Japan’s Renewable Energy Policy

Takuya YAMAZAKI

Director
Renewable Energy Division
Agency for Natural Resources and Energy (ANRE)
Ministry of Economy, Trade and Industry (METI)
Japan’s Electricity Market after the Great East Japan Earthquake in 2011
FIT was introduced in 2012 and power generated by renewables has rapidly increased.

Source: Agency for Natural Resources and Energy
Japan is divided into 10 regions, each of which is operated and controlled by a regional electric power company with little cross-regional demand-supply coordination.

*The figures below indicates the maximum electricity demand in 2015.
*DC: direct current, FC: frequency conversion
Big Policy Changes after 3.11: Market Reform

Established OCCTO* in 2015 to promote cross-regional electricity transmission

Big EPCOs will be mandated to unbundle T&D sector in 2020

Power Generation

Transmission & Distribution

Retail

Retail market was fully deregulated in 2016

*Organization for Cross-regional Coordination of Transmission Operators
Renewables in Japan
RES, particularly solar, have rapidly increased since FIT introduction in 2012.

**Capacity of renewables (GW)**

- **Solar PV**: Average annual growth rate 5%
- **Wind power**: Average annual growth rate 9%
- **Middle and small hydropower**: Average annual growth rate 26%
- **Geothermal**: Average annual growth rate
- **Biomass**: Average annual growth rate

Source: Agency for Natural Resources and Energy
Japan will aim at increasing power generated by renewables up to 22-24% by 2030 and “will make renewables primary generation source”.

Power generation ratio (%)

- Hydro: 8.8-9.2%
- Solar: 7.0%
- Wind: 1.7%
- Biomass: 3.7-4.6%
- Geothermal: 1-1.1%
Challenges
Challenge #1: High Cost

It costs a lot to produce power by renewables in Japan.

Cost of solar (¥/kWh, 2016)

Operation & maintenance
• Few experts and little use of big data lead to high operation and maintenance cost

Construction cost
• Little flat land and insufficient construction industry system make construction cost high.

Equipment cost
• High FIT allows multiple intermediaries to join the market, creating multi-layered distribution system.

Source: Agency for Natural Resources and Energy’s analysis based on data by Bloomberg New Energy Finance
While power generated by renewables greatly vary due to geographical and climate reasons, regional monopoly, which prevents national-level demand-supply adjustment, creates overcapacity in some regions.

Power generated by solar reaches 80% in Kyushu area.
Challenge #3: Unbalanced Mix

Unbalanced introduction of renewables has proceeded after FIT started in 2012.

**RES integration after FIT started (%)**

- **Solar**: 94.1%
- **Wind**: 2.1%
- **Biomass**: 3%
- **Geothermal**: 0.04%

Source: Agency for Natural Resources and Energy
Responses to Challenges

**High cost**
- Introduce auction system to FIT.
  - Solar: introduced (¥21/kWh → ¥17/kWh)
  - Biomass: planned

**Grid constraints**
- Promote further cross-regional adjustment through OCCTO
- Introducing implicit auction for interconnections
- Started the “Connect & Manage” scheme

**Unbalanced mix**
- Set three-year tariffs for geothermal and biomass
- Promote offshore windmill through providing rights to use sea area to lowest-bidding power generators
  - Submitted the bill to the Diet to be discussed
Current Status of Bioenergy

- Introduce more biomass without subsidies (→ combined heat and power (CHP), larger scale development)
- Ensure stable procurement and sustainability (→ stringent verification)

<table>
<thead>
<tr>
<th>Year</th>
<th>Municipal waste</th>
<th>Construction waste</th>
<th>General wood</th>
<th>Thinned wood</th>
<th>Methane gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before FIT</td>
<td>2.3</td>
<td>0.48</td>
<td>0.64</td>
<td>0.42</td>
<td>0.05</td>
</tr>
<tr>
<td>After FIT</td>
<td>3.5</td>
<td>1.89</td>
<td>0.64</td>
<td>0.42</td>
<td>0.05</td>
</tr>
<tr>
<td>2030</td>
<td>6.0-7.3</td>
<td>1.24</td>
<td>0.37</td>
<td>2.7-4.0</td>
<td>0.24</td>
</tr>
</tbody>
</table>

- Installed Capacity of Biomass (GW)

- Introduce more biomass without subsidies (→ combined heat and power (CHP), larger scale development)
- Ensure stable procurement and sustainability (→ stringent verification)
Thank you very much