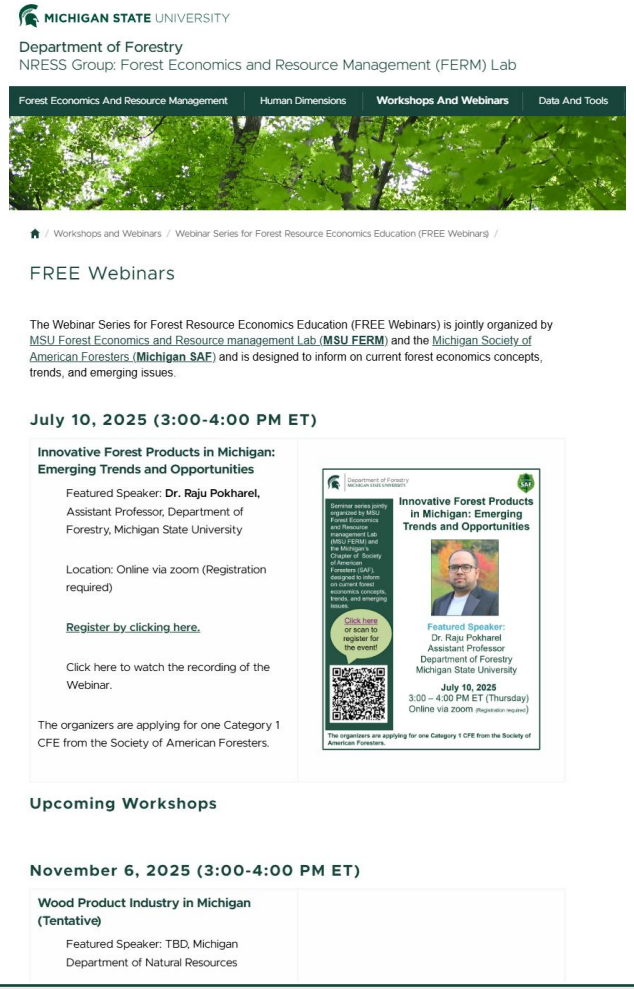
Webinar Series for Forest Resource Economics Education (**FREE Webinars**)

The Webinar Series for Forest Resource Economics Education (FREE Webinars) is jointly organized by MSU Forest Economics and Resource Management Lab (MSU FERM) and the Michigan Society of American Foresters (Michigan SAF) and is designed to inform on current forest economics concepts, trends, and emerging issues.

https://www.canr.msu.edu/FERM/Workshops/FREEWebinars/

Special Thanks to Mike Smalligan and Dr. Kamana Poudel


MICHIGAN STATE UNIVERSITY

Department of Forestry
NRESS Group: Forest Economics and Resource Management (FERM) Lab

Forest Economics And Resource Management | Human Dimensions | Workshops And Webinars | Data And Tools

Workshops and Webinars / Webinar Series for Forest Resource Economics Education (FREE Webinars) /

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July 10, 2025 (3:00-4:00 PM ET)

Innovative Forest Products in Michigan: Emerging Trends and Opportunities

Featured Speaker: **Dr. Raju Pokharel,** Assistant Professor, Department of Forestry, Michigan State University

Location: Online via zoom (Registration required)

Register by clicking here.

Click here to watch the recording of the Webinar.

The organizers are applying for one Category 1 CFE from the Society of American Foresters.

Innovative Forest Products in Michigan: Emerging Trends and Opportunities

Click here or scan to register for the event!

Featured Speaker: Dr. Raju Pokharel Assistant Professor Department of Forestry Michigan State University

July 10, 2025 3:00 – 4:00 PM ET (Thursday) Online via zoom (Registration required)

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Upcoming Workshops

November 6, 2025 (3:00-4:00 PM ET)

Wood Product Industry in Michigan (Tentative)

Featured Speaker: TBD, Michigan Department of Natural Resources

Next FREE webinars

November 6, 2025 (3:00-4:00 PM ET)

Wood product industry in Michigan

We will send out a survey to choose the topic of interest for the 2026 and identify the speakers. Stay tuned.

At least two webinars on First Thursday of

March and November every year

November 6, 2025 (3:00-4:00 PM ET)

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March 5, 2026 (3:00-4:00 PM ET)

Details will be speaker information will be posted soon.

November 5, 2026 (3:00-4:00 PM ET)

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First Thursday of March and November every year at 3:00-4:00 PM ET

Innovative Forest Products in Michigan: Emerging Trends and Opportunities

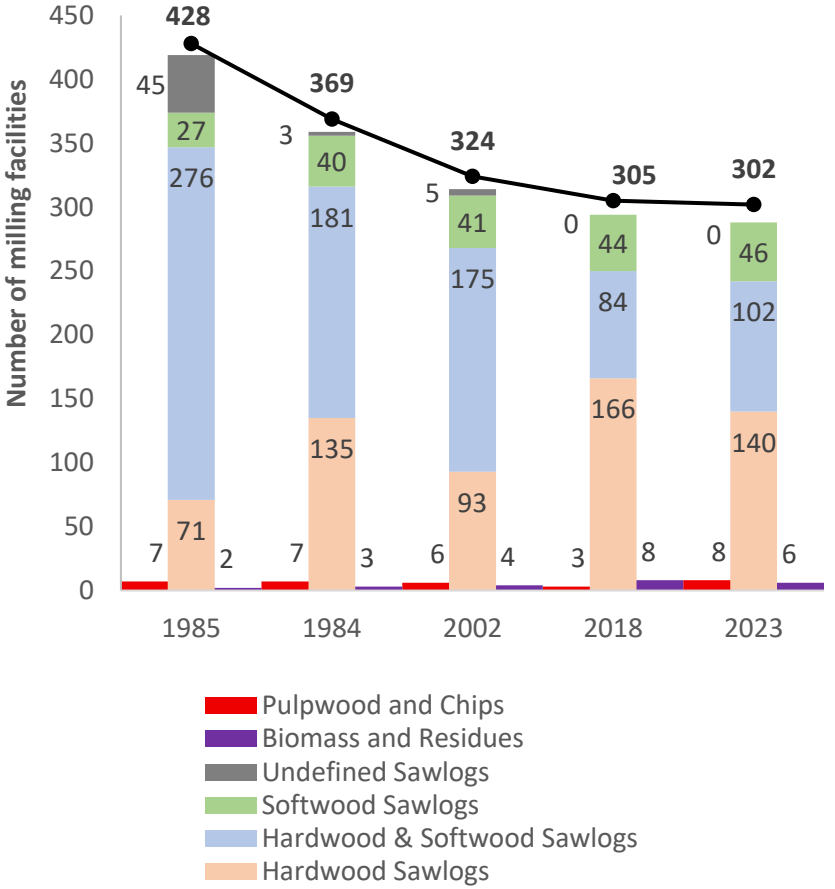
Dr. Raju Pokharel,
Assistant Professor
Department of Forestry
Michigan State University

July 10, 2025

Wood products industry in MI

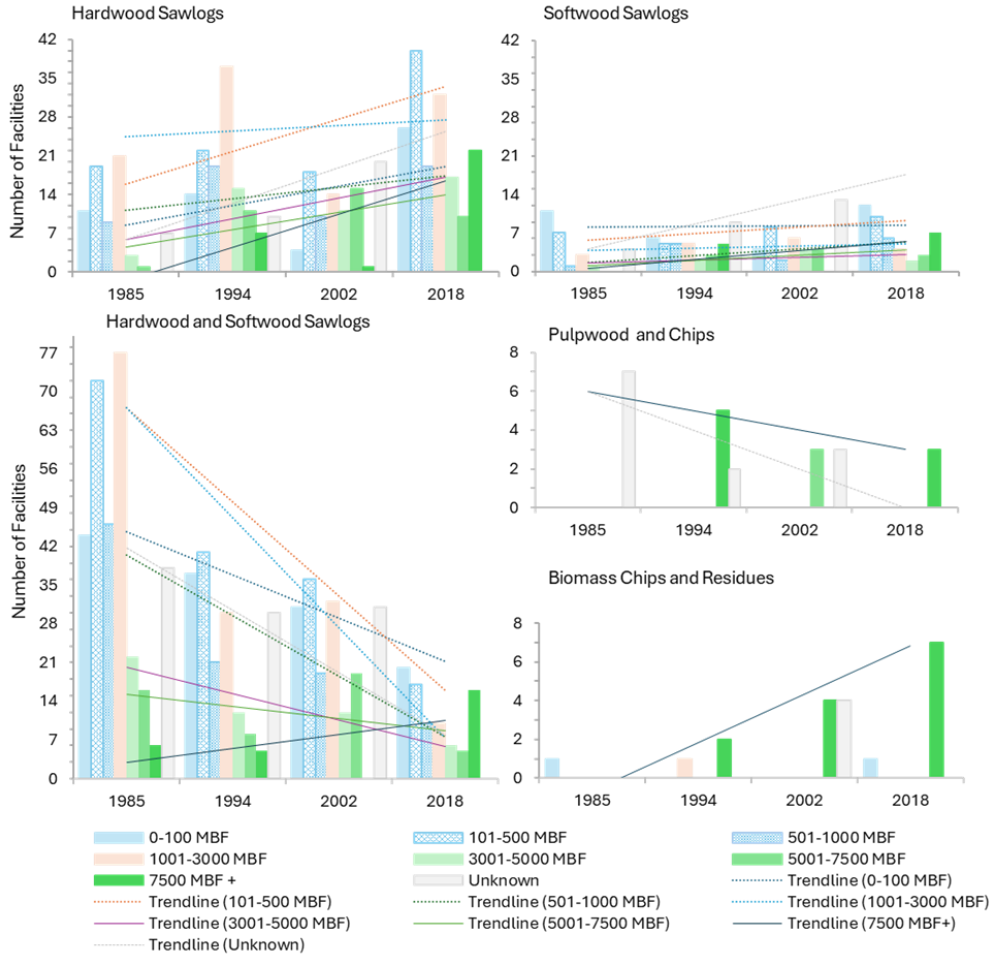
Total mills in 2023: 302

- Lumber, plywood, veneer, post, and pole - **288**
- Pulp, Paper and Boards (composite panel, OSB, MDF, etc.) -**8**
- Bioenergy and biomaterials - **6**



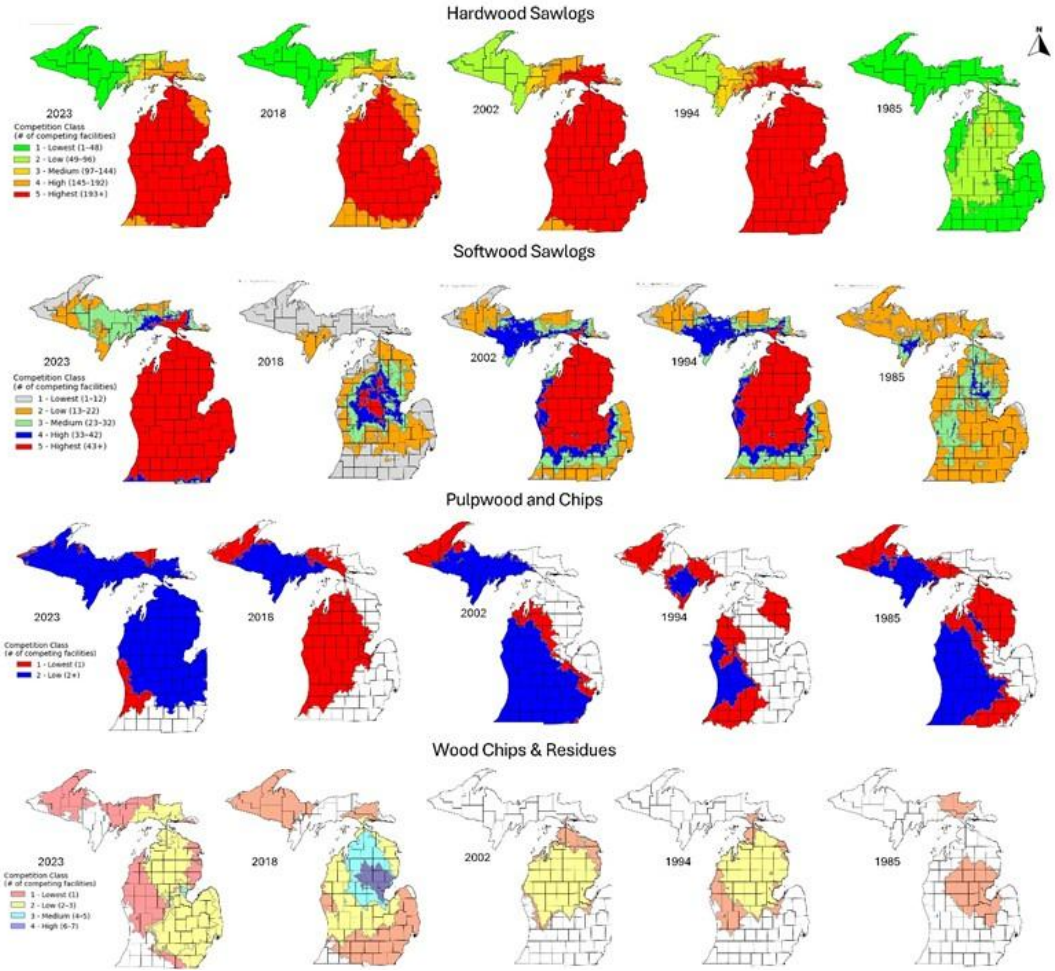
Wood Product Industry in MI

- Large-capacity, species-specific mills increased.
- Low-capacity, all-species sawmills declined.
- Pulp and paper industry declined.
- Biomass industry grew, then declined recently.
  - (although this has declined in recent years)



Change in market competition

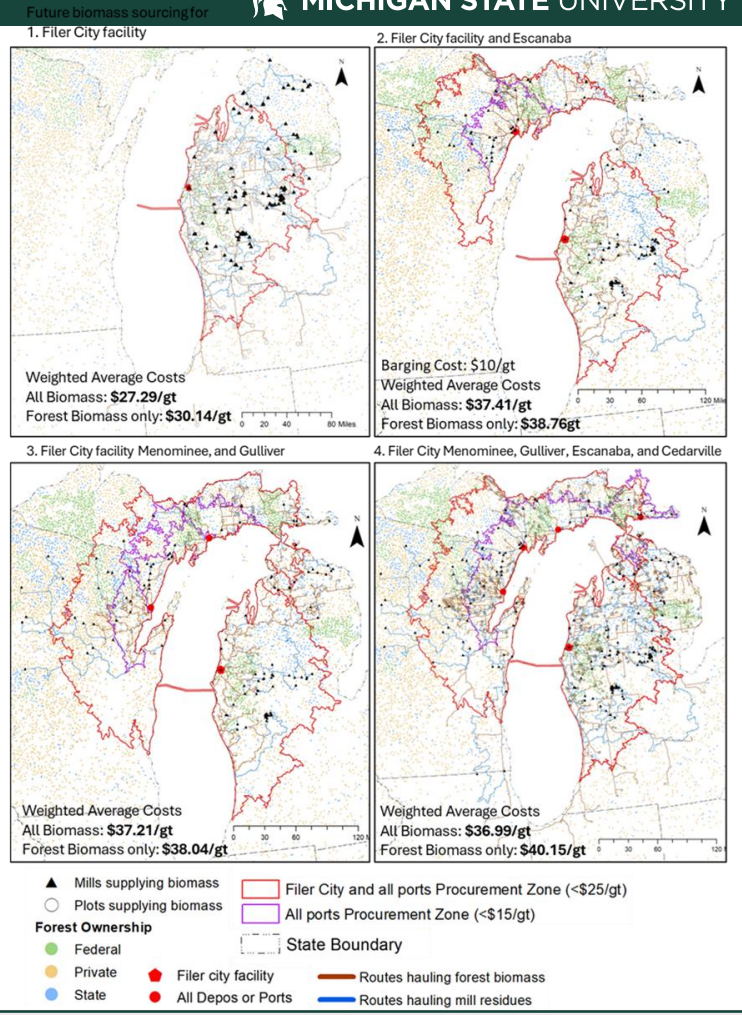
- Market coverage remained stable for logs, declined for pulpwood and chips, and increased for biomass.
- Competition declined across pulpwood and chips, signaling market loss and rising monopoly.



Opportunity for biomass bioenergy

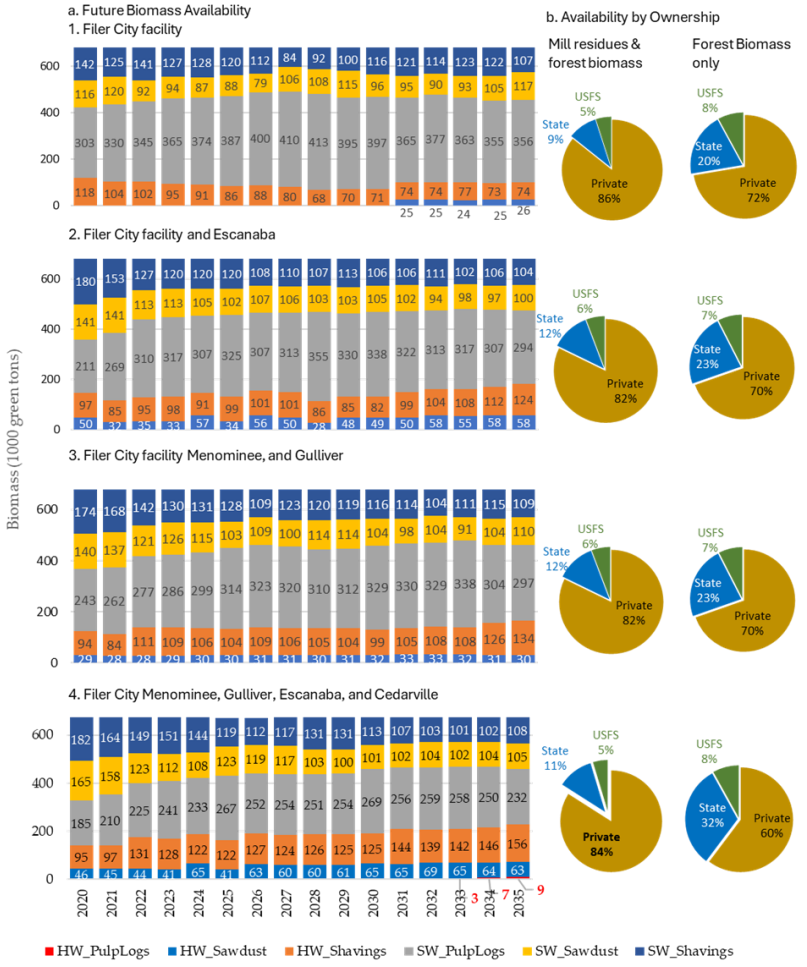
- Retrofitting Filer City coal plant
- Demand: 680,000 green tons
- Cost competitive with existing industry
- Biomass is sufficiently available, but cost vary by region and feedstock type.

- LP truck-based biomass is cheaper than UP barging, but UP sourcing expands supply and reduces risk.
- Diversifying regions and materials stabilizes supply and limits price swings.



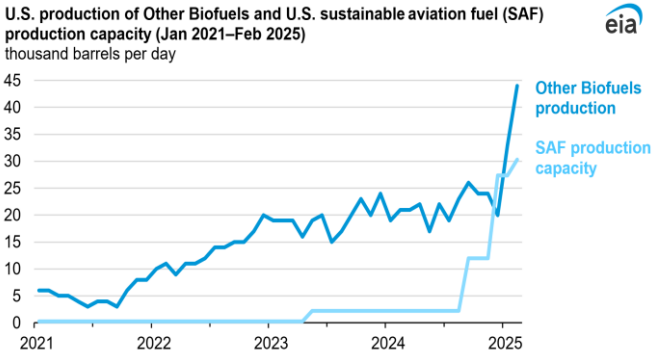
Bioenergy – Electricity and Biofuel

- UP sourcing increases public land use and eases pressure on private lands.
- Mill residues (especially softwood pulp logs) will lead initial supply.
- Future demand will shift supply toward hardwoods and by-products.
- A mixed strategy, mainly using residues, is most cost-effective.

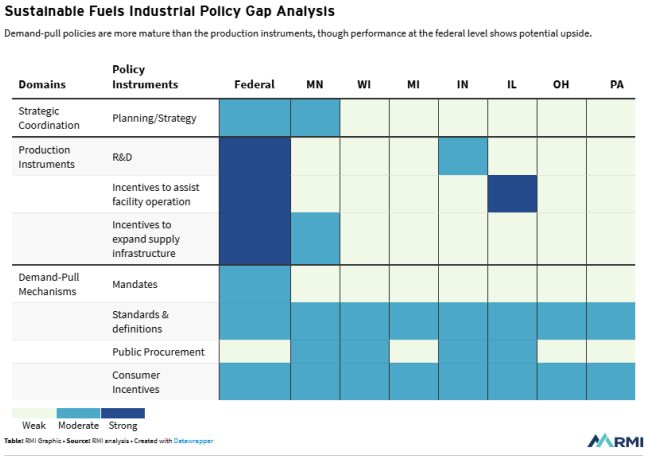


Bioenergy –Biofuel

- Renewable heating oil, renewable naphtha, renewable propane, renewable gasoline, and others.
- **Sustainable aviation fuel (SAF)** is an alternative to petroleum jet fuel.
- California and Texas opened two large facilities in 2024
- By 2030, 43 SAF projects, 286,000 barrels per day. https://wisconsinagconnection.com/news/oil-giants-invest-heavily-in-biofuels
- Great Lakes Region-Targeted Opportunity Region (Illinois, Indiana, Michigan, Minnesota, Ohio, Pennsylvania, and Wisconsin)
- Bill introduction for tax incentive in Wisconsin (Chicago and other Airports) https://biomassmagazine.com/articles/wisconsin-lawmakers-to-introduce-bill-creating-production-tax-credit-for-saf)



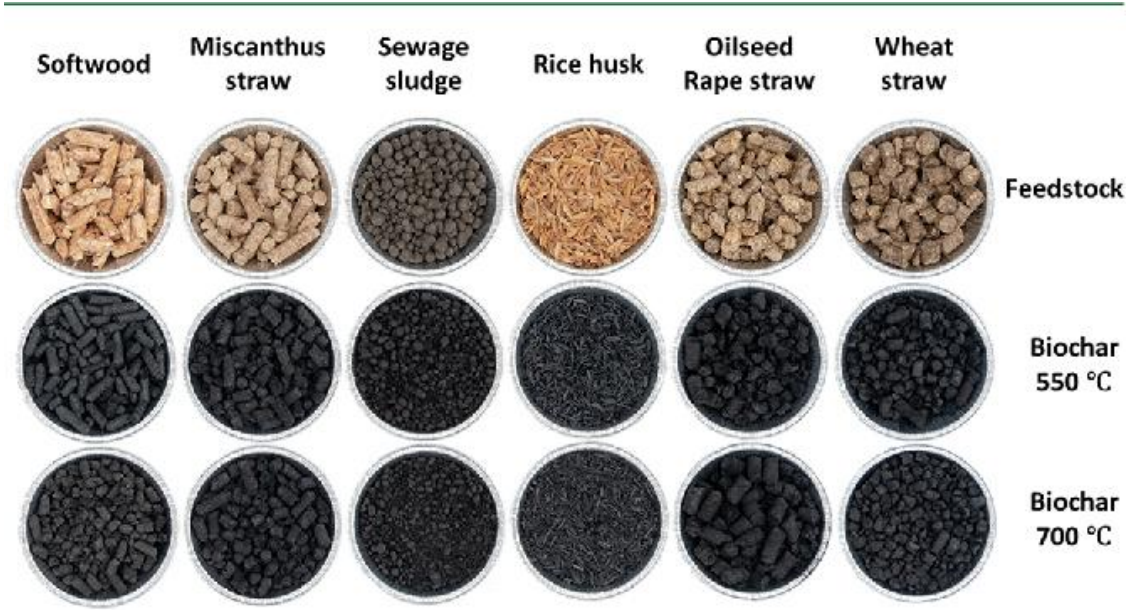
Source: https://www.eia.gov/todayinenergy/detail.php?id=65204



Source: https://rmi.org/sustainable-aviation-fuel-targeted-opportunity-region-great-lakes-region/

Biochar

- Agriculture crops and waste
- Forest residues
- Woody waste materials
  - Urban wood
  - Community Landfill



Mašek, O., Buss, W., Sohi, S., 2018. Standard Biochar Materials. Environ. Sci. Technol. 52, 9543–9544. https://doi.org/10.1021/acs.est.8b04053

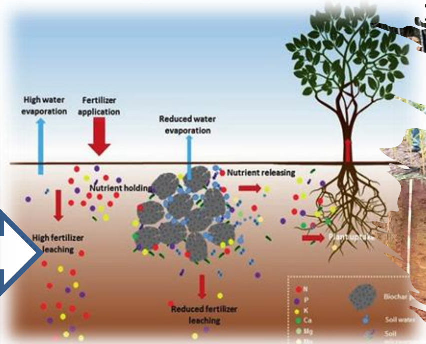
Why Biochar? : **win-win-win scenario**

Low value woods, woody waste and Logging residues
Economic Profitability
New Markets

Image: ROI
https://...mag.com/2019/12/biochar-the-little-forest-product-with-big-potential/

Biochar

Soil Amendments
Microbial activities
Organic matter
Moisture/Water Quality
Nutrient Availability



https://greenfrederick.org/biochar-builder-of-organic-matter-and-super-charged-compost/

Image: Wakefield Biochar
https://www.wakefieldbiochar.com/science-of-biochar/

And beyond: 55 Uses of Biochar
(https://www.biochar-journal.org/en/ct/2)

Habitat and climate
Carbon sequestration
Habitat Conservation

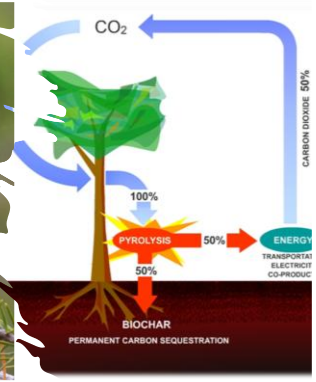
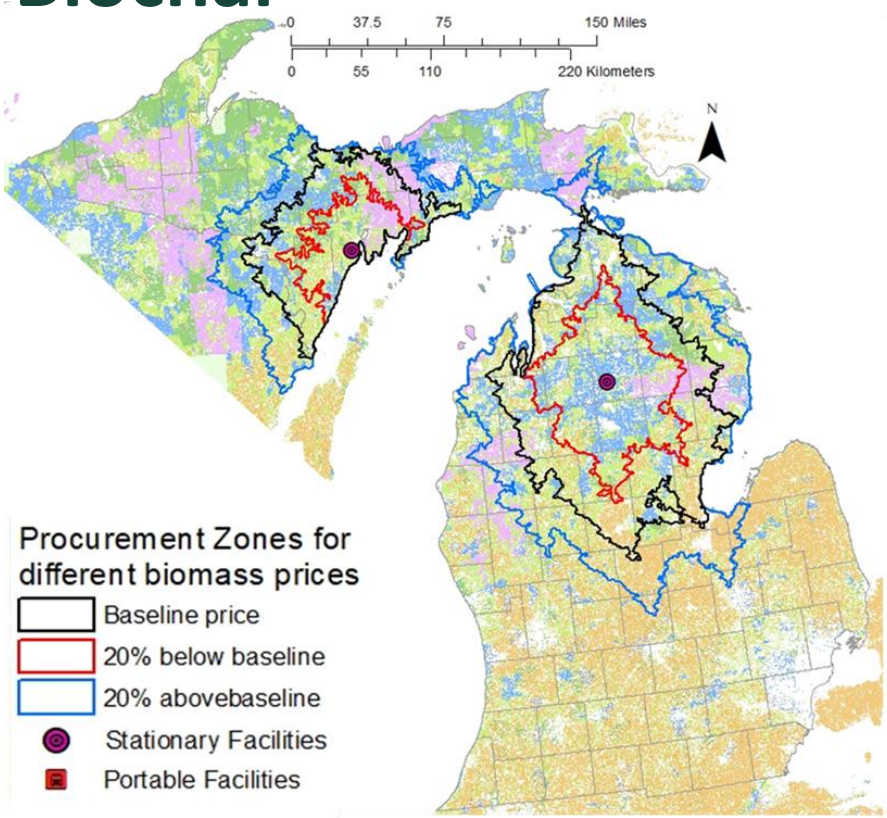
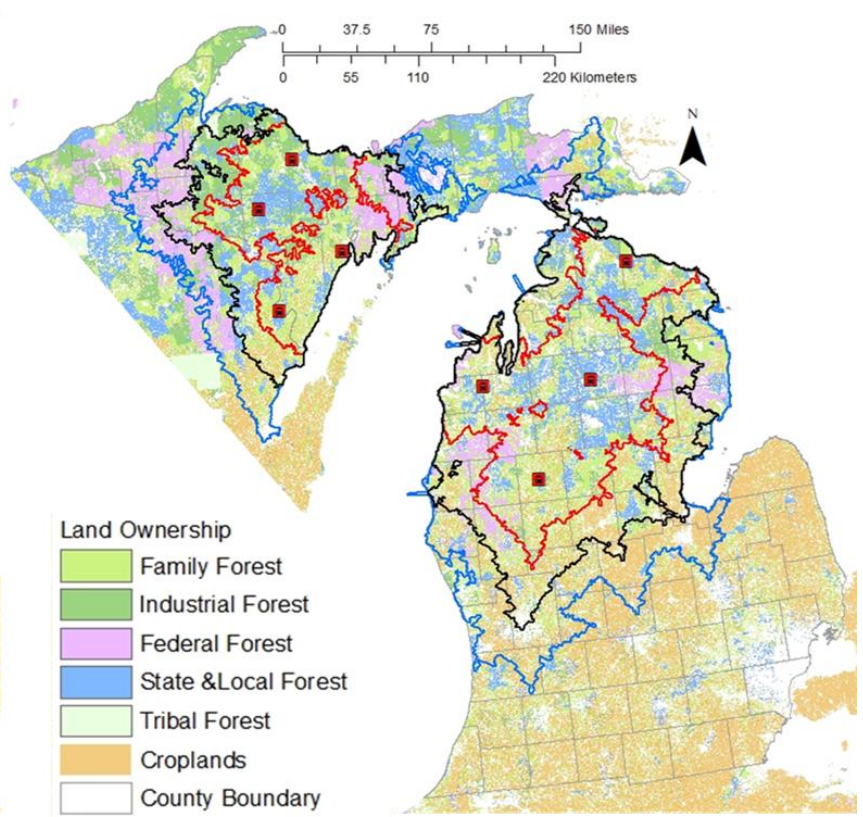


Image: USDA Forest Service x
https://www.nationalforests.org/who-we-are/our-impact/jack-pine-planting-for-kirtlands-warbler-habitat
ImageImage: Christoph Steiner
http://www.biochar.org/joomla/index.php?option=com_content&task=view&id=67&Itemid=7&limit=1&limitstart=4

...Ansari, A. A., Gill, S.S., 2017. Essential plant nutrients: Uptake, use efficiency, and management. Essent. Plant Nutr. Uptake, Use Effic. Manag. 1–569. https://doi.org/10.1007/978-3-319-58841-4

Biochar


0 37.5 75 150 Miles
0 55 110 220 Kilometers
N
Procurement Zones for different biomass prices
Baseline price
20% below baseline
20% abovebaseline
Stationary Facilities
Portable Facilities


0 37.5 75 150 Miles
0 55 110 220 Kilometers
N
Land Ownership
Family Forest
Industrial Forest
Federal Forest
State &Local Forest
Tribal Forest
Croplands
County Boundary

What are the economic barriers in biochar systems?

https://onlinelibrary.wiley.com/doi/10.1111/gcbb.70030

Item	*20% below baseline*				*Baseline ($25/green ton)*				*20% above baseline*			
	Stationary		Portable		Stationary		Portable		Stationary		Portable	
	UP	LP	UP	LP	UP	LP	UP	LP	UP	LP	UP	LP
Forest within procurement zones (1000 acres)	0.8 (60%↓)	1.98 (52%↓)	2.33 (37%↓)	3.99 (40%↓)	2.00	4.12	3.72	6.611	2.85 (43%↑)	6.31 (53%↑)	4.91 (32%↑)	8.31 (26%↑)
Potential Supply (*kt*)	44 (67%↓)	133 (60%↓)	58 (27%↓)	206 (42%↓)	134	331	79	356	139 (4%↑)	572 (73%↑)	120 (52%↑)	462 (30%↑)
Cropland within service area (1000 acres)	66 (43%↓)	176 (80%↓)	126 (49%↓)	606 (62%↓)	116	890	246	1599	227 (96%↑)	1922 (116%↑)	399 (62%↑)	3040 (90%↑)
Potential Demand (*kt*)	22 (44%↓)	59 (80%↓)	42 (49%↓)	202 (62%↓)	39	297	82	533	76 (95%↑)	641 (116%↑)	133 (62%↑)	1013 (90%↑)
# of units required to meet the demand	1	1	97	345	1	2	132	596	1	3	200	772
Demand-to-supply ratio (*DSR*)	0.50	0.44	0.72	0.98	0.29	0.90	1.04	1.50	0.55	1.12	1.11	2.19
Minimum Selling **Price** of Biochar ($/ton)	4353 **(170%↑)**	1583 **(18%↑)**	2296 (2%↓)	2295 (2%↓)	**1606**	**1340**	**2351**	**2350**	1592 **(1%↓)**	1234 **(8%↓)**	2423 (3%↑)	2422 (3%↑)

Note: *Baseline* Biomass price at the facility gate: $23.25/green t; *Baseline* biochar hauling cost: $15.15/t

Percentage in the parenthesis indicates the change from the *Baseline* where ↑ indicates increase and ↓ indicated decrease.

The minimum selling price of biochar includes the transportation cost of low-value biomass, production costs (capital costs, equipment costs, operational costs, labor costs) and the transportation cost of biochar to agricultural lands in Michigan. The values have been rounded off to the closest integer.

What are the economic barriers in biochar systems?

Need does not mean demand

- Cost associated with
  - Feedstock acquisition (40%-70%)
  - Labor, logistics and capital
  - Transportation of feedstocks and products (50-100 miles)
- Uncertain Income or Revenue Stream (Market Value)
  - Sales, climate offsets, and energy subsidies are less developed and could impede investment in biochar production)
- Competition with Bioenergy and other systems
- Thermal equipment and emission control is expensive
  - $1 million or more per dry ton per hour fuel input)
- Expensive alternative to pile burning or other site preparation and treatment options
- Investment
- Regulatory – emission permitting process (lacking)

Image: Wakefield Biochar, https://www.wakefieldbiochar.com/shop/wakefield-kickstart-charged-biochar/

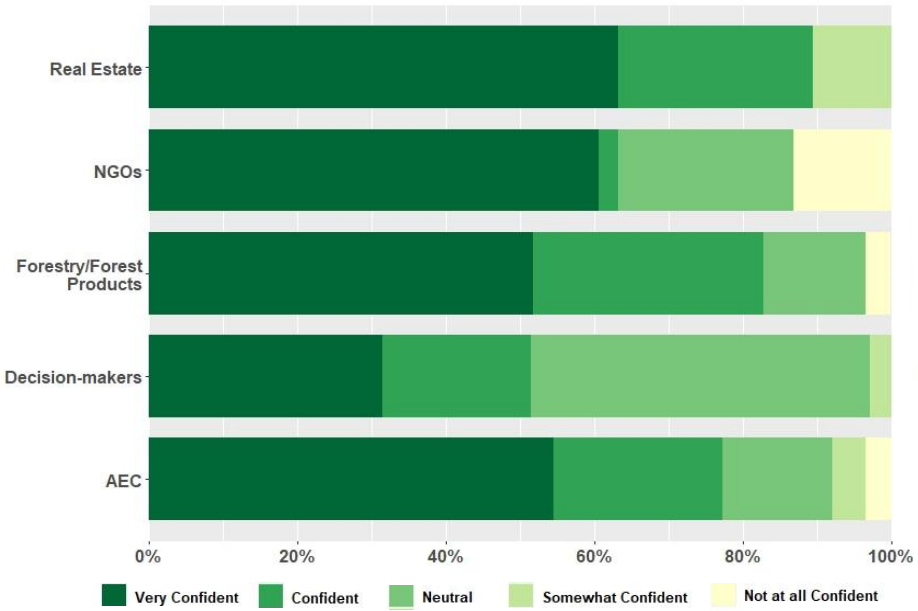
Mass timber

Demand for mass timber in Great Lakes region

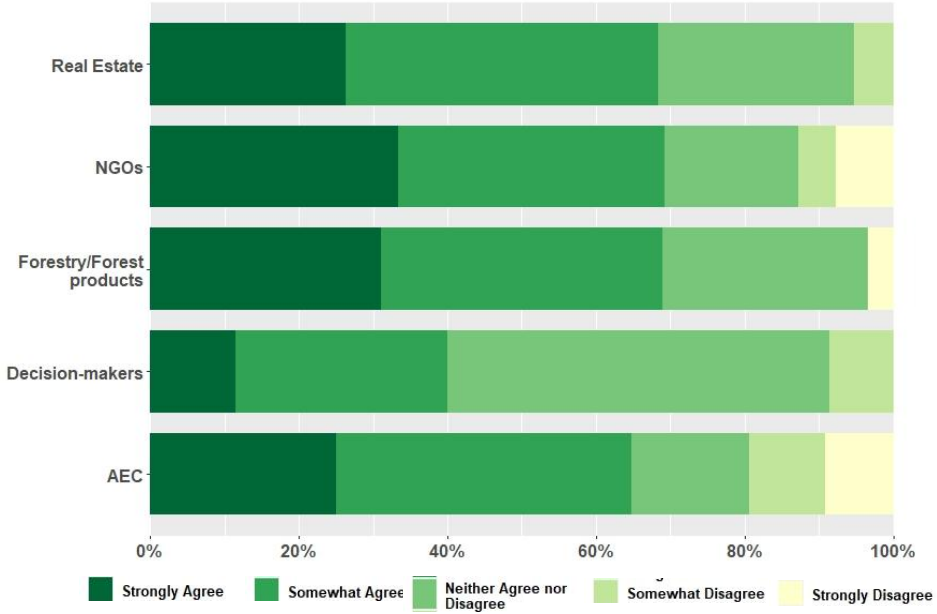
- Mass Timber projects planned in the next 5 years: 35 – 43
- Total cubic meters = ~125,000 (AEC Industry Response ~40% of 402 Survey Respondents)

Type of Projects	Type of Mass Timber	Volume (cubic meters)	State	# of Projects
Recreational/Educational	CLT, GLULAM	16,545	MI, MD, NJ, NC, TN, FL, SC, NC, NY	12-14
Residential buildings	CLT, GLULAM	15,008	MI, NJ, NC, GA, NY	7
Commerical buildings	CLT, GLULAM	15,328	MI,PA, TX, IA, NY	5-8
Government (city hall, civic)	CLT, GLULAM	1,422	MI, GA, OK, NJ, VA	5
Mixed-use (businesses, amenities, residential)	CLT, GLULAM	5,012	MI, VA, NC, NY	3-6
Others	CLT, GLULAM	71,075	NY, WI, MN	3

Mass timber



Confidence with mass timber as a construction material for residential/commercial buildings



Agreement with "There is market demand to shift to mass timber as building material"

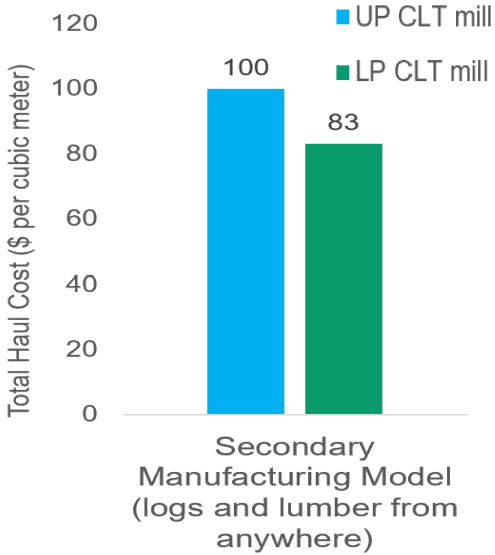
Main point: Confidence with and agreement on market demand for mass timber varies by different groups – more support and knowledge building would benefit local and regional decision and policy makers and the forestry community

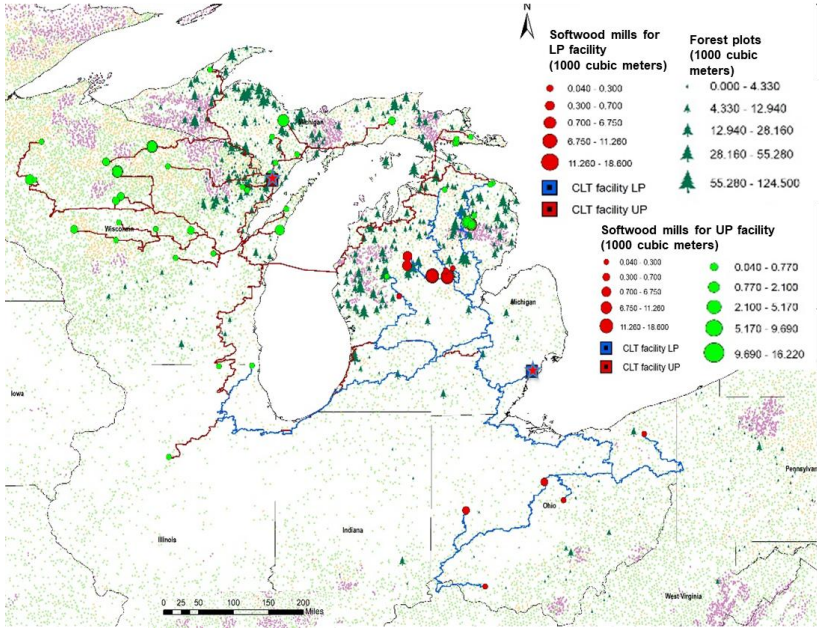
Can we really produce Mass timber in Lake States region?

Supply Scenario: Secondary Manufacturing Model

Open Sourcing
Forests : Across the US
Sawmills : Across the US

- Plenty of softwood in the region
- Focus on untapped feedstock
  - Smaller diameter
  - Private lands
- Consider prioritizing market gaps or emerging products
  - Large glulam
  - Structural veneer products: mass plywood panels, laminated veneer lumber
  - Value-added fabrication



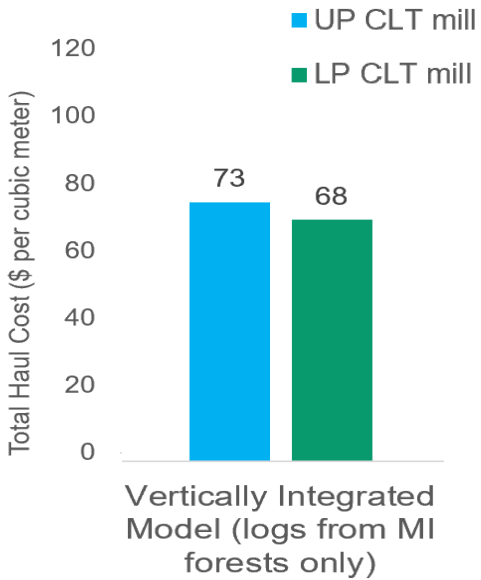


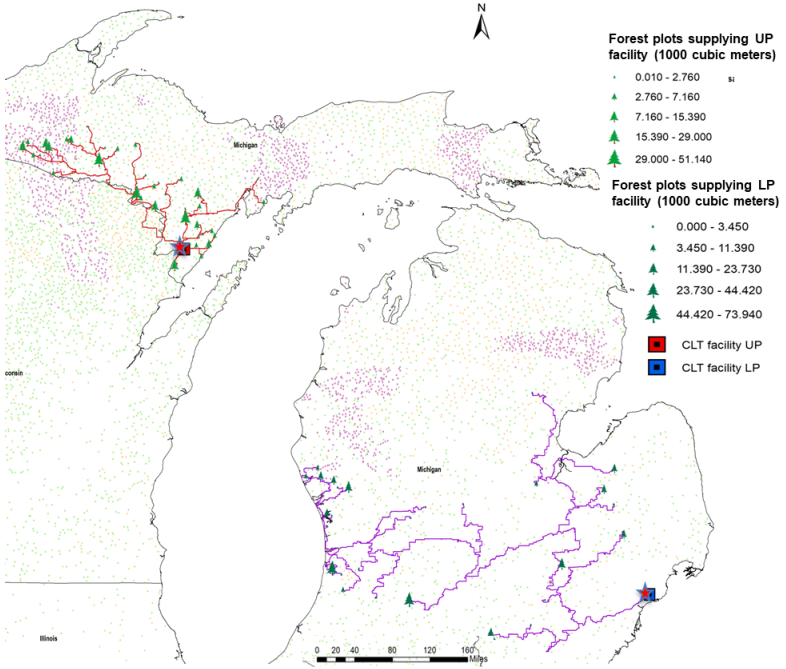
Can we really produce Mass timber in Lake States region?

Supply Scenario: Vertically Integrated Model

MI Sourcing
Forests : Michigan only
Sawmills : MT facility

Vertically integrated model more cost-effective and sustainable for both facilities





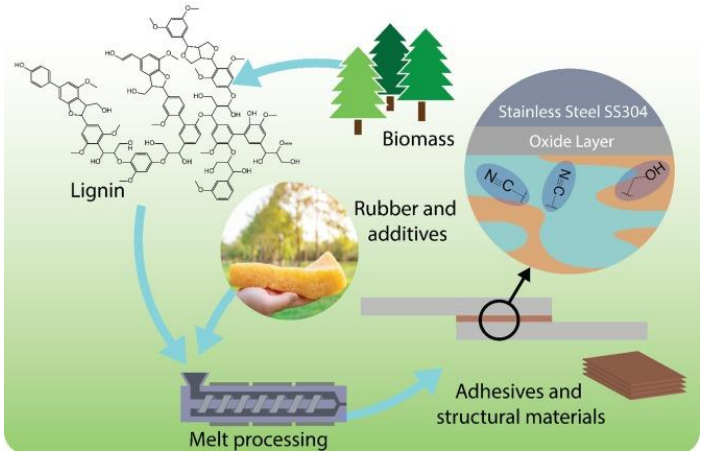
Lignin

- Lignin is a branching material that holds a plant together and keeps the structure of the plant stable. (Plant cell is made of lignin and cellulose)

- **Using lignin as a sustainable alternative in biobased adhesives- Dr. Nejad**

https://www.canr.msu.edu/news/using-lignin-as-a-sustainable-alternative-in-biobased-adhesives

- An intermediate product that can be used to produce alternatives for several petrochemical products.



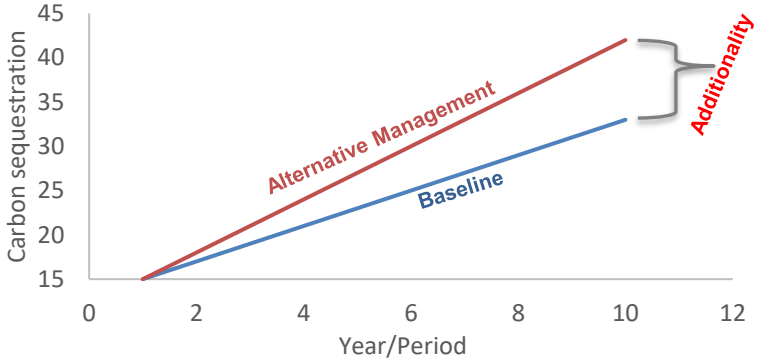
Source: Kanbargi et al. (2023)
https://www.sciencedirect.com/science/article/pii/S0014305723001647#f0005

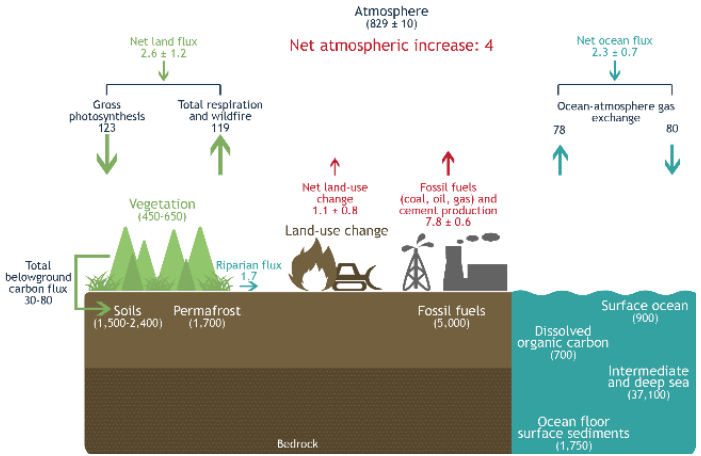
Forest carbon as a commodity

- The additional carbon sequestered (or avoided emissions) compared to baseline or business as usual. Hence, **Additionality** is the commodity, not the actual sequestration.

- It is all about the fluxes, not the pools (stocks)

- Generating credits from forest is complex process



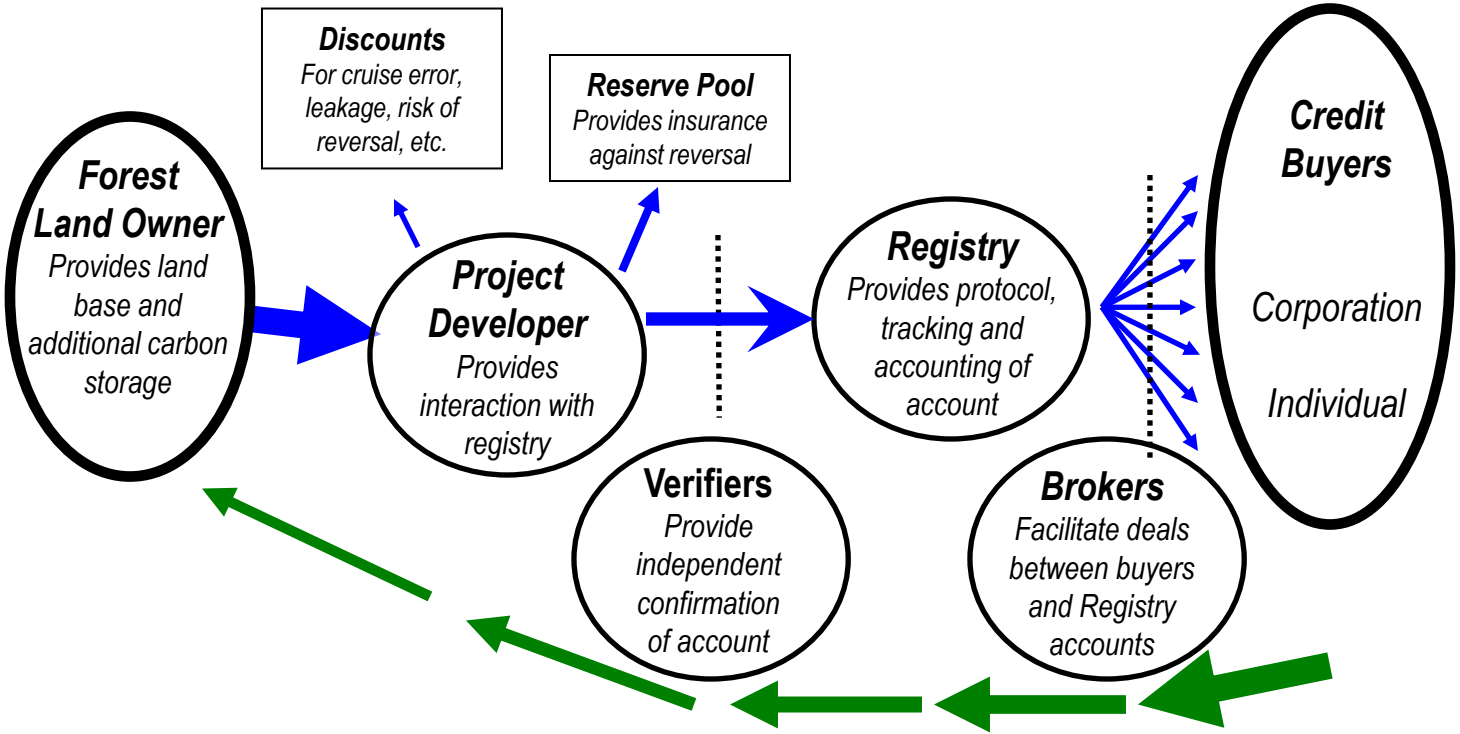


How It Works

- Landowners enroll their forested lands in the forest carbon programs through voluntary or compliance markets.
- They agree to specific practices, such as improving forest management, extending harvest rotations, or avoiding deforestation.
- Carbon credits are generated based on the additional carbon stored or emissions avoided.
- These credits are verified by third parties and sold to entities (e.g., corporations or governments) seeking to offset their carbon footprints

The voluntary offset market

Following CARBON and MONEY through an Offset Market



How are landowners paid?

Additionality

Paid for managing forests to sequester additional carbon compared to Business-as-usual management activities (baseline)

1. Paid on per tonne CO2eq (generally negotiated)
   - Project Developers work with landowners to establish a baseline, and change in management activity, leading to additionality
   - Developer helps with the verification and sale of credits
   - Targeted to large landowners, at least a few thousand acres.
2. Paid on a per-acre basis
   - Project Developers recruit landowners to change management activity and pay on a per-acre basis.
   - The developer pools the land base from multiple landowners, estimates and verifies the additionality, and gets paid for the carbon sequestration credits.
   - Targeted to small landowners
     - (40 acres and more, can be implemented on fewer acres if they are productive)

Thank you

Contact

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