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Geothermal Power Generation Technologies

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Abstract

In recent years, the adoption of renewable energy has been promoted to reduce CO₂ emissions, with solar and wind power being implemented worldwide on a large scale. Meanwhile, geothermal power generation continues to be promoted as a renewable energy source in countries with geothermal resources.

This presentation introduces the characteristics of geothermal power generation, presents the global situation, and explains the current status and challenges of geothermal power generation in Japan. Geothermal power generation can provide a stable supply of electricity regardless of weather conditions, unlike solar and wind power generation.

On the other hand, the difficulties in constructing geothermal power plants in Japan can be summarized in three main points.

First, approximately three-quarters of the country is mountainous, and most geothermal power plants are built in mountainous areas, including national parks where development is not permitted, making it difficult to develop large-scale geothermal power plants.

Second, while it is said that the wells drilled for geothermal power generation are at different depths than those of hot springs and therefore do not affect the hot springs, existing hot spring inns remain concerned that the springs may stop flowing.

Third, there is also the risk that even after drilling wells for power generation, it may not always be possible to find wells that produce sufficient steam.

To address these challenges, Japan has implemented measures to promote the adoption of renewable energy, including geothermal power generation, such as the introduction of the Feed-in Tariff (FIT) system in July 2012, and, from April 2022, the Feed-in Premium (FIP) system, which encourages power generation linked to market electricity prices. As a result, geothermal power development has become increasingly active. Additionally, we will introduce examples of the construction of small-scale geothermal power plants that can be constructed on limited space, and large-scale geothermal power generation technologies.