Topic

Trends of Fossil Fuel Input for Power Generation more than 3 Years after the Great East Japan Earthquake

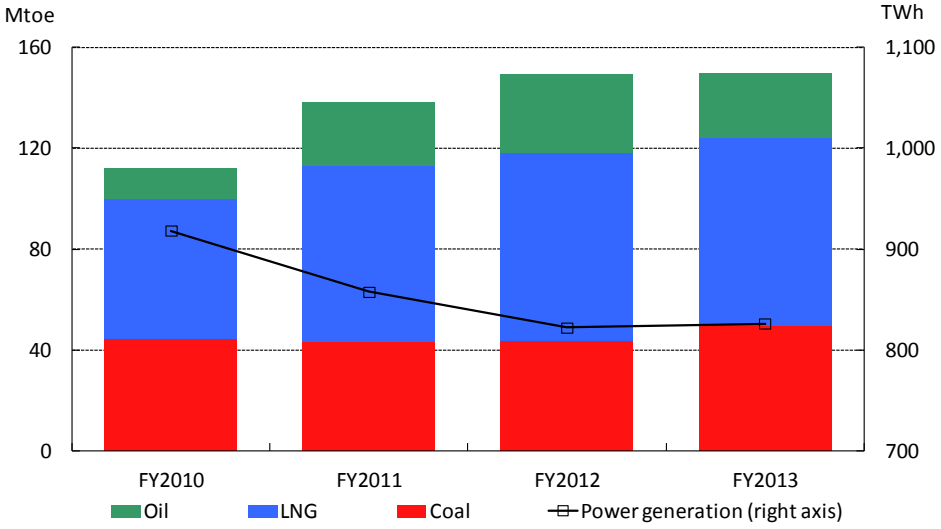
Takayuki Yoshioka
Researcher
Energy Demand, Supply and Forecast Analysis Group
Energy Data and Modelling Center

Changes in fossil fuel input for power generation after the earthquake disaster

Since the March 2011 Great East Japan Earthquake, Japanese nuclear power plants, with some exceptions, have not been restarted following regular maintenance shutdowns. As data for three full fiscal years became available at the end of March 2014, I would like to review the changes over the period.

Compared with FY2010, power utilities' generation[1] declined by 7% in FY2011 and 10% each in FY2012 and FY2013. Their fossil fuel input for power generation, which increased to cover the nuclear power generation losses, expanded 23% in FY2011, 34% in FY2012 and 34% in FY2013, from FY2010. Fossil fuel input for power generation, though remaining high since FY2012, has fallen short of expanding further due to nuclear power generation's leveling off at low levels and continued energy conservation efforts.

Figure 1 Power Utilities' Fossil Fuel Input



Note: LNG includes city gas.
Sources: Data were calculated from or estimated based on "Monthly Electric Power Survey Statistics" by the Ministry of Economy, Trade and Industry.

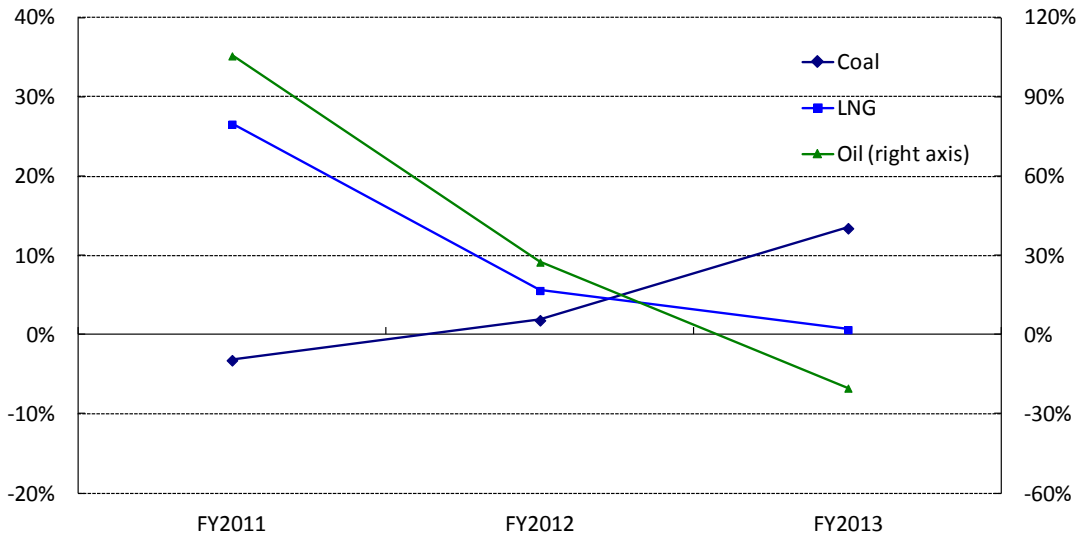
[1] The data cover generation by general, wholesale, specified and specified-scale power utilities, excluding their power receipts.

Each fossil fuel for power generation features a unique trend. In FY2011 just after the earthquake disaster, coal input declined 3% from FY2010, while oil and LNG input scored sharp increases of 106% and 27% respectively. The decline in coal came as the disaster damaged multiple large coal power plants after the coal plants served as base-load electricity sources operating at high utilization rate. Oil power plants, which are designed to provide electricity at peak demand and are usually shut down over a long term, were widely used for covering nuclear power generation losses that LNG plants failed to make up for.

In FY2012, coal input scored a 2% increase over the previous year as the Haramachi coal power plant was restored and operating rates were raised at other coal power plants. As more nuclear power plants were shut down, oil input for power generation increased 28% from the previous year even after scoring a sharp rise in the previous year. LNG input for power generation also expanded 6%.

In FY2013, coal input for power generation expanded 13% from the previous year as the No. 2 unit at the Hitachi Naka power plant and the No. 6 unit at the Hirono power plant were completed and test operated. The high growth in coal input led oil power input to decline by 20% from the previous year. However, LNG input for power generation still posted an increase of 1%.

Figure 2 Year-on-Year Changes in Electricity Suppliers' Fossil Fuel Input for Power Generation



Note: LNG includes city gas.
Sources: Data were calculated from or estimated based on "Monthly Electric Power Survey Statistics" by the Ministry of Economy, Trade and Industry.

While the nuclear power plant's operating rate was as low as 2-4% of its total capacity and electricity demand remaining almost unchanged from FY2012 to FY2013, cheaper coal power generation's share of total generation clearly expanded with additional coal and LNG generation capacity put into operation in FY2013.

In and after FY2014, oil consumption for power generation can be expected to decline further due to additional LNG generation capacity over the short term[2], if other conditions remain unchanged. But it is important to acknowledge that the future situation remains very uncertain, depending on the examination of nuclear plants and the requirement for repair of heavily used fossil fuel power plants.

Over the three years after the devastating disaster, Japan has tided over the severely tight power supply-demand balance by implementing trouble prevention measures energetically and increasing fossil fuel generation capacity steadily. But the supply-demand balance is expected to remain severely tight. This summer's balance is expected to be more severe than a year earlier, as the Electricity Supply and Demand Verification Subcommittee has pointed out that the electricity reserve margin could slip below the minimum threshold of 3% for stable electricity supply[3] in central and western Japan, particularly areas served by Kansai Electric Power Co. and Kyushu Electric Power Co., without supply from eastern Japan. Japan's heavy dependence on fossil fuel power generation must be corrected as early as possible. But it is uncertain whether the correction could be made over a short term. We must seriously consider the implications of the much delayed correction of the current high share of fossil fuels in power generation..

Contact: report@tky.ieej.or.jp

[2] As indicated by major power utilities' plans to invite bids for constructing large coal power plants through the first half of the 2020s, they place great expectations on coal power generation over a medium to long term in view of coal generation's advantages regarding costs and stable supply.

[3] If without the restart of nuclear power plants and electricity supply from eastern Japan through frequency converters, the electricity reserve margin is expected to fall to 1.8% for Kansai Electric and 1.3% for Kyushu Electric. If two reactors at the Sendai nuclear plant in Kagoshima Prefecture are restarted with electricity supplied from eastern Japan via frequency converters, the reserve electricity margin for Kyushu Electric is expected to reach 14.2%.