

Prepared for the 1989 Annual Meeting of the
Interagency Geothermal Coordinating Council

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Abstract

The geothermal direct-use industry growth trends, potential, needs, and how they can be met, are addressed. Recent investigations about the current status of the industry and the identification of institutional and technical needs provide the basis on which this paper is presented. Initial drilling risk is the major obstacle to direct-use development. The applications presented include space and district heating projects, heat pumps (heating and cooling), industrial processes, resorts and pools, aquaculture and agriculture.

Introduction

The use of low- and moderate-temperature (50 to 300°F) geothermal resources for direct-use applications has increased significantly since the late-1970s. The oil price shocks of the 1970s revived interest in the use of geothermal energy as an alternative energy source. Accordingly, the U.S. Department of Energy (USDOE) initiated numerous programs that caused a significant growth of this industry. These programs involved technical assistance to developers, cost sharing of demonstration projects, resource assessment, loan guarantees, support of state resource and commercial activities, and others. Also adding to the growth were various state and federal tax credits. The use of groundwater heat pumps contributed to the growth, starting in 1980.

In January 1989, for the first time in a decade, the United States imported more crude oil and petroleum products than its domestic wells produced. As dependence on imports increases, the threat of future disruptions brought on by supply interruptions increases. The country needs a serious program to develop alternative energy resources and incentives to encourage energy conservation. It is crucial at this time that feasible ways be found to diminish this country's rising dependence on oil imports, preferably through a comprehensive approach to conservation and developing cost-effective alternative energy sources (excerpted from a *Los Angeles Times* editorial).

Direct-Use Installations

Direct heat use of geothermal energy in the United States is recognized as one of the alternative energy resources that has proven itself technically and economically, and is commercially available. Developments include space conditioning of buildings, district heating, groundwater heat pumps, greenhouse heating, industrial processing, aquaculture, and swimming pool heating. Forty-four states have experienced significant geothermal direct-use development in the last ten years. The total installed capacity is 5.8 billion Btu/hr (1,700 MW_e), with an annual energy use of over 18,000 billion Btu/yr (5 million barrels of oil energy equivalent). These data are based on an extensive site data gathering effort by the Geo-Heat Center in the spring of 1988, under contract to the U.S. Department of Energy (Lienau, 1988). These energy use values are graphically displayed in Figure 1, showing