

C I N T R A F O R

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The Potential Trade and Competitive Implications of Alternative Approaches for Harvested Wood Products

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Executive Summary

Forests play three central roles in the carbon cycle. Forests act as sinks and sources of carbon. Second, harvested wood products (HWP) from forests store carbon over their life cycle. Third, wood products conserve fossil fuels through energy substitution and by their lower fossil-fuel usage during their manufacture. International governmental bodies have recognized these roles in their discussions. The current United Nations Framework Convention on Climate Change (UNFCCC) methodology used to prepare national greenhouse gas (GHG) inventories provides the suggested default assumption that all forest biomass harvested be recorded as an immediate source. Additionally, the convention also recognizes that the wood product sink can be included if it can be documented that existing stocks are increasing. Our study focuses on the second role -- HWP and their function in forest carbon accounting.

Past studies estimated carbon additions and emissions under alternate accounting approaches and analyzed their impacts using case studies. We calculated the emissions associated with three alternative approaches for 30 regions comprising the global forest sector and reported results for the globe and regions. We briefly investigated alternative methods to calculate the additions and emissions under alternate approaches by examining the sensitivity of alternative assumptions on landfill pools. We also investigated economic implications associated with the alternative approaches by imposing costs on the global forest products industry for national emissions of the forest carbon account.

Three approaches to calculate stock changes and estimated emissions associated with HWP proposed by IPCC are the stock change approach, the production approach and the atmospheric flow approach. The stock change approach estimates the net annual change in carbon stocks in the forest and wood products pool within national boundaries. Briefly stated, stock changes in the forest pool are accounted for in the producing country. Stock changes in HWP pool are accounted for in the consuming country. The production approach also estimates net annual changes in the forest and HWP carbon stocks. Producing nations account for forest stock changes and the changes in carbon from HWP that came from domestic harvests including exported wood products. The atmospheric flow approach estimates carbon flows between the atmosphere and the forest and HWP pools within the national boundary. Producing nations account for forest growth carbon and consuming countries count emissions from wood and wood products.

We examined the overall effect of the approaches on national emissions to compare the results to those obtained using the IPCC default. For sake of clarity, we divided the national account into the forest account and the HWP account. All that we were interested in the forest account was that portion of emissions calculated by measuring stock changes affected by the HWP accounting approaches.

Within each accounting approach there may be more than one estimation method that can be applied with different levels of complexity, depending on data availability. Two examples are alternative assumptions on the fraction of wood product leaving the in-use pool every year and degrading half lives. We examined the sensitivity of IPCC good practice guidelines default assumptions changing the default parameters associated with half-lives of discarded products. Other sensitivities are possible given the data base created but not pursued for this study.

We used an economic model of global forest sector to extend the calculations of carbon emissions under the different approaches to 2016. Economic equilibria to production, consumption, traded volumes and prices were calculated for coniferous and non-coniferous sawn wood and plywood. We maintained industrial roundwood

material balances in the production of these products using estimated input/output coefficients such that equilibrium amounts produced, consumed and traded for saw logs were also calculated for the years 2004 to 2016. Projections of other panels and paper and paperboard products and their use of industrial roundwood were required as input by the economic model so as to maintain material balances at the roundwood level. Paper and paperboard projections were made using estimated income elasticities and gross domestic product (GDP) projections differentiated regionally.

Scenario assessment was employed to examine the trade and competitiveness implications associated with alternative approaches. We imposed a cost in the country in the form of an emission tax. The tax level was determined by using the calculated forest sector removals/emissions for the default and three alternative approaches. The impact of the emission tax for each approach was then compared with the IPCC default approach. We chose to limit the analysis of economic impacts to the softwood lumber sector since other wood product sectors accounted for in the model do not use equilibrium methods to determine stock inflows in response to a cost increase. We investigated a carbon price of \$10 and \$35 per tonne of CO₂.

We summarize our conclusions as follows.

- Using available forestry data and IPCC accounting methods that consider carbon in HWP, it is demonstrated that HWP pools are increasing globally. By 2002, global carbon stocks in products in use had accumulated to approximately 4,508 Tg C, and were increasing at a rate of 1.2% per year. Global carbon stocks in landfills were estimated to be 3,447 Tg C and were increasing at 2.4% per year.
- Different accounting approaches (i.e. the current IPCC default, stock change, production, and atmospheric flow) led to different national accounts of emissions. Compared to alternative approaches, the IPCC default approach resulted in higher national emissions for all nations, with the possible exception of a few regions where much of the harvest is used for fuel wood. The stock change approach produced lower emissions for large net importers of HWP. The production and atmospheric flow approaches led to lower emissions for large net exporters of HWP.
- If the forest products industry became financially responsible for HWP carbon emissions, the selection of an accounting approach could significantly affect the industry. In particular, the current IPCC default approach could result in lower global industry output and higher lumber prices than the three alternatives (i.e. stock change, production, and atmospheric flow). The differences between the three alternative approaches, do not appear to be significant at the global level (differences in wood costs of \$0.25 per m³ or less). In some countries, however, the differences between the three alternatives can be more than \$10 per m³ of wood.
- The stock change approach can give rise to the elimination of accounted HWP emissions when import levels lead to increasing HWP pools that are greater than domestic harvest emissions.
- Calculating the land-filled pool using alternative values of half-lives led to relatively small changes in emission accounts. These changes were relatively constant across accounting approaches.
- The economic impact of emission changes depended on the level of these charges
- High carbon prices led to persistent change in coniferous sawlog harvest levels and higher prices in softwood lumber markets. We expect similar responses in other forest product markets including pulp and paper. Their raw material costs would increase since the emission tax increases harvesting costs, and lower output by the softwood lumber sector reduces residual supply to pulp mills.
- Low carbon prices led to higher price in these markets as consumption levels recovered.
- Higher prices under both low and high carbon values could signal product substitution.

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