The outlook for biomass energy in Asia

RISI Wood Fibre Resource and Trade Conference, 2018

Durban, South Africa – 19 September 2018

John Bingham
A strategic assessment of Asian Pacific biomass demand and supply to 2030

A multi-client proposal

Available First Quarter 2018
Rapid increases in North-east Asian imports of wood pellets

South Korea

2.43Mt (2017)

12-month moving total

Japan

0.54Mt (2017)

12-month moving total
Japan’s imports of palm kernel shells and wood chips

Japan’s imports of PKS

Japan’s consumption of energy chips

* Jan-June 2018 annualised

Source: Renewable Energy Institute and Forest Agency
Electricity generation mix in South Korea and Japan
Both countries need to reduce their reliance on fossil fuels if they are to meet the GHG emission targets agreed in Paris.

Source: IEA
Japan - biomass demand

- The future energy mix assumes a strong recovery for nuclear to 20-22% of generation by 2030.
- Is this realistic and, if not, what technology will fill the gap? More coal and natural gas?
- But is a >50% share for fossil fuels consistent with agreements made in Paris?
- Strategy is to have 22-24% renewable energy share by 2030.
- **Biomass share to be 3.7-4.6%**
- Critics claim that these targets lack ambition

*Proposed sources of electricity in 2030*

Source: METI
Japan: Biomass power capacity (installed)

Source: Renewable Energy Institute
Japan’s Feed-in Tariff

- Set at generous levels to incentivise renewable energy deployment
- Fixed FiT purchase agreement with network operators
- Valid for 20 years (no indexation)
- Particularly generous for projects using local biomass

### Feed-in Tariff rates for woody biomass

<table>
<thead>
<tr>
<th>Type of Biomass</th>
<th>JPY/kWh</th>
<th>$/MWh</th>
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<tbody>
<tr>
<td>Unutilized wood</td>
<td>32 (&gt;2MW)</td>
<td>$290</td>
</tr>
<tr>
<td>Domestic forest residues and thinned wood</td>
<td>40 (&lt;2MW)</td>
<td>$360</td>
</tr>
<tr>
<td>General wood &amp; agricultural wastes</td>
<td>21 (&gt;20MW)</td>
<td>$190</td>
</tr>
<tr>
<td>Imported wood pellets and wood chips &amp; PKS</td>
<td>24 (&lt;20MW)</td>
<td>$210</td>
</tr>
<tr>
<td>Waste wood</td>
<td>13</td>
<td>$120</td>
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</table>
Japan’s FIT has been hugely oversubscribed
Approvals in the “general wood” category >3x Japan’s 2030 target

BUT, “general wood” is dominated by projects that intend to burn CPO and PKS

Projects based on wood pellets and chips account for “just” 17% of the total, but this still amounts to ~2GW of capacity.

Source: METI
Japan’s approved projects with FiT

- Four groups of biomass projects...
  - Cofiring at existing coal plants
  - New dedicated and cofiring plants 20-200 MW
  - New dedicated biomass generation 2-20 MW
  - Small-scale CHP <2MW

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<thead>
<tr>
<th></th>
<th>Cofiring at existing coal plants</th>
<th>New dedicated/cofiring biomass</th>
<th>New dedicated biomass generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>200-4,000MW</td>
<td>20-200MW</td>
<td>2-10MW</td>
</tr>
<tr>
<td>Number of plants/projects granted a FiT</td>
<td>23</td>
<td>110</td>
<td>43</td>
</tr>
<tr>
<td>Principal biomass fuel</td>
<td>Imported wood pellets</td>
<td>Imported wood pellets, PKS and wood chips</td>
<td>Domestic wood chips and waste wood</td>
</tr>
</tbody>
</table>

Source: Renewable Energy Institute
Japan - biomass demand

- The authorities are seeking to control the FIT budget
  > FITs for projects >10MW will in future be allocated by auction. Ceiling of total approvals set at 180MW
  > FITs for **biomass cofiring** with coal under scrutiny. Compatibility with a possible capacity market.
  > Stricter energy efficiency standard at coal plants (42%) and an ban on the use of biomass cofiring as a means of meeting this standard.

- Even at the low energy mix target for ‘general wood’ (i.e. 2.7GW) this still implies annual biomass demand of >10Mt/y of wood pellet equivalent.
South Korea - biomass demand

- Investments in renewable energy are supported by a Renewable Portfolio Standard
  - > 4.5% in 2018 rising to 10% in 2024
- Generators receive RECs for the renewable power they generate
  - 1x REC = ~USD70
- Biopower projects being developed equate to biomass demand of >10Mt of wood pellet equivalent (mainly pellets/chips)
- **BUT...**
South Korea: new rates of subsidy for biomass power

- Government has reviewed REC allocation.
  - **Winners**: generators using local biomass
  - **Losers**: new cofiring plus new projects using imported biomass unable to meet permitting deadlines
- RECs for existing cofiring also being scrutinised. Decision likely mid-2019.

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<th>Previous weighting</th>
<th>Revised weighting</th>
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<tr>
<td>Cofiring and conversion</td>
<td></td>
<td></td>
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<tr>
<td>New wood chip/pellet cofiring</td>
<td>1.0</td>
<td>zero</td>
</tr>
<tr>
<td>New conversion from coal to</td>
<td>1.0</td>
<td>0.5</td>
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<tr>
<td>wood chip/pellet</td>
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<th>New dedicated biopower plants using imported biomass</th>
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<tr>
<td>Wood chip and wood pellet</td>
<td>1.5</td>
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<th>New plants using local (domestic) unused biomass</th>
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<tr>
<td>Biomass cofiring</td>
<td>1.0</td>
<td>1.5</td>
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<tr>
<td>Biomass conversion</td>
<td>1.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Dedicated biomass power</td>
<td>1.5</td>
<td>2.0</td>
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</table>
The outlook for biomass demand in NE Asia
Under central forecast, demand is expected to more than double to ~19Mt pellet equiv.

Source: Hawkins Wright (Asian Pacific Biomass, 2018)
Where will the biomass come from, and in what form?
Availability, sustainability and bankability…

**Wood chips**
- Pulp-quality chip supply in Asia is already tight and getting tighter.
- Rising pulp chip prices and the pulp mills’ superior paying capability will likely minimise diversion to energy end-uses.
- Opportunities to mobilise lower quality/cheaper chips (e.g. mixed species, bark).
- Also energy crops.

**Wood pellets**
- SE Asian wood pellets have cost competitive advantages, but quality, sustainability and bankability are often inadequate for the Japanese market.
- Canadian (BC) suppliers meet all criteria and have freight cost advantages.
- The US South meets all requirements also, (but shipping costs will be higher).

**Palm kernel shells**
- A by-product of palm oil processing, production in Indonesia and Malaysia totals around 14Mt/y.
- Most is used by the mills for process heat: only ~1.5Mt/y is exported.
- Potential to grow the export supply, with investment and ingenuity.
- Sustainability and bankability questions.

**Other biomass resources**
- Furniture manufacturing and other wood processing wastes.
- Other residues from oil palm processing: Empty Fruit Bunches (EFB), Oil Palm Trunks (OPT), mesocarp fibre.
- Rubberwood and bagasse.
- Other agricultural residues.
How might Asian biomass demand be satisfied?
A “thought experiment”, not a forecast...

Source: Hawkins Wright (Asian Pacific Biomass, 2018)
Conclusions

• Demand for imported biomass fuels for electricity generation in Japan and Korea has the potential to grow to >20Mt/ y* by the mid-2020s.
  > But converting potential demand into actual consumption will be constrained by government policy, the availability of affordable and sustainable feedstock, and the development of logistic infrastructure.

• Varied sourcing strategies:
  > Wood pellets, PKS, energy chips and non-traditional biomass fuels. Fuel choices are unlikely to compete directly with pulp & paper
  > Short as well as long term contracts with bankable counterparties.
  > North America, Australia, SE Asia (and Japan’s domestic forests).

• An exciting opportunity for some, but not without risk

* in wood pellet equivalent (17GJ/t)
Global woodchip supply and demand outlook

An assessment of the global seaborne trade of woodchips to the pulp, panel board and energy sectors

A multi-client proposal, available late 2018