Product Category Rules (PCR)

(Approved PCR ID: PA-CC-01)

Wood, Wood Materials

Release date: March 29, 2011

The Carbon Footprint of Products Calculation and Labeling Pilot Program

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http://www.cfp-japan.jp/english/pcr/pcrs.html

* This approved PCR will expire at the end of the CFP Pilot Project (scheduled until March 31, 2012).
If this PCR is revised during the Pilot Project, the revised PCR will become effective.

(Provisional Translation)

Product Category Rule of "Wood, Wood Materials" (Approved PCR ID: PA-CC-01)

Foreword

- The contents provided in this PCR may be changed and revised as needed for further refinement, through PCR revision procedures, as a result of continued discussions with relevant stakeholders during the period of the Japanese CFP Pilot Project.
- This PCR will expire at the end of the Project (scheduled until March 31, 2012).

- This English translation of the original Japanese PCR is provided for information purpose.

No.	Items	Contents
1	Scope	This PCR prescribes rules, requirements and instructions for calculation and communication of the total GHG (greenhouse gases) emissions from a life cycle of "wood or wood materials" under the CFP Pilot Project.
2	Definitions of products	
2-1	Descriptions of product category	- The products covered by this PCR are the following: > Wood; Lumber (121) and Chemical-treated woods (125), > Wood materials; Glue laminated timber (1242), Plywood (123), Laminated veneer lumber (12431), Particle board (1244),and Fiber board (135). (Number corresponds to the classification No. of the Japan Standard Commodity Classification) -Both virgin and recycled materials are included.. -Products can be calculated as final goods or intermediate goods under this PCR, according to the actual use.
2-2	Components of products	- Wood or wood materials themselves - Packing materials (binding band, pallet, film, etc.)
3	Referenced Standards and PCRs	Referenced standards and PCRs are, (1) Standards *JAS (Japanese Agricultural Standards); - "*Lumber*" (Notification No.1083 (pp.42) of MAFF (the Ministry of Agriculture, Forestry and Fisheries) of August 29, 2007) - "*Structural lumber for wood frame construction*" (Notification No.1035 (pp.46) of MAFF of July 9, 2010) - "*Finger-joint structural lumber for wood frame construction*" (Notification No.1036 (pp.9) of MAFF of July 9, 2010) - "*Glue laminated timber*" (Notification No.1152 (pp.37) of MAFF of September 25, 2007) - "*Plywood*" (Notification No.17521 (pp.37) of MAFF of December 2, 2008) - "*Laminated veneer lumber*" (Notification No.701 (pp.22) of MAFF of May 13, 2008) *JIS (Japanese Industrial Standards); - "*Particleboards*" (JIS A5908: 2008, pp.12 (2008)) - "*Fiberboards*" (JIS A5905: 2008, pp.23 (2008)) - "*Wood Preservatives*" (JIS K1570: 2010, pp.46 (2010)) - "*Preservative treatments of wood products by pressure processes*" (JIS A9002: 2005, pp.3 (2005)) *Other standards - The "standards on performance of wood preservatives and wood preservatives/termiticides," (the 14th edition, 1992) (from the standards of the

		Japan Wood Preserving Associations) - "AQ certified wood products" (revised on May 15, 2009) (by the Japan Housing and Wood Technology Center) URL: http://www.howtec.or.jp/ninsyou/aq/taisyouhinmoku.pdf (See "Nov. 10, 2010".) (2) PCR (When referring these PCRs, use the latest edition downloaded from the CFP website.) - "PA-BB, *Paper containers, packaging and wrapping (intermediate goods)* - "PA-BC, *Plastic containers and packaging*"
4	Terms and Definitions	(1) Lumber Refers to a member made by cutting raw woods, etc. and adjusting sizes. It is classified into board type, square type, and cylinder type according to shapes. It is also classified according to application and durability. (2) Glue laminated timber Refers to a member made by gluing sawn boards (called lamina,) scantling, etc. together, having their grains in almost parallel to each other to the direction of thickness, width, and length. It is classified according to cross-section shape, strength, application, and so forth. (3) Plywood Three or more veneers (including scantling for heart wood), cut by rotary lathe or slicer, are glued together with adjacent plies having their grains at almost right angles to each other. Plywood is classified according to performance and application. (4) Laminated veneer lumber (LVL) Veneers, cut by rotary lathe, slicer, or other cutting machine, are glued together with adjacent piles having their grains in almost parallel to each other. In the case that veneers, whose grains are set to right angles, are used for the product, the total thickness of such veneers shall be less than 20% of the product thickness, and the ratio of the total number of such veneers shall be less than 30% of the product. (5) Particle board Refers to a plate-like board formed and hot-pressed after bonding wood particles (e.g., chips, flakes, wafer, and strand) together by using adhesive. It is classified according to properties of the front/back side of board, modulus of rupture, adhesive to be used, formaldehyde emissions amount, and flame resistance. (6) Fiber board Refers to a plate-like board made by foaming plant fibers mainly from woods, etc. Fiber board is broadly divided into insulation fiber board (IB), medium-density fiber board (MDF), and hard fiber board (HB), according to its density and manufacturing process. Furthermore, each classification is subdivided according to special treatment and properties on the front/back side of board, modulus of rupture, types of adhesive to be used, formaldehyde emissions amount, flame resistance, and application.

		(7) Chemical-treated woods (by pressure processes) Refer to the following woods (including wood materials) treated to avoid deterioration due to decay, pest damage, or discoloration, etc.; - the woods which meet the JAS standards of preservative treatment (excluding K1) of lumber, - the woods with preservative treatment by pressure processes prescribed in "JIS A9002," by using wood preservatives prescribed in "JIS K1570" or by using wood preservatives for pressure processes certified by the Japan Wood Preserving Association, and - of among the products certified as quality wood product (AQ certified mark labeled product) by the Japan Housing and Wood Technology Center, the products treated with preservatives/termiticides (agents which are specified in the quality performance assessment standards) by pressure processes. (8) Unused thinned wood Refers to treetops generated after sawing a standing tree into a log in a forest land. (Previously refers to raw materials called "thinned woods which do not come down from a forest".) (9) Wood residues Refers to raw materials which have possibilities to become raw materials of another product or raw materials to be disposed, generated from production phase of raw materials and products (e.g., "mill ends" from production phase, "chips" made by crushing those mill ends, and "sawdust" by machine from processing phase). (10) Waste wood - "Wood debris," prescribed in the "Wastes Disposal and Public Cleansing Act"), - "waste woods from construction," prescribed in the "Construction Material Recycling Act," and - "tree branches pruned" and "tree barks," etc., which are not included in (8) of No.4.
5	Range of assessment	
5-1	Calculation unit	- Sales unit - If it does not match the actual sales conditions, unit volume (/m^3), unit weight (/kg, etc.), number of woods, or number of boards may be used.
5-2	Life cycle stages	Following life cycle stages shall be covered. - Raw material acquisition stage - Production stage - Distribution stage - Use and maintenance stage (In the case of intermediate goods, this stage shall be excluded) - Disposal and recycling stage
6	General requirements applied to all stages	
6-1	Life cycle flow chart	- Life cycle flow charts are shown in Annex A (normative). - When calculating CFP, create a flow chart of the product studied, based on the closest flow chart selected from Annex A (normative). Calculation shall be based on the chart created.
6-2	Range of data collection	- Indirect department (e.g., clerical department, research department, etc.) shall be

		excluded. If it is difficult to separate only direct department from those indirect departments, indirect department may be included. - Capital goods such as facilities, etc. used for manufacturing products shall be excluded.
6-3	Data collection period	- Primary data shall be collected over the most recent one year. - When the data of the most recent one year can not be used, its reason shall be clearly reported, and its accuracy shall be assured.
6-4	Allocation	- Physical quantity (weight, volume, etc.) shall be used. - When allocation is conducted based on economic value (amount of money), the reason of the validity shall be shown.
6-5	Cut-off criteria	- When conducting cut-off, the range of cut-off shall be within 5% of the total life cycle GHG emissions, and the range shall be clearly reported. Cut-off may be conducted only if it is difficult to use any scenarios, similar data, and estimated data.
6-6	Others	[Transport] - Fuel consumption associated with transport processes shall be calculated by the fuel consumption method, prescribed as the highest-accuracy and a standard method in the "Act on the Rational Use of Energy (enforced on April 1, 2006)". - When adoption of the fuel consumption method is difficult, the fuel cost method should be used. When it is also difficult even by the fuel cost method, the improved ton-kilometer method can be used. GHG emissions from transport means shall be allocated only to transport of applicable cargo. When calculating GHG emissions by using the fuel consumption method or the fuel cost method, allocation shall be made on the basis of the ratio of transport amount of applicable cargo among the total transport amount. When calculating GHG emissions by using the improved ton-kilometer method, follow the method of Annex B.3 (normative). Both "outward" and "return" cargo shall be calculated and included. The data of transport distance shall be actually measured, but it may be obtained from navigation software. [Consumables] Consumables (sawing tools, cutting tools, grinding belt, lubricating oil, conveyor belt, etc.) are excluded from the assessment, since they make small contributions to the total GHG emissions. [Capital goods] GHG emissions arising from using capital goods shall be included, but other than using them (e.g., manufacturing, maintenance, checkup, and disposal, etc., of capital goods) are excluded from the assessment. [On-site electricity generation and steam generation] When on-site electricity generation and/or steam generation is used for the production of the product, the input fuel amount shall be collected as primary data, and calculate the GHG emissions associated with the production and combustion.

		If the electricity/steam is used out of the site, deduct the “GHG emissions from electricity/steam when assuming that they are obtained by ordinary method” from the “GHG emissions of the product covered by this PCR”. [Assessment of wood residues] In the case of using wood residues as inputs, GHG emissions associated with its production and transport of them shall include the GHG emissions emitted after the processes for ones reading for the recycling preparations (e.g., regeneration processing, etc.) or the reusing (e.g., collection, cleaning, etc.). [Method of collecting primary data] Either measuring method of primary data shall be used. a) Collecting and adding up input amount and discharge amount of input/output items, per operation unit or per equipment/facility operation (e.g., operating hours per unit, 1 lot) necessary for process execution. (e.g., Operating time of machine x fuel consumption of machine = input amount of electricity) If a certain product other than the product targeted by this PCR is manufactured in the same plant, the same adding-up calculation shall be applied to the product, and it shall indicate that the grand total of the adding-up results of all outputs will not deviate greatly from the resultant value of the entire site. b) Allocating the result of each operator in a specified period among outputs. (e.g., allocating total input amount of fuels in a year among products manufactured)
7	Requirements for raw material acquisition stage	
7-1	Range of the processes	- The following processes shall be covered. - When conducting CFP assessment of a specific product, select the processes actually used, and collect data on those processes. Processes related to (1) “logs” production and transport (2) “lamina,” “veneer,” and “chip” manufacture and transport (3) “unused thinned woods,” “wood residues,” and “waste woods” procurement and transport (4) “adhesive raw materials” or “adhesive” production and transport (5) “raw materials for wood preserving chemicals” production and transport (6) “other raw materials and other materials” production and transport
7-2	Data collection items	Collect the data on the processes selected in No.7-1. (1) Processes related to production and transport processes of “logs” - GHG emissions associated with production and transport of “logs” (2) Processes related to production and transport of “lamina,” “veneer,” and “chip” - GHG emissions associated with production and transport of “lamina,” “veneer,” and “chip” (3) Procurement and transport processes of “unused thinned woods,” “wood residues,” and “waste woods” - GHG emissions associated with procurement and transport of “unused thinned woods,” “wood residues,” and “waste wood” (4) Processes related to production and transport of “adhesive raw materials” or

		"adhesive" - GHG emissions associated with production and transport of "adhesive raw materials" or "adhesive" (5) Processes related to production and transport of "raw materials for wood preserving chemicals" - GHG emissions associated with production and transport of "raw materials for wood preserving chemicals" (6) Processes related to production and transport of "other raw materials and other materials" - GHG emissions associated with production and transport of "other raw materials and other materials"
7-3	Primary data collection items	Data shall be collected as primary data, following No.7-2 data collection. (1) Processes related to production and transport processes of "logs" - GHG emissions associated with transport of "logs" (2) Processes related to production and transport of "lamina," "veneer," and "chip" - GHG emissions associated with transport of "lamina," "veneer," and "chip" (3) Processes related to procurement and transport of "unused thinned woods" "wood residues," and "waste woods" - GHG emissions associated with transport of "unused thinned woods" "wood residues," and "waste woods" (4) Processes related to production and transport of "adhesive raw materials" or "adhesive" - GHG emissions associated with transport of "adhesive raw materials" or "adhesive"
7-4	Primary data Collection method and Requirements	(1) Primary data allocation method - Economic value of lumber (main product) is significantly different from that of chips, sawdust, and wood shavings, and the like (byproduct). Therefore, in the case of allocation between main product and byproduct, there is a possibility of underestimation if it is based on physical quantity (e.g., weight, wood volume). To avoid this, allocation should be based on economic value. (Source: "*On the trial allocation in life cycle inventory of structural domestic lumber*" by HITOE Kyouichiro, HABUTO Masashi, NISHIMURA Yukihiro, NISHIMURA Hitoo, and HATTORI Nobuaki, from 5-(4) (pp.456-461) of "*Journal of Life Cycle Assessment*" (2009)) - When conducting allocation for the main product and byproduct based on other than economic value (= physical quantity), the validity of the reason shall be reported. - When conducting allocation for byproduct and byproduct based on other than physical quantity (= economic value, etc.) the validity of the reason shall be reported. (2) Procurement from multiple suppliers Even if raw materials were procured from multiple suppliers, collect primary data from all the suppliers. However, if it is difficult, primary data collected for 50% or more of the total amount of the procured raw materials can be used as secondary data for the rest of the data.
7-5	Scenario	For the transport of "log," "chip," "unused thinned wood," "wood residues," and "waste wood," applicable scenario described in Annex C (normative) may be used.

7-6	Other	- As for > production of “adhesive raw material” or “adhesive,” the secondary data up to and including “adhesive” production processes, combining raw materials production and adhesive production, may be used. > manufacture of “raw materials for wood preserving chemicals,” the secondary data up to and including manufacture processes of “wood preserving chemicals” may be used as an alternative. - When calculating GHG emissions associated with procurement of “logs” and “lamina” by using the ton-kilometer method, convert from wood volume (m^3) to weight (t) by using density in Annex D (informative). As for tree species not described in Annex D, primary data on weight shall be collected.
8	Requirements for the production stage	
8-1	Range of the processes	- The following processes shall be covered. - When conducting CFP assessment of a specific product, select the processes actually used, and collect data on those processes. Processes related to manufacture of (1) “lumber” (2) “glue laminated timber” (3) “plywood” (4) “laminated veneer lumber” (5) “particle board” (6) “fiber board” (7) “chemical–treated woods by pressure processes” (8) Processes related to “other raw materials and other materials” (9) “Finishing” related processes (10) Processes related to manufacture and transport of “packing materials” (11) “Shipping preparation” related processes (12) Processes related to transport and treatment of “wastes”
8-2	Data collection items	Data on the processes selected in No.8-1 shall be collected. (1) Processes related to manufacture of “lumber” - Input amount of “logs” - Input amount of “electricity” and ”fuels” - Discharge amounts of wood residues (remaining materials, wood debris, etc.) and wastes (e.g., defective items, losses from processing, etc.) - GHG emissions associated with manufacture and transport of “lumber” (2) Processes of manufacture related to “glue laminated timber” - Input amount of “logs” - Input amount of "electricity" and "fuels" - Discharge amounts of wood residues (remaining materials, wood debris, etc.) and wastes (e.g., defective items, losses from processing, etc.) - GHG emissions related to manufacture and transport of “glue laminated timber” (3) Processes related to manufacture of “plywood” - Input amount of “logs” - Input amount of "electricity" and "fuels" - Discharge amounts of wood residues (remaining materials, wood debris, etc.) and wastes (e.g., defective items, losses from processing, etc.)

		- GHG emissions related to manufacture and transport of “plywood” (4) Manufacture related to processes of “laminated veneer lumber” - Input amount of “logs” - Input amount of "electricity" and "fuels" - Discharge amounts of wood residues (remaining materials, wood debris, etc.) and wastes (e.g., defective items, losses from processing, etc.) - GHG emissions related to manufacture and transport of “laminated veneer lumber” (5) Processes related to manufacture of “particle board” - Input amount of “wood residues” - Input amount of "electricity" and "fuels" - Discharge amount of wood residues (remaining materials, wood debris, etc.) and wastes (e.g., defective items, losses from processing, etc.) - GHG emissions associated with manufacture and transport of “particle board” (6) “Fiber board” related processes - Input amount of “wood residues” - Input amount of "electricity" and "fuels" - Discharge amounts of wood residues (remaining materials, wood debris, etc.) and wastes (e.g., defective items, losses from processing, etc.) - GHG emissions associated with manufacture and transport of “fiber board” (7) Processes related to manufacture of “chemical-treated woods by pressure processes” - Input amount of “logs” - Input amount of "electricity" and "fuels" - Discharge amount of wood residues (remaining materials, wood debris, etc.) and wastes (e.g., defective items, losses from processing, etc.) - GHG emissions associated with manufacture and transport of “chemical-treated woods by pressure processes” (8) Processes related to “other raw materials and other materials” - Input amount of “other raw materials and other materials” - GHG emissions associated with production and transport of “other raw materials and other materials” (9) “Finishing” related processes - Input amount of "electricity" and "fuels" - Discharge amounts of wood residues (remaining materials, wood debris, etc.) and wastes (e.g., defective items, losses from processing, etc.) - GHG emissions associated with finishing of “products” (10) Processes related to manufacture and transport of “packing materials” - Input amount of “packing materials” - GHG emissions related to manufacture and transport of “packing materials” (11) “Shipping preparation” related processes

		- Input amount of "electricity" and "fuels" - Amount of production - Discharge amounts of wood residues (remaining materials, wood debris, etc.) and wastes (e.g., defective items, losses from processing, etc.) - GHG emissions associated with shipping preparation of “products” (12) Processes related to transport and treatment of “wastes” - Amount of wastes - Discharge amount of waste water - GHG emissions associated with waste treatment - GHG emissions associated with waste water treatment NOTE 1: “Discharge amount of wood residues (remaining materials, wood debris, etc.) and wastes (e.g., defective items, losses from processing, etc.)” and “discharge amount of waste water” refer to the discharged amount to them brought outside the production site. When those wood residues, wastes, and waste water are treated by external business operators, the processes of transport and processing of them shall be included. Processes related to recycling shall be excluded. NOTE 2: The transport in this stage means a transport inside the site. If transport between sites is conducted, the data on the following items shall be collected. - Cargo weight - Life cycle GHG emissions associated with fuel consumption by transport [Fuel consumption method] - Fuel consumption amount [Fuel cost method] - Transport distance - Fuel cost of a vehicle used [Improved ton-kilometer method] - Transport distance - The maximum loading weight of a vehicle used - Loading ratio - GHG emissions factor of improved ton-kilometer method
8-3	Primary data collection items	- Primary data shall be collected for the data on the processes selected in No 8-1. - Data related to manufacture of packing materials shall be excluded.
8-4	Primary data Collection method and Requirements	(1) Primary data allocation method Conform to (1) of No.7-4. (2) When a process in the production stage is outsourced to external business (e.g., a purchase of half-finished goods), secondary data may be applied.
8-5	Scenario	Scenario in Annex C (normative) may be used for GHG emissions associated with transport of “wastes”.
8-6	Other	Not stipulated.
9	Requirements for the distribution stage	
9-1	Range of the processes	The data on the following processes shall be covered. (1) Processes related to transport of “product” (2) Processes related to “precut” processing (if “precut” is included)
9-2	Data collection items	The data on the following items shall be collected. (1) Processes related to transport of “product” - Weight of “products” transported

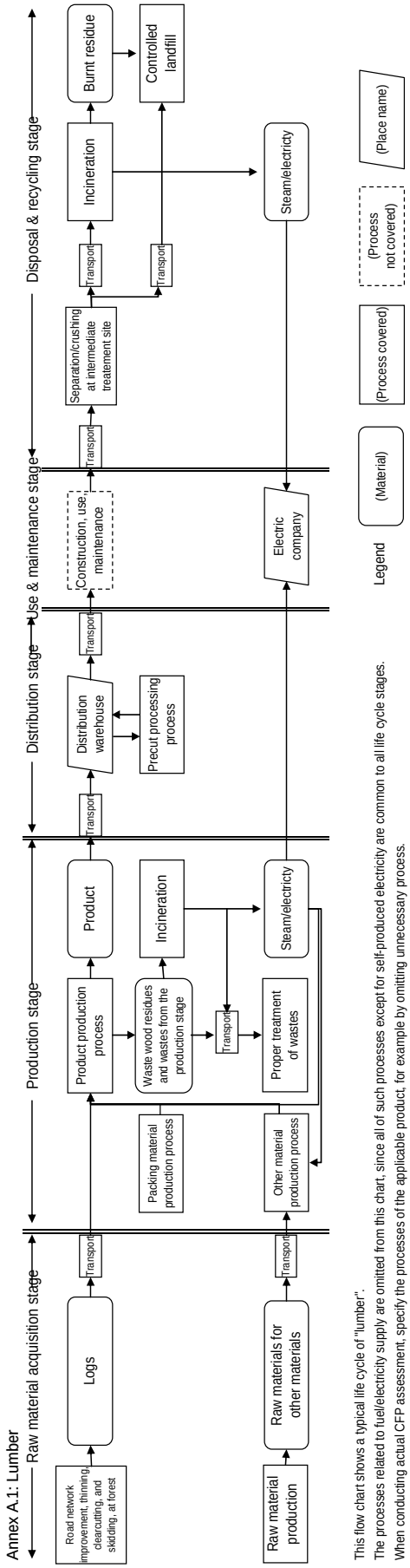
		- GHG emissions associated with transport of “products” (2) Processes related to “precut” processing - GHG emissions associated with “precut” processing
9-3	Primary data collection items	Primary data on the following item should be collected. If it is difficult, scenario in No.9-5 may be used. (1) Processes related to transport of “product” - GHG emissions associated with transport of “product”
9-4	Primary data Collection method and Requirements	Not stipulated.
9-5	Scenario	GHG emissions associated with transport of product, Annex C (normative) may be used. For construction use, GHG emissions associated with precut shall be included.
9-6	Other	[Precut at different site] - In the case that a precut processing site is separately located from distribution warehouse, primary data on transport between the sites shall be collected. When such primary data is difficult to be collected, however, the scenario in Annex C (normative) may be used. - For GHG emissions associated with precut, secondary data may be used. [Conversion of volume to weight] - When calculating GHG emissions associated with transport of “lumber” and “glue laminated timber” by using improved ton-kilometer method, convert from wood volume (m^3) to weight (t) by using density in Annex D (informative). - As for tree species not described in Annex D, primary data of weight shall be collected.
10	Requirements for the use and maintenance stage	
10-1	Range of the processes	- It is assumed that no GHG emitted from the use stage of wood/wood materials, since they do not consume any energy such as electricity and water when in use. - Calculations of GHG emissions from the maintenance stage shall be excluded. Because the use stage of applicable product will end at the time of renovation of a house and then the product will enter the disposal and recycling stage, even if GHG emitted from the renovation process.
10-2	Data collection items	Excluded from the assessment.
10-3	Primary data collection items	Excluded from the assessment.
10-4	Primary data Collection method and Requirements	Excluded from the assessment.
10-5	Scenario	Excluded from the assessment.
10-6	Other	Not stipulated.
11	Requirements for the disposal and recycling stage	
11-1	Range of the processes	The following processes shall be covered. Processes related to (1) transport of used wood/wood materials to waste treatment facility (2) separation of used wood/wood materials in waste treatment facility (3) crushing of disposed wood/wood materials in waste treatment facility (4) incineration of disposed wood/wood materials in waste treatment facility (5) landfill of disposed wood/wood materials in waste treatment facility NOTE: The processes related to recycling and reusing of disposed wood/wood

		materials in waste treatment facility shall be excluded from the assessment, since they are assessed within a product system where they will be reused.
11-2	Data collection items	The data on the following items shall be collected. (1) Processes related to the transport of used wood/wood materials to waste treatment facility - Weight of used wood/wood materials - GHG emissions associated with transport of used wood/wood materials to waste treatment facility. (2) Processes related to separation of used wood/wood materials in waste treatment facility - GHG emissions associated with separation of used wood/wood materials in waste treatment facility (3) Processes related to crushing of disposed wood/wood materials in waste treatment facility - GHG emissions associated with crushing of disposed wood/wood materials in waste treatment facility (4) Processes related to incineration of disposed wood/wood materials in waste treatment facility - GHG emissions associated with incineration of disposed wood/wood materials in waste treatment facility - Generation amount of byproduct obtained by the energy from incineration (5) Processes related to landfill of disposed wood/wood materials in waste treatment facility - GHG emissions associated with landfill of disposed wood/wood materials in waste treatment facility
11-3	Primary data collection items	Disposal amount of the product.
11-4	Primary data Collection method and Requirements	Not stipulated.
11-5	Scenario	Scenario in Annex E (informative) shall be used.
11-6	Other	Not stipulated.
12	Items applied secondary data	- The data provided in the "Tentative Database of GHG Emission Factors for the CFP Pilot Project" (hereinafter called "GHG Emission Factor Database"). - Of secondary data which is not included in GHG Emission Factor Database, but the data prepared as "reference data" by the CFP Pilot Project Secretariat.
13	Communication requirements	
13-1	Unit to be displayed on the label	- Calculation unit shall be used. - The communication methods described in the "*Basic Guideline of the Carbon Footprint of Products*" and the "*Guide of Establishing Product Category Rules*" can be used. In this case, its appropriateness shall be assessed on the CFP verification panel.
13-2	Label position and Size	- Follow the common rules, the "*Specifications of CFP Label and Displaying Other Information*". - In the case of final products, CFP label shall be displayed directly on the product. If the product cannot be seen from the outside (e.g. wrapped or bundled), CFP

		label may be displayed on a bundled or packed unit. Even in the case, the absolute-value of GHG emissions for each product shall be disclosed on the CFP website, and shall also be disclosed among on their websites, pamphlets, environmental reports, and such. - For intermediate goods, follow "*Specifications of CFP label and Displaying Other Information*". The indication of "Intermediate goods" shall be displayed.
13-3	Contents of additional information	(1) Amount of carbon content stored in applicable product, which is calculated in accordance with Annex F (informative), may be included in additional information. (2) To communicate the GHG reduction efforts made by producers and businesses appropriately to consumers, as for the same or similar product by the same business, reduction amount of GHG emissions over years, GHG emissions for each process, GHG emissions for each usage method, and GHG emissions for each disposal, may be included in additional information. (3) As for "chemical-treated woods by pressure processes" with its service life included in additional information, the GHG emissions for single-year (calculated by dividing the total life cycle GHG emissions by its service life) may be used as additional information. Service life means a time period that product functions have been maintained under the service conditions assumed for the woods in the product. Applicant shall define a service life of the product by referring to Annex G (informative) and its validity shall be verified by the CFP Verification Panel.

Annex A (normative): Life cycle flow chart

Note that “sales process” in the distribution stage is excluded from the assessment until the proper calculation method will be established, by the revision of the basic rules in July, 2010.



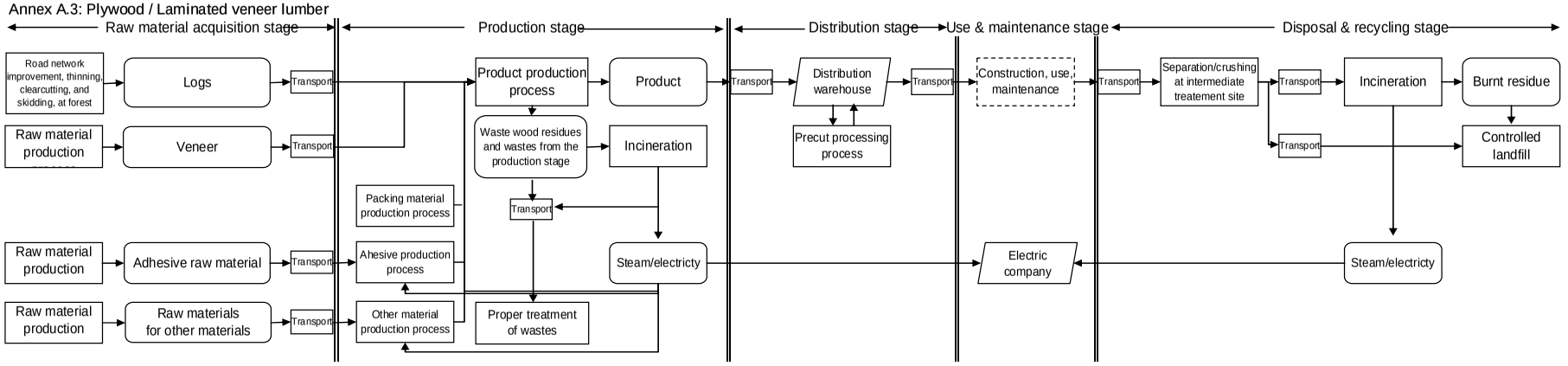
This flow chart shows a typical life cycle of "lumber".
The processes related to fuel/electricity supply are omitted from this chart, since all of such processes except for self-produced electricity are common to all life cycle stages.
When conducting actual CFP assessment, specify the processes of the applicable product, for example by omitting unnecessary process.

Chart 1: Life cycle flow chart of lumber

This flow chart shows a typical life cycle of "glue laminated timber".
The processes related to fuel/electricity supply are omitted from this chart, since all of such processes except for self-produced electricity are common to all life cycle stages.
When conducting actual CFP assessment, specify the processes of the applicable product, for example by omitting unnecessary process.

Chart 2: Life cycle flow chart of glued laminated timber

Annex A.3: Plywood / Laminated veneer lumber

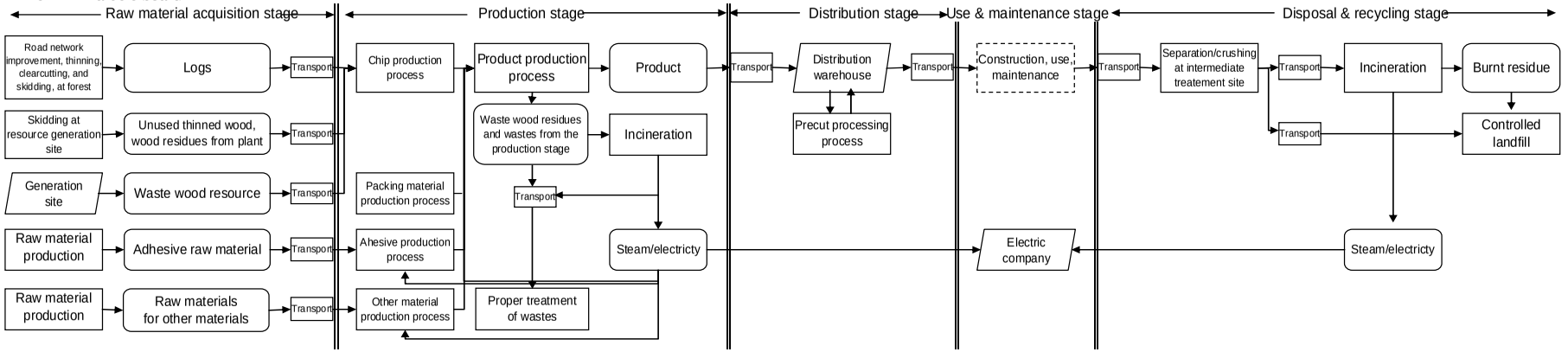


This flow chart shows a typical life cycle of "plywood".
The processes related to fuel/electricity supply are omitted from this chart, since all of such processes except for self-produced electricity are common to all life cycle stages.
When conducting actual CFP assessment, specify the processes of the applicable product, for example by omitting unnecessary process.

Legend: (Material) (Process covered) (Process not covered) (Place name)

Chart 3: Life cycle flow chart of plywood

Annex A.4: Particle board

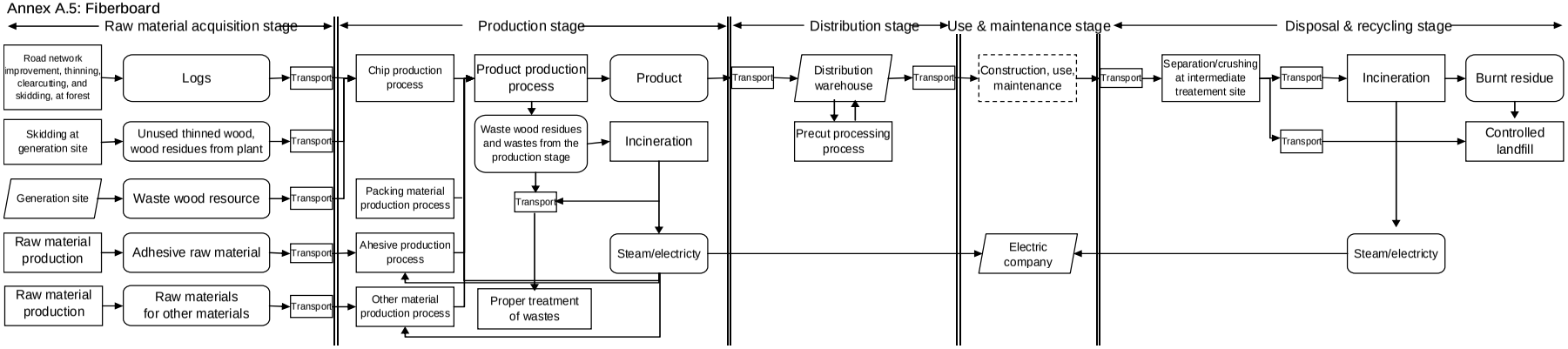


This flow chart shows a typical life cycle of "paricle board".
The processes related to fuel/electricity supply are omitted from this chart, since all of such processes except for self-produced electricity are common to all life cycle stages.
When conducting actual CFP assessment, specify the processes of the applicable product, for example by omitting unnecessary process.

Legend: (Material) (Process covered) (Process not covered) (Place name)

Chart 4: Life cycle flow chart of particle board

Annex A.5: Fiberboard

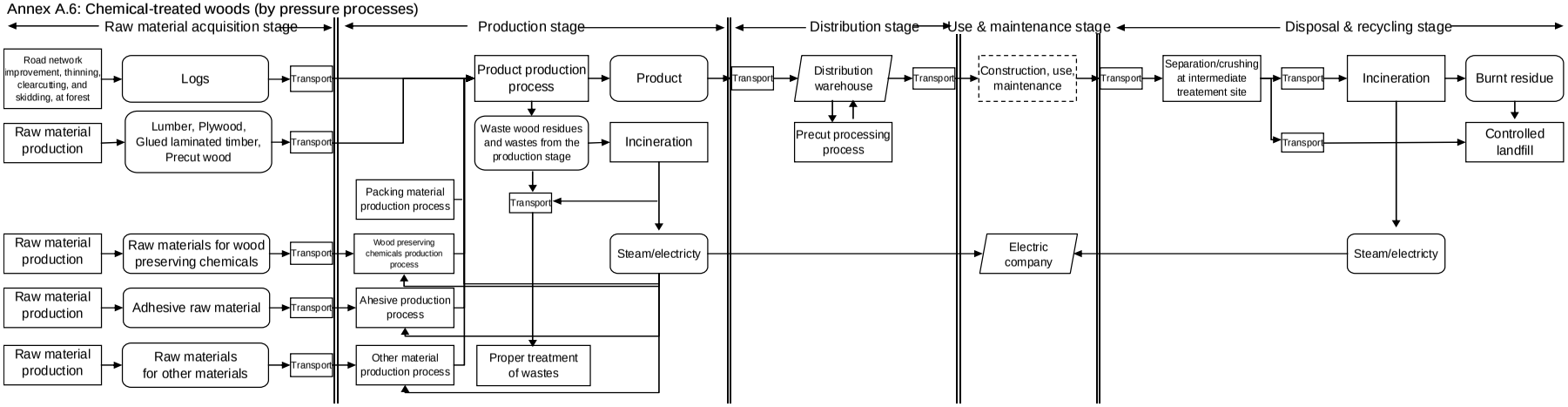


This flow chart shows a typical life cycle of "fiberboard".
The processes related to fuel/electricity supply are omitted from this chart, since all of such processes except for self-produced electricity are common to all life cycle stages.
When conducting actual CFP assessment, specify the processes of the applicable product, for example by omitting unnecessary process.

Legend: (Material) (Process covered) (Process not covered) (Place name)

Chart 5: Life cycle flow chart of fiberboard

Annex A.6: Chemical-treated woods (by pressure processes)



This flow chart shows a typical life cycle of "chemical-treated woods (by pressure processes)".
The processes related to fuel/electricity supply are omitted from this chart, since all of such processes except for self-produced electricity are common to all life cycle stages.
When conducting actual CFP assessment, specify the processes of the applicable product, for example by omitting unnecessary process.

Legend: (Material) (Process covered) (Process not covered) (Place name)

Chart 6: Life cycle flow chart of chemical-treated woods (by pressure processes)

Annex B (normative): Calculation method for GHG emissions associated with fuel consumption during transport

B.1 Fuel consumption method

1) Collect data on fuel consumption [L] for each mean of transport, and convert the fuel unit, "L," to "kg" by using following equation.

Fuel consumption [kg] = Fuel consumption [L] x fuel density "γ" [kg/L]

Fuel density of gasoline: γ = 0.75kg/L

Fuel density of light oil: γ = 0.83kg/L

2) Calculate life cycle GHG emissions [kg-CO_2e] by multiplying fuel consumption [kg] and the "life cycle GHG emissions related to supply and use of fuel" [kg-CO_2e/kg] (secondary data) for each type of fuel.

B.2 Fuel cost method

1) Collect data on fuel cost [km/L] and transport distance for each mean of transport, and calculate fuel consumption [kg] by using the following equation.

Fuel consumption [kg] = transport distance [km] / fuel cost [km/L] x fuel density "γ" [kg/L]

2) Calculate life cycle GHG emissions [kg-CO_2e] by multiplying fuel consumption F [kg] and the "life cycle GHG emissions related to supply and use of fuel" [kg-CO_2e/kg] (secondary data) for each type of fuel.

B.3 Ton-kilometer method

1) Collect data on loading ratio [%] and transport load (transport ton-kilometer) [t-km] for each mean of transport.

2) If the loading ratio is unknown, assume it to be 25% for wastes and wood residues, 50% for the other items.

3) Calculate life cycle GHG emissions [kg-CO_2e] by multiplying the transport load (transport ton-kilometer) [t-km] by the "life cycle GHG emissions related to fuel consumption per transport ton-kilometer" [kg-CO_2e/t-km] (secondary data) for different transport loads for each mean of transport.

When calculating GHG emissions by the improved ton-kilometer method, select the closest loading ratio (%) to the actual usage, from secondary data of the applicable transport means listed in GHG Emission Factor Database. Then, use the corresponding GHG emissions, the weight of applicable product, and the transport distance, for the calculation.

Annex C (normative): Transport scenario

In this PCR, the transport scenario is created when no primary data is obtained from each life cycle stage of wood/wood materials. When calculating GHG emissions by using the fuel consumption method or the fuel cost method, however, the businesses shall collect or define the "ratio of transport amount of applicable cargo" among the "total transport amount transported by using applicable transport measure".

How to create a scenario

- For an incentive to provide primary data collection, transport distance is set to a little longer and loading ratio is set to a possible lower than the average.
- As for transport within Japan, "truck transport" is assumed for an incentive to take CO_2 reduction measures in distribution such as modal shift.
- The size of ship is set based on the sizes of ships actually entered into Japanese ports.

C.1 Transport scenario of logs and unused thinned woods

<<Domestic transport>>

(1) When procuring domestic lumber which is obviously produced within a specific prefecture

<Transport distance> Refer to the table 1.

<Means> 10-ton truck

<Loading ratio> Transport within a prefecture: Outward: 62%, Return: 0%

Transport between prefectures: Outward: 62%, Return: 0%

[Assumption]

(a) Distance within a prefecture: assumption was made by adding a fixed constant obtained from an actual survey to a variable in accordance with the area of the prefecture. (See below equation.):

$$0.16\sqrt{D_i}+15\ (\mathrm{km})$$

D_i : The area of the prefecture (km^2)

(b) Distance between prefectures: assumption was made by multiplying straight-line distance between those two prefectural governments by detour rate (1.4) based on road distance obtained from the website.

(2) Procurement of domestic lumber unable to be specified its production area

<Transport distance> 69 km

[Assumption] The "distance between prefectures in the table 1" is averaged the value weighted by the "data in the table of interflow of materials in the report on supply and demand of woods in 2006" by the MAFF.

<Means> 10-ton truck

<Loading ratio> Outward: 62 %, Return: 0 %

(3) Transport from the importation port of imported wood to the manufacturing site

<Transport distance> 50km

<Means> 10-ton truck

<Loading ratio> Outward: 62 %, Return: 0 %

<<Transport within an overseas country>>

(1) In the case of importing logs into Japan

<Transport distance from logging area to export port> 250 km

<Means> a trailer dedicated to $30m^3$ of raw wood, or a towable raft

Use secondary data of "20-ton truck" for a trailer dedicated to $30m^3$ of raw wood,

and "pusher barge" for a towable raft.

[Assumption] Major imported log (North American lumber) is assumed.

<Loading ratio> Outward: 62 %, Return: 0 %

(2) In the case that logs are produced and sawed overseas, then they are imported into Japan.
<Transport distance from logging area to lumbering site> 50 km
<Means> a trailer dedicated to 30m^3 of raw wood, or a towable raft
Use secondary data of "20-ton truck" for a trailer dedicated to 30m^3 of raw wood, and "pusher barge" for a towable raft.
[Assumption] Major imported lumber (North American lumber) is assumed.
<Loading ratio> Outward: 62 %, Return: 0 %

<<Transport from abroad>>
<Transport distance from export port to import port> Use the navigate distance from a departing port to an arriving port. Or, "reference data" provided by the Pilot Project Secretariat may be used.
<Means> Other bulk carrier (80,000 DWT or less)

C.2 Transport scenario for "other raw materials and other materials" and "packing materials"
<Transport distance> 500 km
[Assumption] The distance from Tokyo to Osaka is assumed.
<Means> 10-ton truck
<Loading ratio> Outward: 62 %, Return: 0%

C.3 Product transport scenario
<<Domestic transport>>
(1) Transport within a city or not across adjacent cities
<Transport distance> 50 km
[Assumption] The distance from a prefectural center to a prefectural border is assumed.
<Means> 10-ton truck
<Loading ratio> Outward: 62 %, Return: 0 %

(2) Transport within a prefecture
<Transport distance> 100 km
[Assumption] The distance from a prefectural border to another side of the border is assumed.
<Means> 10-ton truck
<Loading ratio> Outward: 62 %, Return: 0 %

(3) Transport possibly across prefectural border to another side of the border is assumed.
<Transport distance> 500 km
[Assumption] The distance from Tokyo to Osaka is assumed.
<Means> 10-ton truck
<Loading ratio> Outward: 62 %, Return: 0 %

(4) Transport from producer to consumer (a site consumed the product is not limited in a specific area) is assumed.
<Transport distance> 1,000 km
[Assumption] The distance a little longer than half Honshu (the main island of Japan: 1,600 km) is assumed.
<Means> 10-ton truck
<Loading ratio> Outward: 62 %, Return: 0 %

<<Transport within an overseas country>>
<Transport distance from lumber site to export port> 200 km
<Means> Rail
[Assumption] Major imported lumber (North American lumber) is assumed.

<<Transport from abroad>>

<Transport distance from export port to Japan> Use the “reference data” provided by the CFP Pilot Project Secretariat.

<Means> Container ship (4,000 TEU or more)

C.4 Transport scenario of wastes and wood residues

<Transport distance> 50 km

[Assumption] The distance from a prefectural center to a prefectural border is assumed.

<Means> 10-ton truck

<Loading ratio> Outward: 25 %, Return: 0 %

Source: The appended table 2 in “Procurement distance of logs produced in a specific prefecture (2010)” excerpted from the “*Investigation report on wood miles (No. 20)*” by TAKIGUCHI Yasuhiro
URL: http://woodmiles.net/pdf/kn020.pdf [Refer to November 10, 2010]

Table 1: Distance between prefectures (all numeric fugires refer to one-way distance)

Unit: km

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
		Hokkaido	Aomori	Iwate	Miyagi	Akita	Yamagata	Fukushima	Ibaragi	Tochigi	Gunma	Saitama	Chiba	Tokyo	Kanagawa	Niigata	Toyama	Ishikawa	Fukui	Yamanashi	Nagano	Gifu	Shizuoka	Aichi	Mie	
1	Hokkaido	61	287	409	585	447	602	656	823	814	873	904	918	922	951	715	988	1,056	1,142	981	906	1,152	1,066	1,155	1,232	Hokkaido
2	Aomori	287	30	150	309	166	316	372	541	527	589	617	633	635	665	438	732	808	895	699	634	891	783	890	969	Aomori
3	Iwate	409	150	35	179	163	215	258	420	425	512	517	518	532	561	395	708	793	877	626	587	855	707	847	928	Iwate
4	Miyagi	585	309	179	28	211	79	89	241	255	360	346	340	359	388	291	599	689	768	473	460	728	550	715	795	Miyagi
5	Akita	447	166	163	211	32	181	242	407	377	426	465	491	484	513	273	572	651	737	535	469	728	619	726	805	Akita
6	Yamagata	602	316	215	79	181	28	61	228	213	299	305	317	322	351	212	523	612	692	413	388	657	493	645	725	Yamagata
7	Fukushima	656	372	258	89	242	61	34	169	168	272	259	262	274	303	225	521	613	689	385	379	644	461	630	709	Fukushima
8	Ibaragi	823	541	420	241	407	228	169	27	92	216	137	101	141	164	289	505	595	658	303	354	590	359	567	641	Ibaragi
9	Tochigi	814	527	425	255	377	213	168	92	28	130	92	120	108	138	207	416	507	573	231	265	510	299	490	566	Tochigi
10	Gunma	873	589	512	360	426	299	272	216	130	28	111	190	128	143	178	290	380	443	115	140	382	196	363	441	Gunma
11	Saitama	904	617	517	346	465	305	259	137	92	111	25	80	21	49	260	392	478	534	170	247	458	222	434	506	Saitama
12	Chiba	918	633	518	340	491	317	262	101	120	190	80	26	68	77	321	471	556	609	242	326	530	281	503	571	Chiba
13	Tokyo	922	635	532	359	484	322	274	141	108	128	21	68	26	30	281	403	488	541	175	261	463	220	437	507	Tokyo
14	Kanagawa	951	665	561	388	513	351	303	164	138	143	49	77	30	23	305	405	488	537	169	268	454	204	427	495	Kanagawa
15	Niigata	715	438	395	291	273	212	225	289	207	178	260	321	281	305	32	315	402	484	271	196	460	356	455	535	Niigata
16	Toyama	988	732	708	599	572	523	521	505	416	290	392	471	403	405	315	22	92	170	242	151	167	269	179	248	Toyama
17	Ishikawa	1,056	808	793	689	651	612	613	595	507	380	478	556	488	488	402	92	25	87	321	242	137	330	166	211	Ishikawa
18	Fukui	1,142	895	877	768	737	692	689	658	573	443	534	609	541	537	484	170	87	25	368	312	109	358	146	157	Fukui
19	Yamanashi	981	699	626	473	535	413	385	303	231	115	170	242	175	169	271	242	321	368	25	130	289	85	264	338	Yamanashi
20	Nagano	906	634	587	460	469	388	379	354	265	140	247	326	261	268	196	151	242	312	130	33	269	197	260	341	Nagano
21	Gifu	1,152	891	855	728	728	657	644	590	510	382	458	530	463	454	460	167	137	109	289	269	31	263	37	82	Gifu
22	Shizuoka	1,066	783	707	550	619	493	461	359	299	196	222	281	220	204	356	269	330	358	85	197	263	29	231	293	Shizuoka
23	Aichi	1,155	890	847	715	726	645	630	567	490	363	434	503	437	427	455	179	166	146	264	260	37	231	26	80	Aichi
24	Mie	1,232	969	928	795	805	725	709	641	566	441	506	571	507	495	535	248	211	157	338	341	82	293	80	27	Mie
25	Shiga	1,268	1,015	987	866	855	793	783	729	650	521	596	666	600	589	592	283	214	131	427	406	140	391	163	104	Shiga
26	Kyoto	1,278	1,026	1,001	881	867	808	798	746	666	538	613	683	617	607	606	295	222	137	444	420	156	409	180	122	Kyoto
27	Osaka	1,330	1,079	1,052	930	919	858	847	790	712	584	656	724	659	647	657	347	274	189	487	470	203	447	223	154	Osaka
28	Hyogo	1,364	1,117	1,095	977	959	903	894	841	762	634	707	776	711	699	700	387	309	223	538	516	252	499	274	206	Hyogo
29	Nara	1,299	1,044	1,013	887	883	816	804	743	666	539	609	676	611	599	618	312	247	166	440	428	159	398	176	105	Nara
30	Wakayama	1,404	1,153	1,126	1,003	993	931	919	857	781	654	722	787	723	710	731	422	348	262	554	543	275	507	291	216	Wakayama
31	Tottori	1,406	1,181	1,179	1,079	1,031	1,003	1,002	970	886	757	843	916	849	841	792	481	391	315	674	627	387	647	417	363	Tottori
32	Shimane	1,553	1,341	1,349	1,257	1,197	1,180	1,182	1,155	1,070	941	1,027	1,100	1,033	1,025	968	661	570	498	859	809	571	831	601	544	Shimane
33	Okayama	1,502	1,271	1,262	1,155	1,118	1,080	1,075	1,031	950	821	899	969	903	892	872	557	470	388	729	697	441	693	466	400	Okayama
34	Hiroshima	1,695	1,478	1,479	1,380	1,330	1,303	1,302	1,262	1,180	1,051	1,130	1,200	1,134	1,124	1,093	781	691	613	961	924	672	924	697	631	Hiroshima
35	Yamaguchi	1,830	1,621	1,628	1,532	1,477	1,455	1,455	1,417	1,335	1,205	1,285	1,355	1,290	1,279	1,244	934	843	766	1,116	1,078	827	1,079	852	786	Yamaguchi
36	Tokushima	1,480	1,235	1,214	1,094	1,077	1,021	1,011	952	876	748	818	883	819	806	819	506	427	340	649	634	367	604	386	312	Tokushima
37	Kagawa	1,514	1,278	1,265	1,153	1,124	1,079	1,072	1,022	943	814	889	957	892	880	873	558	473	389	719	694	433	679	455	386	Kagawa
38	Ehime	1,696	1,470	1,464	1,357	1,319	1,281	1,276	1,228	1,149	1,020	1,094	1,161	1,097	1,085	1,073	759	672	590	925	898	638	883	661	590	Ehime
39	Kochi	1,630	1,393	1,377	1,261	1,237	1,188	1,179	1,121	1,045	917	986	1,051	988	974	984	669	586	501	818	801	536	771	555	481	Kochi
40	Fukuoka	1,998	1,793	1,801	1,706	1,650	1,629	1,629	1,589	1,508	1,378	1,457	1,526	1,461	1,449	1,418	1,108	1,017	940	1,287	1,252	999	1,248	1,023	955	Fukuoka
41	Saga	2,034	1,827	1,833	1,736	1,682	1,659	1,658	1,615	1,535	1,405	1,482	1,550	1,485	1,473	1,449	1,137	1,047	969	1,313	1,280	1,025	1,271	1,048	979	Saga
42	Nagasaki	2,117	1,909	1,915	1,816	1,765	1,739	1,737	1,691	1,612	1,483	1,558	1,625	1,561	1,548	1,529	1,217	1,127	1,048	1,389	1,359	1,102	1,345	1,124	1,053	Nagasaki
43	Kumamoto	2,007	1,792	1,793	1,689	1,645	1,613	1,609	1,560	1,482	1,353	1,426	1,492	1,428	1,415	1,404	1,091	1,002	922	1,257	1,231	971	1,212	993	921	Kumamoto
44	Ooita	1,873	1,654	1,652	1,546	1,505	1,471	1,467	1,417	1,339	1,210	1,283	1,350	1,286	1,273	1,262	949	860	779	1,114	1,088	828	1,070	850	778	Ooita
45	Miyazaki	1,986	1,757	1,747	1,632	1,604	1,559	1,550	1,488	1,413	1,286	1,352	1,414	1,352	1,337	1,354	1,039	954	870	1,185	1,172	906	1,133	923	847	Miyazaki
46	Kagoshima	2,109	1,886	1,880	1,768	1,735	1,694	1,686	1,626	1,551	1,424	1,491	1,553	1,491	1,476	1,488	1,173	1,087	1,004	1,324	1,308	1,043	1,273	1,061	986	Kagoshima
47	Okinawa	2,796	2,566	2,550	2,427	2,411	2,356	2,342	2,263	2,196	2,073	2,126	2,180	2,124	2,105	2,156	1,842	1,760	1,675	1,966	1,968	1,699	1,904	1,712	1,633	Okinawa

Unit: km

	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	
	Shiga	Kyoto	Osaka	Hyogo	Nara	Wakayama	Tottori	Shimane	Okayama	Hiroshima	Yamaguchi	Tokushima	Kagawa	Ehime	Kochi	Fukuoka	Saga	Nagasaki	Kumamoto	Ooita	Miyazaki	Kagoshima	Okinawa	
1 Hokkaido	1,268	1,278	1,330	1,364	1,299	1,404	1,406	1,553	1,502	1,695	1,830	1,480	1,514	1,696	1,630	1,998	2,034	2,117	2,007	1,873	1,986	2,109	2,796	Hokkaido
2 Aomori	1,015	1,026	1,079	1,117	1,044	1,153	1,181	1,341	1,271	1,478	1,621	1,235	1,278	1,470	1,393	1,793	1,827	1,909	1,792	1,654	1,757	1,886	2,566	Aomori
3 Iwate	987	1,001	1,052	1,095	1,013	1,126	1,179	1,349	1,262	1,479	1,628	1,214	1,265	1,464	1,377	1,801	1,833	1,915	1,793	1,652	1,747	1,880	2,550	Iwate
4 Miyagi	866	881	930	977	887	1,003	1,079	1,257	1,155	1,380	1,532	1,094	1,153	1,357	1,261	1,706	1,736	1,816	1,689	1,546	1,632	1,768	2,427	Miyagi
5 Akita	855	867	919	959	883	993	1,031	1,197	1,118	1,330	1,477	1,077	1,124	1,319	1,237	1,650	1,682	1,765	1,645	1,505	1,604	1,735	2,411	Akita
6 Yamagata	793	808	858	903	816	931	1,003	1,180	1,080	1,303	1,455	1,021	1,079	1,281	1,188	1,629	1,659	1,739	1,613	1,471	1,559	1,694	2,356	Yamagata
7 Fukushima	783	798	847	894	804	919	1,002	1,182	1,075	1,302	1,455	1,011	1,072	1,276	1,179	1,629	1,658	1,737	1,609	1,467	1,550	1,686	2,342	Fukushima
8 Ibaragi	729	746	790	841	743	857	970	1,155	1,031	1,262	1,417	952	1,022	1,228	1,121	1,589	1,615	1,691	1,560	1,417	1,488	1,626	2,263	Ibaragi
9 Tochigi	650	666	712	762	666	781	886	1,070	950	1,180	1,335	876	943	1,149	1,045	1,508	1,535	1,612	1,482	1,339	1,413	1,551	2,196	Tochigi
10 Gunma	521	538	584	634	539	654	757	941	821	1,051	1,205	748	814	1,020	917	1,378	1,405	1,483	1,353	1,210	1,286	1,424	2,073	Gunma
11 Saitama	596	613	656	707	609	722	843	1,027	899	1,130	1,285	818	889	1,094	986	1,457	1,482	1,558	1,426	1,283	1,352	1,491	2,126	Saitama
12 Chiba	666	683	724	776	676	787	916	1,100	969	1,200	1,355	883	957	1,161	1,051	1,526	1,550	1,625	1,492	1,350	1,414	1,553	2,180	Chiba
13 Tokyo	600	617	659	711	611	723	849	1,033	903	1,134	1,290	819	892	1,097	988	1,461	1,485	1,561	1,428	1,286	1,352	1,491	2,124	Tokyo
14 Kanagawa	589	607	647	699	599	710	841	1,025	892	1,124	1,279	806	880	1,085	974	1,449	1,473	1,548	1,415	1,273	1,337	1,476	2,105	Kanagawa
15 Niigata	592	606	657	700	618	731	792	968	872	1,093	1,244	819	873	1,073	984	1,418	1,449	1,529	1,404	1,262	1,354	1,488	2,156	Niigata
16 Toyama	283	295	347	387	312	422	481	661	557	781	934	506	558	759	669	1,108	1,137	1,217	1,091	949	1,039	1,173	1,842	Toyama
17 Ishikawa	214	222	274	309	247	348	391	570	470	691	843	427	473	672	586	1,017	1,047	1,127	1,002	860	954	1,087	1,760	Ishikawa
18 Fukui	131	137	189	223	166	262	315	498	388	613	766	340	389	590	501	940	969	1,048	922	779	870	1,004	1,675	Fukui
19 Yamanashi	427	444	487	538	440	554	674	859	729	961	1,116	649	719	925	818	1,287	1,313	1,389	1,257	1,114	1,185	1,324	1,966	Yamanashi
20 Nagano	406	420	470	516	428	543	627	809	697	924	1,078	634	694	898	801	1,252	1,280	1,359	1,231	1,088	1,172	1,308	1,968	Nagano
21 Gifu	140	156	203	252	159	275	387	571	441	672	827	367	433	638	536	999	1,025	1,102	971	828	906	1,043	1,699	Gifu
22 Shizuoka	391	409	447	499	398	507	647	831	693	924	1,079	604	679	883	771	1,248	1,271	1,345	1,212	1,070	1,133	1,273	1,904	Shizuoka
23 Aichi	163	180	223	274	176	291	417	601	466	697	852	386	455	661	555	1,023	1,048	1,124	993	850	923	1,061	1,712	Aichi
24 Mie	104	122	154	206	105	216	363	544	400	631	786	312	386	590	481	955	979	1,053	921	778	847	986	1,633	Mie
25 Shiga	25	18	65	112	36	139	259	441	303	534	690	228	293	499	396	861	886	963	832	689	767	904	1,563	Shiga
26 Kyoto	18	26	52	96	39	127	242	424	286	517	672	214	277	482	381	844	869	946	815	672	752	888	1,550	Kyoto
27 Osaka	65	52	22	52	49	75	219	393	247	477	632	164	233	438	333	802	826	902	770	627	703	840	1,499	Osaka
28 Hyogo	112	96	52	22	101	51	172	342	194	425	580	119	181	387	285	750	775	851	720	577	656	792	1,455	Hyogo
29 Nara	36	39	49	101	25	115	264	441	295	526	681	210	281	486	379	850	874	949	817	675	748	885	1,540	Nara
30 Wakayama	139	127	75	51	115	26	201	356	198	422	575	96	175	376	265	742	764	838	705	563	632	770	1,425	Wakayama
31 Tottori	259	242	219	172	264	201	24	185	103	301	452	164	130	290	237	627	657	737	614	474	580	706	1,390	Tottori
32 Shimane	441	424	393	342	441	356	185	28	163	146	280	279	196	178	217	453	486	568	455	324	450	561	1,250	Shimane
33 Okayama	303	286	247	194	295	198	103	163	28	231	386	117	39	202	134	558	584	662	534	391	486	617	1,296	Okayama
34 Hiroshima	534	517	477	425	526	422	301	146	231	30	155	329	246	75	189	328	356	436	315	179	304	416	1,105	Hiroshima
35 Yamaguchi	690	672	632	580	681	575	452	280	386	155	28	481	400	205	327	174	206	288	182	100	234	303	985	Yamaguchi
36 Tokushima	228	214	164	119	210	96	164	279	117	329	481	25	86	280	169	646	668	742	609	467	539	676	1,336	Tokushima
37 Kagawa	293	277	233	181	281	175	130	196	39	246	400	86	22	206	116	569	593	669	539	396	481	615	1,288	Kagawa
38 Ehime	499	482	438	387	486	376	290	178	202	75	205	280	206	27	123	366	389	464	333	190	290	417	1,100	Ehime
39 Kochi	396	381	333	285	379	265	237	217	134	189	327	169	116	123	28	484	504	575	441	300	371	507	1,174	Kochi
40 Fukuoka	861	844	802	750	850	742	627	453	558	328	174	646	569	366	484	26	40	121	97	190	233	208	840	Fukuoka
41 Saga	886	869	826	775	874	764	657	486	584	356	206	668	593	389	504	40	23	83	83	204	222	175	800	Saga
42 Nagasaki	963	946	902	851	949	838	737	568	662	436	288	742	669	464	575	121	83	25	135	275	256	160	722	Nagasaki
43 Kumamoto	832	815	770	720	817	705	614	455	534	315	182	609	539	333	441	97	83	135	28	143	139	128	803	Kumamoto
44 Ooita	689	672	627	577	675	563	474	324	391	179	100	467	396	190	300	190	204	275	143	26	140	237	927	Ooita
45 Miyazaki	767	752	703	656	748	632	580	450	486	304	234	539	481	290	371	233	222	256	139	140	28	139	810	Miyazaki
46 Kagoshima	904	888	840	792	885	770	706	561	617	416	303	676	615	417	507	208	175	160	128	237	139	30	689	Kagoshima
47 Okinawa	1,563	1,550	1,499	1,455	1,540	1,425	1,390	1,250	1,296	1,105	985	1,336	1,288	1,100	1,174	840	800	722	803	927	810	689	23	Okinawa

Table 2: Quality and green density of logs

Tree species	Forest land	breast-height diameter		Stump, tree age		Average annual ring width		Heart wood ratio (%)		Water content of green lumber (%)					Bulk density (kg/m^3)			Green density	Air-dried density
		Trees measured	cm	Trees measured	Year	Trees measured	mm	Trees measured	Average	Trees measured	Spa wood	Trees measured	Heart wood	Average	Trees measured	Average	Standard Deviation	(kg/m^3)	(kg/m^3)
Japanese yew	Nagawa, Minamiazumi-gun, Nagano	7	22	7	138	153	1	6	80	-	-	-	-		153	454	51.7	Unknown	540
Sakhalin fir	Monbetsu, Chitose-city, Hokkaido	5	43	5	80	91	3.9	-		-	-	-	-		91	329	36.7	Unknown	420
Larch	Miyota, Kitasaku-gun, Nagano	26	37	26	65	279	2.5	3	79	18	80	18	43	51	279	444	49.8	669	530
Whitewood	Shintoku, Kamikawa-gun, Hokkaido	21	46	21	155	250	1.7	2	50	18	169	18	57	113	250	314	24.7	669	430
Japanese red pine	Iwate, Iwate-gun, Iwate	43	25	43	52	478	2.5	4	23	24	143	24	36	118	478	369	55.3	806	
Japanese red pine	Harutomo, Hitachioota-city, Ibaraki	24	32	24	60	207	3.1	3	18	18	130	10	53	116	207	441	40.9	953	530
Japanese red pine	Jouge, Kounu-gun, Hiroshima	33	34	33	65	567	2.2	-		-	-	-	-		567	424	64.6	Unknown	
Japanese black pine	Takajyo, Kitamorokata-gun, Miyazaki	5	7	5	38	125	5	5	5	-	-	-	-		125	452	61.9	Unknown	570
Japanese cedar	Kyowa, Senboku-gun, Akita	21	31	21	61	285	3.2	-		-	-	-	-		285	299	27.4	Unknown	
Japanese cedar	Tatsuyama, Iwata-gun, Shizuoka	23	32	23	66	326	2.3	3	39	18	130	10	53	100	326	321	29.2	642	380
Japanese cedar	Takajyo, Kitamorokata-gun, Miyazaki	48	27	48	48	160	3.1	3	49	25	159	21	129	144	160	333	39.7	814	
Japanese cypress	Uematsu, Nishichikuma-gun, Nagano	16	47	16	254	586	0.9	3	70	18	203	18	43	91	586	339	45.1	647	410
Japanese evergreen oak	Mimata, Kitamorokata-gun, Miyazaki	21	39	21	87	197	1.5	3	27	12	58	12	102	70	197	725	59.1	1,232	920
Japanese oak	Shintoku, Kamikawa-gun, Hokkaido	19	51	19	217	334	1.1	3	75	18	81	18	81	81	334	537	39.9	972	
Japanese oak	Monbetsu, Chitose-city, Hokkaido	16	50	16	157	299	1.3	3	73	18	91	18	90	90	299	520	30.6	989	670
Japanese oak	Towadako, Kamikita-gun, Aomori	8	54	8	191	156	1.6	-		-	-	-	-		156	547	49.8	Unknown	
Japanese oak	Kiyomi, Oono-gun, Gifu	15	54	15	199	173	1	3	75	16	79	18	69	72	173	544	59.1	933	
Zelkova	Ueno, Tano-gun, Gunma	17	45	17	140	255	1.5	3	60	18	87	18	78	82	255	492	40.5	893	620
Japanese ash	Monbetsu, Chitose-city, Hokkaido	20	30	20	69	373	1.8	3	48	21	51	9	83	66	373	492	55.9	818	650
Beech	Kamiiso, Oshima-gun, Hokkaido	22	34	22	99	202	1.6	-		18	89	5	96	89	202	520	36.8	Unknown	
Beech	Towadako, Kamikita-gun, Aomori	12	55	12	196	394	1.3	-		24	73	24	78	73	396	484	59.0	Unknown	
Beech	Kiyomi, Oono-gun, Gifu	24	37	24	148	168	1.4	-		18	78	5	93	78	168	570	30.0	Unknown	630
Beech	Wakasa, Yazu-gun, Tottori	15	51	15	211	164	1.5	-		-	-	-	-		164	507	51.8	Unknown	
Beech	Ueno, Tano-gun, Gunma	20	37	20	149	218	1.2	-		18	85	18	79	85	218	456	3.5	Unknown	
Japanese Judas tree	Monbetsu, Chitose-city, Hokkaido	4	49	4	181	99	1.6	4	43	-	-	-	-		99	414	25.3	Unknown	490
Magnolia	Monbetsu, Chitose-city, Hokkaido	5	48	5	154	125	1.5	-		-	-	-	-		125	386	25.6	Unknown	480
Painted maple	Monbetsu, Chitose-city, Hokkaido	5	47	5	142	110	1.6			-	-	-	-		110	519	50.2	Unknown	670
Japanese linden	Shintoku, Kamikawa-gun, Hokkaido	5	45	5	155	147	1.3	-		-	-	-	-		147	369	47.1	Unknown	480

Source: > (Branch ratio, timber ratio, stem tapering grade, crown height ratio, heart wood ratio, water content of greem lumber, average annual ring width, and bulk density are excerpted from,)
the materials 47-3, "*Nature of major Japaneses tree species* (Nov. 1972)," by the forest experiment station department of the Ministry of Agricultural and Forestry (the predecessor of MAFF)
> (Air-dried density is excepted from) "*300 species of valuable world woods - nature and applications* (pp.126 (1975)),"
eddited by the editorial committee on 300 species of valuable world woods, by the Wood Technological Association of Japan

Annex E (informative): Disposal and recycling scenario after using wood/wood materials

The following scenario may be used for disposal and recycling scenario after using wood/wood materials.

- How to create a scenario -

The scenario was created based on the "result of survey on construction byproduct under actual condition (HY 2008)". According to the survey results, about 9% of wood generated from construction is directly landfilled. In this PCR, however, almost of those directly-landfilled woods are assumed to be clear-cut trees, eliminated roots and the like, and wastes after using wood/wood materials are assumed not to be directly landfilled.

The flow chart of the "disposal and recycling scenario after using wood/wood materials" created is shown the Chart 7 below.

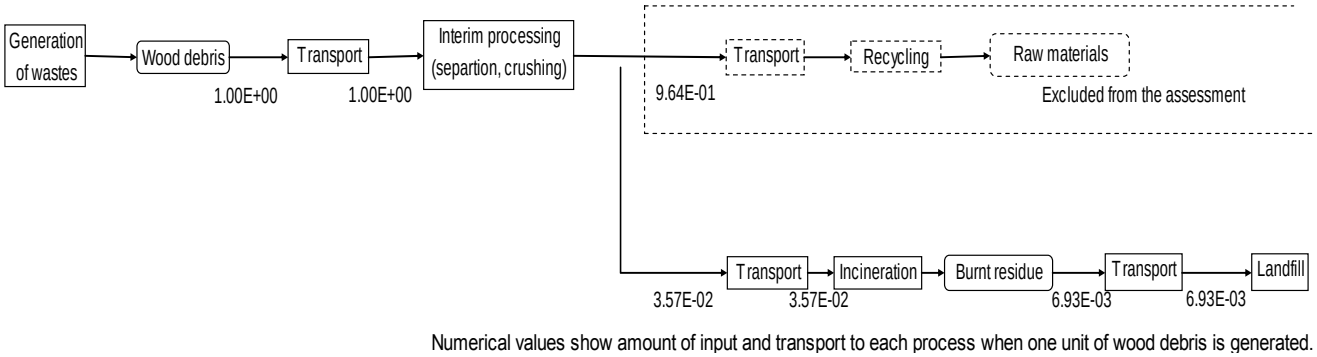


Chart 7: Disposal and recycling scenario after using wood/wood materials

When primary data on waste treatment after using wood/wood materials cannot be obtained, the disposal and recycling scenario described above may be used.

Annex F (informative): Amount of carbon content stored in wood/wood materials

As for woody biomass, "CO_2" that tree leaves absorbed from the atmosphere and "water" absorbed through the roots are converted into "sugar (glucose)" through photosynthesis, then the glucose is changed into high molecule such as cellulose, hemicellulose, and lignin, through various biosynthesis pathways, and finally those high molecules are stored in cell walls, etc. of trees. That is to say, "CO_2" from the atmosphere is assumed to be fixed as "C (carbon)" in woods.

Though ratio of cellulose, hemicellulose, and lignin in a wood are slightly different by wood species, it is said roughly, 2: 1: 1. Weight composition of elements comprising a wood is assumed to be 50% for "C," 6% for "H," 43% for "O," and 1% for other elements.

According to an interim report, "the quantitative assessment of contribution to the environment by wood usage," the amount of carbon content stored in a wood can be obtained by the following equation, and the result value may be used as the amount of carbon content stored.

Amount of carbon content stored (kg-C) = total weight of dried wood among wood/wood materials (kg-wood) x 0.5

To convert the "amount of carbon content stored" into the "amount of CO_2 in the atmosphere," use the following equitation:
Amount of carbon content stored x 44/12
The "44" in the equitation above means molecular weight of "CO_2," and "12" means "C".

Annex G (informative): Assumptions of service life of preservative-treated woods

As for preservative-treated woods, many field exposure tests have been conducted and the durability has been assessed. According to the result of the field stake test, conducted by Mr. Momohara and his colleagues, the service life of non-treated wood is 2.8 years, while the service life of preservative-treated wood is 10 or more years.[1)]
According to the result of the field test under ungrounded conditions, conducted by Mr. Obuchi and his colleagues, the service life of non-treated wood is from 4 to 5 years, while the service life of preservative-treated wood is 10 or more years.[2)]
Actually, the preservative-treated woods, which have been used as intrusion prevention stakes for 10 years in the field of the Tama Shinrin Kagaku Park, keep necessary strength.[3)]
Thus, treating woods with preservatives can substantially prolong the service life of woods.

According to the results of tests and surveys conducted by Mr. Momohara,[1)] Mr. Obuchi,[2)] Mr. Katoh,[3)] and their colleagues, about 10 years is reasonable for the assumption of the "service life of preservative-treated woods" whose application is for "exterior materials" (e.g., decks, fences, and exterior walls, etc) under the service conditions directly exposed to the rains, and for "civil engineering materials" (e.g., earth retaining, channel works, and guard fences, etc.) under the service conditions constantly exposed to soil, water, or seawater.

As for the service life of preservative-treated structural materials (e.g., ground sill) under the service conditions not directly exposed to rainfalls, under the "Housing Performance Indication System" enacted based on the "Housing Quality Assurance Act,"[4)] in order to meet the standards on the level 3 of wooden house taking anti-deterioration measures,[5)] frame works and the like for exterior wall or ground sills are required that the K3 or higher level (in the performance category of wood preservatives prescribed in the structural lumber standards) of preserved/anti-termite treatment is applied (these treatment include the following: the treatment at plant to ensure the K3 or higher level of wettability and absorption amount of chemicals, and the treatment which has the equivalent performance, by using wood preservatives prescribed in JIS K1570 or by using the equivalent chemicals; hereinafter called the "K3 or higher level of preserved/anti-termite treatment").
The "level 3 of wooden house taking anti-deterioration measures" indicates the standard of measures, requiring for keeping a house through 3 generations or longer until it is considered a serviceability limit state.[5)]
In the "Housing Performance Indication System," the duration of one generation is set from about 25 to 30 years, and three generations are therefore assumed to be about 75 to 90 years.[5)]
According to those mentioned above, it is assumed that from 75 to 90 years is appropriate for the service life of preservative-treated woods of structural materials (e.g., ground sills) with the K3 or higher level of preserved/anti-termite treatment prescribed in JAS or quality wood products certification.

However, there are often the cases that houses in Japan are demolished before they reach their physical service life ends because of social or economic needs.[6)] When demolished a house, structural materials which have been used are not often be reused.[7)] Concerning this point, in this PCR, service life of preservative-treated structural materials is set to 30 years as well as the average lifetime of houses.

"30 years as an average lifetime" is set by referring to the MLIT material released in 2008, which says that the average time period of house from construction to obsolescence is 30 years.[8)]
However, it is supposed that average lifetime of house will become longer in the future, because the Basic Plans for Living under the Basic Act for Housing aims to establish a society that houses will be used more carefully and for a longer time, and also sets a target that average time period of house from construction to obsolescence can be prolonged to about 40 years in 2020, and concrete measures for achieving them will be implemented.[9)] There is a report that the average lifetime of housing has been prolonged since 1980. Therefore, average housing lifetime should be set based on the latest materials released by government agencies such as MLIT when applying CFP.

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