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# Short-Term Energy Supply and Demand Outlook – Energy Supply and Demand Forecast for FY2013 –

Yu Nagatomi *

## Summary

FY2011 was a year of tight constraints on economic and production activity resulting from the damage to production capacity and disruption of supply chains due to the Great East Japan Earthquake, the downturn in consumer confidence, and the implementation of an order to restrict electricity consumption for the first time in 37 years. Strong growth was anticipated for the Japanese economy in FY2012, boosted by demand generated by reconstruction needs, but overall, the recovery will turn out to have been a more gradual one due to a slowdown in exports to China and Europe and other factors. In FY2013, a gradual economic expansion is expected, in particular due to recovery in the U.S. economy, solid growth among emerging countries such as China, and the bottoming out of the European economy. The Japanese economy, as well, is expected to be boosted by a turnaround in the external environment and recovery in demand, and by the effects of last-minute demand prior to the consumption tax increase scheduled for April 2014. Energy demand in FY2011 declined due to a slump in economic activity and a rise in awareness of energy conservation as a consequence of the disaster. Even going into FY2012, a nationwide trend toward electricity and energy conservation became more entrenched, and with near-term economic sentiment weakness, the demand for energy is expected to continue to decline as it did in the previous year. This report presents a forecast of energy supply and demand through FY2013 based on the domestic and overseas situations outlined above.

## 1. Introduction

This report presents the outlook for short-term energy supply and demand in Japan. The report is structured as follows: Chapter 2 describes the outlook for Japan's short-term energy supply and demand up to FY2013. It also includes a sensitivity analysis related to nuclear power plant operations and an analysis of the impact of increases in electricity rate.

## 2. Short-term Energy Supply and Demand Forecast –Forecasts for FY2013--

The purpose of this forecast is to estimate the energy supply and demand for Japan for FY2013. As energy is considered a "derivative demand" of economic activity (a primary demand), it is important to first determine economic trends. FY2011 placed many constraints on economic and production activity, including implementation of an order restricting electricity consumption for the first time in 37 years, a standstill in consumer sentiment, and the destruction of production capacity as well as

* Researcher, Energy Demand, Supply and Forecast Analysis Group, Energy Data and Modelling Center, IEEJ

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interruption of the supply chain due to the Great East Japan Earthquake. Strong growth was anticipated for the Japanese economy in FY2012 with a boost from demand generated by reconstruction efforts, but overall, the recovery will turn out to have been fundamentally weak due to a slowdown in exports to China and Europe in near term and other factors. In FY2013, a gradual economic expansion is anticipated, in particular due to a recovery in the US economy, strong growth among emerging countries and the bottoming out of the European economy. The Japanese economy, as well, is expected to be boosted by a turnaround in the external environment and recovery in demand, and with the additional impact of last-minute demand prior to the consumption tax increase scheduled for April 2014.

**Assumptions Regarding Electricity Supply and Demand**

A report by the government's Supply-Demand Verification Committee on this winter's supply and demand forecasts that in the electricity supply and demand balance on a national scale, a reserve capacity of at least 3% can be ensured through electricity conservation and other already-established measures within the service area of each electric power company. Energy conservation is being enforced without a numerical targets within these service areas (excluding Okinawa Electric Power Company) as of December 3, 2012, except the service area of the Hokkaido Electric Power Company. However, as the impact of the shutdown of the Tomari Nuclear Power Plant is significant, and with restrictions on diversion of electric power from other companies, energy conservation of at least 7% compared to the demand in the FY2010 winter season is being sought within the service area of the Hokkaido Electric Power Company. For the coming summer, in addition to assuming continued operation of the Oi Unit 3 and 4 as of July and August of 2013, additional efforts by the electric power companies to add power generating capacity makes it highly likely that the supply and demand balance will ease in comparison with FY2012. The Supply-Demand Verification Committee forecasts that taking already-established energy conservation into consideration, a reserve capacity of approximately 5% can be ensured even in the event of the stifling heat experienced in 2010. Based on the analysis by the Supply-Demand Verification Committee, this report does not take into account the economic impact (effects on demand) of electric power shortages, but there is concern that augmenting thermal power generation to make up for the decline in nuclear power will continue to place a significant burden on the Japanese economy.

## 2-1 Forecast of Major Economic Indices for FY2013

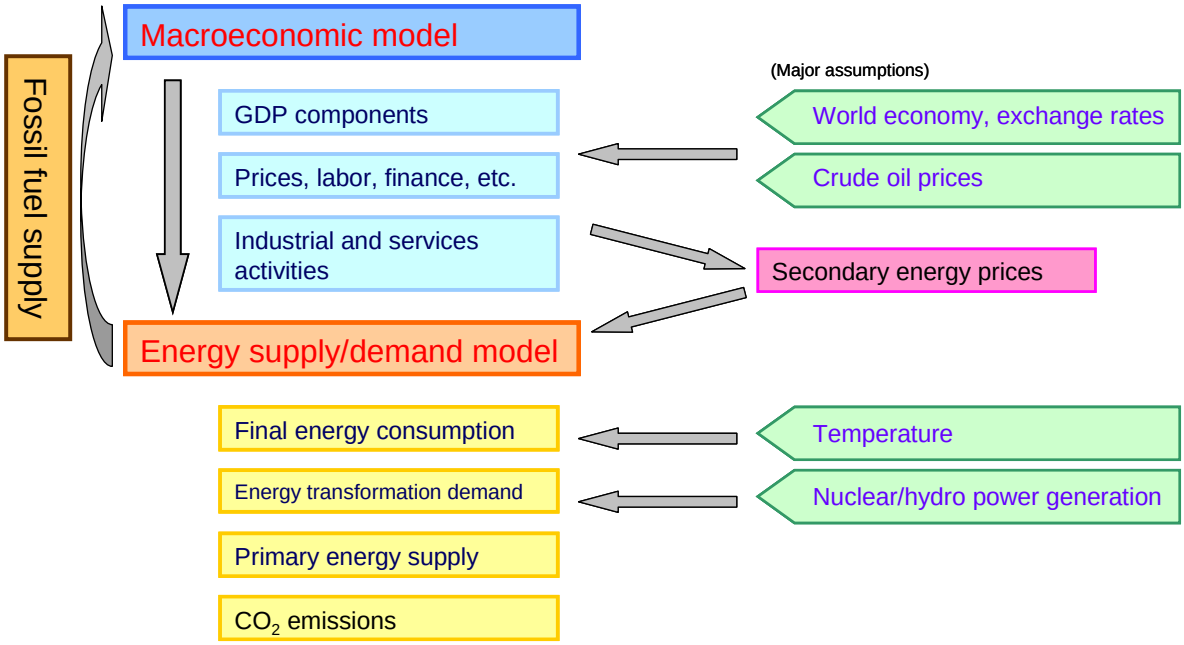
### 2-1-1 Framework for the Short-term Forecast [1]

In this forecast, we surveyed trends in the determining elements behind supply and demand for energy, using forecasting model, which has two sections, (1) the macroeconomic section, and (2) the energy demand section. The key positions on major indices used in the forecast are assumed as follows. The global economy up to FY2013 is expected to continue to expand, gaining traction from emerging countries such as China as the uncertainties surrounding the European economy gradually recede. Import CIF prices for fossil fuels, used as an input in this forecast, assumes an average crude oil price

[1]Note) This forecast is based on information dated no later than December 14, 2012.

of 105 USD/barrel in the second half of FY2012 (FY2011 average was 114 USD/barrel), remaining at about that same level in FY2013. LNG is assumed to be at 843 USD/ton. As for the price of coal, near-term declines in demand centered on China are expected to bottom out, and coal supply and demand is expected to tighten, with the price of steam coal at 118 USD/ton in the second half of FY2012 and at 121 USD/ton in FY2013. An exchange rate of 82 yen/USD has been assumed. Regarding temperature, which affects energy demand in the buildings sector in particular, the three month forecast by the Japan Meteorological Agency (announced November 22) for a slightly colder year than average was used for the second half of FY2012, while the average for the past 10 years was used for FY2013. Restart of nuclear power plants was assumed in addition to, Units 3 and 4 of the Oi Nuclear Power Plant in the second half of FY2013. With regard to the economic, energy and environmental policies currently being studied by the government, they have not as a rule been incorporated since so much remains undetermined, including when they might be enacted and on what scale.

Fig. 2-1 Model Analysis Flow




## 2-1-2 Outlook for the Macro Economy and Industry

Real GDP for FY2012 is expected to grow by 0.9% over the prior year. In the short term, the decline in exports, centered on the slowdown in exports to China, is a concern, but in domestic demand, private consumption is expected to increase due to a recovery in the consumer mindset, in addition to the boost provided by the eco-car subsidy and other measures. The contribution of overall domestic private demand will be +0.8 point. Private consumption will be positive due to an improvement in consumer sentiment as the economy recovers. Private residential investment will

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increase as it did last year due to continuing reconstruction demand. Next, the contribution of public demand overall is expected to be +1.0 point. Public capital formation will significantly increase as the government continues support for reconstruction and demand delayed from FY2011 becomes apparent. Government consumption will continue to increase as it did last year due to continuing support to disaster victims. In addition, the contribution of external demand overall is expected to be -0.8 point. Although domestic production capacity has recovered, exports are expected to decline due to the near-term downturn in exports basically destined for China as the value of yen remains historically high. On the other hand, imports are expected to increase due to the increase in fossil fuels used to generate electricity.

Real GDP for FY2013 is expected to grow by 1.4% compared to the prior year. Exports are expected to increase for the first time in three years due to a recovery in exports destined for the U.S. and China and the bottoming out of the E.U. economy. With domestic demand, although a reduction in reaction to the eco-car subsidy is a concern, an increase is expected with traction provided by private consumption due to last-minute demand before the consumption tax increase at the end of the fiscal year. The contribution from domestic private demand overall is expected to be +1.3 points. Private consumption will increase due to last-minute demand before the consumption tax increase, and private residential investment will continue to increase, as it did the previous year, due to reconstruction demand. The contribution of public demand overall is expected to be +0.1 point. Given that reconstruction demand from FY2012 will be peaking, public capital formation will decrease, but will remain at a high level. Government consumption is expected to slightly increase from the prior year due to making full circle of support for disaster victims. The contribution of external demand overall is expected to be -0.0 point. Exports appear to remain strong, centered on the U.S., and in addition, exports to China and Europe are expected to pick up. Although imports of fossil fuels used for power generation will drop slightly, imports are expected to increase as well due to more vigorous economic activity.

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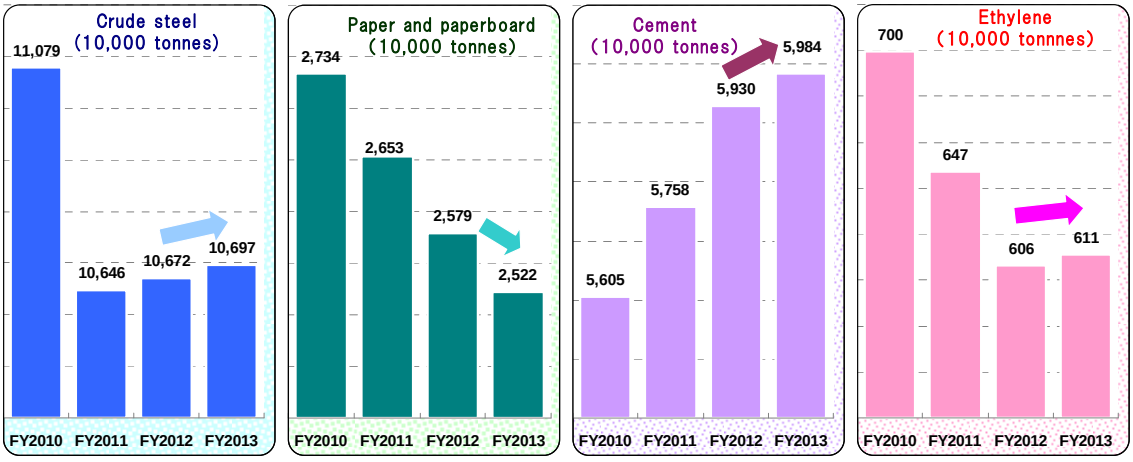
**Fig. 2-2 Forecasts of Macroeconomic Indices**

| | Actual | | Forecast | | year-on-year rare(%) | | | |
|---|---|---|---|---|---|---|---|---|
| | FY2010 | FY2011 | FY2012 | FY2013 | FY2010 | FY2011 | FY2012 | FY2013 |
| Nominal GDP(trillion yen) | 480.1 | 473.3 | 474.7 | 479.6 | 1.3 | -1.4 | 0.3 | 1.0 |
| Real GDP(Chained to Year 2005, trillion yen) | 512.3 | 513.7 | 518.5 | 525.9 | 3.4 | 0.3 | 0.9 | 1.4 |
| Private consumption | 300.0 | 304.7 | 308.7 | 312.1 | 1.7 | 1.6 | 1.3 | 1.1 |
| Private nonresidential investment | 64.8 | 67.4 | 67.1 | 68.3 | 3.6 | 4.1 | -0.5 | 1.8 |
| Public demand | 118.5 | 119.6 | 124.3 | 124.9 | 0.4 | 0.9 | 3.9 | 0.5 |
| Export | 83.7 | 82.3 | 81.6 | 83.2 | 17.3 | -1.7 | -0.9 | 2.0 |
| Indices of Industrial Production (100 for 2005) | 94.1 | 93.2 | 90.8 | 92.9 | 9.4 | -1.0 | -2.6 | 2.3 |
| Consumer price index (100 for 2010) | 99.9 | 99.8 | 99.5 | 99.4 | -0.6 | -0.1 | -0.3 | -0.1 |
| Crude oil CIF price (US$/bbl) | 84.0 | 113.7 | 109.5 | 105.0 | 21.9 | 35.3 | -3.6 | -4.1 |
| LNG CIF price (Yen/ton) | 50,315 | 64,627 | 70,306 | 69,152 | 18.1 | 28.4 | 8.8 | -1.6 |
| Exchange rate (Yen/US$) | 85.7 | 79.1 | 80.7 | 82.0 | -7.7 | -7.7 | 2.1 | 1.6 |

## 2-1-3 Outlook for Production Activity

In FY2012, although cement sector and steel sector that can expect reconstruction-related demand, will increase, ethylene, paper and paper board are expected to decrease due to the high value of the yen and other factors. In FY2013, raw material production overall will be driven by last-minute demand. Production volumes for cement and steel, as sectors that can expect reconstruction-related demand, will increase. On the other hand, ethylene production volumes will increase slightly due to the impact of a relatively high yen, while paper and paper board production volumes will continue their downward trend. The following shows major industry production trends.

**Fig. 2-3 Raw Material Production Forecasts**




### (a) Crude Steel

Crude steel production in FY2012 is expected to increase by 0.2% over the prior year and

increase by 0.2% in FY2013. In FY2012, imports are expected to decrease due to a backlash from the previous year, and exports will increase, primarily around exports to North America. Domestically, while reconstruction demand is well underway, expiration of the eco-car subsidy and a slowing of the economy in the second half are expected to reduce domestic demand. Crude steel production volume in FY2012 is forecast to be about level with the previous year at 167.2 million tons (a 0.2% year-on-year increase). In FY2013, crude steel production capacity in Korea and elsewhere is projected to increase, and with China experiencing surplus production capacity, it is anticipated that imports of steel for shipbuilding and other uses will continue to increase. Consequently, exports are expected to slightly decrease and imports to slightly increase. Domestic demand is expected to slightly increase since last-minute demand for steel used in housing and automobiles is anticipated prior to the consumption tax increase. As a result, the crude steel production volume in FY2013 is forecast at 169.7 million tons (a 0.2% year-on-year increase).

(b) Ethylene

Ethylene production in FY2012 is expected to decrease by 6.3% compared to the previous year and to increase by 0.8% in FY2013. In foreign demand in FY2012, although exports will continue to trend downward due to the effects of the high value of the yen and petrochemical plant operations overseas, imports will decrease in reaction to the significant increase in the previous year. In domestic demand, although factors likely to increase production, such as transport equipment, are anticipated in addition to full-scale reconstruction demand, actual results for the first half of the term showed a lack of growth, and a year-on-year decrease is expected. With both domestic and foreign demand expected to face continuing difficulties, production volume in FY2012 is forecast to fall to 6.06 million tons (a 6.3% year-on-year decrease), a third consecutive year of decrease. In FY2013, given that the rapid rise in the value of the yen will ease, exports are expected to increase and imports to slightly decrease. In addition, a slight increase in domestic demand will be maintained with support from economic growth centered on last-minute demand, and production volume in FY2013 is forecast at 6.11 million tons (a 0.8% year-on-year increase), reversing the ongoing downward trend.

(c) Paper and Paperboard

Production of paper and paperboard in FY2012 is expected to decrease year-on-year by 2.8%, with another year-on-year decrease of 2.2% in FY2013. In FY2012, in foreign demand imported paper is expected to increase due to the impact of the high yen and other factors, and imports of paperboard as well as printing paper are on the rise in the near term. Imports of both paper and paperboard are expected to increase. Domestically, paper use continues to decline with the shift to electronic media, and conditions are expected to continue to be difficult. Paperboard is anticipated to increase due to expanding freight demand accompanying reconstruction demand, but results in the first half of the term were down, and a continuing downward trend is projected for the second half of the term. As a result, total production of paper and paperboard in FY2012 is forecast at 25.79 million tons (a 2.8% year-on-year decrease). In FY2013, although the domestic economy is

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anticipated to improve due to a peak in reconstruction demand and last-minute demand before the consumption tax increase, production of paperboard is expected to decrease, although to a lesser degree. Although business conditions affects paper, in the larger trend, the downward trend centered on paper for printed information is strong, and production is expected to decrease. The production of paper and paperboard in FY2013 is forecast at 25.22 million tons (a 2.2% year-on-year decrease) for a third consecutive year decline.

(d) Cement

Cement production in FY2012 is expected to increase year-on-year by 3.0% and to increase by 0.9% in FY2013. In FY2012, domestic demand will tend to increase due to housing demand and redevelopment that will accompany the economic recovery, particularly apparent in the Kanto region. In addition, the rise of long-delayed reconstruction demand will further boost an increase in demand for cement. At the same time, in foreign demand, exports will decrease in order to handle domestic demand since there will be limits to production capacity, and imports will increase. Consequently, the production of cement in FY2012 is expected to increase in line with the previous year, to 59.3 million tons (a 3.0% year-on-year increase).

In FY2013, domestic demand is expected to receive a further boost from the increase in demand for cement as reconstruction demand peaks and last-minute demand surfaces for housing. Since domestic demand will continue to be strong, in foreign demand, a continued decrease in exports and an increase in imports are expected. Cement production in FY2013 is thus forecast at 59.84 million tons (a 0.9% year-on-year increase).

**Fig. 2-4 Mining and Manufacturing Industry Production・Services・Automobile Ownership Forecasts**

| | Actual | | Forecast | | year-on-year rare(%) | | | |
|---|---|---|---|---|---|---|---|---|
| | FY2010 | FY2011 | FY2012 | FY2013 | FY2010 | FY2011 | FY2012 | FY2013 |
| General and electric machinery | 96.4 | 93.5 | 88.8 | 92.5 | 16.8 | -3.0 | -5.1 | 4.2 |
| Indices of Industrial Production (100 for 2005) | 94.1 | 93.2 | 90.8 | 92.9 | 9.4 | -1.0 | -2.6 | 2.3 |
| Automobile production (10,000 units) | 899 | 927 | 953 | 963 | 1.5 | 3.0 | 2.9 | 1.0 |
| Tertiary industry activity index (100 for 2005) | 97.8 | 98.5 | 99.1 | 100.0 | 1.1 | 0.7 | 0.7 | 0.9 |
| Gasoline vehicle ownership (10,000 units) | 6,843 | 6,909 | 6,938 | 6,960 | 0.4 | 1.0 | 0.4 | 0.3 |
| Diesel vehicle ownership (10,000 units) | 630 | 612 | 591 | 575 | -4.4 | -3.0 | -3.4 | -2.6 |

(e) Automobiles

Automobile production is expected to increase year-on-year by 2.9% and by 1.0% in FY2012 and in FY2013, respectively. In FY2012, the impact of a rebound in spending from the slump following the Lehman Brothers collapse, the eco-car subsidy, and a strong automobile market in the North America are expected to be favorable. In foreign demand, near term uncertainty remains in

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production for China, Europe, and elsewhere, but demand is expected to improve at the end of the year. Domestically, the number of vehicles sold was expected to increase due to the eco-car subsidy in the first half of the term, in particular, but is expected to fall to some extent in the second half of the term when the eco-car subsidy expires. Automobile production is forecast at 9.53 million vehicles (a 2.9% year-on-year increase) due to favorable foreign demand and support for domestic demand. In foreign demand for FY2013, exports destined for North America are expected to remain strong, while those to China, which are on the decline in short term, will recover and exports to Europe are expected to bottom out. In domestic demand, although a decrease is expected as a reaction to the loss of the eco-car subsidy, last-minute demand before the consumption tax increase is expected to limit the decrease in demand and the extent of the decline from the prior year will be kept to a minimum. As a result, production in FY2013 is forecast to reach 9.63 million vehicles (a 1.0% year-on-year increase), a continuing increase.

(f) General and Electric Machinery, etc.

Production trends in general and electric machinery in FY2012 are expected to see a 5.1% year-on-year decrease and 4.2% increase in FY2013. Foreign demand in FY2012 was favorable for generators and such destined for the U.S., but in the near term, the slowdown in production is significant mainly in general and information-related machinery. Although a bottoming out is anticipated, mainly in electric power infrastructure equipment destined for developing countries and elsewhere, the situation is challenging. Domestically, the demand for energy-efficient home appliances is expected to remain firm due to concerns about the electric power supply, while heavy electric machinery used in power generation, such as non-utility generation facility and turbines for thermal power generators continue to be strong. However, with the impact of foreign demand, the trend is difficult overall, and production of general and electric machinery is expected to decrease by 5.1% compared to the previous year. In FY2013, exports to China are expected to improve and those to Europe to bottom out, as the economic situation improves. Domestically, a certain level of continued demand for heavy electric machinery used for power generation can be expected, and overall with improvement in economic conditions and last-minute demand, an improvement in orders for machinery and equipment is expected. Production of general and electric machinery is thus expected to increase year-on-year by 4.2% in FY2013.

## 2-2 Energy Supply and Demand Outlook for FY2012

### 2-2-1 Final Energy Consumption Forecasts

Even with a recovery in economic activity, energy demand in FY2012 is expected to decrease in each sector due to the effects of relatively mild temperatures and promotion of energy savings, beginning with electric power conservation. In the industrial sectors, although cement and steel production are increasing and auto production is recovering, energy demand is predicted to decrease year-on-year by 0.9% due to the promotion of energy savings centered on electric power conservation. In the residential sector, energy demand is expected to decrease year-on-year by 2.4%

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due to a rebound from the impact of temperatures in the previous year, and the spread of energy saving appliances. In the commercial sector, although service activities are expected to recover from the previous mood of voluntary restraint, the projection is for a 0.4% year-on-year decrease due to a rebound from the impact of mild temperatures and strengthening of electric power conservation. In the transportation sector, although there is an increase in transport demand due to recovery in economic activity and reconstruction demand, a 0.7% year-on-year decrease is expected due to fuel economy and continuing improvements in transporting efficiency. As a result, total final energy consumption in FY2012 is expected to be lower year-on-year by 1.0%. In FY2013, while the economic recovery at home and abroad and making full circle of electric power conservation and energy savings are factors that will boost energy consumption, temperatures milder than the previous year (average annual temperatures are projected) will contribute to holding down demand. In the industrial sector, production will increase due to reconstruction demand and last-minute demand due to the consumption tax increase, so a 0.8% year-on-year increase is projected. In the residential sector, a decrease of 1.1% year-on-year is forecast, due to certain continued level of electric power conservation and temperatures milder than in the previous year. In the commercial sector, while a recovery in service activities is expected, electric power conservation will continue and due to the impact of temperatures, a 0.2% year-on-year decrease is projected. In the transportation sector, while an increase in transported volume is expected due to the economic recovery, due to improvements fuel economy and transporting efficiency, a 1.4% year-on-year decrease is projected. As a result, total final energy consumption in FY2013 is projected to decrease year-on-year by 0.2%.

**Fig. 2-5 Forecasts for Final Energy Consumption by Sector**

| (million tonne of oil equivalent) | Actual | | Forecast | | year-on-year rare(%) | | | |
|---|---|---|---|---|---|---|---|---|
| | FY2010 | FY2011 | FY2012 | FY2013 | FY2010 | FY2011 | FY2012 | FY2013 |
| Industry | 162.7 | 159.3 | 157.8 | 159.1 | 4.8 | -2.1 | -0.9 | 0.8 |
| Residential | 54.5 | 52.6 | 51.4 | 50.8 | 5.6 | -3.3 | -2.4 | -1.1 |
| Commercial | 42.6 | 40.9 | 40.7 | 40.6 | 3.0 | -4.1 | -0.4 | -0.2 |
| Transport | 83.6 | 81.9 | 81.3 | 80.1 | 1.1 | -2.0 | -0.7 | -1.4 |
| Total final energy consumption | 343.3 | 334.7 | 331.2 | 330.6 | 3.8 | -2.5 | -1.0 | -0.2 |

（Note） Industry include non-energy use.

### 2-2-2 Primary Energy Supply Forecasts

In the primary energy supply in FY2012, although economic activity has recovered due to reconstruction after the disaster, the development of energy savings such as electric power conservation due to uncertainties about the electric power supply are expected to exert downward pressure. Coal is expected to increase year-on-year by 1.7% due to its increased use for generating electricity with the restoration of damaged coal fired electric power plants. Oil is expected to increase year-on-year by 3.1% due to the significant increase in its use for generating electricity,

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even though a decrease was expected in fuel switching by the various sectors. Natural gas is projected to increase year-on-year by 5.2% due to an increase is its use for generating electricity, in addition to an increase in demand for city gas used in industry with the shift to gas and increase in operation of non-utility generation facility. Nuclear power will significantly decrease due to anticipated operation of only two units at the Oi Nuclear Power Plant for a decrease year-on-year of 84.5%. As a result, the primary energy supply for FY2012 is expected to decrease year-on-year by 1.0%, and energy-related $CO_2$ emissions will increase year-on-year by 3.8% due to the increase in fossil fuel consumption for generating electricity. In addition, imports of fossil fuel due to the recovery in economic activity and increased demand for power generation will increase by 6.1 trillion yen over FY2010 (3.6 trillion yen for generation of electricity) and is projected to reach 24.2 trillion yen in FY2012. As a result, the ratio of fossil fuels as a share of total imports will reach 34% (29% in 2010) and will be a factor in the trade deficit (excess amount of customs cleared trade exports -7.1 trillion yen).

In the primary energy supply for FY2013, while production and economic activities are expected to recover, final energy consumption will decrease year-on-year by 0.2% as a result of energy savings and electric power conservation and the effects of relatively mild temperatures, and the primary energy supply is expected to decrease year-on-year by 0.1%. Coal will increase year-on-year by 2.0% due to restoring of damaged coal-fired power plants. Oil is expected to significantly decrease for use in generating electricity due to a gradual restart of operations at nuclear power plants, and is also expected to decrease due to fuel switching in the industrial and buildings sectors, and in the transportation sector, with improvements in fuel economy and transporting efficiency, for a projected 4.1% year-on-year decrease. With natural gas, city gas use is expected to increase due to increased operation of production facilities by existing industries and due to fuel switching from oil, and since its use in power generation is expected to be about the same as the previous year, a year-on-year increase of 1.2% is projected. Nuclear power is expected to increase due to the restart of several units in the second half of the term, and will increase year-on-year by 125.4%. The volume of $CO_2$ emissions will decrease year-on-year by 1.4% due to the decrease in oil as nuclear power plants resume operation.

Although several units at nuclear power plants are expected to resume operation, the amount of fossil fuel imports will increase by 5.3 trillion yen over FY2010 (3.1 trillion of which is for generation of electricity), and is expected to slightly decrease to 23.4 trillion yen from the previous year in FY2013. As a result, fossil fuels as a ratio of total import amount will be 33% (29% in FY2010) and the trade deficit is expected to improve compared to FY2012 (excess amount of customs cleared trade exports -6.3 trillion yen).

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## Fig. 2-6 Forecasts for Primary Energy Supplies

| (million tonne of oil equivalent) | Actual | | Forecast | | year-on-year rare(%) | | | |
|---|---|---|---|---|---|---|---|---|
| | FY2010 | FY2011 | FY2012 | FY2013 | FY2010 | FY2011 | FY2012 | FY2013 |
| Coal | 119.1 | 112.4 | 114.3 | 116.6 | 10.7 | -5.7 | 1.7 | 2.0 |
| Oil | 211.9 | 217.6 | 224.4 | 215.3 | 1.0 | 2.7 | 3.1 | -4.1 |
| Natural gas | 95.5 | 112.0 | 117.8 | 119.2 | 5.8 | 17.2 | 5.2 | 1.2 |
| Hydro | 18.2 | 18.4 | 16.6 | 17.2 | 10.8 | 1.3 | -9.8 | 3.7 |
| Nuclear | 60.7 | 21.4 | 3.3 | 7.5 | 3.0 | -64.7 | -84.5 | 125.4 |
| New energies, etc. | 7.9 | 7.6 | 7.8 | 8.1 | 6.2 | -4.3 | 3.8 | 3.8 |
| Total primary energy supply | 513.3 | 489.3 | 484.2 | 483.9 | 4.7 | -4.7 | -1.0 | -0.1 |
| Energy self-sufficiency rates (excluding nuclear) | 5.9% | 6.3% | 6.1% | 6.2% | | | | |
| Energy self-sufficiency rates (including nuclear) | 17.7% | 10.7% | 6.7% | 7.8% | | | | |
| Energy-related CO2 emissions (million tonne) | 1,123 | 1,173 | 1,217 | 1,199 | 4.5 | 4.4 | 3.8 | -1.4 |
| Energy-related CO2 emissions (FY1990=100) | (106) | (111) | (115) | (113) | | | | |

## Fig. 2-7 Decomposition analysis of $CO_2$ Emissions

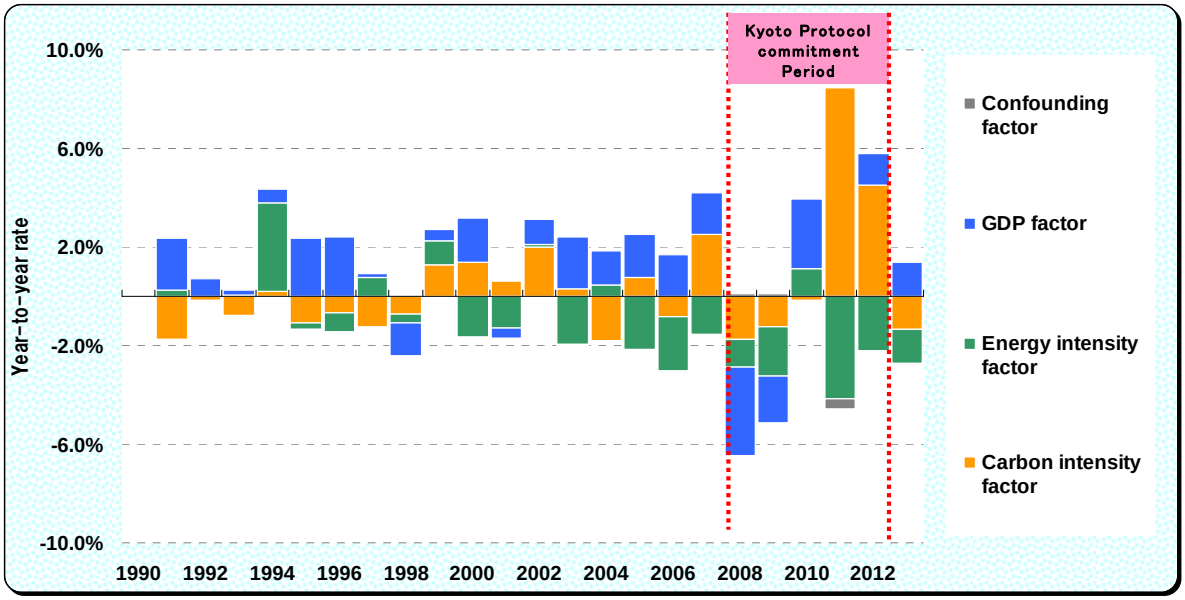

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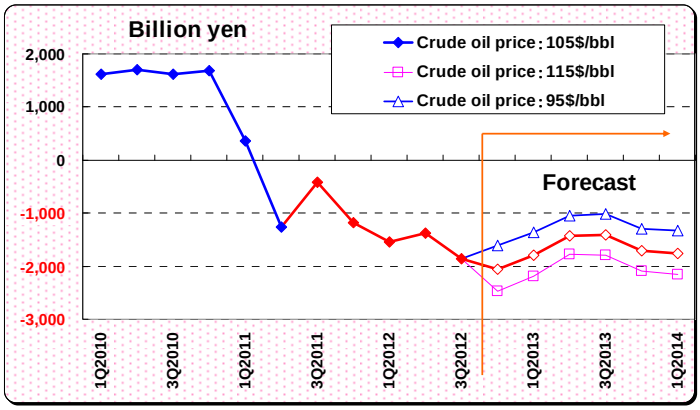
**Fig. 2-8 Forecasts of Trade Balance**




| (Trillion yen) | Actual | | Forecast | |
|---|---|---|---|---|
| | FY2010 | FY2011 | FY2012 | FY2013 |
| Export | 67.8 | 65.3 | 63.4 | 63.6 |
| Import | 62.4 | 69.7 | 70.5 | 69.9 |
| Fossil Fuels | 18.1 | 23.1 | 24.2 | 23.4 |
| Balace of Trade | 5.4 | -4.4 | -7.1 | -6.3 |

FY2013

Oil price -10 $ -4.6 trillion yen

Oil price +10 $ -7.8 trillion yen

**trade deficit (3 years in a row)**

## 2-2-3 Outlook for Energy Sales Volume

### (a) Electricity

The volume of electricity sales in FY2012 is expected to decrease year-on-year by 0.8%. Lighting contract demand is projected to decrease year-on-year by 1.4% due to a rebound from temperatures the previous year, strong awareness of the need to conserve power, well-established national energy savings, and wide use of energy-saving appliances. Demand for power contract is projected to decrease year-on-year by 0.5% due especially to well-established energy saving policies for the summer of FY2011 in the commercial sector, in particular for offices and such, and a strong awareness of the need to conserve power, even though the economy is making a gradual recovery. Large scale consumers of electric power are expected decrease year-on-year use by 1.2% by reducing production and strengthening energy savings. The volume of electric power sold in FY2013 is expected to increase year-on-year by 0.5%. The demand for lighting contract in FY2013 is projected to decrease year-on-year by 0.2% due to the impact of temperatures, even though the results of continuing power savings will have come full circle. The demand for power contract is projected to increase year-on-year by 0.8% due to full scale recovery in production and services activities, while the effects of some energy savings measures remain, having been implemented in FY2012. Large scale consumers of electric power are projected to increase use year-on-year by 0.9%, having shifted to an upward trend in demand for electric power by energy intensive industries as production recovers. As a result, the volume of electric power sales in FY2013 is expected to increase by 0.5%, marking the first increase in three years.

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**Fig. 2-9 Forecasts of Electric Power Sales**

| (TWh) | Actual | | Forecast | | year-on-year rare(%) | | | |
|---|---|---|---|---|---|---|---|---|
| | FY2010 | FY2011 | FY2012 | FY2013 | FY2010 | FY2011 | FY2012 | FY2013 |
| Lighting | 304.2 | 288.9 | 284.9 | 284.3 | 6.8 | -5.0 | -1.4 | -0.2 |
| Power (including Eligible customer use) | 637.9 | 605.9 | 602.6 | 607.7 | 5.5 | -5.0 | -0.5 | 0.8 |
| Total | 942.1 | 894.8 | 887.5 | 892.0 | 5.9 | -5.0 | -0.8 | 0.5 |
| of which: Large-scale industrial users | 300.2 | 290.8 | 287.2 | 289.8 | 6.9 | -3.1 | -1.2 | 0.9 |
| Chemicals | 28.1 | 27.2 | 26.6 | 26.6 | 5.2 | -3.3 | -2.3 | 0.0 |
| Iron & steel | 53.3 | 53.2 | 53.3 | 53.6 | 15.2 | -0.2 | 0.1 | 0.7 |
| Machinery | 74.6 | 71.6 | 70.4 | 72.1 | 7.3 | -3.9 | -1.7 | 2.4 |

(b) City gas

City gas sales in FY2012 are projected to increase year-on-year by 1.4%. In residential use, while the number of contracts is showing a steady increase, a year-on-year decrease of 1.1% is expected in reaction to the severely cold winter the previous year. In business use, while there is a recovery in service activities, commercial use is near flat due to the rebound from temperatures the previous year and a strong awareness of the need to conserve energy, and a year-on-year increase of 0.2% is projected for other business uses. In industry, production is decreasing, but a year-on-year increase of 3.3% is projected, taking into account an increase use for emergency generating equipment in house generators due to concerns about the electric power supply, and with fuel switching from oil. City gas sales in FY2013 are projected to increase 2.1% year-on-year. In FY2013, residential use will continue to see an increase in the number of contracts from the previous year, a year-on-year decrease of 0.4% is projected due to the impact of temperatures. In commercial and other uses, although economic activity is expected to recover, a year-on-year increase of 0.2% is projected for commercial use due to the effects of temperature and well-established energy savings and conservation, while other uses are expected to increase year-on-year by 0.1%. In industrial use, a year-on-year increase of 4.2% is expected due to fuel switching from oil and boosted by a recovery in production. As a result, total city gas sales in FY2013 are projected to increase year-on-year by 2.1%.

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**Fig. 2-10 Forecasts of City gas Sales**

| (100 million cubic meters) | Actual | | Forecast | | year-on-year rare(%) | | | |
|---|---|---|---|---|---|---|---|---|
| | FY2010 | FY2011 | FY2012 | FY2013 | FY2010 | FY2011 | FY2012 | FY2013 |
| Household | 97.9 | 97.9 | 96.8 | 96.5 | 1.7 | 0.0 | -1.1 | -0.4 |
| Commercial | 47.4 | 44.8 | 44.8 | 44.9 | 2.7 | -5.5 | -0.0 | 0.2 |
| Industrial | 176.3 | 186.7 | 192.9 | 200.9 | 5.5 | 5.9 | 3.3 | 4.2 |
| Others | 31.3 | 29.7 | 29.8 | 29.8 | 8.3 | -5.0 | 0.2 | 0.1 |
| Total | 352.8 | 359.1 | 364.2 | 372.1 | 4.3 | 1.8 | 1.4 | 2.1 |

(c) Oil

Total fuel oil sales in FY2012 are expected to increase year-on-year by 0.8%. In gasoline sales, while the downward trend continues as fuel economy has improved with wide use of the eco-car and an increase in lightweight vehicles, the decrease was limited by the torrid summer last year, and sales are projected to decrease year-on-year by 1.0%. The sale of diesel oil is projected to increase year-on-year by 0.2% due to improvements in transporting efficiency while the transportation demand is experiencing a recovery. Naphtha is projected to decrease by 4.0% year-on-year with a decrease in ethylene production. Kerosene is projected to decrease year-on-year by 3.8% as the switching to city gas and electric power moves forward for residential use (space heating, and heating water) and for commercial use, in addition to the impact of temperatures. Heavy fuel oil A is projected to decrease year-on-year by 2.9% due to conversion to city gas, and with progress in energy conservation, even though transportation activity is recovering with reconstruction demand. Heavy fuel oil C is expected to increase year-on-year by 34.3% in total for the year, a significant increase over the previous year due to a decrease in the operation of nuclear power plants used for power generation. Extremely tight supply logistics management is necessary, including ensuring availability of domestic vessels in order to ensure a stable supply for power generation. Heavy fuel oil C for other uses is expected to increase year-on-year by 0.4% in total for the year due to an increase in use of non-utility generation facility, even though, as with heavy fuel oil A, the trend is toward reduced use through energy saving measures and fuel switching. LPG sales for commercial use are trending downward due to a decrease in production activities and the effects of fuel switching, while LPG sales for chemical feedstock are decreasing due to reduced ethylene production, and sales for residential and commercial decrease due to the effects of temperature. At the same time, an increase in use for power generation exerts significant upward pressure overall, and sales are projected to increase year-on-year by 1.5%.

Total fuel oil sales in FY2013 are expected to decrease year-on-year by 2.3%. Gasoline sales in FY2013 are projected to decrease year-on-year by 1.5% due to the effects of mild temperatures and promotion of fuel economy improvements with the eco-car subsidy. Diesel oil sales are projected to decrease year-on-year by 1.4% due to improvements in transporting efficiency even though freight shipments have increased with reconstruction demand and economic recovery. Naphtha is projected

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to increase year-on-year by 0.7% due to the expected gradual recovery in ethylene production, which was in a declining trend. Kerosene continues a downward trend and is projected to decrease year-on-year by 3.6% as fuel switching proceeds toward electric power, city gas and other sources. Heavy fuel oil A is projected to decrease year-on-year by 2.2% as fuel switching proceeds, although production and freight activities are recovering. Heavy fuel oil C for use in power generation is projected to decrease year-on-year by 12.6% with the gradual restart of nuclear power plant operations in FY2013. Other uses are projected to decrease by 1.1% due to progress with fuel switching and energy conservation. As a result, total fuel oil sales in 2013 are projected to decrease year-on-year by 2.3%. LPG sales for industrial use will decrease although the fuel switching effect is moderated by a recovery in production activities. LPG sales for chemical feedstock will increase due to the recovery in ethylene production, and sales for residential and commercial use will decrease due to the effects of temperature. Sales for electric power generation and such have increased full circle and are projected to decrease year-on-year by 1.1%.

**Fig. 2-11 Forecasts of Fuel Oil Sales**

| (billion L) | Actual | | Forecast | | year-on-year rare(%) | | | |
|---|---|---|---|---|---|---|---|---|
| | FY2010 | FY2011 | FY2012 | FY2013 | FY2010 | FY2011 | FY2012 | FY2013 |
| Gasoline | 58.2 | 57.2 | 56.6 | 55.8 | 1.0 | -1.6 | -1.0 | -1.5 |
| Naphtha | 46.7 | 43.7 | 42.0 | 42.3 | -1.3 | -6.4 | -4.0 | 0.7 |
| Kerosene | 25.5 | 23.8 | 23.0 | 22.4 | 0.6 | -6.6 | -3.6 | -2.6 |
| Diesel | 32.9 | 32.9 | 32.9 | 32.5 | 1.6 | -0.1 | 0.2 | -1.4 |
| Heavy fuel oil A | 15.4 | 14.7 | 14.3 | 13.9 | -3.9 | -4.8 | -2.9 | -2.2 |
| Heavy fuel oil B/C | 17.3 | 23.7 | 28.9 | 26.3 | 5.5 | 36.9 | 21.7 | -9.1 |
| (For power generation) | (7.7) | (14.9) | (20.0) | (17.5) | 4.1 | 93.9 | 34.3 | -12.6 |
| Total | 196.0 | 196.1 | 197.7 | 193.1 | 0.5 | 0.0 | 0.8 | -2.3 |
| LPG sales (million tonnes) | 16.5 | 16.7 | 17.0 | 16.8 | 0.4 | 1.6 | 1.5 | -1.1 |

## 2-3 Sensitivity Analysis on Three Scenarios for Nuclear Power Plant Operation

There are many uncertainties at this point regarding restart of nuclear power plant operations, and restart of only units 3 and 4 at the Oi Nuclear Power Plant is anticipated in FY2012. Nuclear power plants that have submitted the results of stress tests as of December 2012 currently number 30 (including units 3 and 4 at Oi) and restart of operations at some future date is possible. At present, there are some nuclear power plants that are taking steps toward restart of operations. Considering these factors, a sensitivity analysis was conducted on the status of the nuclear power plants assuming three scenarios (zero scenario, standard scenario and restart of operation scenario) for FY2013. The number of nuclear power plants in operation at the end of FY2013 under each scenario is respectively zero, 9 units and 26 units.

The standard scenario and the respective scenarios were compared with regard to fuel imports in

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FY2013. In the restart of operation scenario comparison, coal was projected to decrease by 4.69 million tons (a 2.6% decrease), LNG to decrease by 5.81 million tons (a 6.4% decrease), oil to decrease by 12.22 million kL (a 2.6% decrease), fuel costs to decrease by 1.1 trillion yen, and even $CO_2$ to decrease by 59 million tons. In addition, if it becomes possible this year for the nuclear power plants that have already submitted the results of stress tests at this stage to resume operation in early FY2014 and continue operation through the fiscal year, it would have an enormous impact. If, given the 2013 supply and demand situation, fuel costs would decline by 1.8 trillion yen and $CO_2$ would decline by 98 million tons, this could be expected to contribute to a significant positive impact on both the economy and the environment.

**Fig. 2-12 Sensitivity Analysis on Nuclear Power Plant Operation (Energy)**

| | FY2013 | | | (Reference) |
|---|---|---|---|---|
| | Zero Scenario | Standard Scenario (9 units) | Restart Scenario (26 units) | 26 units Full operation |
| Capacity factor | 2.3% | 8.8% | 34.0% | 51.8% |
| Coal | +0.3 Million ton (+0.2%) | – | -4.69 Million ton (- 2.6%) | -8.27 Million ton (- 4.7%) |
| Oil | +4.15 Million kL (+1.8%) | – | -12.2 Million kL (-5.2%) | -17.4 Million kL (- 7.4%) |
| Natural Gas | +1.26 Million ton (+1.4%) | – | -5.81 Million ton (- 6.4%) | -12.2 Million ton (- 13.3%) |
| $CO_2$ | +15 Million ton (+1.3%) | – | -59 Million ton (- 4.9%) | -98 Million ton (- 8.2%) |

**Fig. 2-13 Sensitivity Analysis on Nuclear Power Plant Operation (Economy)**

| | FY2013 | | | (Reference) |
|---|---|---|---|---|
| | Zero Scenario | Standard Scenario (9 units) | Restart Scenario (26 units) | 26 units Full operation |
| Capacity factor | 2.3% | 8.8% | 34.0% | 51.8% |
| GDP | -0.03% | – | +0.12% | +0.22% |
| Fossil fuel import for power suppliers | +0.3 trillion yen | – | -1.1 trillion yen | -1.8 trillion yen |
| Change of power rate | +0.3 yen/kWh | – | -1.2 yen/kWh | -2.0 yen/kWh |

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### 2-4 Effects of Electricity Rate Increases on Industrial Competitiveness

With the increase in fossil fuel imports following the suspension of nuclear power plant operations, Tokyo Electric Power Company implemented an increase in electricity rates for large scale customers in April, and in residential electricity rates in September of 2012. Subsequently, Kansai Electric Power $CO_2$ and Kyushu Electric Power $CO_2$ both requested a rate increase as of April 2013. The significant increase in electric power rates for businesses due to the effect of reduced operations at nuclear power plants had a major economic impact, particularly on energy-intensive industries. Looking at the amount of electric power actually purchased by the various industries in FY2010, the steel industry was the largest. The total amount of electric power purchased for manufacturing sector was approximately 530 billion yen. If the price of electric power were raised 15%, costs to the steel industry would increase by 75 billion yen, and the increase to all industries across the board would be approximately 500 billion yen. In addition, looking at operating profit margins on sales by industry, a 15% price increase would lower the operating profit margin on sales of the steel industry by 0.4% points, and lower the margin for the ceramics industry and general machinery by about 0.2% points, so high electricity rates have a significant impact on the international competitiveness of an industry. With residential electric power rates as well, a price increase of about 10% is being considered and could increase the burden per household by approximately 8,000 yen annually. Reduced capacity factor of nuclear power plant is having a significant impact, such as those stated above, on the economy.

## References

(1) “Monthly of Mineral Resources and Petroleum Products Statistics” Ministry of Economy, Trade and Industry
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(3) “Chemical Industry Statistics,” Ministry of Economy, Trade and Industry
(4) “Paper, Printing, Plastics and Rubber Product Statistics,” Ministry of Economy, Trade and Industry
(5) “Cement Supply and Demand Results,” Japan Cement Association

Contact: report@tky.ieej.or.jp