30 August 2005

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UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

SUBSIDIARY BODY FOR SCIENTIFIC AND TECHNOLOGICAL ADVICE
Twenty-third session
Montreal, 28 November to 6 December 2005

Item 5 (a) of the provisional agenda
Methodological issues under the Convention
Harvested wood products

Data and information on changes in carbon stocks and emissions of greenhouse gases from harvested wood products and experiences with the use of relevant guidelines and guidance of the Intergovernmental Panel on Climate Change

Submissions from Parties

1. The Subsidiary Body for Scientific and Technological Advice (SBSTA), at its twenty-first session, invited Parties included in Annex I to the Convention (Annex I Parties) that have not done so to provide to the secretariat, by 1 August 2005, available data and information on changes in carbon stocks and greenhouse gas (GHG) emissions from harvested wood products, in a transparent manner. It also invited Annex I Parties to submit to the secretariat, by 1 August 2005, updated data and information on harvested wood products and on experiences with the use of the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* and the *Good Practice Guidance for Land Use, Land-use Change and Forestry* to generate such data and information.

2. The secretariat has received four such submissions. In accordance with the procedure for miscellaneous documents, these submissions are attached and reproduced[*] in the language in which they were received and without formal editing.

3. The SBSTA also requested the secretariat to compile the information on harvested wood products contained in previous submissions from Parties specifically on harvested wood products, and in national GHG inventory reports, for its consideration at its twenty-third session. This information will be contained in document FCCC/SBSTA/2005/INF.7.

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

CONTENTS

PAPER NO. 1: CANADA

METHODOLOGICAL ISSUES RELATED TO LAND USE, LAND-USE CHANGE AND FORESTRY:

HARVESTED WOOD PRODUCTS

29 July 2005

1. INTRODUCTION

At the twenty-first session of the Subsidiary Body for Scientific and Technological Advice (SBSTA), Annex I Parties were invited to submit, by 1 August 2005, available data and information on changes in carbon stocks and GHG emissions from harvested wood products (HWP) or, if they had previously done so, to provide updated data and information. Annex I Parties were also invited to describe experiences with use of the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* and the *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (GPG-LULUCF) to generate the HWP data and information. The SBSTA requested that the secretariat compile these submissions, and information on HWP in previous HWP submissions and in national GHG inventory reports, for consideration by SBSTA at its twenty-third session.

This submission provides a short overview of Canada's experience with HWP estimation, and shows HWP estimates. Canada previously provided estimates using various HWP approaches and methodologies in response to an invitation at the nineteenth session of SBSTA. These estimates, contained in document FCCC/SBSTA/2004/MISC.9, are reproduced here in an Annex with some modifications.

2. GENERAL VIEWS ON HWP ESTIMATION

In this submission, consistent with the IPCC GPG-LULUCF, the term *estimation* (or estimating) means the process of calculating emissions and removals quantities. The term *accounting* refers to the rules applied for comparing emissions and removals, against any legally-binding emission limitation commitments assumed by Parties. *Approach* means a conceptual framework for deciding which emissions/removals are reported when and where. Finally, *method* refers to the calculation framework for estimating HWP emissions within a given approach.

Several alternative HWP approaches are available. As well, several estimation methods exist depending on data availability. The 2004 HWP workshop in Lillehammer discussed flux methods (using assumptions about product lifetimes, or using surveys of emissions) and the stock method, and Appendix 3a.1 of GPG-LULUCF also presents these methods. The HWP flux method is similar to the generic methodology described in Equation 3.1.1 of GPG-LULUCF in which a carbon stock change is measured as the sum of inflows and outflows into the pool. The stock method for HWPs is similar to the generic Equation 3.1.2 of GPG-LULUCF. Each of these methods can be applied to any one of the approaches, as demonstrated at the Lillehammer workshop. In principle, different methods applied to the same approach should yield the same result. In this regard, Canada is pleased with the support that SBSTA21 gave to the IPCC's intent to develop methods that are neutral in relation to HWP accounting

approaches, for inclusion in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

Canada believes that estimates from all countries, accompanied by a clear explanation of the methods used, will facilitate understanding and discussion, regardless of the approach chosen. A common understanding of HWP approaches and methods is essential for a meaningful discussion about HWP estimates and their implications. Given the technical complexity of the issue, it is important that Parties have this common understanding as a basis for future decisions on suitable approach(es) for estimation and accounting.

Canada has drawn the following lessons from its experience in HWP estimation.

1. A comprehensive and consistent system requires that forest pools, HWP pools, and landfill pools should not be disconnected.
2. HWP estimation is no more complex than for some of the GHG inventory source categories. This is especially true for the lower tiers suggested in Appendix 3a.1 of GPG-LULUCF.
3. Although the approaches differ, basic data requirements for each do not differ substantially.
4. Clear definitions are crucial (e.g. of commodity categories).
5. An estimated change in C stocks does not always represent an actual emission to, or a removal from, the atmosphere. Thus what would be reported as estimated “emissions” from HWP are not necessarily emissions to the atmosphere but rather estimated changes in HWP C stocks.

3. HWP ESTIMATES

The estimates included in the Annex are based on Canada’s 2002 national GHG inventory submission. The estimates thus apply to 2000. Estimates for later years have not been prepared but it is expected that more up-to-date estimates would not differ substantially. The estimates are shown for four approaches (IPCC “default”, stock-change, production and atmospheric flow). While the approach proposed by New Zealand at the Lillehammer HWP workshop in 2004 also deserves consideration, Canada has not yet prepared estimates for this approach.

Canada did not directly apply the draft HWP guidance in Appendix 3a.1 of GPG-LULUCF, which was not available at the time Canada prepared the estimates. However, conceptually, the estimates presented here are comparable to a Tier 3 (country-specific) flux method based on assumptions about product lifetimes and decay rates, as described in Appendix 3a.1 of GPG-LULUCF, and are based on Canada’s understanding of the approaches.

ANNEX

CO_2 Emission Estimates According to Four HWP Approaches Applied to Canada for the year 2000

The four figures below show components used to calculate estimates for 2000 for the IPCC "default", atmospheric flow, production and stock change approaches. Unless otherwise specified all figures indicate C fluxes in gigagrams (Gg) C.

Complete estimation of forest-related emissions and removals must account for both the net ecosystem exchanges with the atmosphere and the emissions related to HWP. Net ecosystem exchanges of the managed forest with the atmosphere can be highly variable in Canada, reflecting very large inter-annual variations in natural disturbances. Estimated net removals/emissions from forest growth in 2000 are not shown on the figures and would be net of natural disturbances (i.e. they would reflect total biome production). Emissions due to oxidization of harvesting slash from the 2000 harvest are shown on the figures. Although not part of HWP estimation they represent significant emissions associated with harvesting.

Explanatory Notes

Commodity data (imports, exports, production) were downloaded during the week of January 1, 2001 from the FAO online Forestry Database, except for market pulp data that was obtained from the Market Pulp Producer Association.

Industrial Roundwood (IRW) = Sawnwood + Wood-based Panels + Pulpwood + Other Industrial Roundwood
Fuel wood = wood, including cull logs, branches, etc., used to fuel fires in a boiler or furnace for industrial or institutional needs
Firewood = wood used for domestic heating

Inherited emissions: unless otherwise specified, inherited emissions for the stock change, production and atmospheric flow approaches are based on the C stored in long-lived wood products during the previous 30 years (FAO wood commodity data are available from 1961 onwards).

Decay rates are linear over the period: all solid wood products (industrial roundwood commodities) have an annual decay rate of 0.013 (total lifespan of 75 years, e.g. 45 years of use and 30 years in disposal/reuse on average). Pulp and paper products have an annual decay rate of 0.033 (lifespan of 30 years).

Fraction of products in long-term (> 5 years) use:

Sawnwood - 0.8
Wood-based panels - 0.9
Other industrial roundwood - 0.7
Paper & paperboard - 0.6
Market wood pulp - 0.6

In the last 2 categories, it is assumed that one-third (i.e. 0.2 of the 0.6) of the products actually remain in use for over 5 years, and the remaining two-thirds are stored in landfills.

Questions

In compiling these estimates Canada had a number of questions that suggest the need for careful definitions in elaborating the methods.

For example, should “wood production” be defined as total wood harvested (50,107 Gg C for 2000 for Canada, as shown in the figures) or industrial roundwood harvested (40,417 Gg C)? For the stock change and production approaches it could be defined as long-lived commodity production (22,497 Gg C).

With respect to “wood consumption”, for the atmospheric flow approach should it be defined as industrial roundwood consumption (41,239 Gg C) or commodity consumption (10,792 Gg C)? In the Stock Change Approach figure, wood consumption equals “commodity consumed” of long-lived products (i.e. domestic production + imports – exports) (7,704 Gg C).

Explanation of Results

The difference between the stock and production approaches is accounted for by the net trade of long-lived wood products (imports of 1,954 Gg C less exports of 16,747 Gg C) minus the difference in emissions from the reservoir of long-lived products consumed (3,217 Gg C) and produced (9,713 Gg C) in Canada .

The difference between the atmospheric flow and the stock change approaches results because:

1. In the stock change approach Canada’s net exports of long-lived products (imports of 1,954 Gg C less exports of 16,747 Gg C) are counted as an emission and Canada’s net imports of industrial roundwood (imports of 1,496 Gg C less exports of 674 Gg C) are counted as a removal, while the atmospheric flow approach recognizes that no emissions to or removals from the atmosphere result from these trade flows.

2. In the stock change approach the carbon in short-lived commodities (8,991 Gg C) produced by Canada is classified as an emission, while in the atmospheric flow approach, only their consumption by Canada (3,088 Gg C) results in emissions.

Figure 1
IPCC "Default" Approach

Estimated HWP emissions = fuelwood harvested (661)
+ firewood collection (9,029)
+ IRW harvested (40,417)

= 50,107 Gg C
= 183.9 Mt CO_2

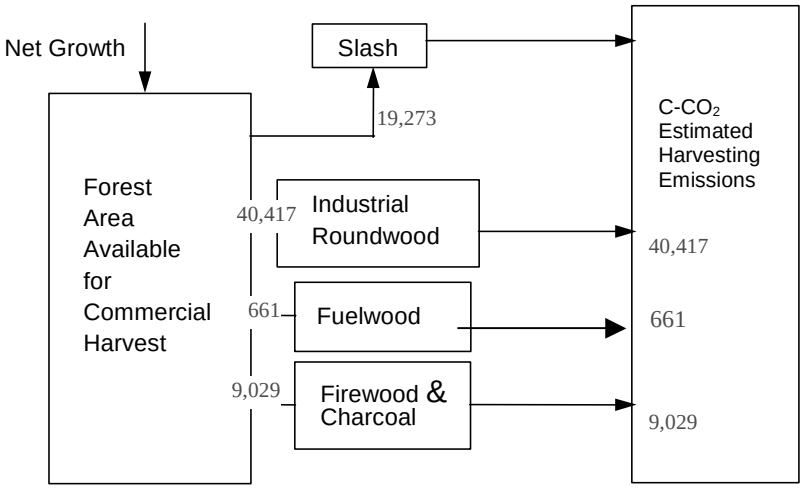
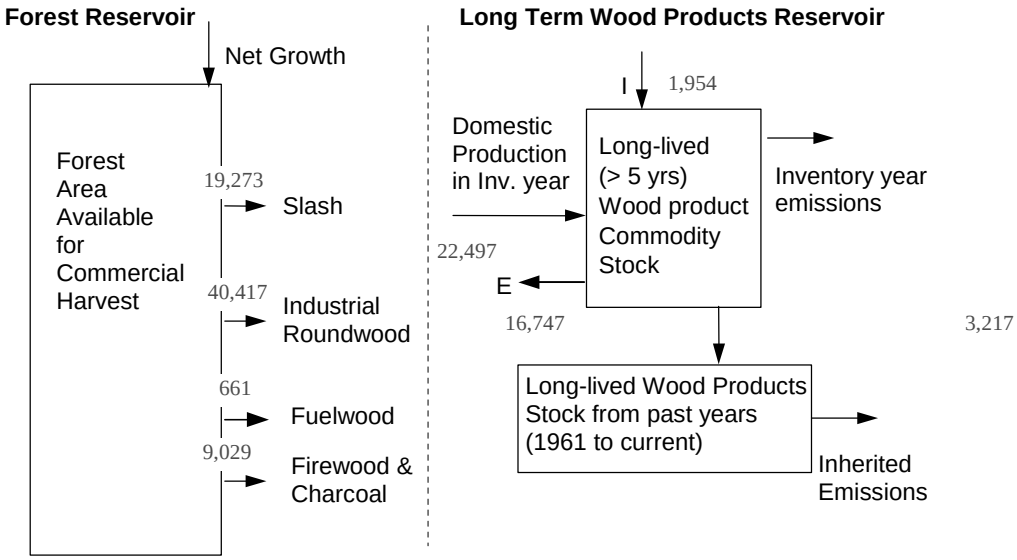


Figure 2
Stock-Change Approach

Estimated HWP emissions = fuelwood harvested (661)
+ firewood collection (9,029)
+ IRW harvested (40,417)
– increase in reservoir of long-lived products consumed in Canada (4,487)

= 45,620 Gg C
= 167.4 Mt CO_2

Increase in reservoir of long-lived products consumed in Canada
= Canadian consumption of long-lived products
– emissions from reservoir of long-lived products consumed by Canada
= (Canadian production + imports of long-lived products – exports of long-lived products)
– emissions from reservoir of long-lived products consumed by Canada
= (22,497 + 1, 954 – 16,747) – 3,217
= 7,704 – 3,217
= 4,487



I = Imports E = Exports

Figure 3
Production Approach

Estimated HWP emissions = fuelwood harvested (661)
+ firewood collection (9,029)
+ IRW harvested (40,417)
– increase in reservoir of long-lived products produced in Canada (12,784)

= 37,323 Gg C
= 137.0 Mt CO_2

Increase in reservoir of long-lived products produced in Canada
= Canadian production of long-lived products
– emissions from reservoir of long-lived products produced in Canada
= 22,497 – 9,713
= 12,784

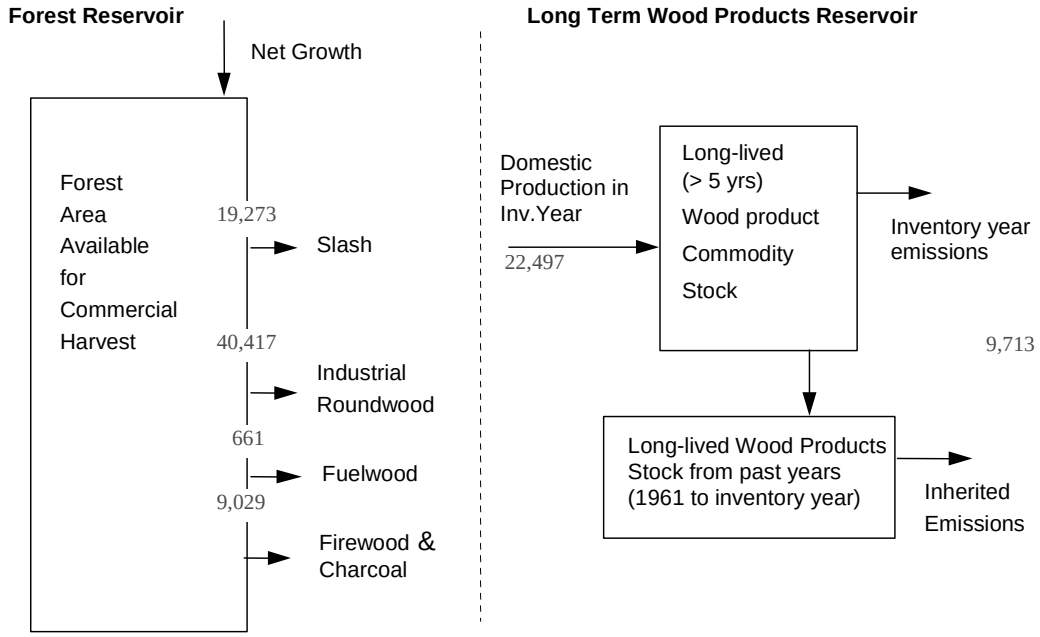
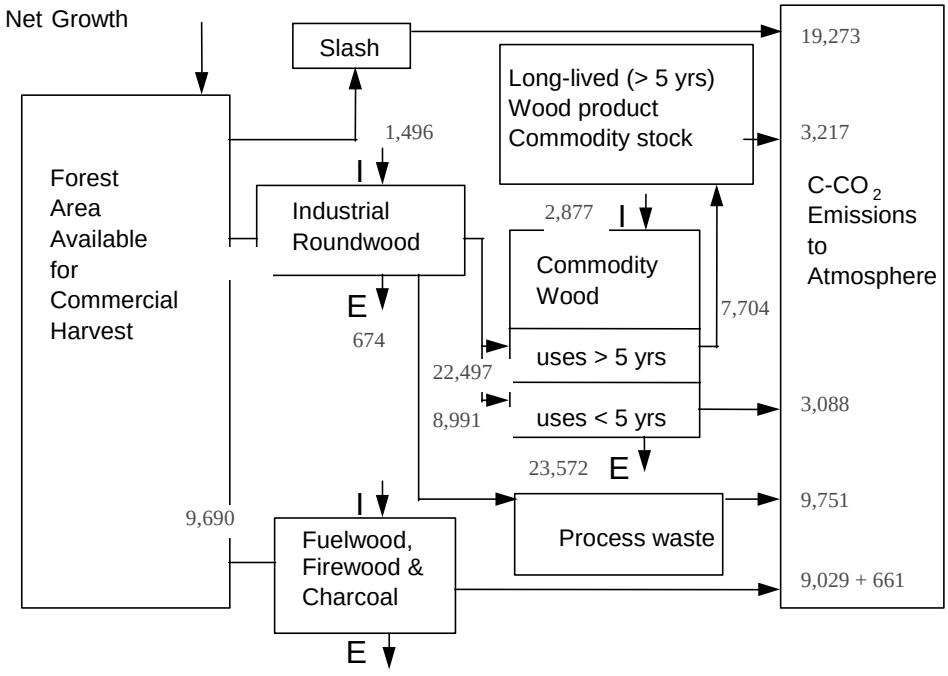


Figure 4
Atmospheric Flow Approach

Estimated HWP emissions = fuelwood harvested (661)
+ firewood collection (9,029)
+ process waste (9,751)
+ Canadian consumption of short-lived products (3,088)
+ emissions from reservoir of long-lived products consumed by Canada (3,217)

= 25,747 Gg C
= 94.5 Mt CO_2

Process waste = Canadian IRW consumption – Canadian product production
= (IRW harvested + IRW imports – IRW exports)
– (long-lived product production + short-lived product production)
= (40,417 + 1,496 – 674) – (22,497 + 8,991)
= 9,751



I = Imports E = Exports

PAPER NO. 2: JAPAN

Harvested Wood Products:
Data on changes in carbon stocks and emissions of greenhouse gases
Explanatory Note

1. Background

The nineteenth session of the Subsidiary Body for Scientific and Technological Advice (SBSTA) invited Parties to submit their views on issues relating to harvested wood products, noting that these submissions could include national data and methodological and other information on changes in carbon stocks and emissions of greenhouse gases relating to harvested wood products (paragraph 27(e), FCCC/SBSTA/2003/15). Further, the twenty-first session of the SBSTA invited Annex I Parties that have not done so to provide available data and information on changes in carbon stocks and emissions of greenhouse gases from harvested wood products (paragraph 32, FCCC/SBSTA/2004/13).

Since Japan has already provided its view on issues relating to harvested wood products in accordance with the invitation, but not data and information on changes in carbon stocks and emissions of greenhouse gases from harvested wood products, Japan provides related data and information in this submission.

2. Estimation

Japan estimated the difference of carbon stocks and emission of greenhouse gases from the IPCC default approach for the year 2002, when each of the "stock change approach," the "production approach," or the "atmospheric flow approach" was applied to Japan's forestry sector (FFPRI 2005). For the estimation of the differences, following equations were applied for each approach:

(a) stock change approach : $\Delta S = \Delta Cd + \Delta Ci$
(b) production approach : $\Delta P = \Delta Cd + \Delta Ce$
(c) atmospheric flow approach: $\Delta AF = \Delta Cd + \Delta Ci - P_{IM} + P_{EX}$ [1]

Where,

ΔS : difference of carbon stocks and emission of greenhouse gases from the IPCC default approach with the application of the stock change approach
ΔP : difference of carbon stocks and emission of greenhouse gases from the IPCC default approach with the application of the production approach
ΔAF : difference of carbon stocks and emission of greenhouse gases from the IPCC default approach with the application of the atmospheric flow approach
ΔCd : annual change in carbon stored in HWP in use from wood harvested in the country, tonnes C yr^{-1}
ΔCi : annual change in carbon stored in HWP in use from wood imported into the country, tonnes C yr^{-1}
ΔCe : annual change in carbon stored in HWP in use from wood exported from the country, tonnes C yr^{-1}

[1] While the equation 3a.1.1-(1C) in the Appendix 3a.1 of the "IPCC Good Practice Guidance for Land Use, Land Use Change, and Forestry (LULUCF)" defines the *atmospheric flow* "E" as the real flux of C from HWP stock into the atmosphere within the borders of the reporting country, this submission defines "ΔAF" as the negative of the difference between the *atmospheric flow* "E" and the emission of greenhouse gases under the "IPCC default approach," that is, wood carbon harvested: "H," because this submission intends to clarify the change of carbon stocks and emission of greenhouse gases from the "IPCC default approach" with the application of each approach.

$\Delta AF = -(E - H) = -(-\Delta S + H - P_{EX} + P_{IM}) + H$ (neglecting W) $= \Delta S + P_{EX} - P_{IM} = \Delta Cd + \Delta Ci + P_{EX} - P_{IM}$

P_{IM} : imports of wood and paper products, tonnes C yr^{-1}
P_{EX} : exports of wood and paper products, tonnes C yr^{-1}
E : carbon flux from HWP into the atmosphere within the borders of the reporting country, tonnes C yr^{-1}
H : current year wood carbon harvested and removed from sites to be processed into forest products, tonnes C yr^{-1}
W : current year HWP carbon disposed into solid waste disposal sites (SWDS)

The estimation results are shown in the Annex.

3. Methodologies

For the estimation of the difference of carbon stocks and emission of greenhouse gases from the IPCC default approach with the application of each approach, Japan adopted "Tier 3: Country-Specific Methods" in the "IPCC Good Practice Guidance for LULUCF." Details of estimation methodologies for each approach are described below:

(a) Stock change approach

The carbon stock change in each of the construction sector, the furniture-fittings sector, the palette-packing sector, the truck-bus sector, and the paper sector was estimated separately, and then totaled. For the construction sector and the truck-bus sector, the stock-data method, which estimates the changes in carbon stocks of wood products by calculating the difference between the total stock at the beginning and the end of a given period, was applied, while for the furniture-fittings sector, the palette-packing sector and the paper sector, the inflow-lifetime analysis method, which estimates the change in carbon stocks on the basis of the inflow of wood products into the stock and of assumed lifetimes and decay factors of these products, was applied.

(b) Production approach

The carbon stock changes in domestic wood and paper products were calculated by multiplying the estimated carbon stock volume with the estimated ratio of domestic wood and paper products for each sector. Since there is no estimation on the ratio of domestic products for the palette-packing sector and the truck-bus sector, these sectors were excluded from the total.

The estimated ratio of domestic wood and paper products were estimated from various data, including the ratio of domestically processed lumber for construction use and the volume of imports (MoE 2004).

Since the volume of wood and paper products exports are relatively small compared to that of imports, changes in carbon stored in wood and paper products exported from the country (ΔCe) are neglected.

(c) Atmospheric flow approach

The difference of carbon stocks and emission of greenhouse gases from the IPCC default approach with the application of the atmospheric flow approach was calculated by subtracting the net imports of wood and paper products ($P_{IM} - P_{EX}$) from the estimated carbon stock change for the stock change approach (ΔS).

4. References

Forest and Forest Products Research Institute. 2005. *Sentan Gijutu wo Katsuyou shita Nourin-suisan Kenkyu Koudoka Jigyou: Shinrin, Ringyou, Mokuzai-sangyou ni okeru Ondanka Boushi Kinou no Keisoku, Hyouka-shuhou no Kaihatsu: Heisei 16-nendo Saishu Houkoku* (in Japanese).

Ministry of Environment. 2004. *Chikyu Kankyou Sougou Suishin-hi: Kyoto Giteisho Kyushugen toshiteno Shinrin Kinou Hyouka ni kansuru Kenkyu: Heisei 16-nendo Nenji Houkokudho* (in Japanese).

ANNEX: Japan's data on changes in carbon stocks and emissions of greenhouse gases from harvested wood products (2002)

（Unit: 1000t-C）

		Stock Volume		Stock change in 2002	Domestic products ratio	Estimated value		
		2002	2003			Stock change app.	Production app.	Atmospheric flow app.
Sector total		222,547	224,656	2,110	-	2,110	590	2,110
	Construction	178,901	180,124	1,223	0.37	1,223	448	1,223
	Furniture-fittings	14,806	14,909	103	0.25	103	26	103
	Palette-packing	4,859	4,768	-91	-	-91	-	-91
	Truck-bus	474	462	-12	-	-12	-	-12
	Paper	23,507	24,393	886	0.13	886	116	886
Wood Imports (Pim)		-	-	-	-	-	-	14,820
Wood Exports (Pex)		-	-	-	-	-	-	1,214
Difference of carbon stocks and emisssion of GHG from IPCC default approach with the application of each approach		-	-	-	-	**2,110**	**590**	**-11,497**
* Definition						ΔCd + ΔCi	ΔCd (+ ΔCe)	ΔCd + ΔCi - Pim + Pex

Data: FFPRI (2005), MoE (2004)

PAPER NO. 3: UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND ON BEHALF OF THE EUROPEAN COMMUNITY AND ITS MEMBER STATES

London, 1 August 2005

Subject: Good practice guidance for land use, land-use change and forestry (LULUCF) activities under the Kyoto Protocol, harvested wood products and other issues relating to LULUCF
Available/updated data and information from Parties included in Annex I to the Convention on changes in carbon stocks and GHG emissions from harvested wood products and on experiences with the use of the *Revised 1996 Intergovernmental Panel on Climate Change Guidelines for Greenhouse Gas Inventories* and the *IPCC Good Practice Guidance for Land Use, Land-use Change and Forestry* to generate such data and information

1. Introduction

SBSTA 21 invited Parties to provide data, information and experiences in reporting harvested wood products by 1 August 2005:

§ 32. *The SBSTA invited Annex I Parties that have not done so to provide available data and information on changes in carbon stocks and GHG emissions from harvested wood products, in a transparent manner, to the secretariat by 1 August 2005. It also invited Annex I Parties to submit to the secretariat, by 1 August 2005, updated data and information on harvested wood products and on experiences with the use of the Revised 1996 Intergovernmental Panel on Climate Change Guidelines for National Greenhouse Gas Inventories and the Good Practice Guidance for Land Use, Land-use Change and Forestry to generate such data and information. (FCCC/SBSTA/2004/13)*

The United Kingdom, on behalf of the European Community and its member States, welcomes this opportunity to submit its views on data, information and experiences on reporting harvested wood products (HWP).

The submission has two substantial parts. Part I contains data for all Member States using statistical data on wood production, consumption and trade from FAO and an Excel-based calculation tool. Part II includes submissions by 4 Member States (Austria, Finland, Ireland and the UK). In their submissions Member States have provided alternative or more detailed data, information and experiences in providing data, including views on methodologies and greenhouse gas emission estimates associated with harvested wood products.

This submission of data and information is of course solely for the purposes of exchanging information among Parties in an approach neutral manner, and to facilitate consideration of harvested wood products for the period post 2012. The data provided are not a formal submission of greenhouse gas information, nor are they a statement of the EU's position on treatment of harvested wood products for the period post 2012. The EU Member States are further elaborating their national HWP data.

PART I

2. Synthesis of indicative HWP data for the EU

Indicative data on changes in carbon stocks associated in wood products in use for 2003 are presented in the following table. The estimates are based on the FAO data on wood production, consumption and trade. Estimates are calculated using an Excel-based calculation tool[1] developed for this purpose. Key factors and assumptions for estimates are:

- Basic data input to the model are FAO[2] historical consumption rates of solid wood products (sawnwood and wood based panels) and paper products (paper and paperboard), which are calculated based on their national production, import and export rates.
- FAOSTAT includes data from 1961. The consumption of solid wood products and paper products prior to 1961 has been estimated by assuming a growth rate of 1.35% per annum in HWP consumption between 1900 and 1961. The initial stock of HWP in 1900 is assumed to be equal to zero.
- Solid wood products and paper products are converted to carbon by using conversion factors:
    - paper: 0.45 Mg C/ air dry tonne (adt) of paper
    - paperboard: 0.45 Mg C/ adt of paperboard
    - sawnwood: 0.225 Mg C /m^3
    - wood based panels: 0.294 Mg C /m^3
- The decay pattern of the carbon stocks is assumed to be exponential. The following half lives have been used for these indicative estimates, but further studies are needed to determine more precisely correct life-times:
    - paper: 1 yr
    - paperboard: 1 yr
    - sawnwood: 30 yrs
    - wood based panels: 30 yrs
- Using above the data the carbon balance in HWP by the stock change approach can be estimated.
- To estimate the carbon balance by the atmospheric flow and production approaches some additional data were required. For the atmospheric flow approach the total carbon flux in imported and exported HWP (including roundwood, pulp, paper and paperboard, sawnwood, wood based panels) for the reporting year were used. For the production approach, a historical estimate (since 1900) of solid wood and paper products that were grown in domestic forests was used.
- Estimates include only wood products in use and exclude woods products in solid waste disposal sites.
- Expert judgement has been used to provide estimates for some individual Member States.

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1 The second version of the EXPHWP model (8 March 2005). For further details, contact kim.pingoud@metla.fi.

2 FAOSTAT forestry on-line data base (http://faostat.fao.org/faostat/collections?version=ext&hasbulk=0&subset=forestry

Table. Indicative estimates of changes in carbon stocks in HWP expressed in carbon (Tg C/yr) and carbon dioxide emissions and removals from HWP (Gg CO_2/yr) in 2003 applying the stock change, atmospheric-flow and production approaches (CO_2 emissions are marked positive and removals negative.)

	Changes in carbon stocks in HWP (Tg C/yr)			**CO_2 emissions and removals from HWP (Gg CO_2/yr)**		
Member State	**Stock change approach**	**Atmospheric flow approach**	**Production approach**	**Stock change approach**	**Atmospheric flow approach**	**Production approach**
Austria	0.819	1.834	1.278	-3003	-6723	-4686
Belgium	0.510	-0.733	0.448	-1870	2687	-1641
Cyprus	0.034	-0.047	-0.005	-125	173	19
Czech Rep.	0.249	0.943	0.444	-913	-3456	-1629
Denmark	0.698	-0.714	-0.060	-2558	2620	220
Estonia	0.223	1.028	0.521	-818	-3770	-1912
Finland	0.748	6.202	1.130	-2744	-22741	-4144
France	1.315	0.531	1.545	-4820	-1946	-5665
Germany	2.455	2.482	4.384	-9002	-9102	-16074
Greece	0.347	-0.350	0.072	-1273	1282	-264
Hungary	0.110	0.006	0.116	-404	-23	-424
Ireland	0.337	0.174	0.325	-1235	-639	-1191
Italy	1.997	-3.340	0.752	-7322	12246	-2759
Latvia	0.163	1.742	1.090	-597	-6388	-3995
Lithuania	0.228	0.613	0.412	-836	-2249	-1511
Luxembourg	0.049	-0.232	-0.005	-180	850	19
Malta	0.014	-0.023	0.000	-50	86	0
Netherlands	0.185	-1.165	0.289	-679	4272	-1060
Poland	0.762	0.901	1.012	-2795	-3303	-3711
Portugal	0.209	1.100	0.349	-768	-4034	-1280
Slovakia	0.047	0.554	0.277	-173	-2032	-1016
Slovenia	0.046	0.031	-0.002	-169	-112	9
Spain	2.046	-0.588	1.199	-7504	2157	-4395
Sweden	0.703	5.929	1.394	-2577	-21740	-5110
UK	1.720	-3.485	0.973	-6306	12777	-3568
Total EU25	16.015	13.393	17.937	-58722	-49108	-65769

PART II

3. Country specific data, information and experiences provided by individual Member States

This part includes submissions by Member States[3] that have provided alternative or more detailed data and information and experiences in providing data, including Member States' views on methodologies and greenhouse gas emission estimates associated with harvested wood products.

3.1. Austria

3.1.1. General

Changes in carbon stocks of HWPs were not considered in the greenhouse gas inventories of Austria, so far. Due to the complexity of accounting C-stock in HWPs and addressing their fate, only few information on reporting for HWPs are currently available.

In response to the invitation of the SBSTA 21 to provide data, information and experiences on the reporting of HWPs, intensive data enquires have taken place to outline possibilities for a national submission following the recommendations of the IPCC – Good Practice Guidance for LULUCF (2003). Identified options of data sources as well as problems to be considered are summarised in this submission. Furthermore results of previous studies, providing first rough estimates of changes in C-stocks in HWPs, are used to discuss the results obtained with the Excel tool (for a description of the Excel tool see part 1 of this submission).

However, further work is needed on national level with regard of selecting appropriate data sets, combining different data sources without running risk of double accounting and verifying default parameters (life span, conversion factors). With regard to the IPCC guidelines, it is recommended to further develop methods and definitions for the inclusion of end products (e.g. like furniture).

The information and data provided do not represent a formal submission of GHG emission data information but should enhance the exchange on experience between Parties with respect to reporting of HWPs.

3.1.2. Views on data, model calculations and different approaches

Data:

In general, FAO data are regarded as applicable for a first (Tier 2a, IPCC, 2003 – Appendix 3a.1) estimation of carbon stock changes in HWP, for Austria. They compare well with data that are available on national level. However, they comprise only semi-finished wood products and therefore do not account for the final fate of woody products. The use of this data may lead to an overestimation of changes in C-stocks of HWPs for Austria, being a net importer of round wood and a net exporter of wood products.

Several independently collected statistical data are available for Austria that are relevant for the estimation of HWP. Relevant data are included in the "Konjunkturerhebung im produzierenden Bereich" (STATISTIK AUSTRIA), that is available since 1995 on a yearly basis. These data are structured according to the CPA-classification[4] as well as to the (Ö)PRODCOM-classification which can be directly

[3] Austria, Finland, Ireland and the UK.
[4] CPA – *Classification of Products by activities.*

linked to the European PRODCOM-list. These data result from about 1/3 of all wood processing companies, representing about 90% of all wood processing in Austria.
Other relevant data are included in the ”Gütereinsatzstatistik im produzierenden Bereich”. These data describe the fate of woody semi-finished products and raw material and provide insights into the flow and application of wood products. Sampling is based on the companies surveyed by the ”Konjunkturerhebung” and comprises about 2000 companies. Due to administrative efforts results are available only 2 years after the year of investigation.

Import and export data are available form the foreign trade statistic. Detailed data on paper can be gathered from the reports of the Austrian Paper and Pulp Industry.

A combination of all these data provides a valuable basis for the further development of estimating changes in C-stocks of HWPs on a national basis. However, statistics are sometimes not complete, report data in different units (e.g. monetary base) or sampling techniques or levels of aggregation underlie changes within time. Therefore a considerable amount of research work on data is needed. Uncertainties of estimating changes of C-stocks in HWP have not yet been estimated but can be regarded as high with some statistical data being biased.

Model calculations:

In the dynamic model EXHWP carbon pools in HWPs are calculated according to the three different approaches of the IPCC GPG on LULUCF (2003) based on FAO data.
The input flows of the stock change approach (SCA) are calculated on the basis of production-, import and export data (sawn wood, wood based panels, paper and paperboard). For the atmospheric flow approach (AFA) the net exports (= exports − imports of round wood, sawn wood, wood-based panels, paper and paperboard, total fibre furnish) are added to the stock change. In the production approach (PA) the amount of HWPs resulting from domestically grown wood is calculated by “roundwood production /roundwood consumption”.

The results for Austria are summarised in Table 1 and Figure 1 and show significant differences between the three approaches.

The AFA approach results in a net carbon stock change for HWP that is almost a factor 2 larger compared to the estimate by the SCA. This reflects the trade situation of Austria as being a net importer of round wood and a net exporter of wood products with round wood production mostly exceeding round wood consumption. Calculated from the average import- and export rates of the periods 1962/71 and 1994/03 significant increases of imports of coniferous round wood (1570%) and coniferous sawn wood (9018%) and exports from particle boards (1355 %) are apparent (SCHWARZBAUER, 2005).

The PA provides higher C-removals compared to the SCA because production of round wood is higher compared to the consumption of solid wood products.

First rough estimates based on national statistical data (BAUR, 2003) resulted in almost the same net carbon stock change for HWP of about 1 Tg C yr^{-1}. In EGGERS (2000) the average annual carbon stock change ranged from 0.4 – 0.75 $TgCyr^{-1}$ (model based calculation).

Table 1: Estimates of changes in carbon stocks in HWP (Tg C yr-1) for selected years applying the stock change, atmospheric-flow and production approaches based on FAO data and the EXHWP calculation tool.

	Changes in carbon stocks in HWP (Tg C yr^{-1})			**CO2 emissions and removals from HWP (Gg CO2 yr^{-1})**		
	Stock change approach	Atm. flow approach	Production approach	Stock change approach	Atm flow approach	Production approach
1990	0,63	1,41	0,92	-2327	-5154	-3386
1995	0,64	1,40	0,77	-2353	-5116	-2806
2000	1,03	1,24	0,70	-3777	-4556	-2579
2003	0,82	1,83	1,28	-3003	-6723	-4686

Removals of about 3.000 Gg CO_2 yr^{-1} (SCA) correspond to 1/3 of the net removals of the total Austrian forests. This comparison leads to the assumption that the model may overestimate the C-sink independent from the approach.

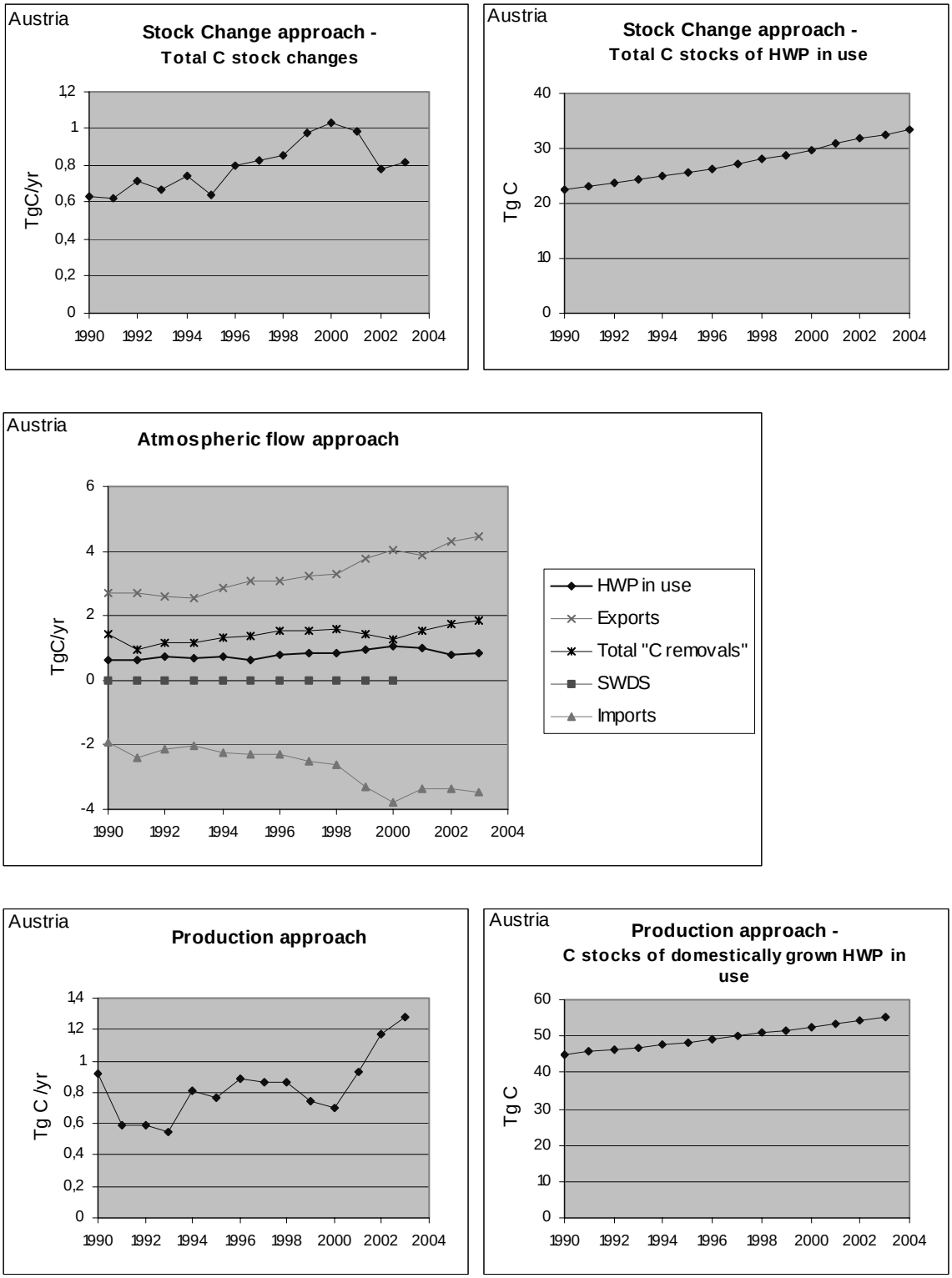

Figure 1. Changes in C- stocks of HWP in use in Austria using three alternative approaches estimated with model EXHWP based on FAO data

The half-life time of 30 years for solid wood products, which is assumed for sawn wood and wood based panels, seems to be quite long. The overall result for the net changes of carbon stocks from HWP is very sensitive to this parameter. Since the half - life of sawn wood and wood based panels may differ significantly between countries it is recommended to validate that parameter for Austria. However, data for such investigation are lacking for Austria for the time being.

Approaches:

From the Austrian point of view the actual C cycle is well represented by the Stock Change Approach taking into account the domestic consumption of HWPs (including imports and exports of woody products). The concept of the approach is straightforward and although data requirements are very comprehensive it should be possible to obtain them from existing national statistics with reasonable effort and accuracy.

The atmospheric flow approach accounts for all C-fluxes to and from the atmosphere from forests and HWPs. This is a completely different approach and requires a careful definition of C-sources that are included. Otherwise there may arise cross-cutting issues with other sectors.

The concept of the production approach is not easy to understand and that may translate into a lack of comparability between countries. Furthermore data availability is an even larger problem compared to the other two approaches. The producer country is liable for the carbon stock resulting from domestic wood products regardless of their further fate. Considering high imports of round wood in Austria and exports of solid wood products it seems not feasible to distinguish products made from domestic or foreign wood or to estimate the half life of exported goods.

Methane emissions of HWPs in solid waste disposal sites (SWDS) are included in the waste sector. According to the landfill ordinance (BGBl.Nr. 164/1996) waste disposal in Austria is restricted to pre-treated waste. This means that carbon from HWP should be included in solid waste only to a very limited amount. This should be taken into account when considering CO2 emissions from HWP deposited in solid waste disposal sites.

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3.2. Finland

A: Introduction

In its greenhouse gas inventory, Finland applies the so called IPCC default assumption, as described in Revised 1996 IPCC Guidelines (IPCC 1997), for harvested wood products. The IPCC Good Practice Guidance for LULUCF (IPCC 2003) includes, in Appendix 3a.1, advice on harvested wood products for future methodological development. Advice is provided for using different approaches (stock change approach, production approach and atmospheric flow approach), tiers and methods. Each of the approaches results in significant differences for a country like Finland where significant amount of carbon is imported and exported in a form of round wood and wood based products.

A case study using two different methods are presented and discussed in the following. The methods are (i) the dynamic model, i.e. the Excel calculation tool (as described in Part 1 of the EU submission), and (ii) direct inventories of the solid wood stock in Finland. In addition, a combination of the two methods is described.

Finland finds it premature to include the harvested wood products into its greenhouse gas inventories. However, Finland continues to explore and develop methods for estimating harvested wood products.

B: Case study

B:1. Methods used in a case study

Two different methods were used: (i) the dynamic model, i.e. the Excel calculation tool, and (ii) direct inventories of the solid wood stock in Finland. The Excel calculation method for HWP in use is similar to the Tier 2a method presented in the IPCC GPG for LULUCF, Appendix 3a.1. One minor difference is that in the Excel tool the analytical solution for exponential decay is used, whereas the method presented in the GPG for LULUCF uses its numerical approximation. Direct inventory could be considered as a country-specific Tier 3 level method.

The calculations were made with the Excel tool using the same model parameters as described in chapter 2 of the EU submission. It is recognized that half life parameters for wood products are relatively poorly known and some expert judgment is needed.

Earlier studies using direct inventories of carbon stocks in wooden building materials were available (Pingoud et al. 2001 and 2003). The inventory was based on detailed database on materials in Finnish building stock being an extension of the official building statistics in Finland. The inventory estimates of wood materials not included in the building statistics (civil engineering, construction without building permit etc.) are a bit coarser and based on enquires and estimates on wood use in those end-uses.

The model calculations were compared with above direct inventories. The lifetime parameter of solid wood products in the model was then changed so that a fit between the model calculations on carbon stocks and the model-independent stock inventories was obtained.

B: Results

B:1. Model calculations with the Excel tool

The additional removal compared to IPCC default assumption was estimated (Figure 1) with the model using the three different approaches: In the stock change approach (STA) the positive carbon stock change of HWP within country boundaries is interpreted as removal. In the atmospheric flow approach (AFA) the net exports (= exports − imports) has to be added to the stock change to obtain the removal. In the production approach (PA) the carbon stock change of domestically grown HWP is estimated.

The trade flow estimates (in the figure for AFA) illustrate Finland's position as a country with significant wood products exports and roundwood imports. The net carbon balance in HWP trade is clearly positive. Further, there is an increasing trend in both roundwood production and roundwood consumption in Finland. Roundwood production is higher than its domestic consumption, resulting in higher stocks and stock changes using PA compared to STA. The significant net removal using AFA is a consequence of its standpoint: Finland as wood producer and wood product exporter would obtain "a net credit" from the gross carbon flux into its forests, whereas the decay flux of the forest biomass back into the atmosphere would take place mostly abroad. The increase in domestic carbon stock of wood products in use (0 - 0.8 Tg C/yr) has been small compared with the net exports (in order of 4 - 6 Tg C/yr). Estimated emissions using the different approaches converted into Gg CO_2/yr are given for the particular years 1990, 2000 and 2003 are presented in Table 1.

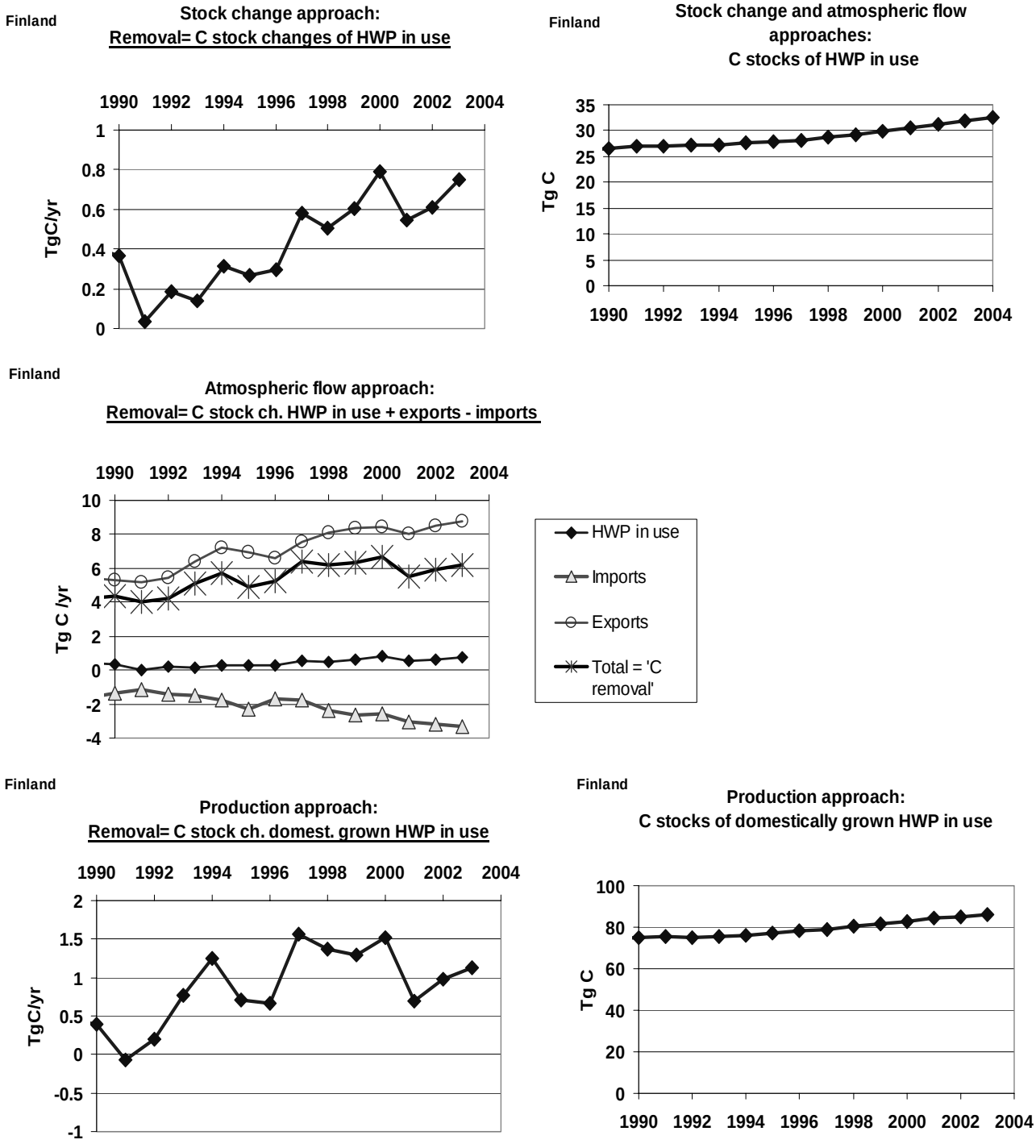


Figure 1. Indicative changes in carbon stocks of HWP in use in Finland using three alternative approaches. (Model calculations with the Excel tool using FAO data)

Table 1. Indicative changes in carbon stocks (Tg C/Yr) and emissions and removals (Gg CO_2 /yr) for years 1990, 2000 and 2003 (Note that assumed half life of sawnwood and wood based panels is 30 years).

FINLAND Year	Changes in carbon stocks in HWP (Tg C/yr)			CO_2 emissions and removals from HWP (Gg CO_2/yr)		
	Stock change approach	Atmospheric flow approach	Production approach	Stock change approach	Atmospheric flow approach	Production approach
1990	0.368	4.345	0.401	-1350	-15931	-1469
2000	0.793	6.657	1.513	-2908	-24408	-5547
2003	0.748	6.202	1.130	-2744	-22741	-4144

B:2. Direct inventories

Direct inventories have been considered as an advisable method. However, a limitation of general applicability of direct inventories is that building statistics in most countries do not give detailed information on building materials and their amounts in the national building stock. In Finland, however, a database has been built up on building stock statistics including information required. Four direct inventories of the carbon amount in the wood products stock (Figure 2) have been made so far (Pingoud et al. 2001, 2003).

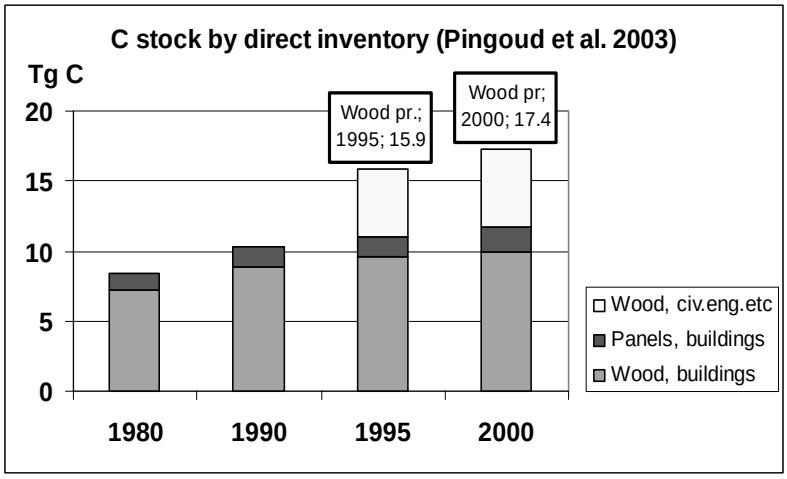


Figure 2. Direct inventories of HWP carbon stocks in Finland (Pingoud et al. 2003)

B:3. Combining direct inventories and model calculations

When direct inventories are available they can be used as an independent way of verifying models such as the Excel tool. In case of the Finnish case study, only the inventories from 1995 and 2000 containing an estimate of the total construction wood stock and could be used in fitting the Excel tool.

By adjusting the half life of solid wood products (sawnwood and wood based panels), their carbon stock calculated with the model could be fitted with the carbon stock according to the inventories (Figure 3). No paper products inventory is available and the default half life of 1 year was used. However, as the carbon stock of paper appears to be much smaller and their service life on the average much shorter than that of solid wood products this uncertainty is of less importance for the total stock change estimate.

The Excel tool calculations showed that the half life of solid wood products had to be decreased from the default half life of 30 years to 15 years to obtain the best fit with the inventory results.

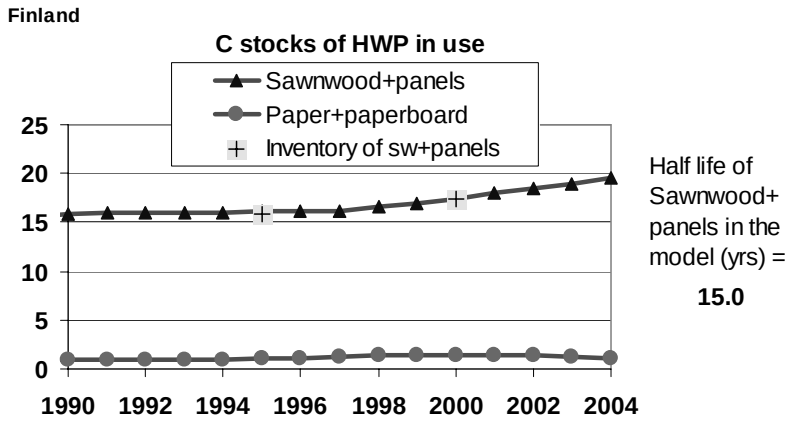


Figure 3. Carbon stocks in HWP: Combining direct inventory estimates and model calculations by adjusting the half life parameter of sawnwood and wood based panels in the model. (Solid lines are outputs of the Excel tool, the + marked points results of direct stock inventories.)

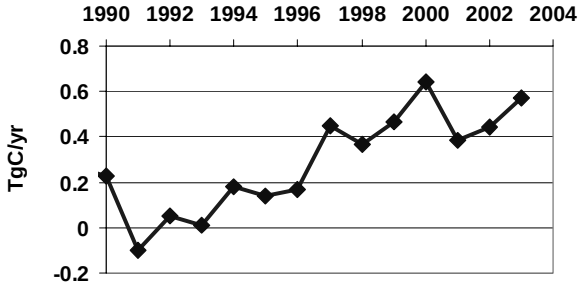
The results for all the three approaches by assuming half live of 15 years for sawnwood and wood based panels and 1 year for paper products are shown in Figure 4 and the estimated emissions converted into CO_2 in 1990, 2000 and 2003 in Table 2.

There is also another way of combining the inventory and model methods: take the inventory result (15.9 Tg C in 1995, Figure 2) to the initial value of the solid wood stock in the model and calculate then the subsequent years with the model. In that case no historical activity data (prior to 1995) would have been needed. Using this method the model and inventory results in year 2000 coincided with each other, when the half life in the model was 15.7 years.

Estimations are very sensitive to half lives used. From the model results for stock change approach in Table 1 and Table 2 it can be seen that using the shorter half life (15 years) the net removals were essentially smaller (20-40% less in years 1990, 2000 and 2003) than with the 30 years half life. For production approach the difference is even larger, whereas applying atmospheric flow approach the difference is minor as the huge net export of HWP is dominating the removal numbers.

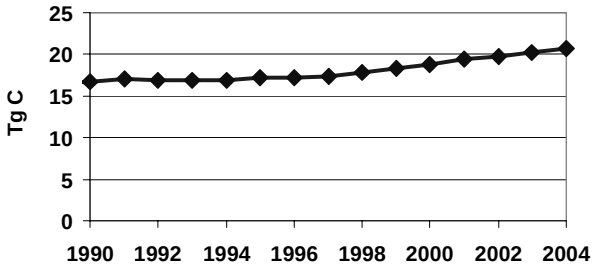
Finland

Stock change approach:
Removal= C stock changes of HWP in use



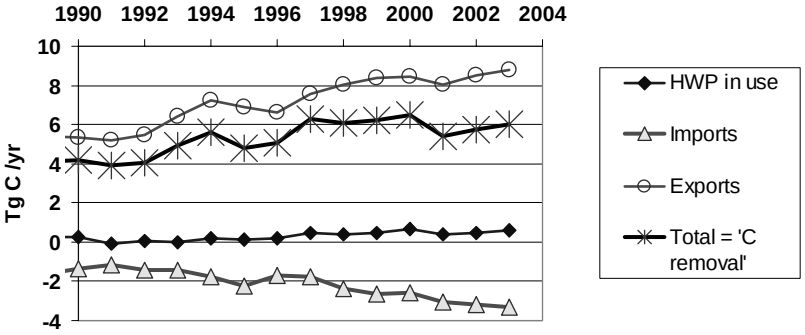
Finland

Stock change and atmospheric flow approaches:
C stocks of HWP in use



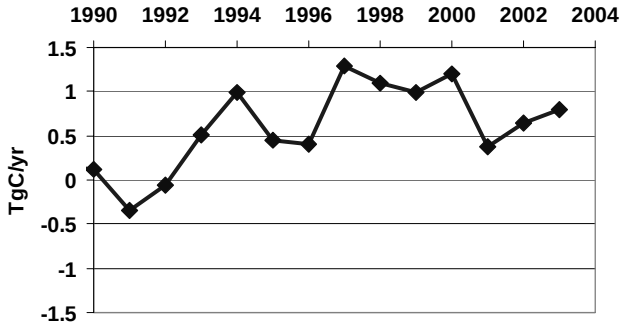
Finland

Atmospheric flow approach:
Removal= C stock ch. HWP in use + exports - imports



Finland

Production approach:
Removal= C stock ch. domest. grown HWP in use



Finland

Production approach:
C stocks of domestically grown HWP in use

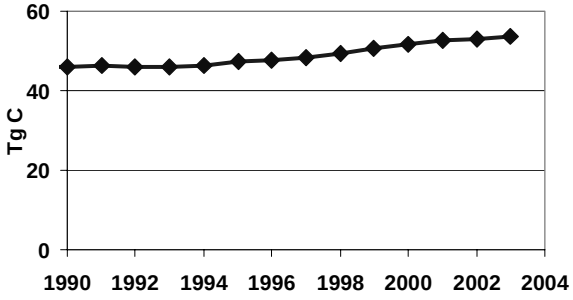


Table 2. Changes in carbon stocks and emissions and removals from HWP for years 1990, 2000 and 2003 by combining direct inventory and model calculations. (Note: Assumed half life of sawnwood and wood based panels was 15 years)

FINLAND Year	Changes in carbon stocks in HWP (Tg C/yr)			CO_2 emissions and removals from HWP (Gg CO_2/yr)		
	Stock change approach	Atmospheric flow approach	Production approach	Stock change approach	Atmospheric flow approach	Production approach
1990	0.228	4.204	0.117	-835	-15416	-430
2000	0.643	6.507	1.203	-2358	-23858	-4409
2003	0.573	6.026	0.790	-2100	-22097	-2898

C: Uncertainties

C:1. Uncertainties associated with model

The experiences have demonstrated that application of the stock change approach is a clear and straightforward exercise. The application of other two approaches (production approach and atmospheric flow approach) raises a number of methodological concerns, require some additional data and information to be estimated and also increase uncertainties. For example, in atmospheric flow approach the total export and import and export fluxes of wood based carbon are needed.

In production approach the methodological problems arise from: (i) estimation of the fate of exported wood that was grown in the reporting country and (ii) estimation of the origin of wood in the domestically manufactured semi-finished products. For instance, sawlogs exported partly end up in sawnwood and partly maybe also in paper products, both differing in service life from each other. Exported pulpwood may also end up in panel products or for biofuels. etc. Further, wood raw material of the semi-finished HWP manufactured in the reporting country may actually originate into some other country (in case of Finland imports most from Russia), and thus those products cannot be included in the stock considered in the production approach.

C:2. Uncertainties associated with activity data and other model parameters

The quality of the FAO data varies by country and also by product group. They are mostly based on national data delivered to FAO, so the national authorities are mainly responsible for its quality. There might also be some deviations in national and FAO statistics; for instance: some countries could report roundwood production over bark whereas the FAO numbers are under bark.

The default conversion factor used for sawnwood (0.225 Mg C/ m^3) seems to be slightly too high for Finland. More realistic would have been a factor = 0.2 Mg C/ m^3. The default conversion factor 0.45 Mg C/adt for paper products seems also to be a bit too high, as some paper products contain substantial amounts of non-wood materials (fillers, coating etc), but due to their shorter half life this conversion factor seems not to be so significant for the carbon estimates.

When comparing with Finnish HWP estimates, the 30 years half life of solid wood products appeared to be a bit too high. It is obvious that further studies are needed to determine in the model more realistic half lives of solid wood products.

D: General discussion on HWP estimation

Estimation of national carbon balance in HWP in use using stock change approach appears to be methodologically and technically sound approach. It is also consistent with the LUCF reporting in the 1996 IPCC Guidelines and IPCC 2003 GPG for LULUCF.

Atmospheric flow approach raises a number of methodological issues for further consideration. For example, the atmospheric flow approach seems to be is inconsistent with the overall IPCC reporting system. For example, imported biofuels could loose their emission neutrality stated in the Guidelines under the Energy sector. It seems also inconsistent with the reporting system for non-wood biomass: internal consistency of the national reporting system would require that atmospheric flow approach should be applied also to agricultural products and other biomass transfers through country borders in case it would be applied to HWP. In case of HWP estimation, it is technically difficult to distinguish between wood and non-wood fibres; both should be treated in similar manner to make the reporting simple.

Production approach appears to be technically difficult if dynamics of HWP is included into estimates. In case of large imports of roundwood and large exports of wood based products it would be difficult to estimate (i) which products are produced from wood grown domestically and (ii) what would be the lifecycle of the products in the export markets.

Inclusion of HWP in solid waste disposal sites (SWDS) to national reporting would create some additional challenges. Methane emissions from SWDS are at present reported under the Waste sector. If reporting of biogenic carbon balance in SWDS were applied, it would be logical to report them under the Waste sector, and not making any artificial separation between wood and other biogenic material.

In case of production approach the segregated reporting of (i) carbon balance of HWP in SWDS under the LUCF sector on the one hand and (ii) methane emissions from SWDS under the Waste sector on the other hand, would lead to a strange outcome: wood based carbon sequestered in SWDS would be allocated to the wood producing country, whereas methane emissions would be allocated to the countries where the SWDS are located.

In addition, technically it is very difficult to estimate which part of wood grown in the reporting country will end up in SWDS in the export markets comprising a number of countries with various waste management practices. Further, management of wood waste in the export markets is a factor, which is out of control of the reporting country.

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3.3. Ireland

1. Introduction

Ireland does not at present report carbon stocks stored in harvested wood products (HWP) in its national inventory. This paper concentrates on the applicability of FAO HWP trade data in the Irish situation, and the result of applying of different approaches for estimating changes in HWP stocks in use.

2. HWP trade data

If parties are to report and/or account for HWP, trade data may be required to estimate changes in carbon stocks. Accuracy of trade data is therefore an important issue. The FAOSTAT data at http://faostat.fao.org/faostat/ are commonly used in studies of international wood trade and may form part of the basis for estimating trade in HWP and hence changes in carbon stocks. In order to examine their application in an Irish context FAO data were compared with national HWP statistics for 2003 and 2004 and, in the case of softwood log imports, with expert opinion.

The data sources were FAOSTAT, and total import and export of HWP as recorded by the Irish Central Statistics Office (CSO). FAOSTAT and CSO use different codes for classifying wood products: FAOSTAT classes are those used for the Joint Forest Questionnaire complied by EUROSTAT, while CSO data are based on Standard International Trade Classification (SITC) codes. The coverage of HWP in the codes used by the two systems is given in Table 1. The categories reported do not always correspond exactly but adjustments have been made in subsequent tables in this report to take this into account[5].

[5] *Roundwood* (Code 1 in FAO) is approximately but not exactly equivalent to *Wood in the rough or roughly squared* (Code 247 in CSO). It can be taken that the CSO category includes roundwood logs, transmission poles, round fencing and the like, and a small quantity of squared baulks for further processing. The CSO places *Moulded timber shaped along any of its edges* or *Shaped along any edge or face* within *Wood, simply worked, and railway sleepers of wood*, whereas the FAO places this as *Further processed sawnwood.* If this CSO category (softwood only) is included with sawnwood the differences between the CSO and FAO for sawn softwood reported here reduce considerably.

Table 1. *Comparison of EUROSTAT [JQ] and CSO [SITC] product codes*.

JQ Product code	*SITC code*	*Description*
1	247	Roundwood
1.1	245	Wood fuel
1.2		Industrial roundwood
1.2.1		Sawlogs & veneer logs
1.2.2		Pulpwood, round and split
1.2.3		Other industrial roundwood (poles etc)
2	245	Wood charcoal
3	246.1	Chips & particles
4	246.2	Wood residues incl. sawdust
5	248	Sawnwood
6		Wood-based panels
6.1	634.11	Veneer sheets
6.2	634.3, 634.4	Plywood
6.3	634.2	Particleboard incl. OSB
6.4		Fibreboard
6.4.1	634.51	Hardboard (over 0.8 g/cc)
6.4.2	634.52	MDF (0.5-0.8 g/cc)
6.4.3	634.53	Insulating board (under 0.5 g/cc)
7	251	Wood pulp
8		Other pulp
9		Recovered paper
10		Graphic papers
11		Secondary wood products
11.1	248.50	Further processed sawnwood
11.2	635.1, 635.2	Packaging
11.3	635.3	Joinery & carpentry
11.4	821	Wooden furniture
11.5	811	Pre-fab buildings

National and FAO data for Irish imports and exports of primary wood products are presented in Tables 2a and 2b.

Table 2a. *Comparison of HWP import statistics for Ireland for 2003 based on national (CSO) and FAO data*.

Category	*CSO 2003*	*FAO 2003 T*	*FAO-CSO*	*% difference*
Roundwood	53,000	95,000	42,000	44%
Chips	80,000	89,000	9,000	10%
Sawn softwood	423,600	467,000	43,400	9%
Sawn hardwood	56,000	56,000	0	0%
Plywood	67,000	109,000	42,000	39%
Particle board	37,000	36,000	-1,000	-3%

For almost all categories of imports of primary HWP examined national data were lower than corresponding FAO reported number (Table 2a). This is related to adjustments to national data that are made when reporting to EUROSTAT and in the conversion factors used. There were large

differences in two categories: roundwood and plywood. For roundwood FAO data are regarded as the more accurate, as expert opinion and discussion with sawmills indicate an import of 140,000 tonnes. Underreporting arises due to the fact that almost all roundwood imports are from the UK (Northern Ireland and Scotland), a fellow EU Member State. Since the advent of the EU Single Market trade between Member States is not estimated directly but is taken from value added tax (VAT) returns submitted by traders. These data are gathered on a sample basis and not all traders or transactions may be covered.

In the case of plywood imports the discrepancy is likely to be a transcription or computational error. Expert opinion is of the view that plywood imports in 2003 were close to the 67,000 t CSO datum.

Table 2b. *Comparison of HWP export statistics for Ireland for 2003 based on national (CSO) and FAO data*.

Category	*CSO 2003*	*FAO 2003*	*FAO-CSO*	*% difference*
Roundwood	233,000	214,000	-19,000	-9%
Chips	10,700	11,000	300	3%
Sawn softwood.	275,000	281,000	6,000	2%
Sawn hardwood	4,000	3,000	-1,000	-33%
Plywood	3,000	0	-3,000	
Particle board	194,000	194,000	0	0%

For exports there was close agreement between CSO and FAO data for almost all categories, and in the case of the large relative difference in sawn hardwood exports the absolute size of the difference, 1000 t was not significant.

Overall the work reported here points to a need to critically examine FAO reported and national trade in HWP, in the event of any proposal for wood products to enter carbon accounting frameworks post 2012. At the practical level there are difficulties for non-technical personnel (customs and other collators of data) in categorising wood and wood products. Examples encountered in this work include an inability to distinguish between softwood and hardwoods – in some cases this can only be determined with certainty by microscopical examination. Description of board materials – veneered particle board or MDF may be misclassified as plywood. This may account for the reported (CSO) exports of plywood (Table 2b), which is not manufactured in Ireland.

Notwithstanding the above considerations, and the data for imports of roundwood, shown in Table 2a, HWP trade data as reported by FAO correspond quite closely to national data and expert opinion, and appear to represent a fair and reasonable estimate for Ireland, given the opportunities for misclassification as noted above. Any errors appear to be random and there is no evidence of a systematic bias.

3. FAO conversion factors

In relation to the following discussion of the application of standard FAO conversion factors it is important to point out that countries reporting HWP data to EUROSTAT have the opportunity to suggest country-specific values for the various factors.

Standard FAO conversion factors used in preparing tables of production and trade were examined (kg/m3 and m3/metric t) for their applicability to Irish circumstances. The factors given for fuelwood, non-coniferous sawlogs and pulpwood, and non-coniferous sawnwood appear a reasonable and necessary compromise, given the wide range of species and variations in moisture content

encountered. Sawn softwood imported to Ireland is overwhelmingly comprised of Norway spruce and Scots pine and is normally dried to 20% moisture content. On this basis the FAO conversion figure of 550 kg/m3 for this category is rather high, as the basic density of these species (on an over-dry basis) is 400-500 kg/m3. Ireland will be seeking to change these conversion factors for its data reported for 2004 onwards.

Most sawnwood exports are palletwood and are not dried, and here the FAO factor of 550 kg/m3 is somewhat low. Palletwood exported from Ireland is mostly Sitka spruce with a high proportion of juvenile wood from small trees. The basic density can be as low as 350 kg/m3 (on an oven dry basis).

The FAO generic density conversion factors for plywood, particle board and hardboard imported to and exported from Ireland are reasonable. The value given for MDF, at 2 m3/t [500 kg/m3] is too low for Irish produced MDF, which averages 750 kg/m3.

4. Estimating changes in carbon stocks

Estimated changes in carbon stocks in HWP in use in Ireland are plotted in Figure 1 for the three approaches outlined in the main submission.

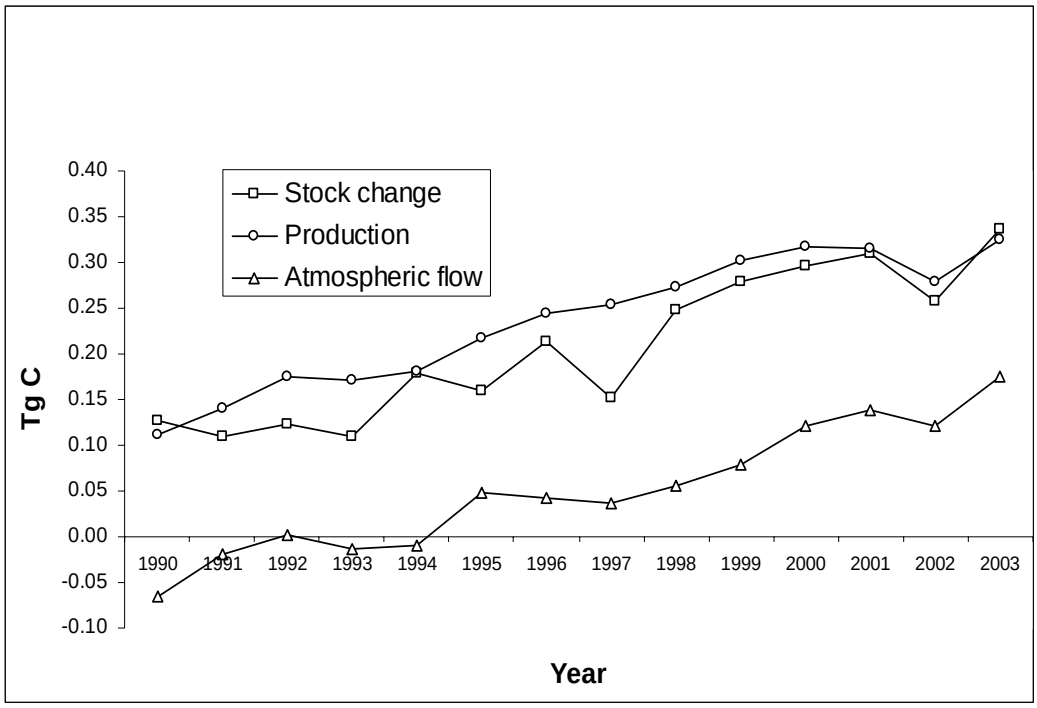

Figure 1. *Indicative changes in carbon stocks of HWP in use in Ireland using three alternative approaches. (Calculations carried out using FAO data and METLA Excel tool[6].)*

All three approaches show a trend of increasing positive stock changes in HWP is use. One of the main reasons is that since the mid 1990s the level of production and use of wood has climbed steadily in line with economic expansion. For example, house construction (a significant user of wood) was at just over 30,000 units in 1995, but by 2004 this had increased to 78,000 units, one of the highest per capita rates (19 per 1000 population) among developed countries[7].

[6] The second version of the EXPHWP model (8 March 2005). For further details, contact kim.pingoud@metla.fi.

[7] Source Department of Environment, Heritage and Local Government.

Further national research will be required to validate the assumptions in the model in relation to half lives of timber products and other aspects.

3.4. The United Kingdom

Current accounting of carbon in harvested wood products

The UK greenhouse gas inventory currently uses the Production Approach to include harvested wood products. Changes in harvested wood product pools associated with timber from coniferous and broadleaf forests are calculated in the C-Flow carbon accounting model[8]. The model uses planting data for UK forests since 1920, mean forest growth curves and standard forest management practices.

Assumptions of current methodology

- Only forests planted since 1920 contribute to the HWP pool.
- Plantations are clear felled and restocked at the time of Maximum Area Increment (59 years for coniferous trees and 92 years for broadleaf trees).
- Lifespans for HWP are for the purposes of computation assumed equal to the rotation length of the source plantation.

Comparison with HWP carbon pools calculated for the UK and given in with Part I of this submission

The production approach estimates made by the UK using C-Flow are lower that the estimates made using EXPHWP (Figure 1 and Table 1 below; compare the right hand end of upper lines with the Production Approach values in 2003 for the UK in the main part of the Submission). The tabulated values for 1990 and subsequently are consistent with the inventory submission made to the UNFCCC in March 2005. Values are not comparable before about 1980 as C-Flow excludes forests planted before 1920. The subsequent differences between the carbon stock changes are consistent with the differences between the two methods, particularly in the lifespan of products. Both methods predict the drop in domestic HWP production after 2000 due to the drop in new planting during the 1940s.

The estimation of how much of the manufactured HWP are made from timber of domestic origin is calculated by EXPHWP in the Production Approach using (domestic roundwood production / roundwood consumption). Due to exports, the domestic production fraction can exceed 1.00; an alternative approach would be better to use (round wood production / (production + imports)), which generates slightly lower values of carbon stock change.

[8] Baggott, S. L., Brown, L., Milne, R., et al., (2004). UK Greenhouse Gas Inventory, 1990 to 2002 Annual Report for submission under Framework Convention on Climate Change. In. AEAT/ENV/R/1702. National Environmental Technology Centre, AEA Technology Centre.

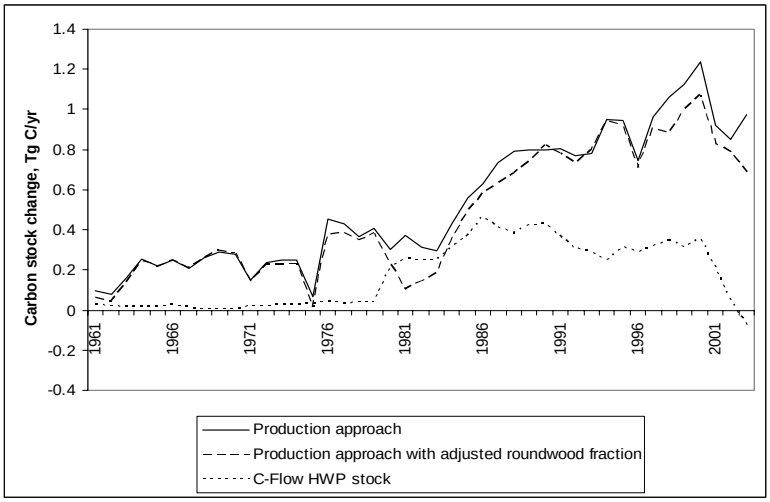

Figure 1: Comparison of HWP carbon stock changes estimated by the Excel-tool Production Approach, the modified Production Approach and the C-Flow model

Table 1: Changes in carbon stocks in HWP predicted by the spreadsheet tool and the C-Flow model

	Changes in carbon stocks in HWP (Tg C yr^{-1})	
Year	Production approach	C-Flow
1980	0.298	0.212
1990	0.796	0.432
2000	1.237	0.360
2003	0.973	-0.073

PAPER NO. 4: UNITED STATES OF AMERICA

Submission of the United States
FCCC/SBSTA/2004/13
Good practice Guidance for LULUCF activities under the Kyoto Protocol, harvested wood products and other issues relating to LULUCF
August 2, 2005

The United States submitted data and information on changes in carbon stocks and greenhouse gas emissions from harvested wood products, and views on the IPCC methods as well as various accounting approaches on 1/23/2003 (SBSTA/2003/misc.1) and submitted additional views on 4/28/2004 (SBSTA/2004/misc.9). The U.S. also provided views on the Land Use Land Use Change and Forestry Common Reporting Format tables on May 13, 2005 (SBSTA/2005/misc.7).

The U.S. welcomes the opportunity to provide an update on the information provided in these earlier submissions. The U.S. reiterates the view that harvested wood products, including those products currently in use and in landfills, are an important component of the carbon cycle and as such, they should be included in any greenhouse gas accounting system. The United States would like to thank the Secretariat and the experts for their preparation of the technical paper on the 2004 workshop on harvested wood products. We also strongly appreciate the efforts by the National Greenhouse Gas Inventories Program of the Intergovernmental Panel on Climate Change in preparing the 2003 *Good Practice Guidance for Land Use, Land-Use Change and Forestry.* In addition, the U.S. supports the efforts by the IPCC to develop approach-neutral methods for the upcoming *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

Experience with the IPCC Methodologies

The U.S. uses assumptions and methods to estimate changes in carbon stored in HWPs that are consistent with the 2003 IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* and the *Revised 1996 IPCC Guidelines*.

The U.S. noted in its 2005 inventory submission that it plans to revise in future inventory submissions the estimates of carbon stored in harvested wood products using more detailed wood products production and use data, and more detailed parameters of disposition and decay of products.

Several approaches have been proposed to account for carbon in forests in combination with carbon in HWPs. in the 2003 *Good Practice Guidance for Land Use, Land-Use Change and Forestry.* The United States currently uses the production approach to report changes in carbon in HWPs. With this approach, carbon stored in HWPS in use and in landfills includes the carbon in exported products and does not include the carbon in imported products. Carbon in exported HWPs is assumed to have the same disposition rates as in the United States.

Table 1: U.S. Forest Carbon Stock Estimates

	1990	1997	2004
	Tg CO2 Equivalents		
Forest	39,498	40,812	41,882
Harvested Wood Products	1,915	2,307	2,713
Total	41,414	43,119	44,594

Source: Information is from the U.S. Environmental Protection Agency. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2003. EPA 430-R-05-003, April 2005.

Table 2: Estimated Net CO2 Sequestration from U.S. Forests

	1990	1997	2003
	Tg CO2 Equivalents		
Forest	(739)	(638)	(537)
Harvested Wood Products	(210)	(213)	(216)
Total	(949)	(851)	(753)

Source: Information is from the U.S. Environmental Protection Agency. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2003. EPA 430-R-05-003, April 2005.

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