Japan’s Electricity Market Deregulation

June, 2015

Electricity and Gas Market Reform Office
Agency for Natural Resources and Energy (ANRE)
Japan’s Electricity Market Outline

- 10 Vertically Integrated Electricity Power Companies (EPCOs)
- TWO frequencies, 50Hz and 60Hz

Frequency in West: 60Hz

- DC – Direct Current
- FC – Frequency Conversion
Japan’s Electricity Market Outline (cont.)

- Market volume (Total): 982.4TWh / 289 GW
- Market volume (10 big EPCOs): 848.5TWh / 209GW / ¥18.2 trillion (= $151.7bn, €134.8bn) (2013)
- Retail competition for over 50kW customers (62% of the market in 2013)
  - Share of non-EPCOs: 4.2% (2013)
  - 1.3% of the total retail market sales is transacted at JEPX (2013)

*JEPX: Japan Electric Power Exchange*
No competition in the electricity market before 1995: 10 vertically integrated EPCO's dominated and controlled the market.

METI embarked on a series of reforms...

<table>
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<tr>
<th>No.</th>
<th>Year enforced</th>
<th>Overview</th>
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| 1   | 1995          | • Opened the IPP (Independent Power Producer) market  
                • Allowed specified-scaled and vertically integrated power generators |
| 2   | 2000          | • Introduced partial retail competition  
                (over 2,000kW in 2000 [26%], over 500kW in 2004 [40%])  
                • Introduced regulation of third party access to grid lines |
| 3   | 2005          | • Expanded retail competition (over 50kW [62%])  
                • Established the wholesale power exchange (JEPX) and its supporting body for transmission in wider areas  
                • Improved regulation of third party access to grid lines, and introduced accounting separation of transmission/distribution sector |
| 4   | 2008          | • Modified the rule of wheeling rates |
Problem revealed by 3.11

- Negative aspects of regional monopoly system with 10 big and vertically integrated EPCOs were revealed in the Great Earthquake on March 11, 2011:
  1. Lack of system to transmit electricity beyond regions
  2. Little competition and strong price control
  3. Limit in handling the change in energy mix including the increase in renewables

Frequency in West: **60Hz**

Frequency in East: **50Hz**

* DC – direct current, FC – frequency conversion
Agency for Natural Resources and Energy organized the Expert Committee on Electricity System Reform in February 2012. 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
Electricity Market Reform in Japan: Roadmap

April 2, 2013, Cabinet decided the “Policy on Electricity System Reform” to realize three objectives in Japan’s market with a three-step approach.

### 3 Objectives

1. Securing a stable supply of electricity
2. Suppressing electricity rates to the maximum extent possible
3. Expanding choices for consumers and business opportunities

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**1st Step**

- **2015.4.1**
- Establishment of the Organization for Cross-regional Coordination of Transmission Operators (OCCTO)

**2nd Step**

- **2016**
- Full retail competition
  - Period of transitional arrangement for retail tariff
  - (Review the competition situation by the government)

**3rd Step**

- **2020**
- Abolishment of retail tariff
  - (At the same time as or after the unbundling)
- Legal unbundling of transmission/distribution sector

(※At around 2015: Transition to new regulatory organizations)
1st step: Establish the OCCTO

- Established the Organization for Cross-regional Coordination of Transmission Operators (OCCTO) in Apr. 2015

- **Main functions of OCCTO**
  1. Aggregate and analyze the EPCO’s supply-demand plans and grid plans, and order to change EPCO’s plans such as tie lines construction
  2. Order EPCOs to reinforce generations and power interchanges under a tight supply-demand situation

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**Frequency in West: 60Hz**

**Frequency in East: 50Hz**

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* DC – direct current, FC – frequency conversion, TDSO – Transmission and Distribution System Operator*
2\textsuperscript{nd} step: Full Retail Competition

- Expand retail competition to the residential sector in 2016, opening a new market
- Maintain regulated tariffs to 10 big EPCOs until the same time as or after the unbundling

### Liberalized Sector
(50kW～)

- Market Volume: ¥10.1 trillion (= $84.2bn, €74.8bn)
- Share of total power supply: 62%

### Regulated Sector
(~50kW)

- Market Volume: ¥8.1 trillion (= $67.5bn, €60.0bn)
- Number of contracts:
  - Residential Customers: 77.3m
  - Small shops and offices: 7.3m
- Share of total power supply: 38%
Revision of Business License Categories

• Business License categories under the Electricity Business Act, such as “General Electricity Utilities (GEU)” and “Wholesale Electricity Utilities”, will be revised in line with the full retail choice.

Current categories

<table>
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<tr>
<th>Category</th>
<th>Description</th>
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</table>
| GEU (10 EPCOs) | • Supply for customers, including those in regulated sector with obligation to supply, regional monopoly and rate regulation  
• Secure stable frequency and voltage |
| PPS (Power Producer and Supplier) | • Supply for customers in liberalized sector (more than 50kW) |
| Wholesale Electricity Utilities, etc | • Supply for GEU |

New categories (after 2016)

<table>
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<tr>
<th>Category</th>
<th>Description</th>
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<tbody>
<tr>
<td>Generation</td>
<td>• Regulation based on the level playing field of competition</td>
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</table>
| Transmission & Distribution | • Operate and maintain transmission/distribution lines  
• Regional monopoly and rate regulation |
| Retail | • Supply for customers  
• Obligation to secure the capacity of power supply  
• Regulation based on the level playing field of competition |

Obtain 3 licenses (not necessary to change corporate organization)

2nd step: Full Retail Competition

- Business License categories under the Electricity Business Act, such as “General Electricity Utilities (GEU)” and “Wholesale Electricity Utilities”, will be revised in line with the full retail choice.
3rd step: Unbundle the T/D sector

• Unbundle the transmission/distribution sectors of big EPCOs by legal unbundling style in 2020

Holding company style

- Holding company
  - Generation company
    - Competitive
  - Transmission/Distribution company
    - (System operation)
    - (Transmission/distribution facilities)
    - Regulated
      • Regional monopoly
      • Network tariff
      • Responsibility for maintaining frequency & providing LR service
      • Code of conduct

Affiliated company style

- Generation company
  - Competitive
- Retail company
  - Competitive
- Transmission/Distribution company
  - (System operation)
  - (Transmission/distribution facilities)
  - Regulated
    • Regional monopoly
    • Network tariff
    • Responsibility for maintaining frequency & providing LR service
    • Code of conduct

<Note>
✓ Big EPCOs will be required to unbundle transmission and distribution companies from generation ones or retail ones, in “legal unbundling.”
✓ Both the holding company style and the affiliated company style, in which a generation and retail company has a transmission and distribution company as a subsidiary company, are allowed.
Future Design of Japan’s Electricity Market

**Generation companies**
- Hydroelectric plant
- Nuclear power plant
- Thermal plant
- Wind farm, etc.

**Transmission/Distribution companies**
- Super high voltage substation
- Primary substation
- Substation for distribution
- Wheeling contract

**Retailers**
- Receive electricity from various power companies
- Contract with retailer to sell electricity
- Not necessary to have assets

**Consumers**
- Large factory
- Large building
- Building
- Medium factory
- Small factory
- Shop
- Household

**JEPX**
- Regional monopoly, tariff regulation

**Electricity Flow**
- 220-500kV
- 154-220kV
- 66kV
- 6.6kV
- 100/200V

**Retail contract with consumers**