

# CLT VALUE CHAIN DEVELOPMENT IN KENYA



Case Study &  
Lessons Learned

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Cover page :



1. CLT Factory ; Source: Katerra.
2. XLT-Nairobi interior ; Source: Author.
3. XLT-Nairobi ; Source: Author.
4. Tanzanian forests ; Source: Klima.

# EXECUTIVE SUMMARY

Accounting for 42% of global emissions<sup>1</sup>, the construction sector is the largest contributor to climate change. Meanwhile, Africa's population growth and fast urbanisation drives the need for buildings and infrastructure. **Mass timber construction offers the most promising opportunity for eliminating the embodied carbon of buildings** globally, with a number of benefits beyond its potential for climate change mitigation.

This report summarises the Lessons Learned by BuildX and partners regarding **the feasibility of CLT buildings in Kenya**, in their efforts to establish a full mass timber value chain in the East African region.

East Africa's climate is well suited to commercial forests for the production of raw timber, with Pine species being the most adapter for mass timber use. Raw material supply must be planned at a regional level, with forest stocks and primary processing capabilities varying across the region. **Uganda offers the most promising supply option** in the short to mid-term thanks to the implementation of forestry schemes and with a significant portion of its resource base being FSC-certified. Kenya's commercial forestry value chain suffers from a supply deficit due to a lack of investment over the years, but its infrastructure and recent industrial development makes it a viable option for the establishment of local CLT manufacturing near urban centres - where a large part of the demand will be located.

Mass timber is new in Kenya, with a demand in its early days. Pioneering projects are seeing the light of day in Zanzibar, but **costs remain the main hurdle** for mass timber developments. With the development of a local mass timber sector, potentially aided by financial incentives, economies of scale will allow CLT to become competitive with conventional construction materials and to even **enter the affordable housing market** in the long term.

Awareness about mass timber also needs to be increased among built environment professionals, authorities and the general public to **debunk common misconceptions** about the material. Engaging with professional regulatory bodies, builders and Government institutions will support the creation of an enabling environment for wooden buildings, from the implementation of an appropriate legal framework to ensuring the knowledge transfer of the required design and construction skills.

The successful development of a mass timber sector in Kenya will **require a coordinated strategy** between a large number of private and public stakeholders, with complex relationships between them.

1. "Why the Built Environment?" ; <https://architecture2030.org/why-the-built-environment/> ; Visited 19th October 2023.



# INTRODUCTION & CONTEXT

Rising green-house gas emissions and the depletion of natural carbon sinks are changing our climate, risking human life and our planet. Buildings and construction account for 42% of global carbon emissions, making the sector the largest carbon emitter. The portion of emissions due to embodied carbon is also increasing in comparison with operational carbon emissions. Meanwhile, population growth drives the need for buildings and infrastructure. As the world's fastest urbanising region, Africa is a main driver for this demand.

**We need to change the way we design and build.**

Mass timber processing and building offers the most promising opportunity for eliminating the embodied carbon of buildings on a global scale.

Trees naturally sequester carbon from the atmosphere and which remains stored as long as the wood is not disintegrated – when burned or left to decompose. By using wood products to construct buildings we guarantee that carbon is locked away long-term. By building structures with wood we also avoid the high carbon emissions produced by concrete and steel.

**70%**  
of the African built stock expected for 2040 has yet to be built.<sup>2</sup>



Image 1: The 3S (Sink - Store - Substitute) model describes the way in which using wood products in buildings can durably lock carbon away from the atmosphere.

Source: Mongabay ; LEVER Architecture ; T3 Bayside Toronto

2. "2022 Global Status Report for Buildings and Construction" ; UNEP and Global Alliance for Buildings and Construction ; 2022.

“Mass timber”, also known as “engineered timber” is a building system developed in Austria in the 1990s made of solid wood pieces bonded together to create structural elements – walls, slabs, columns, beams – of exceptional performance. The most common type of mass timber is Cross-Laminated Timber (CLT) panels. CLT panels consist of layered timber boards stacked crosswise at 90 degree angles and glued into place which offers high strength and structural stability.

Image 2:  
CLT panels are layered in an uneven number – usually 3, 5 or 7 – to ensure uniform structural performance between the two faces of the panels.

Source: Egoi Wood Group



Continued research and experimentation led to full-scale production in early 2000s in Europe and North-America. As a result of increasing awareness of its advantages over conventional building materials, the technology has since been adopted in several other markets including Australia, Asia, Brazil, Uruguay, South Africa and more recently Tanzania.

**The global CLT market reached a value of 1.26b USD in 2022 and is predicted to achieve a total of 3.72b USD by 2030.<sup>3</sup>**

Image 3:  
XLT-Nairobi is a pioneering mass timber office project designed by BuildX and currently in development, set to be the first large-scale mass timber building in Kenya.

Source: Author



BuildX Studio – a design-and-build company based in Nairobi, Kenya – is pioneering an industry-wide transformation in East-Africa towards net-zero buildings using mass timber. Regional market growth for the Middle-East and Africa is promising. A recent study by the London School of Economics ranks East African countries among the highest potential mass timber markets globally. CLT is slowly entering the region with developments happening in Zanzibar, Tanzania and Kenya.

A coordinated full value chain approach – from forest to manufacturing to building – is required to transform the market and create an enabling environment for wood buildings in East Africa.

3. “Cross Laminated Timber Market Size, Share Global Analysis Report, 2022-2030” ; Polaris Market Research ; 2022.

# COMMON MYTHS ABOUT MASS TIMBER

As a new material in the East African region, mass timber is facing a number of misconceptions around its performances and perception. Here are a list of the most common myths that BuildX encountered when promoting mass timber construction in Kenya.

## Myth no. 1 : Timber is weak

**Timber has one of the best strength-to-weight ratio** and its strength is highest when loaded in the direction parallel to its fibres. In the case of CLT, stacking lamellas cross-wise allows the panels to have high structural resistance in two perpendicular directions. Additionally, mass timber is produced with specifically graded and tested timber products to ensure high structural performance that meet Europe and North-America building regulations requirements.

## Myth no. 2 : Timber buildings are not fire safe

Although timber is combustible, **mass timber behaves very predictably in a fire**. Under a fire, mass timber will char and form an outer coal layer that will suffocate the oxygen of the fire and protect the inner layers to leave them with a predictable structural capacity. The depth of the charring can be accurately calculated by fire engineers and included in the sizing of the structure. Many additional measures can also be taken to safeguard fire safety in a timber building such as limiting the amount of exposed timber and installing sprinkler systems.

## Myth no. 3 : Mass timber buildings have poor acoustics

Because of their light weight, timber structures do not absorb sound or impact vibrations such as footsteps as well as heavy building materials do. This can prove particularly challenging in multi-storey residential buildings. However, **acoustic requirements can be met** by combining appropriate design measures such as acoustic buffers between walls and slabs or dense materials on the floor slabs. The key challenge is to strike the right balance between structural integrity, acoustic performance and circularity – so that materials can be separated and reused at the end of life of the building. In any case, involving an experienced acoustic engineer is essential, especially for multi-storey residential buildings.



#### Myth no. 4 : Building with timber increases deforestation

**80% of global deforestation is driven by agriculture and mining**

for construction materials such as cement. Promoting the use of wood products sourced from sustainably managed and certified forests helps providing land owners with a business case for commercial forestry rather than clear-cutting for other uses. Europe's forest area has increased significantly over the past 30 years as a result of increased sustainable forest management, encouraged by the demand for sustainable timber from the construction industry. Although Uganda has a number of FSC-certified commercial forests, their amount and area needs to grow in the region to meet the demand of a local CLT sector.

#### Myth no. 5 : Mass timber is a new technology with no existing knowledge in the region

**Wood is one of the most ancient building materials** and old timber structures can be found everywhere in the world. Even though mass timber is new in Kenya and setting up the first CLT factory will require an experienced operator to train the local team, the construction process is fairly simple. The assembly system with metal plates and screws or nails and the precision required for the prefabricated elements borrow a lot of skills from the construction of steel structures, which exist in Kenya. Initial mass timber projects will also need to integrate an element of knowledge transfer from international experts to local designers and builders.

#### Myth no. 6 : Mass timber will always be more expensive than other materials

**A timber building can become competitive** in price when an experienced building team focuses on timber from the outset and utilises the unique properties of mass timber fully in the design and construction process. When looking at material costs alone, mass timber projects in Kenya are 45% more expensive mostly due to the added costs of importation. The additional material cost can be compensated with a more holistic life-cycle costing approach taking into account CLT's lightweight, industrialized production, its future value (during off-take and at the building's end-of-life), health benefits, and true pricing – including loan repayment and green financing. Prices are expected to decrease further, due to economies of scale as production factories continue to grow and multiply in the East African region.

# WHY MASS TIMBER ?

Mass timber buildings are popping up all over the world with increasing demand and interest due to their significant environmental and human wellbeing benefits, faster construction and cost competitiveness.

**Using mass timber for 90% of new housing urban buildings could save 106bn tons of CO<sub>2</sub> by 2100, equivalent to the past 20 years of USA carbon emissions.<sup>4</sup>**

According to a recent study carried out by Arup<sup>5</sup>, in the Kenyan capital Nairobi alone using timber for mid-rise residential construction could save up to 40% of the embodied carbon compared to traditional construction materials. This would represent a total saving of embodied carbon by 2040 of 2,97M tCO<sub>2</sub>e - equivalent to 645,650 cars taken off the road for a year.

Mass timber is superior to concrete and steel, offering better structural performance and benefits for both people and the planet.

## Lower Carbon Footprint

Concrete and steel alone account for around 14.7% of total global carbon emissions. Mass timber is not only net carbon negative but also a direct structural substitute.

Image 4:  
A large CLT slab is being hoisted in position by a crane for the construction of the Brock Commons Tallwood House in Vancouver (Canada).

Source :  
Naturally Wood



## Stronger

A Portland experiment found that engineered timber is 14.5% stronger than steel. Pound-for-pound, mass timber is stronger than both reinforced concrete and steel, making it an ideal building material.

## Lighter

Timber is 80% lighter in volume which means smaller structural members, reduced transport costs and overall cost efficiencies.

4. "Land use change and carbon emissions of a transformation to timber cities" ; Mishra, A., Humpenöder, F., Churkina, G. et al. ; 2022.

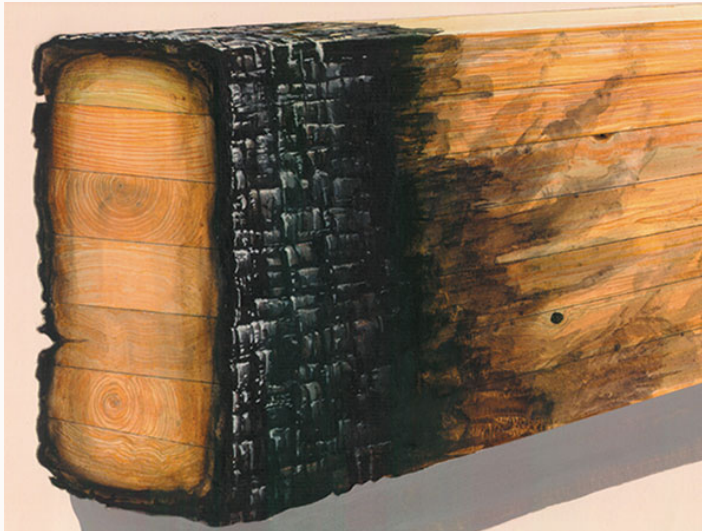
5. "East Africa Sustainable Timber Construction, Supply and demand study" ; Arup ; 2023.

## Faster

Thanks to prefabrication, mass timber building projects can be between 20% - 70% faster to build, making this type of construction more attractive for investors and developers alike.

Image 5:  
Structural and fire engineers collaborate on mass timber project to calculate the thickness of the charring layer to be expected in case of a fire. This layer is then accounted for in the sizing of the structure.

Source: UBU



## Better with fire

Contrary to assumptions, mass timber is safer and behaves more predictably than concrete or steel when exposed to fire. Thanks to its massive size, CLT or Glulam structures do not catch fire easily.

In the event that a mass timber piece burns, the charring of the outer layers suffocates the fire and prevents it from spreading to the inner layers, enabling it to maintain structural integrity.

Image 6:  
The St Jerome's Children Centre in Nakuru, designed by Orkidstudio is built with recycled timber.

Source: Author



## Thermal Efficiency

Concrete is 15 times less efficient at thermal insulation than wood, and steel is 400 times less efficient. This results in a better indoor environment without the need of further insulation or mechanised heating and cooling systems.

## Health Benefits

Timber improves indoor air quality by regulating humidity levels. Studies also show that interiors with natural materials such as wood reduce users' blood pressure and stress levels and improve their optimism and ability to concentrate.



## Lessons learned: A new way of designing and building

The use of the right materials in the right places of a building must be emphasised. Concrete and/or steel are still required within mass timber buildings for elements such as foundations, cement screed on top of CLT slabs for fire protection and acoustic insulation, exterior cladding, etc.). Hybrid structures also serve to create confidence with developers, authorities and the general public on the viability of mass timber buildings before full mass timber structures are possible. Drawing on the existing knowledge and building skills for prefabricated concrete and steel structures will support a faster development of a mass timber sector in conjunction with the existing industries rather than in opposition to it.

Understanding how to optimally design buildings with timber as opposed to adopting old principles from the use of concrete is also key. The race to the tallest building is a mentality that could fit well concrete and steel buildings whilst mass timber doesn't respond to the same logic. Being a light material, mass timber buildings work better from an efficient resource use perspective in low-to-mid rise structures. In high-rise mass timber buildings, there is a need for introducing other high carbon products to add mass to the structure to counter horizontal forces from wind or seismic loads. The sizes of timber structural members will also be significantly higher which reduces the efficiency of the interior spaces especially in commercial buildings. At such heights, other specialised hardwood or veneer timber products may become required for the structure, which come at a premium and present other environmental risks in the region such as increased deforestation and intensive eucalyptus plantation.

Mass timber building is quick, clean, and easy, making it the basis for safe and healthy cities made of exceptionally designed and responsibly constructed buildings. The Dalston Works building in London - offering 121 affordable homes along with 3,500m<sup>2</sup> of commercial space - was completed in a total of 130 weeks, with the timber assembly taking 52 weeks and the total number of deliveries during construction reduced by 80%.

Image 7:  
Dalston Works  
was the world's  
largest CLT  
building upon  
completion  
in 2017. The  
rapid pace of  
construction  
of the project  
allowed to  
reduce costs  
of utilities and  
labour while  
providing a safe  
and healthy site.

Source: Waugh  
Thistleton



With a rapidly growing population, East Africa faces a significant challenge to provide dignified and affordable housing, and other buildings and infrastructure to meet the needs of its society. Kenya alone has an existing residential housing deficit of around 2 million homes which is predicted to grow to 9 million homes over the next 20 years based on the current rate to develop new housing supply. Mass timber's speed of construction offers an unparalleled opportunity to build fast enough to meet this growing demand.

### Local CLT production must be established before full cost benefits can be achieved in East Africa.

With widespread industry buy-in and locally-made products, a mass timber building market realised at scale can deliver lower overall building development costs and help bridge the gap in the affordable housing deficit.

### Lessons learned: Economic and social impacts

The creation of a new high-volume and high-value market demand pull for mass timber could unlock significant new investment, job creation and livelihoods in the forestry and wood processing sector.

	 Roundwood production (m³)	 Job creation	 Value creation (USD)	 Total carbon benefits (tCO <sub>2</sub> e)
2025 - 2035	<b>+ 321,000</b>	<b>7,861</b>	<b>+ 136.7 M</b>	<b>1.7 M</b>
2035 +	<b>6,772,000</b>	<b>161,966</b>	<b>+ 2,882 M</b>	<b>35.7 M</b>

Environmental benefits of mass timber should be interwoven with the social and economic benefits as it serves to also address the needs of the low income communities within urban and rural areas. The high value utilisation of forest products within the urban areas where there is rapid population growth and demand for new buildings will sustain the livelihoods of plantation forests and timber primary processing workers which are mostly located in rural areas.

The narrative of a growing African population, rapid urbanisation and high poverty levels as leading contributors to a rise in deforestation needs to be treated with caution. The growing population that drives the demand for new buildings could allow for an even faster growth of sustainable forestry cover which in turn would reduce deforestation and improve economic livelihoods. Community led reforestation programmes coupled with robust policy enforcement on the utilisation of forestry products would allow for this sustainable growth to occur.

# SUPPLY

Pine, a fast-growing softwood, is the most commonly available timber species in the region that is well suited for mass timber production. Not all pine trees and plantations can meet the required criteria, as wood boards must be of a suitable size and consistent quality to be used for mass timber. The sourcing of timber must be done from sustainably managed forests, to guarantee the positive environmental impact of mass timber construction. CLT manufacturers can rely on certifications such as the Forest Stewardship Council (FSC) - which rewards responsible forestry - or they can confirm the sustainable practices of foresters independently.

Raw material supply must be planned at a regional level, with forest stocks and primary processing capabilities varying across East Africa. Although Tanzania has the largest area of timber plantation and associated volume of timber supply in the region, Uganda offers the most promising supply option in the short to mid-term. This is due to successful forestry schemes implemented over the years, a larger volume of high-quality Ugandan pine saw logs is expected to come onto the market in the next 10 years compared to other regional supply markets. Additionally, a significant area of Uganda's resource base is FSC-certified, ensuring sustainable forest management.

Kenya's commercial forestry value chains currently have supply deficits due to increasing demand and limited new investment in plantation development. Initial wood supply for mass timber production and construction in Kenya will primarily come from Uganda or Tanzania. However, there is a need to catalyse a growing sustainable forestry sector in Kenya alongside key forestry partners.<sup>6</sup>

## Lessons learned: Sustainable commercial forestry

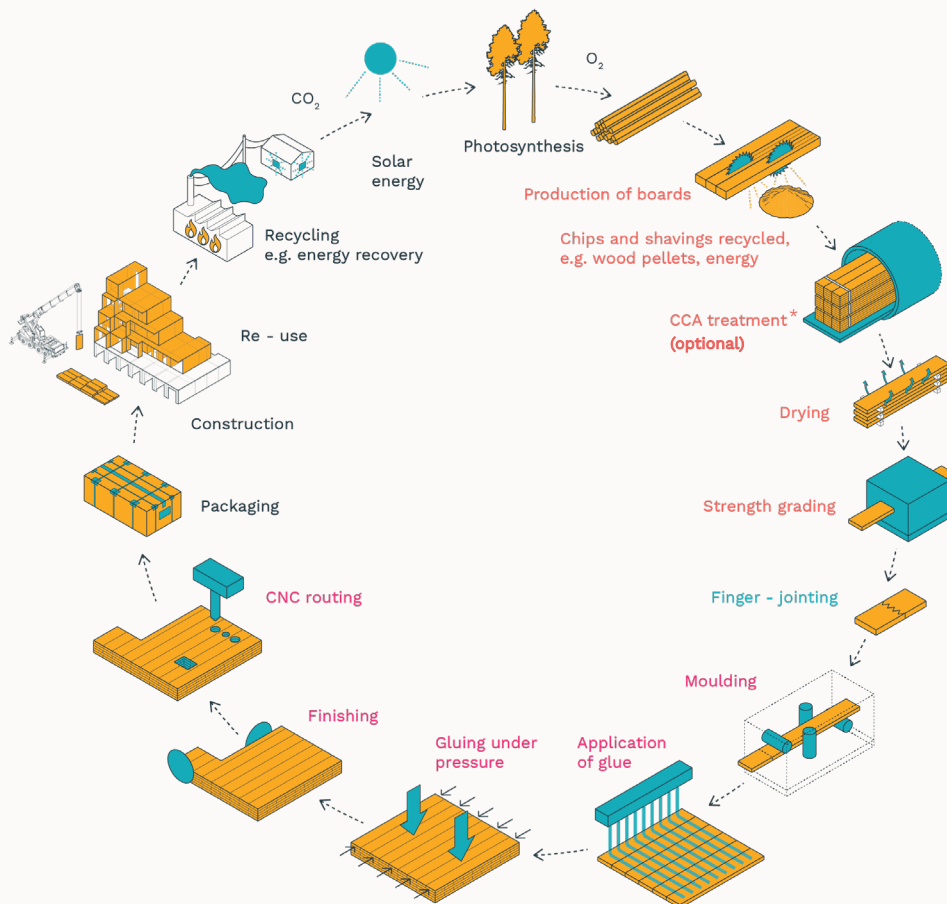
Kenya's plantation forestry supply is critical in meeting the projected future demand of mass timber buildings. Efforts geared towards lifting of the logging ban and establishing a regulatory framework for the utilisation of plantation forests will unlock investments which will help improve the forestry supply.

The environmental crisis has long been based on deforestation and not carbon footprints, which in East Africa has led to the vilification of cutting down trees and commercial forestry. However, there should be increased awareness of the importance of sustainable plantation forests and silviculture as well as the distinction with natural forests. Sustainable forestry helps reduce reliance on natural forests, sequester even more carbon, improve rural economies and create a sustainable manufacturing industry for forest products.

6. "East Africa Sustainable Timber Construction, Supply and demand study" ; Arup ; 2023.

Mass timber is a highly industrialised product and requires a complex manufacturing process from the tree logs to building components.

Primary processing (cutting, treating, kiln drying and grading) is more efficient if handled at or near the forest resource. Where technical capability is lacking, the processing can be moved to the CLT factory.



Currently, finger-jointing capacity is limited in East Africa, although considered easy to establish and so shouldn't be a bottleneck in setting up mass timber production. Ugandan forestry firms as well as Komaza in Kenya are exploring finger jointing capabilities, which otherwise would need to be handled at the CLT processing factory.

The manufacturing process for CLT is entirely new to the region and requires a bespoke technical setup. Since CLT panels are large, production factories should be as close to the demand, in large urban centres.

Image 8: Mass timber's circular life cycle (from production to end-of-life) optimises the use of resources.

\* CCA treatment is very corrosive for machining tools, produces toxic micro-particles of sawdust and gives a green colour to the wood. Alternatively, CLT panels can be treated with boron-based products after CNC routing.

Source : Author

## Lessons learned: Local manufacturing capacity

Establishing mass timber manufacturing requires adequate and quality primary processing facilities (saw mills, kiln drying and finger jointing) which are currently in their infancy in East Africa. The high cost of capital investment into a mass timber production facility requires an assured demand for the timber products that can keep the factory busy for at least 1-2 years. Manufacturing partners are getting more interested in the region but are sceptical about the quality of timber from saw mills and a sustained demand. As such, investments in both primary processing and a number of demonstration projects is key in unlocking investments into manufacturing facilities.



# DEMAND

Given it is a new product, awareness of and demand for mass timber is currently low in East Africa, and cost will be one of the key factors in overcoming distrust of this new technology. Due to the lack of local manufacturing capacity at the moment, initial mass timber demonstration buildings rely on imported materials, and the absence of economies of scale increases the construction costs for a hybrid mass timber building by around 45% compared to conventional construction materials.

In a scenario where existing forests are sustainably managed with additional forests expanded and local mass timber factories have been set up, the overall construction cost for a fully or hybrid timber building will remain +17% and +7% higher than traditional construction in the short to mid-term.<sup>7</sup> To be competitive with conventional materials as it goes through market growth, mass timber construction will need to benefit from financial incentives such as tax exemptions, access to carbon markets and green funding, and facilitated applications for carbon credits.

Currently there is no global standard for carbon offsetting when substituting materials in the construction and building industry.<sup>8</sup> While the current market average price for a ton of CO<sub>2</sub>e stands at 5 to 15 USD, its selling price should be considerably higher in order to compensate for the added expense of using mass timber in the current East African context. However, the voluntary carbon market remains an avenue that can be explored to generate additional finance when substituting mass timber for traditional building materials. With the development of a local mass timber sector, the cost difference with conventional construction materials will reduce, thus making carbon credits a more viable financial option for mass timber projects.

Image 9:  
MODUL  
(MOdel for  
Decarbonised  
Urban Living) is  
a flat-pack CLT  
urban housing  
concept with  
options for  
affordable and  
middle-income  
developments.

Source : Author



7. "East Africa Sustainable Timber Construction, Supply and demand study" ; Arup ; 2023.

8. "East Africa Sustainable Timber Construction, 3S Assessment & Carbon Markets" ; Arup for CSFEP ; 2023.

## Lessons learned: Holistic cost benefits of mass timber

The cost comparison of mass timber buildings with traditional construction methods – steel and concrete – should consider factors beyond the capital expenditure incurred by the project.

Building with mass timber saves on construction time which equates to reduced construction preliminaries and on-site labour, a faster return on investment and reduces the costs of capital as loans can be repaid sooner with less interests. The carbon stored in the building also presents opportunities for obtaining carbon credits and the higher sustainability of the building can make it eligible for climate funding and higher levels of green building certification which will in turn benefit the marketing of the project and increase its attractiveness.

The performance of timber as a good insulating material ensures an indoor comfortable environment without needing mechanical air heating or cooling, thus reducing operational costs and emissions. Timber surfaces can be left exposed hence there is no need for additional finishes. Finally, mass timber buildings can improve the productivity of occupants and its effects on the profits and financial bottom line of companies can be significant.

Besides costs, building insurance and fire risk are often cited as barriers to the uptake of mass timber.

For the technology to be used as a structural building material (especially in a high-rise building), the project will require the adoption of a fire engineered performance-based approach. The design team must ensure that the structural integrity of the building can be maintained during and after a fire event, through the use of protection systems such as sprinklers and adequate sizing of the structural members to account for a charring layer. The collaboration of the project team with local fire brigades is also an essential aspect of the building fire safety design so that the project safety strategy aligns with locally available means of fire-fighting.

As much as the installation of a sprinkler system in a mass timber building currently has an impact on costs compared to traditional construction, the Kenya National Building Code 2022 - which is pending approval by Parliament - will require mandatory sprinkler systems in large a number of buildings, including public buildings and tall structures - over 30 metres height.

Insurance companies are open to new technologies and encourage more and more projects with high sustainability credentials, making mass timber buildings an attractive option for them. Due to the novelty of the technology in the region, insurers are however likely to require additional design documentation.



A close collaboration between the project team and building insurers can allow the latter to better understand the associated risks and opportunities of mass timber for the building's Estimated Maximum Loss (EML).

**Fire, water and moisture infiltration, termites and seismic activity are the main risks to be mitigated for a mass timber structure in East Africa.**

Initial consultations suggest building insurance premiums will be about three to four times higher when using mass timber as a structural material. By showing that the appropriate protection measures have been put in place and by highlighting the ease and lower cost of repairs of a mass timber structure compared to concrete or steel, developers will increase the confidence of insurers in the viability of mass timber construction and will be able to reduce their insurance premiums.

**Lessons learned: Material perception and behaviour change**

Low tech applications of timber are still relevant in the journey towards high tech engineered timber structural solutions. As much as the goal is to build a scaled-up mass timber sector, the use of regular sawn timber is not widespread enough to make the transition seamless. The normalisation of the use of timber starts with having the material visible in some of its already existing applications such as trusses, windows, doors, interior partitions etc. A further combination of mass timber and sawn timber stud partition walls serves to improve the cost efficiency of projects.

The growth in the demand for green buildings is key in driving the demand for the use of mass timber. Green Buildings are a growing market, with an investment opportunity estimated at 768 billion USD by 2030 for Sub-Saharan Africa.<sup>9</sup> Financial institutions are providing loans and bonds to support green construction, often tied to the use of IFC EDGE as a framework, presenting a key opportunity to influence material choice. Ideally, this would be backed up through a national carbon taxation mechanism and integration of emissions targets into Government strategies. Since much of the attention has been given to operational carbon as a measure of sustainability, an emphasis on mass timber's ability to significantly lower the embodied carbon of buildings is important.

Getting government buy-in to influence policy changes that allow the adoption of mass timber in public buildings and projects will also be key as it would result in an even bigger demand for the material. For example, the French government now requires all new public buildings to contain at least 50% wood and 20% of new homes built in Amsterdam must be built of timber or bio-based materials from 2025.

# ENABLING ENVIRONMENT

As expected with any new construction material, awareness of mass timber in Kenya is currently low among the public, developers, authorities and construction industry generally. Whilst universities teach building materials, generally timber is not covered specifically and mass timber projects in the region have relied on international expertise for both structural and fire design. Partnerships with experienced teams must be combined with a knowledge transfer program to local professionals and regulatory bodies such as the Architectural Association of Kenya (AAK) and the Engineers Board of Kenya (EBK).

The significant pool of Kenyan carpenters also needs up-skilling for structural use of sawn timber and even more for mass timber which requires specialist skills and tools for fabrication and assembly. BuildX partnered with its sister company Buildher for the assembly of a CLT prototype, training at the same time a first crew of women carpenters in mass timber assembly.

Image 10:  
A team of five Buildher workers assembled the CLT structure prototype in a total of 20 hours.

Image 11:  
The prototype is clad with charred timber boards to protect the CLT from water and moisture.

Source: Author



In an effort to build cooperation between stakeholders across the value chain of mass timber, BuildX have also led the establishment of a number of initiatives.

Following the exhibition of an “African Pavilion” at the 2023 International Mass Timber Conference, a group of organisations from across the continent have created together the Mass Timber Africa Group. This alliance gathers a number

of companies specialised in sustainable commercial forestry, mass timber production, mass timber design and real estate development in African countries. With the support of the Climate Smart Forest Economy Program (CSFEP), the group will coordinate advocacy actions around the establishment and full development of mass timber sectors in various African regions, including East Africa.

### Lessons learned: Knowledge transfer

Debunking a number of misconceptions and doubts around timber in buildings among developers, designers, builders and the general public must be a first step in creating awareness about mass timber. The main concerns usually raised are around fire resistance and the safety of timber buildings, the perception of commercial forestry as a contributor to deforestation and the perception of wood as a non-aspirational and 'poor' material compared to steel or concrete.

Outreach to built environment professionals through various professional bodies - Architectural Association of Kenya, Engineers Board of Kenya, Town and County Planners Association of Kenya - is key in spreading the confidence of mass timber as a viable construction material. As other architects, engineers and other professionals become aware of the potential of mass timber construction for future developments in Kenya, they can in turn act as agents of change and further spread information to other professional groups.

The development and construction of high-end commercial demonstration buildings will also promote the use of timber as a noble material and encourage its adoption by developers as the local capacity for production, design and construction increases.

The enabling regulatory environment for the use of sustainable timber in construction is also underdeveloped with gaps across governance, policy, incentives and regulation. Whilst the Kenya Forestry Service and Kenya Timber Manufacturers Association represent growers and manufacturers respectively, there is no industry body dedicated to the use of sustainable timber in construction. Establishing such a body would provide a focal point for driving initiatives across this area. The Tanzania National Timber Sector Development Framework is a key reference and developing a similar framework for Kenya could be a priority action for such a body.<sup>10</sup>

**At the time of writing, the Kenya National Building Code 2022 is still to be approved by the Parliament.**

If approved it would support timber design by referring to the Eurocode suite.

10. "East Africa Sustainable Timber Construction, Supply and demand study"; Arup ; 2023.



Until then, however there is no applicable code for mass timber in Kenya. Once approved the next step would be the authoring of a Eurocode National Annexe for Kenya for design and construction with structural timber.

### Lessons learned: Public and private stakeholders engagement

The adoption of mass timber in Kenya will have economic, social and political impacts on multiple sectors, including commercial forestry, manufacture and industry, technological innovation, urban planning, construction and affordable housing. Stakeholders from both private and public environments pertaining to all sectors must be involved in the sustainable and holistic development of a full value chain.

When developing demonstration projects, engaging early in the design process with planning authorities and other relevant government agencies is key. Until the current regulatory gap for mass timber design and construction is solved, getting formal approval from County Planning authorities needs to be obtained on a case-by-case basis.

Alternatively, developing mass timber buildings in Special Economic Zones (SEZ) such as Tatu City or Konza Technopolis, with simplified approval procedures and special tax incentives for innovative projects can prove to be a viable strategy for the first proof of concept projects.



Image 12: Nairobi County Planning Office representatives visited the CLT prototype at the BuildX office.



Image 13: Members of the Architectural Association of Kenya (AAK) came in June 2023 to learn more about designing with mass timber.

Source: Author

# WHAT'S NEXT ?

Thanks to intense advocacy work and projects carried out by a number of organisations, the business case for mass timber in Kenya now appears promising and the establishment of a local industry becomes more and more viable. Looking ahead, some key gaps remain, where added support and focus can significantly boost the development of a mass timber sector in Kenya and East-Africa.

Image 14:  
The Kenya Bureau of Standards (KEBS) approval process is well defined however testing is likely to have to be undertaken in South Africa (or outside of Kenya) due to a lack of appropriate equipment for structural timber testing.

Source:  
Advances in Engineering



## Material Testing

Once manufactured locally, CLT and Glulam products will need to be tested including for structural and fire resistance in order to meet Kenya Bureau of Standards requirements.

## Behaviour Change

BuildX, alongside other key partners, is following a behaviour change approach listening to key stakeholders and understanding the barriers which affect current behaviour and motivators which can change them in the ways we need. Going forward, behaviour change experts will be necessary to carry out deeper research and strengthen advocacy strategies.

## Carbon & LCA Analyses

Calculating the carbon life cycle of CLT is a complex exercise which varies by geographic location and is greatly impacted by the bio-geophysical energy, material, and information of the specific forest source. Intelligent data will need to be collected to ensure the positive impact of upcoming initiatives and to optimise projects for maximum climate-positive impact. Verifying emission reductions and carbon offsets associated with CLT could open up future financing options, in addition to general climate finance.

Image 15:  
Capacity building  
and technical  
assistance may  
be required  
around  
processing and  
related skills  
training (e.g.  
manufacturing,  
handling of CLT  
panels, etc.)

Source: Katerra



## CLT Factory Operator

An experienced CLT – or other engineered timber – manufacturing operator will be required to manage the implementation of a CLT factory in Kenya. Local forestry and architectural partners can support in the early-stage planning and to create a viable business case for raw material supply and demand of CLT in construction.

## Public Sector & Policy

Ensuring Government and institutional support and buy-in is the major barrier we need to unlock in order to implement and scale this initiative. Support from skilled public sector and policy advocacy partners, as well as globally-renowned experts in demonstration projects will be required to garner this critical support and help foster an enabling environment going forward. Additional advocacy at a regional and international level will also be valuable in scaling up CLT beyond Kenya and even in opening up export markets for CLT.

	Short term	Medium term	Long term
Enabling environment	<ul style="list-style-type: none"> <li>Industry body dedicated to advancing the use of sustainable timber in the construction industry is established.</li> <li>Kenya logging moratorium lifted for sustainably managed forests.</li> <li>National Timber Sector Development framework is authored and implemented.</li> <li>National Building Code 2020 to be approved.</li> </ul>	<ul style="list-style-type: none"> <li>EDGE certification is championed by government and applied to increasing proportion of the industry with target levels increased over time.</li> <li>Uganda SPGS is replicated across the region.</li> <li>Eurocode National Annex for Kenya authored for design and construction of timber and MET.</li> <li>KEBS develops MET testing standards.</li> <li>Kenya develops a carbon taxation mechanism, with a forward pricing corridor tied to the Paris agreement.</li> </ul>	<ul style="list-style-type: none"> <li>Import duties are set to encourage regional trade.</li> <li>Ministries develop decarbonisation plans for commercial, industrial, residential construction sectors.</li> </ul>
Supply	<ul style="list-style-type: none"> <li>Timber manufacturers invest in MET and kilns in particular.</li> <li>Existing plantations are managed sustainably.</li> </ul>	<ul style="list-style-type: none"> <li>Quality increases through improved forest management practices.</li> <li>FSC certification increases, as does practice of grading.</li> </ul>	
Demand	<ul style="list-style-type: none"> <li>Landmark showcase projects are completed.</li> <li>Industry awareness campaign initiated, focussing initially on link to EDGE.</li> </ul>	<ul style="list-style-type: none"> <li>Kenya specific courses developed for design professionals.</li> <li>Local university/educational institution to incorporate a timber design course within its curriculum.</li> <li>Mechanism to be put in place that allows lessons learnt from first timber/MET projects to be shared throughout the industry.</li> <li>An awareness campaign is established to champion benefits of timber construction linked to sustainability, EDGE, fire safety.</li> </ul>	<ul style="list-style-type: none"> <li>Local engineering firms to develop capacity in performance based fire engineering.</li> <li>National Building Code subsequently updated to include carbon emissions targets.</li> </ul>

Image 16: Arup developed a prioritised action plan with short, medium and long term actions towards a local sustainable timber construction sector.

Source: “East Africa Sustainable Timber Construction, Supply and demand study” ; Arup.



## Lessons learned: Public and private stakeholders engagement

The development of a mass timber production and construction sector in Kenya requires no less than a complete transformation of the current real estate and industrial landscape of the country. A large number of stakeholders are involved in the ownership of particular actions, with complex relationships between them.

The success of this vision will require a coordinated short, mid and long term strategy between all stakeholders. In this context, having a public coordinating and supporting body - such as Vision 2030 - able to foster the individual actions of private actors and to bridge the gap with public institutions could spur the growth of the overall value chain.

Additionally, large-scale political events such as the African Climate Summit brings climate change mitigation at the heart of conversations with governments and political organisations. Promoting mass timber projects in such forums broadens the reach of advocacy efforts beyond the borders of Kenya and East-Africa.

Image 17:  
BuildX's CEO  
and co-founder  
James Mitchell  
presented XLT,  
a mass timber  
demonstration  
project during  
the Africa  
Climate Week  
in September  
2023.

Source: Author



# FOR MORE INFORMATION

You can find more information about mass timber and the initiatives happening in Kenya around mass timber in the links below.

- ✕ **BuildX-LT Initiative website**
- ✕ **BuildX-LT – Strategy Deck**
- ✕ **BuildX-LT – Advocacy Deck**
- ✕ **BuildX CLT Prototype Introduction video**
- ✕ **Mass Timber Africa Group website**
- ✕ **Climate Smart Forest Economy Program (CSFEP) website**
- ✕ **Arup report “East Africa Sustainable Timber Construction, Supply and Demand Study”**
- ✕ **Built by Nature - “Discussing Timber Myths : a dialogue between our ambitions and the facts”**

# THANK YOU

**James Mitchell**

CEO & Co-Founder

[james@buildxstudio.com](mailto:james@buildxstudio.com)

**Maryem Sadek**

Mass Timber Initiative Manager,  
Report Author

[maryem@buildxstudio.com](mailto:maryem@buildxstudio.com)

