Washington State Manufacturing Sector Overview

Wood Products

Industry Description

Wood product manufacturing involves the production of intermediate and finished wood products such as lumber, plywood, veneers, wood containers, wood flooring, wood trusses, and prefabricated wood buildings.

Greenhouse Gas Footprint

There are 17 wood product manufacturing facilities in Washington with over 10,000 metric tons in annual carbon dioxide equivalent (CO_2e) emissions. Together, these facilities accounted for approximately 1.3 MMT CO_2e in 2019.[1] Approximately 45% of the industry's emissions came from two lumber mills located in Aberdeen and Burlington/ Mount Vernon.

Just over 96% of these emissions are biogenic carbon dioxide, as seen in Figure 1, meaning emissions resulting from the combustion or decomposition of organic material. In wood product manufacturing, this is due to the wood and bark sawmill residue used as onsite fuel.[2]

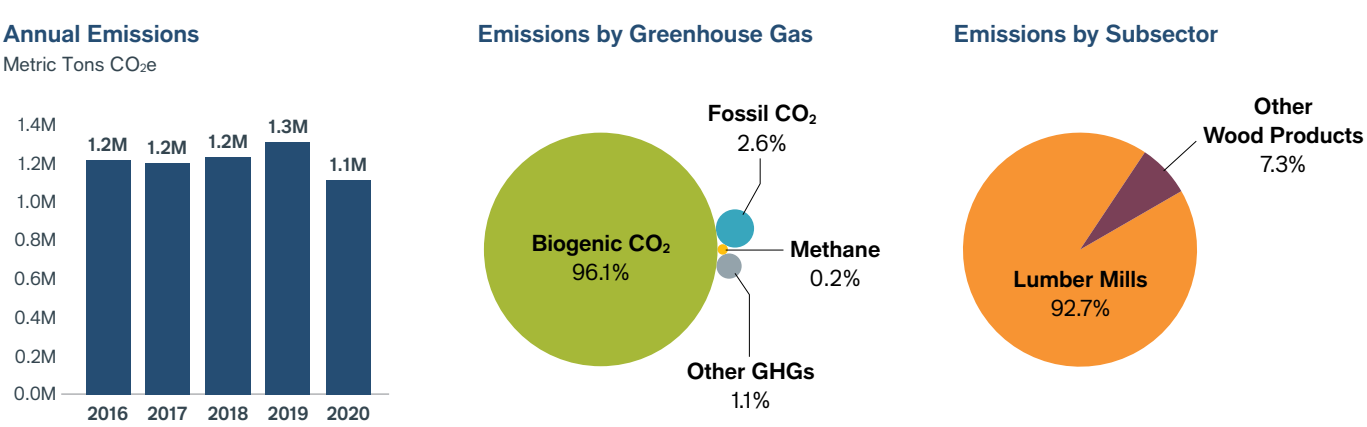
Figure 1 also shows annual direct reported emissions from 2016 to 2020. While wood product manufacturing emissions have been decreasing over the past five years, 2020 reductions are also due in part to economy-wide emissions reductions caused by the COVID-19 pandemic.

Industrial Process and Decarbonization

Wood product manufacturing starts with the extraction of raw material, either through harvesting timber or collecting recycled, post-consumer, or post-industrial wood products. The harvesting of trees for virgin wood results in a large amount of forest biomass residue that is typically disposed of via open burning at logging sites.

Harvested logs are then made into wood products through a variety of processes including de-barking, sawing, drying, planing, shaping, smoothing, laminating, and assembling. Lumber may either be air-dried or kiln-dried to some extent, depending on the type of wood products being produced. Drying lumber is typically the largest source of energy consumption by sawmills.[3]

Figure 1. Washington wood product manufacturing direct reported emissions, 2016–2020



Data Source: Washington State Department of Ecology. "Facility Greenhouse Gas Reports." Accessed April 11, 2022. https://ecology.wa.gov/Air-Climate/Climate-change/Tracking-greenhouse-gases/Greenhouse-gas-reporting/Facility-greenhouse-gas-reports; NAICS codes for reporting facilities: 321113 (Sawmills); 321912 (Reconstituted wood product manufacturing); 321212 (Softwood veneer and plywood manufacturing). **Note:** This figure shows direct reported emissions from facilities with over 10,000 metric tons CO_2e in annual emissions. Direct reported emissions do not include electricity use.

Wood Products

Onsite steam and electricity production used in the wood product manufacturing process are the dominant sources of the industry's greenhouse gas emissions. Hogfuel (i.e., wood and bark sawmill residue) is typically the largest source of fuel used onsite by the industry. Emissions from electricity generation and onsite heat production could be reduced by installing energy-efficient equipment at facilities and deploying systems for waste heat capture and reuse as well as combined heat and power systems.

Additionally, since wood product manufacturing has lower heat requirements than many other manufacturing subsectors, electrification is a more viable option. This includes solutions such as ultraviolet wood curing, industrial heat pumps, and electric machine drives.[4]

On the downstream side, decomposition or open burning of unused lumber mill residue and post-consumer/post-industrial wood products disposed of in landfills also contribute to greenhouse gas emissions. Pathways to decarbonizing the wood products industry will likely involve a mix of energy efficiency improvements, electrification, and circular economy strategies.[5]

Workforce

The wood product manufacturing industry directly supports over 12,000 workers in Washington. The Woodworkers Department of the International Association of Machinists and Aerospace Workers represents a portion of Washington workers.[6]

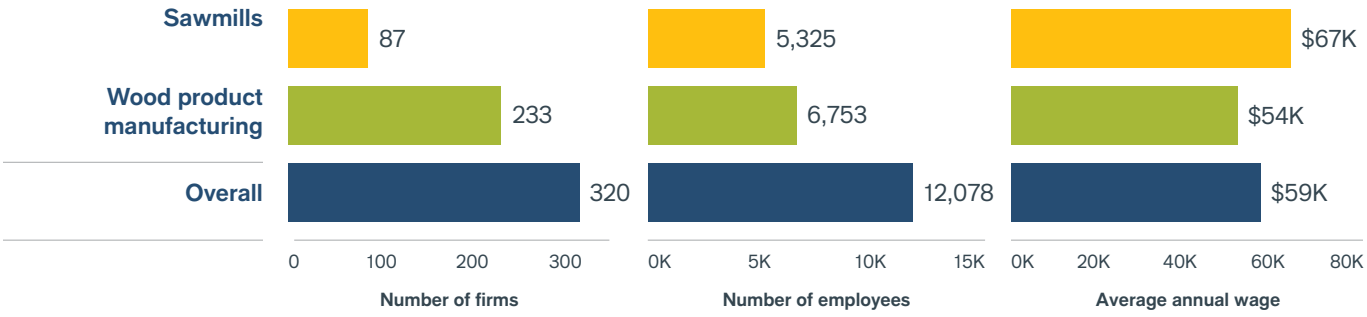
Washington's wood product facilities are predominantly located in smaller communities, such as Port Townsend, Cosmopolis, and Wallula. Decarbonizing process-based emissions will likely require new technologies, which in turn could require workers to develop new skills. On a broader level, using more wood in place of concrete and steel in construction could reduce greenhouse gas emissions overall while increasing workforce demand and greenhouse gas emissions specifically from wood product manufacturing.[7]

The age of the wood product manufacturing workforce is relatively balanced, unlike the aging pulp and paper industry.[8] Nationwide, the vast majority of wood product manufacturing positions require a high school diploma or equivalent, with most requiring additional on-the-job training (see Figure 3).

Many jobs in wood product manufacturing are non-specialized, requiring relatively transferable skill sets, but there is also a core demand for specialized work that draws from a smaller pool of labor. For these specialized occupations, it may be difficult to scale training programs when demand is low—especially if training is site-specific.[9] As a result, workforce development strategies should center on both attraction and retention of qualified workers.[10]

Workforce training research and analysis are required at a state level to address the specific needs of Washington's wood product manufacturing workers. The occupations and education pathways data displayed in Figure 3 are only available at a national level.

Figure 2. Washington wood product manufacturing workforce snapshot, 2020



Data Source: Washington State Employment Security Department. Covered Employment (QCEW). 2020, https://esd.wa.gov/labormarketinfo/covered-employment. NAICS code: 321 (Wood product manufacturing).

Wood Products

Figure 3. U.S. wood product manufacturing: occupations and education pathways, 2021

Occupation	Percent of industry	Typical education needed for entry	Work experience in a related occupation	Typical on-the-job training needed to attain competency
Team assemblers	33.0%	High school diploma or equivalent	None	Moderate-term on-the-job training
Woodworking machine setters, operators, and tenders, except sawing	24.5%	High school diploma or equivalent	None	Moderate-term on-the-job training
Sawing machine setters, operators, and tenders, wood	18.8%	High school diploma or equivalent	None	Moderate-term on-the-job training
First-line supervisors/ managers of production and operating workers	8.8%	High school diploma or equivalent	Less than 5 years	None
Carpenters	6.2%	High school diploma or equivalent	None	Apprenticeship
Cabinetmakers and bench carpenters	4.8%	High school diploma or equivalent	None	Moderate-term on-the-job training
Machine feeders and offbearers	4.1%	No formal educational credential	None	Short-term on-the-job training

Data Sources: "Industries at a Glance: Wood Product Manufacturing: NAICS 321," accessed May 5, 2022, https://www.bls.gov/iag/tgs/iag321.htm.; "Education and Training Assignments by Detailed Occupation: U.S. Bureau of Labor Statistics," accessed April 18, 2022, https://www.bls.gov/emp/tables/education-and-training-by-occupation.htm.

Endnotes

1 Washington State Department of Ecology. "Facility Greenhouse Gas Reports." Accessed April 11, 2022. https://ecology.wa.gov/Air-Climate/Climate-change/Tracking-greenhouse-gases/Greenhouse-gas-reporting/Facility-greenhouse-gas-reports.

2 Kristen E. Tomberlin, Richard Venditti, and Yuan Yao, "Life Cycle Carbon Footprint Analysis of Pulp and Paper Grades in the United States Using Production-Line-Based Data and Integration," *BioResources* 15, no. 2 (April 7, 2020): 3899–3914, https://doi.org/10.15376/biores.15.2.3899-3914.

3 Thomas Donahue, Todd A Morgan, and Thale Dillon, "Oregon Sawmill Energy Consumption and Associated Emissions, 2017" (University of Montana, Bureau of Business and Economic Research, 2017), https://www.oregon.gov/odf/forestbenefits/Documents/or-sawmill-energy-consumption-associated-emissions-2017.pdf.

4 Melanie Kenderdine et al., "Optionality, Flexibility, & Innovation: Pathways for Deep Decarbonization in California" (Energy Futures Initiative, 2019), https://static1.squarespace.com/static/58ec123cb3db2bd94e057628/t/5cadebd04cd61c00017a563b/1554901977873/EFI+California+Summary+DE+PM.pdf.

5 Kenderdine et al.

6 Washington State Labor Council. "Directory of Labor Organizations in Washington State." Washington State Labor Council, December 15, 2020. https://www.wslc.org/wp-content/uploads/2020/12/WSLC-2021-Directory_20Dec15.pdf. Exact union membership numbers are not publicly available.

7 Chadwick Dearing Oliver et al., "Carbon, Fossil Fuel, and Biodiversity Mitigation With Wood and Forests," *Journal of Sustainable Forestry* 33, no. 3 (April 3, 2014): 248–75, https://doi.org/10.1080/10549811.2013.839386.

8 Ryan Wallace et al., "The Forest Opportunity Roadmap for Maine Workforce Development Strategy Prepared for Forest Opportunity Roadmap for Maine (FOR/Maine)," April 2021, 22. https://formaine.org/wp-content/uploads/2021/07/FORMaine-Workforce-Report-Final_Revised_06.2021.pdf

9 Wallace et al.

10 BC Wood Specialties Group Association, "BC Value-Added Wood Products: Workforce Development Strategic Plan," July 30, 2021, https://bcwood.com/wp-content/uploads/2021/12/Copy-of-Del-4_-BC-Wood-Strategic-Plan_FINAL_for-Advisory-Group-approval.pdf.

NOTE: This manufacturing sector overview is based on CETI and SEI-US research conducted in the summer of 2021. For the full report, please see **"Washington Industrial Emissions Analysis."**

For more information, please see Washington State Clean Materials Manufacturing on the Clean Energy Transition Institute website.