Thermal Power in the Discarded Fluids at Mexican Geothermal Power Plants and Possible Applications

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Currently there are three geothermal fields exploited for power generation in Mexico. All of them produce steam and separated brines. The oldest and best known is Cerro Prieto, located about 30 km South of the city of Mexicali, which sits on the Western Mexico-U.S.A. border. The installed capacity in Cerro Prieto is 620 MWe. Los Azufres, located in central Mexico, near the city of Morelia , was developed several years after Cerro Prieto. Its installed capacity is 98 MWe. Los Humeros was developed after Los Azufres. It is also located in central Mexico, close to the town of Perote, in the state of Puebla. It ranks third in installed capacity, with 35 MWe.

In all, there are 28 geothermal units housed in 22 power plants, in these fields. These units vary significantly in power rating (from 1.5 to 110 MWe), type (there are single-flash, double-flash, back-pressure and binary units) and specific consumption. Vast amounts of relatively hot brines, at about 100°C, are discarded every year by the power plants.

In this work we assess the thermal power discarded by the Mexican geothermal power plants and identify convenient applications for it. The assessment is done on a plant by plant basis. It includes detailed information on the temperature and chemical composition of the discarded brines as well as on the plants' locations and their local environments.

The physical environments of the plants vary widely. Cerro Prieto is located in a semi-desertic, flat area which is essentially at sea-level, while Los Azufres and Los Humeros fields lie at high altitude (2,500 to 3,200 masl) on high-relief woodlands. The corresponding economic environments vary widely also. These factors affect significantly the convenience or feasibility of possible applications. Therefore we considered them carefully when identifying the convenient applications of the discarded fluids.