Wilderness Society Report on Wood Products and Carbon Storage: A Critical Review

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Introduction

In April 2009 The Wilderness Society released a report "Wood Products and Carbon Storage: Can Increased Production Help Solve the Climate Crisis?"[1] The report begins by noting that much attention has been focused on wood products and wood fuels to store carbon and reduce fossil emissions. Taken to its extreme, the report states, "this approach suggests that cutting down forests is the best preemptive move to prevent carbon losses due to fires or insect infestations." The report concludes that "an increased use of wood fuels and lumber will have very little effect on climate change." Thirty-nine pages of discussion and analysis, interwoven with Wilderness Society forest policy recommendations focused on preserving old growth and/or public forests, support this conclusion.

Unfortunately, what is promoted as a scientific evaluation of the carbon storage/wood products issue is deeply flawed. Whether intended or not, the net effect is a muddying of the waters on the issue of carbon storage and wood products under the guise of science.

Positives

There are a number of key statements found in the "Conclusion" and "Summary" sections of the Wilderness Society report that are not included under a listing of "Key Points," and which don't reflect the tone and tenor of the bulk of the report. Many of these statements make sense from environmental, economic, and social perspectives. For example, the report acknowledges that:

- Wood products and wood fuels have a role to play in a carbon-friendly future;
- Wood products and fuels generate revenue for landowners—an incentive to keep forests as forests;
- Wood products provide material comforts for consumers;
- Greenhouse gas emissions may be reduced by substituting wood for more fossil-fuel-intensive alternatives;
- There is room for reducing consumption without harming basic human welfare.

Similarly, policy options outlined in the report tend to favor wood over fossil fuel-based products. Specifically, the report recommends:

- Imposition of full environmental costs on fossil fuel-based and wood-based products alike, hence giving wood a competitive advantage;
- Encouragement of voluntary choices that favor wood through approaches like green building standards or renewable energy certificates;
- Offering of temporary subsidies or tax breaks to switch fossil-fuel furnaces to clean-burning wood furnaces where sustainable supplies are available;
- Encouragement of community-scale wood heat projects that use locally sourced wood and are likely to have fewer environmental and fossil energy impacts than larger-scale projects.

[1] The report, Ingerson, A. 2009. Wood Products and Carbon Storage: Can Increased Production Help Solve the Climate Crisis? Washington, D.C.: The Wilderness Society, is available at: (http://wilderness.org/files/Wood-Products-and-Carbon-Storage.pdf)

Flaws

Notwithstanding the above summary points and recommendations, the full report falls short on many counts. Chief among the short-comings are:

- Disregard of the existence of complete life cycle analyses (LCA) of wood products manufacturing and carbon storage;
- Simplification of the importance of wood-based products and fuels as substitutes for fossil fuel-based products (avoided emissions issue);
- Faulty assumptions regarding end-of-life disposal of wood products;
- Establishment of a false dichotomy between healthy-carbon storing forests and efficiently manufactured carbon-storing wood products; and
- A tendency to single out wood production as a culprit in our nation's use of energy and materials.

An apparent assumption underlying the Wilderness Society report is that unmanaged forests are static. For instance, the report highlights carbon storage from a wood removal perspective but ignores the option of 'no wood removal' from a forest. In addition, little discussion is included on the risks posed to forests by fire, pests, and other calamities. The net effect is that whereas wood production is carefully scrutinized for carbon storage and leakage, the "do nothing" (no harvest) option receives no scrutiny whatsoever.

There are a number of other problems with the Wilderness Society report, including significant inaccuracies, omissions, and unwarranted conclusions.

The following is a commentary on a few of the most disturbing statements made in the report.

> **Page 3 – On this page there is strong endorsement of use of life cycle analysis in evaluating harvested wood products. The paper also suggests we should be keenly interested in carbon accumulation in forests.**
>
> *Comment:* A key task in LCA is defining the system boundary for analysis. The IPCC 2006 Guidelines for Carbon Sinks and Emissions Reporting (IPCC 2006) suggests it is important when estimating carbon flows associated with harvested wood products (HWP) to view HWP as part of a larger forest/HWP system. This is critically important, in part, for coordinating the carbon accounting across forests and products. The IPCC guidelines define flows into the HWP part of the combined system as amounts of wood leaving a harvest site. The forest part of the system accounts for accumulation and decay of any logging residue left on site.
>
> In this paper flows into the wood products part of the system are defined as any trees cut down as part of harvesting. This means the forest part of the system would exclude any carbon left on harvest sites that is part of the course woody debris or, eventually, the soil. If the paper implicitly assumes we can use U.S. estimates of forest carbon change developed under the IPCC guidelines (the ones reported internationally) then the HWP carbon starting point in the first line of Table 2 (page 6) (harvest loss) should be deleted. **With this adjustment the estimates in Table 2 would suggest that 22% to 59% of wood leaving harvest sites is stored after 100 years, rather than the 1% reported.**

If this line is retained we would need a companion paper explaining how U.S. forest carbon accumulation estimates would be adjusted downward from the IPCC based estimates to exclude carbon in forests that came from logging residue.

With either system boundary what matters is the change in carbon to the atmosphere; to determine this it is necessary to evaluate the combined forest/ HWP system.

For a complete understanding of the effect of changing HWP production a system boundary would be needed around 1) all forests (U.S. and foreign – where we may obtain imports or offset harvest) and 2) around all U.S. forest products harvest, transport, production and use (placing in applications), disposal, reuse, and 3) around all manufacturing production processes where wood is a substitute. In principle it is necessary to estimate the effect of a one unit increase/ decrease in wood product production for this complex system.

Separate analysis can (should) be done for individual forest / HWP / substitute systems where the forest is a particular forest type in a particular location since impacts will vary.

Page 3 – A 2003 citation is highlighted that suggests that studies of carbon flows associated with wood products manufacturing and use ignore GHG emissions from harvest, transportation to processing plants, mill emissions, and transportation to regional distributors and consumers.

Comment: In research published by the Consortium for Research on Renewable Industrial Materials (CORRIM), that is prominently referred to later in the report, all of these carbon flows have been tracked (e.g. Puettmann. and J. Wilson 2005).

Page 4 – "Scientists have yet to demonstrate that there is net C storage in forest products if a complete LCA, cradle to grave, is completed."

Comment: Not true. A number of studies have demonstrated this (e.g. Perez-Garcia et al. 2005).

Related to this point, it is interesting to note that other than in a concluding statement (*"Greenhouse gas emissions may be reduced by substituting wood for more fossil-fuel-intensive alternatives."*) the Wilderness Society report otherwise ignores the issue of avoided emissions, suggesting an assumption that using wood, or using nothing, are the only options available. In reality, using wood or using something else (e.g. fossil fuel intensive materials) are the likely options, and comparisons of the impact of these two options consistently indicate a substantial positive carbon balance for wood products manufacture and use. Sathre and O'Connor (2008) provide a comprehensive review of studies indicating the degree to which use of wood products can offset emissions by substituting for other products.

Page 5 – "The data that we synthesized from multiple studies indicate that as little as 1% of the carbon present in the standing tree may remain in solid wood products after 100 years."

Comment: This is a completely inaccurate analysis of those multiple studies, and ignores IPCC accounting guidelines. See note for page 3 above.

Page 6 – Figure 2: Carbon Storage Through the Wood Products Chain.

Comment: The commentary that follows this figure generally refers to carbon storage in structural wood products (typically manufactured from softwoods). The fact that hardwood and softwood data is combined in this table (which is obvious since logging losses in softwoods are generally under 25%) throws the subsequent calculations off substantially from the very beginning.

Another problem here is that although a notation in the bottom left portion of Figure 2 indicates that values shown refer to medium loss estimates, the numbers presented correspond to the far right column of Table 2 – the author's "High" loss scenario.

Page 9 – "With about 36% of original starting tree volume available for processing into long-lived products, primary mill losses amount to about 1% to 22% (average of 13% of the standing tree volume), leaving about 23% of the original volume to be incorporated into long-lived products such as lumber or panels."

Comment: The losses that do occur generally go either to paper, particleboard, hardboard, or energy production. The recapture of manufacturing "losses" is not considered in any way, nor are the avoided emissions (and carbon implications) that result from use of wood residues rather than fossil fuels for energy production.

Page 9 – Commentary regarding secondary waste in manufacturing furniture (middle of page).

Comment: Again, no consideration of avoided emissions or use of wood "residues" in making other long-lived products (such as cabinet backing, drawer sides and bottoms, frame blocking, veneered particleboard tops, etc.).

Page 14 – Primary Processing, paragraph 3. " . . . ; they exclude transport to the final consumer and do not account for any CH_4 or N_2O emissions from transport." . . . "This translates to 12% to 24% of the CO_2e content of these raw materials."

Comment: This statement indicates that the authors are comparing emissions linked to wood products production and use with emissions associated with doing nothing. In other words, the comparison is between 1) building a structure and 2) not building a structure. This is an easy case to make, since not building a structure will win (i.e., have lower environmental impact) every time. Using this kind of logic the authors could have also meticulously calculated the carbon emissions linked to air, train, and auto travel to wilderness areas, manufacturing of camping gear, burning of campfires, and so on. The only valid comparison here should be between various options available for building of a structure.

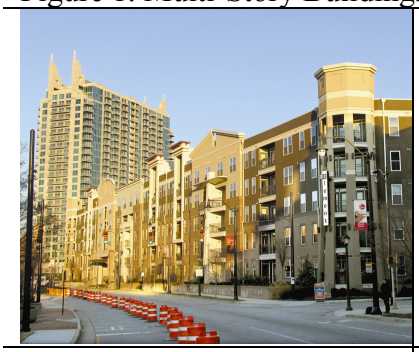
Page 15, last paragraph – "It is important to recognize that total manufacturing and construction emissions for these sample homes exceed the CO_2 stored in the wood, even without considering secondary processing of the wood components."

Comment: In the sample homes referred to, the carbon stored in the wood makes up 15% of the mass of the Minneapolis CORRIM house and 10% of the mass of the Atlanta CORRIM house. The statement refers to the fact that carbon emissions linked to production of the concrete, steel, and wood in these houses, and to on-site construction, in total exceed the quantity of carbon stored within the wood.

Page 16 – Disposal. " . . . the entire process of transforming wood into a form suitable for carbon storage causes substantial GHG emissions, and in some cases long-distance transport may cause emissions to exceed the CO_2e storage value."

Comment: It is assumed that the components of a home are landfilled at the end of life. This is already not true (in Minneapolis/St. Paul virtually 100 percent of woody components of landfill trash are currently diverted to district heating and energy production) and certainly won't be at the end of life of any structure built today. If it is properly assumed that the woody components are either reused (rare today, but an increasing trend) or converted to energy, then the reality of avoided emissions comes into play, with significantly positive carbon implications.

Figure 1. Multi-Story Buildings Made Primarily of Wood



Atlantic Station, Atlanta, Georgia (Photo APA – The Engineered Wood Association)

Post Riverside Apartments, Atlanta, Georgia (Photo Post Properties)

Stadthaus Building, London, UK (Waugh Thistleton Architects) (Nine stories cross-laminated timber over first story of concrete)

Page 18 – last paragraph. Essentially says wood is the default building material for residential and that it is difficult to build wood high-rises.

Comment: The first observation is true and the point seems to be that this violates the rule of additionality (i.e. that in order for carbon storage to be counted under international protocols the storage must be greater than would result from business as usual).[2] The second observation regarding high rises is patently not true. All of the buildings pictured

[2] Additionality is discussed in following paragraphs.

in Figure 1 are made primarily of wood; wood is commonly used today in building multi-story office and apartment buildings, hotels, schools, and commercial structures. Evaluation of codes for non residential building has identified significant opportunities for increasing construction using wood (Goetzl and McKeever 1999). In addition there are ways to modify residential construction to use more wood and decrease emissions by displacing other products emitting more in manufacturing (Lippke and Edmonds 2006).

Page 19 – second paragraph under "Biomass" - "First, an analysis of the GHG benefits of wood fuels must reflect the fact that they, like wood products, require fossil energy to produce and transport. In the case of wood chip fuel . . ."

Comment: The transport energy for moving logs to mills was counted earlier by the report authors. Ignoring the fact that wood is most often converted to energy right at the wood products manufacturing sites, this approach appears to double count transportation energy.

Page 27 - Additionality. Argues that it would be difficult to establish a baseline for carbon storage in wood products that would allow calculation of additionality traceable to increased wood products use.

Comment: Though work is ongoing to establish the correct procedure, the issues are no more complex than forest carbon additionality issues that are under consideration. Because work is needed to evaluate additionality, as for forest carbon, is not a reason to exclude HWP carbon. Work simply needs to be done to evaluate uncertainty, reduce uncertainty and apply appropriate discounts as for forest carbon (Carbon Action Reserve 2009).

Page 29 - First sentence under "Permanence." "Wood products do not store carbon permanently."

Comment: Neither do forests.

Page 30 - First sentence, second paragraph. "Setting public goals for forests will require weighing the advantages of accumulating more carbon in forests versus the advantages of accumulating it in furniture, homes, and landfills or burning to generate energy."

Comment: While the authors choose to cast this as an either/or dilemma, it is not. We can have healthy, thriving, carbon-storing forests at the same time that we enjoy a myriad of wood homes and products that themselves store vast quantities of carbon.

By framing this as an either/or policy issue ignores the fact that people will buy homes, furniture, cabinets, and all the rest. If not made of wood, they will be made of something, and therein lies one of the many fundamental flaws of this analysis. By ignoring this core reality the author ignores the very real and very substantial carbon advantages of wood.

This false dichotomy also ignores the fact that the carbon offsets that can be obtained by combined forest / HWP systems will vary by forest type, climate, wildfire and other

hazards, markets for wood and energy products, and efficiency of technologies for converting wood and its substitutes to useful products. To imply that offsets from storing wood in products alone are unlikely to lead to lower carbon offsets than additions to forests alone is to ignore what the literature suggests are greater offset contributions for a range of forest / HWP/ technology/ use systems (e.g Perez-Garcia et al. 2005). (Also see IPCC 2007)

Page 30 - last paragraph. "Wood products and wood fuels have a role to play in a carbon-friendly future. An emphasis on increasing wood production, however, can distract from the ultimate goal of reducing the use of energy and materials."

Comment: This statement is far off the topic of this report. Substitute the words "Wind and solar energy have a role to play in a carbon-friendly future" and the second sentence would also apply. So what is the point? We clearly need to address the demand side of the energy equation. But we need to do so at the same time as developing alternative energy options and in substituting, wherever possible, products linked to low carbon emissions for products linked to high carbon emissions; together the impact on fossil fuel consumption and carbon emissions could be enormous.

Summary

The Wilderness Society report "Wood Products and Carbon Storage: Can Increased Production Help Solve the Climate Crisis?" is neither accurate nor helpful to the carbon in wood products debate. While several of the conclusions of this report appear to favor wood over more fossil intensive products, the report's author in many ways seems to "want it" both ways (i.e., the author acknowledges that wood is better from a GHG perspective than most materials but argues that more trees should not be harvested in order to make wood products).

As noted in the report, any serious attempt to reduce carbon emissions will necessitate attention to the demand side of the equation. At the same time, however, it will be necessary to reduce GHG and fossil emissions at every opportunity through the supply chains that support ongoing actions of society. Using wood in building construction rather than potential substitutes such as steel, aluminum, concrete, and plastics results in far lower carbon and fossil emissions than if these other materials are used, and it is a reality that cannot be ignored. Similarly, production of energy from wood rather than principal fuels substantially reduces fossil emissions.

If carbon accounting rules ignore carbon storage and avoided emissions linked to use of wood products, then the inevitable result would be societal incentives to not harvest forests. Yet, people will continue to buy homes, furniture, and cabinets, and commercial structures will continue to be built; if not made of wood, these products and structures will be made of "something", meaning that incentives to not harvest forests would by default favor the use of more carbon and fossil intensive materials. This would be an enormous error.

We can clearly have healthy, thriving, carbon-storing forests at the same time that we enjoy wood homes and a myriad of products that themselves store vast quantities of carbon. We can also use sustainably sourced wood to partially substitute for fossil fuels, again with significant carbon benefits. Development of forest carbon protocols that properly recognize both carbon storage and avoided carbon linked to use of wood products are needed.

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