Electricity Market Reform in Japan

Sep. 11, 2013

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Agency for Natural Resources and Energy (ANRE)
1. Current electricity system and Problems revealed by 3.11

2. Discussion on electricity market reform after 3.11

3. Planned actions
   • Cross-regional coordination of transmission operators
   • Full retail competition
   • Unbundle the transmission/distribution sector

4. Further discussion points for detailed design
<1>
CURRENT ELECTRICITY SYSTEM AND PROBLEMS REVEALED BY 3.11
Partial liberalization: retail competition for over 50kW customers
Retail Players: 10 big EPCOs (vertically integrated, regional monopoly), PPS, etc.
Reality is...
- Share of non-EPCO power producer and supplier: 3.6%
- 0.6% of the total retail market sales is transacted at JEPX
  <Cf.>
  - Market volume: 1000TWh/280GW
  - Electricity price (2011): 16.8 yen (average), 21.3 yen (household), 14.6 yen (industry)

* DC – direct current, FC – frequency conversion
Problems Revealed by 3.11

- Negative aspects of regional monopoly system were revealed:
  1. Lack of system to transmit electricity beyond regions
  2. Little competition and strong price control
  3. Limit in digesting the change in energy mix including the increase in renewables
<2>

DISCUSSION ON ELECTRICITY MARKET REFORM AFTER 3.11
Cabinet Decision on Electricity System Reform

• Based on the report by Expert Committee, the Cabinet decided to approve the Policy on Electricity System Reform on April 2, 2013.


• The reform aims to achieve 3 purposes:
  (1) Securing the stable supply of electricity
  (2) Suppressing electricity rates to the maximum extent possible
  (3) Expanding choices for consumers and business opportunities

• To achieve these purposes, a bold reform will be steadily carried out according to a realistic schedule step by step, focusing on the following the 3 steps’ roadmap:
Roadmap for Electricity Market Reform in Japan

(Note 1) Implementation of legal unbundling of transmission/distribution sector shall not interfere with the procurement of money necessary for stable supply of power.

(Note 2) At stage 3, the rate schedule shall be abolished simultaneously when or after the power transmission departments will have been legally spun off.

(Note 3) Timing of abolition of the tariff regulation may be reassessed depending on the progress of the market competition, the change of the market structure and the condition of business environment when decision on the full retail choice.

1st Reform: Ordinary Diet in 2013 → extended
1) Establishment of the Organization for Cross-regional Coordination of Transmission Operators (OCCTO)
2) Action programs for 2nd and 3rd reforms etc.

2nd Reform: Ordinary Diet in 2014
1) Full liberalization of entry to electricity retail business
2) Revision of applicable and regulations associated with the abolishment of GEU system

3rd Reform: Ordinary Diet in 2015 (Plan)
1) Legal unbundling of transmission/distribution sector
2) Code of Conduct

【1st Stage】 Around 2015
(1) Formulation of a supply-demand plan and an electrical grid plan
(2) Address coordination from the viewpoint of wide-area operation regarding the supply-demand balancing under normal situations
(3) Balance supply and demand under a tight supply-demand situation, etc.

【2nd Stage】 Around 2016
Households and other small-scale users can freely choose electricity supplier, rate plan, option depending on power source, etc.

【3rd Stage】 Around 2018 through 2020
Period of transitional arrangement for rate regulation
Abolishment of tariff regulation
Formulate systems necessary for user protection (Last resort service, universal service, etc.)

Legal unbundling of transmission/distribution sector
Realization of competitive market environment

※At around 2015: Transition to new regulatory organizations

Bills

Apr. 2, 2013

Cabinet Decision on the Policy on Electricity System Reform

Establishment of the Organization for Cross-regional Coordination of Transmission Operators (OCCTO)
<3>

PLANNED ACTIONS
Agenda 1: Cross-regional Coordination of Transmission Operators

- Establish the Organization for Cross-regional Coordination of Transmission Operators (OCCTO) by about 2015
- Main functions of OCCTO: Detailed designing is ongoing
  1. Aggregate and analyze the EPCO’s supply-demand plans and grid plans, and order to change EPCO’s plans such as for tie lines
  2. Coordinate the supply-demand balancing and frequency adjustment by T/D sectors in each area
  3. Order EPCOs to reinforce generations and power interchanges under a tight supply-demand situation
**Agenda 2: Full Retail Competition**

- Expand the retail competition to the residential sector at around 2016
- Remain the regulated tariff to 10 big EPCOs until around 2018-2020

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<table>
<thead>
<tr>
<th>March 2000</th>
<th>April 2004</th>
<th>April 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Liberalized segment</strong></td>
<td><strong>Liberalized segment</strong></td>
<td><strong>Liberalized segment</strong></td>
</tr>
<tr>
<td>[Contract (kW)]</td>
<td>[Extra-high-voltage power for industrial uses] Large-scale factories</td>
<td>[Extra-high-voltage power for industrial uses] Large-scale factories</td>
</tr>
<tr>
<td>(Voltage (V))</td>
<td>[Extra-high-voltage power for commercial uses] Department stores, office buildings</td>
<td>[Extra-high-voltage power for commercial uses] Department stores, office buildings</td>
</tr>
<tr>
<td><strong>Share of total power: 26%</strong></td>
<td><strong>Share of total power: 40%</strong></td>
<td><strong>Share of total power: 63%</strong></td>
</tr>
<tr>
<td><strong>[2,000kW] (20,000V)</strong></td>
<td><strong>[500kW]</strong></td>
<td><strong>[Low-voltage power] Small-scale factories, convenience stores</strong></td>
</tr>
<tr>
<td><strong>[High-voltage B power] Medium-scale factories</strong></td>
<td><strong>[High-voltage A power] Small-scale factories</strong></td>
<td><strong>[Electric light] Households</strong></td>
</tr>
<tr>
<td><strong>Share of total power: 9%</strong></td>
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<td><strong>Share of total power: 31%</strong></td>
</tr>
<tr>
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<td><strong>[Electric light] Households</strong></td>
</tr>
<tr>
<td><strong>Share of total power: 5%</strong></td>
<td><strong>Share of total power: 5%</strong></td>
<td><strong>Share of total power: 31%</strong></td>
</tr>
<tr>
<td><strong>[Electric light] Households</strong></td>
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<td><strong>Share of total power: 31%</strong></td>
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(Note) The scope of liberalization of Okinawa Electric Power Company was expanded in April 2004, from users of power over 20,000kW, 60,000V, to extra-high-voltage power users (over 2,000kW, in principle).
Activate generation competition

- Little use of the current wholesale market (JEPX)

- Activate the wholesale market
  - Introduce various products such as intra-day and futures
  - Secure the balancing market at the same time etc.

- Promote the “nega-watt” trading etc.

**Share of trading in JEPX to retail market sales**
- Others 99.4% (920.69 TWh)
- Trading in JEPX 0.6% (5.68 TWh)

**Breakdown of trading in JEPX**
- Forward trading 89% (162GWh)
- 4 hour-Ahead spot trading 5% (9.03 GWh)
- New Forward trading 6% (11.7 GWh)
- Day-Ahead spot trading 97% (5.5TWh)
- Others 3% (0.18 TWh)
Agenda 3: Unbundle the transmission/distribution sector

- Need for securing the neutrality of the transmission/distribution sector
- Unbundle the transmission/distribution sectors by TSO-style (legal unbundling) at around 2018-2020

Transmission/distribution businesses will continuously remain holding a regional monopoly and return of investments on electricity transmission/distribution grids will be institutionally guaranteed through tariff regulations including fully distributed cost methods. In addition, a high quality power supply acting as a foundation of economic activity, such as stable frequency and voltage, will be secured by continuously imposing the obligation to maintain a supply-demand balance of the whole electrical system.

A code of conduct concerning personnel affairs and budget to secure greater neutrality will be implemented.
A Generation company
1) Construct plants
2) Purchase fuel
3) Operate plants
4) Sell power to retailers (or retail section in the company) 1)

B Transmission/Distribution company
• 1) Regional monopoly, tariff regulation, 2) Guaranteed return of investment on lines through the regulated electricity rate, 3) Obligation to provide universal service, to maintain balance of demand-supply
• Code of conducts on some issues such as personnel, and accounting to secure neutrality
1) Construct and maintain transmission and distribution lines
2) Operate electric system (dispatch to each plant, stable power supply by operating the transmission/distribution lines)
3) Set up meters, metering
4) Provide “last resort service” and “universal service to isolated islands”

C Retailer
1) Purchase electricity to sell to consumers (purchase from power company or power sector in the company) 1)
2) Develop and provide tariff menus
3) Business to consumers, provide services
4) Collect the tariff

1) The case that a company has both retail sector and power sector.
## Status of the amending bill on Electricity Business Act

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 2, 2013</td>
<td>Cabinet Decision</td>
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<tr>
<td>April 12, 2013</td>
<td>The Bill based on the Cabinet Decision was submitted to the Diet</td>
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<td>May 28, 2013</td>
<td>Discussion on the Diet started</td>
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<td>June 13, 2013</td>
<td>Passed the lower house</td>
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<td>June 26, 2013</td>
<td>The regular Diet session ended</td>
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<td>→ The current bill was abolished</td>
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<td></td>
<td>→ Press conference of Minister Motegi</td>
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<td></td>
<td>“ We will submit the bill again to the next extraordinary Diet session, and surely will try to pass it.”</td>
</tr>
<tr>
<td>August 2, 2013</td>
<td>The Working Group for the detailed design started to discuss</td>
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</table>
FURTHER DISCUSSION POINTS FOR DETAILED DESIGN
Further discussion points for detailed design

1. Retail competition
   - Scheme to transfer or share consumer’s information in order to facilitate switching retailers
   - Way to facilitate the wholesale power exchange
   - Design for the regulated tariff in the transition period

2. Resource Adequacy
   - Scheme to maintain adequate capacity (obligation for retailers to secure adequate capacity, capacity market, generator’s auction for the long-run capacity etc.)
   - Financing new generations

3. Design for OCCTO and TDSOs
   - Relations between OCCTO and TDSOs
   - Relations between balancing mechanism and wholesale power exchange (imbalance fee etc.)
   - Code of conduct and IT system design for unbundling of T&D sectors
Thank you!

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APPENDIX
LNG mainly compensates for the decline of nuclear power.

Energy mix in Japan

Electricity Generation by Fuel

Source: Compiled by METI based on “Outline of Electric Power Development in FY 2010” etc.
After 3.11: Nuclear Power Plants Suspended

- Only one out of 50 nuclear power plants are currently in operation
- Lost approximately 26% out of 1000TWh and 15% out of 280GW
After 3.11: Increase in Renewables

- Started Feed in Tariff Scheme for Renewables in July 2012.
  - PV, Wind, Small/Medium hydro, Biomass, Geothermal
  - Eg. 42 yen/kWh for PV
- Expect rapid increase in introduction of intermittent renewables

<table>
<thead>
<tr>
<th></th>
<th>Amount deployed as of FY2011</th>
<th>Capacity of facilities that started operation between Apr. 2012 and Jan. 2013</th>
<th>Capacity of facilities that were approved by the end of January 2013 for the fixed price purchase system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar PV (residential)</td>
<td>Approx. 4,400MW</td>
<td>1,023MW</td>
<td>958MW</td>
</tr>
<tr>
<td>Solar PV (non-residential)</td>
<td>Approx. 900MW</td>
<td>306MW</td>
<td>5,749MW</td>
</tr>
<tr>
<td>Wind</td>
<td>Approx. 2,500MW</td>
<td>37MW</td>
<td>570MW</td>
</tr>
<tr>
<td>Mid- to small-sized hydraulic (1000kW or more)</td>
<td>Approx. 9,400MW</td>
<td>1MW</td>
<td>1MW</td>
</tr>
<tr>
<td>Mid- to small-sized hydraulic (Less than 1000kW)</td>
<td>Approx. 200MW</td>
<td>2MW</td>
<td>4MW</td>
</tr>
<tr>
<td>Biomass</td>
<td>Approx. 2,100MW</td>
<td>25MW</td>
<td>84MW</td>
</tr>
<tr>
<td>Geothermal</td>
<td>Approx. 500MW</td>
<td>0MW</td>
<td>2MW</td>
</tr>
<tr>
<td>Total</td>
<td>Approx. 20,000MW</td>
<td>1,394MW</td>
<td>7,368MW</td>
</tr>
</tbody>
</table>
No competition in the electricity market before 1995: 10 vertically integrated GEUs (General Electricity Utilities) dominated and controlled the market.

METI embarked series of reforms...

<table>
<thead>
<tr>
<th>No.</th>
<th>Year enforced</th>
<th>Overview</th>
</tr>
</thead>
</table>
| 1   | 1995          | • Open the IPP (Independent Power Producer) market  
                         • Allow specified-scaled and vertically integrated power generators |
| 2   | 2000          | • Introduce partial retail competition  
                         • Accounting separation of transmission/distribution sector |
| 3   | 2005          | • Expand retail competition  
                         • Establish the wholesale power exchange (JEPX) and its supporting body for transmission in wider areas |
| 4   | 2008          | • Modify the rule of wheeling rates... |

In November, the Committee started discussion on detailed design of reform. Based on the discussions over 12 meetings, the Committee compiled a final report on February 8, 2013.

The Members of the Expert Committee of Electricity System Reform

<Chairman>
Motoshige Ito  
Professor at Graduate school of Economics, The University of Tokyo

<Deputy Chairman>
Junji Annen  
Professor at Law School Academy, Chuo University

<Members>
Toshinori Ito  
Representative Director and analyst at Ito Research and Advisory Co., Ltd.
Hiroko Ohta  
Professor, National Graduate Institute for Policy Studies
Junichi Ogasawara  
Chief Research fellow and Manager at The Institute of Energy Economics, Japan, Electric Power Group
Takao Kashiwagi  
Specially appointed professor at Tokyo Institute of Technology
Hiroshi Takahashi  
Chief researcher at Fujitsu Research Institute of Economics Co., Ltd.
Kikuko Tatsumi  
Regular adviser, Public Corporation, Nippon Association of Consumer Specialists
Tatsuo Hatta  
Special visiting professor, Gakushuin University
Toshihiro Matsumura  
Professor at The Institute of Social Science, The University of Tokyo
Akihiko Yokoyama  
Professor at Graduate School of Frontier Sciences, The University of Tokyo
Securing the Stable Supply of Electricity

Ⅰ. Transmission/Distribution companies

(1) Secure a high quality power supply such as stable frequency and voltage by continuously imposing the obligation to maintain a supply-demand balance of the whole electrical system.

(2) Have obligation to construct and maintain transmission/distribution network, guaranteed through regional monopoly and tariff regulations including fully distributed cost methods.

(3) Provide the last resort service of supply, and secure a stable supply in isolated islands at equivalent price that is comparable to that of the mainland.

Ⅱ. In Emergencies

(1) “The Organization for Cross-regional Coordination of Transmission Operators” (OCCTO) balance supply and demand by means of ordering reinforcement of thermal power sources and power interchange.

(2) Government (METI) orders/requests power companies and other companies which have in-house power generation to supply power, as necessary.

Ⅲ. Securing Capacity of Power Supply

(1) Place an obligation on electricity retailers to secure the capacity of power supply.

(2) Recruit constructors of power plants, which will be prepared by “the Organization for Cross-regional Coordination of Transmission Operators” (OCCTO) for future electricity shortfalls.