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Outlook and Challenges for Electric Utility Industry and Renewable Energy in 2016
(Summary)

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Electricity system reform/FIT and 3 challenges

1. In FY2015, three developments came in regard to the electricity system reform and the feed-in tariff system and brought about challenges regarding the coordination of relevant systems, forcing these systems to be reviewed. A challenge accompanying the electricity system reform is a rapid increase in the number of new entrants into the electricity retail market. The rapid increase comes as the cost level for avoiding power generation by purchasing FIT electricity falls below general power utilities' electricity cost levels in some regions including the region served by Tokyo Electric Power Co. As a result, FIT electricity can be procured at lower cost than electricity offered by general electric utilities. As electricity retail is fully deregulated in April 2016, licenses will be issued for electricity retailers and generators separately and the present categories including the general electric utility and the power producer and supplier will be repealed. A plan under consideration will link the avoidable cost level to day-ahead spot and hour-ahead spot market prices.
   (Note 1) The cost level for avoiding power generation by purchasing FIT electricity represents a general electric utility's weighted average power generation cost. The avoidable cost level's gap with the feed-in tariff is a surcharge.
   (Note 2) In Europe, electricity distributors purchase FIT electricity, with a single avoidable cost level set for local utilities and new power generators. Therefore, the cost level is neutral to competition.
2. The second challenge is a rapid rise in the number of new coal power plant construction projects. As great expectations are placed on the power generation business, fossil power plant investment plans call for plants with total capacity at more than 50 gigawatts to be built by the middle of the 2020s. Of the total capacity, coal power plants account for more than 20 GW and LNG power plants for more than 30 GW. Given Japan's maximum electricity demand at 150 GW, the fossil power plant investment plans are coupled with the expected expansion of renewable

energy power generation to indicate oversupply. Another matter of concern is an increase in carbon dioxide emissions accompanying coal power plants. Measures to address these problems are under consideration.

3. The third challenge is a rapid expansion in small-sized solar photovoltaic power generation facilities, related to the FIT system. Authorized capacity levels have exceeded regional minimum demand levels in some regions, forcing output restriction systems to be reviewed. In consideration of a heavy bias toward solar PV generation and many solar PV projects that have yet to be implemented even after authorization, a panel on reforming renewable energy promotion systems has been considering modifying the FIT system fundamentally since September 2015.
   How to address the three challenges will be important in 2016.

Electricity system reform

4. Electricity retail will be fully deregulated in April 2016. The number of electricity retailers registered for the full deregulation has reached 73. In the first half of 2015, the number of power producer and supplier companies conducting sales operations hit 93, indicating a further increase in the future.
5. As of September 2015, PPS companies accounted for 7.0% of the deregulation sector and 4.6% of the total power market. The shares in February 2011 before the Fukushima Daiichi Nuclear Power Station accident had been 3.4% and 2.0%, respectively. These shares have thus almost doubled. PPS companies' sales might have concentrated on the Tokyo Electric Power-served region where the avoidable cost level is relatively higher. But avoidable cost level gaps between general electric utilities based on energy mix differences have shrunk in response to fuel price declines. Power generation cost gaps between general electric utilities and new entrants in the electricity market have also narrowed. Under the current market conditions, it has become difficult for PPS companies to offer cheap electricity prices for the full retail deregulation from April 2016. Any electricity charge falls may be limited to those for some high-income households that consume much electricity. The abovementioned review of the avoidable cost level and its impacts are also attracting attention.
6. The recent increase in the number of coal power plant construction projects is feared to endanger the realization of CO_2 emission reduction measures and the target energy mix, leading the government to consider how to address the matter with the Act on the Rational Use of Energy and the Energy Supply Structure Sophistication Act. Regarding the Act on the Rational Use of Energy, the government is considering introducing regulations that would require power generators meeting

certain conditions (power output levels, etc.) to achieve a certain power generation efficiency level for each fuel and an overall power generation efficiency of 44.3% based on the weighted average for the energy mix, when electricity retail is fully deregulated in April 2016.

7. Regarding the Energy Supply Structure Sophistication Act, the government is considering revising the 2010 standards to set non-fossil energy sources' share of total power generation in 2030 at 44% or more and allow electric utilities to choose whether to achieve the target energy mix on an industry-wide basis or a company-by-company basis. The two revisions are expected to secure consistency between regulations and the target energy mix. But further government measures, including wholesale trading in non-fossil electricity sources, are required to enhance the feasibility of these efforts while promoting competition.

FIT system

8. Renewable energy power generation capacity in operation under the FIT system totals 22.34 GW in terms of newly authorized capacity under the system. Including capacity that has shifted from the renewable portfolio standard system to the FIT system, the total such capacity in operation has exceeded 30 GW. FIT electricity purchases have been increasing, exceeding 6% of total electricity consumption in some months. In May when electricity purchases from solar PV facilities increase despite less electricity demand, blackouts and other problems arise in regard to stable electricity supply.
9. Japan's FIT system has been based on the German system. But conditions in Germany focusing on large renewable energy facilities differ from those in Japan where small facilities have so far been dominant. If large facilities are dominant, supply and demand adjustments based on actual data would be easier. In Japan where small facilities are dominant, however, timely measurement of output during power generation is relatively difficult, increasing uncertainties regarding actual power generation. We must take note of this point.
10. Tokyo Electric Power's average unit electricity price for lighting contracts might have exceeded the average solar PV power generation cost, indicating that solar PV facility construction for private consumption could increase even if conditions for connecting residential solar PV facilities to the electric grid are revised under the FIT system.
11. Under such circumstances, the panel on reforming renewable energy promotion systems has been considering revising the FIT system. On December 15, the panel presented a report indicating the direction of the reform. It called for linking the

avoidable cost level to market prices as described above and leading electricity distributors to purchase FIT electricity. If electricity distributors were to purchase FIT electricity, the panel would have to sufficiently discuss how to treat residential solar PV FIT electricity, which is difficult to measure in a timely manner, from the viewpoint of stable electricity supply. If purchased electricity is released to the spot market, spot prices may slacken, as seen in Germany. Therefore, details should be designed carefully.

Finally:

12. The business environment has greatly changed from the state assumed when the electricity system reform plan and the FIT system were introduced. A large number of business operators have newly participated in the systems. Therefore, system modifications should be easy for these new participants to understand.
13. In 2016, Japan will have to consider not only how to solve short-term challenges but also the future electricity system, including a capacity mechanism, and renewable energy measures to secure investment over a medium to long term.