Priority Subjects with Limited Terms — Establishment of Optimal Risk Management

Well-functioning Electricity Market and Network Neutralization

Background and Objective

In Japan, discussion is underway on institutional design for government policy to reform the electricity industry. In order to make this reform beneficial for society, it is important to identify the risks in institutional changes and to present measures to mitigate such risks. The evaluation of cases in other countries where the electricity industry has been restructured to introduce more competition in the industry would be beneficial in helping Japan learn lessons regarding the implementation of such a reform program.
In this project, we aim to contribute to Japan's successful implementation of the reform by revealing the underlying risks in institutional design of the electricity market and network considered for the reform through our analyses of electric restructuring cases in overseas countries.

Main results

1 A Comparative Analysis of Capacity Mechanisms in the US and Europe

We investigate various capacity mechanisms*1 introduced or proposed in the U.S. and Europe (Fig. 1). In the U.S., there is a centralized capacity market in the Northeast and bilateral capacity market in California. The bilateral capacity market suffers from a lack of transparency while the centralized capacity market has a risk of price distortion caused by complex institutional design. In Europe, aiming for a single European electricity market, centralized capacity market is to be introduced in UK while a decentralized capacity market is pursued in France. In addition, there are other types of capacity mechanisms, and as yet, the best practice is unclear.

2 Evaluation of Transmission Unbundling in Germany

We investigated the issues in transmission unbundling in Germany. Two electric power companies are now unable to control the transmission business strategically as a result of choosing "legal unbundling" by transforming their transmission system operators into ITO*2 with a strict code of conduct (Fig. 2). This makes it, in effect, very similar to ownership unbundling. Such stricter forms of unbundling are not required for distribution system operators, over which the holding company still has strategic control. After unbundling the transmission, it is becoming more difficult to coordinate siting of generation and transmission planning, which is likely to lead to an inefficient transmission network. It is important for Japan to consider how to coordinate generation and transmission planning, when unbundling the electric power companies.

3 Issues in Competition Review and Regulated Price in Liberalized Electricity Market

We investigated issues in assessments of electricity retail market competition conducted by the U.K. energy regulator (Ofgem) for 15 years. It became difficult to assess the competition appropriately with indicators such as market shares and switching rates. Ofgem has been relying more on qualitative indicators, such as consumer surveys, though we found that developing appropriate indicators is a complicated task for the regulator (Fig. 3). In addition, determinants of choice between regulated tariffs and market-based tariffs were analyzed based on a questionnaire survey targeting residential customers (Fig. 4). Residential customers are not likely to choose market-based tariffs when regulated tariffs requiring approval by a regulator is emphasized. On the other hand, it would be effective to allow customers to return to regulated tariffs even after they choose market-based tariffs, in order to induce customers to switch to market-based tariffs.

*1 Mechanism to ensure generation adequacy
*2 Independent Transmission Operator

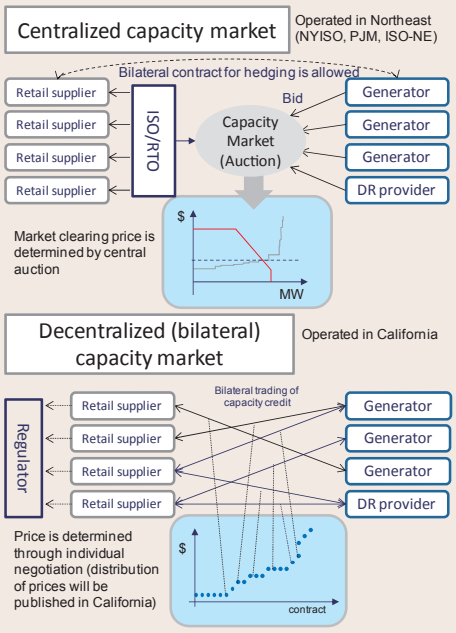

Fig. 1: Categorization of Capacity Market in the United States

In the US, there are two types of capacity market: Centralized capacity market in the Northeast and bilateral capacity market in California. Considerable risk in market design exists for centralized capacity market where price is determined by central auction. Lack of transparency is one of the problems in bilateral capacity market. It is worthwhile to start with a simple bilateral capacity market and gradually improve operation.

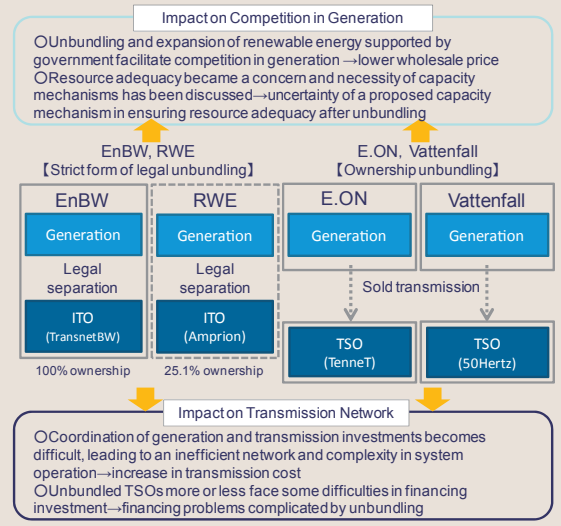

Fig. 2: Current status and issues in transmission unbundling in Germany

In Germany, coordination between generation and transmission investments has become difficult as a result of unbundling, leading to an inefficient network investment and complexities in system operation. In addition, unbundled TSOs face difficulties in financing investment to a varying extent, and unbundling complicates the problem of financing. Competition in generation has been facilitated thanks to a large amount of renewable energy, but capacity shortage in the future is a cause of concern and it is crucial to have an effective capacity mechanism.

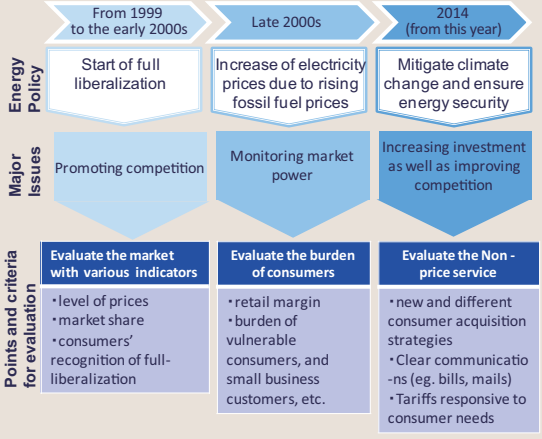

Fig. 3: Transition of electricity retail market competition assessment

In the UK, to assess the electricity retail market, the energy regulator has used not only quantitative indicators, such as market shares and switching rates, but also qualitative ones, such as consumers' experiences. In the late 2000s, as the fuel prices rose dramatically, the energy regulator tried to estimate retail margins, though accurate estimation was apparently difficult. These days, Ofgem has been facing the challenge of developing the qualitative indicators, for instance, new and different consumer acquisition strategies of retailers under vast investment requirements dictated by energy policy. In the near future, the competition assessment of the electricity retail market will be introduced in Japan too. However, as far as we can ascertain from the UK cases, developing appropriate indicators is a complicated task for the regulator under high energy cost.

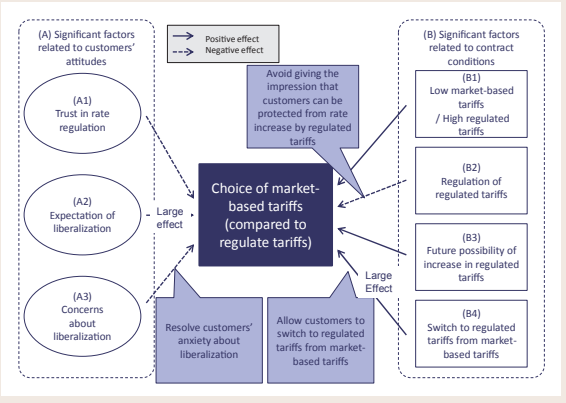

Fig. 4: Determinants of choice between regulated tariffs and market-based tariffs

The results of a survey targeting Japan's residential customers showed that (A) their attitudes and (B) contract conditions would affect their choices.

(A) Effect of customers' attitudes: customers who anticipate electricity rate would decrease due to liberalization are likely to choose market-based tariffs (A2). On the other hand, customers who are concerned that they might not be protected against increases and fluctuations in retail electricity price are unlikely to choose market-based tariffs (A3).

(B) Effect of contract conditions: Residential customers are not likely to choose market-based tariffs when customers are aware that regulated tariffs need to be approved by the regulator (B2). On the other hand, customers are likely to choose market-based tariffs when customers are allowed to return to regulated tariffs from market-based tariffs.