

Conventional power plants

Fuel mix for conventional plants

Japan is not well-endowed with conventional energy resources. Limited domestic oil and gas reserves compel Japan to be heavily dependent on imports. As nuclear power generation is suspended due to the Fukushima disaster, imports of conventional fuel has increased sharply in recent years. The user determines the fuel mix for conventional plants (gas, coal and biomass co-fired with coal).

Level 1

Level 1 assumes that the scenario remains similar to the current situation all the way up to 2050. Under this level, gas-to-coal ratio remains at 1:1 accounting for 90% in the fuel mix and there is no introduction of biomass in 2050.

Level 2

Under this level, gas-to-coal ratio increases to 1.8 accounting for 85% in the total fuel mix and biomass electricity share increases to 10% in 2050.

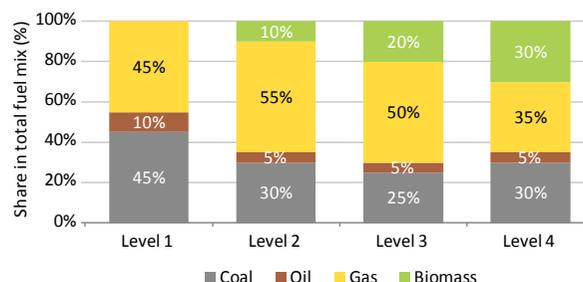
Level 3

For Level 3, gas-to-coal ratio increases to 2, accounting for 75% of total fuel mix and the share of biomass electricity rises to 20% in 2050.

Level 4

Under level 4, gas-to-coal ratio is kept at 1.2, accounting for 65% in the total fuel mix. The biomass electricity share increases to 30% in 2050.

Figure 1 Share in fuel mix for conventional plants in 2050



Source: Authors.

Availability of carbon capture and storage (CCS) technology

Although CCS has not been proven on a large scale, Japan has recently launched its first full-scale CCS demonstration project in Tomakomai, Hokkaido. The deployment of CCS in Japan depends on the availability of geological storage sites. According to a study, the country has a technical potential of 5.2 billion tonnes of CO₂ storage (Ito, 2008). This potential is equivalent to about four times Japan's total GHG emissions in 1990.

Level 1

This level assumes that there is no roll-out of CCS. CCS technology is available only in demonstration plants.

Level 2

Level 2 assumes that 20% of coal-fired power plants and 20% of gas-fired power plants in 2050 are equipped with CCS.

Level 3

In this level, Japan puts significant effort in adopting CCS technology. It assumes that 50% of coal-fired and 50% of gas-fired power plants in 2050 are equipped with CCS.

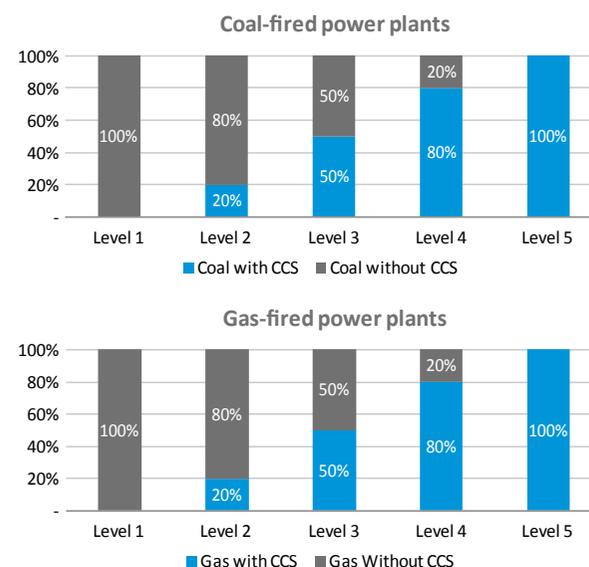
Level 4

At Level 4, Japan undertakes a more aggressive approach for adopting CCS technology. As much as 80% of coal-fired and 80% of gas-fired power plants in 2050 are equipped with CCS facilities.

Level 5

At Level 5, 100% of both coal-fired and gas-fired power plants are equipped with CCS facilities.

Figure 2 Japan's CCS installation rate in 2050 (% of net power generation)



Source: Authors.