NCASI Fact Sheet

IMPACT. SCIENCE. SOLUTIONS.

What is Dynamic Modeling of GHG Impacts and why is it Important to Forest-Based Industries?

NOVEMBER 2016 (Updated MARCH 2019)

Introduction

To date, the assessment of GHGs has largely been done using relatively simplistic methods that assume GHGs from all activities in a product's life cycle are released at the same time and have a warming impact over 100 years. Most commonly, warming has been estimated using 100-year global warming potentials, or GWP100s. Researchers and policy makers, however, are beginning to understand that these simplistic assumptions can significantly affect the conclusions of climate change studies. This has led to broad interest in a more refined approach called "dynamic modeling" of GHG impacts. In this fact sheet, we examine the potential implications of using a dynamic modeling approach to estimate the climate impact of forest products.

What is Dynamic Modeling of GHG Impacts?

Dynamic modeling of GHG impact is different from past practice in that it considers the timing of GHG emissions (instead of assuming they all occur at once) and characterizes the warming impacts of these emissions over time (instead of just at 100 years). The timing of emissions is addressed by considering when emissions occur, and the timing of warming impacts is calculated in terms of the cumulative radiative forcing (a measure of warming) caused by GHGs in the atmosphere over time. A general agreement is emerging among researchers that, compared to the conventional GWP100 approach, the dynamic approach yields far more insight into the potential impacts of public policies and regulations.

Results

NCASI has compared dynamic modeling with the conventional GWP100 approach. NCASI's analysis indicates that the implications of using dynamic modeling instead of the conventional GWP100s approach are highly case specific. In some scenarios, the two approaches yield similar results. In other scenarios, however, the dynamic modeling approach can yield results indicating significantly higher or lower impacts than approaches that ignore the timing of warming impacts (i.e., GWP100s).

In addition, NCASI's examination has found that the use of dynamic modeling accentuates the effects of assumptions about the timing of removals of carbon from the atmosphere by the forest; i.e., do they occur before, during, or after the year of harvest. Assuming that carbon removals occur before harvest generally improves the benefits associated with forest products, and these improved benefits are accentuated by dynamic modeling. Conversely, assuming that carbon removals occur only after harvesting reduces the benefits associated with forest products and the reduction in benefits is accentuated by using dynamic modeling.

Factors Affecting the Results

Some of the factors that appear to affect the comparison are highlighted in the following summary of the scenarios analyses performed to address four questions important to the industry. In reviewing the following material, it is important to understand that

NCASI did not model every possible scenario for question. Other scenarios could yield results different from those highlighted below.

What are the GHG implications of change in demand for roundwood (assuming that carbon is removed from the atmosphere during regrowth of harvested land)?

- If demand increases only to supply bioenergy to displace fossil fuels, a dynamic approach tends to show higher near-term impacts and longer times to see net benefits, compared to a conventional GWP100s approach.
- If demand increases to produce more wood and paper products, which displace non- forest-based alternatives, the predicted impacts using a dynamic approach can be higher or lower than those estimated using a conventional GWP100s approach, depending the specific circumstances.
- If virgin fiber demand decreases due to increased use of recovered fiber, the predicted impacts using a dynamic approach can be higher or lower than those estimated using a conventional GWP100s approach, depending the specific circumstances.

What are the GHG attributes (i.e., carbon footprints) of forest products?

Using a dynamic approach, the carbon footprint can be larger or smaller than calculated using a conventional GWP100s approach.

- It depends strongly on whether carbon removals from the atmosphere by the forest are assumed to occur before, during, or after the year of harvesting. Studies assuming removals occur before harvesting generally show lower carbon footprints while those assuming removals occur after harvest show higher carbon footprints. Dynamic modeling, relative to conventional GWP100s, accentuates the effects of these assumptions.
- The effect of dynamic modeling, relative to using the conventional GWP100s approach, also depends on assumptions about end-of-life management products.

Reference

Vance, E.D. 2018. Conclusions and caveats from studies of managed forest carbon budgets. *Forest Ecology and Management 427 (2018) 350–354*.

For More Information Contact

info@ncasi.org