

# **Policies and initiatives for sustainable wood use promotion by public and private sectors in Japan**



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Input to ITTO Project PDD/21 Rev. 1.2  
“Promotion of Sustainable Domestic Wood Consumption in Vietnam”



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## Acronyms

CLT: Cross Laminated Timber

ESG: Environmental, Social, and Governance

GDP: Gross domestic product

HWP: Harvested Wood Products

JAS: Japanese Agricultural Standards

JIS: Japanese Industrial Standards

MAFF: Ministry of Agriculture, Forestry and Fisheries

MEXT: Ministry of Education, Culture, Sports, Science and Technology

MLIT: Ministry of Land, Infrastructure, Transport and Tourism

MOEJ: Ministry of the Environment, Japan

NDC: Nationally determined contribution

SCJ: Science Council of Japan

SDGs: Sustainable Development Goals

## 1. Introduction and objective

In Japan, the use of wood for mid/large-scale buildings was restricted after World War II until the 2000s due to fire and earthquake concerns. However in 2010, the Japanese government shifted its policy of restricting the use of wooden materials for construction, due to the overabundance of planted forest resources caused by a lack of demand for wood, and also due to the potential developments in new wood technology and construction methods. Thus, the Act on Promoting the Use of Wood in Public Buildings came into force, aimed at the development of wooden constructions.

Since then, the promotion of wood use has been further emphasized, along with forestry development and providing multiple forest ecosystem services. The latest version of the Basic Plan for Forest and Forestry, approved at a Cabinet meeting on 15 June, 2021, calls for "Green Growth" through forests, forestry and the wood industry, and promotes the "Creation of a 'Second Forest' in Urban Areas" by promoting the use of wood in the building sector, as one of five policy pillars in the sector. Moreover, the Forestry Agency (2022a) emphasizes the use of wood as part of plantation forest management, which is "Harvest, Use, Plant, and Grow," and is considering expanding the demand for wood, especially for wood in mid-to-high-rise buildings and non-residential buildings. This is the key component in a cycle to realize sustainable forest management and to contribute to carbon neutrality by 2050. There is also growing attention from businesses, with private sector initiatives on wooden construction and decarbonization in the context of Sustainable Development Goals (SDGs) and Environmental, Social, and Governance (ESG) investment.

Against this backdrop, this study aims to examine policies and initiatives for promoting sustainable wood use by Japan's public/private sectors and identify key approaches and measures to draw lessons for other countries seeking to promote sustainable wood use.

This report is organized as follows: Section 2 below describes the methodology adopted for the analysis. Section 3 provides an overview of the Japanese context, including social and economic factors and the forest situation, as well as wood supply and demand trends. With specific attention to wood use in buildings, Sections 4, 5 and 6 identify and discuss public policies, joint public-private initiatives, and engagement of academic scholars to promote wood use in Japan. Section 7 elaborates on the findings of Japanese policies and initiatives, and Section 8 concludes with lessons for other countries to

promote wood use.

## 2. Methodology

The study was developed based on desk review research using publicly-available information. Research is focused on the Act for Promotion of Use of Wood in Public Buildings and its revised Act and examines the policy documents, government reports, statistical data as well as related literature and reports. In addition, the study was further developed through an email-based questionnaire survey and interviews with experts/industry groups in Japan's wood sector, Forestry Agency, and local governments.

In line with the literature on environmental policy theory and policy measures (such as Bouwma *et al.*, 2015; Keysal, 2005; Kurasaka, 2014; OECD, 1999; Tröster & Hiete, 2018), this study considers the following factors, if applicable, to discuss policies and initiatives.

- Background and objectives of the policies: what are the challenges of wood use that policy/initiatives aim to address?
- Scope of the policy: what types of wood use does the policy promote?
- Targets of the policy and their responsibility: who does this policy target, and what do they have to do to promote wood use?
- Specific goals for wood use: are there specific numerical targets for wood use?
- Overall implementation structure and measures/tools to promote wood use: how is wood use promoted?
- Legality and sustainability of wood use: how is legality ensured and how is sustainability taken into consideration in the use of wood?
- Monitoring and reporting mechanism: how has the progress in wood use been monitored and evaluated?

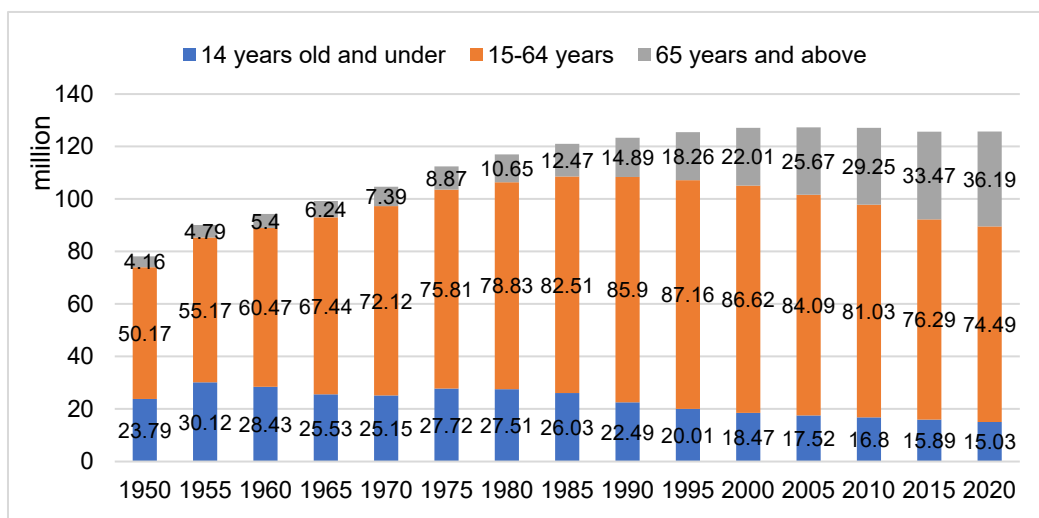
It should be noted that this study is limited in its scope. Diverse aspects and themes impact the promotion of wood use from upper-stream to down-stream policies, practices, and trends as well as over sectors, such as forest management, forestry industries, supply chain system, trade, materials engineering, construction design and technology, energy and heat generation sector, etc. Among others, there is a strong need to create demand for wood use, and, given Japan's policy on the cascading use of wood, this report focuses on the most critical downstream consumption: the use of wood materials in construction.



### 3. Japanese context

#### 3.1. Social and economic situation

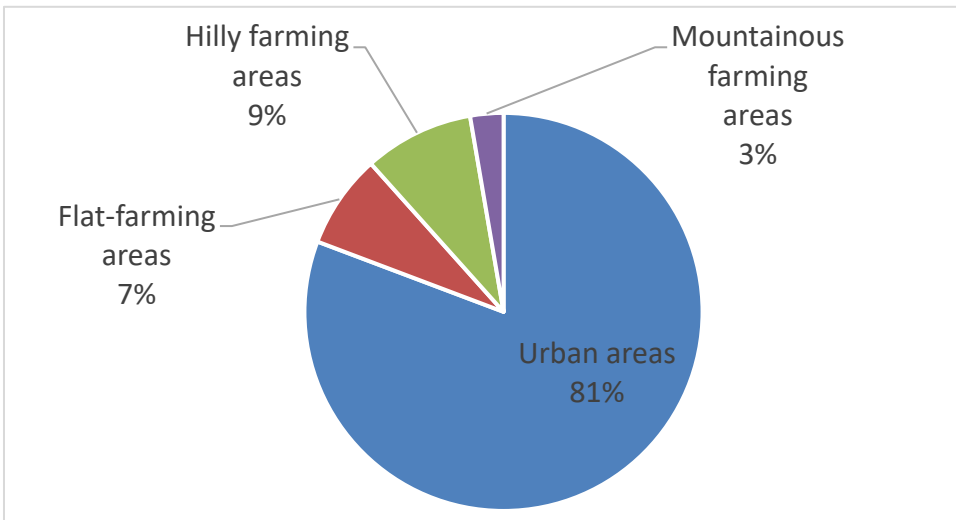
Japan's population peaked in 2004, reaching 127.84 million, and has been declining since then (Figure 1). There are concerns that a shrinking population would cause a decline in demand for the construction of wooden housing.



**Figure 1 Population trends in Japan**

Sources: Forestry Agency of Japan (2021a)

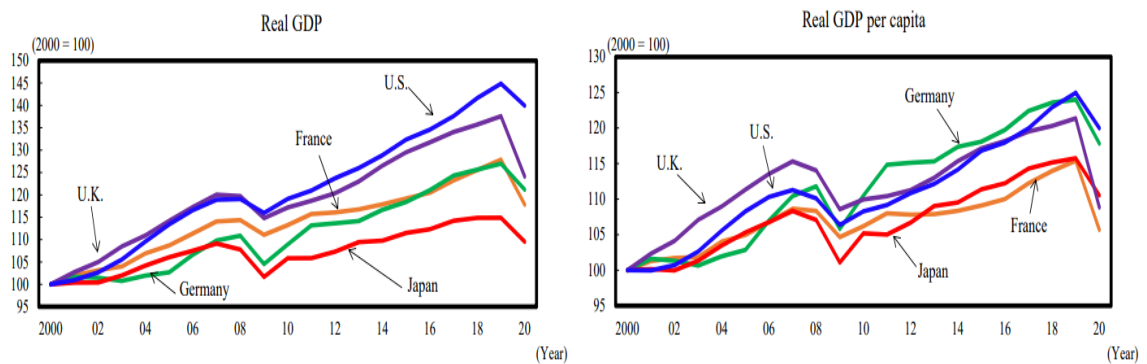
Looking at the Japanese population by agricultural area type (Figure 2), in 2015, there were 177 million people living in urban areas (approximately 80% of the total population), 12.6 million in flat-farming areas, 10.86 million in hilly farming areas, and 3.84 million in mountainous farming areas (PRIMAFF, 2019). From 2000 to 2010, the urban population increased by 3%. In contrast, the population declined by 4% in flat farming areas, by 8% in hilly farming areas, and by 15% in mountainous farming areas (MAFF, 2013). With this trend, there is concern that the forestry sector in mountain regions will face a shortage of human labour.



**Figure 2 Distribution of Population by Agricultural Area Type in 2015**

Source: PRIMAFF (2019)

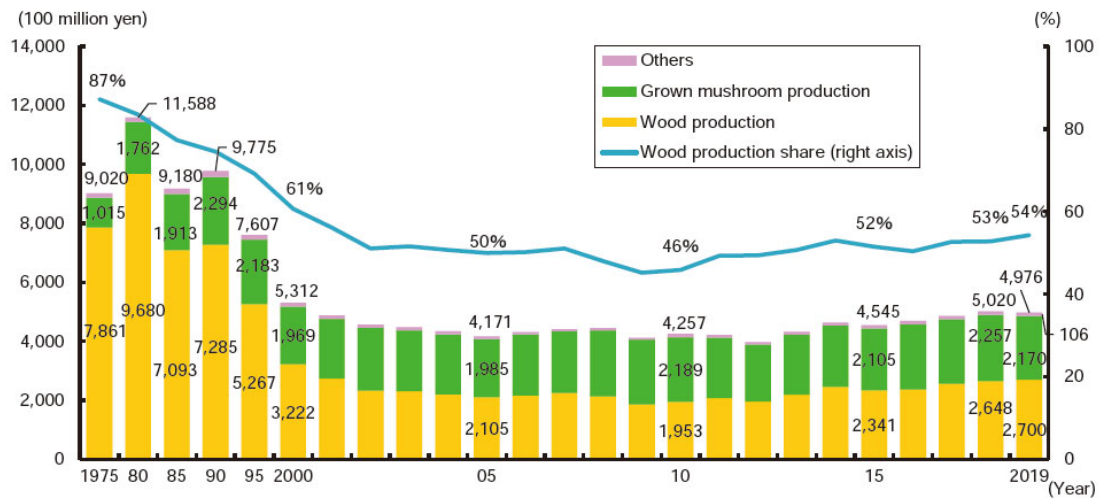
Since 2000, Japan has posted relatively lower real Gross domestic product (GDP) growth than other countries in the Group of Five (G5), but has narrowed the gap in real GDP per capita growth (Figure 3). According to the Cabinet Office of the Japanese government (2021), this can be mainly explained by the decline in Japan's population.



**Figure 3 Real GDP growth rates in major countries**

Source: Cabinet Office (2021)

Regarding the forestry sector, the total forestry output in 2019 was JPY 498 billion, showing a slight upward trend since 2012. Wood production contributed to about 50% of forestry output and reached JPY 270 billion in 2019.

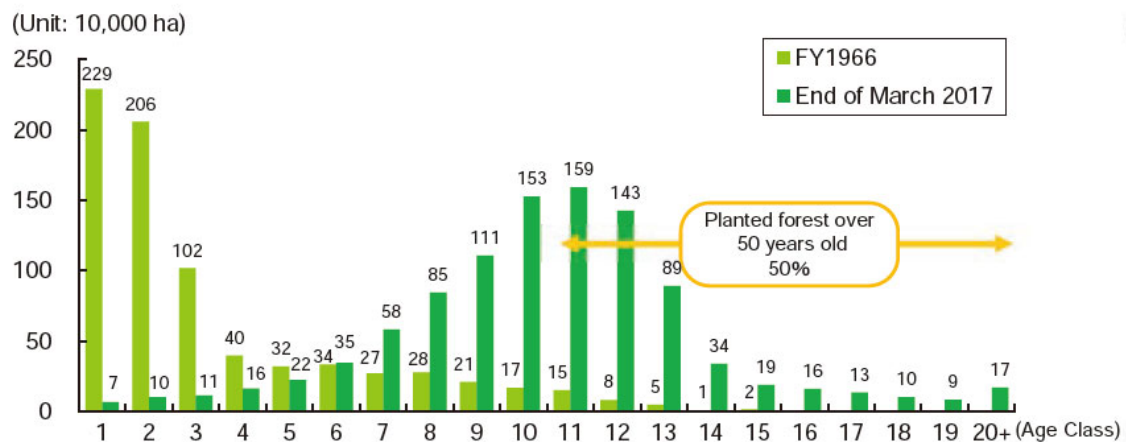


**Figure 4 Gross forestry output**

Source: Forestry Agency (2021a)

### 3.2. Situation of forests

Forest cover in Japan has remained stable for more than 50 years at around 25.0 million hectares, which accounts for two-thirds of the total land area of the country. About 40% of the total forest area (10.2 million ha) is planted forests. Sugi (*Cryptomeria japonica*) and Hinoki (*Chamaecyparis obtusa*) are two major planted species in Japan. The area covered by Sugi is 4.4 million ha, accounting for 44% of the planted forests, while Hinoki covers 2.6 million ha, accounting for 25% (Hashiramoto, 2022). The majority of the planted forests were established during the late 1950s through the early 1970s. At that time, Japan's economy was growing rapidly, leading to an increasing demand for wood to be used in housing construction and for pulp (Forestry Agency, 2019). Currently, half of these planted trees have aged more than 50 years, which is the usual harvesting age in Japan (Figure 5).

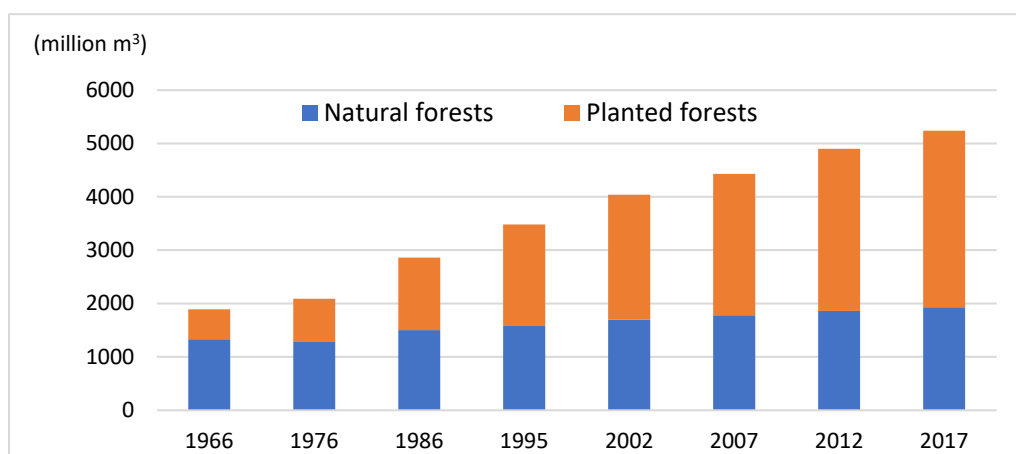


Note. Age-classes are divided by 5 year-period steps. "Age-class 1" includes the 1st to 5th year after planting with the year of planting counted as the 1st year.

**Figure 5 Changes in age class composition of planted forests**

Sources: Forestry Agency (2021a)

The forest stock has been increasing steadily, particularly in planted forests. Japan’s total growing stock is approximately 5.2 billion m<sup>3</sup> as of 2017, which is about 2.6 times larger than the stock in the 1960s. Of this total, planted forests account for approximately 60%, or about 3.3 billion m<sup>3</sup> (Figure 6).

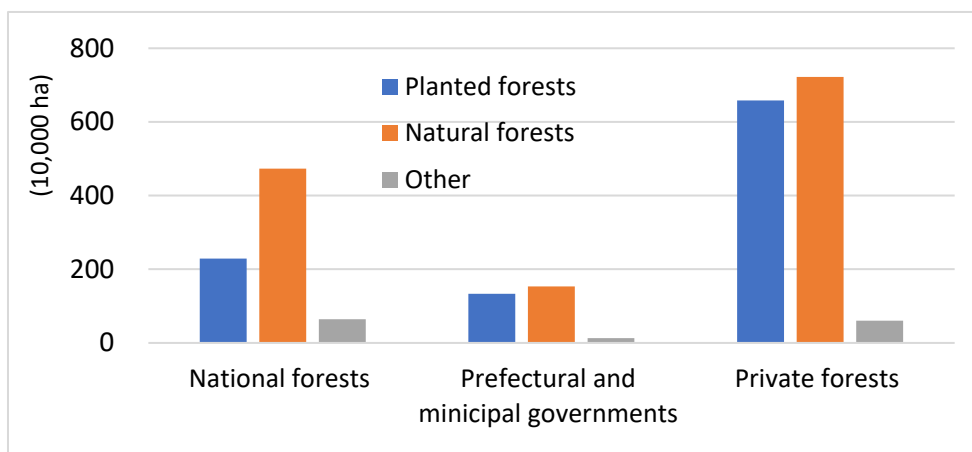


**Figure 5 Changes in the total growing stock of forests in Japan**

Source: Forestry Agency (ibid)

Regarding ownership of forests in Japan, 43% of forests are national and publicly-owned forests, and 57% are privately owned. Figure 7 shows the areas of planted forests and

natural forests by forest ownership. Among national and publicly-owned forests, 72% belong to the national government, and the other 28% belong to local public entities, including prefectural and municipal governments and communal districts. Figure 7 shows the areas of planted forests and natural forests by forest ownership.



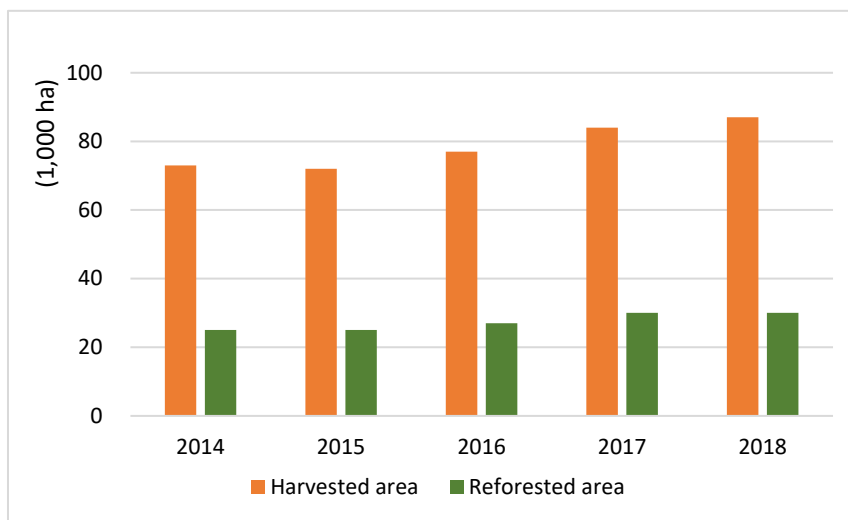
**Figure 6 Forest areas by forest types and ownership in 2017**

Source: Forestry Agency (2017)

The majority of private forests are owned by individuals, and small-scale ownership is the dominant feature of private forests. The 2015 Census of Agriculture and Forestry shows that the number of forestry households was 830,000, 88% of which owned less than 10 ha of forest area (Forestry Agency, 2021a). According to the 2020 Census of Agriculture and Forestry (MAFF 2021), forestry owners/entities amount to 34,001, 24.1% of whom own 5 to 10 ha of forest land, followed by those who own less than 5 ha (22.8%), and those who own 10 to 20 ha (20.7%). One characteristic of the land in Japan is its steep geography and this, combined with the ownership structure of forest land which is generally dominated by small forest owners, means that it is very difficult to carry out efficient forestry operations and active forest management .

Another challenge is the low rate of reforestation after harvest. While log production from the main harvest has been increasing, the area of reforestation remains low at around 30-40% of the area logged (Figure 8). The Forestry Agency (2020) considers low timber prices, the high cost of afforestation, and the resulting lack of interest in forestry management among forest owners as the main reasons for the low reforestation ratio after harvesting. If the reforestation rate continues to be low, it may lead to a decrease in forest stock, which could affect the forestry industry as a whole in the long term. Other

issues related to low reforestation include the increased risk of landslides, and a reduced capacity to protect water resources.



**Figure 7 Areas of logging and reforestation between FY2014 and FY2020**

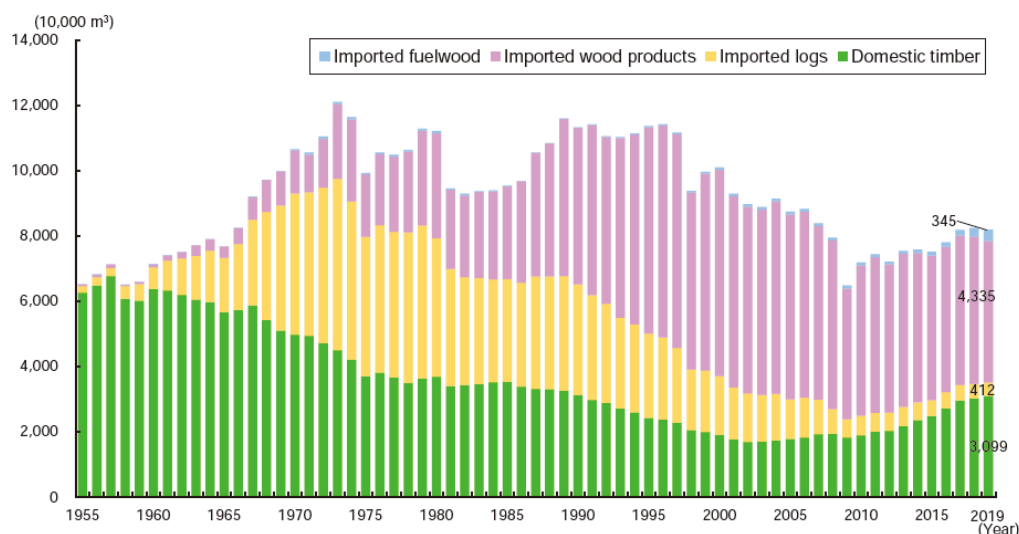
Source : Forestry Agency (ibid)

3.3. Trend of wood supply and demand (production, consumption, imports, and exports of wood products by category

Wood demand in Japan bottomed out in 2009 due to the 2008 economic downturn following the Lehman Shock, and has since recovered. Japan's total wood product demand in 2019 was 81.91 million m<sup>3</sup> (Roundwood equivalent), a 0.7% decrease from the previous year.

Japan's domestic timber supply has increased since bottoming out in 2002 at 16.92 million m<sup>3</sup>. This trend is explained by grown planted forest resources, increased use of cedar and other domestic timber as raw materials for plywood, and increased use of woody biomass for power generation facilities. The domestic timber supply in 2020 was 31.15 million m<sup>3</sup>, up 0.5% from the previous year.

Japan's wood imports have declined since peaking at 90.45 million m<sup>3</sup> in 1996. In 2020, the volume fell 15% from the previous year to 43.29 million m<sup>3</sup>. Imports of logs, wood chips, plywood, and other wood products fell 16.7% from the previous year to 36.11 million m<sup>3</sup>. On the other hand, imports of fuelwood increased 12.3% to 3.88 million m<sup>3</sup>.



**Figure 8 Changes in wood supply**

Source: Forestry Agency (2021a)

Japan's wood self-sufficiency rate has increased since 2002 (18.8%). In 2020, the rate reached 41.8% (35.8% in timber) due to a decrease in log imports and increased demand for fuelwood and domestic timber supply. The self-sufficiency rate by use is as follows: timber (47.2%), plywood (47.0%), pulp and chip (17.0%), and fuel wood (69.7%).

#### 4. Public policies for the promotion of sustainable wood use

##### 4.1. Creation of a 'Second Forest' in Urban Areas

The Forest and Forestry Basic Act, 1964 (Act No. 161) (revised in 2001)<sup>1</sup> is the key sector policy in Japan, and it aims to fulfill a multifunctional role of forests and develop the forestry industry in a sustainable and healthy manner. It stipulates basic principles and fundamental matters concerning forests and forestry policies. The Act consists of seven chapters: (1) General Provisions; (2) Basic Plan for Forest and Forestry; (3) Policies for the Fulfillment of Multifunctional Roles of Forest; (4) Policies for the Sustainable and Sound Development of Forestry; (5) Policies for Securing Supply and Use of Forest Products; (6) Administrative Organs and Relevant Bodies; and (7) The Forest Policy Council.

Based on the Forest and Forestry Basic Act, the Japanese government formulates a Basic Plan for Forest and Forestry (hereinafter, the "Basic Plan") about every five years, which

<sup>1</sup> English version is available at <http://extwprlegs1.fao.org/docs/pdf/jap3175.pdf>

presents the fundamental policy and goals, policy directions and measures, considering the social contexts and the status of forest and forestry. In the Basic Plan, the promotion of wood use has been one of the priority measures, along with forestry development and the provision of multiple benefits. The latest version of the Basic Plan was approved at a Cabinet meeting on 15 June, 2021<sup>2</sup>. This latest Basic Plan calls for "Green Growth" through forests, forestry and the wood industry, and framed the "Creation of a 'Second Forest' in Urban Areas" as one of the five pillars of the policy in the sector<sup>3</sup>. CO<sub>2</sub> absorbed by forests can be stored as carbon for a long time by using harvested wood products (HWP) for buildings and other structures. In addition, using wood as an energy-saving material contributes to the reduction of CO<sub>2</sub> emissions (Government of Japan, 2021a). From this perspective, the "creation of a 'Second Forest' in urban areas" represents the vision and political will of the government of Japan to increase carbon storage in cities, particularly by using wood materials for building structures, interiors and exteriors to achieve carbon neutrality by 2050. Indeed, Japan estimates emissions and removals from annual carbon stock changes of HWP based on a production approach to achieving its Nationally Determined Contribution (NDC) (Government of Japan, 2021b).

#### **Creation of a 'Second Forest' in urban areas**

*We aim to create new demand for wood in mid/high-rise buildings and non-residential buildings by developing and distributing materials that meet fire resistance standards and allow structural calculations, and by extending the supply of Japanese Agricultural Standards (JAS)<sup>4</sup> lumber. We will also promote exports of value-added wood products. Furthermore, the use of renewable energy will be promoted through power generation and heat utilization of woody biomass, as well as through the appropriate utilization of forest land for wind power and geothermal power generation. Through these efforts, we will promote the use of wood, which consumes less energy in manufacturing and has a long-term carbon storage effect. In this way, we will contribute to the reduction of greenhouse gas emissions, aiming to achieve a circular society.*

The Basic Plan for Forest and Forestry issued in 2021  
(Translated by the author)

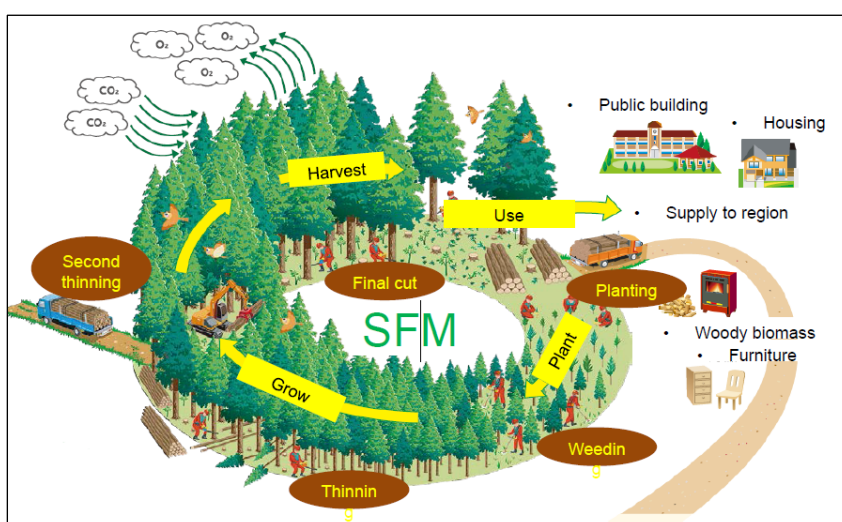
<sup>2</sup> The Japanese version is available at <https://www.rinya.maff.go.jp/j/kikaku/plan/>

<sup>3</sup> Five pillars are "Proper management of forest resources and utilization," "Developing and implementing measures toward "New Forestry," "Enhancing international competitiveness and local competitiveness of wood industries," "Development of second forests in urban areas," and "Creation of new value for rural and mountain villages."

<sup>4</sup> In Japan, a material basically needs to be recognized by JIS (Japanese Industrial Standards) or JAS (Japanese Agricultural Standards) to be used as a structural building material.



The Forestry Agency (2022a) emphasizes using wood as a part of the plantation forest management process of "Harvest, Use, Plant, and Grow" and considers expanding the demand for wood as a key element in the cycle to realize sustainable forest management. In order for forests to provide their many services and contribute to building a circular economy and developing local economies, it is critical to promote wood use and ensure reforestation after harvest and thinning. Along with wood use for building, woody biomass for energy has been promoted in Japan as shown in Figure 10. However, it should be noted that the Basic Plan describes woody biomass for energy as an "unused wood" and/or "cascading use" of wood (Government of Japan, 2021c). The Forestry Agency (2019) defines the latter as "the use of wood as building materials, followed by reuse as boards, paper, etc., and finally as fuel." Accordingly, it is understood that the first and essential step in promoting the widespread use of wood in Japan is to expand the demand for buildings.



**Figure 10 Concept of "Harvest, Use, Plant, and Grow" for the sustainable management of planted forests**

Source: Nagano (2021)

The latest Basic Plan sets a goal to increase the supply of timber from 31 million m<sup>3</sup> (actual performance in 2019) to 42 million m<sup>3</sup> (target for 2030), about 1.4 times larger in 10 years. This would be achieved by promoting wood use, not only relying solely on public sector demand but also by expanding demand in the private sector. As suggested in the latest Basic Plan, in creating demand for wood, it is essential to increase wood use in buildings, especially non-housing buildings where wood is not commonly used in Japan.

To promote wooden construction, the government has taken the lead in promoting wood use for the construction and interiors of public buildings based on the Act for Promotion of Use of Wood in Public Buildings enacted and enforced in 2010. Recently the Act was revised in 2021 to develop demand for wooden construction in the private sector, and new initiatives have been taken to encourage private entities to use wood.

#### 4.2. Act for Promotion of Use of Wood in Public Buildings

##### 4.2.1. Background and the object of the Act

In Japan, wooden construction has historically been the mainstream method, especially for constructing houses. Indeed, about 80% of low-rise (up to three storeys) residential buildings are wooden (Forestry Agency, 2021a). On the other hand, the use of wood for large-scale buildings was restricted after World War II until the 2000s due to fire and earthquake concerns. In addition, due to the lack of sufficient tree growth in the planted forests at that time, increasing demand for wood to construct houses, and concerns about forest degradation because of overuse, wood was not a suitable option for constructing public buildings (Matsui, 2014). In 2008, the ratio of wooden construction (based on floor area) in all buildings, including housing, was 36.1%, while public buildings accounted for 7.5% (Wood Utilization Division, 2011).

The revision of the Building Standard Law and other regulations about wooden buildings in 2000 expanded the possibilities for wooden buildings, allowing them to be made of wood if they meet certain performance requirements (Suematsu and Ikebuchi, 2011). On the other hand, there remained regulatory and procedural restrictions preventing wood use in building construction. In accordance with the size, type and location of buildings, using wood in buildings must address structural and material issues such as earthquake resistance, fire resistance, fireproofing, non-combustibility, preservation, antisepsis and moisture proofing. Due to fireproof restrictions, wooden construction was principally used for houses, but not usually used for medium and high-rise buildings, including public ones. Such limited use and demand for wooden construction resulted in techniques and equipment that were not sufficiently developed to produce large-sized construction materials from wood or construction designs and methods required for wooden buildings.

As shown in Figure 5, the area of planted forest that has aged more than 50 years (the usual harvesting period) has increased 2.4 times during the last decade (Forestry Agency,

2021a). However, these resources had limited use, and the price of domestic planted timber was low, which meant that forest owners were less motivated and the reforestation rate after harvest was lower. One major concern was that this situation could lead to the stagnation of forestry management and its associated sectors, as well as leading to a decline in forest ecosystem services (Suematsu and Ikebuchi, 2011). Further promotion of domestic timber was required from the perspective of forest sector development through the appropriate use of forest resources and the promotion of forestry, timber industries, and mountain village communities.

Against this backdrop, the national government took the lead in wood use for construction in line with this Act. Targeting public buildings where the rate of using wood was low, the aim was to promote the sustainable and sound development of the forestry industry and contribute to the formation of a circular economy and the climate change mitigation. Furthermore, by encouraging local governments and private enterprises to take the initiative in line with the national policy, the Act sought to increase the overall demand for wood, including for buildings in general. The Act also encouraged the promotion of the use of wood biomass.

#### 4.2.2. Definition and scope of wood use under the Act:

The term "wood use" is defined by the Act (Article 2) as "the use of wood produced in Japan and other wood as building materials for main structural parts and other parts of buildings, raw materials for products, and energy sources as prescribed in Article 2, Item 5 of the Building Standards Act." More specifically, Suematsu and Ikebuchi (2011) explain the use of wood under the Act as follows:

- Wood is used in all parts of the main structure of the building, such as columns, beams and walls, and interior parts, such as ceilings, floors and interior walls.
- Wood is used as a building material, including the case when the wood is used to cover the surface of concrete walls.
- Wood is used for manufactured articles, such as guardrails, road noise barriers and park fences, and as raw materials such as paper and pulp or as an energy source.

As written in its objective (Article 1), the Act mainly targets the increased use of wood in "public buildings". It should be noted that "public buildings" for wood use promoted under the Act are defined as those buildings that fall within the following categories (Article 2):

- Buildings that belong to the national government or local governments for public

use or official use.

- Buildings that belong to entities other than the national government or local governments, and that fall within the following types:
  - Schools;
  - Social welfare facilities, including retirement homes, preschools and welfare homes;
  - Hospitals or clinics;
  - Gymnasiums, swimming pools and other sports facilities;
  - Libraries, youth homes and other social education facilities;
  - Passenger facilities of public transportation; and
  - Rest areas of expressways.

In short, public buildings under the Act are defined as those owned and maintained by the national and local governments, and those owned and maintained by private entities with a public nature, such as schools and social welfare facilities.

In addition to wood use in public buildings, the Act covers the following wood uses (Articles 17-20), requiring the national and local governments<sup>5</sup> to make efforts by taking necessary measures to promote:

- Wood use in housing;
- Wood use for guardrails, highway sound barriers, park fences and other structures related to public facilities;
- Woody biomass as raw materials for products such as pulp, paper and bioplastics; and
- Woody biomass as a source of energy.

#### 4.2.3. Subjects of the Act and their responsibility

Many stakeholders are involved in promoting wood use, each playing a different role. Table 1 summarizes the subjects of the Act and their responsibility to promote wood use defined by the Act and its Basic Policy. The main subjects of the Act are national and local governments, as they are responsible for public buildings, but subjects also include business entities and citizens involved in the Act.

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<sup>5</sup> The bureaucratic administration of Japan is divided into three basic levels; national, prefectural and municipal. Local government means prefectural and municipal governments.

**Table 1 Subjects and their responsibility to promote wood use determined by the Act on Promoting the Use of Wood in Public Buildings and its Basic Policy**

Subjects to the Act	Responsibility regarding the promotion of wood use
Government of Japan (national)	<ul style="list-style-type: none"> <li>• Formulate and implement measures to promote wood use</li> <li>• Endeavour to use wood in public buildings for which the national government is responsible</li> <li>• Endeavour to take necessary fiscal and financial measures</li> <li>• Endeavour to take necessary measures to ensure the timber supply for the promotion of advanced wood manufacturing and construction of the public building</li> <li>• Examine the Building Standard Law and other regulations and take the necessary legislative measures to lift or ease the regulations</li> <li>• Endeavour to take necessary measures regarding studies, technology development, dissemination and human resource development</li> <li>• Increase public understanding of wood use</li> </ul>
Local governments <sup>6</sup> (prefectures and municipalities)	<ul style="list-style-type: none"> <li>• Formulate and implement measures to promote the use of wood in accordance with national policies</li> <li>• Endeavour to use wood in public buildings for which the local governments are responsible</li> <li>• Establishment of cross-departmental meetings</li> </ul>
Business entities	<ul style="list-style-type: none"> <li>• Endeavour to promote the use of wood and cooperate with national and local government policies</li> </ul>
Citizens	<ul style="list-style-type: none"> <li>• Endeavour to promote the use of wood and cooperate with national and local government policies</li> </ul>

4.2.4. Quantitative targets regarding wood use in public buildings

The "scope of public buildings to be actively promoted to be made of wood" is defined in the Basic Policy of the Act as "low-rise public buildings" that are not required to be fireproof or to have main fire-resistant structures regulated by the Building Standard Law and other legal standards. In addition, the Basic Policy of the Act sets a quantitative target that all public buildings of the national government that fall within "the scope of

<sup>6</sup> The bureaucratic administration of Japan is divided into three basic levels; national, prefectural and municipal. Local government means prefectural and municipal governments.

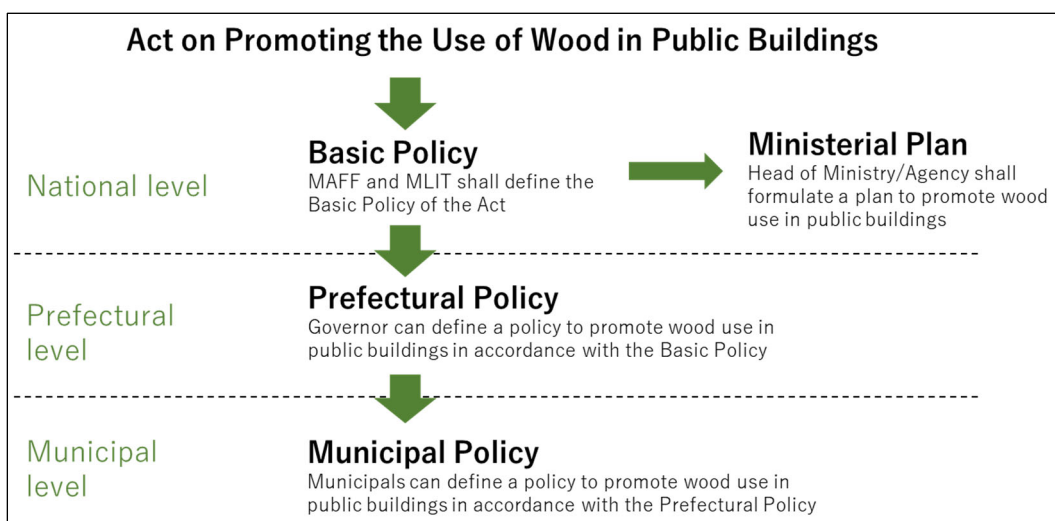
public buildings that the Act actively promotes for wooden construction (including new construction, expansion and reconstruction)" will, in principle, be made of wood.

Under the current Building Standard Law, a building with four storeys or an eave height of 16m and above is considered a large-scale wooden structure that requires fireproofing.<sup>7</sup> In other words, a three-storey building located outside the fire prevention/quasi-fire prevention zones is likely classified mainly under “other buildings (low-rise)” and thus is not subject to fire-resistance requirements.

In addition, the Basic Policy of the Act stipulates promoting wood use for interiors in public buildings regardless of whether they are high-rise or low-rise.

#### 4.2.5. Structure and arrangement to implement the Act

Figure 11 shows how the Act is implemented at the national, prefectural and municipal levels.



**Figure 11 Implementation arrangement to promote wood use**

The Forestry Agency and the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) are the competent authorities for the Act. The Forestry Agency is an external agency of the Ministry of Agriculture, Forestry and Fisheries (MAFF), and its mission is managing forests, providing a fixed supply of forest products and developing the forestry industry. MLIT is responsible for housing and building-related matters. In addition, it has jurisdiction over building-related laws.

<sup>7</sup> Previously, a large wooden structure was considered to have a height of 13m and above or an eave height of 9m and above.

In accordance with the Act, the Basic Policy of the Act was formulated in 2010, which indicated the following matters:

- Fundamental direction of policy;
- Basic matters on measures;
- Targets for the use of wood in public buildings to be developed by the government;
- Basic matters on plans set by each ministry and agency;
- Basic matters on the supply of timber; and
- Other important matters.

MAFF and MLIT have also annually compiled and published the status of implementing measures for wood use in public buildings in line with the Basic Policy (See Section 4.2.8).

In accordance with the Basic Policy of the Act, which sets targets for wood use for the national government, each ministry and agency is required to formulate its plan (hereafter Ministerial/Agency plan) and take the initiative in using wood in public buildings. The Basic Policy determines the elements that the Ministerial/Agency plan needs to address, which are a “policy on wood use in public buildings under the jurisdiction,” “targets for the wood-use in public buildings under the jurisdiction,” and “other matters to implement initiatives based on its plan.”

By February 2012, ministerial and agency plans were formulated by all 11 ministries and other government bodies, including the House of Representatives, House of Councillors, Supreme Court of Japan, Cabinet Office, the Financial Services Agency, Imperial Household Agency, National Police Agency, Japan Fair Trade Commission, Consumer Affairs Agency, Reconstruction Agency, National Personnel Authority and the Board of Audit of Japan.

In addition, the government established an inter-Ministerial/Agency Liaison Group to Promote Wood Use in Public Buildings in 2010, in which the above-mentioned ministries and government bodies participated. Coordinated by MAFF and MLIT, the meetings have been held annually to share progress and information, and to discuss measures to promote the use of wood. In this way, the Act established a system in which all ministries and agencies participate and promote wood use in public buildings through Ministerial/Agency plans and inter-Ministerial/Agency Liaison meetings.

Local governments are also responsible for the use of timber in buildings. However, to enhance the autonomy and independence of local governments and to promote wood use under local contexts, the policies prepared by local governments (Prefectural or Municipal policies) are voluntary rather than mandatory. The matters included in Prefectural or Municipal policies are basic matters on measures, targets for the use of timber in public buildings, basic matters on the supply of timber; and other important matters. Furthermore, the Basic Policy of the Act stipulates that local governments should make efforts to periodically monitor the implementation status of measures and establish cross-departmental meetings to promote wood use.

By March 2012, all 47 prefectures had formulated their policies. As of May 2022, 1,627 municipalities out of 1,741 in total (93.5%) had formulated policies.

#### 4.2.6. Measures to promote wood use in public buildings

Article 3 of the Act and its Basic Policy suggest several measures that the national government should take to promote wood use in public buildings. The following describes measures that have been taken by the national government reported by MAFF and MLIT in their “annual reports on the status of implementing measures for wood use in public buildings.”<sup>8</sup>

- (1) Creating regulatory and enabling conditions to use wood for buildings:  
rationalization of building standards and development of guidelines

For the construction of buildings, it is necessary to meet the various standards for quality performance and structural methods determined by the Building Standard Law to protect life and property from earthquakes and fire. Using wood for buildings had been limited due to concerns about fire safety. At the same time, there have been various developments in new wood products such as Cross Laminated Timber (CLT) and fire-resistant wood materials (e.g. wood covered with plasterboard and steel frames covered with wood) and other technologies, thereby increasing the possibility of using wood in medium- and high-rise buildings and non-housing buildings.

In this context, MLIT, the Forestry Agency, and related research organizations and private entities have examined and verified the performance of woody materials and appropriate construction methods on fire resistance. As a result, building standards have

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<sup>8</sup> The annual reports (from Fiscal Year 2010 to 2019) (in Japanese) are available at <https://www.rinya.maff.go.jp/j/riyou/koukyou/jyoukyou.html>



been revised in recent years along with developments in engineering technology and increased information and evidence on the performance of wood materials and wooden structures concerning fire protection, seismic resistance and durability. Key revisions are listed below:

- In 2013, JAS recognized CLT and established a manufacturing standard. Subsequently in 2016, MLIT promulgated and enforced public notices based on the Building Standard Law, enabling CLT to be used for buildings.
- In 2014, the fire protection performance required for buildings was revised after three years of fire-related verification experiments, allowing three-storey schools to be made into one-hour quasi-fireproof structures with appropriate fire prevention measures. In addition, the revision enabled buildings with a total area of more than 3,000m<sup>2</sup> to be made non-fireproof if each 3,000m<sup>2</sup> or less is divided by highly fire-resistant walls.
- In 2018, the scale of wooden buildings to be fire-resistant structures was revised from 13m and an eave height of over 9m to a height of over 16m and over four storeys. The revision also allows the use of exposed wood in structures provided that there are adequate fire extinguishing measures. Furthermore, the revision enabled the use of wood for interior columns, beams and other structural elements in fire-resistant buildings in fire zones, by improving the performance of exterior walls and windows.
- In 2019, the fireproof construction of wooden buildings was revised. Particular buildings, including hospitals, hotels, apartment buildings, dormitories, child welfare facilities, etc. with three floors and a total floor area of fewer than 200m<sup>2</sup>, are no longer required to be fireproof if an alarm system is installed.

In addition, MLIT provides support ministries, agencies and local governments, as well as private entities that construct public buildings, to encourage more wood use in their facilities, by developing technical standards, providing guidelines, and sharing examples with practical information, as below:

- "Wooden Planning and Design Standard"<sup>9</sup> (published in 2011 and revised in 2017), which sets out standard methods for planning and designing wooden buildings and other technical matters such as durability and structural calculation for government facilities.
- "Standard Specifications for Wooden Construction Work for Public Buildings" (revised in 2013), which provides a standard used by ministries and agencies to

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<sup>9</sup> Japanese version available at <https://www.mlit.go.jp/common/001178738.pdf>

ensure the quality and efficiency of construction for wooden government facilities.

- "Guidelines for the Construction of Fire-Resistant Wooden Buildings in Government Facilities"<sup>10</sup> (issued in 2013), which outlines appropriate methods for the construction of fire-resistant wooden buildings that meet the performance standards required of government facilities, considering cost reduction.
- "Guidelines for the Introduction of Timber Use in Public Buildings"<sup>11</sup> (published in 2013), which summarizes technical matters required in the design of public buildings.
- "Collection of Case Studies on Efforts to Use Wood in Public Buildings"<sup>12</sup> (published in 2012 and 2020). The 2012 collection sets out examples of woody public buildings with practical information such as how to increase awareness among stakeholders regarding wood use, how to deal with issues related to order, such as designer selection and timber demand information, as well as maintenance issues. The 2020 collection describes cases according to various themes, such as CLT, mixed and partial wood construction, large scale/space construction, quasi-fireproof buildings, locally sourced timber, cost planning use and other issues.

The Ministry of Education, Culture, Sports, Science and Technology (MEXT) is responsible for educational facilities, and, in collaboration with MAFF, it developed and published manuals in 2010<sup>13</sup>, specific to wood use in school construction. Mainly addressing local government officials, the manual focuses on developing and implementing ideas/projects to use wood in school facilities and details how to control/reduce costs with examples of creative approaches.

#### **Reasons to use wood in school facilities**

*School facilities are not only places for students to learn but also places where students spend most of their time. Therefore, school facilities should provide a rich environment. Wood has excellent properties such as softness, warmth and high moisture absorption. Wooden school buildings and classrooms with wood interiors are expected to be very effective in creating a rich educational environment. The use of wood is also significant from the perspective of contributing to the prevention of global warming and conveying local culture.*

MEXT and MAFF (2010)  
(Translated by the author)

<sup>10</sup> Japanese version available at <https://www.mlit.go.jp/common/000993924.pdf>

<sup>11</sup> Japanese version available at [https://www.mlit.go.jp/gobuild/moku\\_torikumi.html#moku\\_guidelines](https://www.mlit.go.jp/gobuild/moku_torikumi.html#moku_guidelines)

<sup>12</sup> Japanese version available at [https://www.mlit.go.jp/gobuild/moku\\_torikumi.html](https://www.mlit.go.jp/gobuild/moku_torikumi.html)

<sup>13</sup> Japanese version available at [https://www.mext.go.jp/a\\_menu/shotou/zyosei/mokuzai/1412339\\_00001.html](https://www.mext.go.jp/a_menu/shotou/zyosei/mokuzai/1412339_00001.html)

(2) Measures for the realization and dissemination of wooden buildings: subsidy/support programmes by the government to promote wooden buildings

Since the implementation of the Act, there have been several programmes by different ministries and agencies, mainly the Forestry Agency, MILT, MEXT, and the Ministry of the Environment, Japan (MOEJ), to support private entities or local governments in promoting wooden construction. Table 2 summarizes subsidy/support programmes between 2010 and 2019 reported in annual reports relating to the status of implementation of measures to promote wood use in public buildings published by MAFF and MLIT<sup>14</sup>

**Table 2 Subsidy/support programmes of the national government to promote wood use**

Ministries	Description
Forestry Agency of MAFF	<ul style="list-style-type: none"> <li>• Support for the construction of wooden public buildings               <ul style="list-style-type: none"> <li>➢ Subsidy programmes for the construction of wooden public buildings using local timber</li> <li>➢ Technical assistance for design</li> <li>➢ Interest subsidies for borrowing funds</li> <li>➢ Support for human resource development regarding the design and construction of wooden buildings</li> <li>➢ Support to specify fire-resistant materials and construction methods using laminated wood</li> </ul> </li> <li>• Support to establish a stable timber supply chain               <ul style="list-style-type: none"> <li>➢ Direct Payment Programme for Forest Management and Environmental Conservation</li> <li>➢ Development of dedicated forestry roads</li> <li>➢ Support to establish a stable supply chain of timber from forest thinning to mills</li> <li>➢ Support for studies to promote the use of legal timber</li> </ul> </li> <li>• Dissemination of the Act               <ul style="list-style-type: none"> <li>➢ Briefings and forums for prefectural and municipal officials, building professionals, etc.</li> </ul> </li> </ul>
MLIT	<ul style="list-style-type: none"> <li>• Subsidy programme for the construction of large-scale wooden buildings that incorporate leading design and construction technologies related to structure and fire prevention</li> </ul>

<sup>14</sup> Annual reports (in Japanese) are available at <https://www.rinya.maff.go.jp/j/riyou/koukyou/jyoukyou.html>

MEXT	<ul style="list-style-type: none"> <li>● Promote the Use of Wood in the Construction of Public-School Facilities <ul style="list-style-type: none"> <li>➤ Subsidies for the development of wooden school buildings</li> <li>➤ Workshops for prefectural and municipal government officials, school officials, designers and others</li> </ul> </li> </ul>
MOEJ	<ul style="list-style-type: none"> <li>● Subsidy programme for prefectures regarding the development of natural parks and other facilities using wood</li> </ul>
Ministry of Health, Labour and Welfare	<ul style="list-style-type: none"> <li>● Priority projects for developing social welfare facilities that propose using wood materials</li> </ul>

As the Act was revised in 2021 to expand the scope to include buildings constructed by private entities (See section 4.3 for the revised Act), it is expected that subsidy/support will also be expanded. The Forestry Agency made a list of subsidy programmes to promote wood use in non-residential buildings which were included in the FY2022 government budget.<sup>15</sup> The list shows 33 subsidy/support programmes prepared by different ministries and agencies (MAFF, MLIT, MEXT, MOEJ, the Ministry of Internal Affairs and Communications, and the Ministry of Defense), covering the following topics:

- Increase capacity to produce and supply wood and wood materials for construction, including the development of facilities.
- Develop, verify and demonstrate wooden materials, designs, and construction techniques.
- Disseminate information and develop human resources regarding wooded construction.
- Direct financial support for wooden construction, including high-rise buildings, non-residential buildings, public schools, preschools, university facilities and welfare facilities.

In this way, various programmes are implemented by the different ministries and agencies addressing different issues important for promoting wood use, such as ensuring stable wood production and supply chains, developing human resources in production, design and construction, implementing research and information provision, and subsidies to use wood in construction. Some may have quantitative results in wood use, whereas others may have qualitative results. Accordingly, there has been no analysis of the overall cost-effectiveness of these subsidy/support measures in wood use.

<sup>15</sup> The list (in Japanese) is available at [https://www.rinya.maff.go.jp/j/riyou/kidukai/zirei\\_sankou/attach/pdf/index-39.pdf](https://www.rinya.maff.go.jp/j/riyou/kidukai/zirei_sankou/attach/pdf/index-39.pdf)

#### 4.2.7. Legality and sustainability of harvest in promoting wood use for public buildings

It is critical to procure wood that was legally and sustainably harvested when promoting wood use, as this can contribute to the prevention of climate change, the establishment of a circular society, the fulfillment of the multi-functional role of forests, and the development of forestry industries. Addressing legality and sustainability is even more critical given the low reforestation rate after harvesting (Figure 8).

The legality and sustainability of wood for public procurement, including the construction of public buildings, are addressed by the wood procurement policy implemented in April 2006, under the Act on Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities (hereafter, Act on Promoting Green Procurement).<sup>16</sup> Indeed, the Basic Policy of the Act to promote wood use stipulates that "when using wood in the construction of public buildings, those who carry out construction, including expansion of buildings, and reconstruction, shall endeavour to select eco-friendly goods as stipulated by the Act on Promoting Green procurement."

Under the public procurement policy, legality is a necessary condition and sustainability is a factor for consideration for selected wood and wood products (Wood Products Division, 2006). As a criterion for the procurement decision on wood products, the Basic Policy on Promoting Green Procurement stipulates as below:

- (i) The raw material shall be wood from forestry thinning, forest residues, or small diameter wood. Wood from forestry thinning should be undertaken in accordance with the forest laws and regulations of the country or region of origin.
- (ii) In cases other than (i) above, the wood shall be harvested in accordance with the forest laws and regulations of the country or region of origin.

The Japanese wood procurement policy prioritizes legality as a policy requirement and views sustainability as an additional objective. Lopez-Casero and Scheyvens (2008) explain that this is because it is more challenging to provide evidence that a forest is under sustainable management than that a forest operation is legal. However, it should be noted that wood from forestry thinning, which improves forest health, is prioritized for government procurement, thereby contributing to the sustainability of forest management.

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<sup>16</sup> The Act on Promoting Green Procurement was promulgated in 2000 and came into force in 2001. In 2006, the Act broadened its scope, including wood and wood products. The government introduced a measure to prioritize timber and timber products certified as legal and sustainable for government procurement. The Act on Promoting Green Procurement and its Basic Policy (in English) are available at <https://www.env.go.jp/en/laws/policy/green/index.html>

To implement the policy, the Forestry Agency developed Guidelines for Verifying Legality and Sustainability.<sup>17</sup> These provide three modalities for verifying legality and sustainability: forest certification and chain of custody systems; codes of conduct of wood industry associations; and self-established procedures of individual companies.

In addition, following the enactment of the Act on Promotion of Use and Distribution of Legally-harvested Wood and Wood Products (hereafter, the Clean Wood Act)<sup>18</sup> in 2016, the government procurement policy also refers to the Clean Wood Act as a standard of legality of wood and wood products to comply. However, consistency is needed between the Guidelines for Verifying Legality and Sustainability and the Clean Wood Act. Differences exist between them in terms of wood products and types of businesses that fall under the Act, as well as modalities for verifying legality, which is a burden for the private sector (Forestry Agency, 2022b).

#### 4.2.8. Monitoring and reporting mechanism

A system for monitoring, reporting and compiling data is critical to examine results with regard to wood use and then implement the Act effectively.

In order to monitor the progress in using wood in public buildings since the Act came into force in 2010, the Forestry Agency calculates the ratio of wooden buildings in public buildings on a floor area basis every year using a statistics on construction starts based on a survey conducted by MLIT (see Section 4.2.9). Notably, all ministries and agencies are required to report annually on the results of wood use in their public buildings. To check their performance, the Forestry Agency and MLIT formed a verification team in 2015, headed by the Director-General of the Forestry Policy Planning. The verification team carries out an annual interview with each ministry and agency to verify the results, identify reasons why wood materials were not used in construction, and then provide feedback. This reporting and checking process has helped increase awareness in the ministries and agencies.

In line with Article 7 of the Act, MAFF and MLIT annually compile and publish reports on the status of implementing measures for wood use in public buildings of the

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<sup>17</sup> English version is available at [http://www.goho-wood.jp/world/guideline/doc/guideline\\_en.pdf](http://www.goho-wood.jp/world/guideline/doc/guideline_en.pdf)

<sup>18</sup> Under the Clean Wood Act, all business entities are required to endeavour to use legally-harvested wood and wood products. All wood-related business entities are required to carry out checks to ensure that wood is legally sourced, regardless of whether they are registered under the Act or not. However, the Act allows that even if the legality of the products cannot be confirmed, businesses can transfer the products as "unconfirmed" products through the segregated management system (under which businesses separate "confirmed" and "unconfirmed" products).

government.<sup>19</sup> The annual reports include the following data and information:

- Status of implementation of measures to promote wood use in public buildings following the Basic Policy of the Act:
  - Actions to achieve the targets for wood use in public buildings by the national government.
  - Results of wood use by the national government, including the amount of used wood.
  - Results of wood use for low-rise public buildings, including the number of wooden buildings, floor area and the ratio of wooden public buildings;
  - Results of wood use for interiors of public buildings, including the number of buildings with wooden interiors; and
  - Results of procurement of equipment and supplies using wood as raw material.
- Other measures taken by the government.
- Actions by local governments:
  - Status of policy formulation by local governments.
- Examples of wood use in public buildings.
- Measures to be taken considering the progress.

In “Measures to be taken considering the progress,” MAFF and MLIT summarized and reported the measures to be taken to promote wood use for public buildings of national and local governments, based on the implementation status. The actions below were highlighted in the annual reports. The annual reports continually emphasized the need to provide examples of wood construction and related materials to those who develop/construct public buildings. Also, the reports repeatedly mention the importance of supporting the local government in the following ways:

- Provide advice on wood use and actively encourage municipalities to formulate their policies since there may be a few personnel with forestry-related expertise at the municipal level.
- Assess the needs of local governments and provide technical support and other necessary information.
- Identify related industry associations and other organizations engaged in maintaining public facilities, and disseminate their efforts related to the Act through briefings and meetings.

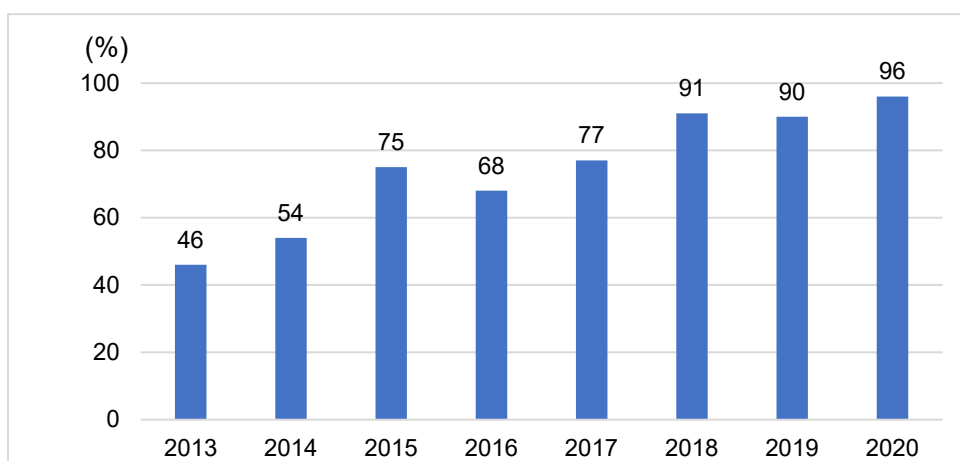
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<sup>19</sup> The annual reports on the status of implementing measures for wood use in public buildings (in Japanese) are available at <https://www.rinya.maff.go.jp/j/riyou/koukyou/jyoukyou.html>

#### 4.2.9. Progress of wood use in public buildings and the overall situation of wooden construction in Japan

Twelve years have passed since the Act for Promotion of Use of Wood in Public Buildings was enacted in 2010. Based on the Act, MAFF and MLIT issued the Basic Policy, and each ministry and agency formulated a plan to promote wood use in their public buildings. In addition, 47 prefectures and more than 93% of municipalities formulated policies to promote wood use. There has also been technological developments, including wood materials with sufficient strength or fire resistance to be used in large buildings, and improved wooden construction methods against earthquakes and fire. In addition, the government has revised and streamlined standards for fireproofing wooden buildings, which has improved institutional conditions for using wood materials in buildings.

As a result of the measures mentioned above, the ratio of wooden construction in public buildings has increased. Figure 12 shows the share of low-rise wooden buildings owned by the national government against low-rise public buildings targeted for wood use between 2013 and 2020. Since 2018, more than 90% (in number) of low-rise public buildings eligible for wood construction<sup>20</sup> have been built with wood materials.



**Figure 12 Percentage of low-rise public buildings built and maintained by the government that are made of wood (Number of buildings)**

*Note:* Percentages are calculated as  $A/(B-C) * 100$

A: number of public buildings in which wood is used in all or part of the main structural load-bearing parts, such as walls, columns, beams, girders and shed frames.

B: number of low-rise public buildings in which wood should be actively used, as stipulated by the Basic Policy of the Act.

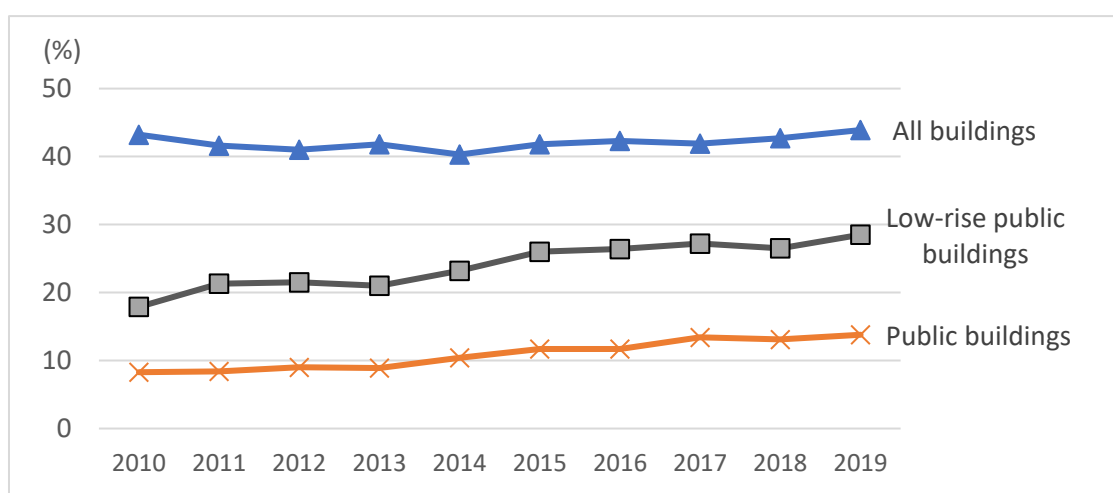
<sup>20</sup> Please see section 4.2.2 on Definition and scope of wood use



C: number of public buildings which were not suited for wooden construction due to functions required in line with the purpose of the facility.

Source: Headquarters for Wood Use Promotion (2022)

Figure 13 shows the ratio of wood construction based on total floor area from 2010 to 2019. The share of wood construction in overall buildings (including residential buildings) in the 2010s was stable at over 40%. Of these, the share of wood construction in public buildings increased from 8.3% in 2010 to 13% in 2017 and beyond. As for low-rise public buildings, the trend shows an increasing ratio of wood construction, from 17.9% in 2010 to 28.5% in 2019. Since the proportion of public buildings out of the total number is small, increased wooden public buildings have little impact on construction sector as a whole in Japan. On the other hand, the proportion of wooden buildings out of all public buildings, especially low-rise ones, has been steadily increasing since the beginning of the 2010s and is on a gradual upward trend.



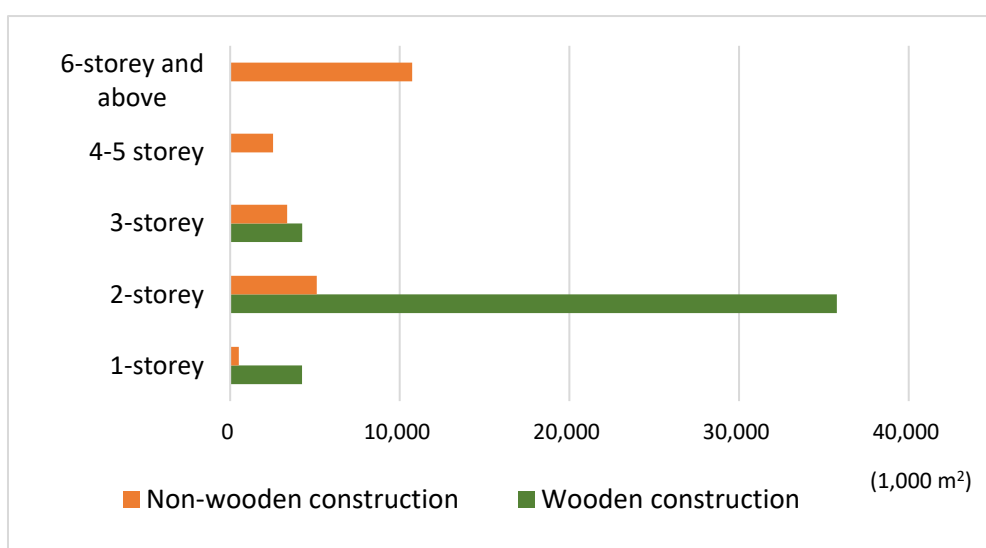
**Figure 13 Trend of the ratio of wooden buildings in Japan**

Note:

- The ratio of wooden buildings was estimated based on floor area using the construction starts statistics survey by MLIT.
- The estimated rate includes residential buildings. For low-rise public buildings, only new construction is included in the estimate.
- When a building consists of more than one type of structure (i.e. wooden structure, reinforced concrete structures), it is classified according to the structure that occupies the larger portion of the total floor area.

Source: Forestry Agency (2022c)

Figures 14 and 15 show the floor area of buildings whose construction started in 2020, according to the number of storeys and type of structure of residential and non-residential buildings, respectively. In Japan, 83% of low-rise (up to three storeys) residential buildings use wooden construction, and 66.6% of the total number of residential buildings. On the other hand, wooden construction accounts for 18.4% of 1 to 3-storey non-residential buildings and less than 10% of all non-residential buildings. It should be noted that ", these figures do not count buildings with partially wood-framed floor areas as wooden buildings. Accordingly, the ratio of new non-residential wood construction may be underestimated because of the increasing use of such mixed construction methods in non-residential buildings (Tada, 2020). However, considerably fewer wood materials are used for housing buildings that are 4-storeys and above, and for non-residential buildings that are three-storeys and above. Accordingly, wood use for these buildings could be expanded. Indeed, with the technological progress of fire-resistant wooden materials and more streamlined building standards, there are more opportunities to use wood in the construction of private buildings, and mid-to-high-rise wooden buildings have started to be constructed (Forestry Agency 2021a).



**Figure 14 Floor area of housing construction starts in 2020 by storey and structure**

Source: Forestry Agency (2022a)



**Figure 15 Floor area of non-housing construction starts in 2020 by storey and structure**  
 Source: Forestry Agency (ibid)

#### 4.3. Revision of the Act: Act for Promotion of Use of Wood in Buildings Contributing Decarbonized Society

##### 4.3.1. Rationality and objective of the Revised Act

As mentioned above, some progress has been made in the use of wood in the construction of public buildings, and the institutional and technical environment for using wood in buildings has improved. Although the share of wooden construction in non-residential and mid-and high-rise buildings has remained low, there is growing attention from the private sector on wooden construction and decarbonization in the contexts of SDGs and ESG investment. Indeed, private buildings using wood are becoming more prevalent, with companies switching to wood construction and using wood in the outer layers, as well as commercial tenant buildings using wood and steel construction. Furthermore, since 2010, when the Act was enacted, Japan's climate change policy has been strengthened in line with global trends. For instance, METI recently formulated a "Green Growth Strategy Through Achieving Carbon Neutrality in 2050"<sup>21</sup> in collaboration with related ministries and agencies. This strategy is an industrial policy to lead the challenging goal of achieving carbon neutrality by 2050, and it recognizes using wood in buildings as one of the actions to achieve this objective. As such, there is growing attention on the role of the forest and wood use sector in mitigating climate change.

<sup>21</sup> The strategy (in English) is available at [https://www.meti.go.jp/english/press/2020/1225\\_001.html](https://www.meti.go.jp/english/press/2020/1225_001.html)

Against this backdrop, the Act was revised in 2021 aiming to further promote wood use, and was renamed the "Act for Promotion of Use of Wood in Buildings Contributing Decarbonized Society (hereafter, revised Act)."<sup>22</sup>

The revision added "contributing to the realization of a decarbonized society" to the objectives of the Act. Furthermore, the newly added Basic Principles of the Act to promote wood use (Article 3) stipulate that "the promotion of wood use shall enhance the carbon absorption effect of forests through forest recycling, reduce carbon emissions and other environmental impacts as an alternative material to fossil resources, and contribute to ensuring multifunctional roles of forests and to enhancing local economies." The term "forest recycling" is understood as a process that supports sustainable forest plantation management, illustrated by the Forestry Agency (Figure 10). In addition, key changes include:

- Expansion of the scope of the Act from public buildings to general buildings, including non-residential buildings and mid-and high- rise buildings.
- Reinforcement of the implementation structure through the establishment of the "Governmental Headquarters for Wood Use Promotion" headed by the Minister of Agriculture, Forestry and Fisheries.
- Measures to promote wooded construction, especially in private buildings:
  - Introduced an agreement system between governments and private entities for facilitation of construction with wood "Agreement on the Promotion of Wood Use in Buildings".
- Strengthen promotion and awareness of wood use and create new value with wood.

#### 4.3.2. Expansion of the scope of wood use to include private buildings

The revision broadened the scope of buildings for which wood use is promoted. Following the revised Act, the new Basic Policy issued in 2021 was expanded to include private buildings, highlighting wood use for non-residential buildings and mid-high buildings.

Furthermore, the scope of public buildings to be constructed of wood was expanded from low-rise public buildings of three storeys or less to all public buildings, regardless of the number of storeys. The new Basic Policy sets a target that, in principle, all public buildings shall be constructed using wood, except for those where this would be difficult due to cost and technology.

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<sup>22</sup> The revised Act (in Japanese) is available at <https://www.rinya.maff.go.jp/j/riyou/koukyou/attach/pdf/index-166.pdf>

#### 4.3.3. Reinforcement of the implementation structure

The basic arrangement to implement the Act remains the same as before the revision, while the implementation structure seems to have been strengthened.

Following the Basic Policy of the revised Act, each ministry and agency update its plan to promote the use of wood and make every effort to use wood. In addition, local governments were also requested to revise their policies and actively promote the use of wood. This implementation arrangement remains the same as in the original Act.

The revision established the "Headquarters for Wood Use Promotion," headed by the Minister of Agriculture, Forestry and Fisheries (New Article 25). Members of the Headquarters are the Minister of Internal Affairs and Communications, the Minister of Education, Culture, Sports, Science and Technology, the Minister of Economy, Trade and Industry, the Minister of Land, Infrastructure, Transport and Tourism, and the Minister of the Environment. These are the ministries responsible for matters of local governance, education, economy, construction and decarbonized society, respectively, all of which are closely related to the promotion of wood use or to the objectives of the revised Act.

Before the revision, MAFF and MLIT were responsible for formulating the Basic Policy and then collecting and publishing the status of implementing the measures to promote wood use. The revision transferred this responsibility to the Headquarters (Article 10 of the revised Act). Additionally, the revised Act (Article 29) has enabled the Headquarters to request the heads of relevant administrative organizations and others to submit information and data, and to provide opinions, explanations and other necessary cooperation. The Liaison Conference of Relevant Ministries and Agencies continues to exist under the Headquarters for the Promotion of Wood Use. The establishment of the Headquarters, which consists of the ministers from relevant ministries, and the expansion of participating ministries as core members, suggests the government's strong commitment to promoting wood use, and will lead to mainstreaming and strengthening the position of wood use promotion as a policy issue.

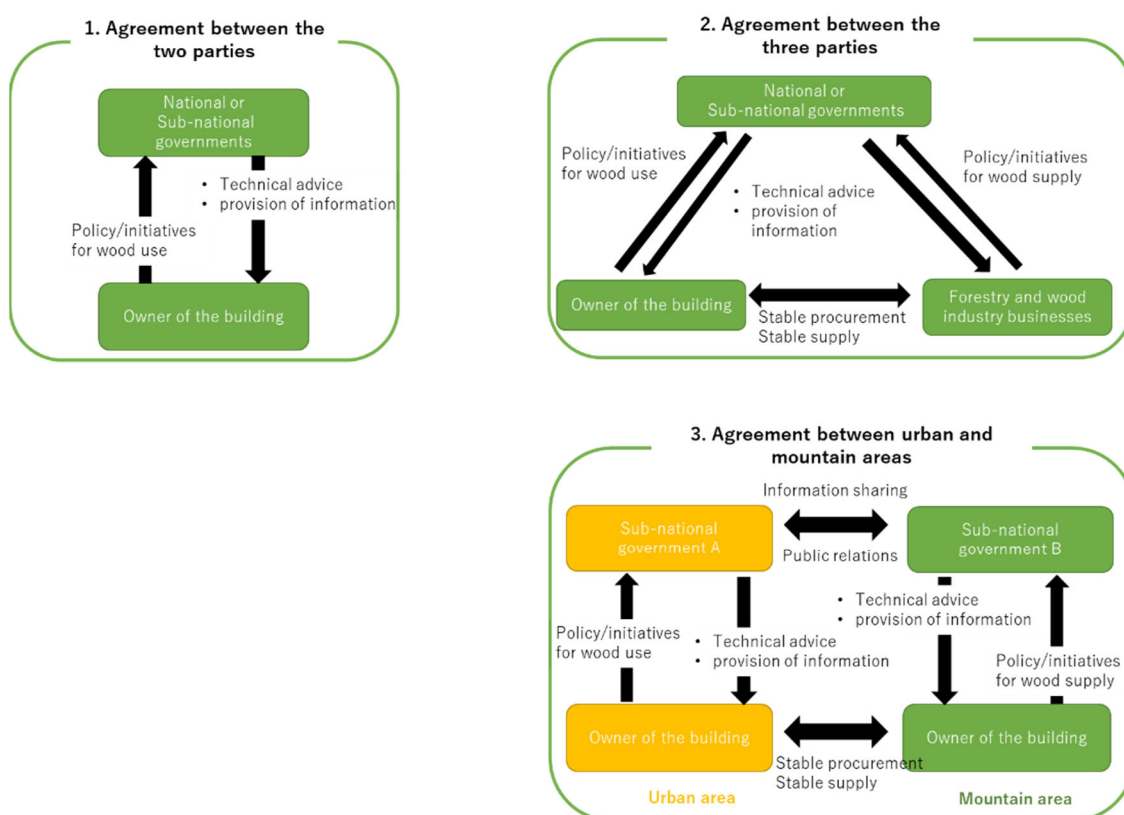
#### 4.3.4. Measures to promote wooded construction, especially in private buildings

The revision expands the scope from public to general buildings, including private ones, especially non-residential and mid-and high-rise buildings. In addition to the participation of ministries and local governments that were the target of the previous Act, this expanded scope requires further engagement from wood processing industries

and suppliers, and from the private sector, such as building owners, construction companies, design companies, and relevant industry associations and groups, as well as. It also calls for collaboration among all these entities. It is essential that the private sector and the general public have a better understanding of wooden buildings and recognize their value.

(1) Agreement system between governments and private entities

The revision established a voluntary agreement system whereby private entities (e.g. building owners, wood and construction-related organizations, wood suppliers, construction companies, and other relevant organizations) can conclude agreements with the national government or local government regarding initiatives/actions to promote wood use in buildings (Article 15 of the revised Act). The agreements should specify a vision for promoting the use of wood in buildings, actions/measures to be taken by private entities, with information and other support provided by national and local governments to help achieve this objective. The agreements are expected to take various forms depending on the parties to the agreement, as shown in Figure 16.



**Figure 16 Possible forms of agreements between governments and private entities**

Source: Forestry Agency (2022a)

The Basic Policy of the revised Act stipulates that when the national government concludes an agreement with a private entity, it shall publicize the contents of the agreement on its website, provide the private entity with information on available support systems and technical information on wood use, and disseminate information on actions by the private entity. Sub-national governments that sign the agreement shall endeavour to take the same measures as the national government and other necessary measures according to their capacity. Including this, Table 3 summarizes the expected benefits private entities can receive from the agreement by business type.

**Table 3 Expected benefits from the Agreement Business types**

Types of private entities	Expected benefits
Owner of the building (client)	<ul style="list-style-type: none"> <li>• Increased social recognition and reputation of the business through publicity on websites, media coverage etc.</li> <li>• Contributions to environmental conservation, such as carbon fixation through the use of wood, which may lead to funding opportunities, such as ESG investments</li> <li>• Increased likelihood of receiving financial support from the national and sub-national governments</li> </ul>
Forestry and wood industry businesses	<ul style="list-style-type: none"> <li>• Supply chain built based on trust</li> <li>• Better business forecasting and improved business stability</li> <li>• Increased public understanding of the contribution of the forestry and timber industry to environmental conservation</li> </ul>
Construction companies	<ul style="list-style-type: none"> <li>• Increased stability of demand by building a trusting relationship</li> <li>• Stable wood procurement through the establishment of a supply chain</li> <li>• Increased social recognition and publicity of technical capacity through publicity on websites, media coverage, etc.</li> </ul>

Source: Forestry Agency (2022d)

In addition, the Forestry Agency has announced that it will give priority support to entities that signed agreements under some of its subsidized projects/ support programmes (Forestry Agency 2022a).

As of June 2022, eight agreements have been concluded with the national government (Table 4). Notably, key national-level industry associations/groups have taken the lead in forming the agreement, which is expected to encourage their member associations and companies to use wood in buildings. These agreements aim to develop human resources, establish a stable supply chain, or promote the construction of wooden mid-high buildings. Individual companies have also formed agreements that set specific goals for wood use.

At the local level, each prefecture established consultation services related to the agreement, with 12 agreements concluded as of June 2022 (Table 5). Notably, diverse sectors of private entities such as education, construction, design and banking have concluded agreements with local governments. Interestingly these agreements include specific goals of using locally produced timber.

The current focus of the government is likely to promote and increase these agreements. However, to date, there is no monitoring or reporting system established to understand the progress of each agreement.



**Table 4 Agreements concluded with the national government (as of June 2022)**

Parties in the agreement		Form of Agreement	Agreed period	Description
Private entities	Government body			
Japan Federation of Architects & Building Engineers Association	MLIT	1	2021 to 2025	Develop human resources for designing and constructing wooden buildings (e.g., seminars and trainings) and awareness activities (e.g., awards) to promote wooden buildings, and facilitate agreements between prefectural architects' associations and local governments
Japan Federation of Wood Industry Association	MAFF	1	2022 to 2025	Establish a stable wood supply system, expand the use of JAS-labelled wood products, promote the use of legally harvested timber and strengthen efforts to prove the legality of wood products, disseminate information to designers and builders, and develop awareness activities to promote wood use in urban areas
National Federation of Construction Workers Union	MAFF and MLIT	1	2022 to 2025	Develop human resources in construction sector through National Youth Carpentry Skills Competition, awareness activities, and facilitate carpentry technicians to promote the use of wood by local construction companies
Nomura Real Estate Holdings and Wing Co Ltd	MAFF	2	2022 to 2027	Promotes the use of local timber in buildings to be constructed over the next five years (10,000 m <sup>3</sup> of local timber within the term of the agreement) while establishing a supply chain to provide timber in a timely manner and support afforestation to contribute to

				carbon neutrality by 2050
ACT Corporation	MAFF	1	2022 to 2025	Propose wooden structures and woody materials to clients, and use 600m <sup>3</sup> of domestic timber in three years based on a design that uses at least 0.191m <sup>3</sup> of domestic timber per 1m <sup>2</sup> of floor area in wooden construction, to promote domestic timber use.
Japan Builders Network	MAFF and MLIT	1	2022	Develop human resources for carpenters, site supervisors, and designers (600 participants in carpentry skills training and more than 1,000 participants in wood use seminars), provide training for female staff involved in the wooden housing sector (more than 500 participants), promote wooden construction in the low-rise non-housing and medium/large-scale buildings, and provide 10,000 JBN-certified high-quality houses per year
Japan Fire-Proof Timber Building Association	MAFF and MLIT	1	2022	Promote the medium- to high-rise and large-scale fire-resistant wooden buildings, develop manuals, and conduct seminars to share good practices
Takenaka Corporation (construction company)	MAFF	1	J2022	Promote the use of domestic timber in mid-and high-rise wooden buildings, create a sustainable cycle between forest resources and the local economy, and promote sustainable use of wood to realize a decarbonized society and use legally harvested timber as stipulated in the Clean Wood to contribute to the SDGs

Source: Forestry Agency<sup>23</sup>, Nomura Real Estate Holdings and Wing Co., Ltd.<sup>24</sup> Takenaka Corporation<sup>25</sup>

<sup>23</sup> [https://www.rinya.maff.go.jp/j/riyou/kidukai/mokuri\\_kyoutei/zisseki.html](https://www.rinya.maff.go.jp/j/riyou/kidukai/mokuri_kyoutei/zisseki.html)

<sup>24</sup> <http://www.wing2x4.co.jp/news/2022/20220318.pdf>

<sup>25</sup> <https://www.takenaka.co.jp/news/2022/06/01/index.html>

**Table 5 Agreements concluded with the local government (as of June 2022)**

Parties in the agreement		Type of Agreement	Agreed period	Description
Private entities (Type of business)	Government body			
Fukui Prefectural Economic Federation (business association)	Fukui Prefecture	1	2021 to 2022	Promote the use of wood produced in Fukui Prefecture through cooperation between the prefecture and the Federation to encourage sound forest management and carbon fixation to achieve the SDGs, realize a decarbonized society, and contribute to the development of local industries.
Ritsumeikan University (university corporation)	Oita Prefecture	1	2021 to 2027	Use local wood for the structure and interior and exterior of the university facilities to contribute to carbon neutrality by 2050. In doing so, use wood whose legality is confirmed based on the Clean Wood Act
University Public Cooperation Osaka, (public university corporations), Takenaka Corporation (construction company) and Yasui Architects & Engineers, INC. (Architecture firm)	Osaka Prefecture and Osaka City	2	2022 to 2026	Promotes the use of timber produced in Osaka prefecture in buildings through collaboration among the parties involved in developing the Osaka Public University campus. By actively using timber produced in Osaka Prefecture and timber from forest thinning, the Agreement contributes to the realization of carbon neutrality by 2050.

Himi Satoyama Cedar Utilization Council	Himi City	1	2022 to 2027	Promote the use of Cedar produced in Himi City and contribute to sustainable forest ecosystem services, the sound development of the forestry and timber industries, and the establishment of a circulatory society through wood use. In doing so, timber legality is ensured based on the Clean Wood Act
Saitama society of architects & building engineers	Saitama Prefecture	1	2022 to 2025	Contribute to promoting wood use in buildings in Saitama Prefecture through human resource development for the design and construction of wooden buildings and activities to promote wooden buildings.
Tanigawa Kensei Co.,Ltd.	Nagasaki Prefecture	1	2022 to 2027	Utilizing locally produced timber in developing and operationalizing wood processing facilities (12,350 m <sup>3</sup> by 2027) to contribute to the realization of carbon neutrality and the revitalization of mountain villages
The Oita Bank, LTD.	Oita Prefecture	1	2022 to 2027	Use locally produced timber in the construction of a new branch of Oita Bank to publicize the benefits of timber to visitors and contribute to the realization of carbon neutrality by 2050.
Esashi Construction Association, Minami-Soya Forest Association, Shotonbetsu Mokuzai co.	Esashi District (Hokkaido Prefecture)	3	2022 to 2025	Build a system for the stable supply and use of locally produced timber, with the effective use and recycling of forest resources, to contribute to the development of the forestry industry and the realization of a decarbonized society
Hokuriku Pre-Cut Co.	Ishikawa Prefecture	1	2022 to 2027	Encourage construction companies and building owners in Ishikawa Prefecture to use locally produced timber for structures, interior, and exterior, and ensure a stable supply of timber from the prefecture for construction, to contribute to the realization of carbon neutrality by 2050 and the revitalization of mountain villages.

Ishikawa Prefecture Federation of Forest Owners' Co-operative Association	Ishikawa Prefecture	1	2022 to 2027	Build a system for stable supply and demand of prefectural timber and promote the wood use in buildings to contribute to the "cut, use, plant, and grow" cycle, achieve carbon neutrality by 2050, and revitalize mountain villages.
Okayama Society of Architects & Building Engineers	Okayama Prefecture	1	2022 to 2025	Develop human resources related to the design and construction of wooden buildings to contribute to the promotion of the use of prefectural timber in buildings in Okayama Prefecture
Life Design KABAYA, Inc., Okayama Prefecture Federation of Wood Industry Association	Okayama Prefecture	2	2022 to 2027	Promote the use of prefectural timber in buildings and the active use of prefectural timber in wooden mid-and high-rise buildings to contribute to the realization of carbon neutrality by 2050

Source: Fukui Prefecture<sup>26</sup>, Oita Prefecture<sup>27</sup>, Osaka Prefecture<sup>28</sup>, Himi City<sup>29</sup>, Saitama Prefecture<sup>30</sup>, Nagasaki Prefecture<sup>31</sup>, Oita Prefecture<sup>32</sup>, Esashi Town<sup>33</sup>, Ishikawa Prefecture<sup>34</sup> and Okayama Prefecture<sup>35</sup>

<sup>26</sup> <https://www.pref.fukui.lg.jp/doc/kensanzai/kyoutei.html>

<sup>27</sup> <https://www.pref.oita.jp/soshiki/16060/kyoutei211216.html>

<sup>28</sup> [https://www.pref.osaka.lg.jp/midori/midori/mokuzairiyou\\_kyoutei.html](https://www.pref.osaka.lg.jp/midori/midori/mokuzairiyou_kyoutei.html)

<sup>29</sup> <https://www.city.himi.toyama.jp/gyosei/soshiki/norinchikusan/2/8129.html>

<sup>30</sup> <https://www.pref.saitama.lg.jp/a1106/mokuzai/20220328.html>

<sup>31</sup> [https://www.rinya.maff.go.jp/j/riyou/kidukai/mokuri\\_kyoutei/attach/pdf/tikoutaizisseki-11.pdf](https://www.rinya.maff.go.jp/j/riyou/kidukai/mokuri_kyoutei/attach/pdf/tikoutaizisseki-11.pdf)

<sup>32</sup> <https://www.pref.oita.jp/soshiki/16060/20220330.html>

<sup>33</sup> <https://www.esashi.jp/town/page.html?id=433>

<sup>34</sup> <https://www.pref.ishikawa.lg.jp/shinrin/mokuzai/kenhoushin.html>

<sup>35</sup> <https://www.pref.okayama.jp/page/778834.html>

- (2) Strengthen promotion and awareness of wood use and create new value with wood

In order to deepen public interest in and understanding of wood use, the government designated 8 October each year as "Wood Utilization Promotion Day" and October as "Wood Utilization Promotion Month (Article 9 of the revised Act). The revised Act also prescribed a commendation system as a measure to promote the use of wood (Article 31)

In October 2021, after the enactment of the revised Act, about 120 events and information dissemination activities, such as symposiums, seminars, awards ceremonies and exhibitions, were conducted by various entities, including the national government, local governments and private entities. Table 6 summarizes the relevant national award programmes to promote wood use, in which the national government is involved.

**Table 6 Award programs for the promotion of wood use involving the national government**

Awards	Organizer	Description
Contest for Excellent Facilities Using Wood for FY 2021 <sup>36</sup>	Central Council to Promote Wood Use (Mokuzai riyou suishin chuo kyogikai in Japanese)	Awards are presented each year to excellent facilities recognized for their contribution to the promotion of wood use, including the Prime Minister's Prize, the Minister of Agriculture, Forestry and Fisheries Prize, and other prizes.
The 25th Wood Utilization Competition <sup>37</sup>	Japan Federation of Lumber and Youth Associations (Nihon mokuzai seisounen dantai rengokai in Japanese)	This award programme aims to promote the benefits of wood use and expand its potential. To do so, it recognizes work that makes the most of the "good qualities of wood" and work that pursues "new possibilities for wood" by using new and unconventional forms of using and showing wood, and new construction methods.

<sup>36</sup> Award-winning Facilities of Contest for Excellent Facilities Using Wood for FY 2021 [https://www.jcatu.jp/\\_files/commendation/20211026182535commendation\\_2220211021.pdf](https://www.jcatu.jp/_files/commendation/20211026182535commendation_2220211021.pdf)

<sup>37</sup> Wood Utilization Contest <https://mokusei.net/mkc/>

Japan Wood Design Award <sup>38</sup>	Wood Design Award Steering Committee	The "Wood Design Award" acknowledges outstanding wood products and related activities that promote comfortable life, human health and social prosperity from the consumers' perspective. It sets three awards categories: Lifecycle Design, Health Care Design and Social Design.
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Source: Forestry Agency (2022a)

In addition to the above, 29 other award programmes are being implemented at the local level (mainly by prefectures) (Ibid). Many of these awards recognize works of the local area. They are considered to be a significant opportunity to demonstrate and share the quality of local timber and wooden construction.

#### 4.3.5. Legality and sustainability of harvest in promoting wood use for private buildings

Wood demand for construction is expected to increase in line with the revised Act and related measures and programmes. At the same time, it is critical to ensure the legality of wood products and address sustainability considerations, particularly in private wooden buildings.

The Basic Policy of the revised Act stipulates, "when using wood in the construction of buildings, those who develop buildings shall comply with the intent of the Clean Wood Act and endeavour to select eco-friendly goods as stipulated in Article 2, Paragraph 1 of the Act on Promoting Green procurement." Accordingly, it is understood that, like public buildings, legality is a criterion for selected wood and wood products, and sustainability is desirable. However, unlike public buildings<sup>39</sup>, there are no reporting and monitoring systems regarding wood use for private buildings. Hence, it is unclear how effective this approach is in avoiding using wood from forest management without reforestation after harvesting.

The voluntary agreement system established by the revised Act may provide an opportunity to address sustainability issues of wood materials between agreed parties

<sup>38</sup> Wood Design Award <https://www.g-mark.org/?locale=en>

<sup>39</sup> Under the Act on Promoting Green procurement each government agency and public institution: develops and implements its own procurement policy, assesses the implementation, and discloses the achievement by reporting it to the Minister of the Environment. Also under the Act to promote wood use, each ministry and agency has to report the progress (see Section 4.2.8.)

if private entities declare what kind of wood they will use in their agreement. For example, the agreement concluded by the University Public Corporation Osaka declares that it will use timber from forest thinning. However, it is basically a voluntary system, and there is no mechanism in place to monitor and verify progress and results of such agreements.

#### 4.4 Tools that support the private sector

##### 4.4.1. Guidelines to quantify carbon storage in wooden buildings

As described in Section 4.1, Japan's national government views buildings as carbon sinks and has developed the concept of a "second forest in urban areas" to promote wood use for buildings.

With this perspective, the Forestry Agency published the "Guidelines to demonstrate Carbon Storage in Wood Used for Buildings" in 2021 to explain how to indicate the amount of carbon stored in wood used for buildings in a straightforward manner. The Forestry Agency considers that these guidelines will help promote wood use by encouraging awareness among private entities and citizens about wooden buildings. The guidelines are not mandatory, and private entities can choose whether to use the guidelines under their own initiative and responsibility. For building owners/construction firms, using the guidelines allows them to quantify their contribution to mitigating climate change and demonstrate this to their clients, investors, and the general public in a transparent and authorized manner.

#### **Equation 1 Formula for calculating carbon storage (CO<sub>2</sub> equivalent) as set out in the guidelines**

$$Cs = W \times D \times Cf \times 44/12$$

- Cs: Carbon sequestration in wood materials used for building construction (including sawn timber, laminated wood, plywood, wood board, and other wood materials) (t-CO<sub>2</sub>)
- W: Amount of wood used for building (m<sup>3</sup>) (Air-dried volume)
- D: Density of wood (t/m<sup>3</sup>) (ratio of total dry weight to volume in air-dry condition)
- Cf: Carbon content of wood (carbon content in total dry weight of wood)

Source: Forestry Agency (2021b)

However, it should be noted that the amount of carbon storage (in terms of CO<sub>2</sub> equivalent) is simply calculated without incorporating a life cycle perspective to evaluate



carbon flows and processes (see Equation 1). In other words, carbon stock calculated using these guidelines represents the carbon stock incorporated in the wood used in individual buildings, not the HWP value<sup>40</sup>.

#### 4.4.2. Information platform to match supply and demand of wood products

Timber goes through several steps along its supply chain, from logging to processing wood products at mills for use in housing and other products, involving different business operators over various regions and sectors. In the attempts to promote wood produced domestically for use in the construction sector, the supply and distribution system can be challenging in Japan. At the first round-table dialogue organized in 2013 by MLIT with academic experts (see Section 6.1) (MLIT 2013), it was pointed out that “upstream operators may claim they cannot produce and ship because they are uncertain about demand; while downstream operators claim they cannot use timber because of the unstable supply system.” In fact, the Wood Industry Division of the Forestry Agency (2021) states the need for a coordination mechanism to facilitate communication between upstream and downstream operators and match wood supply and demand. In addition, new business entities in the initial stages of using wood may not know where to obtain the required wood, which could discourage them from using wood.

In order to promote the use of wood, it is vital to link the flow of logs and wood products with information regarding demand and supply, such as quantity, quality, and standards, and to share and coordinate information throughout the supply chain to optimize the entire distribution of wood.

"Molink (<https://molink.jp/>)" is an information platform for businesses involved in the production, distribution, processing, and sale of timber, from upstream to midstream and downstream. "Molink" was developed under a project subsidized by the Forestry Agency and is currently managed by the Japan Federation of Wood-Industry Associations.

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<sup>40</sup> The 2006 IPCC Guidelines considered four approaches to estimate and report the contribution of these HWP to annual CO<sub>2</sub> emissions/removals from countries, known as the stock-change, production, atmospheric flow, and simple decay approaches. Based on the production approach, Japan estimates emissions and removals from annual carbon stock changes of harvested wood products.

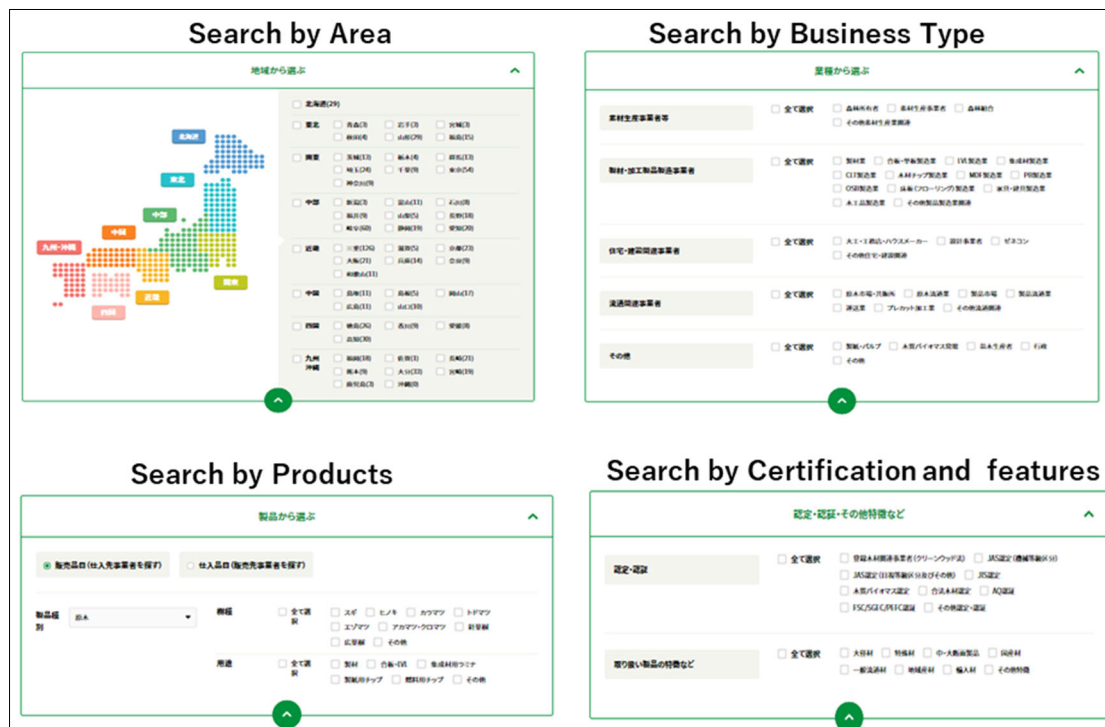


Figure 17 Example of Search function of Molink

As shown in Figure 17, Molink allows users to search for business operators who trade logs and wood products that meet their needs or send out information on their products to find businesses with which they can collaborate or develop business opportunities. It is also expected that business entities share information on supply, demand, and transactions effectively.

##### 5. "Wood Change Council": Joint public-private initiatives

Promoting wood use in private buildings requires the engagement and collaboration of diverse groups, including business operators from upstream, midstream, and downstream, investors, clients, research organizations, and national and local governments.

The revision of the Act led to the launch of the "Council for the Promotion of Wood Use in Private Buildings (commonly known as the "Wood Change Council"), a public-private consultative platform, in September 2021. The council's purpose is to create enabling conditions to use wood in private-sector buildings and others, by involving a wide range of stakeholders, identifying issues, studying solutions, disseminating advanced initiatives,

and sharing information on wood use.

The Forestry Agency serves as the Council's secretariat. Notably, the Council includes a diverse range of groups, such as industry associations from the construction sector and associations of wood production and processing sectors, and three major influential private sector-led business associations (the Japan Business Federation, Japan Association of Corporate Executives, and the Japan Chamber of Commerce and Industry). As a public-private platform, the Council also includes the National Governors' Association, National Mayors' Association, National Association of Towns and Villages, and the ministries participating in the Headquarters for Wood Use Promotion.

As of April 2022, the Council includes 20 industry associations/networks, 22 private companies, one research organization, and six ministries. The first meeting was held in September 2021 to exchange information and opinions regarding wooden constructions. Based on the issues raised during the discussion, the Council established five working groups to address specific subjects (Table 7).

**Table 7 Five working groups of the Wood Change Council**

Working Group	Objective of the groups
Wood Use Environment Improvement Group	Considering contributions to the SDGs and the ESG investment, discuss how to promote collaboration between upstream and downstream stakeholders and visualize environmental and social contributions of wood use
Information Dissemination Group	Compile the advantages of wood use, examples of changes in wood use over time, and examine points to keep in mind when using wood in buildings
Low-rise and small-scale building group	Study of initiatives to promote the use of wood construction based on the wood use models for low-rise and small-scale buildings
Medium-sized building group	Create a model of wood use in mid-size buildings, including the points to reduce costs, and study measures to promote the use of wood construction
High-rise building group	Study tools to promote high-rise wooden buildings to encourage wood use in urban buildings

Source: Forestry Agency<sup>41</sup>

<sup>41</sup> <https://www.rinya.maff.go.jp/j/riyou/kidukai/attach/pdf/wckyougikai-50.pdf>

Led by each working group, the Council has published several reports to promote wooden construction. Three thematic reports compiled construction case studies with standard design models, the effects of wood construction, and technical points for small low-rise buildings, medium-sized buildings, and high-rise buildings respectively.



Collection of works: wood construction in small low-rise buildings<sup>42</sup>



Report on model design for mid-size buildings<sup>43</sup>





Collection of works: wood construction in high-rise buildings<sup>44</sup>

In addition, the publication "Examples of buildings with wood interiors and their effects" introduces case studies and illustrates the effects and advantages of using wood, based on interviews with building owners and research data. Another publication, "A Guide to Wood Construction for Builders," aims to guide builders with no experience in constructing wooden buildings other than houses by providing procedures and issues to be concerned at each step from planning to construction.

<sup>42</sup> Japanese version available at <https://www.rinya.maff.go.jp/j/riyou/kidukai/attach/pdf/wckyoungikai-53.pdf>

<sup>43</sup> Japanese version available at <https://www.rinya.maff.go.jp/j/riyou/kidukai/attach/pdf/wckyoungikai-34.pdf>

<sup>44</sup> Japanese version available at <https://www.rinya.maff.go.jp/j/riyou/kidukai/attach/pdf/wckyoungikai-56.pdf>

	
<p>Examples of buildings with wood interiors and their effects<sup>45</sup></p>	<p>Guide to wood construction for building contractor<sup>46</sup></p>

## 6. Engagement with scholars and scientists

Collaboration with research institutes and academic experts is crucial to promote wood use in buildings, as they can provide scientific data and information on the characteristic of wood materials for construction. Institutes and experts can produce data and statistics necessary to develop or rationalize technical standards for wood use (Hashiramoto, 2022). Research institutes and academic experts can also produce knowledge and provide policy recommendations based on research activities on environmental, economic, and social impact assessment, as well as marketing and policies on wood use.

### 6.1. Annual round-table dialogue with academic experts

Since 2013, MLIT has held an annual round-table dialogue with scholars to discuss effective measures and policies to promote wood use in public buildings. The minutes of round-table dialogues repeatedly highlight the following issues as recommendations:

- Development of human resources or capacity:
  - Ensure the responsible government personnel properly understands wooded constructions and can make an effective plan.
  - Increase the number of personnel who can examine and verify wooden structures.
- Support to local governments:
  - Set a contact point with which local governments can consult.

<sup>45</sup> Japanese version available at <https://www.rinya.maff.go.jp/j/riyou/kidukai/attach/pdf/wckyougikai-47.pdf>

<sup>46</sup> Japanese version available at <https://www.rinya.maff.go.jp/j/riyou/kidukai/attach/pdf/wckyougikai-35.pdf>

- Provide training of engineers for local governments.
- Strengthen implementation structure:
  - Involve the ministry responsible for industry and the economy to improve supply and demand issues of wood.
- Knowledge and information-sharing:
  - Develop and disseminate information and data to the ministries and relevant organizations regarding construction costs and environmental performance of wooden construction, which serves better budget requests.
  - Develop data sets for wooden construction regarding the evaluation of the degree of deterioration in wooden construction and how to deal with it.
  - Develop data set on performance regarding thermal insulation, heat storage effects, and sound insulation of wooden construction.

## 6.2. Recommendations from Science Council of Japan

The Science Council of Japan (SCJ) is a representative organization made up of Japanese scholars and scientists in the fields of humanities, social sciences, life sciences, natural sciences and engineering. SCJ was founded in 1949 to serve as an independent scientific statutory body under the jurisdiction of the Prime Minister of Japan, and its activities include submitting suggestions to the government from an academic viewpoint.

In 2020, the Subcommittee on Forestry of SCJ looked at the potential of wood use in the construction sector as a way to mitigate climate change, and published the results of discussions as recommendations to the government. Below is a summary of its recommendations (Subcommittee on Forestry of SCJ, 2020):

- To promote the development of forest resources, it is necessary to increase the profitability of the forestry industry based on highly productive economic forest zones.
- It is essential to strengthening collaboration between the upstream forestry industry and the downstream industry by sharing forest resource monitoring data.
- To increase the amount of wood used in medium- and high-rise buildings, it is crucial to develop components that effectively combine wood with metal, concrete and other materials. Also, it is critical to create building technology using such materials, set standards for such new materials, introduce indicators of superior environmental performance, and actively encourage consumption behaviour.

- Further research is needed for the evidence-based promotion of wood use in the construction sector, which guarantees earthquake resistance, fire resistance, sound insulation and durability.

## 7. Findings of Japanese policies and initiatives

In Japan, wood was not generally used to construct non-residential, mid-to-high-rise buildings, often due to legal restrictions concerning past earthquake and fire incidents. However, in 2010, the Japanese government shifted its policy of restricting the use of wooden materials for construction, due to the overabundance of planted forest resources caused by a lack of demand for wood, and also due to the potential developments in new wood technology and construction methods. Thus, the Act on Promoting the Use of Wood in Public Buildings came into force, aimed at the development of wooden constructions.

Since then, the promotion of wood use has been further strengthened. The 2021 Basic Plan for Forest and Forestry calls for "Green Growth" through forests, forestry, and the wood industry and highlights the "Creation of a 'Second Forest' in Urban Areas" by promoting wood use in the building sector, as one of the five policy pillars in the sector. The Forestry Agency views using wood as a part of sustainable plantation forest management. It considers expanding the demand for wood, especially for use in mid-to-high-rise buildings and non-residential buildings, as a key to contributing to sustainable planted forest management and carbon neutrality.

In promoting wood use in buildings under the Act, the government first focused on lower public buildings instead of covering all types of buildings. Based on the Basic Plan, each ministry, agency, and local government has formulated plans and policies, realized wooded construction, and improved the institutional and technical environment while disseminating knowledge and information to relevant stakeholders about using wood in buildings. Meanwhile, there has been growing attention from the private sector on wooden construction, along with increased public awareness of SDGs and climate change issues, as well as more opportunities for ESG investment. Against this background, the Act has extended its scope to cover private-sector and mid-to-high-rise buildings, strengthened implementation arrangements, and involved a more comprehensive range of actors in implementation. Accordingly, Japan's approach can be described as step-by-step development, considering the progress of wooden buildings

and socio-environmental situations.

Regarding wood use in public buildings, the Act created the framework in which all ministries and agencies participate and engage in promoting wood use by planning and reporting. An annual monitoring system has been established, including a review by the verification team and publication on the status of implementation. This has led to identifying the challenges faced when promoting wood use, raising awareness across the whole of government, and strengthening the position of wood use promotion as a policy issue. The Act has also involved local governments and encouraged them to formulate and implement policies to promote wood use within their jurisdictions.

The government cannot apply the planning-reporting-monitoring approach to promoting wood use in public buildings when it comes to the private sector. Therefore, it is crucial to determine how to incentivize private entities and encourage them to use wood materials in construction. In Japan, the government has recently launched various initiatives to promote wood use in non-residential buildings and mid-to-high-rise buildings, creating voluntary and non-legally binding instruments through which private entities can participate, collaborate and announce their vision or plan to promote wood use, under agreements with the national or local governments. The agreement system may provide private entities with direct economic incentives (subsidy measures) and indirect incentives (increased social recognition and reputation, marketing, and investment-related advantages). While it is too early to evaluate the impacts of the agreement system, it has been observed that industry associations/groups have shown leadership in concluding agreements. The initiatives and plans set out in the agreements are expected to be disseminated, developed, and implemented by their members.

As an important feature, the Japanese government has made considerable efforts to promote wood use through multi-stakeholder dialogue and collaboration. The Wood Change Council is an example of this type of multi-stakeholder forum. The Japanese experience also shows the involvement of scientists and scholars, whose engagement can enhance the development of wooden construction technology and support evidence-based promotion. Indeed, the Wood Change Council publications included scientific data showing the advantages of using wood in construction.



## 8. Conclusion with recommendations

The way in which wood use is promoted differs depending on national and regional contexts. Nevertheless, a study on policies and initiatives of Japan includes lessons for other countries seeking to promote wood use in buildings.

A step-by-step approach may be appreciated in countries where wood use is limited. Japan has expanded its scope, starting with low-rise public buildings, which is less challenging in terms of institutional and technical aspects for wooden construction. Targeting public buildings means that different policy sectors are engaged, and allows for planning, reporting and monitoring progress. Links can also be made with existing policies such as government procurement. Such an approach can also help to promote wood use while identifying challenges and encouraging the necessary regulatory and technological reforms and capacity building.

Promoting wood use requires dealing with multiple tasks related to institutional, technical, financial, environmental, and socio-economic issues simultaneously. These may include design, construction, wood production, processing and distribution, climate change mitigation, rural development, academic and professional education, social awareness, and others. Accordingly, it is critical to identify the relevant government bodies, industry associations, stakeholders, and experts, decide on their possible roles, and then facilitate dialogues and collaboration between them. Japan's case illustrates measures to enhance the participation of concerned ministries and local governments, schemes to facilitate engagement from industry associations and private entities, and forms of collaboration with academic researchers/experts. Creating a multi-stakeholder forum may be useful, with industry associations playing key roles to facilitate communication among different parties. Setting up working groups or workshops according to the identified challenges can also help promote substantive discussions and deepen understanding.

In addition, the review of the Japanese approach also provides the following recommendations for promoting the use of timber:

- Connect wood use with a wider development and environmental agenda, and national policy objectives. For instance, the Japanese government created the concept of "Creation of a 'Second Forest' in Urban Areas" to support sustainable plantation forest management and contribute to carbon neutrality. This approach

facilitates better understanding and support from a wider range of sectors, and strengthens promotion and awareness of wood use, creating new value for wood.

- Use scientific data to demonstrate and inform the benefits of wood use in buildings. Since the development of facilities using wood has a wide range of effects, such as psychological and emotional effects, reduction of environmental impact, and contribution to the local economy, comprehensive cost-effectiveness studies are necessary. Academic experts play a significant role in increasing information and evidence on the performance of wood materials and wooden structures. Also developing tools that visualize or quantify the effects of wood use, such as carbon storage can encourage private entities to use wood. For instance, owners or builders can visualize their efforts to store carbon to contribute to the prevention of climate change and thus increase their appeal to clients and the public.
- Combine measures and tools to incentivize relevant actors to promote wood use. In Japan, it is likely that the planning-reporting-monitoring measure provided incentives to ministries and agencies. For private entities in Japan, there are direct economic incentives (subsidy measures) and indirect incentives (increased social recognition and reputation, marketing, and investment-related advantages).

Lastly, it is critical to promote the use of wood that has been legally and sustainably harvested so as to contribute to the prevention of climate change, the establishment of a circular society, the fulfillment of the multi-functional role of forests, and the development of forestry industries. Without addressing legality and sustainability, the promotion of wood use may result in the deterioration of forest resources. The Japanese government associates the promotion of wood use with existing legal frameworks and standards regarding legality. In addition, the voluntary agreement system for the private sector demonstrates the possibility of enhancing sustainability by voluntarily adding criteria for the wood to be used by agreed parties. In doing so, private entities can claim and strengthen their contribution to climate change mitigation and SDGs.

## Reference

- Bouwma, I.M., Gerritsen, A.L., Kamphorst, D.A., & F.H. Kistenkas (2015) Policy instruments and modes of governance in environmental policies of the European Union; Past, present and future. Statutory Research Tasks Unit for Nature & the Environment (WOT Natuur & Milieu), WOt-technical report 60.
- Cabinet Office (2021) Annual Report on the Japanese Economy and Public Finance 2021 (Report by Minister of State for Economic and Fiscal Policy) Towards a resilient Japanese economy: Accelerating innovation towards an economic society with strength and flexibility (Summary), September 2021. Cabinet Office, Government of Japan
- Forestry Agency (2017) Shinrin shigen no genkyo H29.3.31 (State of Forest Resources as of 31 March, 2019) [published in Japanese] Available at <https://www.rinya.maff.go.jp/j/keikaku/genkyou/h29/attach/pdf/2-3.pdf>
- Forestry Agency (2019) Heisei sanju nendo shinrin ringyo hakusho (Annual Report on Forest and Forestry in Japan Fiscal Year 2018). Forestry Agency, Ministry of Agriculture, Forestry and Fisheries, Japan [published in Japanese]. Available at <https://www.rinya.maff.go.jp/j/kikaku/hakusyo/30hakusyo/zenbun.html>
- Forestry Agency (2020) Saizourin no suishin (Promotion of reforestation) [published in Japanese]. Available at <https://www.rinya.maff.go.jp/j/rinsei/singikai/attach/pdf/201012si-18.pdf>
- Forestry Agency (2021a) Annual Report on Forest and Forestry in Japan Fiscal Year 2020 (Summary), Forestry Agency, Ministry of Agriculture, Forestry and Fisheries, Japan. Available at <https://www.maff.go.jp/e/data/publish/attach/pdf/index-22.pdf>
- Forestry Agency (2021b) Kenchikubutsu ni riyou shita mokuzai ni kakawaru tanso chozouryou no hyouji ni kansuru gaidorain (Guideline for the Labelling of Carbon Stored in Wood Used for Buildings) [published in Japanese]. Available at <https://www.rinya.maff.go.jp/j/mokusan/attach/pdf/mieruka-1.pdf>
- Forestry Agency (2022a) Datsutanso shakai no jitsugen ni sisurutameno kenchikubutsutou ni okeru mokuzai no riyou no sokushin ni kakawaru houritsu: Mori wo ikashita machi tou no wood change, Hand book version 3 (Outline of the Act on Promotion of Utilization of Wood in Buildings for Contributing to Realization of a Decarbonized Society: Wood Change in Cities Utilizing Forests, Hand book version 3) [published in Japanese]. Available at [https://www.rinya.maff.go.jp/j/riyou/kidukai/mokuri\\_kyoutei/attach/pdf/index-7.pdf](https://www.rinya.maff.go.jp/j/riyou/kidukai/mokuri_kyoutei/attach/pdf/index-7.pdf)
- Forestry Agency (2022b) Chukan torimatome: Goho bassai mokuzaitou no ryuutsuu oyobi riyou ni kakawaru kentokai (Interim summary: Study Group on the Distribution and Use of Legally Harvested Wood) [published in Japanese]. Available at

- <https://www.rinya.maff.go.jp/j/riyou/ryuturiyou/210915.html>
- Forestry Agency (2022c) Reiwa ni nenndo no koukyou kenchikubutsu no mokuzouritsu ni tsuite (Wooden Construction Ratio of Public Buildings in 2020) [published in Japanese]. Available at <https://www.rinya.maff.go.jp/j/press/riyou/220323.html>
- Forestry Agency (2022d) Kenchikubutsu mokuzai riyou sokushin kyoutei (Agreement on the Promotion of Wood Use in Buildings) [published in Japanese]. Available at [https://www.rinya.maff.go.jp/j/riyou/kidukai/mokuri\\_kyoutei/index.html](https://www.rinya.maff.go.jp/j/riyou/kidukai/mokuri_kyoutei/index.html)
- Forestry Agency (2022d) Key Points of the Amendment to the Act for Promotion of Use of Wood in Public Buildings and Future Wood Use: Promoting Recycling and Utilization of Forest Resources through Wood Change, Gendai Ringyou, 2022 February (published in Japanese)
- Government of Japan (2021a) Chikyuundanka taisaku keikaku (The Plan for Global Warming Countermeasures). Available at <https://www.env.go.jp/content/900501972.pdf> (published Japanese)
- Government of Japan (2021b) Japan's Nationally Determined Contribution (NDC). Available at <https://www.env.go.jp/content/900442543.pdf>
- Government of Japan (2021c) Shinrin ringyo kihon keikaku (Basic Plan for Forest and Forestry) [published in Japanese]. Available at <https://www.rinya.maff.go.jp/j/kikaku/plan/attach/pdf/index-10.pdf>
- Hashiramoto, O. (2022) Report on the policies and initiatives for the promotion of sustainable wood use in Japan, International Tropical Timber Organization (ITTO)
- Headquarters for Wood Use Promotion (2022) Reiwa san nendo kenchikubutsu ni okeru mokuzai no riyou no sokushin ni muketa sochi no jisshi joukyou no torimatome gaiyou (Summary of the implementation of measures to promote wood use in buildings in 2021) [published in Japanese]. Available at <https://www.rinya.maff.go.jp/j/riyou/koukyou/attach/pdf/kentikubutusoti-2.pdf>
- Keysal, E. (2005) Procedural Integration in Support of Environmental Policy Objectives: Implementing Sustainability. *Journal of Environmental Planning and Management*, Vol. 48, No. 4, 549 – 569.
- Kurasaka, H. (2014) *Kankyo seisaku ron: Kankyo seisaku no rekishi oyobi gensoku to shuho* (Environmental Policy Theory: History, principles and methods of environmental policy), Third Edition. Shinzansha Publisher Co.,Ltd, Japan [published in Japanese]
- Lopez-Casero, F., and Scheyvens, H. (2008) Public procurement policies for legal and sustainable timber: How to strengthen Japan's policy. Institute for Global Environmental Strategies (IGES) Available at [https://www.iges.or.jp/en/publication\\_documents/pub/policy/en/717/policybrief007\\_e](https://www.iges.or.jp/en/publication_documents/pub/policy/en/717/policybrief007_e).

pdf

MAFF (2013) FY2012 Annual Report on Food, Agriculture and Rural Areas in Japan Summary, Ministry of Agriculture, Forestry and Fisheries Japan. Available at [https://warp.ndl.go.jp/info:ndljp/pid/12232574/www.maff.go.jp/j/wpaper/w\\_maff/h24/pdf/e\\_all.pdf](https://warp.ndl.go.jp/info:ndljp/pid/12232574/www.maff.go.jp/j/wpaper/w_maff/h24/pdf/e_all.pdf)

MAFF (2021) Census of Agriculture and Forestry 2020, Ministry of Agriculture, Forestry and Fisheries, Japan. Available at <https://www.e-stat.go.jp/en/stat-search/files?page=1&layout=datalist&toukei=00500209&tstat=000001032920&cycle=7&year=20200&month=0&tclass1=000001147146&tclass2=000001163067>

Matsui, K., (2014) Kenchikubutsu ni okeru mokuzai riyou sokushin no tameno torikumi – Genjo to kongo no kadai (Initiatives to Promote the Use of Wood in Buildings, etc. - Current Status and Future Issues). Rippo to chousa 2014. 11, No. 358 [published in Japanese]

MEXT and MAFF (2010) Kouyatte tsukuru ki no gakko – Mokuzai riyou no susumekata no pointo, kuhu jirei (This is how to build a wooden school - key points on how to promote the use of timber, examples of innovations) [published in Japanese]. Available at [https://www.mext.go.jp/a\\_menu/shotou/zyosei/mokuzai/1412339\\_00001.html](https://www.mext.go.jp/a_menu/shotou/zyosei/mokuzai/1412339_00001.html)

MLIT (2013) Koukyou kenchikubutshu ni okeru mokuzai no riyou no sokushin ni kansuru kondankai: Daiikkai (Round-table discussion on the promotion of the use of timber in public buildings: 1st meeting). Ministry of Land, Infrastructure, Transport and Tourism (MLIT), Japan [published in Japanese]. Available at [https://www.mlit.go.jp/gobuild/moku\\_kondankai.html](https://www.mlit.go.jp/gobuild/moku_kondankai.html)

Nagano, A., (2021) Introduction to Forest, Forestry and Forest Resources of Japan [PowerPoint presentation]. Wood Utilization Division, Forestry Agency, Ministry of Agriculture, Forestry and Fisheries, Japan.

OECD (1999) Voluntary Approaches for Environmental Policy: An Assessment. The Organisation for Economic Co-operation and Development (OECD)

PRIMAFF (2019) Future Projections of Rural Population and Agricultural Settlements- Rural Structure in 2045. Policy Research Institute, Ministry of Agriculture, Forestry and Fisheries (PRIMAFF)

Subcommittee on Forestry of SCJ (2020) Teigen: Chikyu ondanka taisaku toshiteno kenchiku bunya deno mokuzai riyou no sokushin (Recommendation: Promote the use of wood in the building sector as a countermeasure against global warming in the building sector). Forestry Sub-Committee, Agricultural Committee of Japanese Society of Science [published in Japanese]. Available at <https://www.scj.go.jp/ja/info/kohyo/pdf/kohyo-24-t289-3.pdf>

- Suematsu, H., and Ikebuchi, M., (2011) Chikujo kaisetsu: Kokyo kenchikubututou mokuzai riyou sokushin hou (Commentary for the Act for Promotion of Use of Wood in Public Buildings). Taisei-shuppan, Japan [published in Japanese]
- Tada, T., (2020) Mokuzai sangyo no arubeki sugata to genjou no rikai (Understanding what the timber industry should be and what it is currently doing). In SDGs jidai no mokuzai sangyou (Timber industry in the age of SDGs) edited by Inoue et al., Tokyo: J-FIC, 37-69 [published in Japanese]
- Tröster, R. and Hiete, M. (2018) Success of voluntary sustainability certification schemes – A comprehensive review, *Journal of Cleaner Production*, Volume 196, 1034-1043.
- Wood Products Division (2006) Guideline for Verification on Legality and Sustainability of Wood and Wood Products (Provisional Translation). Wood Products Division, Forestry Agency of Japan. Available at [https://www.rinya.maff.go.jp/j/boutai/ioubatu/pdf/gaido1\\_e.pdf](https://www.rinya.maff.go.jp/j/boutai/ioubatu/pdf/gaido1_e.pdf)
- Wood Industry Division (2021) Chukousou kenchikubutsu ni okeru mokuzai riyou no kankyo seibi houkokusho (Report on improving the environment for wood use in mid- and high-rise buildings). Wood Industry Division, Forestry Agency of Japan [published in Japanese]. Available at <https://www.rinya.maff.go.jp/j/mokusan/attach/pdf/bim-4.pdf>
- Wood Utilization Division (2011) Koukyo kenchikubutsu tou ni okeru mokuzai no riyou ni kansuru houritsu ni tsuite (About the Act for Promotion of Use of Wood in Public Buildings). *Kenchiku Kosto kenkyu*, No.72 2011.1: 33-37 [published in Japanese]