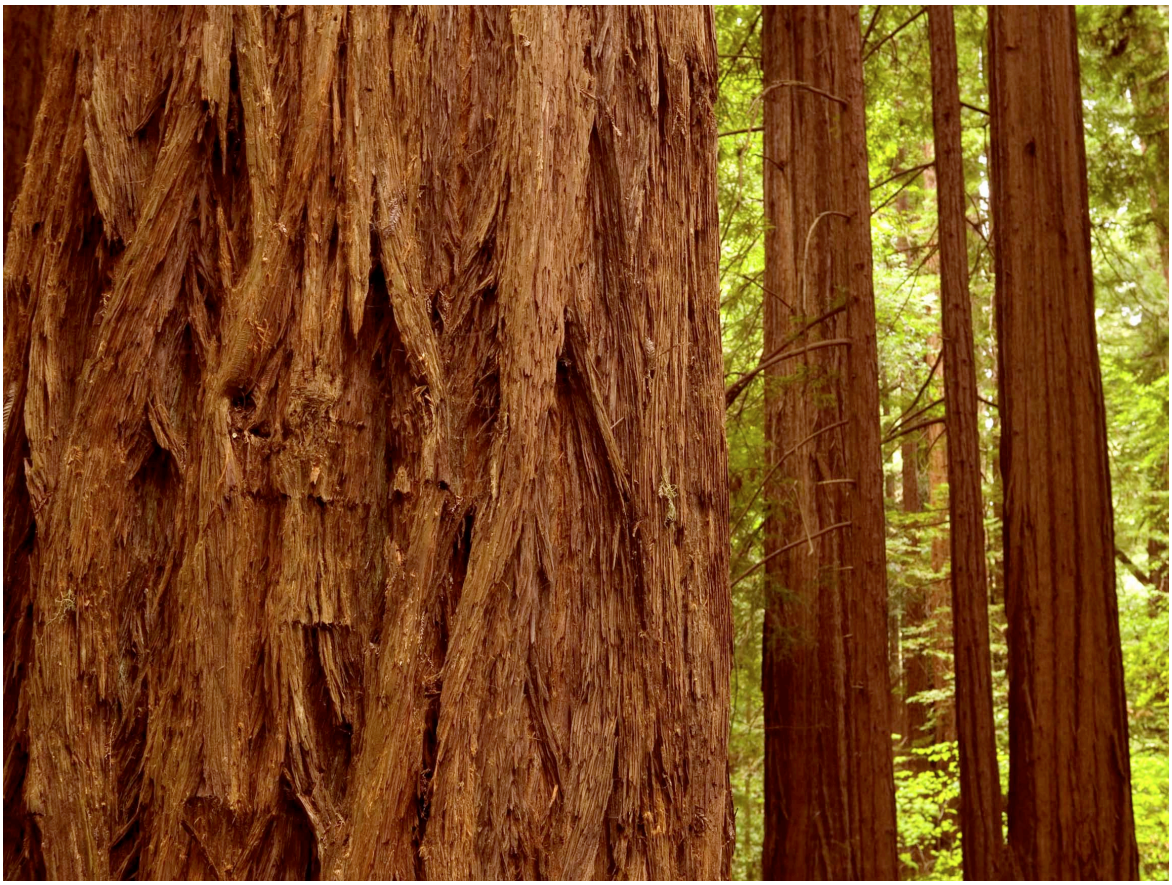
CARBON IMPACTS OF WOOD PRODUCTS



The release of carbon dioxide (CO_2) during a product's manufacture and use is sometimes referred to as its 'carbon footprint.' Coal, oil, natural gas and wood all contain solid carbon that becomes CO_2 gas when the material is burned for energy. Because CO_2 release contributes to climate change, and because of the need to conserve our energy resources, there is a desire to reduce the footprint of products and to choose products with a smaller carbon footprint.

The carbon footprint of a product can be calculated by measuring and categorizing all of the energy inputs.

Calculating the carbon footprint of wood products requires special consideration. Wood manufacturing uses a lot of bio-energy, the products store carbon, and wood products manufacturing is energy efficient. For these reasons, most wood products have negative carbon footprints – their use actually results in net carbon storage. The carbon impacts of wood products can be measured using the simple formula explained below:

The Wood Product
Carbon Impact Equation

A-B-C-D = E

A
Manufacturing Carbon

Manufacturing uses energy and most energy production results in carbon dioxide release.

B
Bio-fuel

Wood residues are often burned for energy during the manufacture of wood products. Because the carbon dioxide released when this wood is burning was recently absorbed from the atmosphere by the growing tree (during photosynthesis), this fuel is considered to be 'carbon neutral'. This 'bio-fuel' usage reduces the carbon footprint of wood products.

C
Carbon Storage

Carbon dioxide (CO_2) is absorbed from the atmosphere during photosynthesis by the growing tree. This carbon is converted to wood, bark and other parts of the tree, which are about ½ carbon by weight. If the tree rots or burns, the solid carbon in the wood is released again to the atmosphere as carbon dioxide gas. However, as long a wood product is in service, it is keeping potential carbon dioxide gas out of the atmosphere. This 'carbon storage' of wood products reduces the carbon footprint of wood products.

D
Substitution

There are alternatives to wood products for most applications. However, almost all of these non-wood alternatives require more energy for their manufacture, and the energy used is almost entirely fossil carbon – carbon that has been stored in coal, oil and natural gas for millions of years. When fossil carbon energy sources are used they contribute to the carbon footprint. If a wood product with a smaller fossil carbon footprint is used in place of a non-wood alternative, we can consider this to be a savings of carbon. This 'substitution effect' reduces the carbon footprint of wood products.

E
Total Carbon Footprint or Carbon Credit

The bio-fuel (**B**), carbon storage (**C**) and substitution (**D**) effects reduce the carbon footprint of wood products. In fact, these effects together are almost always greater than the manufacturing carbon (**A**), so the overall carbon effect of using wood products is a negative carbon footprint (i.e. carbon credit or storage). Thus using wood products can help us to reduce contributions to climate change and conserve energy resources.

Carbon Impacts of Wood Products			A	B	C	D		A-B-C-D = E
Product	**Units & Notes**		**Carbon[1] released during manufacture**	**Carbon from bio-fuel used in manufacturing** (wood energy)	**Carbon stored in the wood product**	**Substitution carbon** (fossil carbon emissions avoided by using the wood instead of an alternative)	**Alternative**	**TOTAL CARBON FOOTPRINT** (Negative values represent a carbon credit)
Hardwood lumber	One board foot (12"x12"x1")	NE/NC region	0.9	0.6	1.8	2.6	PVC (plastic) molding	-4.2
		Southeast region	1.1	0.8	1.8	2.6		-4.1
Softwood lumber	One 2x4 'stud'	NE/NC region	1.8	1.2	6.6	7.0	steel stud	-13.0
		Southeast region	3.9	3.3	8.4	7.0		-14.9
Hardwood flooring	1 ft^2	Solid strip flooring	1.1	0.7	2.1	0.0	vinyl	-1.8
		Engineered wood	1.0	0.5	1.1	-0.1		-0.5
Doors	One door	Solid wood	46.5	29.4	100.4	228.1	steel door	-311.5
Decking	One deck board	ACQ- treated pine	5.2	1.7	16.1	11.9	wood-plastic composite	-24.5
Siding	100 ft^2	Western redcedar	37.7	6.0	77.7	20.4	vinyl	-66.3
Wood treated poles	One 45' pole	Pentachlorophenol-treated wood	454.5	430.9	1160.4	1377.1	concrete pole	-1136.8
OSB	One 4' x 8' sheet 3/8"	Southeast region	19.0	10.7	34.7	-	n/a	-26.3
Plywood	One 4' x 8' sheet 3/8"	PNW	5.7	4.1	25.5	-	n/a	-23.9
		Southeast region	10.1	6.5	30.9	-	n/a	-27.3
I-joist	One 16' long, 10" deep joist	PNW	22.8	18.9	63.9	56.4	steel joist	-59.9
		Southeast region	33.0	22.9	80.0	55.0		-70.0

[1] All "carbon" values are kilograms of CO_2. To convert from CO_2 to elemental carbon, muliply by 0.27. For comparison, a car produces 8.8 kg of CO_2 when it burns one gallon of gasoline.

These data are compiled from Life Cycle Assessments (LCA) of the various products. LCA measures the all of the inputs and emissions from making and using a product and then estimates the total environmental impact in various categories. One important category is the carbon impact of the energy used, which can be separated into fossil (coal, oil and natural gas) and biomass (e.g. wood) components. LCA are conducted according to internationally accepted standards and the data are reviewed by experts.

Data Sources:

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