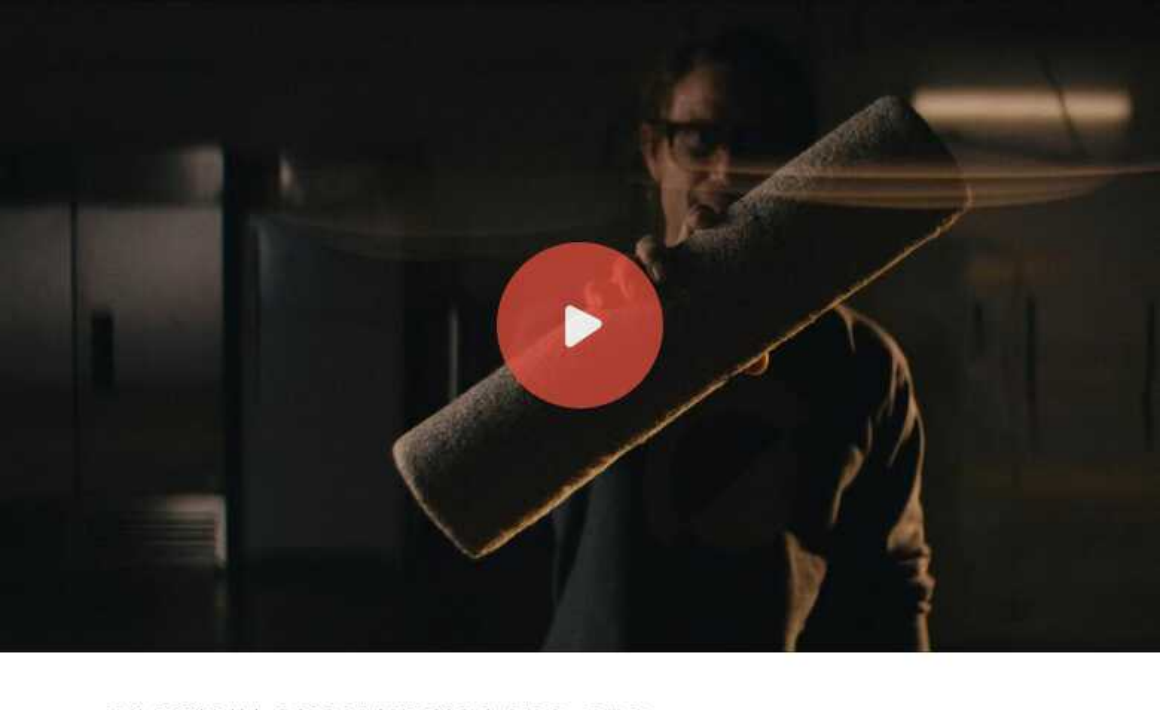


INVEST IN **OKOM WRKS LABS, PBC**

Harnessing hemp and mycelium to grow regenerative, structural building materials

structuralmycelium.co Chicago, IL

Highlights

1. ⚖ U.S. Patent Number 11,866,691 - zerø-frm is the first structural, mycelium composite
2. Harnessing the power of fungi , zerø-frm can eliminate lumber and adhesives from buildings
3. We use ag waste and mycelium to grow 6x more building material than can be extracted from forests
4. Supports farming and manufacturing in the USA
5. Our main ingredient, hemp, is a soil regenerating crop vs. timber which degrades forest soil
6. 1 acre of farmland growing hemp draws down 138T CO2e vs 1 acre of forest emits 83T CO2e post logging
7. Our mycelium based composite (MBC) is an order of magnitude stronger than any other MBC available
8. Grows local economies and reduces supply network challenges

Featured Investor

Robert Gibson Theis Follow

Syndicate Lead

Invested $5,000 ⓘ

I'm an architect, based in California, practicing ecological construction. bob@bobtheis.net

"The foremost challenge of this century is for our culture to learn to live within its solar budget. Contained within that challenge is a critical need for bio-based, carbon storing construction materials that do not require a great deal of energy to produce. Utilizing what the natural world has already developed would seem to be the most practical approach for doing this. A natural material that can replace petroleum based foams would be a great step forward in this direction."

Our Team

Joshua English Founder/CEO

Systems designer with 28 years experience designing large scale solutions with measurable local impact. Inventor of zerø-frm, the world's first and only structurally sound, mycelium based composite.

We are answering the call to action from future generations, developing bio-based material solutions that provide systems-restoring solutions with far-reaching benefits. With our new, structural building materials, we can eliminate our reliance on timber and support the preservation and regeneration of forest land for global carbon sequestration.

Matt Chandler

Chris Magwood Co-Founder/Chief Climate Officer

Chris is on the Carbon-Free Buildings team @ RMI, the Director of Builders for Climate Action, co-creator of the BEAM Estimator tool, and author of several books on natural building systems, including the recently released Build Beyond Zero.

John Kabanda Co-Founder/VP of Engineering

Doctor of Philosophy in Structural Engineering; his research focused minimizing local buckling in thin-walled hollow sections (experimental) at Queen's University. MASc from the University of Toronto and an MBA from the University of Oxford.

April Magill Co-Founder/VP of Architecture

April Magill has dedicated her career to promoting sustainable architecture and affordable housing in and around the Carolinas. She is the owner and Principal Architect of Root Down Designs, an architecture firm whose focus is carbon negative buildings.

Matt Chandler COO

Matt is an accomplished entrepreneur, advisor & investor with over a decade of experience. He specializes in helping companies commercialize products and build strategic ecosystems. Matt is dedicated to driving sustainable growth and impactful solutions.

Chris Magwood

We make the world's strongest mycelium based composite*

okom wrks labs
ZERØFRM
is structural mycelium

OUR MISSION IS SIMPLE...We want to bring the world's first structural mycelium based composite to market.*

> *Creating a future where success is measured in climate and social impact, not profits.*

WHY ARE WE DOING THIS?

2024 has been a momentous year for okom wrks! One of our proudest accomplishments is that we've been accepted into a prestigious research residency at the Autodesk Tech Center in Boston. This is a unique opportunity for us to delve into cutting-edge technology and innovation, pushing the boundaries of our research. However, to make the most of this incredible opportunity, we need your support!

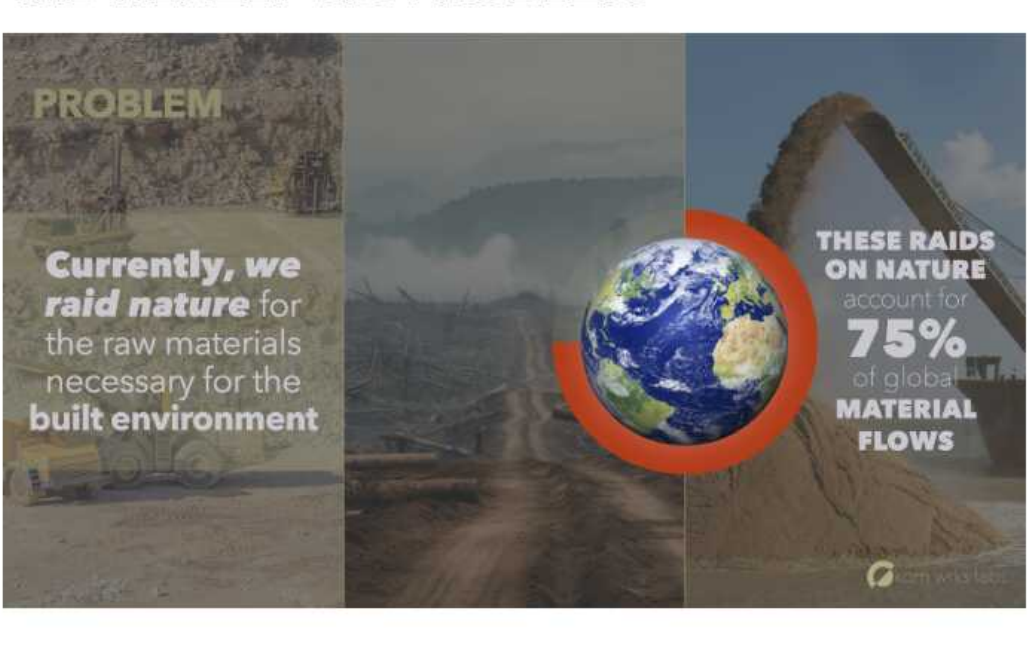
We are launching this crowdfunding campaign to raise funds for essential resources, including state-of-the-art equipment, materials, and travel expenses. Your investment will directly impact our ability to conduct groundbreaking research, collaborate with top industry experts, and bring our innovative ideas to life.

HOW THE FUNDS WILL BE USED

- **$50k for materials** - the residency includes the use of amazing facilities and state-of-the-art equipment, however we need to cover the cost of the materials we need for fabrication
- **$48k for off-campus industrial space** - we need extra space off-campus for storing materials and extra equipment
- **$20k for automation equipment** - a key to our technology relies on the intelligent use of automation
- **$6k for travel needs** - We still have ongoing research with our partners at Argonne National Lab, so we will be traveling to Chicago from Boston every once in a while to support that work

Now that you know why and how we plan to use these funds...We'd like to tell you about the big reasons we are working so hard on this endeavor...

THE REALLY BIG PROBLEM


PROBLEM
Currently, we raid nature for the raw materials necessary for the built environment
THESE RAIDS ON NATURE account for 75% of global MATERIAL FLOWS

> *"Embodied carbon consists of all the GHG emissions associated with building construction, including those that arise from extracting, transporting, manufacturing, and installing building materials on site, as well as the operational and end-of-life emissions associated with those materials."(From: Data to the rescue: Embodied carbon in buildings and the urgency of now)*

At okom wrks, we take a systems approach to tackling the ill effects that buildings have on the planet!

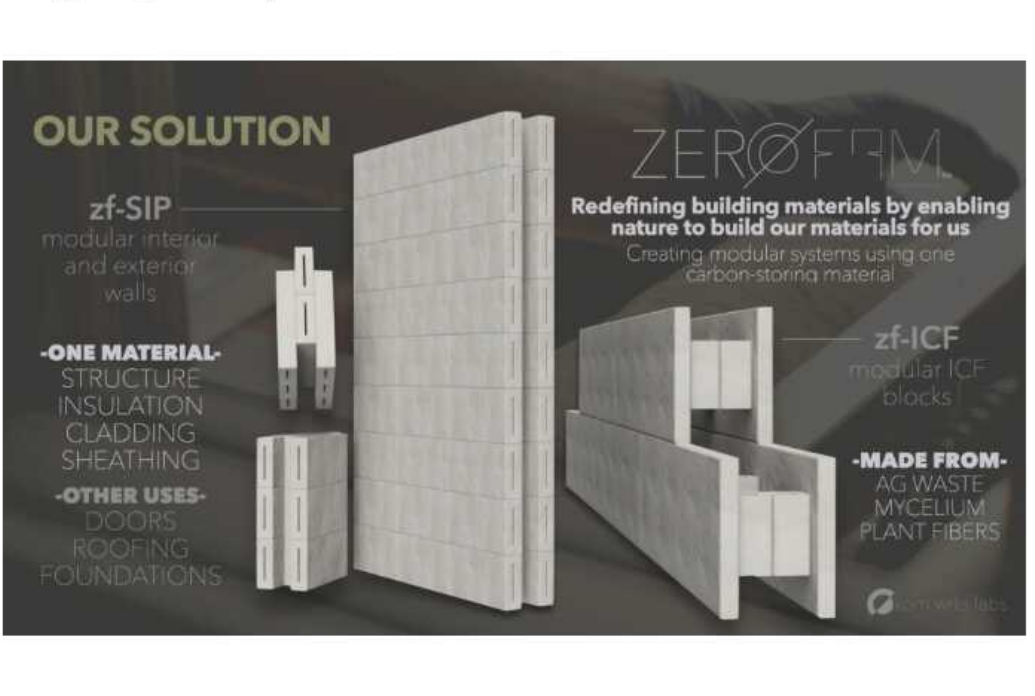
To truly make an impact, okom wrks is focused on:

1. Providing regenerative, carbon storing materials for the built environment
2. Tapping into the 600 million years of fungal evolution to find solutions to the most daunting challenges in building materials
3. Providing mono-material solutions that are easily disassembled at the end of their useful life...by dramatically reducing construction waste, we create circularity where there was once only extraction and waste

> ***"In the landscape of mycelium composites, there is nothing quite like zerø-frm! The potential impact of this kind of truly sustainable building material can't be overstated."***
>
> **Dr. Andrew Dent, EVP of Research | Material ConneXion**

OUR SOLUTION

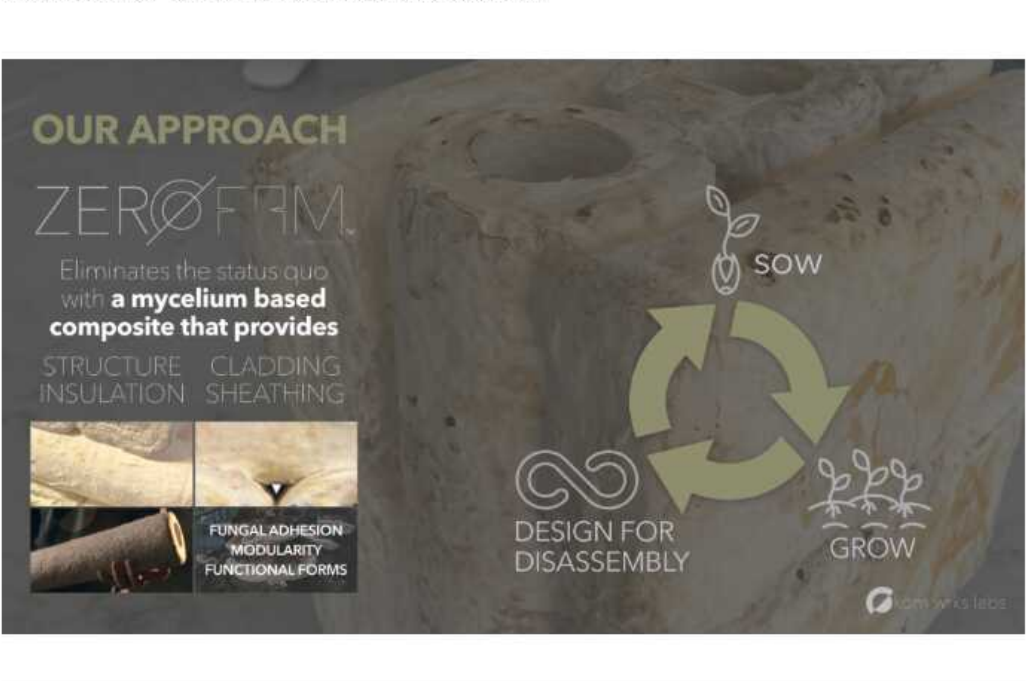
Storing carbon in fast growing crops like hemp, we can use mycelium to bind together particles of hemp hurd with a great strength profile. *The great thing is, our patented process does not require industrial pressures or even adhesives!* We simply provide an optimal growth environment for the mycelium, resulting in parts that have the ability to provide great strength while also being backyard compostable!



Prefab Building Techniques for the Win

Over the years, there has been a **steep decline in the number of skilled workers** in the construction trades. There is a growing trend toward building system solutions that can be consistently constructed with a labor force that is increasingly being trained on the job. This creates opportunities for **prefabricated building systems like SIP (structural insulated panels) walls, tip-up walls, and even entire prefab homes**.

Our initial focus is on fully developing our zf-SIP, a SIP wall that is derived almost entirely from agricultural residue and mycelium. Traditionally, SIP wall panels are constructed from a very large block of EPS foam glued between two sheets of OSB. This configuration contains incredibly large amounts of petro based foams and the adhesives found in OSB are known to be harsh for the health of the inhabitants.



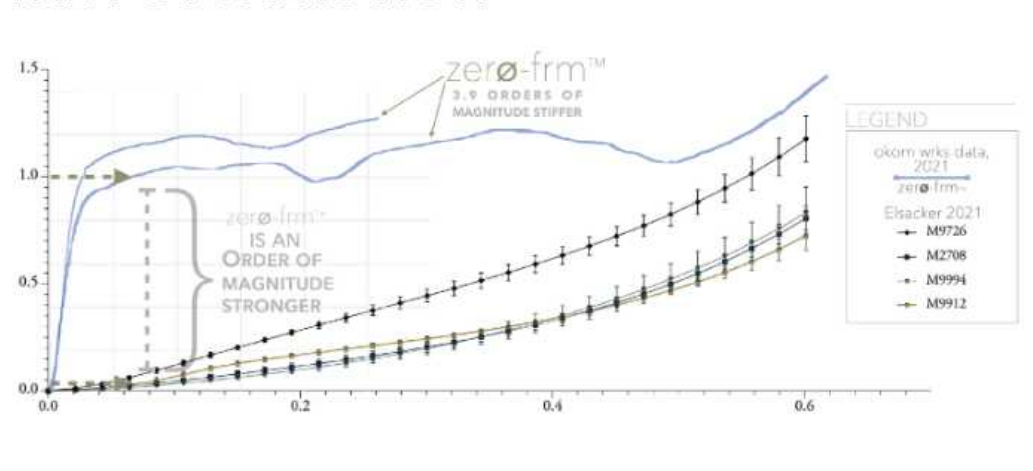
WHAT SETS US APART FROM OTHER MYCELIUM BASED COMPOSITES?

Simply put, our patented mycelium based composite, zerø-frm (pronounced "zero form") is the strongest formulation in the world!*

- 3.9 orders of magnitude stiffer
- 1.1 orders of magnitude stronger in compression...

...and this is just the beginning. We know that with some automation to the process, we can achieve even better results.

THE FUTURE IS NOW



> ***zerø-frm has very different material properties than other mycelium based biocomposites. From its surface hardness to its overall rigidity, strength, and durability; these unique material properties open up brand new opportunities for mycelium-based materials to serve in actual load-bearing applications.***
>
> ***Wil V. Srubar III, Ph.D., Associate Professor | University of Colorado Boulder***

We have conducted baseline compression tests at the Living Materials Laboratory with 3rd party structural analysis from Verdant Structural Engineers. The results were encouraging! Verdant Structural Engineers were able to determine that our patent-pending, structural mycelium-based composite, zerø-frm, can replace lumber in the framing of moderate residential construction.

> ***"Through structural calculations based on initial compression and modulus of elasticity testing, the material was found to be sufficient to perform wall stud-like action with similar wall stud-like shapes to resist gravity loading in moderate residential construction conditions. Though increased compression loading due to wind or earthquake forces would exceed the capacity documented in the existing strength tests and require custom design solutions."- Anthony Dente, PE, LEED AP***
> ***Principal at Verdant Structural Engineers***

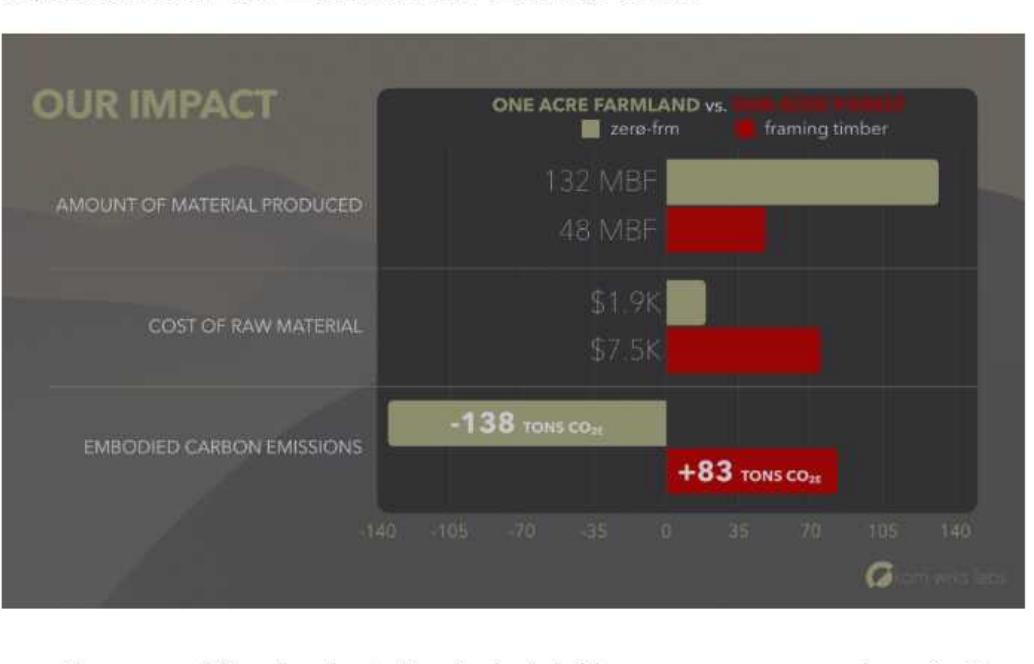
This is only the start! With your support for this Community Round, we will be conducting R&D to improve our formulation and aim to increase compressive strength by 33%. We will also be rounding out the rest of the structural mechanics testing for zerø-frm:

- 3-point and 4-point bending tests
- Tensile strength tests
- Thermal conductivity
- Fire degradation
- Screw hold
- Water uptake

These tests will create a full picture of the structural capabilities for zerø-frm and help us to expand the applications for zerø-frm.

WHY ARE WE FOCUSED ON HEMP?

We can grow 4x-6x more building material per acre AND draw down significant amounts of CO2 for long term storage. It's a Question of Efficient Land Use



- One acre of farmland rotating industrial hemp crops can produce 4x-6x more building material than can be extracted from an acre of forest.
- It only takes hemp 90-120 days to grow! A typical rotation for trees growing on an even-aged plantation is 15-30 years. This means that much less land area is needed to grow building materials using agricultural residues like hemp hurd.
- Hemp will sequester upwards of 15 tons of CO2/hectare in just 90 days!
- The nature of crop rotations also means that no food crops need to be impacted in order to grow the raw materials needed for zerø-frm.
- While lumber is a beautiful building material with impressive strength, it is extracted in ways that weigh heavily on our planet.

Carbon Storing vs. Carbon Sink

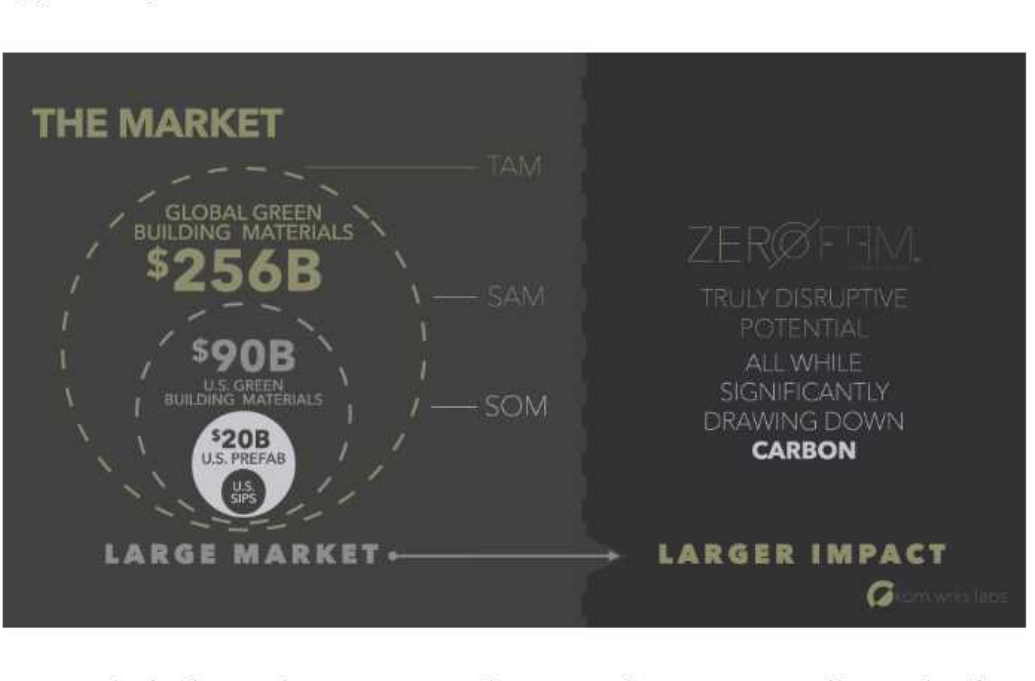
We are hearing more and more about how we might use increased amounts of lumber to mitigate climate change! It's a head scratcher because it is a fallacy. For decades, the true impact of the timber extraction process has been left out of LCA analyses of timber products. **The science is clear, we must protect forests if we want to stave off the effects of rising global temperatures.** It is a fact that increasing demand for timber products will only exacerbate the problem of degrading and disappearing forests.

What is also less commonly known, **when a forest is cleared of its above ground biomass during logging operations, 65% of that carbon is almost immediately lost into the atmosphere.** Of the remaining 35%, an additional 40% of CO2 will be emitted by wood products used in construction. **This is exacerbated by the fact that those extracted trees are no longer available to stay in forests providing habitat, drawing down carbon dioxide, and keeping forest ecosystems healthy and intact. This foregone sequestration is not a small matter.** Clearcutting and even commercial thinning of trees results in carbon emissions of 15T per acre, and current science shows us that **logging is a carbon source that is greater than fossil fuel emissions** year after year!

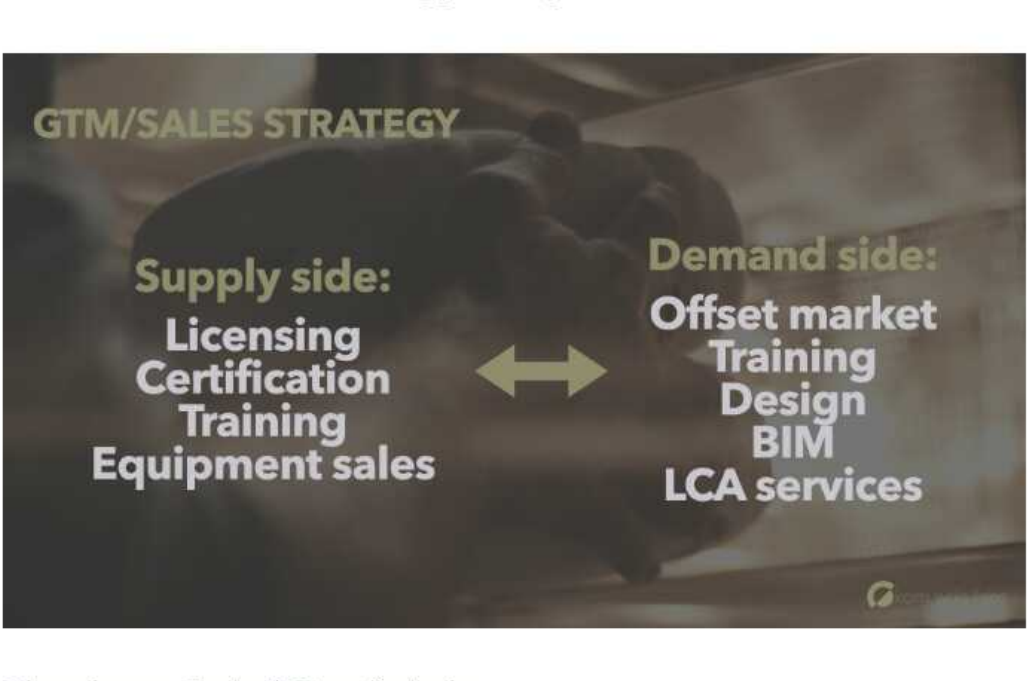
Using Hemp is a True Solution - On the flip-side, hemp is an excellent biomass generating crop! In just 90-120 days, several tons of biomass can be stored for use in long-storing building products. Hemp is soil regenerative, so it can also be used to repair soil that has been depleted by industrial farming. When comparing an acre of farmland and an acre of forest, it is clear that we can draw-down significant CO2 using hemp as an alternative to lumber. **Timber harvests result in creating sequestration dead-zones emitting approximately 83T of carbon per acre over the course of a 30 year rotation.** During that same timeframe, an acre of farmland growing industrial hemp for zerø-frm ***can draw down 132T of CO2*** a while also creating 4x-6x more board feet of building materials!

THE MARKET

Buildings are a significant source of carbon emissions...largely due to the need to create increasingly more and more square footage of floor space to accomodate a rapidly increasing human population. This necessitates a huge economic opportunity for building materials! But we believe that we cannot rely on economic opportunity alone. It is also true that we have a very ripe opportunity to both increase impact for the planet AND create economic opportunity.


THE MARKET
GLOBAL GREEN BUILDING MATERIALS
$256B
TAM
$90B
U.S. GREEN BUILDING MATERIALS
SAM
$20B
U.S. PREFAB
SOM
LARGE MARKET
LARGER IMPACT
ZERØFRM
TRULY DISRUPTIVE POTENTIAL
ALL WHILE SIGNIFICANTLY DRAWING DOWN CARBON

Our analysis shows that we can produce zerø-frm at an overall cost that is 2x-6x more efficient and 10% less costly to manufacture than lumber. Accounting for transport logistics, material waste, and carbon emissions, we see a huge disruptive potential for zerø-frm to replace many forms of lumber in the building materials market. We see this impact being quickly realized in the prefabricated building systems market which, conservatively, has a $20Bn serviceable obtainable market opportunity in the US alone.



Licensing vs. Central Manufacturing

We see tremendous potential in staying agnostic. We are looking to target both large and small manufacturers of prefab building systems as potential licensees. We believe that zerø-frm is too impactful to keep as a closed source technology. By licensing our technology to any and all manufacturers of building systems, we can ensure that this regenerative, carbon-storing mycelium-based composite is adopted widely. The global need is for quickly finding carbon drawdown and storage solutions, we believe zerø-frm is a great candidate to help make a dent in the global sequestration goals for 2030, 2050, and beyond!

TRACTION

- IMPEL+ Cohort 2022
- Dept. of Energy Advanced Building Collaborative
- Raised $450k from angels
- Third Derivative Cohort 23-2
- Demonstration Project for AXA-XL's NYC office ($375k revenue)
- Dept. of Energy Cradle to Commerce Legion 2
- *Collaborative research project with Argonne National Lab*
- Presentation to Autodesk Research Connections

Accepted into Autodesk Research Residency

> ***The Autodesk Research Residency program will give a huge advantage to our R&D efforts. We will begin working out of the Autodesk Tech Center in Boston starting September 2024. This state of the art facility and group of experts will help to derisk our path to commercialization by providing cutting edge fabrication tools, digital design expertise, and educational opportunities. Our 12 month residency will allow us to work alongside Autodesk mentors who will help us design and build the machines and processes we need to provide value to our future licensees. This will also greatly enhance our path to standards and certifications acceptance due to the fact that we will be able to fully automate our process thereby creating consistent test replicates at scale. This residency will culminate in the creation of the world's first freestanding structure made entirely of mycelium based composites...no hidden frameworks, only agricultural residues and mycelium to create the load bearing walls, interior partitions, and roof panels. This project will show the prowess of our unique structural formulation and will highlight the commercial readiness of our patented process.***

Joined Trash Club Ventures & InfiniteEco Venture Studio

> ***In 2024, we began an exciting partnership with Trash Club Ventures and InfiniteEco, two leading venture studios who specialize in commercializing emerging technologies in waste management and the circular economy.***
>
> ***Together, we are focusing our strategy on meeting the building codes, standards, and certifications required to enhance our commercialization efforts, ensuring that our innovative solutions make a substantial impact in the market.***

OUR PARTNERSHIPS AND NETWORK

Argonne NATIONAL LABORATORY
THIRD DERIVATIVE
cradle to commerce
tooketree PASSIVE HOMES
ABC ADVANCED BUILDING CONSTRUCTION Collaborative
IMPEL+
New Frameworks
Material ConneXion
Living Materials Laboratory
MIDWEST NATURAL FIBER
FormationAg
TETRA HEMP COMPANY

It Will Take Deep Collaboration

One of our favorite parts of building okom wrks labs over the last few years has been building the partnerships with stakeholders up and down the supply network. Biobased building materials require the skill and hard work of the agricultural community. We like to take a systems-based approach to developing zerø-frm, so we begin our development well before the manufacturing plant. We have formed deep relationships within the hemp farming and processing community in order to learn from them the most successful way to scale a technology reliant on an ever changing natural landscape. It won't be easy, but we believe that by fostering these partnerships, we can produce licensable manufacturing techniques that can utilize hyper-local manufacturing supply networks. This would have the co-benefit of ensuring that the economic benefits of manufacturing zerø-frm remains in the communities that work hard to produce the material at commercial scale.

WHO WILL BE IMPACTED BY OUR WORK?

Our key stakeholders:

- Owners
- Architects
- Builders
- Regulatory agencies
- Insurers

The built environment is necessarily difficult to innovate. Buildings must be safe and durable. Materials must provide safety, comfort, and be reliably installed no matter what region they may be specified.

24-month Standards and Certifications Strategy

1. Identify Relevant Standards and Codes (Q3 2024)

2. Prioritize Standards Testing (Q4 2024-Q1 2025)

3. Develop a Detailed Testing Plan (Q1 2025)

Phase 1: Initial Research and Development

Phase 2: In-Depth Testing and Certification (Q1 2025-Q1 2026)

Phase 3: Regulatory Approval (Q3 2026)

Phase 4: Market Deployment (Q4 2026)

4. Monitor and Iterate (Ongoing)

Conclusion

By following this structured approach, we will ensure our new building materials comply with all relevant standards and codes, facilitating smoother market acceptance and deployment. Make sure to stay updated with the latest regulatory changes and engage with standards organizations throughout the development process.

ZERØFRM™ U.S. Patent Pending

IS **UNIQUELY SUITED** TO ENABLE A **REGENERATIVE FUTURE** FOR THE **BUILT ENVIRONMENT**

okom wrks labs

We want you to become an investor today because you are our earliest and most ardent supporters...the supporters that deserve to share the upside with us.

*See our white paper attached below for an in-depth look at the science behind okom wrks. Studies and sources for claims in this pitch are included.

Downloads

Okom - White Paper - Business Use Case.pdf