The Biomass Market in Japan

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Akira KAJITA
Managing Director
JETRO Kuala Lumpur
akira_kajita@jetro.go.jp

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(1) Market size

If considering the market size of the biomass market in terms of equipment/plants utilized in biomass energy generation, and biomass-derived products (electricity, pellets, biogas, etc.), the size of the market was estimated to be 235.6 billion yen in 2014. Within that amount, biomass-derived products comprised 70%. In the coming years, the market is projected to expand further, transitioning to a CAGR of 10% and expected to reach 418.7 billion yen by 2020.

Trends in the Size of the Biomass Market (in 100m’s of yen)

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total: 1,159</td>
<td>805</td>
<td>1,493</td>
<td>1,404</td>
<td>2,356</td>
<td>2,661</td>
<td>3,567</td>
<td>4,197</td>
</tr>
<tr>
<td></td>
<td>354</td>
<td>651</td>
<td>1,082</td>
<td>677</td>
<td>585</td>
<td>627</td>
<td>810</td>
</tr>
</tbody>
</table>

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(2) Penetration of biomass

In 2014, biomass accounted for 1.5% of the total amount of electricity generated, making it the second largest renewable energy source after solar power (2.2%). Over the last few years, several large-scale biomass plants have also been constructed\(^1\) and biomass power is expected to see further growth.

Breakdown of Annual Energy Production in Japan (FY 2014)

*1 Please refer to the monthly newsletter (Environment & Energy / ICT, June issue) for more specific examples of power station construction projects.
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Renewable energy

Two-fold increase from current levels (from 12% to 22-24%)

- Renewable energy: 22~24%
- Geothermal: 1.0~1.1%
- Biomass: 3.7~4.6%
- Wind power: 1.7%
- Solar power: 7.0%
- Hydro power: 8.8~9.2%

Renewable energy (excluding hydro power)

Current levels vs FY2030
(3) Promotional policy by the government

Aiming for the further spread of renewable energy, the government established the feed-in tariff scheme in 2012. The scheme obligated all electrical companies to purchase electricity generated using renewable energy sources (such as solar power, wind power, geothermal, hydraulic power, and biomass) at a fixed price. While solar power has reached saturation point and resulted in lower purchase prices for solar energy, FIT prices for biomass energy still maintain high levels.

**Purchase Prices for Biomass Energy, by Fuel Type (FY 2016)**

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Purchase Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methane gas (biomass-derived)</td>
<td>39 yen + consumption tax</td>
</tr>
<tr>
<td>Woody biomass from forest thinning</td>
<td></td>
</tr>
<tr>
<td>2,000kW and under</td>
<td>40 yen + consumption tax</td>
</tr>
<tr>
<td>2,000kW+</td>
<td>32 yen + consumption tax</td>
</tr>
<tr>
<td>General woody biomass/biomass from agricultural harvesting</td>
<td>24 yen + consumption tax</td>
</tr>
<tr>
<td>Waste from construction materials</td>
<td>13 yen + consumption tax</td>
</tr>
<tr>
<td>General waste Other biomass</td>
<td>17 yen + consumption tax</td>
</tr>
</tbody>
</table>

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(4) Competitors/Potential partners

The market for biomass-derived products (solid biomass fuels/carbonized biomass, woody biomass, and algae products) is still developing, with a potential need for partnerships with foreign companies who are in possession of advanced technologies.

**Major Players in Biomass-derived Products**

- **Bioethanol**
  - JBSL
  - Brazil-Japan Ethanol
- **Biomass energy**
  - Kawasaki Biomass
  - Summit Energy
  - National Federation of Agricultural Cooperative Associations
- **Biogas**
  - Kobelco Eco-Solutions
  - Bioenergy
  - Mombetsu Biomass
- **Wood pellets**
  - Meiken Lamwood Corp.
  - Miyazaki Wood Pellet
  - Biomass Recycling Center
  - Kuzumaki Ringyo
- **Biodiesel**
  - Revointernational
  - Daiseki
  - Advan
  - Eco ERC
- **Solid biomass fuels/carbonized biomass**
  - Aichi Kinuura Bio
  - Biocoal Hiroshima-West
- **Woody biomass (cellulose nanofibers, lignin products)**
  - Sugino Machine
  - Daisel FineChem
- **Algae products (food raw materials, biofuels)**
  - IHI NeoG Algae

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(4) Competitors/Potential partners

Major players in the market for equipment/plants utilizing biomass are listed below. Comprised of technology which uses algae, and bio-oil conversion, the market is still developing. As a result, there is a potential need for partnerships with foreign companies who are in possession of advanced technologies.

Major Players in Biomass Equipment/Plants*1

<table>
<thead>
<tr>
<th>Category</th>
<th>Company 1</th>
<th>Company 2</th>
<th>Company 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct-fired biomass boiler</td>
<td>Mitsui Zosen</td>
<td>JFE Engineering</td>
<td>Sumitomo Heavy Industries</td>
</tr>
<tr>
<td>Steam turbines for biomass boilers</td>
<td>JFE Engineering</td>
<td>Shin Nippon Machinery</td>
<td></td>
</tr>
<tr>
<td>Biogas conversion (methane fermentation)</td>
<td>Hitachi Zosen</td>
<td>Mitsui Zosen</td>
<td>Kubota</td>
</tr>
<tr>
<td>Biogas generators</td>
<td>Yanmar Energy Systems</td>
<td>Ohara Corp</td>
<td></td>
</tr>
<tr>
<td>Biomass / gas / fuel conversion</td>
<td>ZE Energy</td>
<td>Mitsui Zosen</td>
<td>Chugai Ro</td>
</tr>
<tr>
<td></td>
<td>Kobelco Eco-Solutions</td>
<td>Hitachi Zosen</td>
<td>Kansai Corp.</td>
</tr>
<tr>
<td>Carbonizing / solid biomass fuel conversion</td>
<td>Tsukishima Kikai</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wood pellet boilers</td>
<td>Takahashi Kikan</td>
<td>Niko Engineering</td>
<td>Nepon</td>
</tr>
<tr>
<td></td>
<td>Yazaki Corp.</td>
<td>Soai</td>
<td>Tomoe Techno</td>
</tr>
<tr>
<td>Biodiesel conversion</td>
<td>Sebec</td>
<td>BDF</td>
<td>Biomass Japan Inc.</td>
</tr>
<tr>
<td></td>
<td>Daiki Axis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bioethanol conversion</td>
<td>JFE Engineering</td>
<td>Kawasaki Heavy Industries</td>
<td>Kansai Chemical Engineering</td>
</tr>
<tr>
<td></td>
<td>Taisei Corp.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology using algae</td>
<td>Espec</td>
<td>Schott AG</td>
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<tr>
<td></td>
<td>Ebara Jitsugyo</td>
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<tr>
<td>Bio-oil conversion</td>
<td>Meiwa Kogyo</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1 Source: Fuji Keizai, 2015 Biomass Utilization Technology and Market: Reality and Future Prospect, 2015
Categories are listed in ascending order of market size.