

Geothermal Update Report of Taiwan (2020)

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ABSTRACT

Taiwan lies along the Pacific Ring of Fire (a vast belt of volcanic activity surrounding the Pacific Ocean) on a convergent and compression boundary between the Philippine Sea Plate and the Eurasian Plate. The collision of the aforementioned plates results in frequent earthquake, structural complexity, and explains the presence of numerous volcanoes and hydrothermal areas. Largely as a result of these volcanic and tectonic activities, Taiwan has large reserves of geothermal energy.

A series of geothermal exploration studies has been carried out in Taiwan since the 1960s by several organizations and universities, including (but not limited to) CPC Corporation Taiwan (CPC) and Industrial Technology Research Institute (ITRI). There has also been the development of two pilot geothermal power plants in the 1980s, with capacities of 280 kWe and 3 MWe. The former was decommissioned due to funding cut and the latter was abandoned due to decline in steam production in 1993 (Hanson, 2019). Since then, there have been no geothermal power plants in operation in Taiwan. Recently, there has been renewed interest in geothermal energy in Taiwan with the aim of developing renewable energy and reducing the dependence on imported fuels.

There are currently 9 geothermal fields under exploration and/or development:

- Volcanic Field Type: Tatun Volcano Group (3.5 MWe; in development stage) and Lutao (0.2 MWe; in development stage).
- Extensional Domain Type: Tuchang (2 MWe, in development stage) and Chingshui (Binary systems of 300 kWe in operation and the other 1 MWe in development).

- Orogenic Belt / Foreland Basin Type: Hongye (1.5 MWe; in development stage), Zhiben (0.01 MWe; in operation), Jinlun (2.5 MWe; in development stage), Jinfeng (9.98 MWe; in development stage), and Ruisui (2 MWe; in development stage.)

The combined planned installed electrical capacity is approximately 23.19 MWe, with a total of 22.88 MWe is in development stage, and only 0.31 MWe is in operation.

The overall pace of geothermal energy development in Taiwan is slow, however. The development of Taiwan's geothermal energy potential is important as the country currently imports nearly all of the fuel that powers its economy. Accordingly, the strategic plan of the Government of Taiwan aims at an installed capacity of more than 200 MWe of geothermal power by 2025. Although the reserves of geothermal energy are quite large in Taiwan, geothermal development in the Island has several challenges, including:

- Social challenges: most potential areas are within aboriginal lands and national parks; which essentially off limits to development; and lack of clear rules related to the ownership of the resource once it is discovered.
- Economic challenges: though Taiwan has established attractive feed-in tariff for renewable energy, including geothermal energy, it is reported that a push for higher FIT by the Taiwan Geothermal Association was not fruitful (Richter, 2020).
- Resource challenges: geothermal fluid is highly acidic (corrosive) hot water, which is present in Tatun Volcano Group Area. Complex geologic setting leads to difficulties in locating the permeable structures.