

Japan Long-Term Energy Outlook

A Projection up to 2030 under Environmental Constraints and Changing Energy Markets

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Summary:

[Outline of the outlook]

Major assumptions:

In spite of the decreasing population and aging society, technological development and other factors will improve labor productivity. Therefore, even though the economic growth rate is expected to decelerate gradually, we assume stable growth with an annual average growth rate of 1.5% for the period between 2004 and 2030. The industrial structure, with the maturing of society and economy, will become increasingly oriented toward services, information and higher added values. Regarding the oil price, we assume that the very high price of today will be corrected in the period up to 2010, but will then gradually rise again to a substantial price of \$45 (nominal price of \$75) per barrel in 2030. Nuclear power is expected to be introduced consistently, becoming a major source of electricity (ten new reactors being constructed by 2030). As for energy-saving, we assume that ongoing energy-saving programs will be successful and that there will be changes along with the trend of times. Regarding new energy, we attempt to predict their scale of implementation based on the general trend of introduction and the evaluation of their economic rationality, taking technology development into account.

Adding to the reference case, we postulated the “technology development case” and the following two cases for sensitivity analyses: the “high economic growth case” (assuming a growth rate 0.5% higher) and the “high oil price case” (assuming a real oil price of \$60 instead of \$45 (nominal oil price of \$100 instead of \$75), both for 2030).

Final energy consumption:

The final energy consumption will decrease even as the economy grows at a stable rate. The figure in 2030 will be 4% less than in 2004 (per annum decrease of 0.1%), suggesting that the energy consumption peaked in 2000.

(If the economic growth rate rises by 0.5% annually, the energy consumption will show a slight increase.)

The electricity demand will continue to increase in future due to stronger emphasis on amenity and convenience, accompanied by a shift to higher process-assembled manufacturing in industries. The demand growth, however, will gradually decline. The demand for city gas is expected to grow steadily, particularly in the industrial and commercial sectors, with growing emphasis on environmental cleanliness and convenience. The demand for petroleum products has been sustained in the past by the increasing demand for transport fuels in spite of the drop

in demand caused by the fuel switching in the industrial and electric power generation sectors. In future, however, the demand is expected to fall continuously as the demand for transport fuels will also start to fall, because the growth in transport demand will be inhibited by the shrinking population, shift in industrial structure, and improving fuel efficiency of automobiles.

The primary energy supply structure (less dependency on oil):

The proportion of oil in the primary energy supply (i.e. oil dependency) is expected to decrease, but oil will still maintain a major share of 37% in 2030. Nuclear, which will greatly help improve the energy self-sufficiency and reduce the emission of greenhouse gases, will continue to serve as a major source of electricity. In 2030, it is expected to produce 41% of the total generated electricity and in terms of the primary energy supply, its share is expected to grow from 11% (in 2004) to 20% (forecast for 2030). The share of natural gas is also expected to increase from 14% to 18%, contributing to the less-carbon emitting structure of the energy supply. Regarding new energy, there are high expectations for photovoltaic and wind power. Even though their contributions will roughly triple during the projected period, the share of these new energy will remain at only about 2%. Even the technology development case assumes the share as 5%. Thus, greater use of these new energy sources is expected only after 2030.

CO₂ emission

After reaching the current peak, the CO₂ emission from fuel combustion is expected to decrease in line with the falling energy demand and expanding share of non-fossil fuel. The level in 2030 will be 14% less than that in 2004. With the reference case, which only assumes the set of present-day systematized technologies and the results from various programs already in effect, the CO₂ emission in 2010 is expected to be 8.5% greater than in 1990, exceeding the reduction goal for this year (0.6% increase from the 1990 level). To achieve the reduction goal, it is important that various additional measures, currently being prepared by the Government, are implemented steadily.

[Implications]

- Even though the demand for oil will decrease, oil will remain the dominant energy source. Considering that currently 90% of the oil imported by Japan comes from the Middle East, it is feared that Japan will remain highly dependent on the region. While continuing to hold rights over the outputs from the oil fields developed with the support of Japan and to strengthen cooperative relationships with oil-producing countries of the Middle East, Japan will need to work hard to diversify supply sources and to consider unconventional oil resources (such as oil sands from Canada), ethanol and so on.
- Coal enjoys a stable supply and is economical. Therefore, rather than rejecting the use of coal due to its high environmental impact, we should look for ways to use coal efficiently. Particularly for Asian countries where energy demand is surging, it will be crucial to be able to use abundant coal resources efficiently in an environmentally sustainable manner.

Japan, with its accumulated know-how, will play an important role in addressing this challenge.

- Among all types of fossil fuels, natural gas will see the largest growth in use. However, since the natural gas price has risen recently with the soaring oil price, a major challenge will be achieving its economical use. We should develop strong bargaining power through coordination between the electric and gas sectors in Japan, as well as through coordination with other LNG importing countries, to achieve a lower LNG price and flexible supply structures.
- In any case, Japan needs a wide range of options concerning the supply of fossil fuels. This will not only increase Japan's bargaining power but also contribute to stable supply. Another important task is the energy security of the Asian region as a whole. Even though each Asian country should make its own efforts, the excessive pursuit of profit by a single country may adversely affect the energy security of the Asian region as a whole. It will become increasingly important for countries in the region sharing the same interests to tackle the issue from the larger perspective of the Asian region as a whole.
- Against the backdrop of the globalization of economy and the deregulation of energy markets, there arises the issue of tradeoffs between stable supply and economic efficiency. The treatment of nuclear power in the context of deregulation is a particularly important issue requiring discussions. Nuclear power has been playing a key role in Japan's efforts to improve energy security and to make progress in environmental efforts, and its importance will surely grow. Clarifications will have to be made, with emphasis on fairness, concerning how social costs such as environmental protection and stable supply should be reflected on markets that are difficult to be evaluated on markets, and how such costs should be shared by the Government, energy suppliers and public.
- In view of the scale of environmental efforts required on a global level, Japan's efforts within its territory can have only a limited impact. Environmental strategies that address the whole Asian region, where energy demand is expected to grow, will be far more effective when looked at from a holistic point of view. Japan leads the world with its state-of-the-art energy-saving and environmental technologies, and should continue to support the economy using its technological resources.
- To achieve the Kyoto Protocol goals, Japan should combine maximum domestic efforts with active implementation of international programs based on the Kyoto mechanisms such as CDM and JI. Japan should also make early preparations and arrangements for long-term efforts in view of the Second Commitment Period and subsequent periods. Japan is expected to demonstrate leadership as an environmentally advanced nation.

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