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Low enthalpy geothermal energy utilisation schemes for greenhouse and district heating at Traianoupolis Evros, Greece

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Abstract

A socio-economic study has been made of the possible use of low enthalpy geothermal resources for district and greenhouse heating in the Traianoupolis Evros region. The thermal energy potential of the Aristino-Traianoupolis geothermal field has been estimated at 10.8 MW_{th} (discharge temperature of 25 °C). Geothermal wellhead water temperatures range from 53 to 92 °C, from 300 m deep wells yielding over 250 m^3/h. Our conclusions show, amongst the different scenarios examined and on the basis of a market study, that utilisation of this geothermal energy capacity for district heating of nearby villages, and/or greenhouse heating directed at serving local vegetable markets, would be an attractive investment.

Keywords: Geothermal investments; District heating; Greenhouses; Greece

1. Introduction

This study demonstrates the positive technical and financial aspects of utilising geothermal energy in a form that has a direct impact on a region by increasing its per capita income and at the same time, improving the standard of living of its inhabitants. An additional benefit of such a project is the reduction in the environmental

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effects that may accompany the utilisation of conventional fuels. The study has been financed by the European programme "Energy Planning at a Regional and Urban Level of DG XVII" (XVII/4.1040/93-022) (Karytsas et al., 1996).

2. Context

This technical and economic feasibility study focuses on a proposal to utilise a new, environmentally clean, thermal energy source (i.e. geothermal energy) for district and greenhouse heating in the region of Traianoupolis Evros (see Fig. 1). The latter region was chosen for this study on the basis of the following:

- The region is one of the coldest in Greece (average minimum outside temperature of −7 °C during the winter period, National Meteorological Survey, 1993), resulting in a relatively high level of energy consumption for house heating (49,392 degree-hours when the desired internal air temperature is equal to 20 °C).
- The geothermal field lies between the villages of Aristino, Aetochori and Loutros, Karytsas 1991; Karytsas et al., 1996 (see Fig. 1).
- Since this is a rural region there is a need for economic development and improvements to the standard of living of the population in the area.

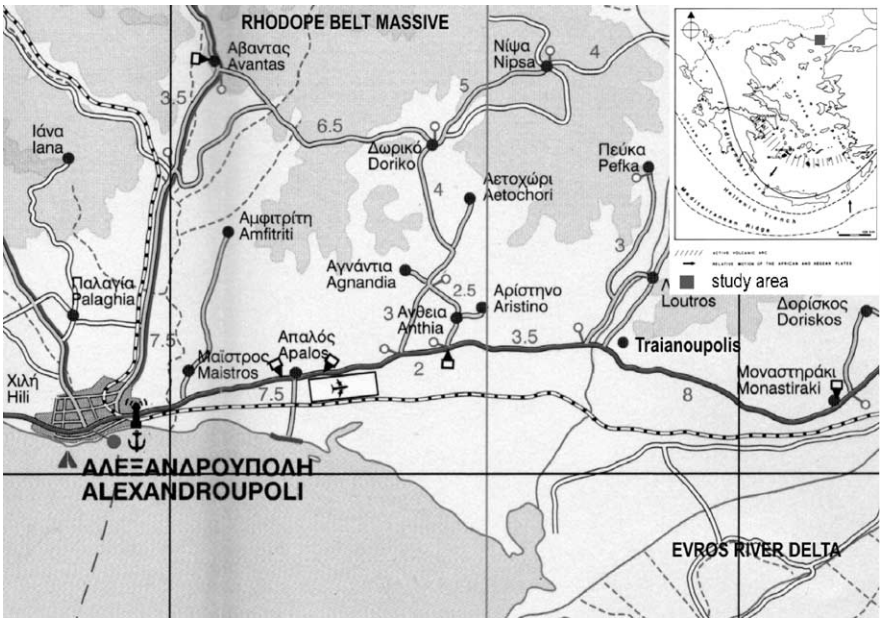

Fig. 1. Map of the study area. The geothermal field is located between the villages of Aetochori, Aristino and Loutros, approximately 3–5 km E and NE of the airport of Alexandroupoli.