

# 高效能地熱發電技術研發計畫

執行單位

工業技術研究院

計畫主持人

顏志偉

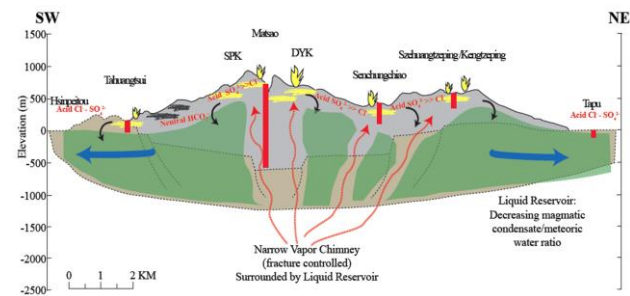
- 開發地熱資料庫系統及高效能地熱田工程技術，除建立地熱開發所需的資源資料查詢及評估系統，亦針對我國地熱發電開發面臨之酸腐蝕及地熱流體分布問題進行研究，力求突破地熱開發之障礙。

103~106年度專利獲證15件:

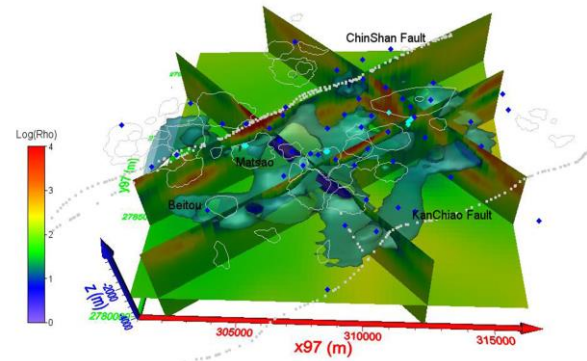
1. 取熱裝置(中華民國 I443294號)
2. 井下注藥裝置以及估測地熱井的閃發深度的方法(中國大陸 ZL201010111489.1號)
3. 新穎的嗜熱菌及其胞外蛋白之應用(美國 8828238號)
4. 有價金屬回收的方法(中華民國 I487790號)
5. 有價金屬回收的方法(美國 8968687號)
6. 地溫熱交換系統及其地溫熱能發電與地溫熱泵系統(中國大陸 ZL201310119779.4 號)
7. 地溫熱交換系統及其地溫熱能發電與地溫熱泵系統(中華民國 I507648號)
8. 井下清除裝置(中華民國 I484090號)
9. 改質碳材與其形成方法及塗料(中華民國 I530454號)
10. 改質碳材與其形成方法及塗料(中國大陸 ZL201410647140.8號)
11. 電沉積設備(中華民國 M522954號)
12. 抑制鹽類生成的方法及高溫廢水的處理方法(中華民國 I510618號)
13. 產生嗜熱性鹼性蛋白酶生產菌屬 (Tepidimonas) 之胞外蛋白的方法(中華民國 I541353號)
14. 產生嗜熱性鹼性蛋白酶生產菌屬 (Tepidimonas) 之胞外蛋白的方法(美國 9,580,738號)
15. 可調式濾光元件及其製作方法(中華民國 I502176號)



四磺子坪鑽井工程施工



大屯火山地熱概念模式



大屯火山地電阻分布圖

本計畫朝地熱技術研發、調查與評估、產業推廣與國際合作等三方面進行，期有效促進我國地熱發電產業之發展。

- 完成與美國勞倫斯國家實驗室(LBNL)為期二年國際合作案，共同建構大屯火山區初步地熱概念模式。
- 完成大屯山四磺子坪地區地熱發電探勘井，鑽鑿深度1300公尺及井下FMI與PT量測作業，與產能測試及水質採樣分析工作。
- 因應我國火山型酸性地熱環境及變質岩型地熱易結垢之特殊問題，開發耐酸腐蝕塗料與金屬管材和環境友善除鈣技術。
- 開發完成地熱資源決策分析系統，輔助鑽井規劃與生產管理監測。
- 推動大屯火山區及東部地熱區地熱開發，透過業界合作及發電示範，加速地熱電廠開發速度。

# Project Name: High efficient geothermal energy technology research project

Execution Unit

Industrial Technology Research Institute

Project Director

Chih-Wei Yen

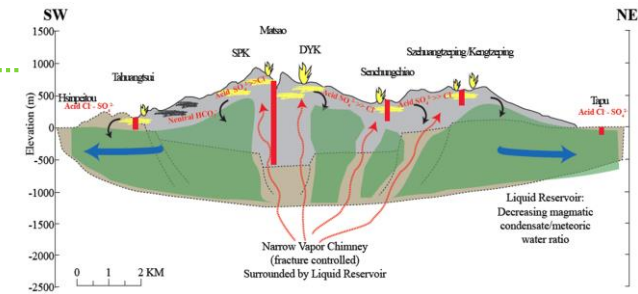
- Several technologies were developed to aid the develop of geothermal generation in Taiwan. Anti acid-corrosion coating technology to cost down for low pH brine geothermal system in Tatun. 4D fluid flow monitoring technology to delineate the distribution and act of geothermal brine in reservoir during discharge and recharge period.

## 15 patents have been awarded from 2014 to 2017:

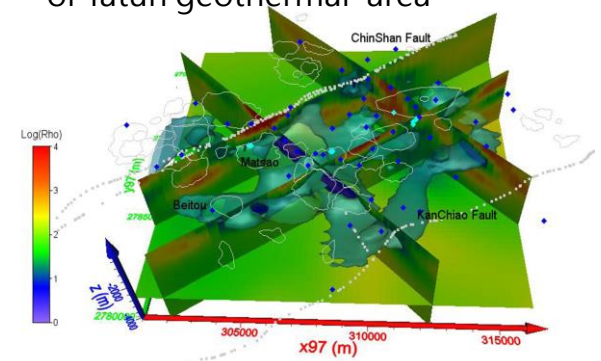
1. Heat exchange device (Taiwan I443294)
2. Downhole dose injection device and a method to estimate flash depth in geothermal well(China ZL201010111489.1)
3. Novel thermophilic bacteria and their extracellular proteins (US 8828238)
4. Valuable metal recovery method (Taiwan I487790)
5. Valuable metal recovery method (US 8968687)
6. Underground heat exchange system and geothermal power generation and heat pump system (China ZL201310119779.4)
7. Underground heat exchange system and geothermal power generation and heat pump system(Taiwan I507648)
8. Downhole removal device (Taiwan I484090)
9. Modified carbon material and method for manufacturing the same and paint (Taiwan I530454)
10. Modified carbon material and method for manufacturing the same and paint (China ZL201410647140.8)
11. Electrodeposition equipment (Taiwan M522954)
12. Method for Inhibiting Salt Generation and Method for Treating High Temperature Wastewater (Taiwan I510618)
13. Method for producing extracellular proteins from genus Tepidimonas(Taiwan I541353)
14. Method for producing extracellular proteins from genus Tepidimonas(U.S. 9,580,738)
15. Adjustable filter element and its making method (Taiwan I502176)



Exploration drilling site



Initial geothermal conceptual model of Tatun geothermal area



3D resistivity distribution map of Tatun Volcano area

This project focused on geothermal exploitation technology, resources estimation, geothermal generation promotion and international technology cooperation to speed up the geothermal industry in Taiwan. Main achievements of this project is described as follows.

- A two-year international cooperation with Lawrence Berkley National Laboratory (LBNL) to construct initial geothermal conceptual model in Tatun volcano area.
- A 1300 m depth exploration well at the Szehuangtzping area is completed to get the reservoir characteristics of Tatun geothermal area. Both downhole FMI and PT logging were conducted to get downhole fracture orientation and temperature information. Production test and fluid chemistry analysis also completed to well delineate the generation potential.
- Both anti-acid corrosion coating and alloy technology were developed to overcome the low pH brine in Tatun area. An environmental friendly calcite inhabitation system is also developed for non-volcanic type geothermal system.
- Both concentrated and distributed promotion act are conducted in Taiwan. Concentrated promotion act focused on Tatun volcanic area as it is the largest geothermal potential area in Taiwan. While distributed promotion act is suitable for the other geothermal systems at eastern part of Taiwan.