

Section 4

Carbon Stock Changes due to Harvested Wood Products in the UK

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4. Carbon Stock Changes due to Harvested Wood Products: UK

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4.1. Key Results

- The EXPHWP spreadsheet model will be useful in calculating carbon flows due to harvested wood products (HWP) in the UK.
- The model provides three methods of calculating carbon flows due to HWP: the Stock-Change Approach, the Atmospheric-Flow Approach and the Production Approach.
- The model uses forestry data from FAOSTAT that is of high quality and regularly updated
- Estimates of the domestic component in HWP production in the Production Approach can be improved
- Results from the EXPHWP model are comparable with those previously produced by CEH using the C-Flow model

4.2. Introduction

Carbon stock changes due to Harvested Wood products (HWP) in the UK were calculated with the aid of the EXPHWP spreadsheet provided by Kim Pingoud of the Finnish Forest Research Institute. The EXPHWP model uses data from the FAO forestry database (FAOSTAT, 2005) and parameters provided by the user. The carbon stock flows for the three HWP accounting approaches with the original version of the spreadsheet are shown in Figure 4-1. The Stock-Change Approach reports the carbon stock changes in HWP in use (consumed) in the UK: a positive stock change is a carbon removal due to HWP. The Atmospheric-Flow Approach reports the carbon emission by decaying HWP, which will then be added to the carbon uptake from growing forest biomass. This carbon emission is estimated from the stock change of HWP in use + Exports of HWP – Imports of HWP. The Production Approach is similar to the Stock-Change Approach but also considers the fate of exported wood products.

The EXPHWP model does not currently calculate carbon stocks in solid waste disposal sites (SWDS). Nor does it consider the international trade in finished wood products (e.g. furniture, books, etc.), as these statistics are not available from the FAO database.

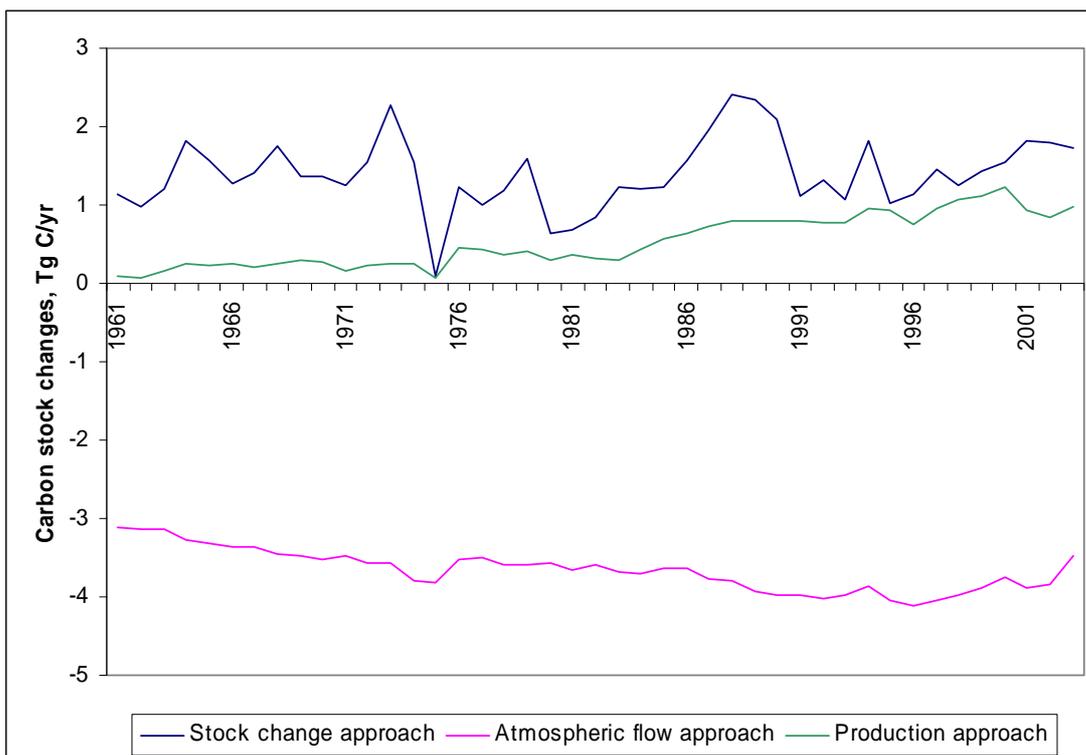


Figure 4-1: Comparison of HWP accounting approaches for the UK using the original values in the EXPHWP model

4.3. Potential model modifications

4.3.1. Input parameters

The current version of the spreadsheet model allows the user to adjust several input parameters: half-lives of wood products, conversion factors for carbon content and growth in HWP consumption prior to 1961.

4.3.1.(a) Half-lives of products

The effect of assumptions on half-life were investigated by making adjustments to the basis of the mix of HWP in 2003 and the half-lives for individual products given by the IPCC defaults ((IPCC, 2003), p.3.270)) and Pingoud *et al* (1996). From this method, the half-life of solid wood products has declined over time from 34.15 years in 1961. Small changes to half-life values appeared to have little impact on the carbon stock outputs so a case could be made for retaining the original model inputs.

Half-life, years	Original values	Adjusted values
Solid wood products	30.00	30.25
Paper and paperboard	1.00	1.32

4.3.1.(b) Conversion factors from volume (m³) to carbon content (Mg)

The conversion factors were adjusted on the basis of the mix of different products in each HWP category in 2003 and the IPCC default conversion factors (IPCC 2003, p.3.265). This adjustment did not have a great impact on the carbon stock outputs. The model input of 1.35% growth rate of HWP consumption prior to 1961 was retained.

	Original values	Adjusted values
Sawnwood	0.225	0.229
Wood-based panels	0.294	0.248
Paper	0.45	0.45

4.3.2. Data input

Data used in the EXPHWP model has been taken from the FAO forestry database (FAOSTAT 2005). This was provided by the UK Expert Group on Timber and Trade Statistics and appears to be the best available complete dataset. The recent UK production statistics are also UK National Statistics (a hall mark of data quality), but statistics for years before 1994 and for imports and exports have not undergone the same quality assurance procedures (although they are still the best available). A recent release of UK Wood Production and Trade figures (May 2005, [http://www.forestry.gov.uk/pdf/trprod05.pdf/\\$FILE/trprod05.pdf](http://www.forestry.gov.uk/pdf/trprod05.pdf/$FILE/trprod05.pdf)) gives revised values for 2003 and 2004 that have not yet been included in the FAO database. These revised values were used in place of the original values in the EXPHWP model.

4.3.3. Adjustment to the production approach calculations

In the Production Approach the domestic production of solid wood and paper products is multiplied by the fraction (domestic roundwood production / roundwood consumption) to give an estimate of how much of the manufactured HWP are made from timber of domestic origin. Consumption is calculated as (production + imports – exports). Due to exports, the domestic production fraction can exceed 1.00, which is misleading as only (roundwood production – roundwood exports) is actually available for HWP manufacture. Therefore, the multiplier fraction is given by (round wood production / (production + imports)). This generates slightly lower values of carbon stock change in the EXPHWP model (Figure 4-2) and slight changes in the total carbon stock (Figure 4-3). It should be noted that wood fuel is included in roundwood production, although strictly speaking wood fuel is carbon-neutral because there is no long-term carbon storage (Nabuurs et al., 2001).

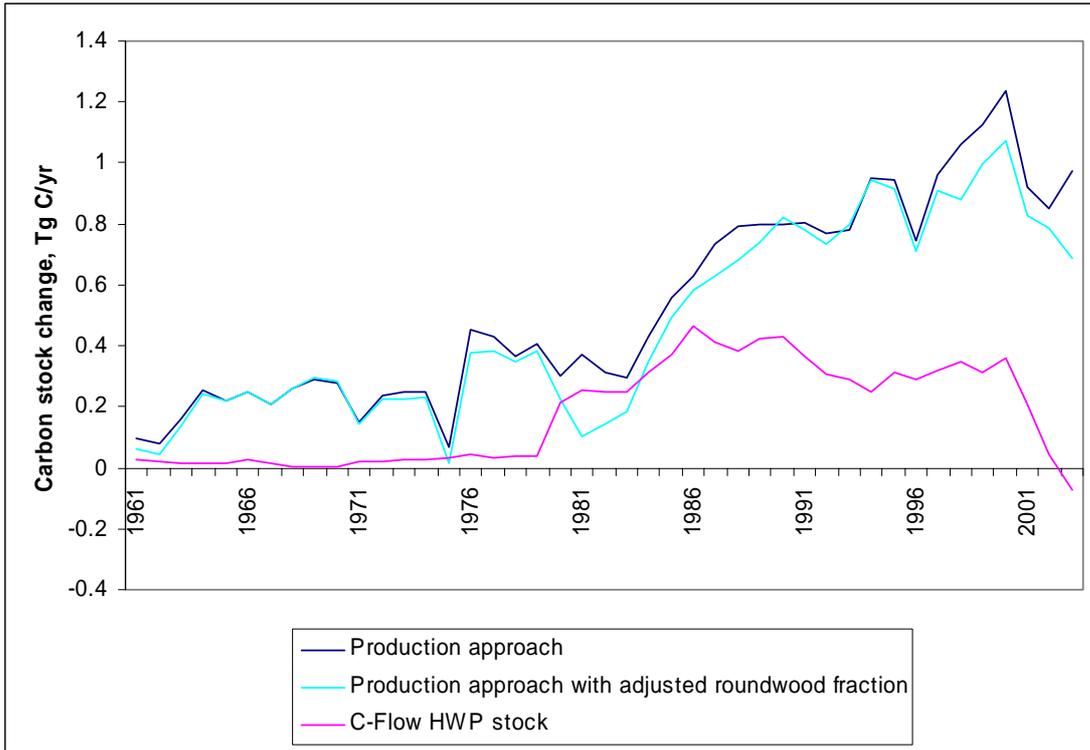


Figure 4-2: Comparison of HWP carbon stock changes estimated by the original EXPHWP model, the modified EXPHWP model and the C-Flow model

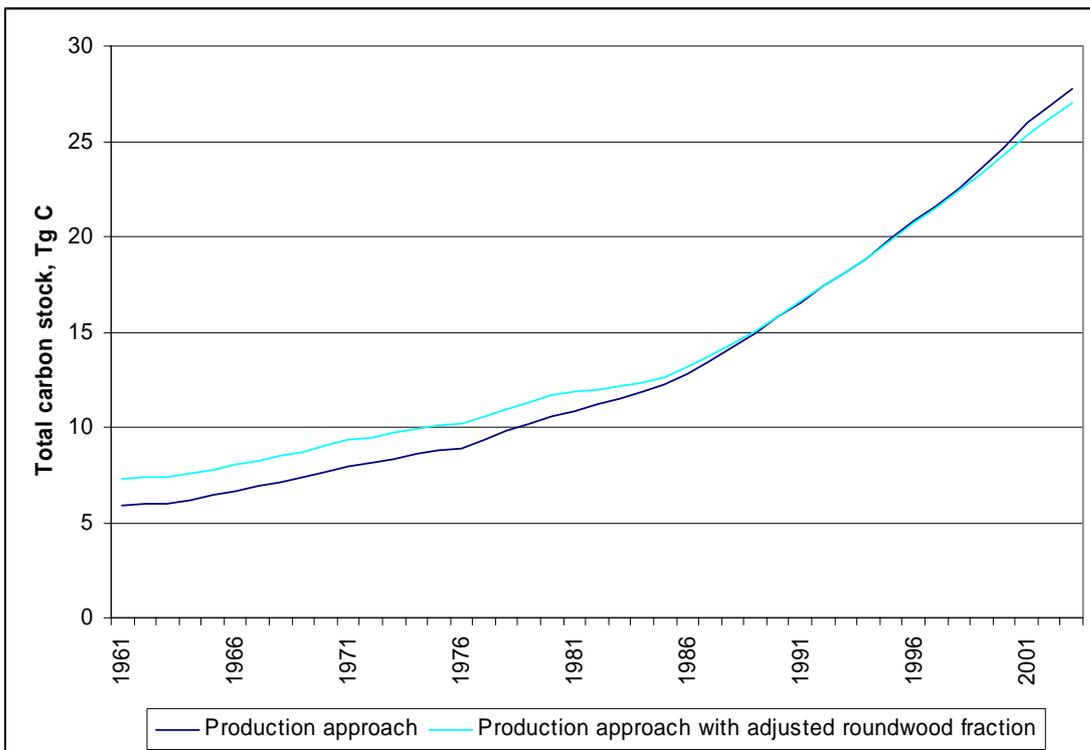


Figure 4-3: Comparison of the total HWP carbon stock estimated by the original and modified EXPHWP model.

4.4. Comparison with C-Flow product estimates

Previous estimates of carbon stock changes in the UK due to HWP have been produced by CEH using the C-Flow model (Baggott et al., 2004). This operates in a similar manner to the Production Approach, but only estimates production from forests planted since 1922, excluding approximately 850,000 hectares of woodland that were either planted before this date or are not of commercial importance. The C-Flow model also assumes a longer lifespan for harvested wood products, equal to the rotation length of the forest.

Figure 4-2 shows HWP carbon stock changes from C-Flow compared to those from the EXPHWP model production approach (both original and modified). Some of the differences between the models can be explained because C-Flow is based on planting data so HWP only become available after a time lag of 60 years (equal in length to a softwood rotation) (see Figure 4-4). Both models predict the drop in domestic HWP production after 2000 due to the drop in new planting during World War II.

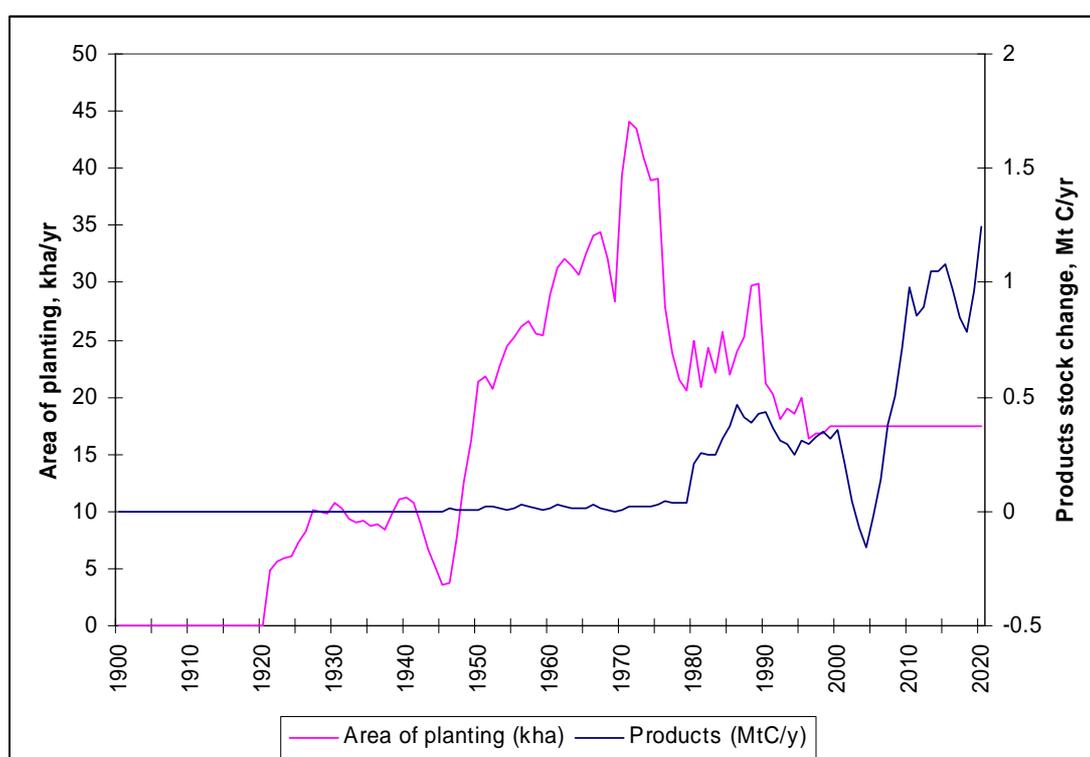


Figure 4-4: Comparison of C-Flow estimated planting and HWP stocks over time in the UK

4.5. Summary

In general, the EXPHWP model seems useful for the calculation of carbon flows due to harvested wood products. The data used in the model (from FAOSTAT) appears to be the best available for the UK but may be subject to minor revisions. The calculation of the Production Approach could be improved by using a different ratio to estimate the amount of HWP that has been produced from roundwood of UK origin. Estimates of carbon stock changes due to HWP from the EXPHWP model were comparable with those from the C-Flow model (given the difference in the two approaches). The EXPHWP model does not currently calculate the HWP stocks in solid waste disposal sites, although this is being addressed. Neither does the model consider the import and export of finished wood products such as furniture, books and

newspapers, or the production of wood for miscellaneous uses such as fencing (263,000 green tonnes in 2003 ((Forestry-Statistics, 2004)).

4.6. References

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