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Challenges in Introducing a Mandatory Quantitative Energy
Supply Capacity (kWh) Requirement in Japan

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Since the full liberalization of the electricity retail market in 2016, Japan's electricity market has been transitioning toward a more efficient market structure based on competitive principles. Trading volumes in the spot market of the Japan Electric Power Exchange (JEPX) have increased year by year, and by 2025, they have expanded to account for approximately 30–40% of total electricity sales. As a result, while market liquidity has improved and the price discovery function has been strengthened, a structural reliance on the spot market has also emerged, particularly among new power producers and suppliers (PPSs) that do not own generation assets. Such operators tend to face significant risks of sudden changes in procurement costs due to fuel price fluctuations and supply–demand imbalances, and their vulnerability from the perspective of the stable supply has become evident.

Under the current scheme, retail companies are only required to secure the necessary electricity volume (kWh) by 1 hour before real-time supply and demand (the so-called “gate closure”). However, there is no institutional mechanism that obliges them to procure the necessary electricity in advance over the medium to long term. While this allows flexible adjustments through short-term markets such as spot and intraday markets, it also embeds structural vulnerability to sudden events such as fuel price spikes and unexpected generation outages.

In fact, from the end of 2020 to January 2021, electricity supply and demand became extremely tight due to cold weather and tight LNG inventories, and spot market prices temporarily reached an extraordinary level of 251 yen/kWh, more than ten times the normal level. Combined with this price spike and the subsequent sustained high price levels, several PPSs with a high dependence on short-term markets faced severe financial deterioration, and some were forced to exit the market. This vividly exposed the limits of a market structure premised on excessive reliance on short-term markets.

Based on these experiences, the government is considering, as part of electricity system reform, the introduction of a new scheme requiring retail companies to secure quantitative energy supply capacity (kWh) over the medium to long term. Unlike the capacity market, which secures installed generation capacity (kW), this system aims to guarantee the actual energy supply volume itself through bilateral contracts. Under the draft scheme currently under consideration, retail companies would be required, in proportion to their projected sales volumes, to secure 50% of their projected sales electricity volume 3 fiscal years before delivery (N-3) (25% for small-scale operators) and 70% 1 fiscal year before delivery (N-1) (50% for small-scale operators). “Small-scale operators” are assumed to be those with an average sales volume of less than 500 million kWh over the past 3 years, and these measures are designed to avoid excessive burdens.

However, the appropriateness of these benchmarks— “50% three years in advance and 70% one year in advance”—has been questioned even within advisory councils, and the author also believes that there is room to reconsider their rationale and levels. Accordingly, the following discussion seeks to clarify the background to imposing quantitative energy supply capacity (kWh) obligations on retail companies and to reconsider the institutional design after clearly distinguishing between different time horizons and policy objectives.

First, from the perspective of generation companies, it is necessary to procure fuel in a stable manner over the long term in order to continuously maintain and operate thermal power plants. For this reason, it is important for generators to conclude long-term fuel contracts with gas-producing countries and other suppliers. Since such contracts usually require contract terms of 10 years or more, it becomes essential to build a framework that makes it possible to reliably offtake the electricity generated over a long period. For example, one possible approach would be to establish a single-buyer system under which a public body would purchase electricity generated based on such long-term fuel contracts at the time when a generator concludes or renews a long-term fuel procurement contract with gas-producing countries. In this case, the single buyer would sell the electricity in the spot market and other markets, and would be able to recover the additional cost—calculated as the difference between the thermal power purchase price based on the long-term fuel contract and the spot market price—through surcharges and similar mechanisms, as in the “FIT imbalance special measure (Type ③).” This would make it easier for generators to conclude stable long-term fuel procurement contracts and, as a result, would suppress the impact of price spikes that can occur with short-term fuel procurement, thereby helping to mitigate sharp price increases in the spot market.

Second, consideration is required from the perspective of retail companies and electricity consumers. Excessive dependence by retailers on short-term markets such as the spot market significantly

destabilizes their management during periods of sharp wholesale price increases. When spot prices surge, the risk of retailer exit becomes a realistic concern. For this reason, it is policy-wise desirable for retailers to hedge price fluctuation risks to some extent. However, long-term contract periods are not necessary for this purpose, and medium-term arrangements of around 1 year are sufficient. Moreover, such medium-term measures need not be limited to physical bilateral contracts, as financial hedging instruments such as electricity futures trading can also achieve the objective of price stability.

Third, it is also necessary to consider the perspective of retailers that provide electricity through real-time pricing, in which tariff levels fluctuate in accordance with supply and demand conditions. Among consumers, there are likely to be a certain number who are willing to actively engage in demand response (DR) in response to changes in price levels. For retailers that offer real-time pricing to such consumers, the need to conclude long-term bilateral contracts is limited. For example, it would be possible to establish a framework under a licensing system that exempts such retailers from the obligation to secure medium- to long-term quantitative energy supply capacity (kWh) and allows them to provide only real-time pricing. However, if such an exemption is granted, it would be desirable to impose certain conditions, such as requiring retailers to provide sufficient explanations to customers regarding the mechanism and risks of real-time pricing, and to present concrete policies to the regulator to avoid business withdrawal and other risks.

As described above, generators require a reliable offtake framework to support long-term fuel procurement, and this can be ensured through a single-buyer system. Retailers, on the other hand, face an increased risk of exit due to dependence on short-term markets, and it is therefore appropriate to require them to enter into medium-term bilateral contracts or to hedge through futures trading. Furthermore, for retailers that offer real-time pricing, the necessity of long-term contracts is low, and it is effective to establish an exemption framework while imposing conditions such as disclosure obligations to customers and the presentation of business continuity measures.

Next, it is also possible to reconsider the relationship between quantitative energy supply capacity (kWh) and installed generation capacity (kW). In Japan, a centralized capacity market was first implemented in FY2020 to secure installed generation capacity (kW) 4 years in advance, adopting a model in which the Organization for Cross-regional Coordination of Transmission Operators (OCCTO) procures the required installed generation capacity (kW) through auctions. Retail companies bear a capacity obligation and pay capacity contributions in order to cover the costs necessary to secure installed generation capacity (kW). During the consideration of introducing the capacity market, there were discussions on whether to adopt a model in which OCCTO centrally procures installed generation capacity (kW) through auctions, or a model that allows the conclusion

of bilateral installed generation capacity contracts (kW bilateral contracts) between generators and retailers in addition to OCCTO's auctions. The former model is used in the United Kingdom, while the latter is used by PJM (Pennsylvania–New Jersey–Maryland), a regional transmission organization in the eastern United States. In Japan, the former model, in which OCCTO centrally procures installed generation capacity (kW), was adopted due to concerns that if kW bilateral contracts were allowed, it would be difficult to grasp the number and types of such contracts and would impose a heavy administrative burden to prevent fraud.

However, if retail companies are required to continuously secure a certain portion of their projected sales volume of quantitative energy supply capacity (kWh) 1 year in advance, then when concluding longer-term bilateral contracts—such as those extending beyond 4 years—it would be possible to include provisions on installed generation capacity (kW) in those bilateral contracts. This would enable generators to deliver both quantitative energy supply capacity (kWh) and installed generation capacity (kW) to retailers in an integrated manner. In that case, the capacity (kW) procured by retailers under such bilateral contracts would be deducted from the amount of capacity that OCCTO needs to procure through capacity auctions, and the retailers concerned would be required to pay capacity contributions only for the portion not covered by their bilateral contracts. In fact, in PJM, alongside the Reliability Pricing Model (RPM), under which PJM itself conducts capacity auctions to secure installed generation capacity (kW), there exists the Fixed Resource Requirement (FRR), under which generators and retailers individually conclude bilateral contracts to secure installed generation capacity (kW).

In summary, since the full liberalization of retailing in 2016, competition in the electricity market has intensified and JEPX liquidity has increased, but it is necessary, when considering scheme design, to keep in mind the fact that a structure in which new power suppliers without their own generation assets rely on short-term markets and become financially vulnerable during periods of fuel price increases has been exposed. In particular, during the 2020–2021 price spike, several PPSs collapsed, making the limitations of dependence on short-term markets clear. Based on this experience, the government is considering a system that requires retailers to secure sales volumes over the medium to long term, but the appropriateness of benchmarks such as “50% three years in advance and 70% one year in advance” remains open to reconsideration. Generators require a reliable offtake framework to support long-term fuel contracts, and a single-buyer system is one possible option. On the other hand, it is appropriate to encourage retailers to use medium-term bilateral contracts and futures hedging to reduce the risks of short-term dependence. In addition, for retailers that offer real-time pricing, the need for long-term contracts is low, and it is desirable to allow exemptions from supply security obligations, subject to conditions such as sufficient disclosure to consumers and the presentation of business continuity

measures. Furthermore, by integrating installed generation capacity (kW) into long-term bilateral contracts for quantitative energy supply capacity (kWh), it would become possible for generators to deliver both kWh and kW to retailers in an integrated manner, and a mechanism similar to PJM's FRR, under which bilaterally contracted capacity is deducted from centrally procured capacity, could be considered in the future.

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