Chapter 4

Biomass Power Generation and Wood Pellets in Japan

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Chapter 4

Biomass Power Generation and Wood Pellets in Japan

1. Current situation of the biomass power business in Japan

Renewable energy has increasingly received attention along with the accelerated transition to clean energy. Japan is committed to fighting climate change, having announced in October 2020 carbon neutrality by 2050, and, in April 2021, a 46% reduction in GHG emissions from the 2013 level. Renewable energy is considered indispensable to Japan's pledged decarbonisation.

Japan's energy policy was significantly changed by the 2011 Great East Japan Earthquake and the Fukushima Nuclear Accident. The 5th Strategic Energy Plan adopted in July 2018 describes renewable energy as a major power source for the first time and plans to expand the share of renewables to 22%–24% of the power generation mix in fiscal year (FY) 2030, of which biomass makes up 3.7%–4.6%.[3] This target is aligned with the Long-term Energy Demand and Supply Outlook 2015, in which the biomass energy is estimated by type as shown in Table 4.1 and general wood is likely to be the major source, accounting for around a half of the total biomass power.

Table 4.1. The Biomass Power Target of the Long-term Energy Demand and Supply Outlook 2015

Category	2030 Target
Unutilised wood	240MW
Construction wood waste	370MW
General wood	2,740–4,000MW
Biogas	160MW
Waste materials and other biomass	1,240MW
Renewable Portfolio Standard*	1,270MW
Total	**6,020–7,280MW**

* Some biomass facilities introduced under the Renewable Portfolio Standard of 2003 did not get transferred to the feed-in-tariff scheme.

Source: Ministry of Economy, Trade and Industry (METI) (2015).

To increase the renewable energy use including biomass energy, the Renewable Portfolio Standard (RPS) scheme started in 2003, followed by the feed-in-tariff (FIT) in 2012. Although the RPS was not as effective as expected, the generous tariff rates of the FIT

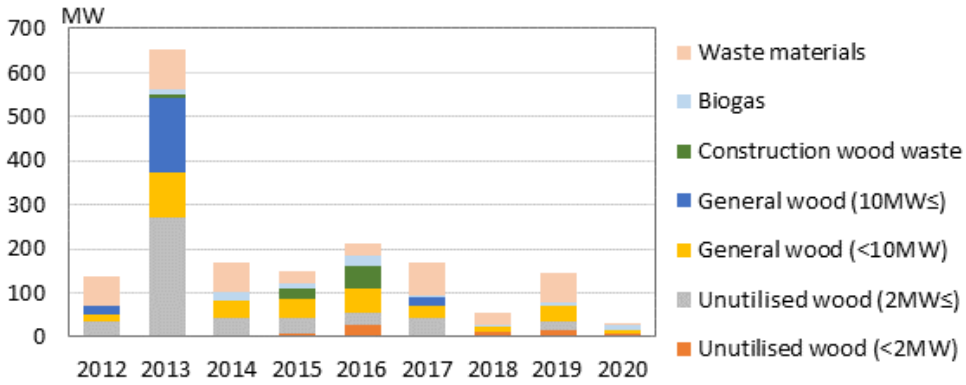
[3] This ratio was decided at the previous 4th Strategic Energy Plan of 2014 and maintained in the 5th Strategic Energy Plan. The Strategic Energy Plan outlines Japan's basic energy policy and is revised every few years.

scheme helped the biomass power capacity to increase by more than double in 7 years. Under the FIT scheme, biomass fuels for power generation are grouped into six categories.

- General wood: sawmill residues, import wood such as pellets and chips, palm kernel shell (PKS) and palm trunk
- Liquid biomass: palm oil
- Unutilised wood: domestic thinned wood
- Construction wood waste: wood waste salvaged from construction and other wood materials
- Waste materials and other biomass: pruned branched, paper, food waste, waste cooking oil, and black liquor
- Biogas: methane derived from sewage sludge, manure, and food waste.

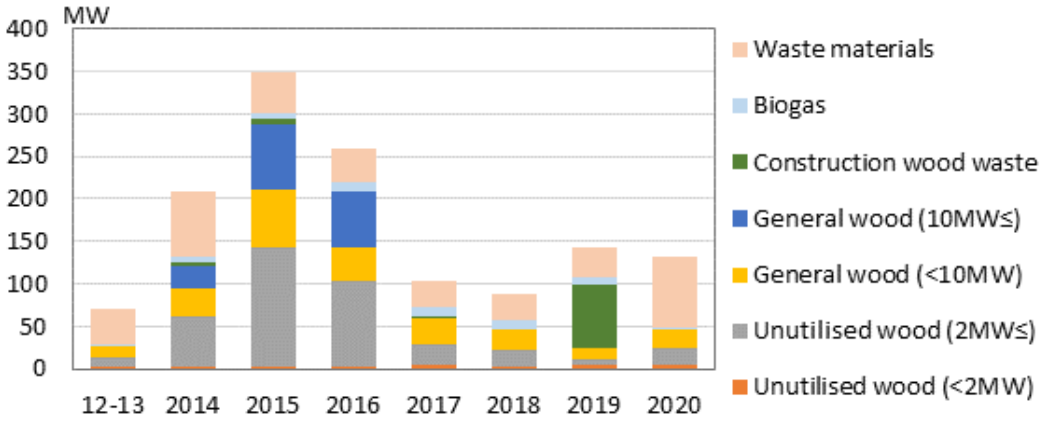
While inexpensive biomass sources such as wood waste from construction and waste materials, were the main fuels under the RPS, the domestic unutilised wood and the general wood whose tariff rates are set higher increased specifically (Figure 4.1, 4.2).

Figure 4.1. Approved Capacity under the FIT Scheme



FIT = feed-in-tariff.
Note: Liquid biomass approved under the FIT scheme between FY2012 and FY2017 is included in general wood and no liquid biomass has been approved since FY2018.
Source: METI (2021a).

Figure 4.2. Operating Capacity under the FIT Scheme



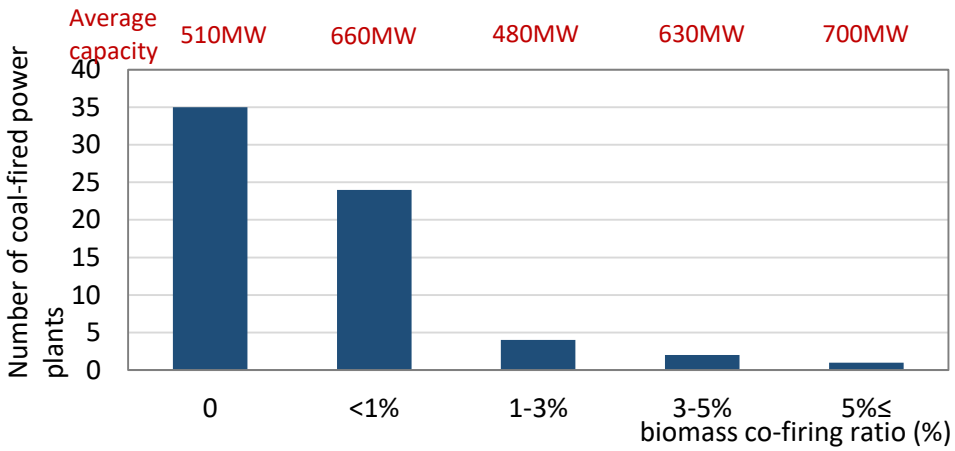
FIT = feed-in-tariff.
Source: METI (2021a).

The newly approved capacity has stagnated lately because some strict measures reduced the accumulated idle capacity in the revised FIT Act of 2017. For instance, developers are required to have entered into the grid connection agreement with a utility company for an FIT approval and to submit a business plan for assessment of feasibility and sustainability. As a result, the approved biomass power capacity is about 160MW on average in FY2018 and FY2019.

A recent change in the FIT scheme is that new projects of biomass co-firing with coal in the category of unutilised wood, general wood, and construction wood waste are no longer eligible for the FIT scheme from FY2019.[4] The data collected after implementation of the FIT scheme revealed that the generation costs of these biomass co-firing with coal are lower than the estimated costs of conventional biomass power plants in terms of capital expenditures, operation and maintenance, and fuels. Hence, biomass co-firing with coal does not have a rationale to receive support through the FIT scheme since it could make profits without it. For reference, Figure 4.3 illustrates a biomass co-firing ratio of the major power utilities' coal-fired power plants. Nearly half of the coal-fired power plants co-combusted biomass in FY2019 and most of them are less than 1% ratio of biomass.

[4] Biomass of waste materials co-firing with coal is not eligible for the FIT scheme from FY2021.

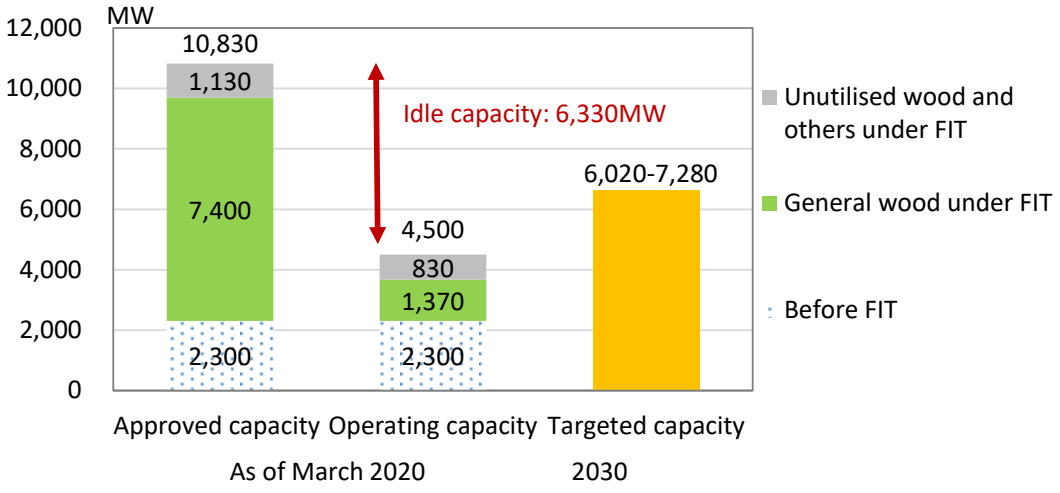
Figure 4.3. Major Power Utilities' Coal-fired Power Plants Co-firing with Biomass (FY2019)



Source: METI (2021c).

As of March 2020, the approved biomass power capacity under the FIT scheme has reached 10,830 MW, which already surpasses the 2030 targeted capacity of 6,020–7,280 MW, whereas the actual operating capacity is merely 4,500 MW (Figure 4.4). In other words, the capacity that was approved but has not started operation stands at 6,330 MW. Most of the idle capacity is explained by the general wood.

Figure 4.4. Biomass Capacity under the FIT Scheme and the 2030 Target



FIT = feed-in-tariff.
Source: METI (2021b).

Given the current situations, the government estimated how much biomass power capacity would increase toward 2030 (Table 4.2). Commencing operation of the idle capacity will be expedited first. Suppose that 40% of the woody biomass which

encompasses unutilised wood, general wood, and construction wood waste and all of the remaining idle projects starts operation; the biomass power of 2,267 MW is expected to start operation by 2030. There is also the scenario analysis to estimate the newly approved capacity: the business as usual (BAU) scenario assumes continuous efforts based on the current policies and the new measure scenario (NMS) seeks to strengthen measures to secure more domestic supply. A difference between the two scenarios is found only in the woody biomass, that is, 310 MW for the BAU and 390 MW for the NMS.

Table 4.2. The Biomass Outlook

(in MW)

	Operating Capacity	Expected Operation of Idle Capacity	Newly approved		Total		2030 Target
			BAU*	NMS*	BAU	NMS	
Woody biomass*	1,836	2,108	310	390	4,254	4,340	3,350–4,610
Biogas	64	22	90		176		160
Waste materials	298	137	57		492		1,240
Before FIT**	2,300				2,300		1,270
Total	**4,506**	**2,267**	**457**	**540**	**7,230**	**7,310**	**6,020–7,280**

BAU = business as usual scenario, FIT = feed-in-tariff, NMS = new measure scenario.

Note: *Woody biomass includes unutilised wood, general wood, and construction wood waste.

** The figure before the FIT scheme includes the facility which did not switch from the Renewable Portfolio Standard.

Source: METI (2021b).

2. Supporting mechanism for biomass power in Japan

The FIT scheme is the main support measure to increase biomass, as well as other renewable energy in power generation. Biomass power approved under the FIT scheme is purchased at a fixed rate for 20 years. Japan's FIT tariff rates for biomass power are different by category (Table 4.3): for FY2021, ¥40 ($0.38)/kWh for unutilised wood with less than 2MW capacity, ¥32 ($0.30)/kWh for unutilised wood with more than or equal to 2MW capacity, ¥24 ($0.22)/kWh for general wood with less than 10 MW capacity, ¥13 ($0.12)/kWh for wood waste from construction, ¥17 ($0.16)/kWh for waste materials, and ¥39 ($0.37)/kWh for biogas. These tariff rates have remained the same since the onset of the scheme, and the domestic unutilised wood with less than 2MW capacity even went up from ¥32/kWh to ¥40/kWh in FY2015 to encourage small-scale biomass power plants. The domestic unutilised wood and the general wood would be treated as the construction wood waste without necessary documents to prove that these feedstocks are sustainably

and legally sourced and are handled properly.[5] The long-term target set for biomass power is to be economically viable without financial support. However, this target seems too hard to achieve since the generation cost remains high.

Table 4.3. The FIT Tariff Rates

(in ¥/kWh)

<table>
<tr><th></th><th>2012</th><th>2013</th><th>2014</th><th>2015</th><th>2016</th><th>2017</th><th>2018</th><th>2019</th><th>2020</th><th>2021</th><th>2022</th></tr>
<tr><td>Unutilised wood</td><td colspan="3" rowspan="2">32</td><td colspan="8">40 (<2MW)</td></tr>
<tr><td colspan="8">32 (2MW ≤)</td></tr>
<tr><td rowspan="2">General wood</td><td colspan="5" rowspan="2">24</td><td>24 | 21 (20MW ≤)</td><td colspan="5" rowspan="2">Auction (10MW ≤)</td></tr>
<tr><td>24 (<20MW)</td></tr>
<tr><td rowspan="2">Liquid biomass (palm oil)</td><td colspan="5" rowspan="2">24</td><td>24 | 21 (20MW ≤)</td><td colspan="5" rowspan="2">Auction</td></tr>
<tr><td>24 (<20MW)</td></tr>
<tr><td>Construction wood waste</td><td colspan="10">13</td></tr>
<tr><td>Waste materials</td><td colspan="10">17</td></tr>
<tr><td>Biogas</td><td colspan="10">39</td></tr>
</table>

FIT = feed-in-tariff.

Source: METI.

Currently, the FIT scheme is under review to make renewable energy the major power source under the Act for Establishing Energy Supply Resilience, which passed the Diet in June 2020 and will take effect in April 2022. This Act covers partial revisions of the Act on Renewable Energy Special Measures (the FIT Act), the Electricity Business Act, and the Act on the Japan Oil, Gas and Metals National Corporation. Japan aims to develop a new scheme that provides investment incentives and reasonable foreseeability, while facilitating the market integration of renewable energies, since the new measure, Feed-in Premium (FIP) is planned to be applied from FY2022. Under the FIP scheme, renewable power generators are encouraged to sell electricity directly at the wholesale market or

[5] Woody biomass needs to follow 'Guidelines for Verification of Woody Biomass for Use in Power Generation' stipulated by Forestry Agency to be eligible for the FIT scheme.

over-the-counter transactions. They are eligible to receive a premium price, a difference between a previously defined guaranteed price (the FIT price) and the average wholesale price over a certain period on top of the wholesale market price.

Scope of the FIP scheme will be large-scale solar, geothermal, and hydro projects with more than or equal to 1MW capacity, biomass (general wood and the others) projects with more than or equal to 10MW capacity, and liquid biomass projects with more than or equal to 50kW capacity. Previously, biomass was not considered as a renewable energy to be covered by the FIP scheme due to the high costs. However, advantage, i.e. the stability and flexibility it provides to the grid, indicates that biomass energy power plants, especially large-scale ones, would be suitable for the FIP scheme. Therefore, biomass (general wood and the others) projects with more than or equal to 10MW capacity will comply with the FIP scheme from April 2022 and then those with more than or equal to 1MW capacity may also follow FY2023. New projects with more than or equal to 50kW capacity will be allowed to apply for the FIP scheme if it is preferred over the FIT scheme.

On the other hand, the FIT scheme will remain for the locally utilised power source. Biomass (general wood and the others) projects with less than 10 MW capacity, and hydro and geothermal projects with less than 1MW capacity will be required to meet certain conditions to be eligible for the FIT scheme from FY2022. The FIT scheme is grouped into either self-consumption or community-based types. The self-consumption type is required that the generated power is consumed at least 30% for their own use or a retailer of the generated power provides at least 50% of its power supply to a local government where a facility is located. For combined heat and power (CHP), in addition to utilisation of the generated heat, self-consumption of power at least 10% is necessary. The community-based type needs to meet one of three conditions: i) utilisation of the generated power or heat is agreed with a local government; ii) the project is either managed or financed by the local government; and iii) the generated power is supplied to a retailer managed or financed by the local government.

The auction system was introduced under the revised FIT Act in 2017. Biomass power plants using general wood with more than or equal to 10MW capacity and liquid biomass are subject to auction, with a pay-as-bid pricing scheme. Japan has conducted three biomass auctions so far (Table 4.4). The first auction of 2018 attracted interest in that the registered capacity exceeded the auctioned capacity for both categories. However, qualification requirements narrowed down the number of bids and only one bid in each category actually participated in the auction. As a result, there was one successful bid in general wood, but the bidder did not reach a contract since the commitment bond was not paid. For liquid biomass, the bidding price surpassed the ceiling price, which resulted in no award.

After unsuccessful two auctions, the third auction was held in 2020 and there was one award. The bidding price of ¥18.50/kWh is lower compared to the FIT tariff rate for general wood of ¥24/kWh. Still, the awarded capacity of 1.92MW is merely 1.6% of the auctioned capacity of 120MW.

Table 4.4. Auction Result

	First auction in 2018		Second auction in 2019	Third auction in 2020
	General wood	Liquid biomass		
Auctioned capacity	180MW	20MW	120MW	120MW
Ceiling price	¥20.60/kWh	¥20.60/kWh	¥19.60/kWh	¥19.60/kWh
Registered capacity	264MW (7)	169MW (26)	101MW (20)	319MW (7)
Qualified capacity	95MW (4)	11MW (5)	6MW (4)	164MW (3)
Participating capacity	35MW (1)	2MW (1)	4MW (3)	1.92MW (1)
Awarded capacity	35MW (1)	0MW (0)	0MW (0)	1.92MW (1)
Average bidding price	¥19.60/kWh	¥23.90/kWh	¥20.55/kWh	¥18.50/kWh

Note: ( ) is the number of bids.
Source: Green Investment Promotion Organization.

Furthermore, ministries across the government have encouraged biomass use for various benefits. For instance, biomass use is expected to revitalise the agriculture, forestry, and fishery sectors, reduce GHG emissions, and cultivate a recycling-based society. Hence, the 2009 Basic Act for the Promotion of Biomass Utilization stipulated developing the Basic Plan for Biomass Usage for comprehensive and strategic support, to establish the Biomass Utilization Promotion Council which coordinates measures amongst seven relevant ministries, and to implement financial or regulatory measures to encourage biomass use.[6]

The Basic Plan for Biomass Usage, which was initially laid out in 2010 and revised in 2016, clarifies the policy direction on measures to create community-led business to help the agriculture, forestry, and fishery sectors, and to bring in profitable opportunities to the community. The Basic Plan also sets the national target and addresses research and development of technology regarding biomass use. Woody biomass was identified as one of the priority strategic areas in the Biomass Commercialization Strategy adopted by the Biomass Utilization Promotion Council in 2012, which led to an aim for an integrated system to collect and transport the unutilised wood and utilisation of woody biomass at the power plants in a systematic way.

[6] The Biomass Utilization Promotion Council is consisted of Ministry of Internal Affairs and Communications, Ministry of Education, Culture, Sports, Science, and Technology, Ministry of Agriculture, Forestry and Fisheries, Ministry of Economy, Trade and Industry, Ministry of Land, Infrastructure, Transport and Tourism, Ministry of the Environment, and Cabinet Office.

The cross-government support has been provided to increase biomass utilisation, that is, subsidy, preferential tax treatment, and finance schemes. The biomass use facilitated by the government includes not only woody biomass but also other different types of biomass such as sewage sludge and food waste. This report focuses on measures on woody biomass, which are presented below.

Subsidy: Biomass utilisation is subsidised in various phases including planning, research, development, and demonstration of technology, and facility development. Table 4.5 presents some examples of subsidy to promote biomass related to energy use along with the ministry in charge and the budget allocated in FY2021.

Table 4.5. Examples of Subsidy for Biomass Energy

Ministry	Objective	Phase	FY2021 Budget
MAFF	Facility development for utilisation of woody biomass	Facility development	¥8,185 million*
MAFF	Facility development for quality improvement of woody biomass fuels	Facility development	¥14,701 million*
METI & MAFF	Stable and efficient supply system development of woody biomass fuels	Research, design, and development	¥1,250 million
METI	Promotion of regional renewable energy utilisation	Planning and facility development	¥3,470 million
MOE, METI, & MIC	Promotion of enhancing regional renewable energy and resilience through cost reductions of renewables	Planning, research, and facility development	¥5,000 million

MAFF = Ministry of Agriculture, Forestry and Fisheries, METI = Ministry of Economy, Trade and Industry, MOE = Ministry of the Environment, MIE = Ministry of Internal Affairs and Communication.
Note: * These budget amounts cover other items.
Source: Relevant Ministries Liaison Committee for Biomass Industrial Area (2021).

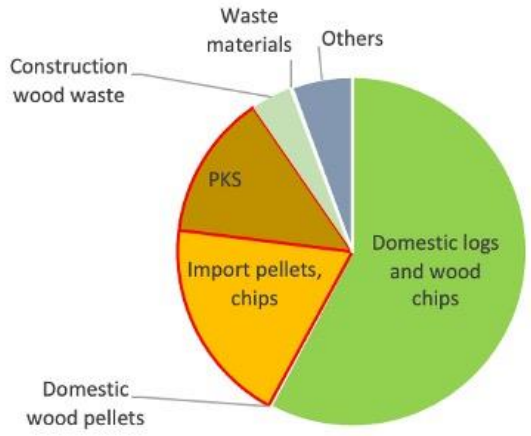
Preferential tax treatment: Property taxes on renewable power plants are reduced for 3 years by one-half for biomass power plants with capacity of less than 10MW and two-thirds for ones with capacity of more than or equal to 10MW and less than 20MW.

Finance scheme: Japan Finance Corporation, a public corporation wholly owned by the Japanese government, provides a program mainly for the cooperatives of agriculture, forestry, or fishery which plan to upgrade, refurbish, or acquire a joint facility to utilise biomass. The conditionality is an interest rate of 0.20% (as of January 2021), a loan limit of 80% of the required amount, and repayment term of 20 years (MAFF, 2021a).

3. Perspective of supply and demand balance of wood pellets and cost structure in Japan

According to a survey taken by the Japan Woody Bioenergy Association in FY2018 (from April 2018 to March 2019) with 55 biomass power generators, more than half of fuel for biomass power generation is domestically produced wood biomass at present in Japan in terms of weight (Figure 4.5).

Figure 4.5. Breakdown of Biomass Power Generation Fuel in Japan



PKS = palm kernel shell.
Note: The share of fuel calculated in terms of biomass fuel weight ('Wood pellets', 'Construction wood waste', 'Waste materials', 'Others': tonne; others: dry tonne).
Source: Depicted by IEEJ based on Japan Woody Bioenergy Association (JWBA), 2020.

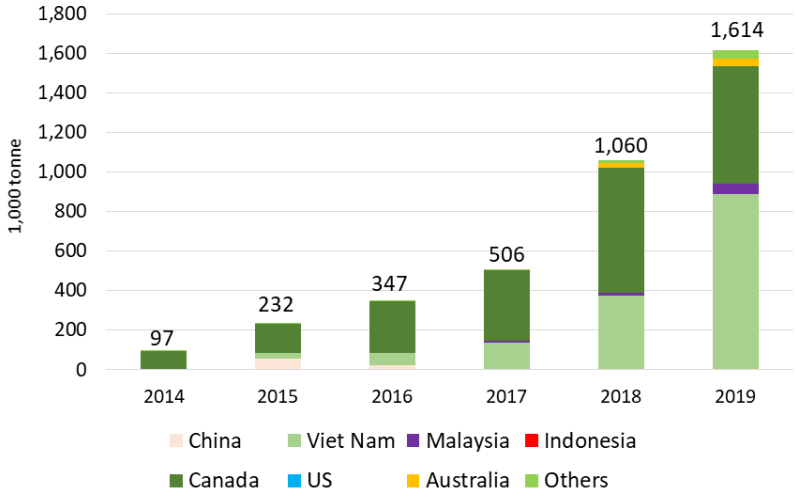
When translating the survey result into energy form, it is estimated that, within biomass power generation using wood biomass ('Unutilised wood', 'General wood', and 'Construction wood waste'), around 30% of input fuel is met by import biomass fuel (Figure 4.6).

Figure 4.6. Input Biomass Fuel for Each Type of Biomass Power Generation

PKS = palm kernel shell.
Heat value used: Domestic logs and wood chips: 19.4 MJ/kg; Domestic wood pellets, Import pellets, chips: 15.5 MJ/kg; PKS: 18 MJ/kg; Construction wood waste, Other waste, and Others: assuming the same with wood pellets.
Source: Depicted by IEEJ based on Japan Woody Bioenergy Association, 2020.

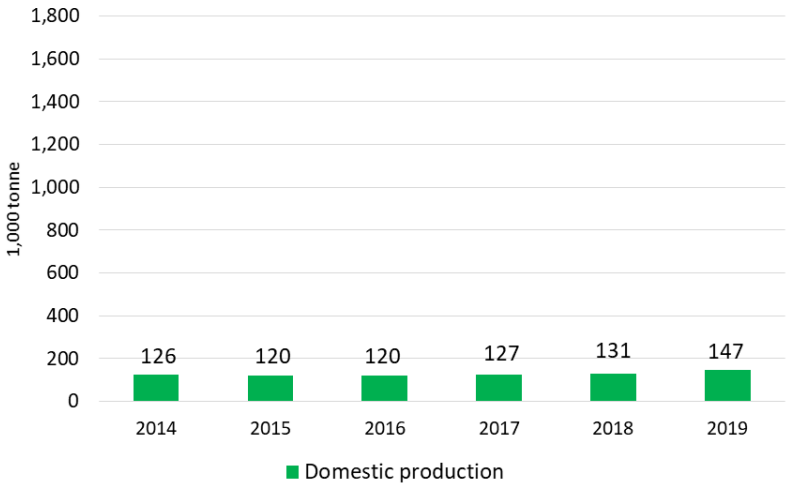
According to Japan's trade statistics, its import of wood pellets has increased around 16 times from 2014 to 2019. Viet Nam and Canada are the largest suppliers of Japan's wood pellet imports (Figure 4.7). On the other hand, domestic wood pellet production stayed almost the same over the same period (Figure 4.8).

Figure 4.7. Wood Pellets Import



Source: Trade Statistics of Japan.

Figure 4.8. Domestic Wood Pellets Production

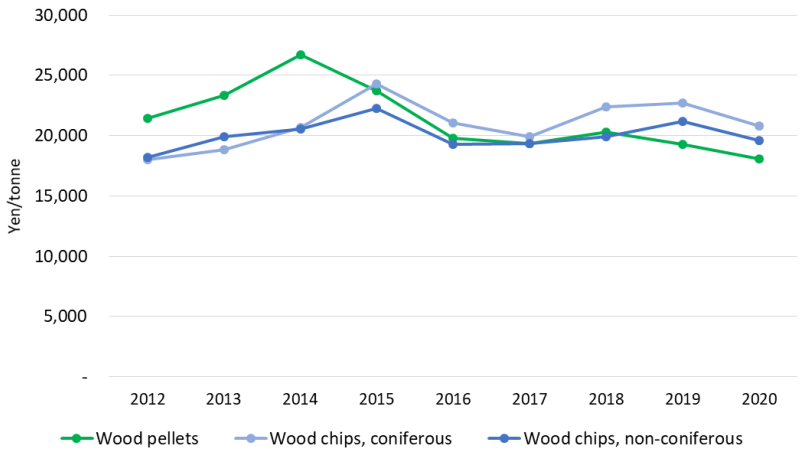


Source: Forestry Agency, Ministry of Agriculture, Forestry and Fishery (MAFF), 2020.

Applications of wood pellets in Japan include power generation, boilers, stoves, agriculture use, and others. Although the trade statistics do not specify the usage of the imported wood pellets, according to the Japan Wood Pellet Association (JPA), most are used for power generation.

The price of domestic wood pellets for power generation has a wide range. According to a survey of domestic wood pellet manufacturers undertaken by JPA in 2020, the average price of domestic wood pellets for power generation is around 14,000~29,000 ¥/tonne, while according to the Trade Statistics of Japan, the average cost, insurance, and freight (CIF) price of imported wood pellets is around 18,000 ¥/tonne in 2020 (Figure 4.9).

Figure 4-9. Average Cost, Insurance, and Freight Prices of Wood Pellets and Wood Chips

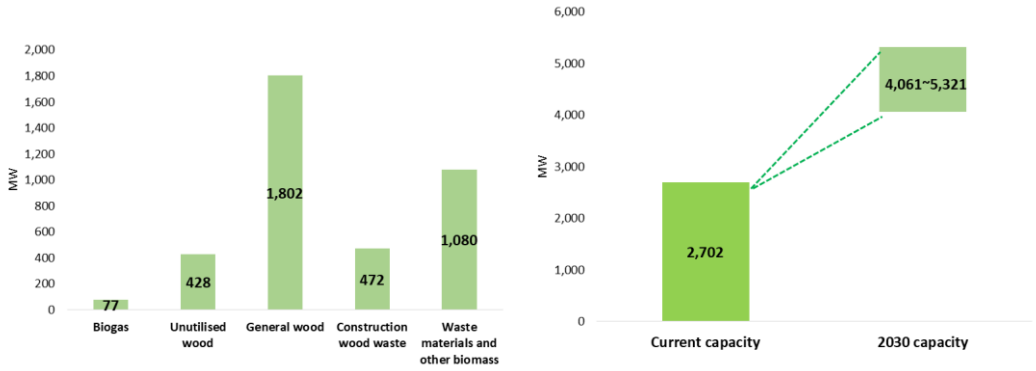


Average price = import value/import tonne.
Source: Estimated by IEEJ based on Trade Statistics of Japan.

According to JPA, most domestic wood pellet manufacturers are small scale, which contributes to their higher price. Besides, even with the increasing demand of wood pellets for power generation, domestic production has seen little scaling up. Imported wood pellets will continue to play an important role in future biomass power generation.

As of September 2020, total installed capacity of biomass power generation is around 3,859 MW (Figure 4.10), of which woody biomass power generation's capacity is 2,702 MW. It is estimated that to achieve the 2030 power generation mix, woody biomass power generation needs to be increased to around 4,061~5,321 MW. Assuming biomass power generation's capacity factor is 50%, thermal efficiency is 32%, and 30% of the biomass fuel input comes from imported wood pellets, by 2030 wood pellets imports are expected to be 3.831~5.019 million tonnes to meet the fuel demand for biomass power generation, which is around 2.4~3.1 times of imported wood pellets in 2019 (Figure 4.11).

Figure 4.10. Installed Capacity of Biomass Power Generation at Present (September 2020) and in 2030



Average price = import value/import tonne.
Source: METI compiled by IEEJ.

Figure 4-11. Needed Wood Pellets Import in the Future

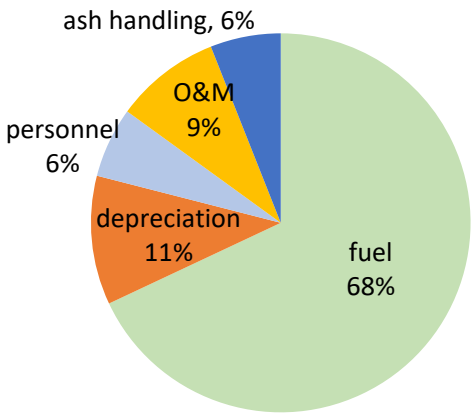
Average price = import value/import tonne.
Source: IEEJ estimation.

4. Issues and challenges

The first challenging issue is that generation cost remains high. In general, the tariff rates under the FIT scheme in Japan are higher compared with those in the European countries. The tariff rate for a biomass power plant with 5 MW capacity and the use of wood pellets is ¥24/kWh in Japan, whereas the equivalent case in Germany was ¥12.7/kWh in 2016 (METI, 2020a).

Unlike the other renewable technologies such as solar and wind power, the biomass power plants need fuels for operation. In Japan, the fuel cost makes up 68% of the generation cost of the biomass power (Figure 4.12) (METI, 2020b). Hence, it is necessary to reduce fuels costs, which will ultimately contribute to reductions of the biomass power generation cost. In particular, the cost reduction is critical for the biomass power plant stakeholders to stay in business after financial assistance under the FIT scheme ends in 20 years.

Figure 4.12. Cost Breakdown of Woody Biomass Power Plant in Japan



O&M = operations and management.
Source: METI (2020b).

To cope with this concern, it is important to create an environment that facilitates cost reductions of woody biomass harvested domestically. It would be effective if the processing and transporting system were adjusted or designed so that thinned wood and forest residues would be efficiently utilised as fuel resources (METI, 2020b). The current forestry is centred on planting and management of conifers, mainly for construction materials. This indicates that woody biomass for energy use comes second after production of construction materials as the main purpose of forestry. Inevitably, the supply of woody biomass for energy use is affected by demand for construction materials. Therefore, a well-organised system is required for collection and delivery of woody biomass for energy.

Another feasible approach is to plant and grow broadleaf trees and fast-growing trees in a coordinated way. Although broadleaf trees are not suitable for the construction materials as they tend to bend in a growing process, they are abundant in Japan. Advantages of fast-growing trees should also be highlighted in that they could save time and costs due to a shortened period of growth. If they are planted collectively in a certain place to be used specifically for energy, efficiency would be enhanced in collecting and transporting them. Moreover, productivity would improve because a thinning process will not be necessary.

The second issue is to secure a stable supply source. Based on the Forest and Forestry Basic Plan, availability of domestic woody biomass is determined (Forestry Agency, 2021). The drafted Basic Plan for revision in FY2021 estimates that demand for fuelwood, i.e. wood pellets, wood chips, firewood, and charcoal, will be 15 million m^3 log equivalent in FY2025 and 16 million m^3 log equivalent in FY2030, whereas domestic availability of fuelwood will be 8 million m^3 log equivalent and 9 million m^3 log equivalent in the respective years (Table 4.6). Imported wood products are expected to fill the gap between them. Therefore, it is essential to secure both domestic and imported biomass resources to meet operation of biomass power plants and to increase the biomass energy as planned.

Table 4.6. Forest and Forestry Basic Plan (draft)

	Demand for fuelwood*	Domestic availability for fuels	Equivalent capacity**
2019	10 million m^3	7 million m^3	280MW
2025	15 million m^3	8 million m^3	320MW
2030	16 million m^3	9 million m^3	360MW

Note: * Fuelwood includes wood pellets, wood chips, firewood, and charcoal.
**Equivalent capacity is estimated by METI.
Source: MAFF (2021b).

The third challenging issue is sustainability. The FIT scheme approves woody biomass on the condition that it is sustainably and legally harvested. Sustainability of fuels is ensured based on the Forest Act for domestic fuels and the third-party sustainability scheme for the imported ones. General wood needs to comply with the Guidelines for Verification of Compliance and Sustainability of Wood and Wood Products issued by the Forestry Agency in 2006. In addition, for sustainability to be qualified, the Guidelines require that woody biomass is harvested from forests which are confirmed by forest certification schemes such as the Forest Stewardship Council, the Programme for the Endorsement of the Forest Certification Scheme, and the Sustainable Green Ecosystem Council. Further, the woody biomass needs to be properly handled and not to be mixed with other uncertified products through the entire supply chain, which is verified by the chain-of-custody system.

In April 2019, the Biomass Sustainability Working Group under the umbrella of the New and Renewable Energy Subcommittee was established to examine the technical standards and aspects of sustainability. Currently, general wood encompasses sawmill residues, wood pellets and chips, PKS, and palm trunk under the FIT scheme. Yet, it is likely that different biomass fuels will be needed to meet demand, which will necessitate examining whether they are valid for the FIT scheme. Along with robust increases of imported woody biomass and agricultural residues like PKS, there is also a growing concern about their sustainability. In response, the Working Group has initiated a review of the current sustainability assessment criteria under the FIT scheme from 2020.

Table 4.7 lists the criteria how sustainability of biomass feedstock is assessed to be eligible for the FIT scheme. The Biomass Sustainability Working Group has investigated new subjects which are the food-versus-fuel dilemma, lifecycle assessment of GHGs, and the new third-party sustainability scheme as new assessment criteria to be added. While they are still under review, the Green Gold Label for PKS and palm trunk was added to the certified sustainability scheme in addition to Renewable on Sustainable Palm Oil for palm oil and Roundtable on Sustainable Biomaterials for PKS and palm trunk.

Table 4.7. Sustainable Assessment Criteria

Subjects	
Environment	Greenhouse gas emission reductions
	Consideration of land use changes
	Biodiversity protection
Society and labour	Impacts on society and labour assessment
Governance	Legal compliance
	Information disclosure
	Renewal/cancellation of certification
Appropriate management throughout the supply chain	
Securing independence of certification	

Source: METI (2021a).

The imported woody biomass and agricultural residues may be affected by the GHG lifecycle assessment standards, depending on policy direction on biomass energy. The certification systems do not include assessment of GHG. If GHG lifecycle assessment standards are required, business opportunities in Japan may change for biomass feedstock suppliers from abroad.

5. Conclusion

Biomass power generation has increased in Japan, mainly supported by the FIT scheme. Since the approved capacity of biomass power under the FIT scheme has already surpassed the 2030 target, it is a matter of time when pre-operational facilities commence operation to achieve the target.

If more biomass power plants start operation toward 2030, fuel demand for operation will inevitably rise. Currently, more than half of fuels for biomass power generation are woody biomass produced domestically but domestic woody biomass production has been limited, which has boosted imports of wood pellets in recent years. Hence, it is likely that imported wood pellets will play an important role to meet the fuel demand for future biomass power generation.

However, the imported fuels for biomass power generation are associated with the issues Japan needs to deal with. The price of the imported fuels needs to be competitive since the fuel cost for biomass power generation is key to reduce the generation cost which remains high in Japan. In addition, sustainability and lifecycle assessment of GHG on the imported fuels will be scrutinised, given the growing momentum for the 2030 Agenda for Sustainable Development worldwide. Japan will certainly pursue pathways to secure affordable and sustainable fuels to fulfil commitments.