Life cycle assessment can improve decisions to optimize wood residue use

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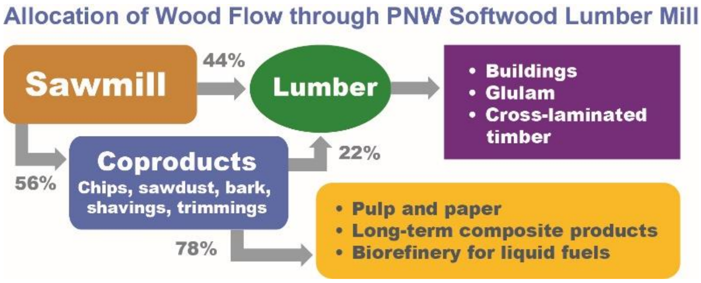
Stricter standards for greenhouse gas reductions along with public pressure to reduce the use of fossil fuels have boosted interest in using clean wood residues from mills for energy and transportation fuels. But this use may produce unintended consequences—such as greater carbon emission than would occur if the wood residues were used in long-term products.



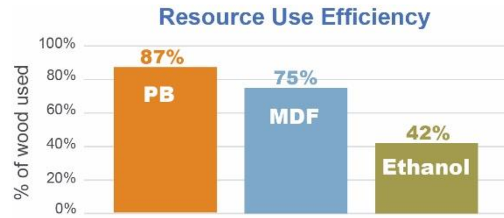
Although the main product from Pacific Northwest (PNW) softwood sawmills is lumber, residues or *coproducts* are also generated when the round-shaped logs are processed into rectangular boards. Coproducts can include chips for pulp and residues such as sawdust, shavings, bark, and wood waste used for wood composite panels (WCP), landscaping, pet bedding, and fuel. A favorable natural characteristic of wood WCP is that they contain carbon: roughly half of their dry mass is carbon, which acts as a carbon store for CO_2—potentially for decades.

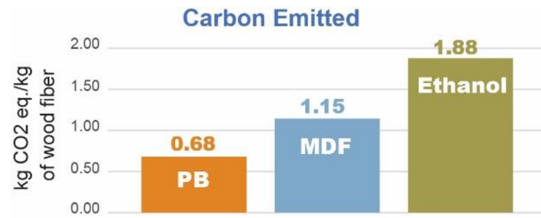
Historically, coproducts are sold as feedstock for pulp and paper or for wood panel products such as medium density fiberboard (MDF), particleboard (PB), and hardboard. Recent surveys of wood industries estimate the softwood residue demand at 8.6 million BDMT per year. In addition, softwood lumber producers use about 3.8 million BDMT per year of coproduct for energy. This self-generated biofuel not only comes at a low environmental and economic cost but is a direct substitution of fossil fuels with a direct reduction in carbon emissions.

A CORRIM researcher performed a life-cycle assessment to compare the environmental consequences of using wood coproducts to produce liquid fuel (ethanol) versus WCP. The results are reported in terms of resource efficiency, carbon emissions, and the substitution of fossil fuels to determine the best use of coproducts for optimal carbon mitigation.

RESULTS

- It is up to 50% more efficient (mass of feedstock to mass of product) to use wood residues to produce WCP than ethanol.
- Less carbon is emitted during the production and use of WCP than of ethanol for biofuel.
- Using residues for WCP and not for ethanol for biofuel provides the greatest displacement of carbon emissions.



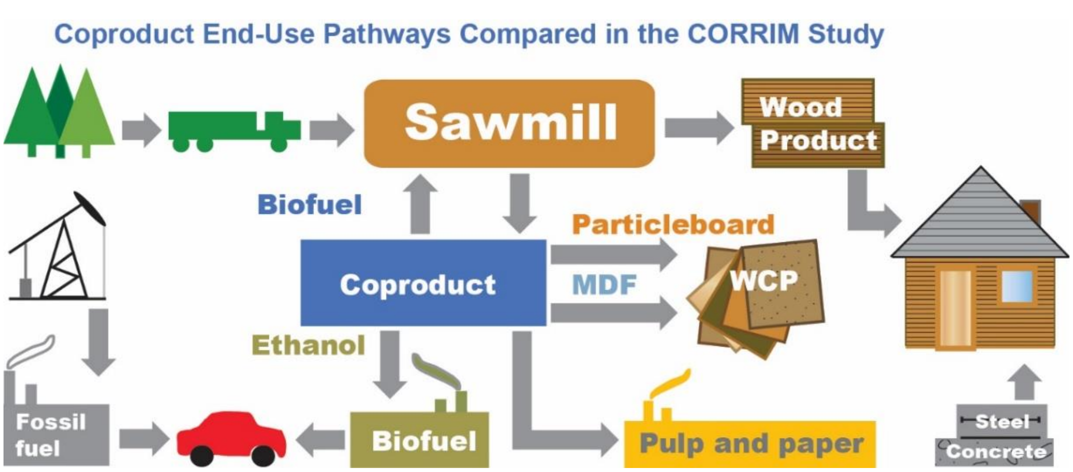


Carbon Emissions Displaced : Carbon Stored in Product

	Displacement (carbon NOT emitted), kg/kg	
	If wood residues are used for WCP and not for ethanol	If ethanol from wood residues is used in place of fossil fuels
Particleboard : Ethanol	7.80	
MDF : Ethanol	5.15	
Ethanol : Gasoline		0.43

SUMMARY

The use of wood residues for WCP rather than in biofuels is a more efficient use of wood resources. Using residues for WCP ensures the entire tree is put to use in value-added products leaving very little for waste. WCP products utilize 87% of the input feedstock, where ethanol production has an efficiency of only 42%. The use of wood residues for WCP rather than in biofuels results in significantly higher carbon mitigation, which means less carbon is emitted during production of WCP than for ethanol. Using wood residuals for WCPs displaces significantly higher amounts carbon over ethanol – nearly 8 kg/kg more for particleboard and over 5 kg/kg more for MDF. In a carbon conscious world, it is clear that WCP provide a much more compelling use of wood residuals than ethanol.



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