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Main aspects of geothermal energy in Mexico

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Abstract

With an installed geothermal electric capacity of 853 MW_e, Mexico is currently the third largest producer of geothermal power worldwide, after the USA and the Philippines. There are four geothermal fields now under exploitation: Cerro Prieto, Los Azufres, Los Humeros and Las Tres Vírgenes. Cerro Prieto is the second largest field in the world, with 720 MW_e and 138 production wells in operation; sedimentary (sandstone) rocks host its geothermal fluids. Los Azufres (88 MW_e), Los Humeros (35 MW_e) and Las Tres Vírgenes (10 MW_e) are volcanic fields, with fluids hosted by volcanic (andesites) and intrusive (granodiorite) rocks. Four additional units, 25 MW_e each, are under construction in Los Azufres and due to go into operation in April 2003. One small (300 kW) binary-cycle unit is operating in Maguarichi, a small village in an isolated area with no link to the national grid. The geothermal power installed in Mexico represents 2% of the total installed electric capacity, but the electricity generated from geothermal accounts for almost 3% of the national total.

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1. Introduction

In Mexico, the generation, transmission, distribution and marketing of electric power is the responsibility of two public utilities, the Comisión Federal de Electricidad (CFE) and the Compañía de Luz y Fuerza (CLF). There are also some private Independent Power Producers (IPP), who have to sell their production to the

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CFE, and self-suppliers and co-generators, who also can sell their excess electricity to the CFE. By December 2002 the total installed power capacity in Mexico was 37,682 MW_e (CFE, 2003d), 853 MW_e of this total being of geothermal origin and installed in the Cerro Prieto, Los Azufres, Los Humeros and Las Tres Virgenes fields. The total does not include about 4000 MW_e from IPP, self-suppliers and co-generators. The main energy sources in Mexico and their contribution are shown in Table 1.

The gross production of electric power in Mexico in 2002, by the CFE and the CLF, was 178,510 GWh (CFE, 2003d). This total excludes the electricity generated by IPP, self suppliers and co-generators. More than 75% of this total came from fossil-fuelled power plants, while the electricity of geothermal origin accounted for 5397 GWh (3%) (Table 2).

Geothermal power generation in Mexico decreased somewhat between 2001 and 2002, from 5567 (CFE, 2003a) to 5398 GWh, i.e. around 3%.

2. Cerro Prieto geothermal field

Cerro Prieto is the largest known water-dominated geothermal field in the world and is located in the State of Baja California, northwestern Mexico, close to the border with the USA (Fig. 1). It is probably one of the most thoroughly investigated geothermal fields.

Table 1
Electric installed capacity in Mexico (2002)

Resource type	Capacity (MW)	Percentage
Hydro	9608	25.5
Fossil fuels ^a	25,854	68.6
Nuclear	1365	3.6
Geothermal	853	2.3
Wind	2	<0.001
Total	37,682	100.0

^a Fossil fuels include several types of power units fueled by oil, gas, and coal.

Table 2
Electric energy produced in Mexico (2002)

Resource type	Electricity (GWh)	Percentage
Hydro	24,862	13.9
Fossil fuels	138,496	77.6
Nuclear	9747	5.5
Geothermal	5398	3.0
Wind	7	<0.001
Total	178,510	100.0

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