秋田県大　2013年

第1問

次の英文を読み，以下の問い(問1～10)の 1 ～ 10 に入る最も適切なものを，イ～ニからそれぞれ一つずつ選び，答えなさい。

**Harnessing**1 **the World’s Geothermal Reserves**2

(1) Geothermal power generation is increasingly being seen as a possible new energy source. The heat that is released from magma in the interior of Earth raises the temperature of underground water. The heated water is deposited in geothermal reservoirs3. Geothermal power generation refers to the process of drilling wells down into the geothermal reservoir and directing the steam produced there to turbines4 to generate electricity. In recent years, geothermal power generation has attracted attention as a rare technique that emits no carbon dioxide (CO2) at the time of generating power, is not dependent on weather conditions, and is capable of a stable supply of energy.

(2) At present, twenty-four countries including Japan are generating geothermal power. Total capacity for power generation installations5 is highest in the United States, followed by the Philippines, Indonesia in third place, and Mexico in fourth place. To date, the total global output of geothermal power generation is more than 10,000 MW6 and the total global output for geothermal power will expand further over the next five years.

(3) Japanese technology is involved in the operation of geothermal power installations around the world. More than 70% of geothermal power worldwide is supplied using the equipment of Japanese corporations such as Fuji Electric, Mitsubishi Heavy Industries, and Toshiba. The hot water and steam used to generate geothermal power are at high temperatures and highly pressurized. They also contain hydrogen sulfide7 and other corrosive8 elements. Therefore, the equipment must be able to withstand both corrosion8 and fatigue. High durability is a strong point of Japanese corporations.

(4) With developments in geothermal power generation underway worldwide, Fuji Electric completed the world’s largest single-unit power station for generating geothermal power, Nga Awa Purua, in New Zealand in May last year. The plant generates 140 MW of power annually, which can cover the needs of about 450,000 households.

(5) Shigeto Yamada, general manager at the Energy Business Headquarters of Fuji Electric comments, “In Iceland, where there are many volcanoes and an abundance of geothermal energy, a quarter of total electricity in the country is provided by geothermal power, making it an advanced country in the field.”

(6) The binary9 power generation system is one of the geothermal energy technologies where Fuji Electric is focusing efforts. By its nature, geothermal power generation uses underground steam at temperatures above 150 °C to turn the turbines to generate power, but by using a fluid with a low boiling point (pentane10: boiling point at 36 °C), binary power generation makes it possible to generate power using steam and boiling water at lower temperatures.

(7) Japan ranks eighth in terms of the total capacity of geothermal power installations, but in terms of usable geothermal resource potential, Japan is third after Indonesia and the United States. To date, geothermal energy has been insufficiently utilized because of the high cost and the restrictions on development posed by the location of geothermal resources within national parks. As of this year, however, there are moves underway to utilize geothermal energy in Japan, with the Ministry of the Environment starting to study ways to relax regulations to promote geothermal power generation. In addition, the major petroleum companies have announced a joint survey of geothermal power generation in Akita Prefecture and Hokkaido.

〔出典〕 Adapted from an article in *Highlighting Japan* (July, 2011), pp. 6-7. http://www.gov-online.go.jp/eng/publicity/book/hlj/index.html

注：

1harness (自然力を)利用する 2reserve 埋蔵量

3reservoir 蓄積 4turbine タービン

5installation 施設 6MW メガワット

7hydrogen sulfide 硫化水素 8corrosive / corrosion 腐食性の／腐食

9binary 二つから成る，二元の 10pentane ペンタン(C5H12)

問1 According to paragraph (1), electricity is generated by 1 -powered turbines.

イ magma ロ drill ハ reservoir ニ steam

問2 According to paragraph (1), which of the following is not true? 2 .

イ Geothermal power generation is not capable of a stable supply of energy

ロ Geothermal power generation emits no carbon dioxide at the time of generating power

ハ Geothermal power generation is not dependent on the weather

ニ Geothermal power generation has attracted attention as a rare technique

問3 According to paragraph (2), which of the following is correct? 3 .

イ At present, twenty-five countries are generating geothermal power

ロ Japan has the highest total capacity for geothermal power generation installations

ハ Indonesia is among the top four countries for total capacity for geothermal power generation installations

ニ Geothermal power generation will decline over the next five years

問4 According to paragraph (3), which statement is true? 4 .

イ High temperatures and pressure cause corrosion

ロ Hot water and steam are corrosive elements

ハ Japan is producing more than 70% of corrosive elements worldwide

ニ Japanese geothermal power equipment is highly durable and able to withstand corrosive elements

問5 According to paragraph (4), the new geothermal power station in New Zealand 5 .

イ was built by the Nga Awa Purua corporation

ロ is the world’s second largest single-unit power station

ハ can supply power to about 450,000 homes a year

ニ generates 140 MW of power per month

問6 According to paragraph (5), Iceland 6 .

イ has an absence of geothermal energy

ロ is considered to be advanced in the production of geothermal energy

ハ is experiencing slow growth due to geothermal power

ニ relies on geothermal energy for all of its power needs

問7 According to paragraph (6), binary power generation makes it possible to 7 .

イ use steam and boiling water at lower temperatures

ロ turn turbines with nature

ハ create pentane at 36 °C

ニ turn turbines with steam at temperatures above 150 °C

問8 According to paragraph (6), Fuji Electric is focusing efforts on 8 .

イ the nature of power generation

ロ using water with a boiling point of 36 °C

ハ increasing underground steam

ニ the binary power generation system

問9 According to paragraph (7), Japan 9 in terms of usable geothermal resource potential.

イ ranks eighth ロ is second after the United States

ハ is third ニ is ahead of Indonesia

問10 According to paragraph (7), one of the reasons Japan has been unable to fully develop geothermal energy is because 10 .

イ the United States and Indonesia control Japan’s resources

ロ the resources are located in national parks

ハ the Ministry of the Environment is too relaxed

ニ petroleum companies plan to drill for oil in Akita