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Key Points of Texas Power Crisis

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My previous report, "A Japanese Perspective on the International Energy Landscape (520)," discussed a power crisis in Texas as of February 17. Following up on that, I would like to take up the Texas power crisis again and summarize key points of the crisis.

First, I would like to review the Texas power crisis. While power demand was expected to hit a record high amid the lowest temperatures in decades in Texas, power supply declined due to frozen wind turbines and natural gas supply drops and restrictions, leading to large-scale rolling outages from February 15. As the situation worsened on cold waves and a tightening power supply-demand balance, some five million Texan electricity customers (27% of the total) were left without power temporarily, with outages peaking at 16.4 gigawatts. Power generation capacity cut off from the grid reached 46 GW on February 17, including 28 GW in fossil-fired power generation capacity and 18 GW in solar and wind capacity. The tightening supply-demand balance pushed wholesale power prices above the ceiling of $9 per kilowatt-hours at some points. As cold waves weakened later, power supply restoration made gradual progress from February 17. On February 19, the Electricity Reliability Council of Texas, which controls about 90% of Texas power grids, announced the restoration of normal power supply. Large outages, power generation capacity cut off from the grid, and unusual power price spikes represent the power crisis. The crisis involving power as a lifeline for civic life and economic and industrial operations not only exerted great impacts on Texas but also became huge news in the United States and in the world.

As the power crisis grew serious, the debate about the causes of the crisis attracted attention. Full official efforts to determine the causes will start soon, leading the official reports to be published someday. Discussions on the causes before the final official reports may have to remain tentative. The first key attention-attracting point was heavy dependence on some power sources. Given that major factors behind the decline in supply included frozen wind turbines and natural gas supply drops and restrictions, it was argued that electricity supply depending on wind as natural renewable energy might have been vulnerable. This argument interpreted renewable energy as unstable and attracted attention as renewable energy was expected to play a key role in the new U.S. Biden administration' initiatives to achieve a zero-emission power sector by 2035 and domestic carbon neutral status by 2050.

Gas-fired power generation, the most important electricity source in Texas, declined as gas production plunged and was supplied primarily for satisfying heating demand under cold waves. It was argued that the crisis became serious as the important electricity source failed to function well. While the power supply shortages were attributed to heavy dependence on some specific electricity sources, it was pointed out that attention should be paid to insufficient cold wave countermeasures for all electricity sources, rather than to degrees of dependence on specific electricity sources. In fact, power supply declined not only from wind and gas-fired power generators but also from coal-fired and nuclear power plants under the cold waves. As a matter of course, power supply declines were

far more serious for wind and gas-fired electricity sources than for others. Among nuclear power plants, South Texas Project Unit 1 came to a halt due to a malfunction of peripheral measurement devices under the cold waves on February 15, restarted on February 17 after safety checks, and restored normal operation on February 19. The three other nuclear power plants in Texas maintained normal operation. No electricity source was free from the influence of the cold waves. In this sense, cold wave countermeasures for all electricity sources are expected to become one of the key points for stable power supply.

Texas has failed to implement sufficient cold wave countermeasures despite its past experiences with outages caused by cold waves. When rolling outages totaled 4 GW during cold waves in February 2011, the Federal Energy Regulatory Commission noted that wind and gas-fired power generation facilities' preparedness against cold waves was insufficient. However, sufficient countermeasures have failed to be implemented. Whether Texas would take full-blown cold wave countermeasures after the latest serious power crisis may attract attention.

In this sense, necessary and sufficient cold wave countermeasures for key power supply facilities are likely to become a key challenge peculiar to Texas. At the same time, however, we must not forget key points for stable electricity supply and energy security to learn from the latest power crisis. First, the most important point is the securement and maintenance of sufficient supply capacity including reserve capacity. Power demand fluctuates wildly depending on weather and other various factors. It is important for stable electricity supply to possess necessary and sufficient supply capacity meeting fluctuating demand and secure reserve capacity to respond to demand fluctuations. As a matter of course, it is also important for the demand side to adequately manage demand to secure an optimum, rational supply-demand balance. Under cost-cutting pressure in the deregulated and competitive power market, however, it is not easy to secure sufficient supply capacity including reserve capacity. The problem is complicated further at a time when renewable energy diffusion exerts downward pressure on wholesale power prices. As additional costs are inevitable for securing reserve capacity, it is also important to hold down such costs.

In the latest power crisis, shortages and declines in power generation capacity were combined with constraints on gas supply for gas-fired power plants as a major electricity source. The constraints came on fuel supply or relevant power generation output (kilowatt-hours) rather than on installed power generation capacity (kilowatts). As Japan's tightening power supply-demand balance in the beginning of this year involved restraints on LNG supply, it has become apparent that abnormal weather conditions can cause fuel supply constraints as a key bottleneck. This means that it will become important to enhance the resilience of relevant supply chains, secure the flexibility of fuel procurement, and ensure buffer supply capacity. The securement of supply flexibility and the enhancement of resilience include the diversification of supply networks and the promotion of cooperation with external markets. These initiatives cannot be implemented in a day or two but require considerable costs and investment. In this sense, the enhancement of cold wave countermeasures for power supply facilities in Texas may be positioned as part of resilience enhancement initiatives. The diversification of supply sources remains a basic stable supply measure. If the power system excessively depends on a specific supply source, problems regarding the source could seriously affect overall supply. The best mix of power sources based on their respective characteristics is indispensable for stable power supply.

The Texas power crisis and the earlier tightening power supply-demand balance in Japan have had interesting common points, including fuel supply constraints for gas-fired power plants as a major electricity source, drops in power supply from renewable energy that has expanded into a

major electricity source, supply-side challenges represented by falls in coal-fired and nuclear power generation in Texas and a delay in the restart of nuclear power plants in Japan, and the basically independent power grid in Texas and Japan. Towards the enhancement of stable power supply, Japan is required to fully learn lessons from the Texas power crisis.

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