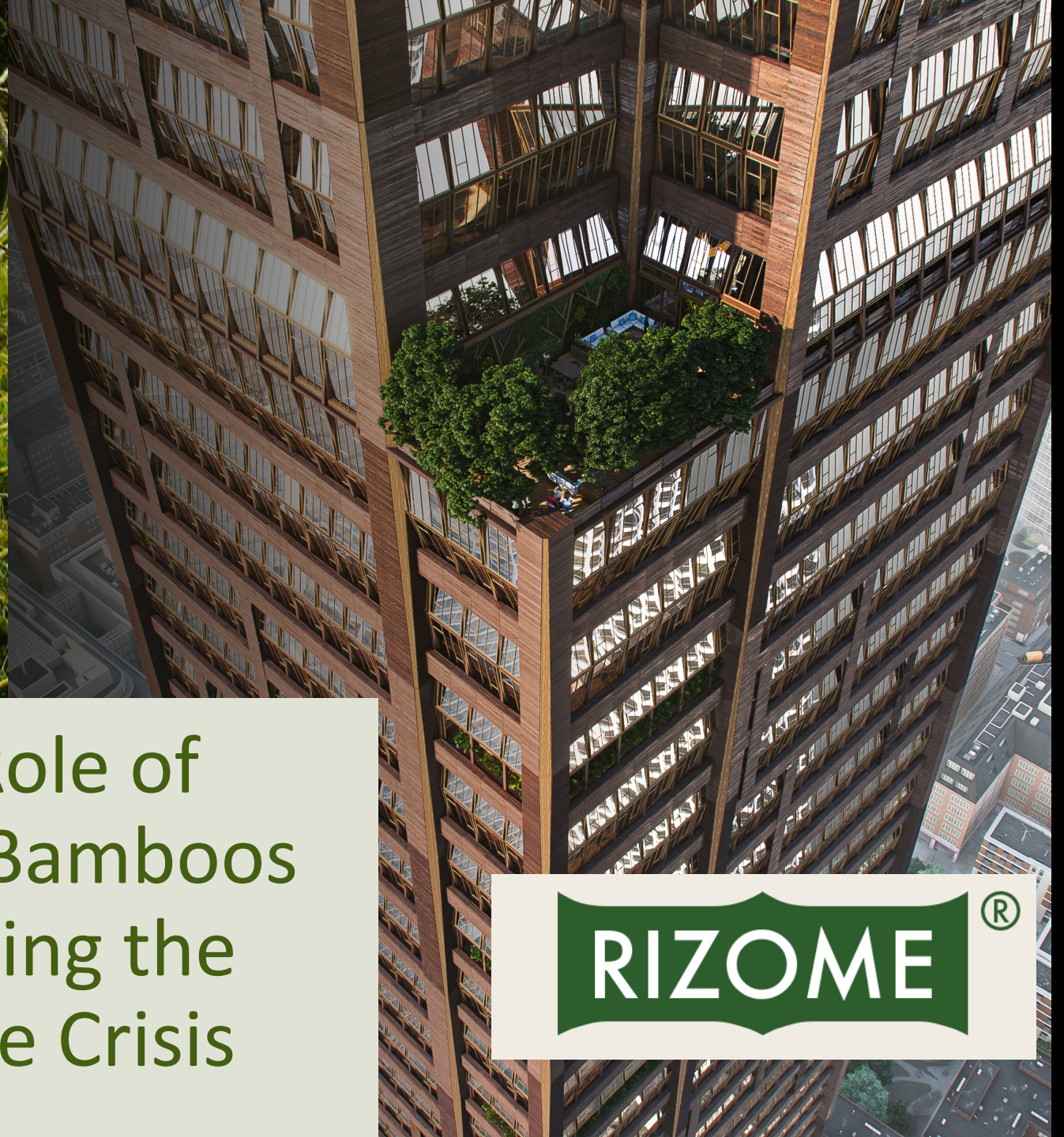


# The Role of Timber Bamboos in Solving the Climate Crisis

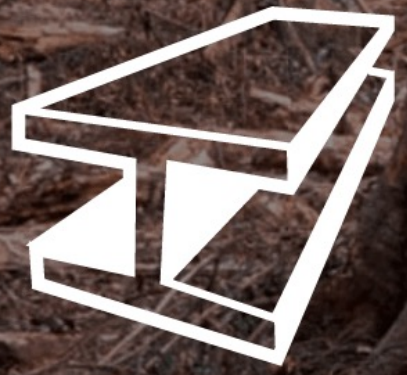
BAMBOO LIVING

RIZOME®


# The Climate Crisis has Arrived

# Global Construction is an Ecological Disaster

*that feeds the Climate Crisis*



**Concrete and Steel**

**17% of Global CO2 Emissions**

**Wood**

**18 million Acres/Year Deforestation**

# The Timber Bamboo Climate Solution

## Create Affordable Building Products With High Demand That Simultaneously Solve Five Linked Major Problems:

Square Footage Of Buildings On Earth Will Double By 2060

Massive Deforestation Driven By The Use Of Wood and The Expansion Of Agriculture

Huge Climate Impact Of Steel And Concrete Usage

Loss Of Soil Carbon Due To Deforestation And Agriculture

Need For Massive Carbon Removal With Durable Lockup to Reduce Atmospheric $CO_2$ To Safe Levels

# WHY TIMBER BAMBOOS?

FASTEST GROWING WOODY PLANTS ON EARTH
10X FASTER GROWTH THAN TREES

HARVESTING DOES NOT KILL THE PLANTS

BAMBOO PLANT CAN LIVE 60-120 YEARS
20-33% OF BAMBOO CULMS HARVESTED EVERY YEAR

NONINVASIVE CLUMPING BAMBOOS
CAN BE PART OF DIVERSE ECOSYSTEMS

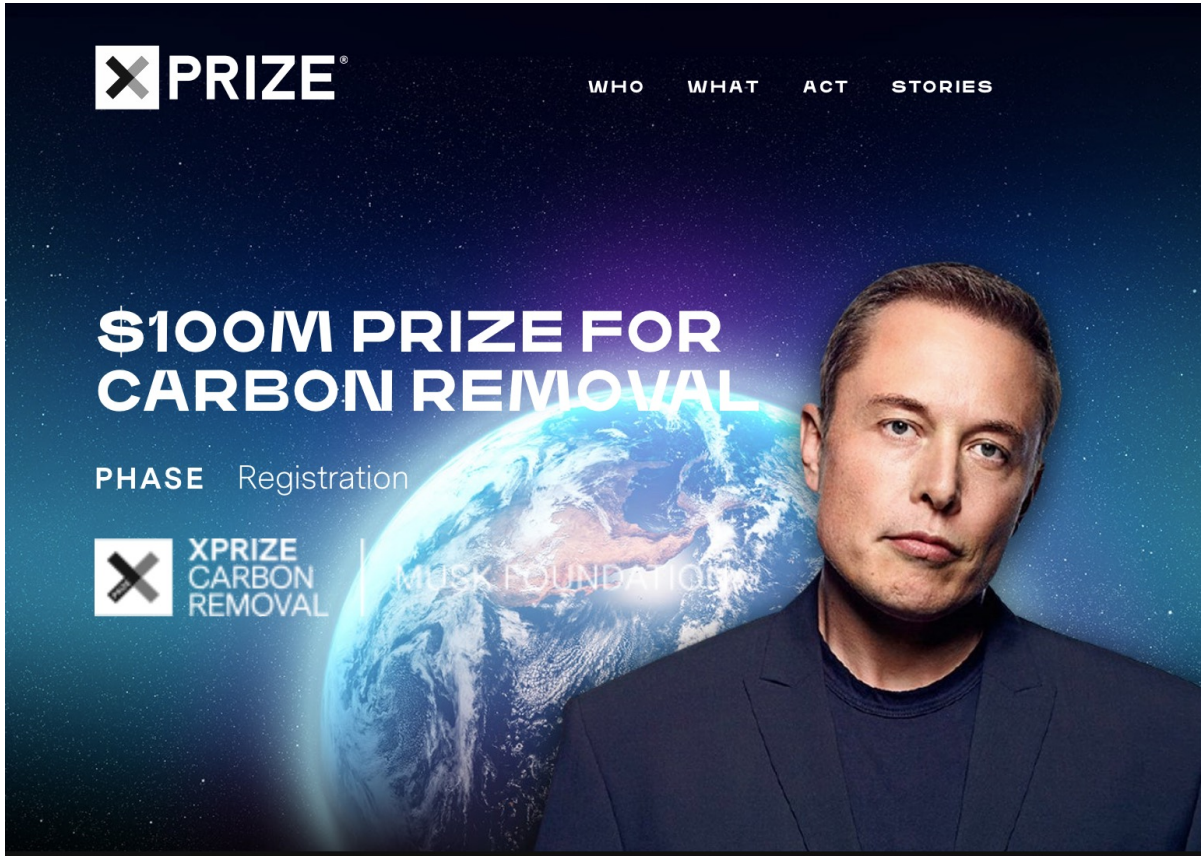
HIGH STRENGTH MATERIAL

# PROGRESS on the TIMBER BAMBOO SOLUTION:

## RIZOME IS TOP 60 FINALIST FOR GLOBAL CARBON REMOVAL PRIZE

"Your proposal represents one of the strongest submissions in the competition."

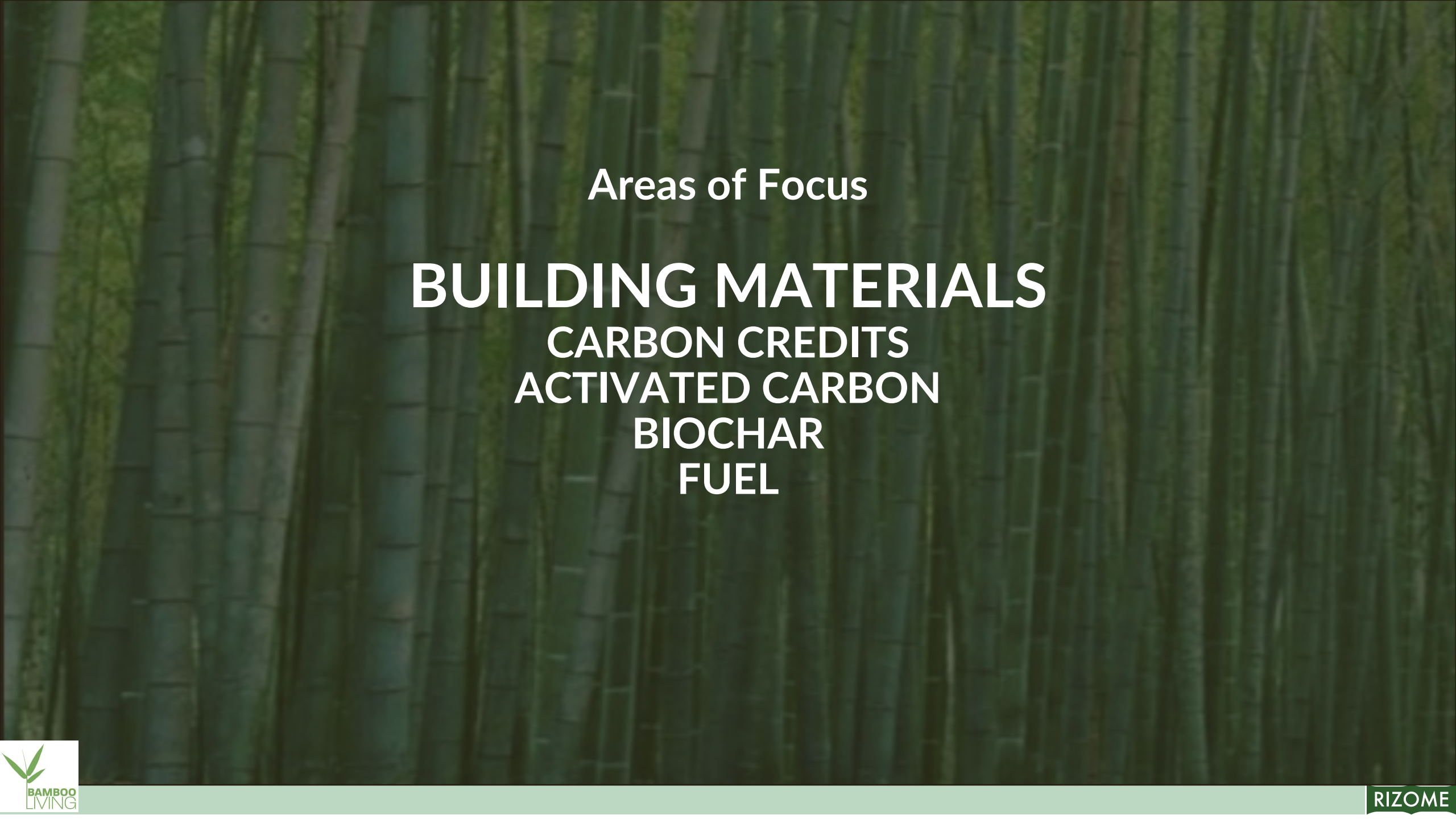
XPRIZE Carbon Removal team



## Saving the Climate

# CONVERT 12% OF GLOBAL CONSTRUCTION TO BAMBOO BASED BUILDING MATERIALS

# ANNUAL IMPACT – ADDRESS 1/3 OF GLOBAL CO2 EMISSIONS IN DRAWDOWN, CAPTURE, AND AVOIDED EMISSIONS


Areas of Focus
BUILDING MATERIALS
CARBON CREDITS
ACTIVATED CARBON
BIOCHAR
FUEL

## OVER 27 YEARS OF EXPERIENCE WITH STRUCTURAL BAMBOO

# BAMBOO LIVING DEVELOPED THE FIRST

# US BUILDING CODE STANDARD

# 2004

ESR-1636
*Issued November 1, 2004*
*This report is subject to re-examination in one year.*

**ICC Evaluation Service, Inc.**
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**DIVISION: 06—WOOD AND PLASTICS**
**Section: 06110—Wood Framing**

**REPORT HOLDER:**

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**120 HANA HIGHWAY #9, SUITE 133**
**PAIA, MAUI, HAWAII 96779**
**(808) 572-1007**
**www.bambooliving.com**
**bamboo@bambootechnologies.com**

**EVALUATION SUBJECT:**

**STRUCTURAL BAMBOO POLES**

**ADDITIONAL LISTEE:**

**BAMBOO HARDWOOD VIETNAM**
**THOI HOA VILLAGE**
**BEN CAT DISTRICT**
**BINH DUONG PROVINCE**
**VIETNAM**

## 1.0 EVALUATION SCOPE

**Compliance with the following codes:**

- 2003 *International Building Code*® (IBC)
- 2003 *International Residential Code*® (IRC)
- 1997 *Uniform Building Code*™ (UBC)

**Properties evaluated:**

Structural

## 2.0 USES

The structural bamboo poles are used as structural elements in wall, roof and floor trusses (panels) or as individual compression and/or tension members, in Type V non-fire-resistance rated residential and commercial construction. The commercial construction is limited to one story and a maximum floor area of 2000 square feet (180 $m^2$).

## 3.0 DESCRIPTION

The structural bamboo poles covered in this report are from Quang Ngai, Vietnam, and are of the Tre Gai (*bambusa stenostachya*) species. The bamboo poles are typically $2^3/_4$ inches (70 mm) to $3^1/_4$ inches (82 mm) in diameter and 10 feet (3048 mm) to 14 feet (4267 mm) in length, depending on the building type. The structural bamboo poles have a nominal density of 42 pcf (673 $kg/m^3$) and are preservatively treated with a borate solution.

## 4.0 DESIGN AND INSTALLATION

### 4.1 General:

Design and construction practices shall take the following into account:

- A design shall be provided for lateral bracing to resist wind and seismic forces.
- The structural performance shall be assessed by calculating the action effects using a linear material model (elastic behavior).
- The effect of shrinkage shall be taken into account in the design of individual structural members, and in the design of the structure as a whole.
- The effects of long-term loading (creep) need to be considered in the design of individual structural members, and in the design of the structure as a whole. Long-term flexural creep in bamboo in bending may be assumed to be 3 to 4 percent of the immediate elastic deformation.

### 4.2 Design Considerations:

**4.2.1 Allowable Design Stresses:** Design stresses shall not exceed the values noted in Table 1. No adjustment for duration of load shall be made, except for permanent load and wind load conditions, as addressed in this section.

For a permanent load condition (more than 10 years), all stresses, except for MOE, shall be reduced by 25 percent. For a wind loading condition, the allowable design stresses, except for MOE, are permitted to be increased by 20 percent.

**4.2.2 Bamboo Poles (Elements):** The design of individual elements shall consider the following:

a. The element retains its elastic behavior, until failure (plastic behavior is considered to be not significant).

b. The elements are analyzed as variable-thickness, hollow-tube structures.

c. The elements are analyzed as not perfectly straight members.

d. The elements are analyzed as tapered members.

e. Design is conducted in accordance with the following:

1. Conventional structural analysis methods are used, with definitions of the initial curvature, the diameter and the wall thickness.
2. Any bamboo joint or support shall be considered to act as a hinge, unless substantiating data are submitted to justify consideration as a semi-rigid or a rigid joint.
3. Bernouilli's theorem (flat cross sections remain flat) is valid for bamboo.

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BAMBOO LIVING

RIZOME

# Hundreds of Homes
# Field Tested -
# 200mph Hurricane Winds
# 6.9 Richter Earthquakes

BAMBOO LIVING

RIZOME

# OUR CLIMATE CHANGE STRATEGY

- Plantation Management
- Biomass Production
- Addressing bamboo flowering
- Increasing Demand for bamboo
- Durable bamboo goods
- Biochar

VIII WORLD BAMBOO CONGRESS THAILAND 2009

THE
REVOLUTIONARY
ALTERNATIVE
FOR
GLOBAL
CONSTRUCTION

# GIANT CLUMPING BAMBOO

BAMBOO LIVING

RIZOME

# Technically Superior. Climate-Positive. Same Price (soon).

## Climate-Positive

Carbon Drawdown Construction

## Regenerative

12x Less Land than Wood

## Strength

2.5X Strength/Weight vs Steel

## Fire-Resistant

Class A Fire Rating

BAMBOO LIVING

RIZOME

# Flexible Fiber

We can use the fiber to make:

- Compressed building materials like OSB and strand lumber
- Laminated building materials like veneers, panels and lumber
- Activated Carbon
- Biochar
- Biofuel through chips and pellets
- 3D printing filaments
- Paper and cardboard pulp

# Strand Materials

- Strandwoven
  - Flooring
  - Siding
  - Exterior Decking
  - Railroad Ties & Mining Road Mats
- Oriented Strand Board (OSB)
  - Floor, Wall, and Roof Sheathing
  - Mass Timber Panels
- Strand Lumber
  - Studs, Joists and Beams
  - Mass Timber Panels


# Laminated Materials

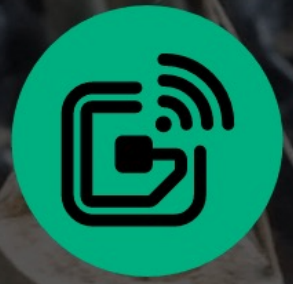
The New Hardwood

- Free and Clear
- Flooring, Paneling, Casework, Doors, Windows, and Trim

# Carbon Offset Credits

## 1. Plant

10X Faster Drawdown vs Trees



## 2. Track

RFID + Blockchain Tracking

## 3. Sell

Global B2B Marketplace

**342% YoY Market Growth**

# Activated Carbon

- Water Treatment and Industrial Uses
- US$5.8 Billion Market Size by 2030

# Biochar

- Agricultural amendment
- Electricity generation
- US$6.3 Billion Market Size by 2031

# Philippines

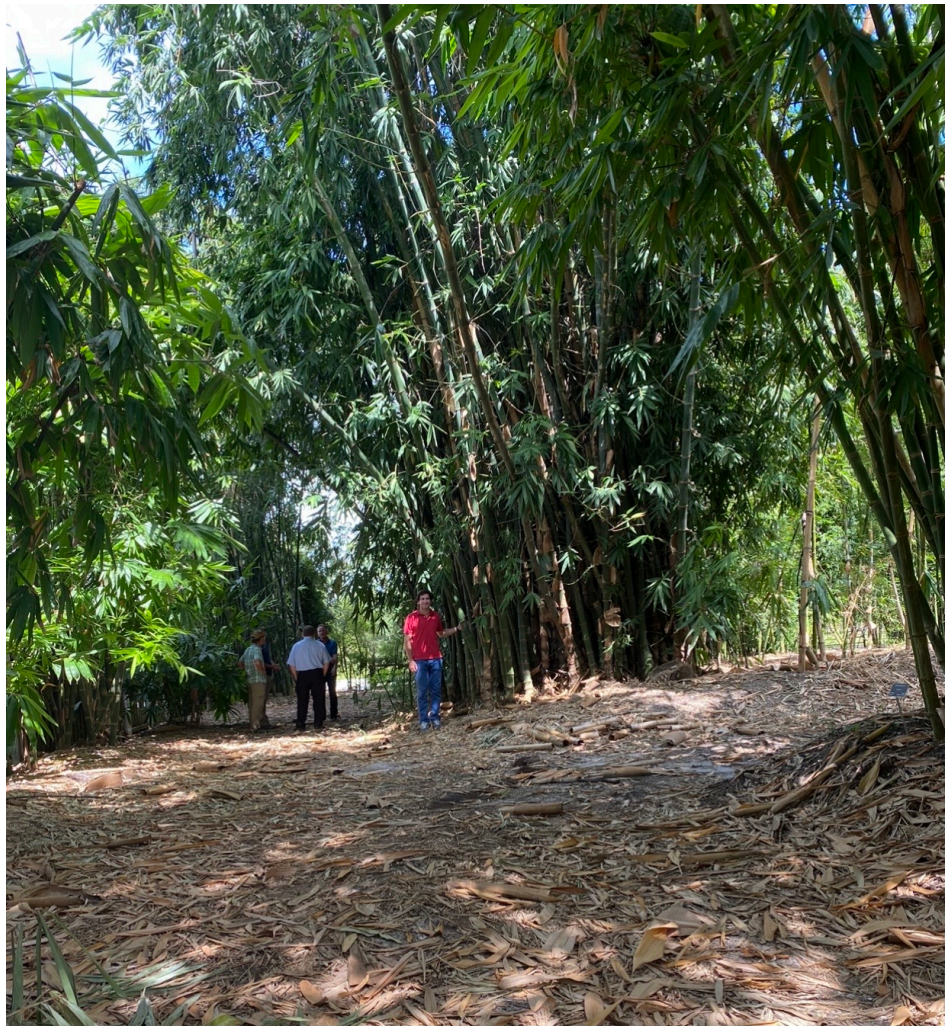
# Philippines

USAID
FROM THE AMERICAN PEOPLE

**Currently reforesting 25,000 acres**

**Our goal is to reforest 2.5 million acres in Philippines**

# Florida – Giant Bamboos Grow Well There



## Tropical Bamboo Nursery

Citrus Grove
Killed by disease

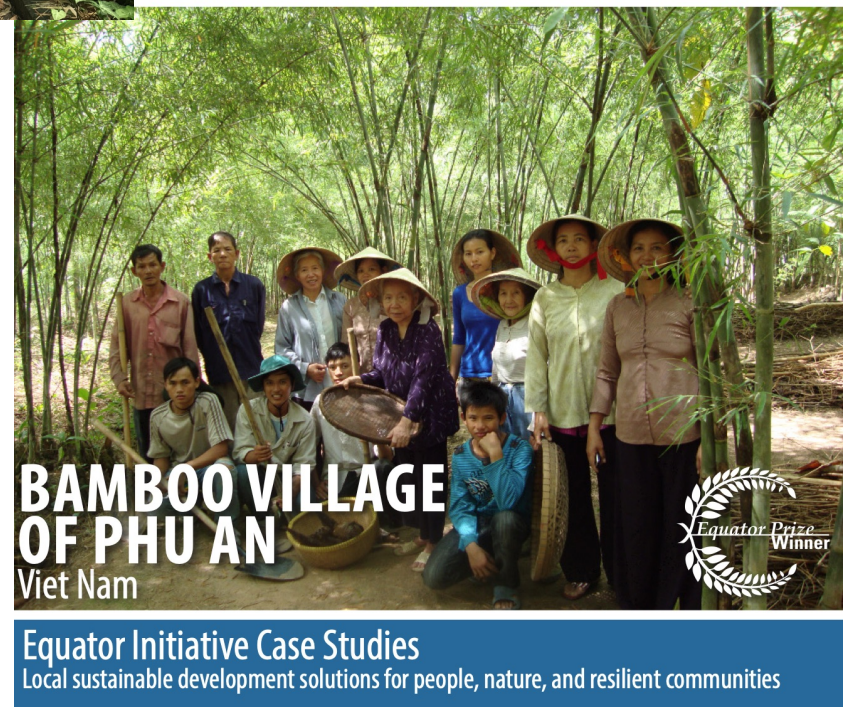
Our Florida Goal-
Replace 1 million acres of dying Citrus and Sugarcane with giant bamboos

Former Florida Citrus Grove –
Prepped for bamboo planting

## Bamboos at 15 months

# Vietnam

Collaborating
with Phu An Bamboo Village
to secure the funding
and
develop the resources
needed
for a 5-million-acre
reforestation project in
Vietnam using noninvasive
timber bamboos



News Flash!

The secret is out.

Bamboo is getting noticed!


Architecture

# Could living in a bamboo home help solve the climate crisis?

Published 15th September 2022

BAMBOO LIVING

RIZOME

# AND IT'S DOING

# A WHOLE LOT OF GOOD!

## Social

Employment brings social stability, and bamboo planting, harvesting, and processing are already having a social impact on the communities we serve.

## Water

Bamboo's root system readily absorbs up to 14 inches of rainwater, reducing catastrophic flooding and erosion while replenishing aquifers.

## Ecology

Bamboo survives grass fires and drought which have devastated other reforestation efforts; we work only with non-invasive species .

## Gender Equality

Bamboo is lightweight, enabling women to participate in the bamboo economy, often in the nursery portion of the program.

## Indigenous Populations

The Rizome Project is one of the first to offer economic opportunity to a rural community that consists of seven hill tribes.

## Economy

Bamboo farmers now generate additional revenue from their existing bamboo stands while gaining access to stable, fair employment with the opening of our new factory.

**OUR PHILIPPINES PROJECT ADDRESSES 16 OF THE 17 UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS UN SDG17**

BAMBOO LIVING

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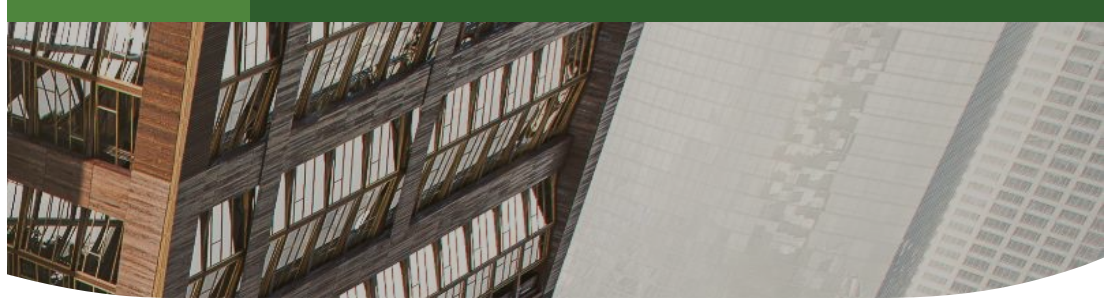
BAMBOO LIVING



RIZOME®

# IN THE BUSINESS OF SAVING OUR CLIMATE

## CONVERT 12% OF GLOBAL CONSTRUCTION TO BAMBOO BASED BUILDING MATERIALS

## ANNUAL IMPACT – OVER 20 GIGATONS OF CO2 REMOVAL AND AVOIDED EMISSIONS

BAMBOO LIVING

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