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REPORTS ON INTER-SESSIONAL ACTIVITIES

ISSUES RELATED TO EMISSIONS FROM FOREST HARVESTING AND WOOD PRODUCTS

Submissions from Parties

Note by the secretariat

1. At its eleventh session, the Subsidiary Body for Scientific and Technological Advice invited Parties to submit, by 15 March 2001, their views on approaches for estimating and accounting for emissions of carbon dioxide from forest harvesting and wood products, taking into account the report of the IPCC expert meeting on that subject held in Dakar, Senegal, from 5 to 6 May 1998, for compilation into a miscellaneous document and consideration by the SBSTA at its fourteenth session (FCCC/SBSTA/1999/14, para. 69).

2. As at 17 April 2001, the secretariat has received ten such submissions.* In accordance with the procedure for miscellaneous documents, these submissions are reproduced in the language in which they were received and without formal editing.

* In order to make these submissions available on electronic systems, including the World Wide Web, these submissions have been electronically imported. The secretariat has made every effort to ensure the correct reproduction of the texts as submitted.

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PAPER NO. 1: AUSTRALIA

**ESTIMATION OF EMISSIONS OF CO₂ FROM FOREST
HARVESTING AND WOOD PRODUCTS**

Australia welcomes the opportunity to make a submission on approaches for estimating and accounting for emissions of CO₂ from harvested wood products.

We note that consideration of issues related to harvested wood was due to commence in 2001 because it was envisaged that key decisions on Land Use, Land Use Change and Forestry, especially in relation to the treatment of greenhouse sinks in the Kyoto Protocol, would have been taken by Parties at COP6. However negotiations on LULUCF are continuing with the result that there is still significant uncertainty in relation to the accounting framework and scope of sinks activities under the Kyoto Protocol. It will be important that the implications of decisions on these issues are understood when considering future options and directions for the accounting for harvested wood products.

Australia considers, therefore, that substantive consideration of policy and technical issues raised by the accounting and attribution of emissions from harvested wood at SBSTA 14 is premature. This consideration should be deferred to SBSTA 15.

However, if Parties wish to begin an initial consideration of harvested wood at SBSTA 14, Australia believes that this should focus on an examination of current and proposed approaches including those presented in the Dakar Report, and methodologies for accounting and attribution of emissions. This consideration could form the first step towards development of a program of work to support future consideration and decision making on the treatment of harvested wood under the Protocol.

Future work program

The IPCC Dakar report and the options it contains for harvested wood products accounting will provide a significant input to further work.

Australia suggests that SBSTA should consider elements of a work program, in order to address a range of technical issues that require further analysis to inform future decision making. This work program should include:

- Work to enhance methodologies for life-cycle analysis of carbon stored in harvested wood products, including product lifetimes and decay functions in the range of harvested wood product and methods for tracking emissions across countries.
- Examination of the impact of current and proposed allocation options for the accounting of emissions from harvested wood on international trade in wood products, including the options presented in the IPCC Dakar Report.

The SBSTA should consider to what extent accounting for harvested wood can be elaborated through the ongoing IPCC work on good practice guidance for Land Use, Land Use Change and Forestry, and to what extent inventory matters are being advanced in a longer time frame.

The SBSTA should consider how to progress analytic and technical work not covered by the IPCC process to address good practice.

PAPER NO. 2: CANADA

**ESTIMATION OF EMISSIONS OF CO₂ FROM FOREST HARVESTING
AND WOOD PRODUCTS**

Abstract

This paper summarizes Canada's views on accounting approaches and methods for dealing with harvested wood products and offers some suggestions on a way forward. The note attempts to clarify the difference between "approaches" and "methods" for accounting for wood products, describes areas where Canada believes there remains some confusion, particularly with respect to the difference between attribution and allocation of emissions and suggests some general guiding principles for evaluating various approaches.

As stated in previous submissions on land use, land-use change and forestry, Canada believes that full carbon accounting, including that related to harvested wood products, is necessary to deal properly with the issue of "sinks". It is Canada's view that by excluding certain sectors and activities that ultimately influence the atmospheric concentrations of greenhouse gases, the Kyoto Protocol fails to foster the sustainability of existing forests and agricultural soils. This is particularly relevant for those countries in which stocks of carbon in wood products are increasing and therefore, should be included in the accounting.

Canada would like to emphasize the difference between "approach" and "method" as in Lim et al. 1999¹, whereby an approach is a "conceptual framework for estimating emissions and removals of greenhouse gases in inventories for a particular sector", while a method is "the calculation framework for estimating emissions and removals within an approach".

The usual "approach" for estimating emissions, whether it be to produce an inventory for an entity, sector, region, or country, is to quantify the emissions where and when they occur. This is commonly referred to as proper attribution; i.e., an approach whereby the source, timing and cause of an emission are identified. Allocation assigns responsibility for emissions. Allocation may differ from attribution depending on which system boundaries are established. Allocation differs from attribution when the accounting approach taken changes the system boundaries such that the responsibility for emissions is not necessarily based on national boundaries.

Recognizing that the land-use change and forestry sector is somewhat different than other sectors, primarily because of the closed nature of the carbon cycle, the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories take a unique approach to account for both emissions and removals from biogenic sources. Both emissions and removals are allocated to the same sector (i.e. land-use change and forestry), regardless of the source. Moreover, for reporting purposes, net emissions remain separate from net removals. Given that the system boundaries for national inventory purposes are national boundaries, accounting and reporting for emissions from wood products could be done without taking into consideration whether or not this provided incentives or disincentives (i.e. with respect to trade, recycling, use of wood products, biodiversity, forest sustainability...)

¹ Lim B., S. Brown and B. Schlamadinger 1999 Carbon accounting for forest harvesting and wood products: review and evaluation of different approaches *Environmental Science and Policy* 2:207-216

Two fundamental questions arise though. How does one estimate emissions based on changes in stocks in the wood products pool? And should the allocation of those emissions be done so that it provides incentives or should it be strictly based on national inventories i.e. proper attribution? Clearly, a reduction in carbon stocks does not necessarily represent an emission to the atmosphere. In fact, it is for this reason that there is general consensus that the IPCC default approach overestimates emissions by failing to account for carbon stored in wood products.

Given competing national interests, finding a single accounting approach acceptable to both importers and exporters of wood products is clearly a tall order. In any case, whatever approach is taken to reporting of wood products for purposes of meeting targets, it is clear to Canada that a proper standardized, complete, meaningful and consistent national inventory reporting and accounting system must be maintained for all sources and sinks within a national inventory.

Context

At its 11th meeting, SBSTA invited Parties to submit, by 15 March 2001, their views on approaches for estimating and accounting for emissions of carbon dioxide from forest harvesting and wood products, taking into account the report of the IPCC expert meeting on that subject held in Dakar, Senegal, from 5 to 6 May 1998, for compilation into a miscellaneous document and consideration by SBSTA at its fourteenth session (FCCC/SBSTA/1999/14 para. 69).

This invitation by SBSTA originates from a request by New Zealand that wood products under Article 3.3 of the Protocol be addressed. Some fundamental differences, however, exist in the way sources and sinks from land-use, land-use change and forestry (LULUCF) are treated under the FCCC and the Protocol. Firstly, the Protocol, and in particular Article 3.3, provide an incomplete coverage of LULUCF activities, whereas under the UNFCCC all sources and sinks are included. Secondly, tracking forest products from Kyoto ARD lands or from forest conversion alone (such as in module 5-3 of the 1996 IPCC Revised Greenhouse Gas Inventory Guidelines) only provides a partial picture and would be extremely difficult for most countries.

The challenges faced in addressing the issue of wood products are further compounded by the current political uncertainty in the ongoing negotiations on land-use, land-use change and forestry (LULUCF) under the Kyoto Protocol. Decisions on additional activities to include under Article 3.4., and on measurement and accounting systems for Articles 3.3 and 3.4 have yet to be made.

Canada welcomed the opportunity offered by the New Zealand government to discuss wood product issues at the recent workshop hosted in Rotorua, 13-17 February, 2001. In many ways the workshop helped to focus our thoughts on those issues of most relevance and concern to various Parties. Canada shares many of the views expressed at the workshop and we hope that the results of the workshop and the views provided by individual Parties will help to stimulate further discussion by SBSTA on this topic.

Overall perspective

Canada would like to emphasize the difference between “approach” and “method” as in Lim et al. 1999, whereby an approach is a “conceptual framework for estimating emissions and removals of greenhouse gases in inventories for a particular sector”, while a method is “the calculation framework for estimating emissions and removals within an approach”.

The usual “approach” for estimating emissions, whether it be to produce an inventory for an entity, sector, region, or country, is to quantify the emissions where and when they occur. This is commonly referred to as proper attribution; i.e., an approach whereby the source, timing and cause of an emission are identified. Allocation differs from attribution when the accounting approach taken changes the system boundaries such that the responsibility for emissions is not necessarily based on national boundaries.

Canada believes that an emissions and removals inventory, and by extension a carbon accounting system, should not be designed on the basis of which incentives, or disincentives it may provide. An accounting system designed as a policy tool is likely to not only create perverse incentives, *but also fail to accurately measure and estimate C emissions and removals*. It is our view that the primary objective of national inventory guidelines, which should include methodologies for accounting for emissions from wood products, is to improve the accuracy and completeness of GHG inventories and reporting under the Framework Convention on Climate Change and under the Kyoto Protocol. A system that provides a complete, transparent and accurate attribution of emissions and removals will enable good policy making which in turn can create the appropriate incentives or disincentives to action.

In an attempt to strike a balance between technical/scientific and policy objectives, the IPCC, experts and governments have been so far unable to agree on an approach to account for carbon stored in wood products. Incentives, disincentives, policy and trade implications of various approaches underlie a series of technical and policy criteria for selection. However, in dealing with the wood products accounting issue, it seems that discussions to date have focused on incentives rather than on methodologies. In Canada’s view, there is no need to establish an allocation approach for reporting under the FCCC, or even under Article 5.2 of the Protocol, to provide incentives since there are no emission reduction targets that include the entire LUCF category.

It is clear that emissions from sources and removals by sinks in the LUCF category do indeed form a closed cycle and should be treated in a manner that acknowledges this. The 1996 IPCC Guidelines recognize this by treating this sector uniquely, and for reporting purposes by separating net emissions from net removals. In fact, the IPCC Guidelines themselves state that a methodology for accounting for carbon stored in products is a “priority for future work” (Revised 1996 IPCC Guidelines for NGI – Reporting Instructions, Overview – General notes on the Guidelines, para d).

It is only under the Kyoto Protocol Articles 3.3 and 3.4 (or under any future legally binding agreement encompassing sinks) where some emissions and removals from LULUCF are included to aid in meeting legally binding targets, that incentives have a role to play. In Canada's opinion, the accounting of "sinks" and delayed emissions from wood products in the Kyoto Protocol may require that an allocation approach be used. The allocation approach

would take incentives into account and for example, would promote the use of biomass as a fossil fuel replacement, promote the use of wood products, promote a reduction in deforestation and promote the enhancement of sustainable forestry and agriculture, and generally take equity and environmental integrity into account. We see that allocation is truly a policy decision, whereas attribution or proper inventorying of emissions and removals should not be. A possible way forward would be that the allocation of emissions (the responsibility) be clearly distinguished from the attribution of emissions to their actual sources, when and where they occur (the inventory itself).

Guiding Principles

Canada believes the two following simple, and yet critical, principles should help to provide a basic framework for decision making on wood products.

Scientific credibility

Accounting should ensure that best methods are used so that the environmental objectives and credibility of the FCCC and the Kyoto Protocol are served. The most accurate, complete, transparent and verifiable emissions and removals estimates possible should be obtained. The methodology should be consistent with standard inventory procedure whereby emissions are inventoried and attributed to their actual source in the most direct and logical way, that is where (within national boundaries) and when (in the year of the inventory) they take place. It is consistent with the manner in which emissions are attributed in the energy and industrial sectors.

Feasibility

Feasibility refers mainly to availability of data and applicability by a vast majority of Parties. All methods primarily rely on FAO data. A tiered approach with various degrees of detail (as mentioned in the Dakar expert meeting report and Lim et al. 1999) in our view is a way to address the varying capacities among countries, including the varying availability and quality of data.

Review of Current and Alternative Approaches

The conservative assumption behind the default approach in the Revised 1996 IPCC Guidelines is that all carbon removed in wood and other biomass from forests is oxidized in the year of harvest (Revised 1996 IPCC Guidelines for National GHG Inventories, Reference Manual, p. 5.17, Box 5). There is a great deal of consensus around the view that this default method is unrealistic both spatially and temporally, as emissions are not related to the location and the time where they actually occur. In particular, such a method clearly leads to overestimated CO₂ emissions if the forest products pool is in fact increasing. As a matter of fact, the Guidelines indicate that carbon storage in forest products can be included in a national inventory, on the condition that the country can document that existing stocks are actually increasing.

Of the three so called “alternative approaches” to the IPCC default that have been proposed so far, namely the stock-change, the production and the atmospheric flow approaches, only the atmospheric flow approach attributes emissions and removals to where and when they

occur. Emissions are allocated to the consumer and removals, to the producer. The other two, in dealing with changes in stocks, and not necessarily emissions, are allocation approaches that allocate responsibility for the emissions associated with the oxidation of the various wood products to users or producers.

Below is a description and review of the approaches as Canada understands them. The reader can find in the Annex 1 to this submission four flow diagrams and in Annex 2 a comparison of the application of the four approaches to wood product carbon accounting in a single country, starting with an annual forest growth of 100 units (C removal from the atmosphere).

The **stock-change** approach estimates net changes in carbon stocks in the forest and the wood products pool *and considers them as emissions or removals*. Changes in C stocks in forests are accounted for in the producing country, whereas changes in the wood products pool are accounted for in the consuming country.

The stock change approach deems exported wood products as emissions for the exporting country (where no emissions actually occur), and in doing so fails to temporally and spatially attribute emissions to their source. The C stock changes in wood products within national boundaries may not reflect actual emissions and removals within those boundaries. This approach, which gives a credit for importing C in wood products, by increasing the importers' domestic C stocks, clearly favours net importers and disadvantages net exporters.

The **production** approach attributes both net changes in forest C stocks and the wood products pool to the producing country. Stock changes are counted when, but not where they occur if wood products are traded. In Canada's view, the production method fails to adequately represent reality in the sense that carbon emissions are allocated to the producing country, even if products are traded. The rationale for this approach appears to be to allocate responsibility for delayed emissions from exports to the producer, regardless of the fate of the product. The use of default decay rates adds some uncertainty that offsets the possible advantages gained by using simpler data sets and calculations. An alternative would be to track the fate of C in the consuming countries and apply country specific decay rates, but this would be cumbersome, if not impossible. Should a production approach be adopted, its implementation would greatly depend on international agreements on commodity categories and associated decay rates, so that an exporting country can assign the appropriate decay functions (and post-use) to each product.

Both stock-based approaches (namely the stock-change and the production approaches) consider a net change in stock as being a source/sink regardless of the various processes by which a C stock can increase or decrease, which may or may not result in emissions or removals. This is the major difference between the stock based approaches and the atmospheric flow approach.

The **atmospheric flow** approach accounts for forest emissions and removals of carbon to and from the atmosphere within national boundaries, where and when they occur. Removals from forest growth are counted in the producing country, and emissions from oxidation, in the consuming nation. As mentioned previously, completeness and accuracy will greatly benefit from an approach which best reflects reality, that is where and when emissions and removals occur.

The flow approach, by providing a more explicit identification of sources and sinks than the other approaches, provides clear signals to undertake the “right actions” to enhance sinks and to reduce emissions such as through the use of bioenergy to displace fossil fuels, recycling and curbing emissions from landfilled wood waste. The explicit identification of sources provides a better indicator of progress achieved by specific actions or policies.

Information gaps

All approaches have, in general, a common need for better data, in particular in the following areas:

- Lifetimes and decay rates (or C retention curves) for commodities;
- Definitions of the proportion assumed not to decay;
- Definition of the different products pools within tiered methods, including characteristics;
- Wood fuels;
- Wood waste stream (incineration, landfills, recycling...).

Currently, all approaches only deal with the first economic life of wood products. The literature suggests that a large proportion of short-lived commodities accumulate in landfills where they do not decompose. Landfills are important carbon pools and should be considered as part of a higher tier method of any of the approaches. It is also important, for wood products in landfills, that clear linkages with the Waste category of the IPCC Guidelines be established and appropriate accounting methods developed to ensure consistency and minimization of double counting.

While there are uncertainties, there is also uncertainty in all other parts of an emissions and removals inventory including estimates of forest inventories and forest CO₂ removals. Furthermore, additional uncertainty is added by not examining all fluxes or changes in stocks. Some methods within the proposed approaches use both flux and stock data in the calculations to estimate the uptake by forests. The selection of an approach does not necessarily restrict the use of either flux or stock data.

The New Zealand workshop also identified the need for an adequate assessment of trade flow implications of the various approaches, to which Canada concurs. Canada is also willing to participate in an international collaborative study, as proposed at the workshop, that would include case studies, and believes it is a way to advance an understanding of the issues and implications as well as the capacity for reporting on wood products and in developing inventories.

Conclusions and Possible action by SBSTA/IPCC for a proactive way forward

Canada recognizes several issues whose resolution may help in reaching agreement on wood product accounting. Examples are:

1. If an atmospheric flow approach were to be selected to account for the fate of harvested material, a question would arise as to whether the estimates obtained with the atmospheric flow approach can be reconciled with those obtained under Article 3.3 which states that

net changes in emissions and removals from ARD since 1990 are to be measured as verifiable changes in stock in each commitment period.

2. The stock-change approach does not distinguish between reductions in C stocks due to emissions to the atmosphere and export of harvested material. Thus wood exports have the same impacts on C stocks as emissions, even if their impacts on the atmosphere differ. Countries exporting wood products are likely to be concerned about this impact on their C balance. Are there ways in which this concern can be addressed? Will the economic system attach a price to the exported C that provides adequate compensation for the impacts on C stocks?
3. Implementing the production method will require assumptions about the decay of forest products and the fate of forest products after their useful life in the countries to which these products have been exported. Will it be possible to agree on a set of wood commodity categories, attach decay rates to each commodity pool (including landfills) and agree on assumptions about the fate of products after their useful life? Even if such an agreement can be reached, how will country-specific management differences, e.g. the use of disposed wood products for energy production or recycling be accommodated in such a system?

To conclude, Canada believes it is critical to identify the location, timing and cause of emissions and removals, including those from wood products. This is ultimately the purpose of a national inventory whose aim is to target areas for emissions reductions and removals enhancement. Given competing national interests, finding a single accounting approach acceptable to both importers and exporters of wood products is clearly a tall order. Perhaps the most constructive direction is toward a separation between scientific accounting issues (the attribution) and the assignment of responsibilities (the allocation). Whatever approach is taken to reporting of wood products for purposes of meeting targets, it is clear to Canada that a proper standardized, complete, meaningful and consistent national inventory reporting and accounting system must be maintained for all sources and sinks within a national inventory.

As a means to increase understanding, capacity and transparency in reporting, Canada would like to suggest that Parties be encouraged to report estimates obtained with all approaches available (default IPCC and three alternatives), to the extent possible, using tiered methods as appropriate, and submit adequate background information. Canada recognizes that in order to do so, approaches and methods would need to be clearly defined. This could be an issue for the IPCC Good Practice Guidance workplan to address, to the extent possible.

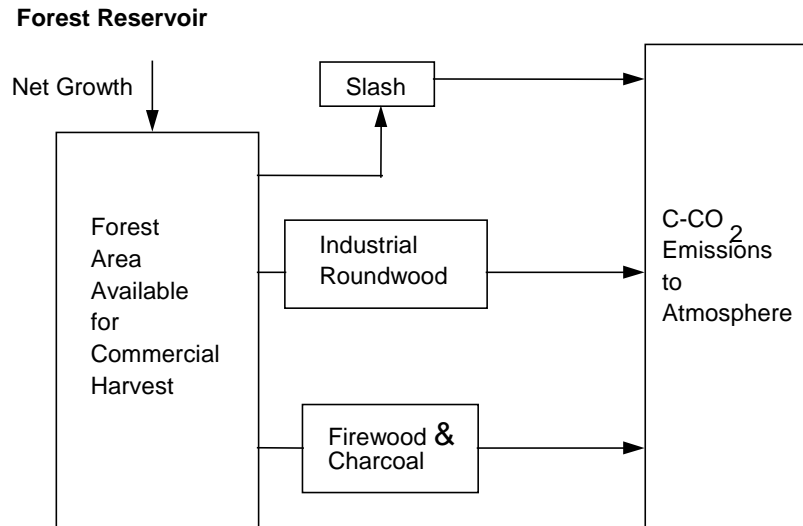
There are also other products not made of wood such as strawboard which can store carbon for long periods of time and for which the accounting issues are identical to those for wood products. Canada sees this as another potential area that should be examined along with forest products.

As far as the way forward is concerned, SBSTA 14 will discuss country submissions on wood products. Around the same period of time, CoP6 will resume and hopefully adopt a LULUCF decision on Articles 3.3 and 3.4, including possible guidance to IPCC on work on methodological issues on LULUCF. In any event, Canada believes that a CoP decision related to Articles 3.3. and 3.4 must take precedence over any decision on wood products. Furthermore, given the opportunity provided by the future work of the IPCC on Good

Practice Guidance on LULUCF, Canada would like to suggest that SBSTA give guidance to the IPCC on the necessary and relevant methodological work on wood products that could be coupled with the IPCC Good Practice Guidance work programme.

Annex 1. Schematics of the current (default) IPCC approaches and of the three alternative accounting approaches for C in wood products.

Current IPCC approach:

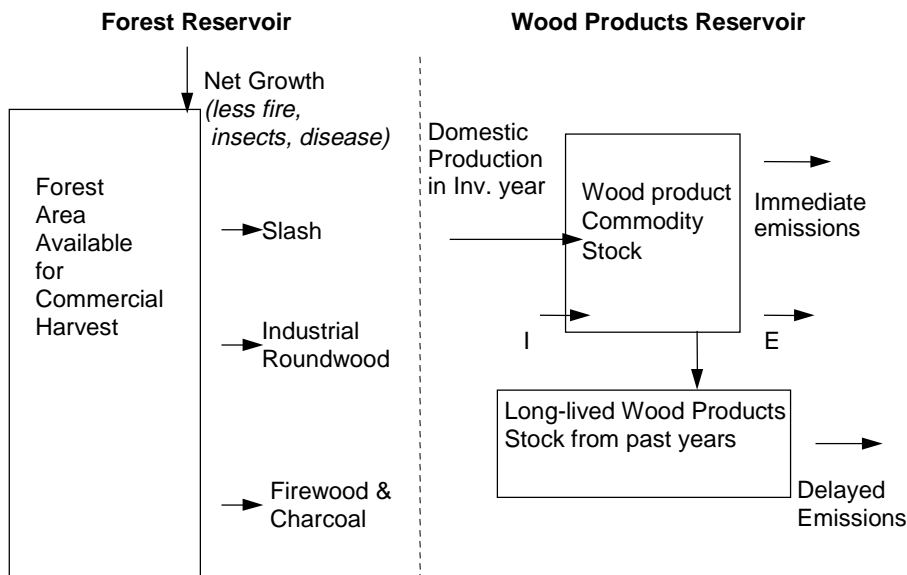


FAO Definitions:

Roundwood = Industrial Roundwood + [Firewood & Charcoal]

Industrial Roundwood = Sawnwood + Wood-base Panels + Pulpwood + Other Ind. Roundwood

Stock-change approach:



$$\text{Stock change} = (\text{stock change forest}) + (\text{stock change products stored domestically})$$

$$= (\text{forest growth} - \text{slash oxidation} - \text{roundwood harvested} - \text{firewood \& charcoal combustion})$$

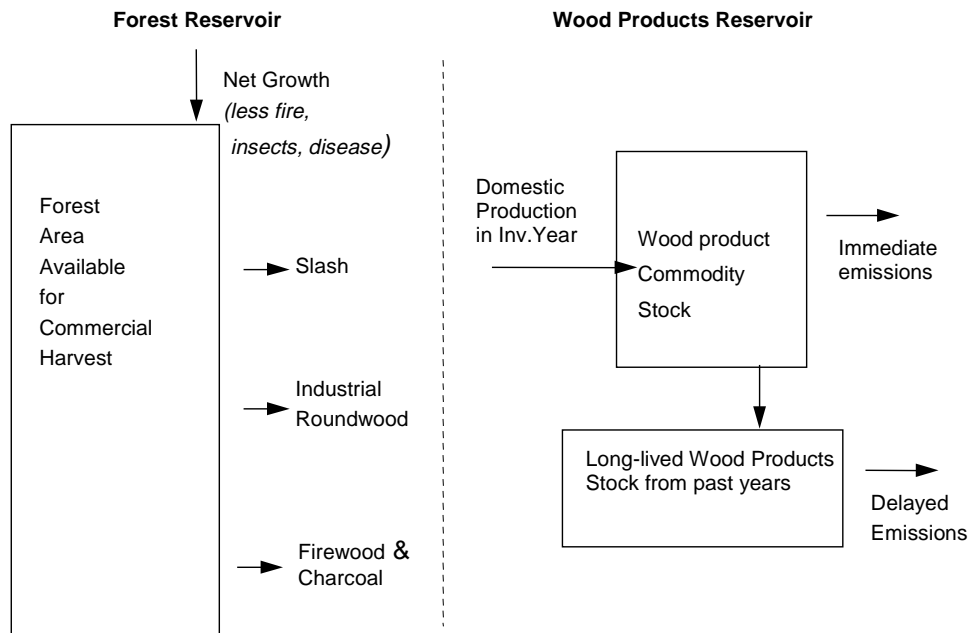
$$+ (\text{commodity production} - \text{net trade} - \text{immediate emissions} - \text{delayed emissions})$$

Net trade = exports - imports

Immediate emissions = oxidation of wood commodities consumed domestically

Delayed emissions = decay of the national stock of long-lived wood commodities

Production approach:



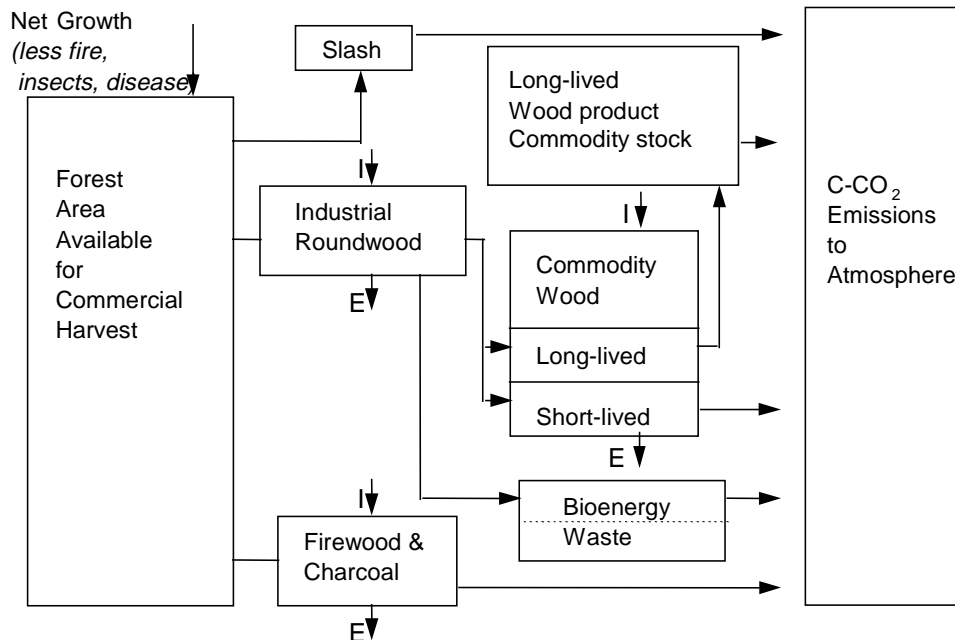
$$\text{Stock change} = (\text{stock change forest}) + (\text{stock change commodities made of wood grown domestically})$$

$$= (\text{forest growth} - \text{slash} - \text{roundwood harvested} - \text{firewood \& charcoal}) + (\text{commodity production} - \text{immediate emissions} - \text{delayed emissions})$$

Immediate emissions = oxidation of short-lived wood commodities made of wood grown domestically

Delayed emissions = decay of long-lived commodities made of wood grown domestically

Atmospheric flow approach:



$$\text{Atmospheric flow} = \text{forest growth} - \text{slash oxidation} - \text{delayed emissions} - \text{immediate emissions} - \text{waste oxidation and bioenergy combustion}$$

Annex 2: Comparison of the application of the four approaches to wood product carbon accounting in a single country, starting with an annual forest growth of 100 units (C removal from the atmosphere).

		Default	Stock Change	Production	Atmospheric Flow
1	Growth	100	100	100	100
2	Fire emissions	6	6	6	6
3	Slash emissions	25	25	25	25
4	Industrial Roundwood Harvested	55	55	55	55
5	Firewood & Charcoal emissions	10	10	10	10
6	Change in forest stock	4	4	4	n/a
7	Production of wood commodities: a.Long-lived b.Short-lived	n/a	30 10	30 10	30 10
8	Imports of wood commodities: a.Long-lived b.Short-lived	n/a	5 3	n/a	5 3
9	Exports of wood commodities: a.Long-lived b.Short-lived	n/a	11 6	n/a	11 6
10	Delayed emissions from long-lived wood commodities stock	n/a	20	28	20
11	Emissions associated with oxidation of short-lived commodities consumed domestically (row 7b + row 8b – row 9b)	n/a	7	n/a	7
12	Emissions associated with oxidation of short-lived commodities produced domestically (row 7b)	n/a	n/a	10	n/a
13	Change in wood commodities stock (row7 + row8 – row9 – row10 – row11 – row12)	n/a	4	2	n/a
14	Bioenergy/waste emissions	included in row 4	included in row 4	included in row 4	15
15	Net emissions (+) / removals (-)	-4	-8	-6	-17

The ordering of the approaches is arbitrary, and the numerical example is totally hypothetical

N/a = not applicable

Net removals (row 15) are calculated in the following way:

Default: row 15 = - row 1 + (row2+row3+row4+row5) = - row6

Stock change: row 15 = - row 6 - row 13

Production: row 15 = - row 6 - row 13

Atmospheric flow: row 15 = - row 1 + (row 2 + row 3 + row 5 + row 10 + row 11 + row 14)

PAPER NO. 3: JAPAN

VIEWS ON CARBON ACCOUNTING OF HARVESTED WOOD PRODUCTS

1. Basic viewpoints

(1) Role and implication of harvested wood products to climate change prevention / mitigation

In considering carbon accounting of harvested wood products (HWP), it should be fully recognized that HWP are one of the carbon reservoirs and sustainable management, conservation and enhancement of them would contribute to prevention / mitigation of global climate change, which should form a basic viewpoint for this consideration. It should also be noted that this viewpoint is reflected in both UNFCCC and the Kyoto Protocol:

UNFCCC, Article 4

“1. All Parties, ... , shall:

...

(d) Promote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gasses not controlled by the Montreal Protocol, including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems;”

Kyoto Protocol, Article 2

“1. Each Party included in Annex I, ... in order to promote sustainable development, shall:

(a) Implement and/or further elaborate policies and measures in accordance with its national circumstances, such as:

...

(ii) Protection and enhancement of sinks and reservoirs of greenhouse gases not controlled by the Montreal Protocol, taking into account its commitments under relevant international environmental agreements; promotion of sustainable forest management practices, afforestation and reforestation;”

(2) Environmental integrity and appropriate incentives

It has been recognized that environmental integrity should be kept in measures for global climate change prevention / mitigation. Carbon accounting of HWP should be treated under the same notion. Therefore, environmental integrity should be fully realized when applying carbon accounting of HWP and special attention should be paid to sustainable forest management since HWP are produced from forest resources.

It should also be noted that appropriate incentives would be realized if environmental integrity is fully recognized as a basic viewpoint. In other words, appropriate incentives to enhance these good qualities be encouraged by clearly recognizing environmental integrity including sustainable forest management as a basis for considering carbon accounting of HWP while inappropriate incentives such as excessive harvesting and/or deforestation be avoided at the same time.

(3) Equity in application of HWP carbon accounting

Equity should be maintained between producing and consuming countries when applying HWP carbon accounting. In particular, equity should be considered in terms of (a) carbon stock and its change to be accounted for producing and consuming countries, (b) implication to wood industries and other relevant economic sectors.

(4) Scientific, technological and other issues

Prerequisite in considering the application of HWP carbon accounting should be based on full consideration of scientific and technological issues as well as various impacts caused by the application of HWP carbon accounting. In particular, scientific and technical expertise is indispensable in considering above-mentioned (1) through (3).

As relevant scientific and technological expertise has not been fully prepared yet, it is necessary to consider how and which expertise is required and to establish national as well as international framework for these considerations.

(i) Scientific and technical issues

In accounting HWP (i.e. carbon stock of HWP and its change), basic data on production, consumption, trade, lifetimes of products, and disposition (combustion, landfill, etc.) are needed, which are satisfactory enough in terms of uncertainty, transparency and verifiability. Scientific and technical consideration for the collection, estimation and measurement of these data is necessary. Especially, measurement of disposition is difficult compared to measurement of production and other data, and GHGs emitted would vary between combustion and landfill, so that future study is particularly needed for disposition.

In addition, socio-economic situation and/or relevant policies such as enhancement of wood product utilization, extended lifetime and recycling, would also impact on HWP. Therefore it would be necessary to analyze which factors would bring what kind of impact to what extent on HWP.

It should also be reminded that each country has different conditions which should be reflected in above-mentioned considerations.

(ii) Implication of application of HWP carbon accounting

Implication of accounting approaches should be fully analyzed before actually applying HWP carbon accounting.

Several accounting approaches had been presented and considered at IPCC / OECD / IEA Expert Meeting held in May 1998, Dakar, Senegal, which have not been analyzed in details so far. Detailed analysis on the approaches should be made first. This means analysis on the following issues should form a basis for political discussion on the practical application of HWP;

- Implication of the proposed three approaches on global climate change prevention / mitigation as well as environmental integrity and incentives

- Impacts that the proposed approaches would bring on carbon accounting in producing and consuming countries, wood products trade, wood industries and other relevant economic sectors

It is also important to analyze what cost (technical, financial, other) producing / consuming countries should bear in estimating and measuring carbon accounting of HWP.

2. Necessity of the establishment of international collaboration on scientific and technical issues

As stated in 1 (1), it should be considered in mid and/or long term that HWP should be reflected in carbon accounting as is the case of carbon sinks including forest, sustainable management, conservation and enhancement of HWP should be sought since HWP is one of the carbon pool.

On the other hand, the issues mentioned in 1 above should be fully studied before making political discussions on practical application of HWP carbon accounting. In particular, as stated in 1 (4), scientific and technical issues as well as implication of accounting approaches should be analyzed in detail with sufficient expertise and time frame, which is indispensable for future political discussions and conclusions on practical applications of HWP carbon accounting.

Therefore it should be sought to establish international collaborative framework to deal with scientific / technical issues and implication of accounting approaches. In carrying out collaborative studies, the following points should be reminded:

- Relevant international institutions with sufficient expertise and experiences should be invited.
- Experts and specialized institutions from wide range of expertise should be invited, as required, since socio-economic issues should also be analyzed.
- Regional balance should be considered upon selecting experts, in order that various conditions of the countries be reflected and equity be realized.

3. Application of HWP carbon accounting in practice

Application of HWP carbon accounting, that is to reflect the accounting in the emission reduction commitment, should be initiated in the second commitment period or later, however, it is inappropriate to initiate it in the first commitment period. The reasons are reflected as follows:

(1) Background of the negotiations

Framework for emission reduction target in the first commitment period and application of carbon sinks in achieving this target are specified in the Kyoto Protocol formulated at COP3, December 1997. In the process of considering reduction target and application of sinks, it was not clearly envisaged that carbon accounting of HWP be also included. It would therefore be afraid that the negotiation on sinks would be further complicated if HWP carbon accounting be also included in the first commitment period, which is to bring about different framework for emission reduction target from what had been envisaged at COP3.

It should be also born in mind that in the process towards COP6 inclusion of HWP in carbon accounting was not explicitly envisioned:

- Only limited number of countries included HWP carbon stock in their country submissions on 1 August 2000 (Japan did not included HWP in its submission).
- In the discussion of LULUCF negotiation text, inclusion of forest management under 3.4 has been discussed, but HWP was not clearly envisaged to be included in forest management.

(2) Conclusion at SBSTA11/COP5

The issue of HWP carbon account had been on the table at SBSTA11/COP5. In this occasion Japan expressed its view that it was still premature to discuss on this issue as detailed analysis has not been made including IPCC / OECD / IEA Expert Meeting in Dakar. It was concluded at SBSTA11/COP5 that 1) the Parties were invited to submit their views on this issue by 15 March 2001, and 2) consideration of this issue should have been taken place at SBSTA14. Japan understands that this conclusion reflects that the consideration of this issue should be initiated after COP6, which means that application of HWP carbon accounting should be at the second commitment period or later.

(3) Consideration on relevant issues

As stated in 1. (4) and 2., detailed consideration and analysis on scientific and technical issues as well as implication of accounting approaches should be prerequisites for policy discussion on the application of HWP. Unfortunately it cannot be said that sufficient consideration and analysis have been carried out and necessary expertise and experiences have been compiled. Therefore, sufficient expertise and time need to be input in considering and analyzing the relevant issues.

The three accounting approaches of HWP presented at IPCC / OECD / IEA Expert Meeting in May 1998, Dakar, Senegal, would form a basis for future consideration. As mentioned above, detailed studies should be made when analyzing the three approaches. Japan would like to conduct detailed studies on the relevant issues before coming to the analysis on the approaches.

PAPER NO. 4: NEW ZEALAND

HARVESTED WOOD PRODUCTS

New Zealand supports the further development of reporting and accounting methodologies for harvested wood products under the UNFCCC and the Kyoto Protocol because sustainable sourced forest products expand the global carbon stock through:

- the retention of carbon in short, medium and long life forest products
- recycling of forest products
- providing a source of renewable energy which can displace fossil fuel, and
- the displacement of energy intensive non-wood substitutes

Clearly, optimising the use of harvested wood products is a legitimate strategy to reducing greenhouse gas emissions and increasing carbon stocks.

New Zealand notes that the current IPCC default approach assumes that all CO₂ emissions associated with forest harvesting and the oxidation of wood products are accounted for in the country in which the wood is grown and in the year of harvest. The IPCC Revised 1996 Guidelines for National Greenhouse Gas Inventories do, however, make provision for accounting for harvested wood products (Volume 3, Section 5.7) where a country can document that existing stocks of long term forest products are in fact increasing.

Currently New Zealand exports approximately two thirds of its total volume of Harvested Wood Products. This equates to approximately 2.5 million tonnes of carbon per year. With a projected increase in harvesting over the next ten years this will increase to 4 million tonnes of carbon per year by 2010. New Zealand contends that while the current IPCC default approach may be practical for UNFCCC reporting purposes this approach is inconsistent with the treatment of other emissions e.g. fossil fuel production, exports and consumption. In addition, it fails to take cognisance of the renewable aspects of wood products derived from sustainably managed forests.

New Zealand recognises that harvested wood products represent an important (time-bound) carbon reservoir, which under Article 2 (a) (ii) of the Kyoto Protocol, require protection and enhancement. Improving the total use of sustainably grown wood products offers the opportunity to expand a carbon reservoir that can result in increased carbon stocks over time through the increased utilisation of wood products. Importantly, the increased use of harvested wood products may allow for both direct and indirect fossil fuel substitution and thus assist in reducing atmospheric emissions from fossil fuels.

For the above reasons New Zealand wants further development of methodologies beyond the work reported back from the IPCC/OECD/IEA meeting on Evaluating Approaches for Estimating Net Emissions of Carbon Dioxide from Forest Harvesting and Wood Products held in Dakar, Senegal, in May 1998.

In designing and implementing a system to monitor the carbon emissions from harvested wood products New Zealand recognises that the system developed is required to demonstrate:

- environmental integrity;
- accuracy;
- sustainability; and
- international verifiability.

New Zealand considers that carbon contained in exported wood products is clearly not emitted in the producer country. It is New Zealand's view that the country of consumption is best placed to influence the management of harvested wood products within its borders. Requiring the importing country to account for emissions from all harvested wood products will provide the best incentive to maintain and increase the total pool of harvested wood products.

Further work

In supporting the accounting for harvested wood products, New Zealand acknowledges the need for more work building on the models described in the Dakar Report. New Zealand proposes that the Secretariat sponsor further work on the development of methodologies for the standardisation of the calculations. We believe this work should differentiate between:

- methodological issues associated with establishing the data on wood product stocks from which changes in stocks, and hence carbon emissions to and removals from the atmosphere can be assessed and reported; and
- the accounting rules by which responsibilities for these emissions and removals are allocated to countries.

In particular it will be important to identify product life times for different components of harvested wood products, e.g. short lived products vs long lived products.

New Zealand would like to see this work progressed so that at the next meeting of the subsidiary bodies after the resumed COP 6 the findings from the study could be considered.

New Zealand also proposes that the Secretariat undertake research with regard to:

- Trade ramifications of the accounting of harvested wood products between Annex I countries and non-Annex I countries under the three approaches; and
- Identifying potential market imbalances.

An analysis of international trade implications is required to determine the ramifications for exporting and importing countries under the different possible accounting approaches. A wood exporting country such as New Zealand which produces wood products from sustainably managed forests could be disadvantaged in international markets if its wood products carry additional costs in relation to its international competitors (many of whom are non-Annex I countries).

The results from this work should be available for consideration at a subsidiary bodies meeting in 2002.

Harvested Wood Products Workshop

The New Zealand Government hosted an informal Harvested Wood Products Workshop in Rotorua, New Zealand 12 – 16 February 2001. The Workshop provided an opportunity to discuss and evaluate the methods for accounting for harvested wood products developed at the Dakar meeting and the associated policy issues around the inclusion of harvested wood products in the accounting framework. Appendix I of this submission contains the Chairman's report from the Workshop.

As part of this meeting conditional agreement was reached between 10 countries to undertake an international collaborative study on the development of methodologies for the calculation of transfers of harvested wood products utilising the FAO classifications, data and definitions for forest products.

New Zealand has undertaken to co-ordinate this collaborative study and will make the findings of this work available to the UNFCCC and other interested parties.

Timing Issue

The implementation of accounting approaches for harvested wood products will depend upon the outcome of discussions at a resumed COP 6.

New Zealand's current preference is for harvested wood products to be accounted for in the first commitment period. However, we recognise that this will depend largely on the outcome of the various further research proposed and the state of international negotiations.

New Zealand therefore reserves the right to further submit on this issue pending the outcome of those negotiations.

Appendix 1:

**HARVESTED WOOD PRODUCTS WORKSHOP
ROTORUA
NEW ZEALAND**

12-16 February 2001

Chairman's Summary

INTRODUCTION

The Government of New Zealand sponsored an informal international workshop on the topic of Harvested Wood Products (HWP) to support activities related to the Framework Convention on Climate Change (FCCC) and the Kyoto Protocol. Twelve papers and a series of workshop sessions formed the basis of discussions held in Rotorua, New Zealand from 12–16 February 2001. These papers are available on the Forest Research website at <http://www.forestresearch.co.nz/site.cfm/hwpworkshop>.

The meeting was attended by 52 participants from 17 countries from governmental agencies, the private sector, international and research organisations. The participants expressed their appreciation and thanks to the New Zealand Government and *Forest Research* for organising and hosting the workshop. NZ Forest Industries Council and the American Forest and Paper Association were thanked for sponsoring the field tour that preceded the workshop.

Please note that any points of view presented in the Chairman's summary do not necessarily represent views of particular Parties to the FCCC and should not be viewed as preliminary positions in preparation for the 14th session of the Subsidiary Body for Scientific and Technical Advice (SBSTA).

BACKGROUND

Under the United Nations Framework Convention on Climate Change (UNFCCC), Parties are committed to prepare national greenhouse gas (GHG) inventories of anthropogenic emissions by sources and removals by sinks. The standard reporting framework for preparing GHG inventories is the *Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories* (Guidelines). The revised 1996 Guidelines were later adopted in Kyoto by the Conference of the Parties as the basis for Annex B Parties to report under the Protocol.

Approaches for accounting for HWP have been the subject of debate within the IPCC process. The last official consideration was the IPCC/OECD/IEA meeting on Evaluating Approaches for Estimating Net Emissions of Carbon Dioxide from Forest Harvesting and Wood Products held in Dakar, Senegal, in May 1998. That meeting sought to identify alternative methodologies to the default approach contained within the Revised 1996 IPCC Guidelines. The IPCC default approach assumes there is no change in the stocks of carbon in wood products and therefore assumes that “all carbon in biomass harvested is oxidised in the removal year”. However, the IPCC Guidelines permit the inclusion of harvested products in national inventories “to account for increases in the pool of forest products. This information would, of course, require careful documentation including accounting for imports and exports of forest products during the inventory period” (Revised 1996 IPCC Guidelines). The accounting approach or methods to be used for such a reporting process are not yet specified. The Dakar meeting defined these terms as follows:

Approach is a conceptual framework for estimating emissions and removals of greenhouse gases in inventories. Within each approach, there may be more than one method.

Method is the calculation framework within an *approach* for estimating emissions and removals of greenhouse gases in inventories.

The accounting approaches discussed at the Dakar Workshop include:

- **Stock Change** approach
This accounting approach uses estimates of net changes in carbon stocks in the forest and wood products pool. Changes in carbon stock in forests are accounted for in the country in which the wood is grown, referred to as the producing country. Changes in the products pool are accounted for in the country where products are used, referred to as the consuming country. These stock changes are counted within national boundaries, *where* and *when* they occur.
- **Production** approach.
This accounting approach also uses estimates of the net changes in carbon stocks in the forests and the wood products pool, but attributes both to the producing country. This approach uses inventories of domestically produced stocks only and does not provide a complete inventory of national stocks. Stock changes are counted when, but not where they occur if wood products are traded.
- **Atmospheric Flow** approach
This accounting approach uses net emissions or removals of carbon to/from the atmosphere within national boundaries, where and when the emissions and removals occur. Removals of carbon from the atmosphere due to forest growth are accounted for in the producing country, while emissions of carbon to the atmosphere from oxidation of HWP are accounted for in the consuming country.

The system boundaries of the three accounting approaches differ. All three approaches offer tiered methods, ranging from the default method based on currently available data, to a second or third tier relying on national statistics of varying levels of detail.

This informal workshop on harvested wood products sought to further develop and refine concepts proposed by the meeting in Dakar. It is intended that the outcomes of the workshop will assist Parties with preparation of submissions due on 15 March 2001 and contribute to the consideration of HWP issues by the SBSTA.

POLICY ISSUES

Among other benefits increasing the stocks of carbon in harvested wood products and increasing the use of biofuels were generally considered to be beneficial to atmospheric greenhouse gas concentrations. Providing there were no disincentives for emission reductions, appropriate incentives and other mechanisms, for increasing the stocks of carbon in wood products and the use of biofuels were generally considered to be policy relevant outcomes.

More information on the magnitude and source of the global and national HWP stocks and movement, and an improved understanding of the responses of these stocks to policy direction would benefit decision-makers. Greater knowledge of the economic, environmental

and social factors that drive demand for wood products, and that influence carbon stocks of these products would assist in achieving these objectives.

A hierarchy of scientifically credible methods may be needed. Such a hierarchy of methods, comparable with other greenhouse gas inventories, is presented in the technical section below.

The meeting noted the clear **distinction between reporting** requirements for HWP under the UNFCCC and **the accounting** requirements under the Kyoto Protocol

The current uncertainty surrounding the Kyoto Protocol, specifically with regard to Articles 3.3 and 3.4, is one aspect limiting the development of policy options relating to HWP.

The challenges in developing policies for dealing with HWP were noted. Important issues raised by some participants included:

- The need for globally relevant policies over the longer term, and their possible conflict with the limited country involvement and forest coverage.
- The Land Use, Land Use Change and Forestry (LULUCF) accounting rules proposed for the Kyoto Protocol.
- The potential impacts of HWP accounting approaches and methods on developing countries.

The meeting agreed that application of the IPCC default accounting approach may not capture the atmospheric impact of HWP and may not provide a direct incentive for the long-term storage of carbon in wood products. However, the meeting also noted that current method provide some incentives for using woody biomass for fuel.

The Dakar Report assessed some policy issues related to the four proposed approaches, e.g., the incentives for sustainable forest management, deforestation, and the use of biofuels. There is a need to further examine the existing and proposed approaches in this policy context. A detailed assessment of the likely impacts of the approaches on trade flows was considered to be necessary by some participants. This assessment may require involvement of a number of competent national and international bodies. Some participants noted that an agreement on approach may facilitate the elaboration of appropriate inventory methods.

Priority topics requiring further information

These items were identified for further investigation:

- Magnitude/scale and source of harvested wood products and their changes over time.
- Assessment of HWP stock changes at a global level as a means of determining the validity of the IPCC default.
- Trade flow implications of the various approaches.

TECHNICAL ISSUES

A hierarchy of methods, ranging from the simple to the complex, was considered to be the most appropriate means of meeting the reporting requirements of various countries.

Production data, including roundwood production, and the imports and exports of wood products, were generally considered to be robust whereas data on stocks and dynamics of

products in use and after disposal, such as product lifecycle information, decay rates, and landfill information were more uncertain.

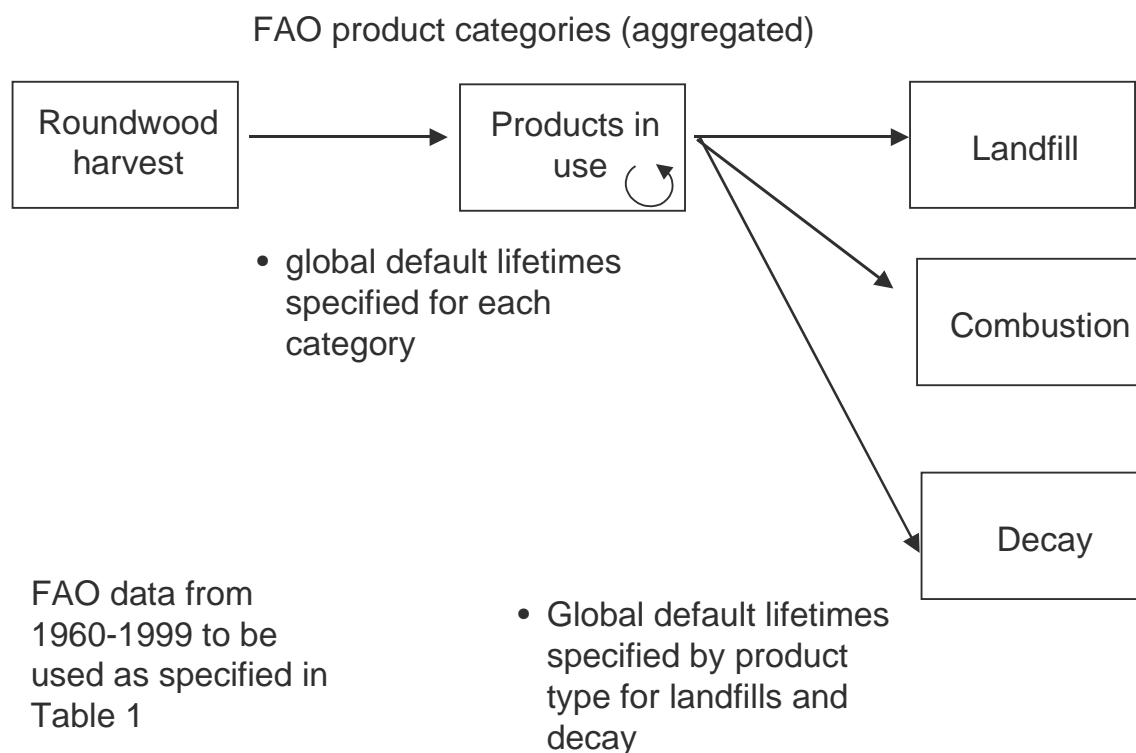
It was suggested it would be difficult to trace the origin of wood products, e.g., from different countries or forests. One solution proposed is to include the management of harvest wood products carbon stock as an additional activity under Article 3.4.

There may be a need for a clear distinction between wood products in use and those disposed of in landfills, and to ensure there is no double counting between sectors. In the future, both LULUCF and waste sector inventory guidelines may require further work.

Tier 1 methods: estimating carbon stock additions, removals and emissions from HWP

A tier 1a method, which is the simplest method, was initiated as shown in Figure 1. The FAO forest products database, which covers the period from 1961-1999, was proposed as a starting point for making estimates. The adequacy of the data and the proposed method need further evaluation. The FAO database, together with estimates of decay and emissions from products could be sufficient to make estimates needed for all the Dakar accounting approaches. An argument was presented that the FAO fuelwood data, which may be less robust, would not be required for estimating stock changes

FIGURE 1: Tier 1a HWP method



Over an extended period (i.e., a time interval at least as long as the product lifetime), these data may be used to estimate the stocks of carbon in the different product pools. It was noted that an incorrect starting stock assumption may generate misleading results because emissions

from wood products generated prior to the start date are ignored. The methodology for calculating the carbon stock data is summarised in Table 1 and a suggestion of aggregated product categories based upon the FAO Classification and definitions of forest products, is presented in Table 2. Data on lifetimes for each product category and in landfills is required to complete the calculation. Examples of product lifetime ranges for these pools are presented in Table 2. The participants suggested that the waste management sector decay guidelines could be used in order to remain consistent with existing IPCC Guidelines. It is acknowledged that estimates of product lifetimes and decay rates will vary regionally and nationally and are based on limited data. Improving the accuracy of these estimates is considered to be a priority topic.

Table 1: Example of Tier 1 calculation methodology

Roundwood harvest (including bark)	=	Products with long lifetime (A)
	+	Products with medium lifetime (B)
	+	Products with short lifetime (C)
	+	fuelwood from roundwood
	+	residue not used for above products

Quantities A, B, and C are intended to be estimates of a country's harvested wood fibre in a year that ends up in products. Countries may export some of the products. Amounts of carbon exported would be noted. Emissions from the products remaining in country would be estimated over time. Emissions from a country's imported wood products would also be estimated over time. For products with HWP inputs from other countries (such as paper and paperboard products which may use imported market pulp) or recycled inputs the method would need to allow for this refinement.

Table 2: Examples of aggregated forest product categories and possible life times

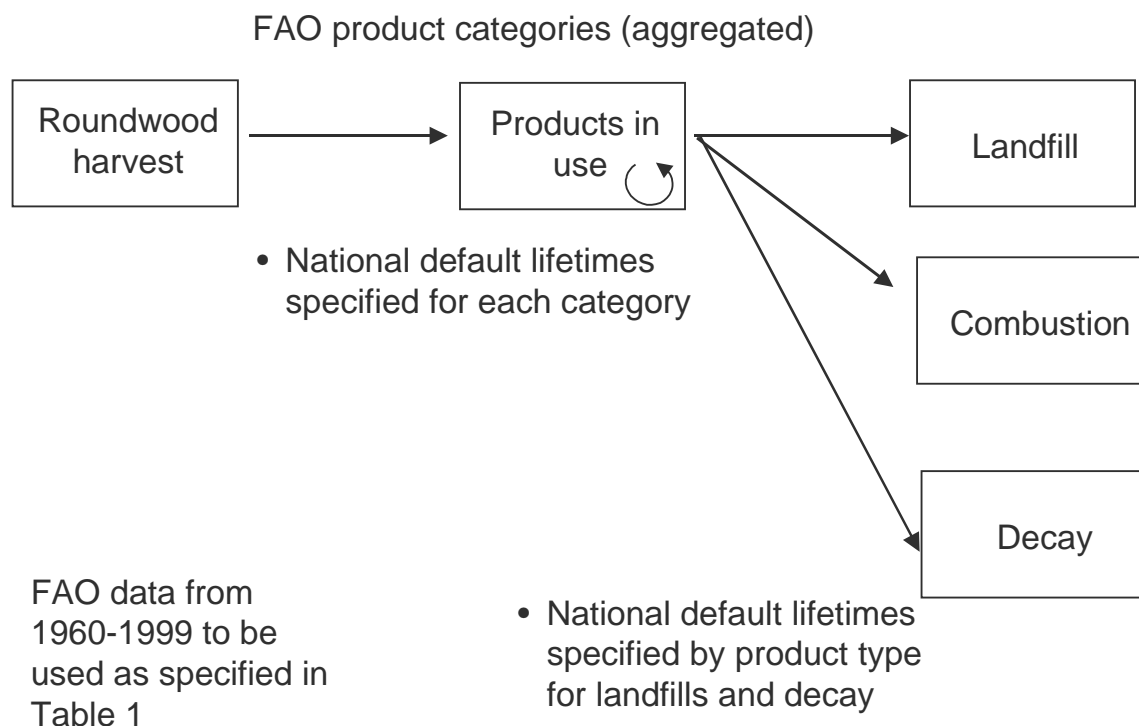
Product category	Product type	Possible life time (years)
Long life time	Softwood sawnwood Hardwood sawnwood Veneer sheets Plywood	40-60
Medium lifetime	Particleboard (including OSB) Fibreboard Fibreboard compressed Medium density fibreboard Hardboard Insulating board	15-30
Short lifetime	Wood pulp Recovered paper Newsprint Printing and writing Household and sanitary Wrapping and packaging Other paper and paperboard	1-3

It is recognised that product lifetimes will vary due to a number of technical and socioeconomic factors. These vary both between region and over time. Where national information is available on product lifetimes, these data may be substituted for the global default values. This method has been termed Tier 1b and is represented in Figure 2.

Tier 2 method: direct inventory

Countries may use their own data to improve inflows and outflows, e.g., roundwood removals, product manufacture, and landfill decay rates. Where suitable data are available, a direct inventory method, which is based on an empirical estimate of the product pool, is preferred. Such a method may result in a more accurate assessment than the Tier 1 methods. At present, some countries are able to undertake a direct inventory of some products. Countries are encouraged to use a hybrid of Tier 1 and 2 methodologies as data availability permits and to move towards a complete Tier 2 method over time. Inventory surveys could be used to initialise Tier 1 methods.

FIGURE 2: Tier 1b HWP method



Priority topics requiring further information

The following list summarises the major areas of data uncertainty. These items are priority topics for further investigation:

- lifetimes of products and product pools
- carbon content of products and product pools
- disposition after use (landfill, burning, decay, recycling)
- rate and extent of decay in landfills
- rate and proportion of carbon emitted from landfills as methane and carbon dioxide
- alignment of assumptions and landfill decay methods with those used in the waste management sector to avoid double counting of emissions.

INTERNATIONAL COLLABORATIVE STUDY

It was agreed that development of a Tier 1 method and a series of case studies testing the Tier 1 and improved methods would be the best means of advancing capability in reporting on HWP, determining the areas of greatest uncertainty and providing input to a variety of accounting approaches. Undertaking the case studies may also guide countries' understandings of the policy implications that need to be addressed in the HWP deliberations.

An informal international study to develop such case studies was tentatively agreed to by the following countries:

- Australia
- Canada
- Finland
- France
- Japan
- New Zealand
- Norway
- Sweden
- United Kingdom
- United States

Other participants indicated that their countries may be able to participate in this study and would confirm their involvement after the meeting. The meeting encouraged the participation of Annex 1 and Non-Annex 1 countries in this work.

New Zealand undertook to coordinate the collaboration. An outline of the proposed collaboration will be circulated by 31 March 2001 and confirmation of participation will be sought by 30 April 2001. The output from this informal collaboration may be used to contribute to formal processes within the framework of the IPCC and UNFCCC.

PAPER NO. 5: NORWAY

**VIEWS ON APPROACHES FOR ACCOUNTING EMISSIONS AND REMOVALS
OF CO₂ FROM FOREST HARVESTING AND WOOD PRODUCTS UNDER
ARTICLES 3.3 AND 3.4 OF THE KYOTO PROTOCOL**

At its 11th session the SBSTA invited Parties to submit views on approaches for estimating and accounting for emissions of CO₂ from forest harvesting and wood products, taking into account the report of the IPCC expert meeting on the subject held in Dakar in 1998, for consideration at SBSTA 14.

This submission contains Norway's views on this issue. We would like to emphasise that our views and proposals, as well as data and information are preliminary.

The submission is divided into three parts. The first part summarises our general views, the second presents our views on the different approaches for estimation proposed at the Dakar-meeting, and in the third part we provide preliminary data and information for Norway related to two of the approaches. Our submission is guided by the report from the IPCC/OECD/IEA Expert Meeting on Land Use Change and Forestry held in Dakar, Senegal in May 1998, the informal workshop on Harvested Wood Products in Rotorua, New Zealand in February 2001, as well as a new Norwegian study on the numeric effects of the different methodological options.

1. General views

Measures to enhance the removals and reduce the emissions from all Land-Use, Land-Use Change and Forestry (LULUCF) activities, including wood products, can be effective in limiting global warming. In our view, any such activity should be consistent with and promote sustainable development and the protection of biological diversity.

It is Norway's general view that all relevant carbon pools should be considered under Articles 3.3 and 3.4 in the future, as long as the stock change can be measured in a verifiable and transparent way. In principal we therefore support the idea of including changes in carbon stock in wood products for the second and subsequent commitment periods.

More information is needed to facilitate further discussions regarding harvesting and wood products, such as: consequences of the different calculating approaches, the magnitude and source of the global and national wood product stocks and the magnitude and consequences of wood products trading. There is a particular need for better knowledge on how different calculating approaches will influence on the promotion of sustainable development and protection of biological diversity, as well as how effective different policy incentives would be in enhancing the removals and reducing the emission from harvesting and wood products. Effects on both CO₂ and other greenhouse gases should be further investigated. An important aspect here is the regional and national variations, and the different starting points, which implies that activities will have different effects depending on where and when they are set out. The goal should be to take the dynamic lifecycle into consideration, and elaborate on incentives for limiting global warming through management of forests and wood products. Hence there is a need for a process to establish such information and to further investigate

different aspects of emissions and removals of greenhouse gases from forest harvesting and wood products.

There is also a need for further development of estimation methodology and good practice guidance. Further work on these issues, with the possible invitation to the IPCC for more methodological input in that respect, should be considered for decision at a later stage. Until now, the IPCC has mainly concentrated on presenting different approaches for the estimation of removals and emissions from harvested wood. However, the calculation methods are still incomplete and need further elaboration. In this regard we appreciate informal contacts among Parties as a part of this process, as provided through the workshop held in Rotorua in New Zealand in February 2001, which we found very useful and constructive. Such workshops facilitate the discussions, and the possibility for follow-up arrangements should be considered.

Regarding our views on the different approaches described in the Dakar-report, we think that further discussions should not be limited to the approaches already described, as better ones might still be developed. The approaches should be transparent, verifiable, complete, consistent with sustainable forest management, and last but not least; they should provide incentives to enhance the removals and reduce the emissions of greenhouse gases from forest harvesting and wood products. We would not like to conclude very firmly on which of the three Dakar-approaches we support, but at this point we are most in favour of the stock change approach. We would like to emphasise that for some countries with large rates of export or import of wood products, the effects of the different approaches could differ significantly. Thus, developing the right approach is in our view an important and complex issue, which deserves further investigation before decisions should be taken.

If wood products are to be included under Articles 3.3/3.4, we think that stock changes in landfills should also be considered for inclusion to secure consistency and to cover the total lifecycle of wood products. Studies from Norway (see chapter 3) show that the CO₂ removals in landfills are important, but highly uncertain, due to the sensitivity with regard to the assumed decay-rate of wood products.

Lastly, we would like to mention that for most countries sequestration in wood products seems to be less important than sequestration in the living biomass and in soils. In a Norwegian study the net annual accumulation of CO₂ in wood products in Norway has been estimated – using the stock change approach - to constitute not more than about 3 % of the total net annual CO₂ sink in the forests. However, the overall importance of the different parts will depend on country specific situations, the final decisions on approaches for accounting under Articles 3.3 and 3.4, as well as the effects of human induced activities in the short and longer run.

2. Views on the different methodological approaches

The IPCC default calculation methodology assumes that all the CO₂ is emitted immediately after harvesting. In countries where the carbon stock in wood products increases, this approach does not capture the positive atmospheric impact of storage, especially not for long-lived products. The method may thus not provide a direct incentive for enhancing the carbon stock in wood products. We therefore welcome the development of estimation approaches that take these effects into account.

The IPCC has described three different and alternative accounting approaches for wood product in the Dakar report:

- **Stock change approach**, which accounts the stock changes in the country where and when they physically occur.
- **Production approach**, which accounts the stock changes in the producing country when they occur.
- **Atmospheric flow approach**, which accounts the emissions and removals in the country where and when they occur. Hence this approach will define net export of wood products as removals for the producing country and net import of wood products as emissions for the consuming country.

In this context it is important to distinguish between the *approaches* (stock change, atmospheric flow, production), which focus on either stocks or emissions in order to assign sinks to countries, and the actual *estimation methods* (stock method, flux method), which may focus on either stocks or emissions, depending on the availability of data.

It is our preliminary view that the stock change approach would be the approach most consistent with the Kyoto Protocol. For example, Article 3.3 makes it clear that eligible activities should be “*measured as verifiable changes in carbon stock*”. This is one of the reasons why we believe the stock change approach may be the best way to treat emissions and sinks in forests and in wood products similarly. The stock change approach is also consistent with the treatment of Land-Use Change and Forestry in the Revised 1996 IPCC Inventory Guideline.

Furthermore, it is important that the chosen accounting approach is transparent, verifiable, consistent with sustainable forest management and that it gives the right incentives to enhance the sinks and reduce the emissions from forest harvesting and wood products. It is also important that the chosen accounting approach covers both activities leading to net emissions and activities leading to net removals of greenhouse gases. Lastly, the accounting approach should be developed in such a way that it could be applied both at a national and a project level. In the following paragraphs we have looked at how the three approaches in our view meet these criteria.

We believe the stock change approach is most suitable for application both at national and project level. The atmospheric flow and production approaches would need export and import data, which are normally collected only at a national level, and they would therefore be less transparent and verifiable. The production approach is also sensitive to the assumed lifetime of exported wood products. Since this is not easily available, we believe this approach could give less accurate data than the other two approaches.

One of the main differences between the three approaches is how imports and exports of wood products are allocated. For instance, the atmospheric flow approach would give incentives to producing countries to enhance their export of wood products. However, this approach does not necessarily provide incentives to import e.g. fuelwood, since this import would only show up as emissions in the importing country’s account, and the CO₂ emissions per unit energy output (MJ) are higher for biofuels than for most fossil fuels. In a similar way the production approach may not provide incentives to countries to enhance the removal of carbon or limit the emissions from imported wood products, since emissions and removals

are accounted for in the producing country. We find that the stock change approach is quite neutral in this regard, since the changes in carbon stocks are accounted in the country where and when they occur. In this way, the importing country has an incentive to increase the storage, and to limit the emissions from imported wood.

We would also focus on the need for consistency with sustainable forest management. For instance, the atmospheric flow approach could in some cases give the producing countries incentives to increase their harvesting rate above a level of sustainability, since the exported wood products would be accounted as removals. The same is true for the production approach. To prevent such unintended incentives, it is important to establish a methodology which covers the forests and the wood products consistently.

The Norwegian study, see chapter 3, shows that the atmospheric flow approach is very sensitive to annual variations in the level of import and export. Hence, this approach introduces an additional uncertainty into the accounting system and makes it more difficult to establish the targets for later commitment periods.

3. Preliminary data and information for Norway

In this chapter we provide some preliminary data and information on how the different approaches for estimating emissions and removals from wood products would affect the Norwegian account. This information has been elaborated in a study performed by Statistics Norway, and is still under preparation. The study focuses on the stock change and the atmospheric flow approaches. The rationale for the production approach being left out is that we consider this approach to be less relevant than the other two because of reasons mentioned in the previous chapter. In addition, there was a lack of information on the fate of wood products exported from Norway which made the estimations more uncertain than for the stock change and the atmospheric flow approaches.

The total carbon reservoir in wood products and waste in Norway was estimated to about 17-18 million tonnes in 1998. Compared to 1990 the total reservoir had increased with about 10 percent. Waste in landfills and wood materials in buildings were the main storage sources, contributing to respectively 43 and 50 percent of the 1998 reservoir. Projections based on the expected economic development give further increase in the carbon reservoir. The total reservoir of carbon in wood products and waste is expected to increase by about 2.3 million tonnes, or almost 14 percent, from 1998 to 2010.

The study (see Table I) shows that the main intrinsic difference between the approaches relates to how the product stocks and foreign trade of wood products are treated. The approaches do not differ in the accounting of changes in the forest stocks, but rather in the way emissions and removals from export and import of wood products is allocated to the countries involved. As mentioned earlier, it is important to distinguish between the *approaches*, which focus on either stocks or emissions in order to assign sinks to countries, and the actual *estimation method*, which may focus on either stocks or emissions depending on the availability of data.

In the study two years were compared, and the data show that Norway was a net exporter of wood and wood products in 1993, while a net importer in 1998. The calculations of the removal of carbon for these two years provide a good illustration of the large differences in

allocation of net export between the two approaches. We would like to emphasise that annual variations in import and export are to be expected also in the future, depending on the market situation, social changes, etc. The study shows that the stock change approach would give Norway larger credits in 1998 compared to a calculation based on the atmospheric flow approach. In 1993 Norway was a net wood products exporter, thus the atmospheric flow approach would give us larger credits this year. In 1998, estimating the removals and emissions using the atmospheric flow approach, the wood product stock change would be negative, and provide an emission source of 0.5 million tonnes CO₂, see Table I. Calculations according to the stock change approach would result in a net sink of 0.7 million tonnes CO₂ the same year. In 1993 the situation was different, with the atmospheric flow approach resulting in a net sink of 2.2 million tonnes of CO₂, while the stock change approach would give only 0.6 million tonnes.

The study further shows that the best methodology for estimations of removals and emissions of CO₂ from wood products and waste is a combination of a reservoir method (where you estimate the changes in stored carbon, like for instance in buildings) and a flux methodology (where you estimate emissions of carbon from the products). This is not dependent on whether you choose the “stock change approach” or the “atmospheric flow approach”, but it certainly depends on data availability which will differ between Parties.

The accounting may focus on various parts of the production chain. Timber is harvested and traded, converted to building materials and pulp and finally processed to end products. In principle, this makes no difference as long as all products are counted as production, export and import. The advantage of counting unprocessed products is that the statistics is easily available and of high quality and that the risk of double counting is smaller. The disadvantage is that the fate of the products may be less precisely known. The suggested approach in Brown *et al.* (1998) is not clear at this point, our interpretation when counting the term *stock change products* is that it counts semi-processed products; paper and paper board, sawn wood, wood-based panels and other industrial roundwood. Export and import is also counted at this level, thus preventing double counting. This, however, might give a misleading picture if products are exported as end-use products, e.g. furniture. This is one of the questions which should be clarified in the further methodological work.

The estimates of carbon accumulation and storage in landfills are rather sensitive to the assumption of how large fraction of the deposited carbon that is decomposed. Both the estimates of carbon disposed of on landfills and the fraction of decomposed carbon should be investigated further to improve the quality of estimations.

*Table I. Preliminary estimations of stock change in Norway in 1993 and 1998.
1000 tonnes CO₂*

	1993		1998	
	Stock change approach	Atmosph. flow approach	Stock change approach	Atmosph. flow approach
Forest stock:				
Annual gross increment	31,467	31,467	33,518	33,518
Timber and fuelwood harvest	-14,614	-14,614	-12,709	-12,709
Slash and natural decay	-3,178	-3,178	-3,204	-3,204
Net removals in forests	13,675	13,675	17,605	17,605
Wood products and waste:				
Stock change in wood products	595	595	672	672
Export of wood products		4,807		5,298
Import of wood products		-3,248		-6,442
Net removals in wood products and waste	595	2,154	672	-472
Total net carbon removals	14,270	15,829	18,277	17,133

PAPER NO. 6: RUSSIAN FEDERATION

VIEWS ON APPROACHES FOR ESTIMATING OF AND ACCOUNTING FOR EMISSIONS OF CO₂ FROM FOREST HARVESTING AND WOOD PRODUCTS

Rational and balanced utilization of forest resources is an important part of economy in Russian Federation. National legislation and primarily Forestry Code, regulate types of forest use and legal issues of their implementation². Forest use includes harvesting wood, resin, and other wood products, as well as utilization non-wood forest resources, water conserving, protective, sanitary hygienic, and other forest properties. Besides in Russia, forests are used for hunting and scientific research purposes.

In 1998, the growing stock in Russian Federation was 81.9 billion m³, and it covered 1178.6 mln ha³. Wood harvesting is the major type of forest use. In 1999, there were 20915 harvesting, wood processing, and pulp and paper enterprises in Russia. And 90.1 mln compact m³ of timber (including 73.0 mln compact m³ of commercial timber) were removed from cutting areas in the year 1999⁴. Recalculated for 1000 m³ of removed timber, the production for 1999 comprised 216 m³ of sown wood, 14.7 m³ of veneer, 22.1 and 2695 conventional m² of chipboard and fiberboard respectively, and 50.4 t of paper and cardboard. Products from wood and pulp and paper industry are important components of export and import activities of Russian Federation. In 1999, Russian export to other than CIS countries comprised 27483 thousand m³ of round wood, 3366 thousand t of sown wood, 897 thousand m³ of plywood, 1330 thousand t of wood pulp, and 1048 thousand t of newsprint. Within the same period import of pulp and other wood products formed 3.6% of general structure of commodity import of Russian Federation³.

Wood products are widely used in the country. Their main types include:

- Sown wood products for different purposes;
- Standard wooden houses and their parts;
- Country houses (including their parts, wooden frames, and other constructions);
- Chipboard and fiberboard;
- Furniture;
- Sporting commodities;
- Wood pulp;
- Paper and printing and writing products.

The wood is used in chemical industry, for heating in private houses, and as alternative fuel in energy sector (biofuel).

Wood products have different lifetime. Part of them can be recycled as soon as their lifetime is over. Wood products are able to preserve for a long period of time and therefore, conserve accumulated carbon. That increases carbon sequestration from the atmosphere. Thus, harvested wood and wood products can be considered artificial carbon reservoir. The increase in this reservoir results in subsequent reduction in atmospheric concentration of carbon dioxide (CO₂). Meanwhile, CO₂ does not release immediately from decomposed wood products. This process lasts for several years. The use of biofuel is economically efficient alternative to fossil fuel combustion.

² The Forestry Code of Russian Federation. Approved by the State Duma on January 21, 1997. Moscow, 1997 (In Russian).

³ Forest Stock of Russia. Reference book. Moscow. All-Russian Scientific and Research Institute for Forest Resources, 1999 (In Russian).

⁴ Russian Federation Statistic Annual Report. Moscow. State Committee of Russian Federation for Statistics, 2000 (In Russian).

The United Nations Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol recognize the role of forests as natural CO₂ sink from the atmosphere. However, they pay insufficient attention to wood products as “artificial” carbon reservoirs. According to default approach of the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, it is assumed that all carbon in harvested wood biomass is released as CO₂ in the year of harvest⁵. Consequently, the use of default approach results in significant overestimating of CO₂ emission above its real values. Therefore, the default approach does not contribute to involvement of wood processing and pulp and paper industry in greenhouse gas emission abatement activities. Besides, it does not provide incentives for multiple and intensive treatment of harvested wood as well as development of new methods of wood products utilization including the use of biofuel. It must be noticed that the *Revised 1996 IPCC Guidelines* admit the inclusion of harvested and wood products in GHG inventories as an additional reservoir of carbon. However, in that case the accounting of wood export and import is required together with presenting the methodology used for calculation of carbon accumulated in wood products⁴. The shortcomings of the above approach are associated to complexity of checking and comparison results of national inventories, because no unified methodology has been developed for carbon accounting in wood products.

Russian Federation proposes that UNFCCC Parties should decide that harvested and wood products should be treated as additional carbon dioxide sink from the atmosphere. This decision will promote to inclusion of wood processing and pulp industry in the activities aimed at mitigation negative effects of climate change and provide incentives for further development and improvement of harvesting, wood processing, and pulp and paper industries in UNFCCC participating countries.

The task of elaboration methodology for carbon accounting in harvested and wood products is very important. It must be consistent to main goals of Convention and Kyoto Protocol. The methodology should be understandable and acceptable for all UNFCCC Parties. The principal approaches for accounting CO₂ emission and carbon sequestration in harvested and wood products were considered at the IPCC Expert Meeting in Dakar, Senegal, 5-7 May 1998. The Dakar Meeting proposed following three approaches for estimating CO₂ net emissions from forest harvesting and wood products:

1. Stock-change approach;
2. Production approach; and
3. Atmospheric-flow approach.

Practical issues of application the above approaches were discussed at Harvested Wood Products Workshop held in Rotorua, New Zealand, 12-16 February 2001. Russian Federation highly estimates results of meetings in Dakar and Rotorua. To our view, they form the background for elaboration a unified methodology for quantitative evaluation of carbon in wood products.

Russian Federation proposes that UNFCCC Subsidiary Bodies and UNFCCC Secretariat should develop methodological approaches and criteria for quantitative evaluation of carbon reserves in wood products. Then they should request that IPCC should elaborate common and unified method for accounting carbon dioxide associated with the use of harvested and wood products based on criteria and approaches developed by UNFCCC Subsidiary Bodies and Secretariat.

Different sectors are involved in wood processing and commodities production. These include timber processing enterprises and chemical, energy, and construction industries. Waste treatment and recycling operations are also performed at different enterprises.

⁵ Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. IPCC-OECD-IEA. Paris, 1997.

Therefore, methodological approaches for accounting carbon in wood products should avoid potential double counting of emissions and sinks associated with overlapping of activities implemented in different sector.

Besides, harvested wood and wood products are the commodities that are widely exported and imported by the countries. It must be noticed that these trade operations may be rather complex and involve several countries. The country may export raw material and import final product, or final products may be exported to a third country. The refuse treatment and recycling will be performed in the importing country. Consequently, trade operations may be potential source of double counting of CO₂ emission and sequestration. To avoid double counting, all Parties should use the same methodological approach for quantitative assessment of carbon in harvested wood and wood products.

National circumstances and economical development of UNFCCC Parties may exert a strong influence on scale and availability of activity data. **To our view, the methodology for quantitative evaluation should provide a tier approach that considered availability and scale of activity data.**

Types of commodities produced and used in the countries depend on their geographical position, national circumstances, and economical development. Besides, these factors specify lifetime and decomposition of wood products, as well as utilization industrial and domestic refuse and recycling. Thus in Russia, the lifetime for wooden industrial houses is set 50 years⁶. Standard rates for refuse and waste output from wood harvesting and processing and making wood products have been elaborated and approved in Russian Federation. For example, harvesting debris left over cutting areas vary from 5 to 12 m³ for 1 ha of the area. The refuse from production of furniture and parts for wooden houses is about 53.7 and 40% respectively⁷. The production technology determines the way as the refuse is utilized. **Therefore, the lifetime of wood products should depend on their type, exploitation purposes, and climate region and technology development of producing country.** Climate conditions should be considered, when the period of decomposition and recycling of industrial and domestic waste are determined. The UNFCCC Parties should undertake special research to determine the lifetime, decomposition period, and prospects of recycling of wood products. These should involve the experts from wood harvesting, processing, pulp and paper, and chemical industries and energy sector.

National experts on wood processing, recycling, trade operations, and economists should be involved in assessment of carbon in harvested wood and wood products. To our view, the IPCC should ask countries to nominate experts in these fields, when the appropriate request on methodology elaboration is received from UNFCCC Subsidiary Bodies and Secretariat.

To achieve carbon accounting in harvested wood and wood products, Russian Federation proposes the following options to be implemented:

1. The Conference of Parties should decide that harvested wood and wood products should be considered as additional sink of carbon dioxide from the atmosphere. This decision enables involvement of wood harvesting, processing, and pulp and paper industries in mitigation the negative effects of climate change and provides incentives for future development and improvement of wood processing industries in the UNFCCC Parties.
2. The UNFCCC Subsidiary Bodies and Secretariat should elaborate methodological approaches and criteria for quantitative evaluation of carbon reserves in wood products.

⁶ The Production of Wooden Houses. -Moscow, 1979. (In Russian).

⁷ The Secondary Materials in Wood Harvesting and Processing Industry.-Moscow, Economy, 1983. (In Russian).

Then they should request IPCC to develop a unified methodology for accounting CO₂ emission and sink associated to use of wood products on the basis of criteria and approaches elaborated earlier.

3. The methodology developed should be consistent with the goals of Convention and Kyoto Protocol. It should be common, understandable, and acceptable for all UNFCCC Parties. It should avoid possible double counting of CO₂ emission and sink that might be associated to overlapping of activities in different sectors of UNFCCC countries.
4. Harvested wood and wood products should be subdivided into parts that are utilized in the producing country and exported to other countries. Carbon stored in exported timber and wood products should be subtracted from total amount of wood harvested and processed in the producing country. The responsibility for carbon imported with wood and wood products should be transferred to importing country. IPCC should develop appropriate methodology and procedure for accounting carbon in imported and exported wood and wood products.
5. The lifetime of wood products should be determined based on climate region and technology development of countries. Climate region should be taken into consideration when periods of timber decomposition, refuse utilization, and recycling are determined. The UNFCCC Parties should undertake special researches for determination the lifetime and periods of decomposition, refuse utilization (storage, burning, and etc.), and the prospects of recycling wood products.
6. Tier approach should be applied for elaboration methodology for carbon accounting in harvested wood and wood products. The approach should take into account scale and availability of activity data. National experts on wood processing, recycling, trade operations, and economists should be involved in methodology elaboration. They should be nominated by the Parties in response to appropriate IPCC request to the Parties.

PAPER NO. 7: SAMOA
(ON BEHALF OF THE ALLIANCE OF SMALL ISLAND STATES (AOSIS))

HARVESTED WOOD PRODUCTS

Samoa, in its capacity as Chairman of the Alliance of Small Island States (AOSIS), is pleased to submit some initial views on the issues relating to harvested wood products. These views are a preliminary reaction based on recent reports from the scientific community as well as the recently held workshop in Rotorua, New Zealand (February 12 to 16, 2001). AOSIS reserves the right to make further submissions in light of further discussion on these issues.

It is the view of AOSIS that in the context of climate change harvested wood products must be considered in two distinct areas, namely:

- a) the reporting of harvested wood products in national inventories
- b) and the accounting for harvested wood products to meet commitments under Article 3 of the Kyoto Protocol.

Reporting on Harvested Wood Products:

Annex I Parties should be encouraged to report on the carbon flows associated with harvested wood products in their national inventories. Further methodological work by the IPCC may be necessary to assist Parties in their reporting.

Accounting for Harvested Wood Products:

AOSIS believes that carbon accounting for harvested wood products should not be considered for the first commitment period. The reasons for this include:

a) Review of Default IPCC Approach:

The view that the IPCC Default Approach is no longer relevant due to a possible build up of carbon stocks in wood products is yet to be properly tested. The build up of carbon stocks in harvested wood products may be due to an increase in logging of unsustainably managed forests or from deforestation. The atmosphere may not be witnessing an increase in net carbon stocks.

b) Article 3.3 and the First Commitment Period:

AOSIS believes that it is premature to consider additional accounting systems under the land use, land-use change and forestry sector until all current issues are resolved. To this end AOSIS believes that the first commitment period should be limited to accounting for Article 3.3 activities. AOSIS believes that it is inappropriate to include harvested wood products in the definition of afforestation, reforestation and deforestation under Article 3.3. Harvested wood products do not fit into the definitions included in Article 3.3 nor are they consistent with decision 9/CP.4. Further reasons to exclude these products from Article 3.3 are set out below in c).

c) Perverse Incentives from Current Accounting Approaches

The two principal accounting methodologies that are currently being considered to account for harvested wood products are:

- i. Stock Change Method
- ii. Flow Consumption Method

Both these approaches have advantages and disadvantages, and both have the potential for creating perverse incentives. For instance, the Stock Change method may create an incentive for Annex I Parties to procure roundlogs and other wood products from Non-Annex I countries that are not practicing sustainable forest management. The resultant effect of this may be to give credit to Annex I Parties for carbon stocks that have come from an unsustainable supply and a source of emissions.

The Flow Consumption method does not provide an incentive to use biofuels, as all emissions would be debited against the importing country. To resolve this, a different approach for biofuels may be necessary.

Considerable methodological work is required to resolve some of the accounting anomalies associated with these methods.

d) Decay Rate of Harvested Wood Products

The various decay rates of harvested wood products is well developed in some products and not well known in others. Further methodological work is required.

e) Treatment of Biofuels

As discussed earlier the treatment of biofuels may need a separate approach to the accounting approaches being considered for harvested wood products. Further methodological work is required.

f) Implications of Short Rotation Forestry

AOSIS is aware of a current proposal suggested at the Rotorua Workshop to factor out emissions from short rotation forestry during the first (and possibly successive commitment periods). AOSIS does not support this approach, as it does not properly reflect greenhouse gas emissions from the LULUCF sector, which have to be considered over a much longer timeframe taking into account all the factors outlined by the IPCC methodologies. The implications of this proposal could be further exacerbated by the inclusion of harvested wood products within the equation. Further methodological work is required.

g) Implications of Accounting for JI and Harvest Wood Products

It is possible that certain Annex I Parties that undertake LULUCF projects under the auspices of Joint Implementation may receive additional accounting benefits for harvested wood products over and above actual changes in greenhouse gas emissions. The implications of such anomalies in the accounting systems need to be tested against any trading system implemented.

Overall Impact on Reducing Emissions

In considering the overall significance of any accounting approach AOSIS believes that the primary concern must be to review the implications of these approaches in the context of reducing greenhouse gases emissions. To this end the complex interlinkages between incentives and disincentives, accounting methodologies and the overall implications for reducing greenhouse gas emissions need to be studied carefully. Based on these considerations, AOSIS makes the following recommendations:

AOSIS believes that the IPCC should be requested to undertake a review of the sources of harvested wood products to determine whether there is an actual overall increase in carbon stocks in both forests and wood products. This would then test whether the IPCC default approach is still relevant or not.

AOSIS believes that the IPCC should be invited to carry out further extensive work on accounting methodologies for harvested wood products. These findings should be reported back to SBSTA. However, AOSIS does not see this as a priority as other aspects of the LULUCF sector warrant more immediate attention. AOSIS is of the view that this work is not required before the first commitment period. In the same context, AOSIS believes that the IPCC should explore accounting methodologies for biofuels.

PAPER NO. 8: SWEDEN
(ON BEHALF OF THE EUROPEAN COMMUNITY AND ITS MEMBER STATES)

**ESTIMATES OF EMISSIONS OF CARBON DIOXIDE FROM FOREST
HARVESTING AND WOOD PRODUCTS**

Sweden, on behalf of the European Community and its Member States, submits views on approaches for estimating and accounting of emissions of carbon dioxide from forest harvesting and wood products (HWP). The submission follows the request by SBSTA at its eleventh session. It builds on the EU's previous statement on this subject, made at SBSTA11 by Finland.

The treatment of wood products in greenhouse gas reporting and carbon accounting is an important, but complex issue. Therefore, the EU has the view that the default IPCC method should continue to be used for reporting during the first commitment period but has serious concerns about including harvested wood products for accounting during the first commitment period because of the scale, uncertainties and risks associated with their inclusion. The EU believes that it is possible to improve on the default method and is willing to work constructively with other Parties to this end.

The EU has identified the use of wood from sustainably managed forests as a substantial element of its common forest strategy. Therefore we prefer, in the longer term, an approach which:

- gives Parties an incentive to increase carbon stocks in the harvested wood products within the national boundary;
- avoids unintended penalties for emissions associated with imports of sustainably produced timber or other wood products being used for bioenergy or materials substitution (wood products and biofuels can be sustainably produced in contrast to fossil fuels);
- does not make a Party's inventory subject to policies over which it has no control;
- is not over-sensitive to year by year changes in the balance of imports and exports.

The EU believes the stock-change approach is the most promising of the HWP accounting approaches currently under discussion, in order to meet these criteria.

The EU feels that progress could best be made following agreement on an approach for accounting of additional activities in relation to the Kyoto protocol and other LULUCF accounting and therefore suggests that the consideration of harvested wood products be on the agenda of the SBSTA in November 2001. In preparation of this work, the UNFCCC secretariat should be asked to compile relevant new information e.g. on approaches and estimation methods. This would facilitate inter alia an assessment by Parties of the need for, and availability of, country-specific data on the causes, magnitude and direction of the changes in the harvested wood product pools. Any disincentives for sustainable forest management that may arise from proposed accounting methods should also be analysed. We note that this process would not preclude consideration by IPCC of those methodological and reporting issues which are common to all the reporting methods under discussion.

The EU thanks the Government of New Zealand for providing representatives from developing and developed countries with the opportunity to have positive informal discussions of these issues at the workshop in Rotorua from 12 to 16 February 2001.

PAPER NO. 9: SWITZERLAND

**ESTIMATION OF EMISSIONS OF CO₂ FROM FORESTS HARVESTING
AND WOOD PRODUCTS**

In response to the call for comments on estimation of emissions of CO₂ from forests harvesting and wood products, Switzerland presents the following views.

1. Switzerland welcomes the initiative for inventory-approaches for CO₂ which are aimed to take into account stocks and stock changes from forests and wood products. The three approaches in discussion promote a better understanding of the real situation. Stock-change-, Production- and Atmospheric-flow-approach represent a relevant improvement in comparison with the IPCC default approach. Carbon accumulation in long-lived wooden products is accounted for in all of the three approaches. For wooden products with an annual life cycle there is no difference to the actually used approach.
2. The three approaches generate the same global result, although the inventory methods are different. At the national level, however, the results can differ considerably. As every country is interested to increase its accounted reductions and sinks, the decision for the type of approach becomes as well a political one.
3. The Stock-change-approach estimates changes of carbon stocks on the basis of national statistics. As an effect, building up large growing stocks in the forests and large stocks of wooden products is rewarded. As long as a country has small growing stocks and a high potential for increment in the forests, the national inventory can be influenced positively by imports of wooden products for consumption in the country.
4. Unlike this, the Production-approach takes into account all produced wood products within national boundaries without to consider in which country they are consumed. The approach is rewarding exports of wood products, whereas imports are not taken into account. It seems to be difficult to estimate and to verify emissions of decomposition/combustion of the exported wood products. Those should remain in the producing countries inventory. There are no generally accepted certificates of origin for wood products.
5. The Atmospheric-flow-approach estimates the flows of CO₂ between biosphere and atmosphere when and where they occur. As in the Stock-change-Approach only national data are needed. Imports of wooden products are sources of CO₂. That is why incentives for imports are only given for long lived products and in case of small growing stocks. The treatment of emissions is the same as that of fossil fuels. This approach is considered less suitable, because the wood-domain is not exclusively treating with emissions, but is as well considering sinks and sources. In particular it is inconsistent with the first sentence of article 3.4 of Kyoto Protocol. Flows estimated in this way would not correspond with stock changes.
6. The results of CO₂-inventories show if and in which extend measures on forestry, wood production and wood consumption offer a potential for the fulfillment of the obligations imposed by the Kyoto Protocol. These measures may be far-reaching and expensive. In order to be certain of the necessity and implications of such measures high quality data

should be used for inventorying. Advantageously the inventory will be based on existing and reliable data. The actual database in Switzerland is judged as follows:

7. Growing stock, increment, forest harvesting, slash:
Growing stocks in the forests, annual increment and harvesting (including natural losses and slash) are estimated in the National Forest Inventory every 10 years. In addition, forest service is measuring quantities of harvested wood every year. The accuracy of these figures is high. Although other European countries perform similar estimations, there is no absolute guarantee for comparability.
8. Exports, Imports:
Quantities of exported and imported wooden products figure in the foreign trade statistic. This data is compiled with sufficient accuracy. Internationally the statistic of FAO has to be used as database. The quality of data, however, differs widely from country to country. For products of higher tier, converting factors (standards) have to be defined (e.g. kg of wood in building elements or furniture, kg of CO₂ in different wooden products).
9. Decomposition / Combustion of wood produced or consumed:
Switzerland has a good statistic for fuel wood. Only rough and fragmentary estimations exist for outcome and utilisation of wood leaving the product circle. To ensure quality of CO₂-inventory, accuracy of these data has to be improved for all the three approaches.
10. Regarding the actual national and international database and expected impacts/signals of the accounting methods, the **Stock-Change-Approach** is considered to be most suitable to build up acceptable CO₂-inventories of wood flows including sinks and sources. In our point of view it has a direct and positive impact on growing stocks in forests and stocks of long-lived wooden products. It contributes to a sustainable utilisation of wood as a natural resource, which is in accordance to the goals of the United Nation Framework Convention on Climate Change. Only products consumed in the country have to be taken into account. The exporting country is not responsible for exported products, which are in the area of responsibility of another country. An appropriate solution has to be found in the case wood or wooden products pass boundaries between Annex I and non-Annex I countries. Appropriate guidelines have to be developed in order to avoid perverse incentives.
11. Switzerland expects clearly defined methodological guidelines for the inventory models to be applied. These should be based on the level of data collection of industrialised countries, but also show possibilities for continuous enlargement and improvements of models and underlying data. Recommendations have to be given especially for the recording of wood leaving the product cycle. In addition to data recording, estimations can be supported by dynamic modelling of the national forestry-wood flows. For disposal of wooden products on landfills, which is illegal in Switzerland, surveys about source effects are needed.

PAPER NO. 10: UNITED STATES OF AMERICA

**ESTIMATION OF EMISSIONS OF CARBON DIOXIDE FROM FOREST
HARVESTING AND WOOD PRODUCTS**

Wood products are an important component of the carbon cycle and as such, they should be included in any greenhouse gas accounting system. A variety of approaches have been proposed to account for wood products, including the stock change, production, atmospheric flow and modified production approaches. Issues, such as how to properly account for carbon in imported and exported wood products need to be addressed before any one accounting approach can be selected. Under the Framework Convention on Climate Change, the U.S. has supported a comprehensive approach to carbon accounting, including wood products.

Background

A comprehensive approach to carbon accounting should capture all relevant pools including the carbon in forests as well as disposition of harvested wood (see figure below). The flow of carbon can be estimated by subtracting the carbon emissions (i.e. wood burned for energy, wood burned without generation of usable energy and decomposing wood) from the gross carbon uptake attributed to the forest ecosystem. Alternatively, the flow of carbon can be estimated as the net change in carbon stock in forests, harvested wood products and landfills.

Harvested wood products are goods manufactured or processed from wood, including lumber and panels for end uses such as housing and furniture, and paper and paperboard for uses such as packaging, printing and writing, and sanitary applications. Landfills store carbon as discarded products that eventually decompose, releasing carbon as emissions. The actual amount of carbon released to the atmosphere depends on how products are processed, their end-use and their ultimate disposal. For example, carbon emissions from residues and wastes are generally released into the atmosphere in a relative short period of time. However, carbon may be stored in products (e.g. paper products, buildings) for relatively long periods of time. Generally, the amount of time the carbon remains in paper products in use range from less to 1 to 6 years while the amount of time carbon remains in homes can range from 70 to over 100 years (Skog and Nichololson, 2000). In addition, when products are taken out of use, some carbon is sequestered in landfills. In modern landfills much of the wood and paper carbon can be sequestered almost indefinitely (Micales and Skog, 1997). To reflect the fact that carbon from harvested wood products is released gradually over time, the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* allow a country, if data exist, to account for increases in the pool of forest products (IPCC, 1997).

Methodology

Because most of the timber that is harvested from U.S. forests is used in wood products and much of the discarded wood products are disposed of by landfilling rather than incineration, significant quantities of harvested carbon are transferred to long-term storage rather than released to the atmosphere. Therefore, while the U.S. reports the harvested carbon remaining

in wood products (including landfill disposition) in its greenhouse gas inventory, this carbon is not reported as an emission since it remains stored.⁸

The U.S. derives its flux estimates from a combination of direct measurements and models. The U.S. uses assumptions and methods that are consistent with the *Revised 1996 IPCC Guidelines* (IPCC, 1999). The IPCC identifies two approaches to accounting for carbon emissions from harvested wood: 1) assume all harvested wood replaces wood products that decay in the inventory year so that the amount of carbon in annual harvests equals annual emissions from harvests; or 2) account for the variable rate of decay of harvested wood according to its disposition (e.g., product pool, landfill, combustion).

The second approach is applied for the U.S. inventory using estimates of carbon stored in wood products and landfilled wood (see Table 1). Historical data and long-range projections are used to track roundwood and carbon disposition through to end uses such as housing and paper. Estimates are also made of the disposition of wood and paper after use e.g. burning, landfills or other locations of decay. Decay rates for products in use and landfills are applied to the carbon stocks in respective pools to yield carbon fluxes.⁹

A complete list of references and sources for U.S. methodologies and data are provided in the Inventory of U.S. Greenhouse Gas Emissions and Sinks.

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⁹ For a more complete description of the methods used to estimate carbon in wood products and discarded in landfills see Skog and Nicholson (2000) and Heath et.al. (1996)

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Skog, K.E., and G. A. Nicholson. (2000). Carbon Sequestration in Wood and Paper Products. Chapter 5 in “The Impacts of Climate Change on America’s Forests: A technical document supporting the 2000 USDA Forest Service RPA Assessment.” L.A. Joyce and R. Birdsey (eds.) Gen. Tech. Rep. RMRS-GTR-59. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 133 p.

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Table 1: Estimated Net CO2 Sequestration in Harvested Wood Products 1/

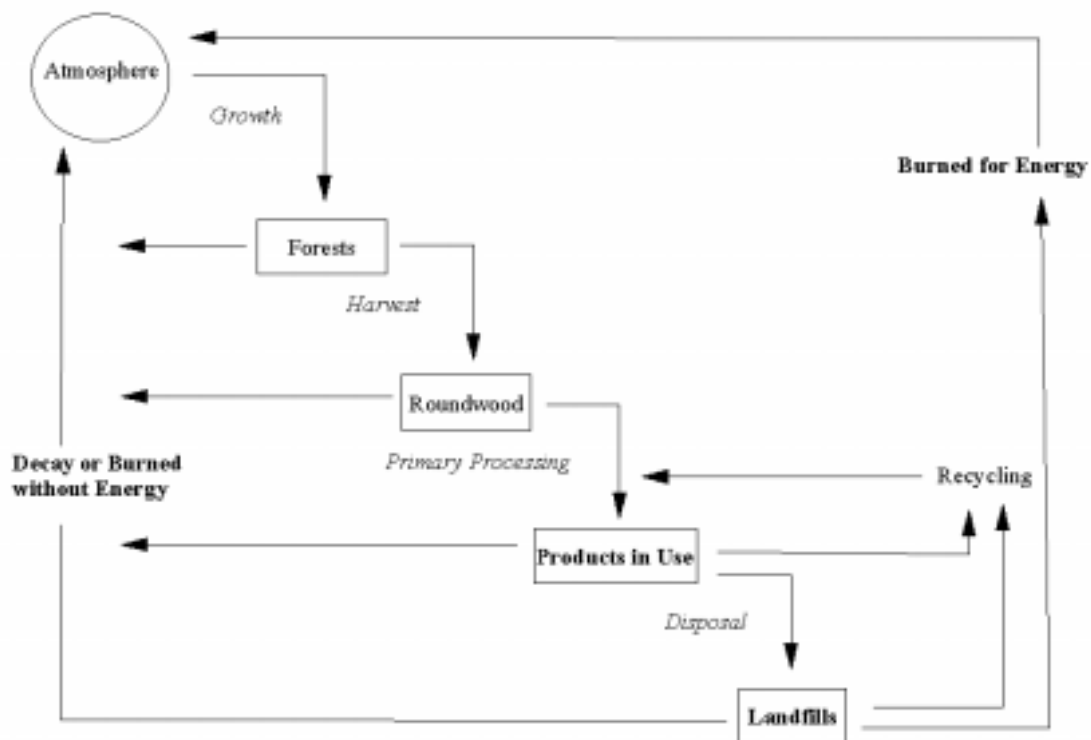
	1990	1999 2/
	Tg CO2 Equivalents	
Wood Products	48	62
Landfilled Wood	162	153
Total	210	215

	1990	1999
	MMTC Eq	
Wood Products	13	17
Landfilled Wood	44	42
Total	57	59

1/ The United States currently accounts for net carbon in harvested wood products using the production approach. The carbon stored in wood product and landfilled wood pools include the carbon in exported wood and does not include the carbon in imported wood. Carbon in exported wood is assumed to have the same disposition rates as in the United States. While the United States currently uses the production approach for its Inventory of Greenhouse Gas Emissions and Sinks, we are open to discussing other accounting approaches.

2/ Information is from the U.S. Inventory of Greenhouse Gas Emissions and Sinks: 1990-1999 (USEPA, 2001). This draft is currently under public review. Any estimates should be viewed as preliminary.

Cycling of carbon through harvested wood products



Source: Adapted from Skog and Nicholas, 2000
