10 Lessons Learnt from our Breakthrough Initiatives in Establishing Climate Smart Forest Economies around the Globe

2021 - 2022

Climate Smart Forest Economy Program
Unlocking Forests' Potential

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Introduction

The Climate Smart Forest Economy Program (CSFEP) uses breakthrough initiatives (BIs) to understand the broader challenges and opportunities for climate-smart forest economies, and how to overcome these. We have built a portfolio of ~15 initiatives across geographies, sectors, stakeholders, and project types, so we can develop a diverse and holistic set of learnings.

This report is a retrospective on the lessons which have been gleaned from each of our completed BIs. Each BI has been based in a different place, faced different challenges, and been given different opportunities and each has trialled different angles to build or to start its Climate Smart Forest Economy. We explore each BI first, and we then list all enablers and barriers faced by the BIs, we then analyse the 10 key lessons learnt - the ten most frequent enablers and barriers that the BIs faced. Although, as the second section shows, many more were identified, they didn't apply to a large number of BIs so we decided to omit them.

Before we start, we must first note that the climate potential of the carbon Sink, Storage, and fossil-carbon Substitution (3S) functions of forests and forest products is showing promise to be a strong enabler of action along the forest-timber-construction value chain. Successful projects in the forest economy sector can be climate smart and unlock future investment.

The analysis shows a divide between nascent forest economies and more established forest economy markets. Very new markets suffer from slower progress in the move to building with timber, but they do represent an opportunity to develop sustainable value chains as a standard and not an exception. On the other hand, more established forest economy markets offer bright spots in terms of demonstrating what the potential is but they do suffer complications from maturity. Examples of both are included in this report.

For both nascent and established markets there are clear lessons learnt on enablers and barriers. We hope that what we have learnt is adopted by other value chain actors seeking to improve climate impacts along the forest-to-frame value chain.

The Breakthrough Initiatives

Barcelona Social Housing Tower, Spain

The Barcelona Social Housing Tower breakthrough initiative is a competition-winning building, supported by the City of Barcelona. The project provides an opportunity to rethink social housing with an emphasis on creating a climate-smart, high-quality living environment. There is demand for increased social housing in Barcelona and demand for social housing is growing across almost all European countries. The CSFEP is working with architect Daniel Ibanez to support the development of this innovative timber social housing tower in Barcelona and ensure it meets the required standards to be a blueprint for other cities to follow.

Marina Tower, Gabon

Working alongside the Strategic Investment Fund of Gabon (FGIS) and Façade Maritime du Champ Triomphal (FMCT), to support the development of The Gabon Sovereign Wealth Tower. This Tower will be a flagship mass timber building in Gabon to offer a template for construction in a CSFE. The opportunity to use a building to develop a nuanced understanding of a CSFE that can inform national-level strategy is exciting. Capitalizing on Gabon's existing investments in forest protection and recent goals to diversify its economy, the Gabon Sovereign Wealth Tower project aims to initiate the creation of a CLT value chain that emphasizes sustainable harvesting and regeneration of forest assets.

DIY Bamboo houses with CASSA, Guatemala

CASSA is creating a market for affordable DIY bamboo housing which will facilitate investment in sustainably managed plantations and address the need for climate-resilient housing across Central America. These homes will meet the demand for climate-resilient homes that can withstand the growing impacts of climate change in the vulnerable region where most people lack access to affordable and safe housing options. The bamboo plantations and the use of local communities in their management will also support improved livelihoods while maintaining positive climate impacts. CASSA will supplement the plantation course offered to local communities with a forestry management course to maximize climate impacts from natural resources. Construction on the DIY houses was completed in June 2022, alongside the finalization of training materials (including manuals and videos).

Regional Strategy in Glasgow City Region, Scotland

Scotland's largest city region is actively tackling climate change through a range of resilience and net zero measures, such as the Clyde Climate Forest and Climate Ready Clyde. These activities are now being reinforced by another innovative project. Glasgow and the wider region is one of the regional breakthrough initiatives under the Climate Smart Forest Economy Program (CSFEP), an ambitious example of innovation in forests and wood products, to reshape and restructure operations in the region's forestry, built environment, construction and manufacturing sectors. CSFEP worked with BeZero Carbon to model the (1) carbon sequestration impact of existing and projected forest cover, dividing between broadleaf and conifer; (2) the carbon footprint of construction materials to provide an estimate of the production potential; and (3) the carbon balance (i.e., savings) that could be generated through product substitution in the construction sector.

Community Housing with AKAH, India

Working with Agha Khan Agency for Habitat (AKAH) this initiative seeks to redesign housing opportunities, shifting communities towards sustainable, locally sourced, mass-timber hybrid houses in Gujarat, India. The initiative aims to build on AKAH's rural housing program by replacing the use of concrete and bricks with timber and adapting AKAH's reforestation program to include tree species suitable for construction. Through the breakthrough initiative, CSFEP supports AKAH in developing an integrated forest to frame value chain in a nascent mass timber market, understanding the 3S impact across the value chain, assessing and developing necessary safeguards for sourcing, engaging and influencing key decision-makers, and developing a community through the India Value Chain Alliance initiative.

WRI and CRB's Value Chain Alliance, India

The World Resources Institute India (WRI India), partnering with the Centre for Responsible Business (CRB), chose local bamboo species as the most suitable commodity to open the door for a climate-smart forest economy and identified Madhya Pradesh State (Central India) as the most promising geography to build India's first value chain alliance for bamboo. The partners are now prioritizing start-up activities and tentative partners for such an alliance to raise funds for its launch, while at the same time finalizing a white paper that summarizes efforts over the past eight months. Drawing from a master list of 64 stakeholders, the partners consulted close to 100 people in a national workshop, two consultations in regions rich in bamboo resources (Guwahati, Northeast India and Bhopal, Central India), and 14 one-on-one conversations. These consultations and a literature review helped the partners determine the criteria to select a suitable commodity and finalize their choice of geography and strategy for an alliance with discussion with strategic partners like Tamil Nadu Agriculture University, with which WRI signed an MoU in March 2022.

A "Wood-to-City" Value Chain with Bauhütte 4.0, Berlin

This initiative is planning to develop Europe's first "Forest-to-City" value chain for affordable housing in wood, located in the heart of Europe, in the neighbourhood of the former Tegel airport in Berlin. It is developing a 3S-based prototypical value chain that connects actors from forest management in the Brandenburg region as the Sink, housing construction in Berlin as Storage, and building of the new residential "Schumacher Quartier" constructed with prefabricated wood components as an example of Substitution.

A Climate Smart Wood Group in the Pacific Northwest, USA

The Climate Smart Wood Group (Ecotrust, Carbon Leadership Forum, Sustainable Northwest, Northwest Natural Resources Group, Washington Environmental Council, Forest Stewardship Council, WWF, Magnusson Klemencic Associates, ARUP Engineering, and ZGF Architects.) envisions a new forest economy in the Pacific Northwest that shifts the dominant management paradigm to climate-smart forestry, which encourages management practices that emphasize and incentivize carbon storage, resilience, biodiversity, and other ecosystem services.

Although the research is positive, and there is a demand for climate-smart forest products, the business model for landowners is challenging. Moreover, tribal communities require further support to overcome structural market barriers.

A HQ for Stora Enso, Finland

The new Stora Enso company headquarters is an example of carbon-driven decision-making in urban development. The headquarters will be constructed in Helsinki, Finland, and built with Stora Enso's mass timber building solutions, mainly CLT (Cross Laminated Timber) and LVL (Laminated Veneer Lumber). As Stora Enso is the tenant, manufacturing company and forest owner in this project, CSFEP has been able to work with Stora Enso to address challenges and opportunities across the value chain. The ambition for the building and Stora Enso´s HQ is for it to be carbon neutral and a biophilic design landmark. The building will also pursue the highest level of LEED certification and use the WELL standard in its design. The ultimate objective is for the project the help define levers that can scale up wood construction, promote sustainable forest management and convert the growing cities into carbon sinks.

Prefab Homes with Easy Housing, Uganda

Easy Housing aims to spur the development of a Climate Smart Forest Economy (CSFE) in Uganda to scale timber-based affordable housing solutions. Easy Housing has completed successful demonstration projects in Mozambique and Uganda and is looking to further scale its operations in these countries. As they develop the value chain for their operations in Uganda, they will also be looking to ensure the availability of supply of sustainable (FSC) timber for their solution as it scales over the coming years. Currently, Uganda has a housing shortage of about 2.4 million homes, and Easy Housing's solution of prefabricated timber homes has the potential to help address that gap. While the homes are built to be permanent, their method of construction allows for them to be disassembled and reassembled, allowing for additional flexibility and extending the lifecycle of the prefabricated timber panels.

Building a regional CSFE with BuildX, East Africa

In East Africa, we are working to lay the foundations for an East Africa climate-smart forest economy. In this phase, we are working with BuildX (an architecture, engineering, and construction B Corp™) based in Kenya, to unlock the forest economy in Kenya, Tanzania, and Uganda. The opportunity presented by a regional value chain and market through this initiative is very exciting to the program. This initiative enables us to generate learnings on opportunities and challenges for realizing a CSFE in East Africa, a regional approach to value-chain development, the potential for a Climate Smart Forest Economy to support the restoration, and how to change behaviours and attitudes towards mass timber. This initiative is demonstrating the feasibility and activates demand for mass timber to meet construction needs in the region. In addition, we are engaging relevant stakeholders interested in supporting a Climate Smart Forest Economy in East Arica to develop a network that can support growth and help address barriers in the value chain. We are also engaging actors to advocate for necessary investments to support value chain development.

WRI's Value Chain Alliance, Brazil

The World Resources Institute Brazil (WRI Brazil) has now outlined two strategic options for a value chain alliance: (1) Southern region including Paraná and Santa Catarina states focused on the production of exotic pine, all close to the existing plantation and engineered wood operations and housing demand from São Paulo, Rio de Janeiro, and Minas Gerais; (2) São Paulo State, Espírito Santo State, and southern Bahia State, all most suitable for growing native species and having a high consumer demand potential. The latter states have an advanced legal framework to manage native species in restored areas, and a viable timber market for these species can be envisioned (although it will require considerable time). 17 participants in a virtual consultation perceived the formation of an alliance as relevant and worthwhile but were equally divided on choosing a regional priority and on launching a new alliance or linking to an existing forum. A rapid assessment of the literature and interviews with key experts and stakeholders were the foundation for this virtual workshop. The WRI Brasil team is now exploring the best way to produce a final set of more detailed observations for one of the strategic options.

All Enablers and Barriers faced by the Breakthrough Initiatives

A wide variety of enablers and barriers were met by the different Breakthrough Initiatives. Figure 1, below, illustrates all enablers (green circles) and barriers (beige circles) found and discussed through interviewing the BI leads. The different BIs are tagged on the different enablers and barriers; please use the legend for details. The size of each circle is relative to the number of BIs who faced that enabler/barrier. These are then grouped and listed in the table beneath. An interesting observation is that many BIs have enablers in common than they do barriers suggesting that what is needed for success is easier to preempt, whereas challenges are more case specific.

Figure 1: All enablers and barriers
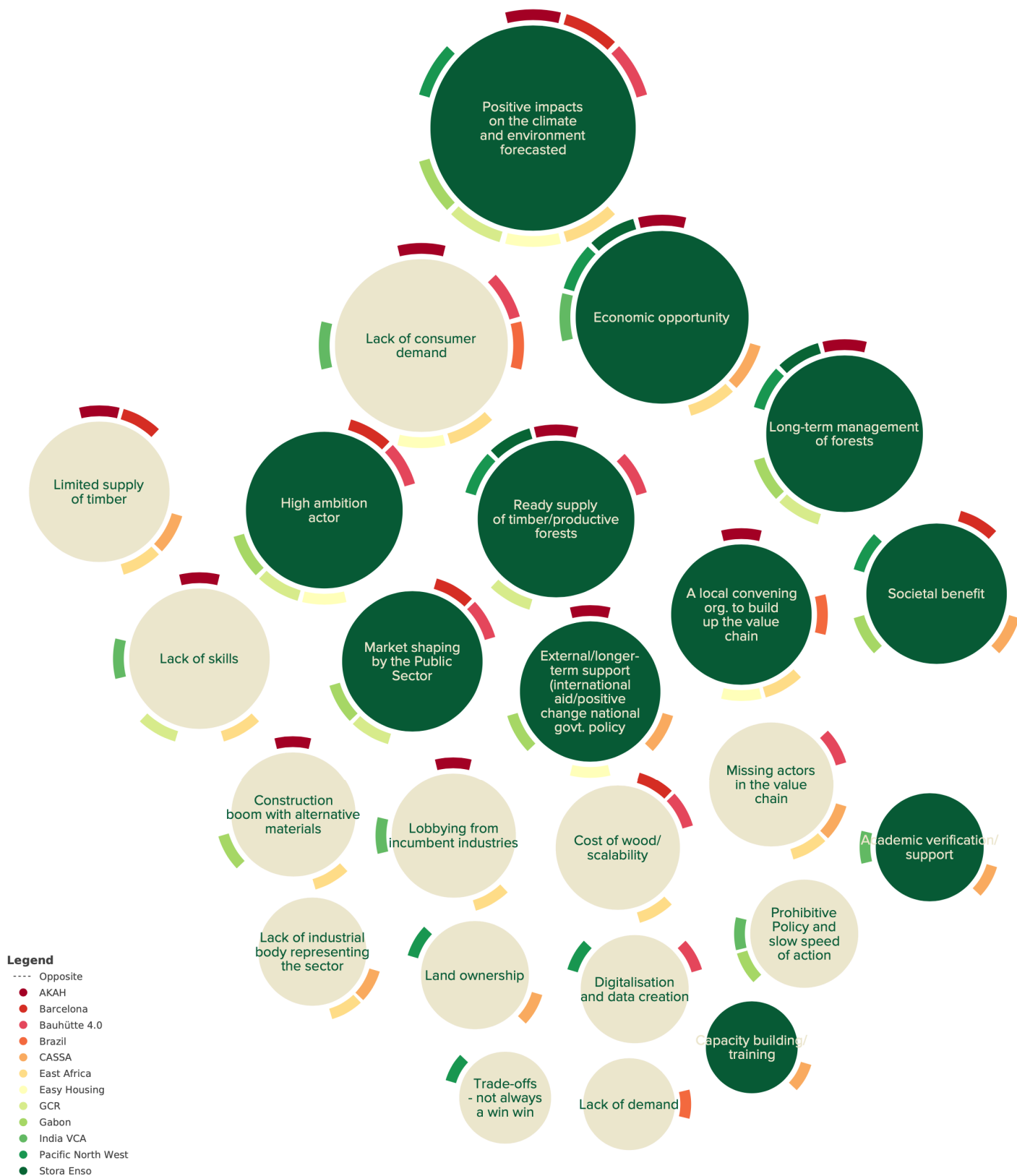
Table 1: Summary of Enablers and Barriers

Category		Impact	Description
Actors	Public sector	Enabler	- Local public sector market shaping via procurement processes, high-ambition strategies - National government market shaping via shifts in policy, procurement, or specifications and standards - External government market shaping via development aid
		Barrier	- Prohibiting policy - Slow speed of action/timelines of change - Contested land ownership
	Private sector	Enabler	- Private investment towards MMC/mass timber processing & manufacturing - Designers and architects showcasing the potential of building with timber
		Barrier	- Lobbying from incumbent industries (e.g., steel, cement, or pulp/paper)
	Other	Enabler	- Actors connecting the value chain, or those promoting innovation and knowledge exchange - Academic validation and advocacy as a legitimizing voice - Presence of local leaders acting as local champions of climate smart forest economies and mass timber
		Barrier	- Missing part/actor of the forest-to-city value chain - Lack of industry body representing the sector
Actions	Community & Consumers	Enabler	- Community involvement in actions
		Barrier	- Consumer preferences not favouring timber in construction
	Market	Enabler	- Evidencing and showcasing demand via identified developments/ pipeline of projects - An organiation can see economic value for themselves (a validated economic opportunity)
		Barrier	- Cost of wood/raw products - Lack of demand - Construction boom incentivising different actions
Resources	Supply of wood	Enabler	- Ample supply of trees and productive forests - Restoration of degraded lands to increase and supplement the supply of trees
		Barrier	- Lack of nurseries, mature forests and other timber supply challenges
	Skills & capabilities	Enabler	- Capacity building on the use of bio-based programs - Implementation of the Just transition mechanism to support the shift towards offsite and other more innovative building systems
		Barrier	- Lack of skills in relation to wood management, processing, architecture and construction across the value chain
	Data & Information	Enabler	- Transparency of the supply chain

	information	Barrier	- Lack of value chain data and analytics
Impacts & outcomes	Socio-economic	Enabler	- Cost effective, affordable and low-income housing - Supporting sustainable local economies (job creation & employment) - Equity along the value chain - Setting up inclusive partnerships with different profiles of forest owners - tribal, small, family, public, community, and other forest dependent communities
		Barrier	- It is not always a win-win scenario (trade-offs)
	Climate & Environment	Enabler	- Lower embodied carbon and reduced climate impact - Long-term sustainable forest management - Tapping into carbon credits market to make buildings more affordable
		Barrier	- Competition for land use between forests, food production and urban development

The Ten Lessons
Learnt

Not all enablers and barriers have been chosen as the 10 lessons learnt, only five of each have been selected. These are pictured below in Figure 2, enablers are again in green, barriers in beige and BIs are tagged. Please use the legend for clarity. These 10 lessons, with the BIs, used to elucidate the points are afterwards discussed.

Figure 2: The 10 lessons: Five Key Enablers and Five Key Barriers:

ENABLERS
1. Having a positive impact on the climate and the environment is an enabler

The Barcelona Social Housing Tower project was procured by the City of Barcelona who wished to promote the importance of low embodied carbon over that of cost. In selecting the winning project, the city applied the following criteria to proposals: architectural innovation (30%), low embodied carbon (30%), speed of assembly (30%) and cost (10%).

In Barcelona, the administration deciding to place more gravitas on low embodied carbon and reduced climate impact than on other more standard considerations such as cost was a key enabler in the creation of the sustainable Barcelona Social Housing Tower. The city's criteria for the building brought in an array of climate-smart and innovative proposals, thereby pushing the envelope amongst architects for lower embodied carbon and bio-based solutions in construction for multifamily social housing. The building itself will also serve as a demonstration piece for mass timber buildings, thereby hopefully seeding future climate-smart and environmentally friendly considered decisions and construction.

Gabon is 1) a leader in increasing legal mandates for the protection and sustainable use of forests, 2) a carbon-negative country, and 3) committed to having halved its Green House Gas emissions by 50% by 2025. Forests are also one of the country's two key resources. With long-term sustainable forest management being a key driver for Gabon and the government looking for forests to be a means of diversification of the economy through 1) carbon credits and 2) building a Mass Timber Value Chain, it is hardly surprising that the Marina Tower, a flagship timber development which acts as a demonstration and a leader for the sector, has been procured by Gabon's sovereign wealth fund.

2. Market shaping by the Public Sector is an enabler

A climate-smart forest economy in the Glasgow City Region has had an enormous step up due to the support and ambition provided by the regional authorities. Glasgow City Region played a key part in spurring the project and has supported it from the off. Secondly and importantly, industry players need to see market security and direction set by the public sector to justify investment into the value chain. In response to this, Glasgow City Region has started work on demonstrating demand and market shaping signals by exploring various measures, namely: Timber First Policies, offsite manufacturing targets, and deconstruction plans. A supportive environment such as this has already helped create a value chain alliance and we expect to see further market responses such as investments in timber processing.

In India, a 28-year-long ban on timber in construction has existed which has only recently been lifted. Regulation has dramatically shifted since. The end of the prohibition on timber usage is an important opening to decarbonise India's construction sector while meeting the growing housing needs through hybrid timber buildings and mass timber technology. The change in national regulation surrounding timber in construction has been foundational in CSFEP creating a value chain alliance for a regional climate smart forest economy. A national government has great market-shaping ability via shifts in policy, procurement, or specifications and standards.

The Barcelona Social Housing Tower, as a demonstration piece, a home for 40 families and a cause of new innovative, climate-smart design in Barcelona and potentially

multiple social housing blocks across Europe was the brain-child of the City of Barcelona. The support and procurement process by the city authorities is central to the success of this BI and to the subsequent market shaping with the municipality giving a clear signal to the market that low embodied carbon and speed of assembly (indication of offsite wood manufacturing) are to be prioritised over other conventional building systems.

3. Economic Opportunity is an enabler

CASSA is creating a market for affordable DIY bamboo housing which will facilitate investment in sustainably managed plantations and address the need for climate-resilient housing across Central America. Climate change and the devastating impacts it is having on people's lives and homes in this vulnerable region are creating a huge need and demand for resilient housing. CASSA with its easy-to-build, scalable, affordable, DYI bamboo housing and the accompanying bamboo plantations have developed a market opportunity which not only supplies this demand but also through the growing bamboo increases local resilience.

Recently Guatemala was hit by Tropical storm Agatha, passing the location of the pilot CASSA home. Unfortunately many residents homes in the area were severely affected, however the pilot bamboo house stood resilient to the storm, and the raised platform it was built on prevented the house from flooding and mudslides, a fate suffered by many in the location. As demonstrated by the strength of the bamboo home compared to others in storm Agatha there is a huge market opportunity. If an organisation can see economic value for itself in pushing for systemic, interconnected and sustainable Timber-to-Frame solutions, the climate-smart forest economy is more likely to progress. CASSA is planning to fundraise 500,000 USD to set up the facility for cross-laminated bamboo, entering a market of mass production of bamboo products, different to the DIY low-cost solution, further accelerating the delivery of bamboo homes.

4. A high-ambition actor is an enabler

The Easy Housing BI demonstrates on three fronts the importance of highly ambitious actors. Firstly, in East Africa, the local market is sceptical of timber in construction. Strong engagement with local governmental actors and having local leaders as champions of mass timber houses have helped change the behaviours and perceptions of local people around the timber. Secondly, engagement with UNHCR provides a good sponsor and launch for the refugee housing programme. Finally, from CSFEP's perspective, working with Easy housing - a strong and curious actor who is keen to learn more about and apply the 3S framework - has helped us strengthen the systemic overview of the sink-storage-substitution interconnectedness.

5. A ready supply of timber/ productive forests is an enabler

The Pacific Northwest's ambition to transform local forestry and the supply chain into a climate-smart forest economy has 3 key enablers in place to assist its mission, these are 1) productive forests, especially in the western part of the Pacific North West; 2) a tradition of trying different models of forest economies and having a more long-term perspective due to indigenous communities being involved, and 3) a history of observing tribal forestry impacts on carbon footprints as well as the embedded carbon benefit of FSC-certified wood in PNW forests.

Stora Enso is in a strong position to make their new Head Quarter out of timber being a vertically integrated forestry company with a large amount of forestry and long history of planting trees for commercial use.

BARRIERS
6. A limited supply of timber/ productive forests is a barrier

In East Africa, the forestry sector is nascent, it is not established for a sustainable timber market. Forest resources and demand are not evenly distributed in the three countries - whilst Uganda has forests, it lacks demand and therefore forestry is historically quite export-facing, and informal and the products are of varying quality. Kenya and Tanzania have expanding urban markets and limited forests and so are the recipients of Ugandan timber. Overall, there is demand for other forest products - for furniture, desks, pulp and paper, but the demand for timber in construction is still low in East Africa. Furthermore, within the forestry sector there is neither integration nor systemic thinking around the best use of timber nor around working with the construction sector.

Organisations such as Komaza are building up local forestry in Kenya, however, growing trees takes time. Local processing of structural timber is also minimal - the nearest CLT plant is in South Africa. The lack of nurseries, local forests, local processing, regulation on timber quality and more generally of a joined-up forestry sector causes timber supply challenges and means the cost of timber/raw products and final products made of wood is often prohibitive.

7. Lobbying from incumbent industries is a barrier

For AKAH, India CSFEP is working in a nascent market where the ban on using timber in construction was removed only in 2019/2020. Given there was no timber construction for the past 30 years there is very little knowledge of building with wood and other industries have a significant presence in India such as the massive cement and steel industries (one of the three biggest steel manufacturers in the world is based in India). Building a sink function for construction and demonstrating timber's environmental and climate benefits will be crucial for 1) introducing sustainably managed timber as a building material in India and 2) approaching the various opposition voices: those of incumbent cement and steel industries and those of the government worried that the use of timber in construction will lead to over-exploitation of forests of which India is very protective of.

8. Missing actors in the value chain is a barrier

Bauhütte 4.0 is working across the forest-to-city value chain in the Berlin-Brandenburg region, looking at using locally sourced trees processed at regional facilities to be turned into approximately ten thousand affordable housing units for Berlin. Whilst Berlin-Brandenburg region has abundant forests able to supply more than enough wood for the construction of the district, there is very little processing and manufacturing happening locally. This gap in local and regional industries able to manufacture a sufficient volume of building products for affordable multi-storey timber housing is the result of, among other reasons, existing market perceptions against timber buildings as not being safe enough. The building industry and developers need to see more market security that demonstrates a need for timber developments at scale, to increase production levels, and lengthen pipelines, thereby attracting new industry actors and closing the gap. Without these missing actors, neither the value chain nor the vision cannot materialise. Importantly, given that key developers on the site will be housing associations providing affordable housing, this proven demand and higher volumes will help expand the supply chain which could drive the cost down of mass timber to compete with steel and concrete.

9. Lack of consumer demand is a barrier

Consumer preference often does not favour timber in construction, either because of aspirational reasons (wood is a poor man's material, so people want to demonstrate their social standing by prioritising more "Western" construction materials such as steel and cement) or because of lack of knowledge and unfamiliarity with structural performances of wood in construction.

In Brazil and India, the demand for timber buildings and the culture of building with wood doesn't exist. To shift this, cultural and behavioural changes would be required for both value chains, as historically there has not been building with wood.

In urban East Africa, we also face reluctance to use timber in construction. Wood is associated with village life. There is also a common perception that timber lacks strength and has a low resistance to environmental hazards such as flooding, termites and fires. The situation has created a local, negative feedback loop. In East Africa, timber is now expensive; associated construction costs are high; the supply chain is fragmented, not formalised and dispersed; skilled timber builders are rare; and regulation is undeveloped. All this directly reduces both timber desirability and the quality of timber buildings. Again, a shift in cultural perceptions and knowledge is required, as well as the need for an improved supply chain.

In Germany, whilst supply is ample - the Brandenburg forests can supply the project with up to 20,000 solid m3 per year for a period of 10 years, consumer demand is absent. In Berlin, the lack of demand is down to the fear of flammability, and the thinking that wood is more exposed to insects and more prone to humidity and decay. Educating people, and making the technical, structural and scientific case for timber multi-storey construction would help overcome this resistance to change.

10. Lack of skills is a barrier

In the Glasgow City Region, there is a lack of skills in wood management across the value chain. The construction sector is already facing severe labour shortages, an ageing and male-dominated workforce, and increased demand. As the sector shifts towards offsite manufacturing the profiles and types of positions needed in construction will also shift. An economic analysis conducted as part of the Breakthrough Initiative confirmed the need to support people and the sector through the forecasted impacts and changes to the labour market. A just transition mechanism is critical for supporting individuals and communities through this shift.

Are you working towards realising the full climate impact of the forest-to-frame value chain?

Find out further information on the Breakthrough Initiatives **here**, and useful resources on the programme and 3S framework **here**.

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