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Impacts of East Japan Great Earthquake on Power Supply

The Institute of Energy Economics, Japan

It is estimated that as of March 21, a total of 27.1 GW of power generating facilities at Tokyo Electric Power Co (TEPCO), Tohoku Electric Power Co. and Co-operative Thermal Power Co. etc.. remained suspended due to the effects of the great earthquake. Under such circumstances, the planned blackout now being implemented in the areas covered by TEPCO is expected to continue until late April, when electricity demand usually declines. Although measures are expected to be taken to enhance the nation's power generation capacity to the maximum, centering on thermal power generation, it is highly likely that power demand will become tight again in July through September, when demand for air-conditioning usually increases. Therefore, it will become necessary to consider measures to control total power demand in order to limit the social and economic effects of power shortage to a minimum, in addition to taking power saving measures.

Based on power companies' accounts on their websites and news reports by media, the Institute of Energy Economics, Japan estimates that, as of March 21, the power generation capacity that remained suspended due to the great earthquake totaled 27.1 GW (Figure 1); 15.9 GW at Tokyo Electric Power Co., 5.56 GW at Tohoku Electric Power Co., 4.5 GW at three plants of Co-operative Thermal Power, and 1.1 GW million kW at the Tokai Daini Plant of Japan Atomic Power Co. At present, efforts are being made to confirm the safety of relatively little damaged thermal power plants and to restart them in a sequential manner.

Under the circumstances, in order to make up for the serious power shortage, TEPCO has been receiving 1 GW of electricity from the 60 Hz area (three frequency conversion stations: 0.3 GW from Sakuma, 0.6 GW from Shin-Shinano, 0.1 GW from Higashi Shimizu) and 0.6 GW from Hokkaido Co. Measures are also being implemented to move up the resumption of thermal power plants under regular maintenance service or repair work, increase purchases from IPP, enhance the power output of hydraulic power plants and restart a thermal power plant that has remained suspended under a long-term plan (a total of about 2.27 GW at Yokosuka thermal power plant).

As a result, TEPCO has increased its power supply capacity from 33.5 GW as of March 17 to around 34 GW by March 22. The company plans to further increase its supply capacity to around 36.5 GW by the end of March, to around 40 GW in the first half of April, and up to around 50 GW by the summer. Meanwhile, the peak power demand in the areas covered by TEPCO (actual results in 2010) came to around 47 GW in March, decreased to around 46 GW in April and to around 41 GW in May, but increased to around 50 GW in June, when electricity demand for cooling increases, and peaked at around 60 GW in July through September (Figure 2). Therefore, TEPCO is making utmost efforts to expand its supply capacity. Still, a considerable power shortage is expected, as it is difficult for the company to meet peak demand in the summer.

Meanwhile, although the power generating capacity of Tohoku Electric Power Co. has substantially decreased due to the great earthquake, the company has decided to forgo planned power cuts until March 27, as power demand has also decreased substantially (Figure 3). The maximum power demand is expected to increase toward the summer, when electricity demand for air-conditioning usually increases. However, at present, it is difficult to predict the extent of the power supply-demand gap due to uncertainties about an increase in power demand resulting from restoration from the quake disaster and the timing of the resumption of thermal power plants now suspended.

As described above, TEPCO and Tohoku Electric Power Co. are striving to increase their power supply capacity to the extent possible. But it is not easy for them to meet peak demand in the summer. Since a considerable power shortage is expected particularly in the areas covered by TEPCO, it is necessary to further strengthen power-saving measures in industry, business, households and all other sectors. At the same time, given the high possibility of a protracted power shortage, it is also necessary to consider measures to control total power demand in order to minimize the social and economic impacts of the power cut and win the understanding of the people and corporations.

Figure 1 Power Plants Suspended (includes those under periodic inspection) due to Effects of Great Earthquake <As of March 21>

Tohoku Electric Power

Onagawa Nuclear Power Plant	▲2.17 GW
Sendai Thermal Power Plant	▲0.44 GW
Shin Sendai thermal Power Plant	▲0.95 GW
Haramachi Thermal Power Plant	▲2 GW
Total	▲5.66 GW

Tokyo Electric Power

Fukushima Daiichi Nuclear Power Plant	▲4.7 GW
Fukushima Daini Nuclear Power Plant	▲4.4 GW
Hirono Thermal Power Plant	▲1.6 GW
Hitachi Naka Thermal Power Plant	▲1 GW
Kashima Thermal Power Plant	▲3.2 GW
Higashi-Ogishima Thermal Power Plant	▲1 GW
Total	▲15.9 GW

Power Received from Other Companies

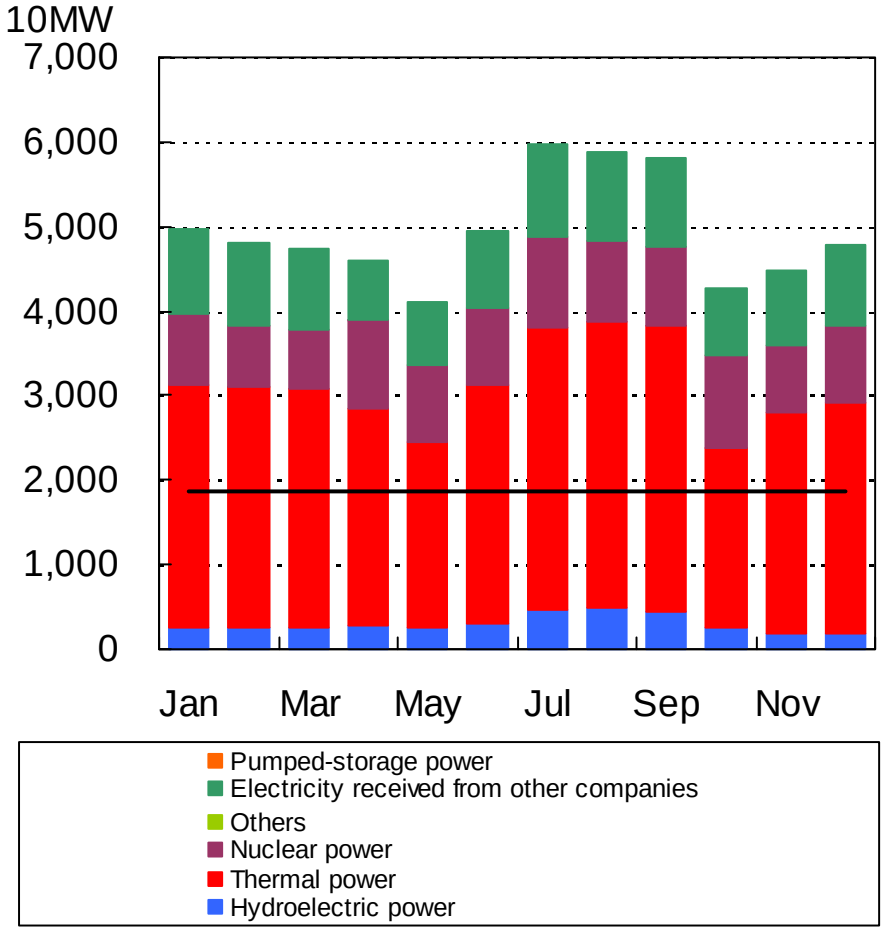
Shinchi Power Plant (Soma Kyodo Power Co..)	▲2 GW
Nakoso Power Plant (Joban Joint Power Co.)	▲1.45 GW
Kashima Kyodo Electric Power Co.	▲1.05 GW
Tokai Daini Power Plant (the Japan Atomic Power Co.)	▲1.1 GW
Total	▲5.6 GW

(Note) The supply capacity of the suspended plants is an estimate made by the Institute of Energy Economics based on power companies' accounts on their websites and news reports by media.

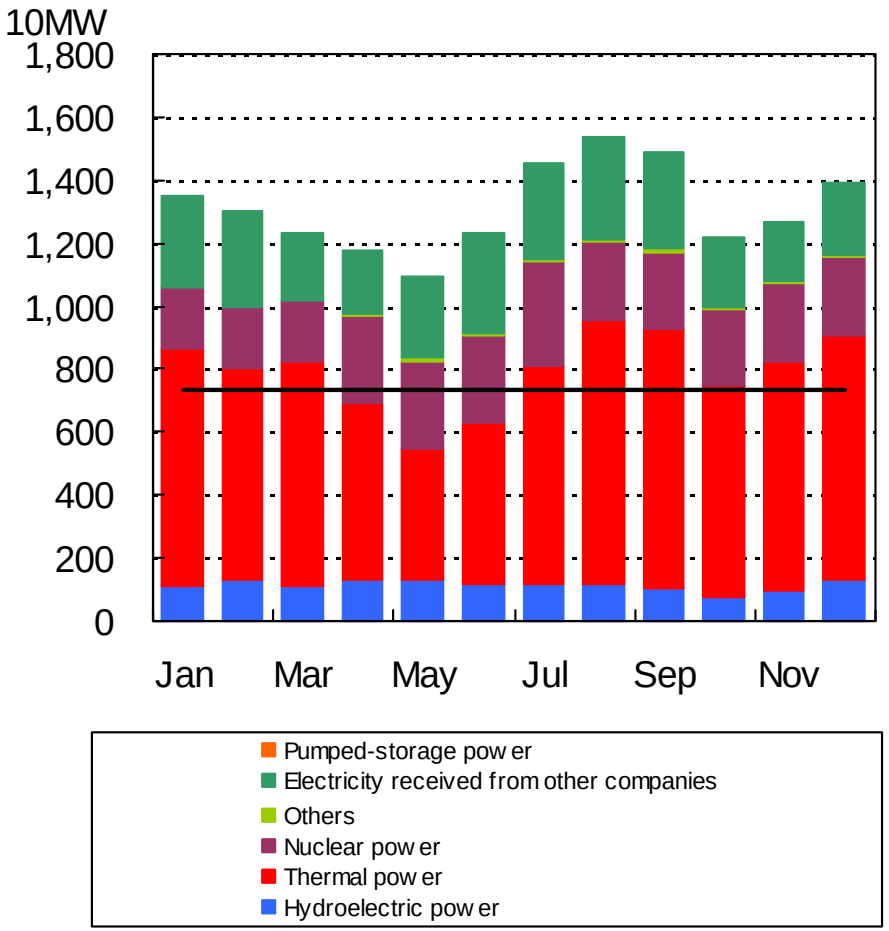
(Note) Since the operation or suspension conditions of Kashima Kyodo Electric Power are not clear, the total power received from plants, other than from the No. 2 plant which remains suspended for a long time, is listed.

Figure 2 Monthly Supply-Demand Situation in 2010 (Peak Demand)

Tokyo Electric Power

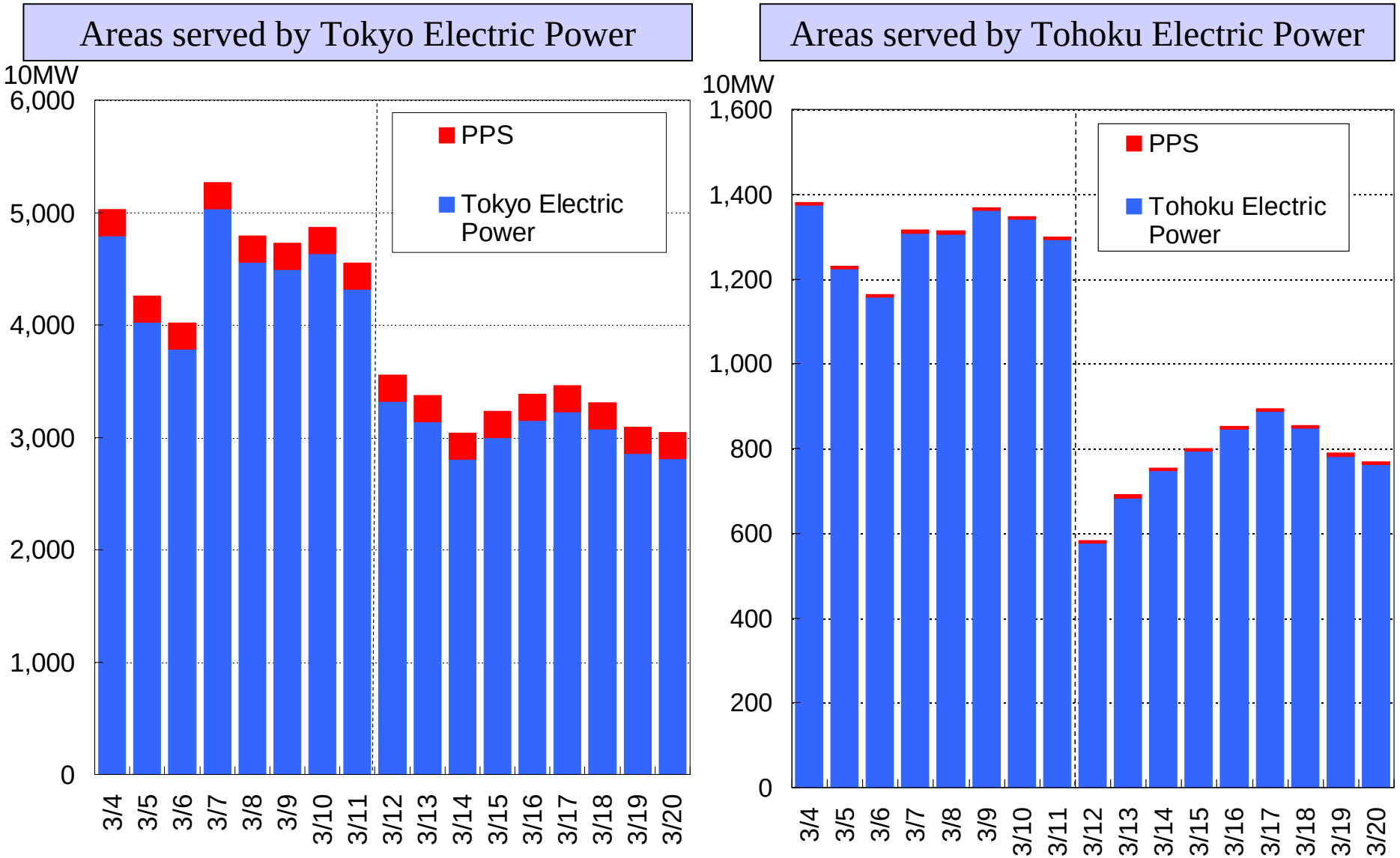


Tohoku Electric Power



(Source) "*Electric Power Survey Statistics*," Ministry of Economy, Trade and Industry

Figure 3 Great Earthquake's Effects on Peak Demand



(Note) The portion of PPS demand is treated as a fixed value.

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