Lessons from the Activities of the Woodmiles Forum

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Summary

Japanese people have consumed a large amount of wood imported from the remote corners of the world. In order to shorten the transportation distance of the timber, thereby reducing the environmental impacts resulting from transportation, the Woodmiles Forum was launched in June 2003. The forum aims at the development and promotion of the woodmiles indexes, including “the Woodmileage CO2 for buildings” showing the quantity of carbon dioxide discharged in transportation processes. Recently the Forum started the Woodmiles Report Program, which illustrates the environmental aspects of houses built from local timber by local house builders, using the Woodmileage indexes, to support the marketing of the house builders. This paper clarifies the possibility of the woodmiles indexes as a tool of communications of house builders with their customers.

1. Foreword

Five years have passed since the Woodmiles Forum was established and started its operation in June 2003 in Japan to develop and disseminate indexes concerning the distances between the places at which timber is harvested and the places at which it is consumed [1] [1]. The transportation distance of timber to be used in Japan is a lot longer than that in other countries, and the distance has been getting longer in recent years. Timber requires less energy consumption in its production process compared to other building materials. Timber is expected to play an important role in the future sustainable society as a recyclable and environment-friendly material. The extremely long transportation process of timber, however, will cause problems in two aspects, namely, environmental load in the transportation process of timber and lack of interest of consumers in the environmental load in the place of production.

This article presents the activities of the Woodmiles Forum and discusses future possibilities, while explaining the significance of activities to shorten the transportation distance of timber.

2. Establishment of the Woodmiles Forum and its background

2.1 Characteristics of the use of timber in Japan

According to the statistics, Japan used a total of 88 million m^3 of timber in 2006, of which 18 million m^3 was domestic and 70 million m^3 imported, with a self-sufficiency ratio of about 20%. Timber was imported from North America, South East Asia, Russia, Europe, etc. Table 1 below categorizes the importers of timber by distance from country of origin in order to compare the characteristics of timber importation by Japan with those by other timber-importing countries.

The U.S., the world’s largest importer of timber, and Germany, the largest importer in Europe, have been categorized along with Japan according to the distance from country of origin to make comparisons, which reveals that the transportation distance of timber consumed in Japan is generally longer than that in other major timber importing countries.

Table 1 Timber Importation Volume of Major Importing Countries by Distance from Origin

thousand cubic meters

Distance from origin	Japan		USA		Germany	
Total import of timber	52009	100.0%	60357	100.0%	22790	100.0%
-1000km	0	0.0%	55889	92.6%	9378	41.1%
1000-8000km	33393	64.2%	2845	4.7%	13074	57.4%
8000km-	18616	35.8%	1623	2.7%	338	1.5%

Fujiwara, T. 2002

If we introduce the concept of "Woodmileage" (total transporting distance that multiplies imported quantity of timber and transporting distances), though the quantity of imported timbers for Japan would be less than that for the U.S.A., the woodmileage for Japan would be more than 4 times greater than that of the U.S.A. (Fig. 1)

Moreover, it is pointed out that there is a tendency for the transportation distance of timber to be consumed in Japan to get longer[2][3].

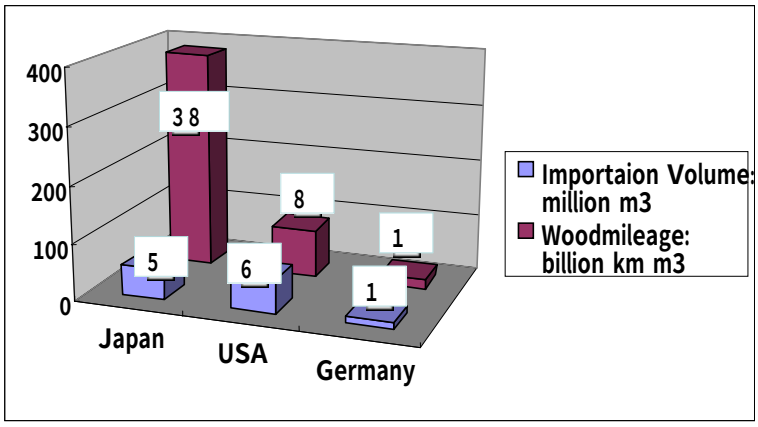

Figure 1 Comparison of woodmileage of imported timber in major timber importing countries.

2.2 Transportation distance and energy consumption in the transportation process of timber

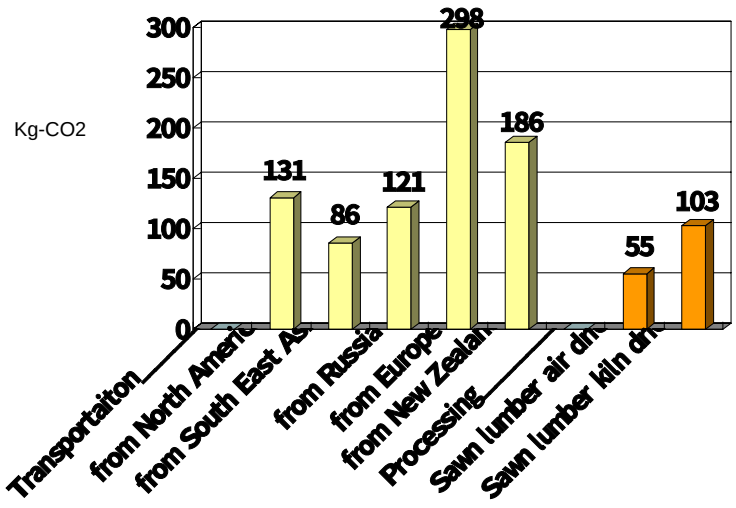

Figure2 CO_2 discharged on timber transportation to the Japanese market and timber production process (Source: Fujiwara, T. and the Woodmiles Forum 2005)

Timber is said to be an eco-friendly material whose energy consumption in its production process is extremely low. The energy consumption in the transportation process has been calculated and is shown in Fig. 2 for comparison.

The transportation route, i.e., from the place of harvesting to the place of processing in the country of origin, then to the port of export, and eventually to the port of import in Japan, and the transportation method, including railroads, ships, and trucks, have been assumed by the major country of origin that exports timber to Japan. Each portion of the route distance was multiplied by the specific energy

consumption of the respective transportation methods to obtain the transportation energy required for the transportation of 1cubic meter of timber, which is compared with the energy consumption in the production process.

It is apparent that the amount of energy consumed in the transportation process of timber transported over a long distance is up to several times larger than that consumed in its production process.

2.3 Establishment of the Woodmiles Forum and its objectives

As stated above, the long transportation distance of timber generally used in Japan, the tendency of the above distance to get longer, and the environmental load caused by the energy consumed in the transportation process and in addition, the fact that the forest trees planted en masse after World War II are maturing and efforts to promote their use are an important issue as background factors, the Woodmiles Forum was established and started its operation in June 2003 in Japan for the objectives to develop and disseminate indexes concerning the distances between the places at which timber is harvested and the places at which it is consumed

3. Activities of the Woodmiles Forum

For the achievement of its objectives, the Woodmiles Forum is active in three areas: ① development of woodmiles indexes and tools; ② dissemination of woodmiles and establishment of networks; and ③ collection and study of relevant information.

3.1 Development of woodmiles indexes

To achieve the above mentioned objectives the Forum developed a manual to provide a reproducible and objective method of calculating the "Woodmiles Indexes for Building".

The manual revised in September 2006 defines the following four indexes for the evaluation of building construction.

Woodmileage(WM)

Actual distance covered in transporting timber of the applicable type (hereafter, applicable timber materials) from each place of harvest (timber type-specific woodmiles) multiplied by the respective volumes of timber transported from each place of harvest (unit: km m3).

Woodmileage CO2 (WMCO2)

CO2 emissions equivalent to the energy expended in covering the above distances according to the types of transportation used (road, rail, sea, etc.) for each form of timber (unprocessed or processed) (unit: kg- CO2).

Woodmileage L (L = linear) (BWML)

The linear distance from each place of harvest (timber type-specific woodmiles L) of applicable timber materials to the site, multiplied by the respective volumes of timber transported from each place of harvest (unit: km m3).

Logistics Stops Knowledge Level (LSNL)

The degree, expressed as a proportion of the total woodmileage, of applicable timber materials for which knowledge of processing and storage stops on the way from each place of harvest to the site enables the calculation of an accurate woodmileage figure.

3.2 Dissemination of woodmiles and establishment of networks (Collaboration with local governments)

The Forum implements activities to use and disseminate the above indexes as tools to promote buildings that positively use locally produced timber.

One of the good examples is the woodmiles evaluation of the “Konohana Dome” built by Miyazaki Prefecture with the timber produced in the above prefecture. The Forum reported the results of

evaluation of the three largest wooden frame domes in Japan, consisting of the Izumo Dome in Shimane Prefecture (1992), the Jyukai Dome in Akita Prefecture (1997), and the Konohana Dome in Miyazaki Prefecture (2004), based on woodmiles indexes at the 2005 World Sustainable Building Conference (SB05Tokyo). The three domes were built in different years. The Izumo Dome, which is the first one built, is built with Douglas fir harvested and processed in Oregon, U.S.A.; the Jyukai Dome in Akita Prefecture, the second one built, is built with laminated Sugi produced in the above prefecture (part of the materials were processed outside the prefecture); and the Konohana Dome in Miyazaki Prefecture, the last one of the three, is built entirely with laminated Sugi produced and processed in the above prefecture. The above shows how the conditions to process timber produced in Japan into large-section laminated timber have improved over time, and at the same time provides the items for comparison concerning the environmental load in the transportation process of timber. More specifically, it has been revealed that there is a difference of nearly 1,000 tons of CO2 emission in the construction of a large sized building, as seen in the difference between the Miyazaki method and the Izumo method.[3][6]

The evaluation such as the above not only indicates the importance of woodmiles but also defines the role of the Forum to assess the efforts made by local governments to recommend the use of locally produced timber in terms of the environment.

Thirty two out of forty-seven prefectural governments implement measures to certify and positively sell and promote local timber and the woodmile indexes contribute to the movement. Other than Miyazaki Prefecture as stated above, Kyoto Prefecture, the birthplace of the Kyoto Protocol, mandates that the the woodmileage CO2 must be displayed on timber produced in Kyoto Prefecture to promote the dissemination of the use of local timber to citizens.

The activities of local governments to locally consume locally-produced products sometimes result in an inward-looking attitude with possible confusion in boundary areas with other prefectures. Collaboration between neighbouring prefectures is necessary. Accordingly, it is meaningful to clarify the significance of the use of locally produced timber in terms of environmental load.

4. Houses built with timber harvested from nearby forests and the woodmiles report

The importance of collaboration with local governments for the diffusion of woodmiles has been discussed in the preceding text. Another important stakeholder for the diffusion of woodmiles is the house builders whose selling point is to build houses with timber harvested from nearby forests.

4.1 Trend of house building using local timber

The movement to build houses using local timber is spreading in recent years. About 130 collaborative networks of timber suppliers and house builders all over Japan have been registered on the website that features the above activities[4][7]. Moreover, local governments are providing support for the above activities. In fiscal 2006, 38 out of the 47 prefectural governments provided support in the form of subsidies and low-interest loans for the construction of houses using local timber[5][8].

4.2 The subject of the woodmiles report

The Woodmiles Forum works collaboratively with house builders who are involved in the above activities in their respective regions to implement a project to create a booklet titled the “Woodmiles Report” to explain to the users in an easy-to-understand manner the evaluation of houses built by the respective house builders using woodmiles indexes.

The following example is of the house built by S Housing KK active in the Kyushu region.

S Housing is a major regional house builder that builds about 200 new houses annually in the Kyushu region. The company is committed to the rule that it offers houses built with non-engineered, air-dried timber, almost all of which has traceability, as raw materials and never uses laminated wood or plywood.

Design of the cover of the report

Table of contents of the woodmiles report

1-04：Background of woodmiles

05-06：Comprehensive valuation/ Woodmileage

7-08：Timber traceability

09-10：CO2 emission in the transportation process

A show house of S Housing was made the subject of the woodmiles report. The house is a two-storied wooden house with a building area of 76.72 m^2 and a gross floor space of 134.76 m^2. The amount of timber used is 46.77m^3.

Figure 3: Woodmiles Report on S Housing KK

4.3 The format and the contents of the woodmiles report

The woodmiles report is cooperatively prepared by the Woodmiles Forum Secretariat and an employee of the relevant company that is a certified engineer who attended the woodmiles engineer training session for woodmiles evaluation. The timber used in the construction of the house will be categorized into structural material, foundation material, carpentry material, finishing material, etc. and a traceability check of the acquiring process is thoroughly conducted. The findings are put into a chart with the results of calculation of the woodmiles indexes as stated above. In order to explain the meanings of the figures to the citizens in an easy-to-understand manner, a comparison with a case where a house with similar specifications is built based on the most generally-used timber material procurement policy is made.

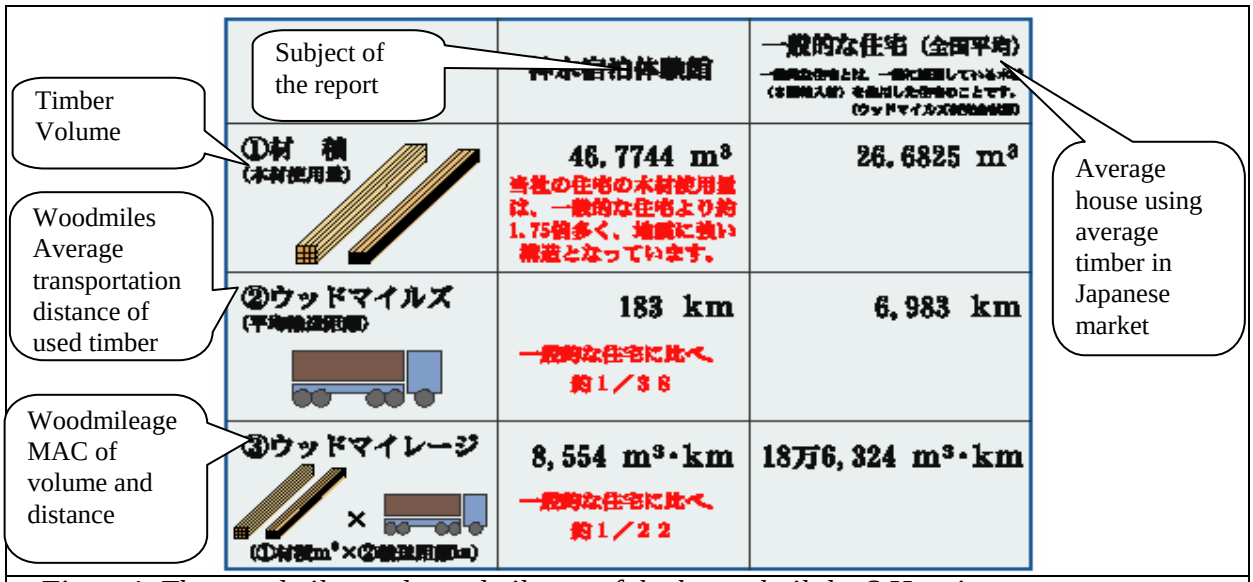

Figure4: The woodmiles and woodmileage of the house built by S Housing Woodmiles Report on S Housing KK (prepared in 2007)

Figure 4 shows that the average transportation distance (woodmiles) of the construction of this particular house was 183 km, which is 1/38th the transportation distance of an average house (6983km).

4.4 Evaluation of energy consumption in the transportation process

Next, the woodmiles report shows the volume of carbon dioxide emitted in the transportation process of the timber used for the subject house. The energy used in the transportation process of the timber used for the subject house expressed in terms of carbon dioxide was 1131kg. The corresponding figure for an average house with similar specifications using average timber distributed in the Japanese market is 5473kg, which means that the carbon dioxide emission of the former is smaller by about 4342kg (4.3ton), as shown in Table 2.

Table 2 Comparison of carbon dioxide emission in the timber transportation process between the house built by S Housing KK and an average house

	S Housing KK	Average house using average timber	Difference
Timber Volume m3	46.7744	46.7744	46.7744
Average transportation distance km	183	6983	6800
CO2 Emission Kg	1131	5473	4342

Figure 5 explains the above figures from a different angle, which can be said to be the core of the report.

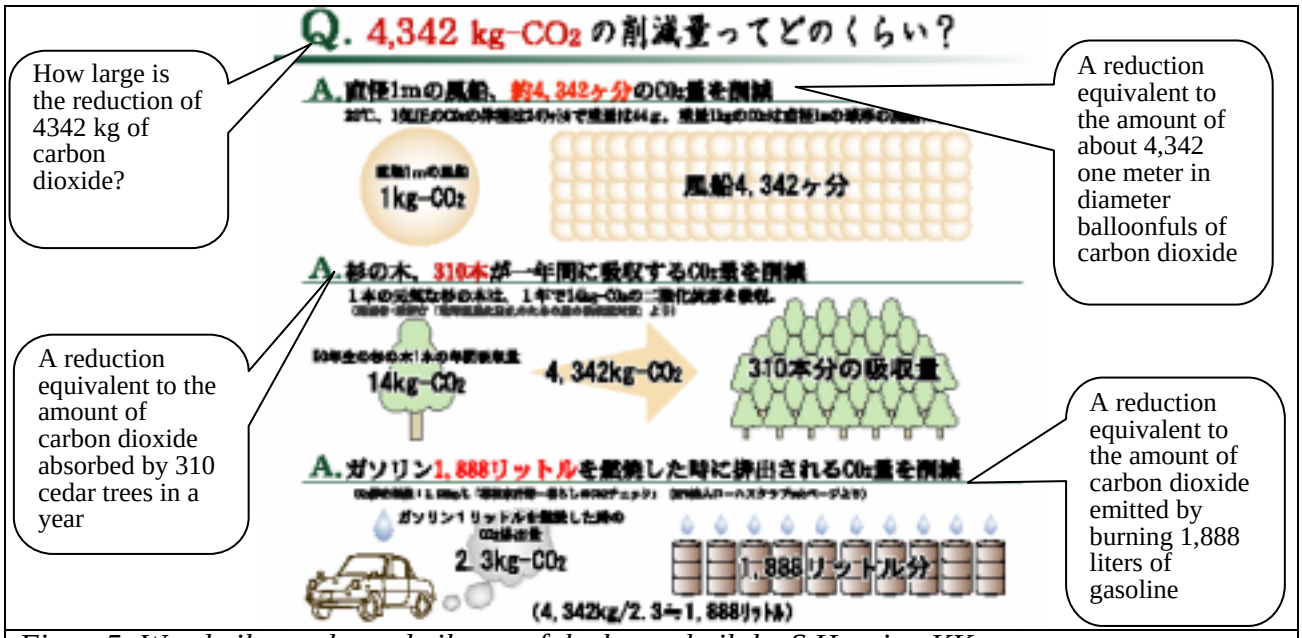

Figure5: Woodmiles and woodmileage of the house built by S Housing KK

Woodmiles Report on S Housing KK (prepared in 2007)

A reduction equivalent to the amount of about 4,342 one meter in diameter balloonful of carbon dioxide
A reduction equivalent to the amount of carbon dioxide absorbed by 310 cedar trees in a year
A reduction equivalent to the amount of carbon dioxide emitted by burning 1,888 liters of gasoline

Furthermore, comparison was made with the emission volume of one household of 1.04 tons[6][9] , which Japan committed to under the Kyoto Protocol, and with the figure in Cool Earth50[7][10], in which the Japanese Government set as a target an emission reduction by half by 2050.

Figure 6 shows the results of the questionnaire survey of the participants of the seminar held after the preparation of the report on how they evaluated the presentation on the relevant section. The results show that the respondents found the comparison with the amount of fuel consumed daily in households very easy to understand.

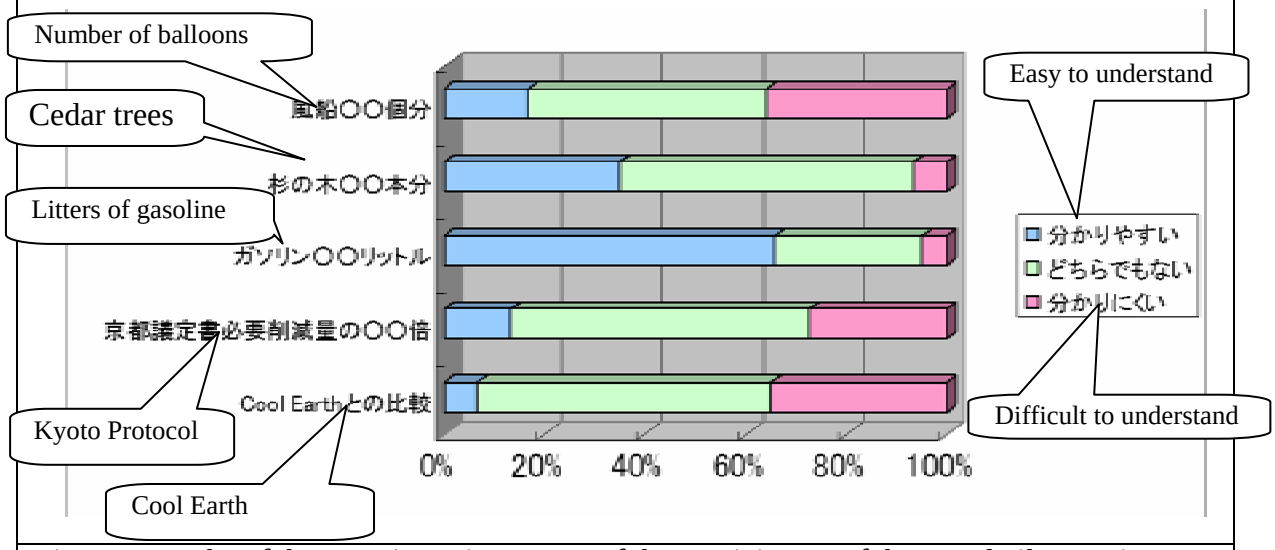

Figure6 Results of the questionnaire survey of the participants of the Woodmiles seminars

From now on, post Kyoto Protocol reduction targets will emerge newly, followed by the emergence of internal targets based on them, and discussions will be made in detail for the establishment of a low carbon society in the future. The woodmiles report will offer various topics for presentations such as the relation with the above reduction target figures.

Furthermore, the report shows the importance of establishing a mechanism that enables to feed back the resultant saved energy as specific economic merits through the carbon offset system, etc.

5. Conclusion

5.1 A new framework of measures against global warming and woodmiles

At the 13th Conference of the Parties (COP13) of the United Nations Framework Convention on Climate Change held in Bali, Indonesia, in December 2007, an agreement was made on deep cuts in global emissions of GHG at an early date, focusing on the figures concerning the stabilization of GHG density, which is the ultimate objective of the convention, for the establishment of the framework for the stage that follows the first commitment period of the Kyoto Protocol[8][12].

A reduction as significant as 45-95% from the base year by 2050 has become the target for developed countries and not only the promotional activities by the government but also a large-scale national campaign and an change of lifestyle based on improved awareness are required. Accordingly, discussions are being made on tools such as emissions trading and carbon offsetting, but it is essential to accumulate basic carbon dioxide emissions data in our daily life in order for the citizens to use the above tools effectively and initiate a large-scale social campaign.

It will be meaningful that the Woodmiles Forum has helped identify the environmental load of the transportation distance of timber in terms of carbon dioxide emissions. The Forum's activities so far has mainly involved the steady dissemination of the indexes concerning environmental load of the transportation process of timber. The Forum intends to go a step further for the possible collaboration with the carbon offset and other new projects.

5.2 Possibilities of woodmiles

It is necessary for the establishment of a sustainable society, which is urgently required in the 21st century, to analyze the various aspects of environmental loads from the entire lifecycle of products and services and make the analysis results common knowledge for consumers to impact their selection of merchandise. The woodmiles are attracting attention as a set of unique and easy-to-understand indexes. The woodmiles indexes are, however, those of environmental load in the transportation process of timber materials, which is just a small portion of the entire lifecycle of the above materials, which are just a small portion of the entire building materials. Accordingly, it is important to use the indexes collaboratively with other indexes in the method of comprehensive evaluation.

In that sense, we may say that the following developments are significant steps.

i) The proposals made by the Woodmiles Forum played a certain role in the definition of locally-produced timber in the development of the Comprehensive Assessment System for Building Environmental Efficiency (CASBEE, green building rating system in Japan)

ii) Woodmiles Indexes are included in the risk assessment indexes of environmental loads on forests by place of origin in "the Wood Selection Guide," which the Fair Wood Campaign is implementing for the "diffusion of environment-friendly, socially-fair timber"[9][15].

The Woodmiles Forum will continue to gather and organize data to increase the reliability of the woodmiles indexes themselves and work collaboratively with a number of persons concerned, including academic researchers, who are working for the establishment of a sustainable society through the use of sustainable timber to make the woodmiles indexes one of the comprehensive indexes of environmental load.

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[1] The Woodmiles Forum, "Bylaws of the Woodmiles Forum", http://woodmiles.net/english/bylaws.htm

[2] T. Fujiwara, "Energy consumption due to transportation of wood and policy for local wood promotion: Policy evaluation with the Woodmileage", *the proceedings of 2004 Conference of The Society for Environmental Economics and Policy Studies (SEEPS)* in Japanese

[3] T. Fujiwara et al., "ENERGY CONSUMPTION THROUGH TIMBER TRANSPORTATION AND THE WOODMILES -THE POSSIBILITIES OF THE WOODMILES INDEXES FOR EVALUTAION OF BUILDING" *SB05Tokyo* (2005)

[4] A total of 136 networks are registered as the data for those who "wish to build a house with local timber" on the website titled "Database on house building, focusing on traceability" managed by the Japan Housing and Wood Technology Centre at http://iezukuridb.howtec.or.jp/. (As of December 2007)

[5] Housing Department, Nagano Prefecture: "Results of the questionnaire survey on the support system for house building, etc. using local timber in fiscal 2007." (September 2006)

[6] Under the Kyoto Protocol, the Japanese Government made a commitment to reduce greenhouse gas emissions by 6% from the 1990 level during the first commitment period between 2008 and 2012. The emissions in the household sector were 129 million ton in 1990, which had increased to 170 million tons in 2003. There are 17 million households in Japan. If the committed reduction target under the Kyoto Protocol is allocated to the respective households, the amount of reduction will be 1.04 ton/household, which is a total of 6% (8 million ton) of the base year and the increased amount (41 million ton) divided by the number of households.

[7] In May 2006, Japan proposed the "Cool Earth 50" initiative, calling for a halving of global greenhouse gas emissions by 2050

[8] UNFCCC COP13, "Bali Action Plan"(2006/12)

[9] http://www.fairwood.jp/woodguide/index.html