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Cumulative Global Forest Carbon Implications of Regional Bioenergy Expansion Policies

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Highlights

- Numerous policies globally could increase the demand for wood-based bioenergy.
- Biomass energy demand growth can drive forest resource investment/management.
- Global market reallocation and trade adjustments are also important considerations.
- Projected changes in forest management globally show carbon beneficial outcomes.

ABSTRACT

Several previous studies have evaluated the potential greenhouse gas (GHG) benefits of forest biomass energy relative to fossil fuel equivalents over different spatial scales and time frames and applying a variety of methodologies. This paper contributes to this literature through an analysis of multiple projected sources of biomass demand growth in different regions of the world using a detailed intertemporal optimization model of the global forest sector. Given the range of current policies incentivizing bioenergy expansion globally, evaluating the combined global implications of regional bioenergy expansion efforts is critical for understanding the extent to which renewable energy supplied from forest biomass can contribute to various policy goals (including GHG emissions mitigation). Unlike previous studies that have been more regionally focused, this study provides a global perspective, illustrating how large potential demand increases for forest biomass in one or multiple regions can alter future forest management trends, markets, and forest carbon sequestration in key timber supply regions. Results show that potential near term (2015-2030) biomass demand growth in the U.S., Europe, and elsewhere can drive forest resource investment at the intensive and extensive margins, resulting in a net increase in forest carbon stocks for most regions of the world. When the reallocation of biomass away from traditional pulp and sawtimber markets is accounted for, net forest carbon sequestration increases (that stored on the land and in wood products) by 9.4 billion tons CO₂ by 2025 and 15.4 billion tons CO₂ by 2095. Even if most of the increased forest biomass demand arises from one region (e.g., Europe) due to a particularly strong promotion of forest bioenergy expansion, changes in forest management globally in anticipation of this demand increase could result in carbon beneficial outcomes that can be shared by most regions.

Keywords: bioenergy, carbon sequestration, forest management

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