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Project Summary and FAQs for

Advancing Social Impact Using Mass Timber in Industrial Building Types

US Forest Service 2022 Wood Innovations Grant

Ecotone Analytics Social Impact Analysis
January 2025

Project Summary

Key Message

This document provides a brief summary and frequently asked questions (FAQs) to accompany a technical report that assess the social impact of constructing light industrial buildings from mass timber harvested from responsibly managed forests. The analysis, funded by a US Forest Service grant, isolates the benefits of mass timber in comparison to traditional concrete tilt-up construction. Key benefits include ecosystem services, improved employee well-being, and reduced carbon emissions. The report also proposes a Key Performance Indicator framework for tracking future impacts of future projects and and identifies areas for further research, such as a comprehensive Social Life Cycle Assessment. Finally, it is important to note that this analysis is projecting potential benefits of a hypothetical building bearing the same characteristics of the one planned to be built for A1X Automation (a project partner).

Key Talking Points

This in-depth analysis quantifies the social and economic value of constructing a hypothetical light industrial building with mass timber using wood procured from responsibly managed forests in comparison to a comparable building using concrete tilt-up.

Key talking points of the analysis include:

1. **Significant Social and Economic Benefits:** Building with mass timber from responsibly managed forests, rather than concrete, can generate substantial social and economic benefits across the entire value chain, from forestry and manufacturing to building use and community well-being.
2. **Monetized Benefits Exceed $2 Million:** The projected monetized social and economic benefits of the hypothetical light industrial mass timber building are estimated to be over $2.1 million over a 30-year period.
    a. The largest benefits stem from:
        i. Ecosystem services provided by responsibly managed forests (e.g., improved air and water quality). 40% of the total $2.1 million in benefits are tied to the ecosystem services of the forest, making clear the importance of supporting quality markets for forest products to help ensure society gets to experience those ecosystem service benefits.
        ii. Improved employee well-being resulting from working in a building with exposed wood surfaces (biophilic design) makes up 35% of total monetized benefits.
    b. Other monetized benefits include reduced employee absenteeism, increased employee retention, the value of attracting and retaining top talent, reduced energy use, and various benefits during the construction phase, such as increased worker safety and reduced noise pollution.
    c. There are limitations to monetizing all potential benefits - several non-monetized outcomes, such as reduced wildfire risk, improved mental and physical health of workers, and economic growth, could not be quantified due to data limitations.
3. **Rent Premiums Reflect Social Value:** The higher rent premiums often observed in mass timber buildings are justified by the significant social benefits they offer, particularly in terms of improved worker well-being and productivity.
4. **Key Performance Indicators (KPIs) for the Industry:** The analysis provides a framework of KPIs that can be used to track and measure the social and economic impact of mass timber projects. This framework offers practical tools for municipalities, communities, and project owners to demonstrate the value of mass timber and encourage its wider adoption. See the accompanying technical documentation for details on these KPIs.
5. **Need for Further Research:** Key areas where further research is needed to strengthen the understanding and quantification of mass timber's benefits include:
    a. The long-term impact on wildfire risk
    b. Social benefits for Indigenous communities
    c. Development of a comprehensive Social Life Cycle Assessment (LCA) framework

Core Assumptions of Outcome Projections

A series of assumptions were leveraged to develop the monetized outcome projections. For transparency, these assumptions are outlined below. See the accompanying technical documentation for further details.

1. **Counterfactual:**
    - Mass timber using sustainably certified wood compared to a concrete tilt up building of the same size and function.
2. **Value chain characteristics:**
    - No geographic specificity to any steps of the value chain including no location of the forest assumed other than being in U.S./Canada
    - Trees are approximately 30 years old when harvested. There was a range of timelines for softwood trees that would be used in mass timber products, with ~25 years tending to be the low end and 30-35 years often referenced in the southeast (Brasher, 2021). In the north, these figures could be 40+ years and there is advocacy for extending harvest timelines throughout the country which could in some cases double the lifespan of the tree before being harvested. Since we aren't assuming where in the US the forest is that's supplying the wood we're using, we want to be conservative in terms of how many years of forest benefits we are accounting for.
3. **Building characteristics:**
    - Based on A1X Automation building estimate: At least 23 workers in the completed building with at least one of those workers being considered a very high performer (i.e. max productivity)
    - Based on A1X Automation building estimate: Approximately 26,000 sq ft final structure
    - A1X workers have average rates of job retention for the engineering and manufacturing industry
4. **Duration of impact:**
    - Impact duration varies by the type of impact – ranging from either a one time benefit or benefits that last as long as the building is in good operating order. We assume that from the completion of the building, the building will generate benefits for 30 years before potentially large investments are required to continue to generate positive impacts.
    - Multi-year benefits are discounted to present value using a 3% discount rate. This puts future benefits into 2024 dollars.

Note: This analysis is a projection, it is not a measurement of impact realized. The values included in this analysis are based on existing evidence, but their valuation is projected.

Featured Talking Points in the Journey Map

To accompany this analysis, a journey map visualization was developed to help show how benefits could be realized across the mass timber value chain. Some stages of the value chain did not have a monetized outcome and as a result, just included an insight from the literature. These insights and estimations are summarized in Table 1.

Table 1. Journey Map Talking Points

Value Chain Stage	Example Impacts
Forest	Increased Ecosystem Services • $850,000* in sustainable forestry benefits of air and water quality, water supply, erosion control, recreation, aesthetic value, and stormwater damage mitigation (FEMA, 2022) – ecosystem services supported by requirements within the SFI Forest Management Standards. Educational Impact to Landowner, Loggers, and Communities • Environmental education can boost environmental behaviors (Van de Wetering et al., 2022). An average of 10,000 harvesting professionals are trained each year due to requirements within the SFI standards. Reduced Wildfire Risk • Mass timber products can be manufactured from smaller-diameter trees which, when harvested, helps prevent wildfires (Manke, 2021). SFI Forest Management Objective 10 requires certified organizations to mitigate the undesirable impacts of wildfire and raise community awareness.
Processor/ Sawmill	Increased Rural Economic Activity • 35% - Available capacity of sawmills in the U.S. in 2024 (U.S. Census Bureau, 2024).
Mass Timber Manufacturer	Increased Diversity of Jobs • Factories require a wider range of skill sets than construction sites, supporting a more diverse workforce (Anderson et al., 2020). Safer Work Environment • $4,100* in avoided injuries - Mass timber involves more prefabrication and less on site construction, reducing rate of injury by half (Smith, 2010).
Construction	Reduced Noise Pollution • $6,000* in avoided disruption to neighboring residents from faster construction (Weinhold, 2012). Faster Construction • 25% faster to construct than concrete buildings and require 90% less construction traffic (Think Wood, 2023).
Building Use	Improved Employee Well-being • $700,000* in improved comfort and reduced stress over 30 years (Wilson, 1984). Attracting and Retaining Talent • $225,000* in reduced hiring and on-boarding costs due to up to 25% increase in employee retention from biophilia (Ryan et al., 2023).

* Monetized benefits are estimated for a specific building.

Frequently Asked Questions

1. What is Ecotone Analytics GBC?

Ecotone is a Minneapolis-based impact analysis and stakeholder communication firm. Its mission is to help clients scale their social and environmental impact by estimating and communicating impact value to stakeholders and investors.

2. What is a monetized impact?

A monetized impact is when a dollar value is placed on the estimated change generated by an intervention. In this analysis, 'monetized impact', 'social return' and 'benefit' can be used interchangeably as the monetized impacts appear on the 'benefits' side of the cost-benefit ratio and are considered the 'social return' on the investment. For example, a monetized impact of 'improved respiratory health' could be the health care expenditures avoided as a result of that improvement in respiratory health.

3. Why do you think you can monetize social and environmental impacts?

This analysis is focused on monetizing social and environmental impacts because these are impacts that are unlikely to appear on a financial statement or generate financial returns for investors. However, these impacts are always occurring with everything we do and we know implicitly they have value. But unless you are an expert in the particular field of social or environmental impact being analyzed, your perception of just how valuable that impact is may be relatively uninformed. By linking social and environmental changes (i.e. impacts) to some exchange of money (e.g. a cost occurring event), we can provide context of just how substantial that particular impact may be. For example, when I have a more nutritional diet, I am more likely to avoid future health conditions such as heart disease. When I avoid heart disease, I avoid the health care costs that come with it while also enjoying improved quality of life. Not all social and environmental impacts can be linked to a cost like in this example, but we are able to paint at least a partial picture of monetized value of otherwise often uncertain impact values.

While monetizing social impacts can provide valuable insights, it is important to approach it thoughtfully and ethically, ensuring that it serves the interests of all stakeholders and fosters genuine social improvement.

4. Why is it helpful to monetize social and environmental impacts?

Monetizing impacts is useful for multiple reasons. It puts what can be hard to understand impacts into readily understandable units - money, while also allowing for adding multiple impacts together and comparing impacts to each other.

The process to estimate the monetized impact requires a focus on causality, ensuring that the intervention conducted is driving the impact of interest rather than just being correlated. Monetization also helps boost the importance of outcomes, particularly long-term outcomes, as those long-term changes that we experience from an intervention tend to be those changes that can be monetized. This is important because impact measurement often focuses only on measuring outputs (i.e. countable units such as # of people served) or short-term outcomes (e.g. improved test scores). Monetization forces the analyst to ask 'so what' - why does this output or that short-term outcome matter?

Together these features of impact monetization help with communicating impacts, supporting decision-making, improving program management and accountability, among other benefits.

5. What is a non-monetized impact?

There are impacts that are not monetized due to their intangible nature and/or the lack of quality data to support monetization presently. As future studies are conducted however, certain impacts may become monetizable.

6. How does outcome monetization differ from SROI?

Outcome monetization shows the evidence-based estimate of the social value generated from a given initiative in monetary terms. Outcome monetization shows us the size of the benefits. SROI takes that estimated social value (the benefits) and compares it to the size of the investment needed to implement the given initiative. SROI is helpful for understanding and monitoring the efficiency of impact of a given initiative per dollar invested. Changes in the SROI serve as signals for discussion around why the shift has occurred and can inform investment and program strategy decisions. SROI was not suitable for this analysis given the uncertainty in what the investment difference can and should be between a light industrial mass timber building and a concrete tilt-up building.

7. How does this valuation differ from an economic impact study?

This analysis is focused on monetizing social impacts. This is distinct from an economic impact study given that we are not including estimations of economic growth, business activity, and indirect employment changes. While social and environmental impacts certainly can influence economic conditions, that is beyond the scope of this analysis.

8. What is the shelf life of this analysis?

We recommend updating the impact analysis at least every 3 years given the potential change in market conditions and development of the evidence base over that time period.

9. What would make the impact estimates higher?

Several factors could potentially lead to higher impact estimates for mass timber construction:

- **Greater Availability of Data and Research:** The analysis highlights the need for more research in areas like the long-term impact on wildfire risk, the social benefits for Indigenous communities, and the development of a standardized framework for comprehensive social Life Cycle Assessment. As more data becomes available, the ability to quantify and monetize a broader range of social and environmental benefits will likely increase, leading to higher overall impact estimates.
- **Stronger Policy Support:** The analysis acknowledges the influence of policy and regulatory changes on the feasibility and benefits of mass timber construction. Supportive policies, such as carbon pricing mechanisms, incentives for sustainable building materials, or streamlined building codes for mass timber, could further enhance its economic viability and increase the projected benefits.
- **Focus on Non-Monetized Outcomes:** The analysis identifies several non-monetized outcomes, such as reduced wildfire risk, improved mental and physical health of workers, and the positive impacts on Indigenous communities. Developing robust methodologies for quantifying these benefits in monetary terms could significantly increase the overall impact estimates.
- **Shift in Societal Values:** As awareness of sustainability and the importance of a circular economy grows, the value placed on certain benefits, such as the use of renewable materials, reduced embodied carbon, and the end-of-life management of buildings, might increase. This shift in societal values could contribute to higher perceived benefits of mass timber construction.
- **Incorporation of Indirect and Spillover Effects:** The analysis focuses primarily on direct, measurable impacts. However, considering the broader indirect and spillover effects, such as the revitalization of rural economies, the promotion of sustainable forestry practices, and the creation of a more resilient and sustainable built environment, could lead to significantly higher overall impact estimates.

By addressing these factors and continuing to build a comprehensive understanding of the multifaceted value proposition of mass timber, the impact estimates associated with this innovative building material are likely to increase, further solidifying its role in creating a more sustainable future.

10. What are the greatest uncertainties in this analysis?

The analysis acknowledges several key uncertainties that could impact the accuracy and reliability of the projected social and economic benefits of mass timber construction using responsibly sourced wood. These uncertainties stem from data limitations, evolving contexts, and the inherent complexity of assessing long-term impacts.

Here are some of the key uncertainties:

Limited Data for Certain Outcomes: The analysis identifies several non-monetized outcomes that, while recognized as valuable, could not be assigned monetary values due to a lack of robust data or established methodologies for quantification.

- These non-monetized outcomes include the reduced risk of wildfires associated with sustainable forest management, the potential positive impacts on the mental and physical health of building occupants, and the economic and social benefits for Indigenous communities.
    - The analysis acknowledges that the inability to monetize these outcomes results in a potentially underestimated representation of the total value of mass timber construction.
- **Variability in Project-specific Contexts:** The analysis emphasizes that the actual benefits realized from individual mass timber projects can vary significantly depending on factors such as the specific characteristics of the value chain, the building design and use, the workforce demographics, and the local economic conditions.
    - The hypothetical nature of the building analyzed in this case introduces further variability, as the actual outcomes may differ from the projections once the building is constructed and operational.

It is crucial to approach the findings with an awareness of these inherent uncertainties and to interpret them as potential benefits rather than guaranteed outcomes. Continuous research, data collection, and refinement of assessment methodologies are essential to addressing these uncertainties and enhancing the accuracy and comprehensiveness of future impact analyses.

11. What are the greatest strengths of this analysis?

This analysis demonstrates several strengths in its approach to evaluating the social and economic benefits of mass timber construction using responsibly sourced wood:

- **Comprehensive Scope:** The analysis encompasses the entire value chain of mass timber, from sustainable forest management to the building use phase. This holistic perspective provides a more complete picture of the potential benefits, considering the interconnectedness of various stages and stakeholders.
- **Emphasis on Evidence-based Approach:** The analysis prioritizes the use of existing research, including meta-analyses, systematic reviews, and case studies, to support its claims. It employs a rigorous evidence review process, considering the levels of causal evidence to ensure the reliability of the findings. This commitment to scientific rigor strengthens the credibility and trustworthiness of the analysis.
- **Transparency and Acknowledgment of Limitations:** The analysis explicitly acknowledges the inherent uncertainties and limitations associated with projecting social and economic impacts. It openly discusses the challenges of data availability, evolving contexts, and the potential for variability in project-specific outcomes. This transparency enhances the analysis's credibility and allows readers to interpret the findings with appropriate caution.
- **Practical Tools for Industry Application:** The analysis goes beyond theoretical projections by providing a Key Performance Indicator framework that can be used by municipalities, communities, and project owners to track and measure the actual social and economic impacts of mass timber projects. This practical tool promotes ongoing monitoring and evaluation, enabling data-driven decision-making and continuous improvement within the industry.

- **Focus on Future Research Needs:** The analysis identifies areas where further research is needed to strengthen the understanding of the value of mass timber. It highlights the importance of investigating the long-term impact on wildfire risk, the social benefits for Indigenous communities, and the development of a comprehensive social Life Cycle Assessment framework.
    - This forward-looking perspective encourages ongoing inquiry and the refinement of assessment methodologies, contributing to a more robust and comprehensive understanding of mass timber's potential.
- **Targeted Communication Strategy:** The analysis recognizes the importance of tailoring communication to different audiences.
    - It developed audience-specific talking points to effectively convey the value proposition of mass timber to stakeholders such as investors, policymakers, community members, and industry professionals. This strategic approach to communication enhances the likelihood of influencing decision-making and promoting wider adoption of mass timber construction.

12. Why aren't there more benefits due to SFI?

While the analysis highlights the positive role of the Sustainable Forestry Initiative in promoting responsible forestry and driving demand for mass timber, its impact may appear less pronounced in the analysis due to several factors:

- **Focus on Quantifiable Benefits:** The analysis primarily focuses on monetizing the social and economic benefits of mass timber construction. While SFI's standards contribute to many of these benefits, they often play an indirect role that is difficult to isolate and quantify. For example, SFI's forest management standards help ensure the long-term health and resilience of forests, which in turn supports the ecosystem services that are monetized in the analysis. However, attributing a specific dollar value to SFI's contribution to these ecosystem services is challenging.
- **Data Limitations:** The analysis acknowledges the lack of robust data for quantifying certain outcomes, such as the specific social benefits for Indigenous communities and the impact of sustainable forest management on wildfire risk. These data gaps limit the ability to fully assess the impact of SFI's standards in these areas, potentially underestimating its overall contribution.
- **Broader Scope of SFI's Impact:** The analysis primarily focuses on the social and economic benefits of mass timber construction itself while asserting that the mass timber used comes from responsibly managed forests. However, SFI's impact extends beyond the building industry to encompass broader environmental and social goals. SFI's work in promoting sustainable forestry practices, for example, has implications for biodiversity conservation, carbon sequestration, workforce development, youth education, and community well-being that may not be fully captured in an analysis focused on building construction.

In essence, while the analysis recognizes SFI's positive contributions, its methodological approach and specific focus may not fully capture the breadth and depth of SFI's impact. Future research that addresses data limitations, examines real-world projects, and considers the broader scope of SFI's activities could provide a more comprehensive assessment of its significant role in promoting a sustainable and equitable future.