



Asian Biomass Markets and Risks to Pacific Northwest Forests

COUNTRIES IN EAST ASIA are rapidly scaling up demand for energy from biomass. Increases in renewable energy use in Japan and South Korea have been driven by adoption of EU-style Renewable Energy Portfolio Standards (RPS), mandating year-on-year increases in RE as a percent of total primary energy. Unfortunately, the RPS mandates mix together zero-emission RE sources like wind and solar with large-scale biomass burning. In Europe, this RPS ‘category error’ has driven a massive increase in harvests

and loss of natural forests in the U.S. Southeast (see below: ‘the EU context’). South Korea, Japan, and China are increasingly looking for new markets to supply woody and waste biomass, and their attention is turning to the wood resources of the Pacific Northwest. Not only is this a potential large new driver of forest landscape change, the substitution of wood pellets for coal can simply extend the life of existing coal-fired power plants, without solving any of the climate and air pollution problems that the RPS was intended to address.

Exploding East Asian demand for wood energy may:

- 1 Impact forested landscapes** in the Pacific Northwest.
- 2 Overwhelm local demand for wood residuals**, preventing a sustainable, bioregionally-appropriate biomass sector based on thinning/restoration from getting a better foothold.
- 3 Embed a 'false climate solution' narrative** into our understanding of renewable energy. The "post-Coal" era means replacing the high-polluting, high-carbon infrastructure associated with coal, not perpetuating it with wood pellets.

Growing Asian Markets

As energy demand in East Asia continues to grow, China, Japan, and South Korea are all increasing the share of their renewable energy generating capacity. Japan and South Korea adopted RPS that give substantial incentives to biomass use.

Japan aims to double its biomass power production by 2030, to 4.6 percent of total installed capacity, which would require a breakneck speed of expansion.¹ South Korea converted a coal power plant to biomass in 2015, making this 105MW power station the largest biopower unit in Asia.² It appears that much of the feedstock is derived from Southeast Asian tropical rainforest trees, which are being chipped and burned. Vietnam is also a current supplier to Korea. The world's largest pellet producer, Enviva, is focusing its growth strategy on East Asia, anticipating increased demand for industrial wood pellets.³

The EU Context

The European Union set an extremely unfortunate model with its approach to renewable energy use by failing to distinguish between zero-emission and high-carbon renewable energy sources, by failing to impose any meaningful sustainability standards on biomass, and by categorizing biomass as 'carbon neutral'. The

loophole, and the ability thus far of utilities to lobby for and receive massive government subsidies for retooling coal burners into wood burners, has dramatically reduced the effectiveness of the Renewable Energy Directive (RED) as a tool for European greenhouse gas emission reductions. Besides implications for

the climate, the EU is importing much of the woody biomass from the southeast US, a global biodiversity hotspot, in the form of wood pellets. These pellet markets are adding significant strain on natural forests in that region.

Since adoption and launch of the EU RED in 2010, this suite of flawed renewable energy policies has driven immense new demand for forest biomass. US wood-pellet exports *doubled* in a single year (2013), and year-on-year growth rates are more than 10 percent, from one million tons in 2011 to 4.9 million tons in 2016.^{4,5} Significantly, almost three-quarters of US pellet production is exported, overwhelmingly to fill existing European demand.

Meanwhile, Japan and South Korea's mandates are just now ramping up. East Asia's impact on the Pacific Northwest (PNW) could look like European impact on the U.S. Southeast – with important implications for forests, the climate, and residuals markets.





Increasing Domestic Pressures

Wood harvests in the PNW are largely driven by saw-log prices. Pulp and biomass are typically by-products of harvests that focus on softwood lumber markets. The tight cycling of mill wastes and limited pulp-driven harvests provides little room for the emergence of a stand-alone industrial wood-pellet industry in the PNW at current prices. However, it's possible that a large-enough price premium might make it economical to collect slash and logging residues for export.

REPOWERING BOARDMAN – Oregon's sole remaining coal-fired power plant, Boardman Power Plant, is set to cease coal operations in 2020. Portland General Electric, the utility, has publicly explored repowering the plant with biomass. Doing so would make Boardman five times larger than any other biopower facility in the US.⁶ The demand for feedstock would be immense, and has not been demonstrated to be able to be supplied without extensive strain on Oregon forests or feedstock imports from other regions. PGE has stated that the conversion will not be economically justifiable without substantial government support, and PGE has pursued such support. Oregon Representative Greg Walden (R) and Oregon Senator Ron Wyden (D) have promoted or introduced legislation that would allow Boardman to receive public subsidies for utilizing biomass.^{7, 8} "Powering Boardman" with wood would reshape forested landscapes in the PNW, transforming the region into a vast supply shed for

one facility – a facility that Portland General Electric indicated would close at the end of the decade.

FIRE – Woodland managers in Oregon and Washington are concerned about fire management—particularly on the drier eastern slopes of the Cascade range. Many are discussing financial and technical assistance with fuelwood removals. However, modeling out of Oregon State University demonstrates that such removals would *not* catalyze the profitability of biomass depots. The gathering and transport of such materials is too expensive, and the volumes considered are not that large compared to the fiber derived from timber harvests and mill wastes.⁹

However, at some price threshold – currently, the price difference between 'green' chips and finished 'densified biomass fuel' – it would be economical to gather this material. Already Korean and Japanese wood pellet buyers provide a 30-40 percent price premium compared to prices for pellets in domestic markets, and with increasing East Asian demand, that price differential could increase. Meanwhile, policy drivers pertaining to increased wood harvests on public lands could amplify lumber and wood-waste market signals. Having announced sharp increases in 'the cut' from National Forests, the Trump administration could put in place further incentives for biomass development – based either on local demand, or an export orientation.

Asian Drivers by Country

Japan

After the Fukushima disaster, Japan closed its nuclear plants, which led to greater reliance on coal and a spike in fossil fuel imports. In 2016, Japan passed a law that changed the country's renewable energy feed-in tariff systems. The law that took effect in April 2017 *reduces* the tariff for wind and solar while maintaining the current generous tariff for biomass, geothermal, and hydroelectric projects.¹⁰ The impact of these changes can already be seen today with a surge in investment in bioenergy projects. To date, over 800 projects totaling 12.4 gigawatts of capacity have received government approval. As a recent article by Reuters notes, this equals 12 nuclear power stations and is already double Japan's biomass energy target.¹¹ Many of the investments are from renewable energy companies that, due to the imbalance in the feed-in tariff, are shifting investments away from PV solar and toward biomass. Examples of recent developments are listed below.



INDUSTRIAL PLANT | THINKSTOCK

Table 1¹²

COMPANY	CURRENT ENERGY PROJECTS	ANTICIPATED GROWTH
Sumitomo Corporation	Imports 200,000 tons of chips from Canada and Vietnam for two biomass plants (Itoigawa 50 MW and Handa 75 MW)	Intends to import 1 million tons of wood chips by 2019, selling to additional power plants. Bought 48 percent stake in Canadian wood pellet maker.
Itochu (International Trading Firm)	Unknown	Plans for importing 1.2 million tons of biomass annually by 2019 for energy
Orix (Financial Services Company)	Operate 920 MW of solar capacity	Aims to shift towards biomass and geothermal.
Aioi Bioenergy Corporation (joint venture between Mitsubishi Corporation Power Systems Inc. and Kansai Electric Power Co.)	Current 375 MW Aioi Power Station (using crude oil)	Aims to convert the Aioi power station to woody biomass. 4 million USD in initial capital. Plans to develop additional biomass power generation plants. ¹³
Japan Renewable Energy (started by Goldman Sachs)	Currently operates 27 mega-solar plants and 2 wind farms.	Plans for 10 bioenergy facilities with the capacity of 70,000 kW by 2020 using 365 million USD ¹⁴
Marubeni Corporation	Operates 37 MW biomass plant in Tsuruga City ¹⁵	Invested in biomass co-firing 300 MW facility. ¹⁶

THESE INVESTMENTS are supported by Japan's zero tariff for wood pellets, which has allowed imports to rise rapidly.¹⁷ A new report from the US Foreign Agricultural Service¹⁸ found that:

In 2016, Japan's imports of wood pellets increased 49 percent from the previous year, to 347 thousand metric tons (MT). Of these, 261,000 MT, or 75 percent, were imported from Canada, followed by Vietnam (18 percent) and China (6 percent). According to industry sources, Canada is the leading supplier due to its competitive prices and quality. Imports of wood pellets are likely to increase in the coming years because the trend of mixing wood pellets with coal for thermal power generation is expected to continue, and the number of small and medium-scale biomass power facilities (below 10,000 kW), which use wood materials (including wood pellets and palm kernel shells) is increasing under the FIT system.

With the exponential growth in biomass development, wood pellet imports will increase even more dramatically, up to 60 million tons. Sourcing that volume of pellets becomes a daunting question.

While most of Japan's imports are currently sourced from Canada, Japanese firms have also attempted to diversify its sources of supply through investments in the Pacific Northwest and Southeast Asia. Japanese investors have backed the development of a torrefaction facility in Oregon, signaling a diversification away from the current heavy reliance on Canadian woodchips.¹⁹ Torrefaction is a process to dry and 'densify' woody biomass so as to increase its suitability for utility co-firing with coal. PGE/Boardman also sought to source 'torrefied' material in carrying out its test-burns of biomass with coal.

Hancock Renewable Energy Group, an investor and asset manager, has partnered with Enviva—the world's largest wood pellet supplier—to develop pellet plants and marine export terminals in the Southeastern United States and biomass power generation in the UK. Target investments include 'biomass to pellets' in British Columbia and Washington state, and the development of biomass power in Japan.²⁰

South Korea

South Korea is 97 percent dependent on energy imports for its generation needs.²¹ In 2012, South Korea passed a RPS requiring the largest power companies to increase RE's contribution to the country's total primary energy mix. Since biomass qualifies under these RPS definitions, many Korean utilities have also chosen to 'co-fire' coal and biomass to fulfill their obligations under the RPS. Co-firing perpetuates the 'dirty infrastructure' built for burning coal, and with the shift to wood burning, it causes the plant to run less efficiently and may also cause *more* carbon pollution per unit of useable energy than coal.²²

There are also investments planned for standalone biomass power facilities, and the Renewable Portfolio Standard currently grants 150 percent 'credit' to utilities that build such stand-alone facilities (that is, a 100MW plant would be credited as contributing 150MW toward the required RE generating requirement). Hana Financial Investment Company is financing a 200 MW biomass power plant led by the state-run utility, Korea Midland Power Co.²³ When completed (by 2020), it will be the largest biomass plant in the country.²⁴ The Korean Development Bank has also submitted a project proposal to the Green Climate Fund, which would seek to source biomass pellets from Fiji and Papua New Guinea. The 'mitigation' rationale for this project is now being heavily contested.

South Korea currently holds the title of largest biomass importer in Asia, the third largest in the world—just behind the United Kingdom and Denmark. Vietnam supplies 65 percent of the pellets for the country followed by Malaysia, Russia, Indonesia, and Canada. The government anticipates that by 2020, up to 80 percent of pellets will be imported. Over the next few years, we can expect markets to develop along with the policies, supply, and demand to support them.²⁵



Under the stress of Asian pellet markets, Pacific Northwest forests face severe habitat loss.

As the investments in biomass facilities rise in Japan and South Korea, forests in Southeast Asia, Russia, and the West Coast of North America may be at risk. Meanwhile, renewable energy policies intended to spur a transformation of power-supply systems away from fossil fuels and toward low-carbon renewables is being undercut by increased investment in torrefied woody materials that can be burned with coal.

There are even plans to co-locate coal and 'biocoal' (torrefied biomass) export facilities in forest-rich regions of Canada, Brazil, and the U.S. PNW, so that exporters can simply fill the holds of 'Panamax'-sized cargo vessels with 75 percent coal and 25 percent wood chips—since 25 percent is the required level of the contribution from 'renewable sources' that utilities are required to meet. This so-called 'shift' to renewables in fact retards the rate of investment in low-carbon renewables like wind and solar while compromising efforts to lower actual GHG emission rates.

Investment firms are making linkages between the PNW and East Asia as they did five years ago between the southeastern United States and the United Kingdom. The market for pellets from the UK has decimated forests in the Southeast, increased carbon emissions that are not accounted for, and negatively affected the health of rural communities where pellet facilities are located. A similar threat looms over PNW forests and communities.

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