

Geothermal electricity

Geothermal energy uses heat from hot dry rocks from underground to generate electricity. With about 120 active volcanoes, Japan has quite high potential for developing geothermal energy (GRSJ, undated). Indeed, Japan has the world's most advanced technologies for exploration, development, use and monitoring of geothermal power. The first geothermal power generation experiment in Japan dates back to 1925, although commercial exploitation has only taken place since 1966 (GRSJ, undated). In 2010, Japan had 0.5 GW of installed capacity for geothermal energy (EDMC, 2013), generating 3 TWh/y of electricity. After the Fukushima disaster, however, there has been renewed interest among relevant Japanese companies to explore and invest in geothermal power.

Level 1

Level 1 assumes that because of its high development costs and potential adverse effects on national parks and resorts, Japan focuses on other energy sources and no additional geothermal capacity is added. The 2010 level of 0.5 GW capacity is maintained all the way to 2050, generating around 4 TWh/y electricity.

Level 2

Under this level, low efforts from Japan lead to a capacity increase, which reaches 2 GW in 2030 and then 4.3 GW in 2050. With this capacity, Japan generates 30 TWh/y of electricity in 2050.

Level 3

At Level 3, Japan makes moderate efforts and its geothermal installed capacity reaches 2.1 GW in 2030 and further expands to 6.4 GW in 2050. 45 TWh/y of electricity is produced in 2050.

Level 4

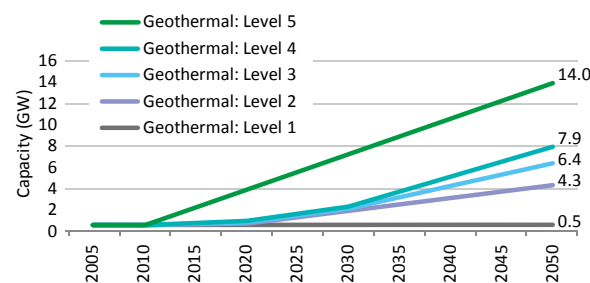
Level 4 assumes that Japan puts great efforts into expanding its geothermal capacity. By 2030, the capacity reaches 2.3 GW but by 2050 it rises to about 8 GW, which generates 56 TWh/y of electricity.

Level 5

Level 5 represents Japan's physical and economic potential for developing geothermal capacity. At this level, Japan's capacity reaches 14 GW in 2050, which generates 98 TWh/y electricity.

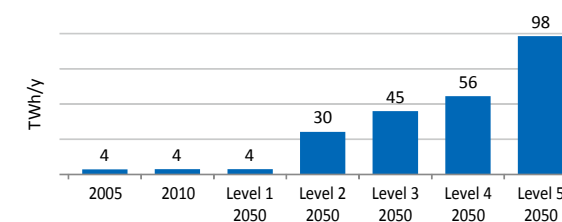
For detailed references related to the level settings, please see the Excel spreadsheet model (Zhou et al., 2014).

Figure 1 Japan's geothermal power capacity versus time



Source: Authors.

Figure 2 Geothermal electricity generation under different scenarios



Source: Authors.