

# BUILDINGENERGY BOSTON

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## Scaling Resilience Through Community & Collaboration

Virgil Blower (he/him), Building Integrity

Greg Bossie (he/him), Rare Forms

Ace McArleton (he/him), New Frameworks

*Curated by Greg Bossie and Sara Cooper*

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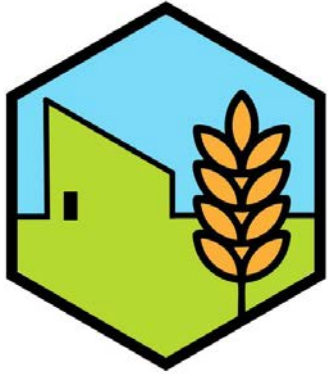
Northeast Sustainable Energy Association (NESEA) | March 23, 2026

# Scaling Resilience Through Community & Collaboration



Beyond Competitive Models for Climate-Restorative Construction

Ace McArleton, Greg Bossie, Virgil Blower  
NESEA Building Energy Boston | March 23, 2026



# The Seed Collaborative

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Straw Panel Network



Greg Bossie (he/him)  
Founder Rare Forms



Ace McArleton (he/him)  
Co-Founder New Frameworks



New Frameworks



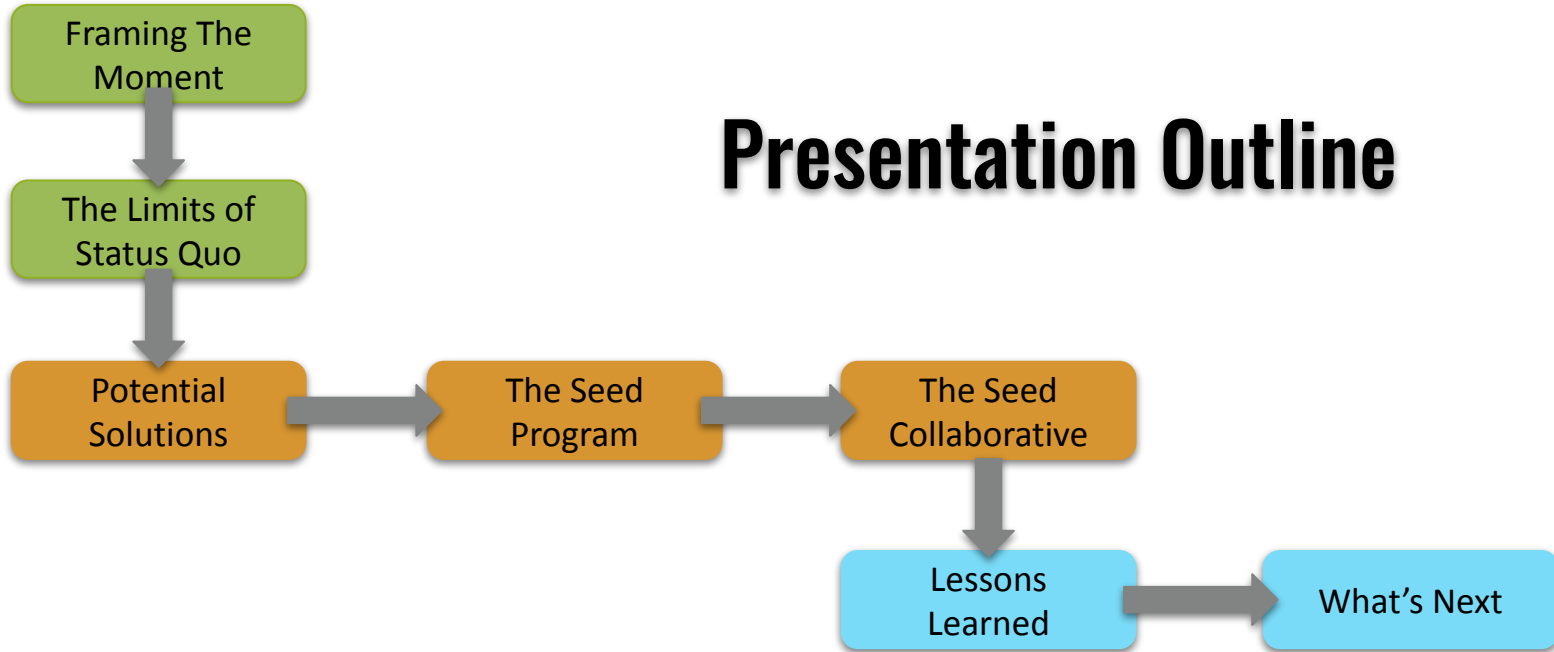
Virgil Blower (he/him)  
Co-Founder Building Integrity



# Learning Objectives

1. Identify the core principles of cooperative and shared-services business models, and explain how these models differ from conventional competitive structures in the architecture, construction, and manufacturing sectors.
2. Describe the Seed Program's standardized training approach for structural straw panel manufacturing, installation, and design, and evaluate how localized deployment of these methods supports regional capacity-building in bio-based construction.
3. Analyze the operational functions of the Seed Collaborative—including shared sales, marketing, workforce development, scheduling, SOPs, and R&D—and assess how shared resources can accelerate climate-restorative building practices at scale.
4. Apply lessons from the Seed Collaborative model to conceptualize new collaborative strategies within participants' own organizations or projects, with the goal of challenging status-quo practices and advancing equitable, climate-focused industry transformation.

# Presentation Outline





# Framing the Moment

# CONVERGING CRISES: CLIMATE, HOUSING, & LABOR



# PROJECTED U.S. HOUSING NEEDS BY 2040: NORTHEAST REGION & NATIONAL



NORTHEAST U.S. REGION

**~2 MILLION NEW UNITS NEEDED**



NATIONAL (U.S.A.)  
HOUSING NEED

**15-18 MILLION**  
NEW UNITS NATIONWIDE

Closing the Supply Backlog and  
Supporting Population Growth

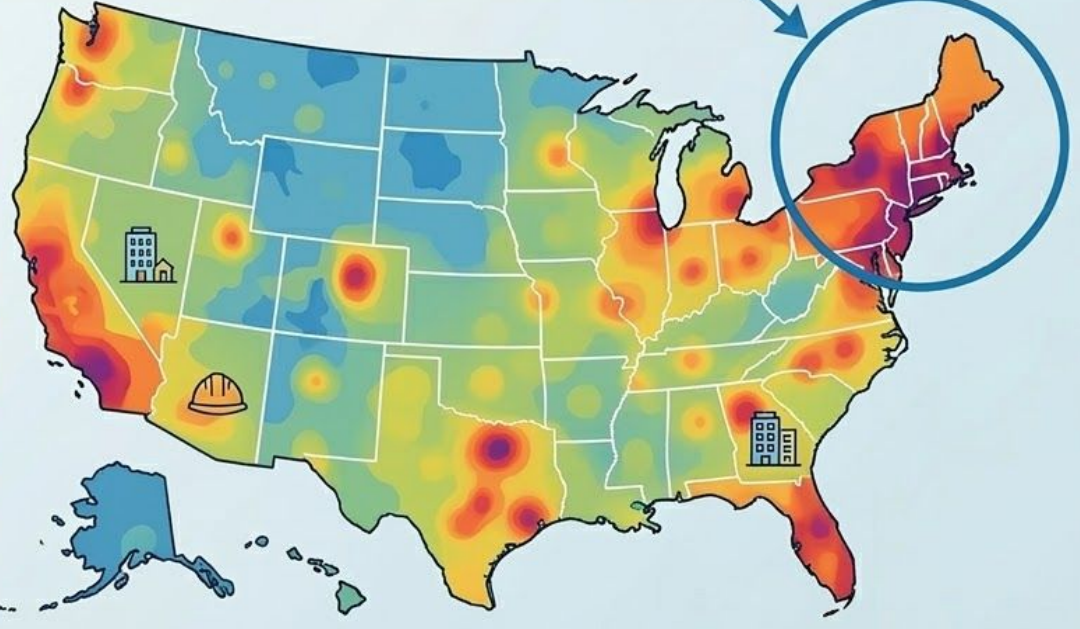
20  
Million

15

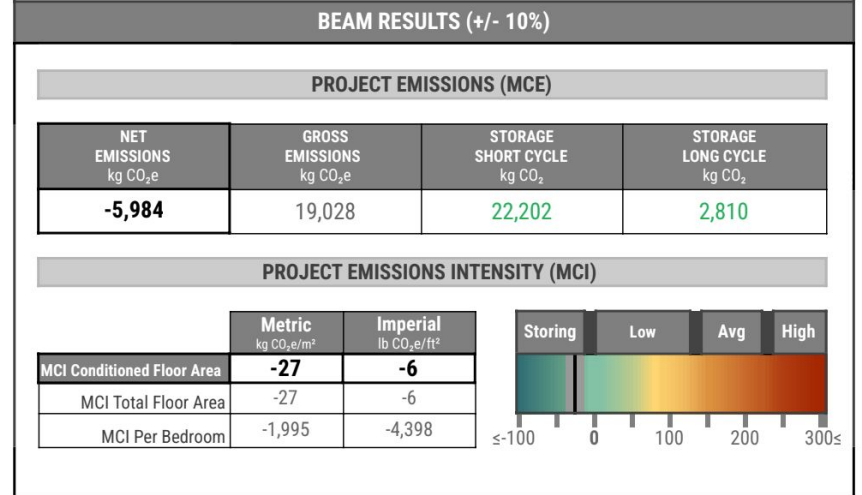
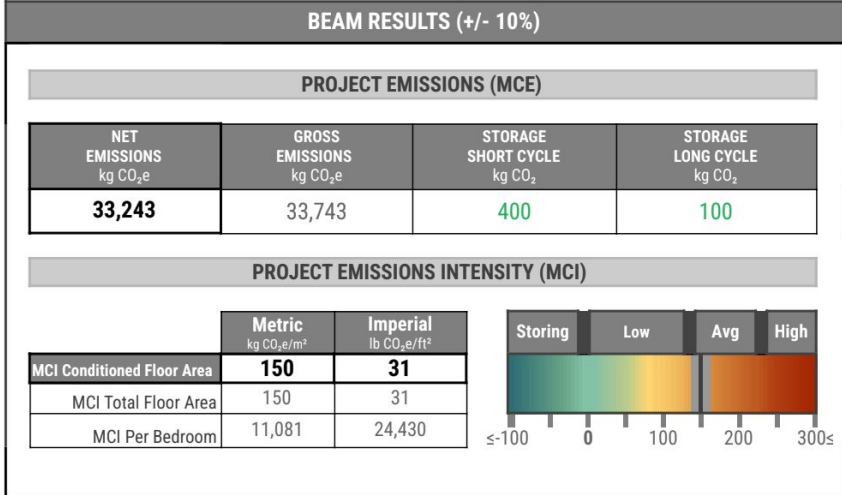
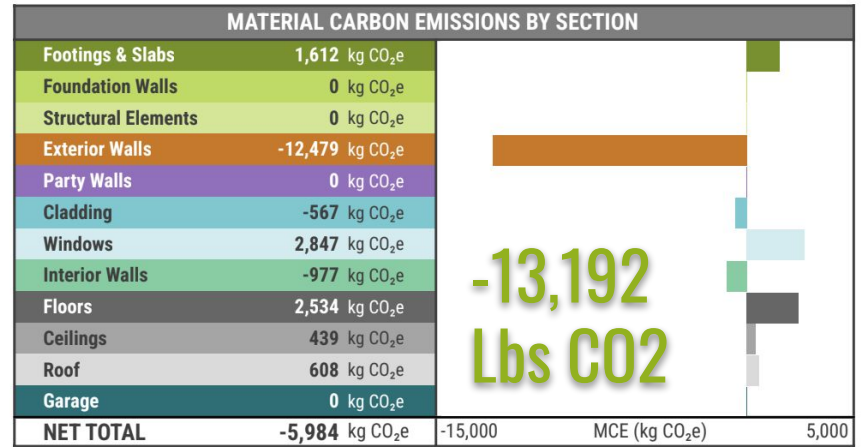
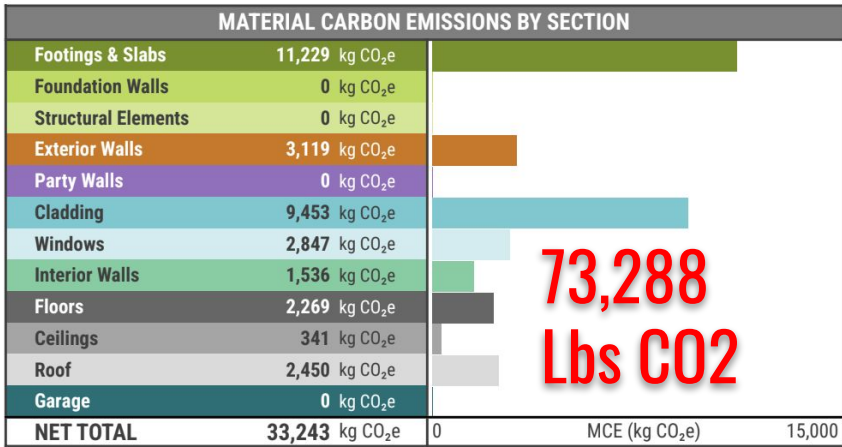
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Data Sources & Citations: National need figures synthesized from **JCHS of Harvard University**, **NAR Research**, and **NAHB** analysis. Northeast need figures from **RPA** and other regional planning studies. Population projections based on **U.S. Census Bureau** data.



## NORTHEAST: 2 MILLION HOMES

### STATUS QUO

73,288 lbs CO<sub>2</sub>e per home



146.6 Billion lbs CO<sub>2</sub>e

73.3 Million Tons CO<sub>2</sub>e



= 21 Coal Power Plants



= 15 Million Cars / year

### CARBON STORING

13,192 lbs CO<sub>2</sub>e stored per home



26.4 Billion lbs CO<sub>2</sub>e

13.2 Million Tons CO<sub>2</sub>e Removed



= 3.8 Coal Plants Retired



= 2.8 Million Cars Removed

### Net Climate Difference

86 Million Tons CO<sub>2</sub>e

= 25 Coal Power Plants

## NATIONAL: 15-18 MILLION HOMES

### STATUS QUO

73,288 lbs CO<sub>2</sub>e per home



1.10-1.32 Trillion lbs CO<sub>2</sub>e

550-660 Million Tons CO<sub>2</sub>e



= 180-215 Coal Power Plants



= 140-170 Million Cars / year

### CARBON STORING

13,192 lbs CO<sub>2</sub>e stored per home



198-237 Billion lbs CO<sub>2</sub>e

99-118 Million Tons CO<sub>2</sub>e Removed



= 28-32 Coal Plants Retired



= 21-28 Million Cars Removed

### Net Climate Difference

650-780 Million Tons CO<sub>2</sub>e

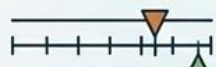
= 180-215 Coal Power Plants

# PROJECTED U.S. CONSTRUCTION LABOR NEEDS TO BUILD 15-18 MILLION HOUSING UNITS BY 2040: THE CHALLENGE OF AN AGING WORKFORCE

**~7.2 MILLION** CONSTRUCTION WORKERS (BY 2040)  
PROJECTED LABOR NEED TO MEET HOUSING GOAL



**DEMOGRAPHIC PROFILE:**  
MEDIAN AGE OVER U.S. AVG



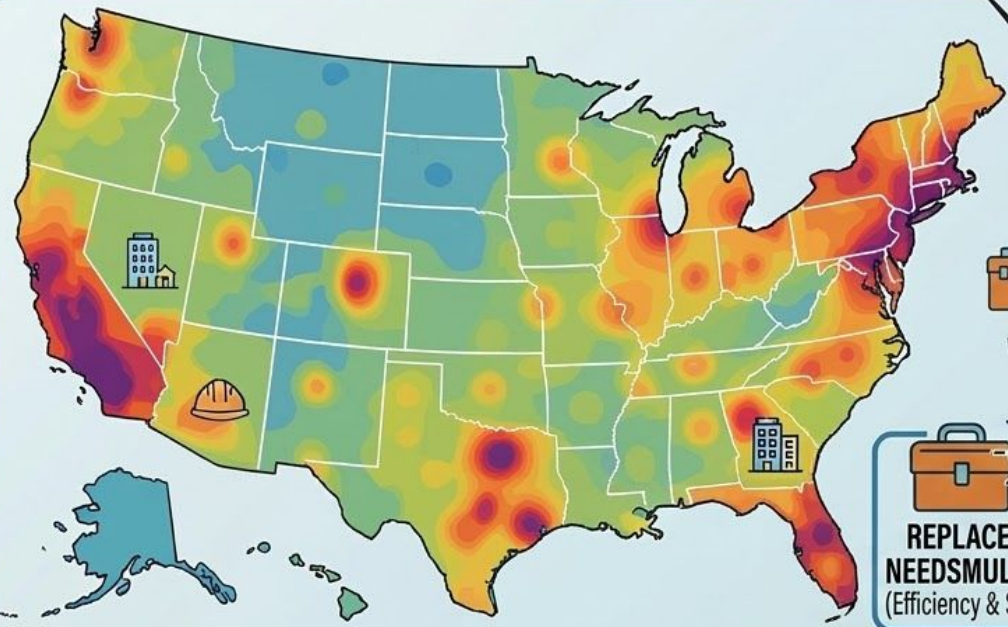
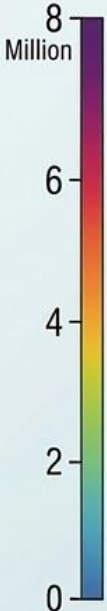
**CURRENT CONSTRUCTION WORKFORCE**

↑ **~3.4 MILLION** ↑  
TOTAL CONSTRUCTION WORKERS (CURRENT)

HIGH MEDIAN AGE: A Cohort Approaches Retirement Simultaneously.

**LABOR SHORTAGE GAP: ACCDERATING**

⊘ **~500,000+**   
WITH PENDING RETIREMENTS



**REPLACEMENT NEEDSMULTIPLIER**  
(Efficiency & Skill Loss)

**Bridging the Skill Gap and Workforce Shortfall to Deliver Needed Housing**

**Data Sources & Citations:** Labor shortage figures synthesized from JCHS of Harvard University, NAR Research, NAHB analysis. Labor need projections based on U.S. Census Bureau population data and worker-per-unit productivity models. Aging fom BLS and JCHS. Regional shortage intensity figures from RPA and NAHB studies. Multiplier context based on industry skill-loss and automation analyses.

# STATUS QUO ECONOMIC MODEL: A CYCLIC VIEW

## PROFIT-CENTERED EXTRACTION & PRODUCTION

## ECOLOGICAL & SOCIETAL DEGRADATION



Linear, industrial scale, fossil fuel dependence.

Descending ecological quality, increasing poverty, systemic breakdown

# Two Loops



# What Economic & Social Models Does Climate Restoration Require?



# What Does Climate Restoration Require?

- embed menti here
- What are the limitations of profit/competitive model?  
(word cloud/mentimeter responses)
- What does climate restoration require from us in how we organize?

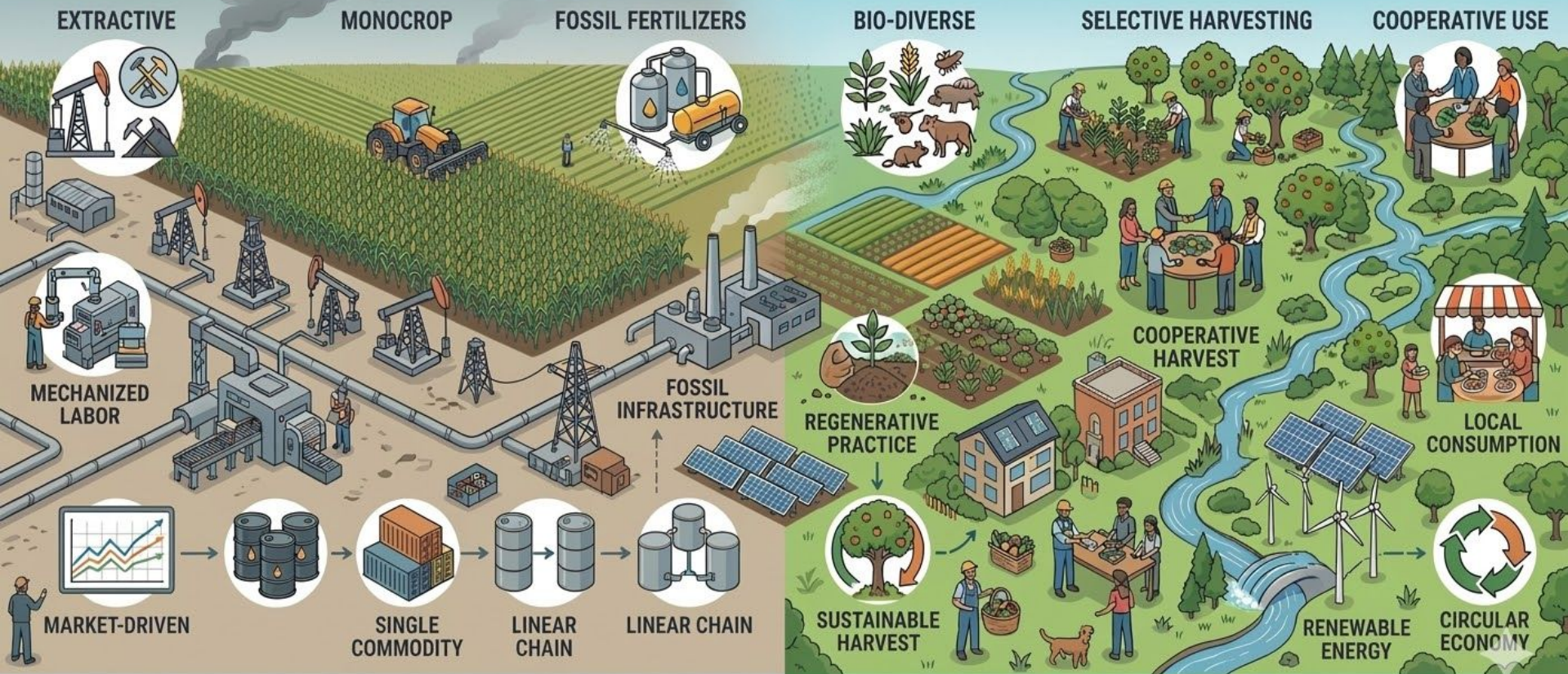


# What economic and social models does climate restoration require?

# ECONOMIC MODELS FOR RESOURCE MANAGEMENT

## EXTRACTIVE MONOCROP & FOSSIL FUEL FERTILIZERS

## BIO-DIVERSE & COOPERATIVE USE



Linear, industrial scale, fossil fuel dependence.

Circular, diverse, community-focused, renewable.



TOXIC  
FERTILIZER

2019 BuildingEnergy Boston keynote  
presenters Jacob Racusin, Chris  
Magwood, and Ace McArleton



# The story of the Seed Program

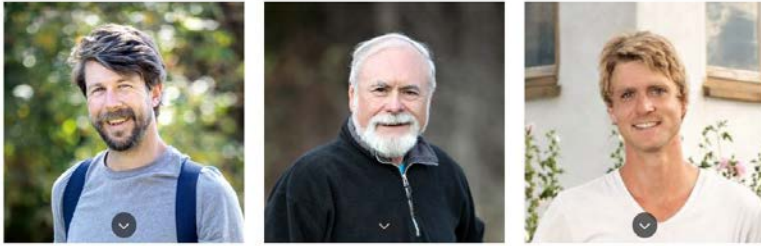
# Rare Forms

The image shows the interior of a building under construction. The ceiling is made of exposed wooden joists with corrugated metal hangers. The walls are partially covered with straw panels. The floor is covered with plywood sheathing, some of which has 'FLAT OUT BEST' printed on it. A worker in a yellow shirt is visible in the background near an open doorway. A Makita generator is on the left, and a roll of material is on the floor in the center.

Founded 2020

First straw panels - 2024

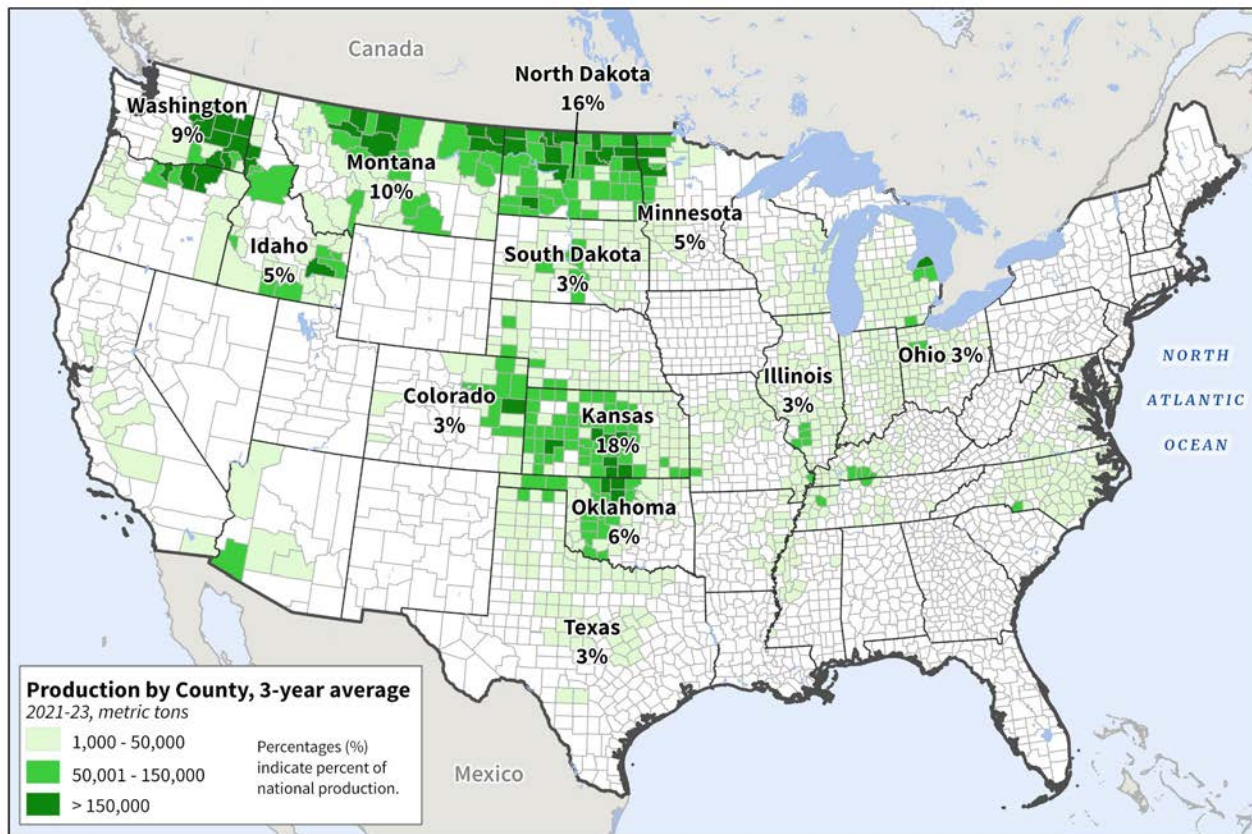
8 completed or currently  
in production



New Frameworks  
*Low Impact. High Performance.*



# United States: Wheat Production



Source: U.S. Department of Agriculture,  
National Agricultural Statistics Service





Spring 2024, @New  
Frameworks, Essex Jct VT

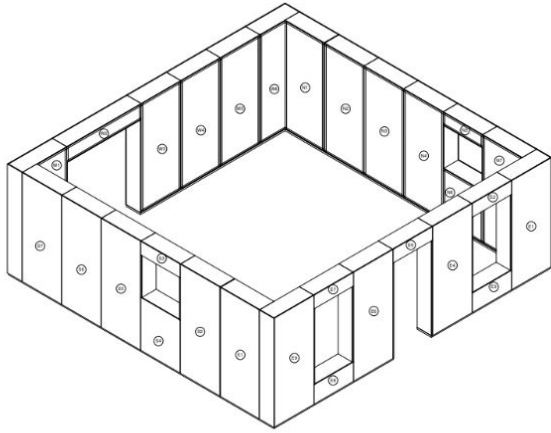




## **Project #1:**

Boone County, Missouri

Design, Shop Drawings, Panel Fabrication, Panel Install,  
Finish Out (except roofing)



PANEL SHEET LIST	
SHEET NAME	SHEET NUMBER
GENERAL INFORMATION	PG 100
COVER PAGE	
EXHIBIT PLANS	PG 100
SECTION PLANS	PG 100
DETAILS AND DETAILS	PG 100

MAIN FLOOR PANEL LIST			
Mark	Type	Mark	Height
E1	SP	SP	82.5"
E2	SP	SP	11.5"
E3	P	SP	82.5"
E4	P	SP	11.5"
E5	P	SP	82.5"
E6	SP	SP	11.5"
E7	P	SP	82.5"
E8	SP	SP	11.5"
E9	P	SP	82.5"
E10	P	SP	82.5"
E11	P	SP	82.5"
E12	P	SP	82.5"
E13	P	SP	82.5"
E14	P	SP	82.5"
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E90	P	SP	82.5"
E91	P	SP	82.5"
E92	P	SP	82.5"
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E97	P	SP	82.5"
E98	P	SP	82.5"
E99	P	SP	82.5"
E100	P	SP	82.5"
TOTAL PANELS: 20			

PANEL LAYOUT MAIN FLOOR

and Second Floor ... 240104 SMCo Vagelos Panel Sho... 240508 Rare Forms - Williston A... + Create

Find text or tools 🔍 📄 🔄 🖨️

PANEL W/ (2) 2x4 ON RIGHT												
Mark	Type	Mark	Height	TRIMMS (in)								Mark
				A (in)	B (in)	C (in)	D (in)	E (in)	F (in)	G (in)	H (in)	
E1	SP	SP	82.5"	0"	0"	0"	0"	0"	0"	0"	0"	0"
E2	SP	SP	11.5"	0"	0"	0"	0"	0"	0"	0"	0"	0"
E3	P	SP	82.5"	0"	0"	0"	0"	0"	0"	0"	0"	0"
E4	P	SP	11.5"	0"	0"	0"	0"	0"	0"	0"	0"	0"
E5	P	SP	82.5"	0"	0"	0"	0"	0"	0"	0"	0"	0"
E6	SP	SP	11.5"	0"	0"	0"	0"	0"	0"	0"	0"	0"
E7	P	SP	82.5"	0"	0"	0"	0"	0"	0"	0"	0"	0"
E8	SP	SP	11.5"	0"	0"	0"	0"	0"	0"	0"	0"	0"
E9	P	SP	82.5"	0"	0"	0"	0"	0"	0"	0"	0"	0"
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E87	P	SP	82.5"	0"	0"	0"	0"	0"	0"	0"	0"	0"
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E89	P	SP	82.5"	0"	0"	0"	0"	0"	0"	0"	0"	0"
E90	P	SP	82.5"	0"	0"	0"	0"	0"	0"	0"	0"	0"
E91	P	SP	82.5"	0"	0"	0"	0"	0"	0"	0"	0"	0"
E92	P	SP	82.5"	0"	0"	0"	0"	0"	0"	0"	0"	0"
E93	P	SP	82.5"	0"	0"	0"	0"	0"	0"	0"	0"	0"
E94	P	SP	82.5"	0"	0"	0"	0"	0"	0"	0"	0"	0"
E95	P	SP	82.5"	0"	0"	0"	0"	0"	0"	0"	0"	0"
E96	P	SP	82.5"	0"	0"	0"	0"	0"	0"	0"	0"	0"
E97	P	SP	82.5"	0"	0"	0"	0"	0"	0"	0"	0"	0"
E98	P	SP	82.5"	0"	0"	0"</						



**BUILDING  
INTEGRITY**















Come see Missouri's first\*  
prefabricated straw bale  
home under construction!

Straw bale construction was  
developed over 125 years ago,  
and prefabricated straw bale  
construction has gained  
popularity in Europe in the last  
decade.

Learn about the many  
environmental benefits of this  
construction method and the  
local companies making it  
happen!

December 14, 2024 2pm - 5pm

9765 S. Smith Hatchery Rd  
Columbia, MO 65203

Free & open to  
the public!

For more info visit:  
[www.buildinteg.com](http://www.buildinteg.com)

Light Refreshments  
& Hot Beverages!

\*to our knowledge; if you know of another prefab  
straw bale building, please tell us!



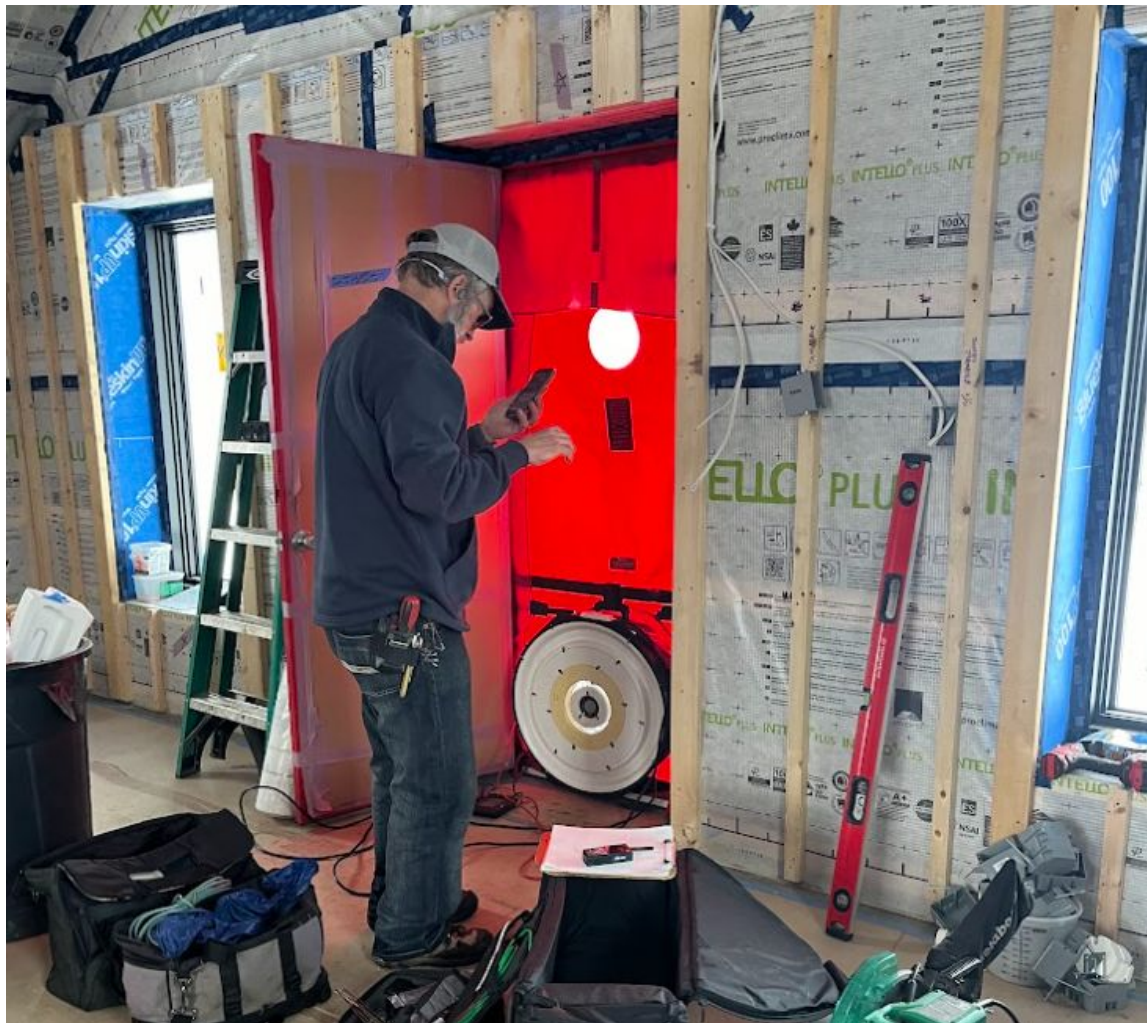
# Open House!



This is straw!











6 months from  
foundation to  
occupancy in March  
2025!



# The story of the Seed Program



New Frameworks' Story:  
From Bespoke Straw → Prefab & Pre-design Straw  
2004 → 2025



Straw bale timber  
frame home in  
Barnet, VT - 2007

Built avg of 1-2  
homes & buildings  
/year in the  
Northeast from  
2004-2019 = 20  
straw homes total  
over 1st 15 years



How we built with straw then: Ace & Jacob - co-founders of New Frameworks, in 2009



Built avg of 6  
straw panel homes  
& buildings per  
year across the  
U.S. from  
2019-2025 (6  
years) = 36  
buildings total with  
straw panels

Structural Straw Bale  
Panel Predesigned Kit  
Home (Casita Terra) -  
2024

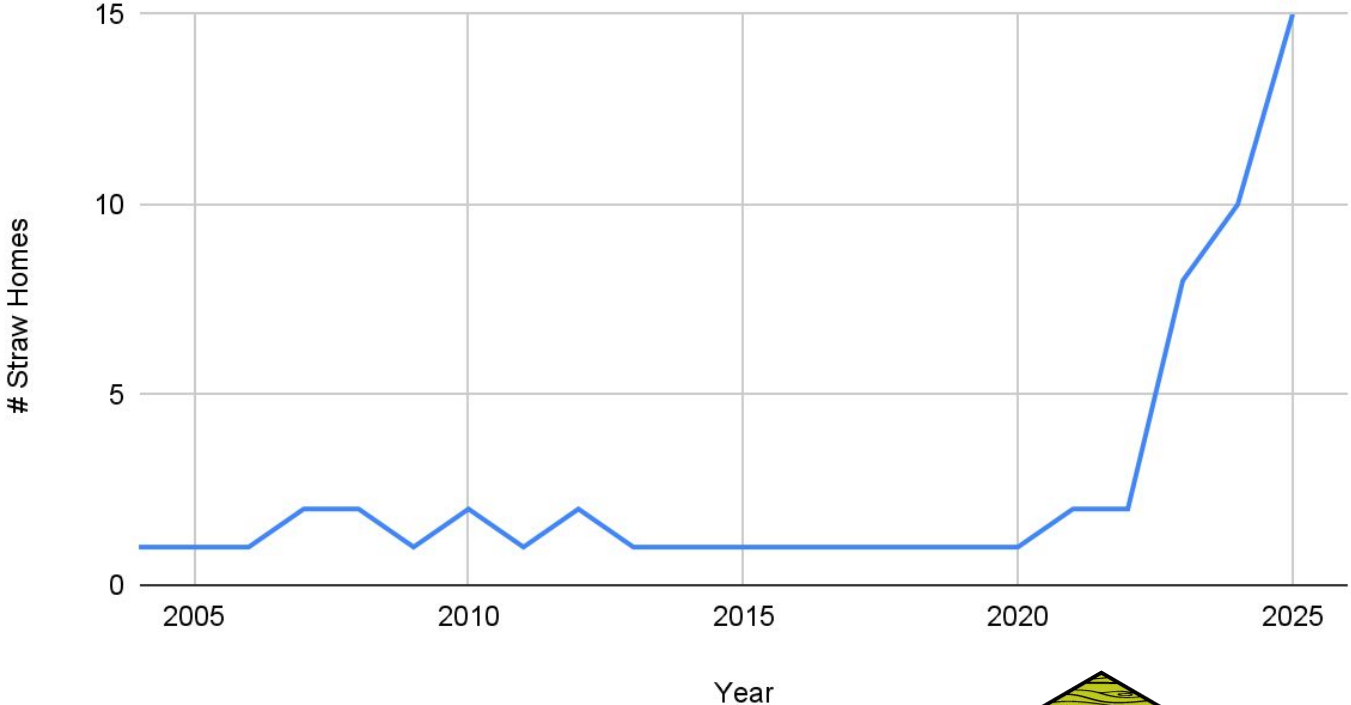


New Frameworks

How we build  
with straw  
now:



# # Straw Homes vs. Year



↑ 385%

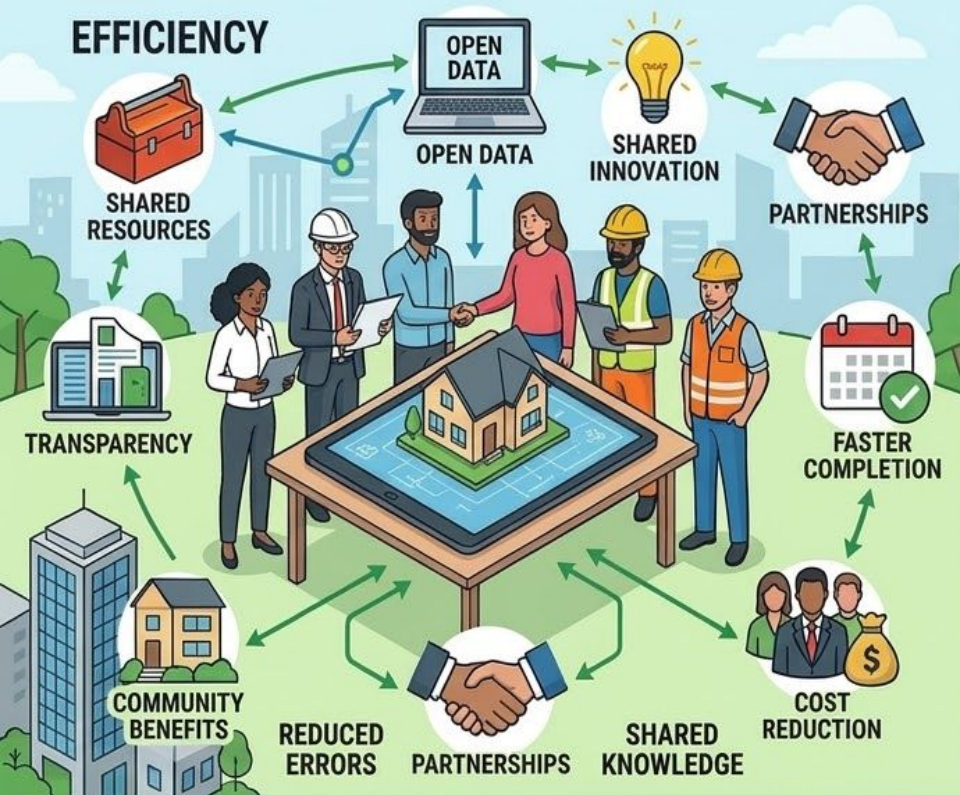


New Frameworks

# BENEFITS OF COLLABORATION IN RESIDENTIAL CONSTRUCTION

## COLLABORATIVE OPEN SOURCE MODEL

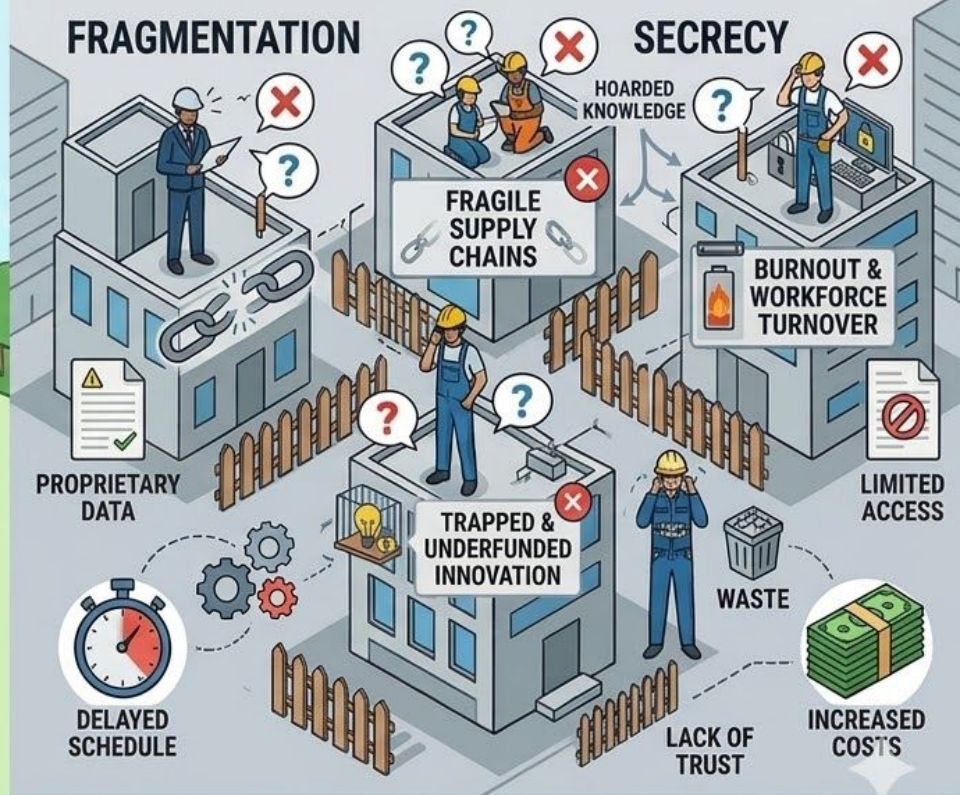
Unified effort, shared information, collective success



Unified effort, shared information, collective success

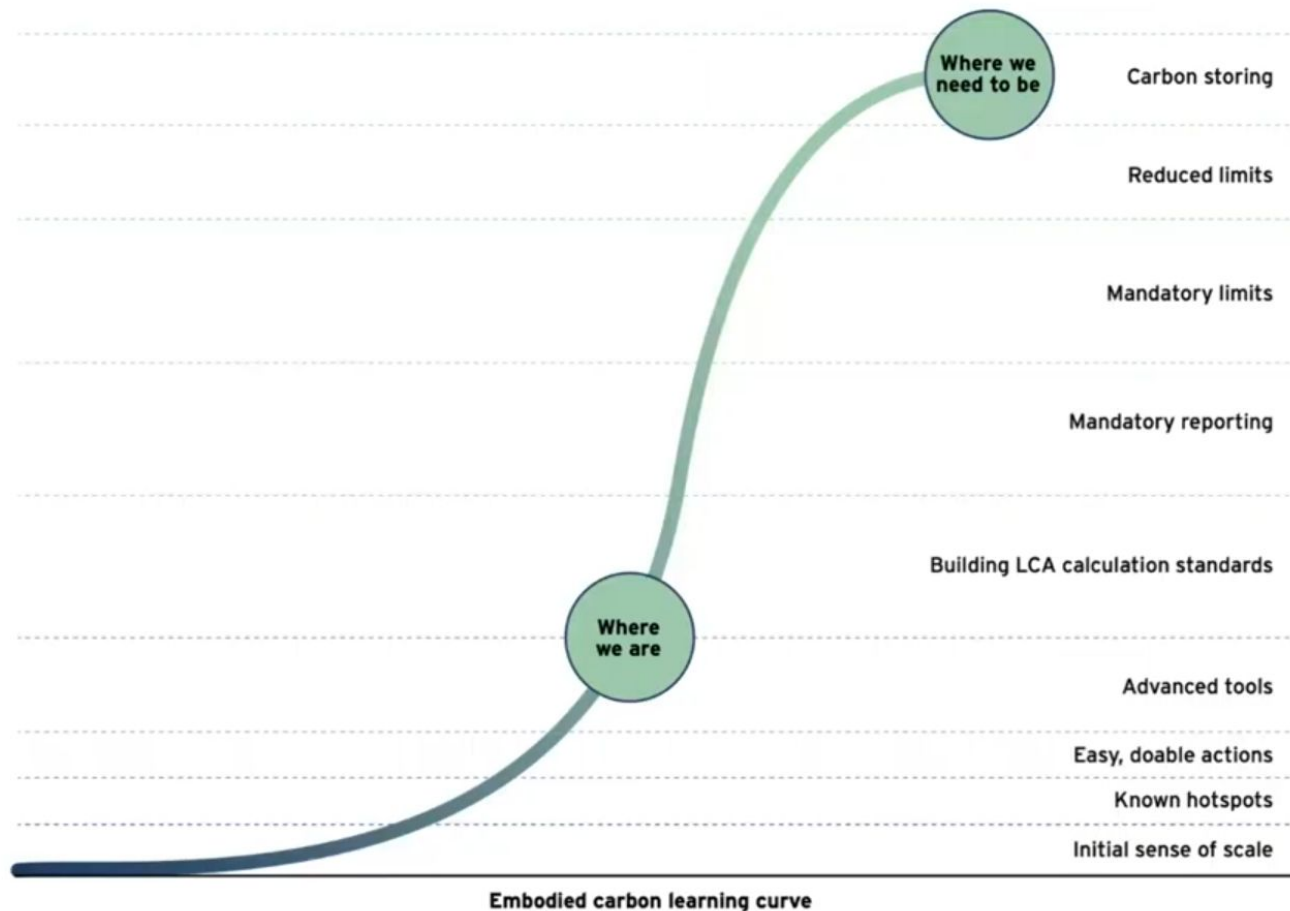
## SILOED COMPETITIVE MODEL

Separate efforts, guarded information, isolated outcomes, structural risks.



Separate efforts, guarded information, isolated outcomes, structural risks, high cost of friction

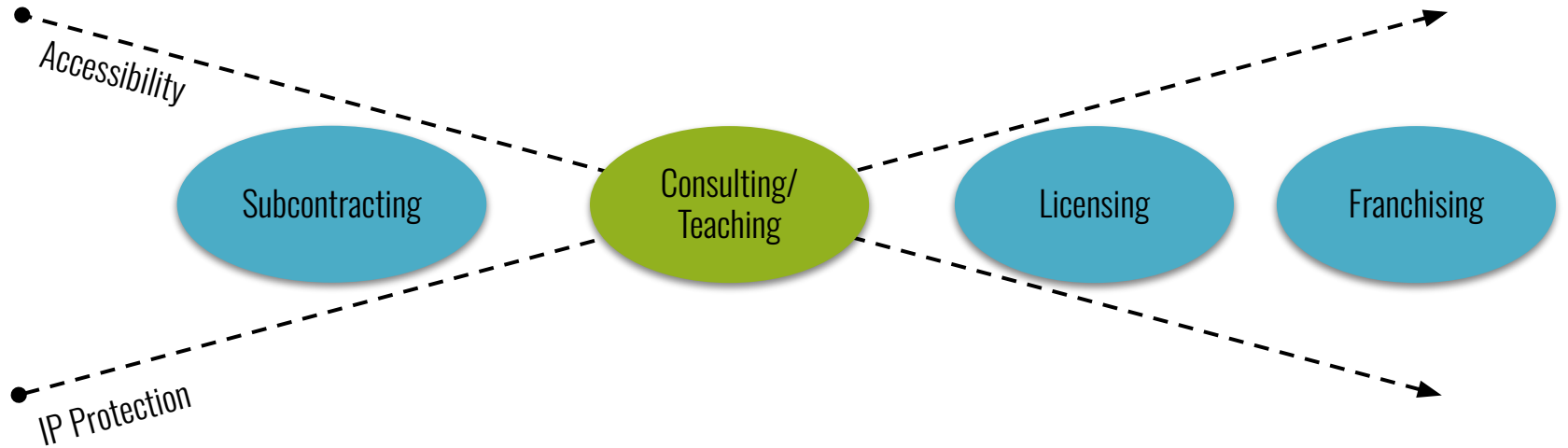
## We must accelerate our position on this curve to meet climate thresholds



# Seed Program Structure



# Structural Options



# 3 Year Program

## **Year 1: Startup Intensive**

- . 14 Info Sessions
- . Group Q&A
- . Individual Consulting
- . In-Person Training
- . Network Development

## **Year 2-3: Journey Years**

- . Consulting Support
- . Seed Collaborator Sessions (2x/year)
- . Shared Improvements
- . Marketing
- . Fostering further cooperation

# 2024 - The Seed Program Begins



New Frameworks



**RARE  
FORMS**  
LOCALLY GROWN HOMES



**BUILDING  
INTEGRITY**



# 2025 - The Seed Collaborative Develops

The Collaborative emerges from the 2024 cohort graduates as a model to build mutual support and an economic ecosystem around straw panel manufacturing.



**The Seed Collaborative**  
Straw Panel Network



New Frameworks



**RARE FORMS**  
LOCALLY GROWN HOMES



**BUILDING INTEGRITY**



**AI Design Build**

LIVING  
CRAFT

**AIM**  
STUDIO  
ARCHITECTS

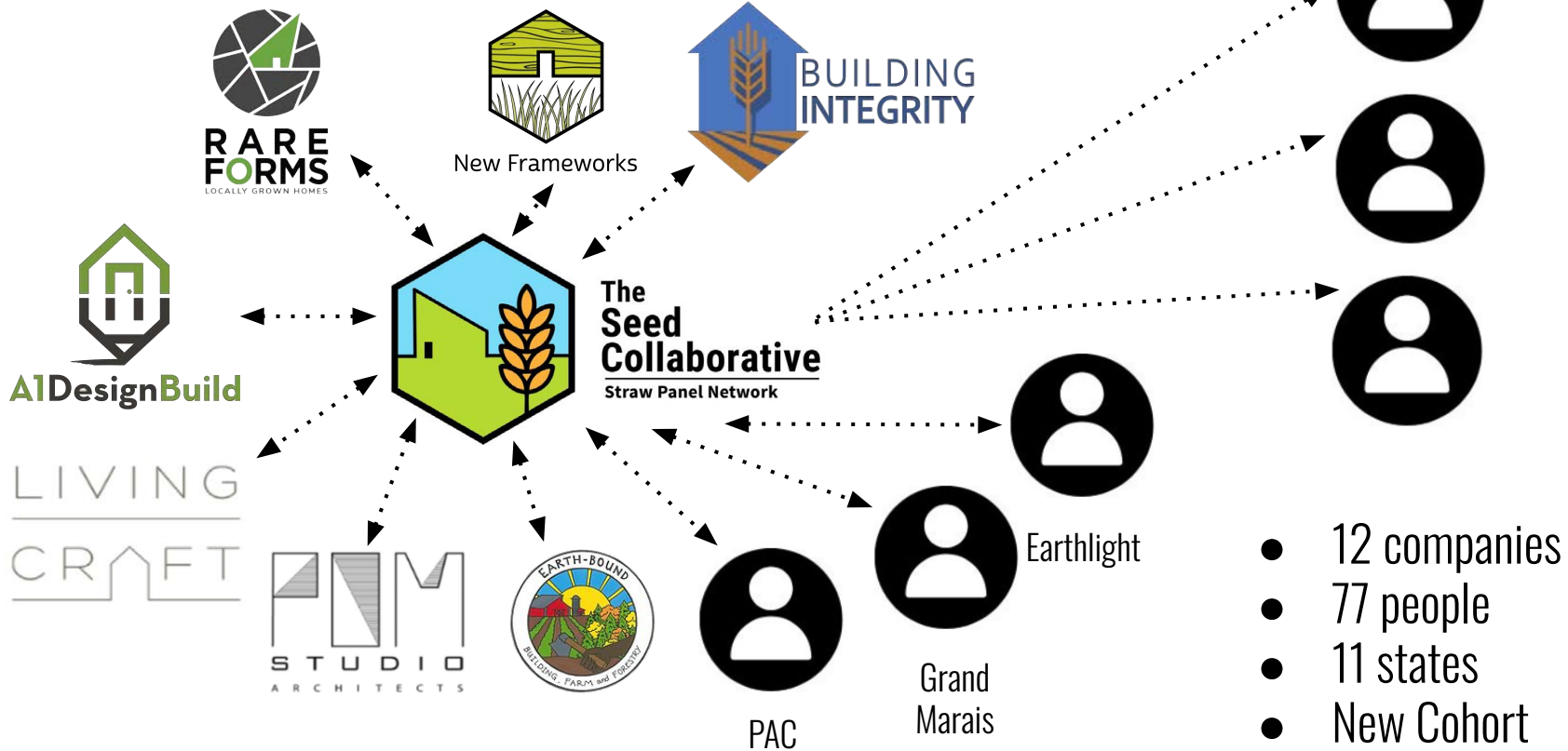


# 2026 - The Seed Collaborative Expands

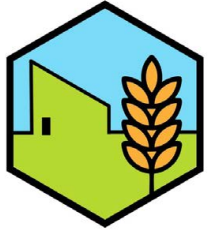
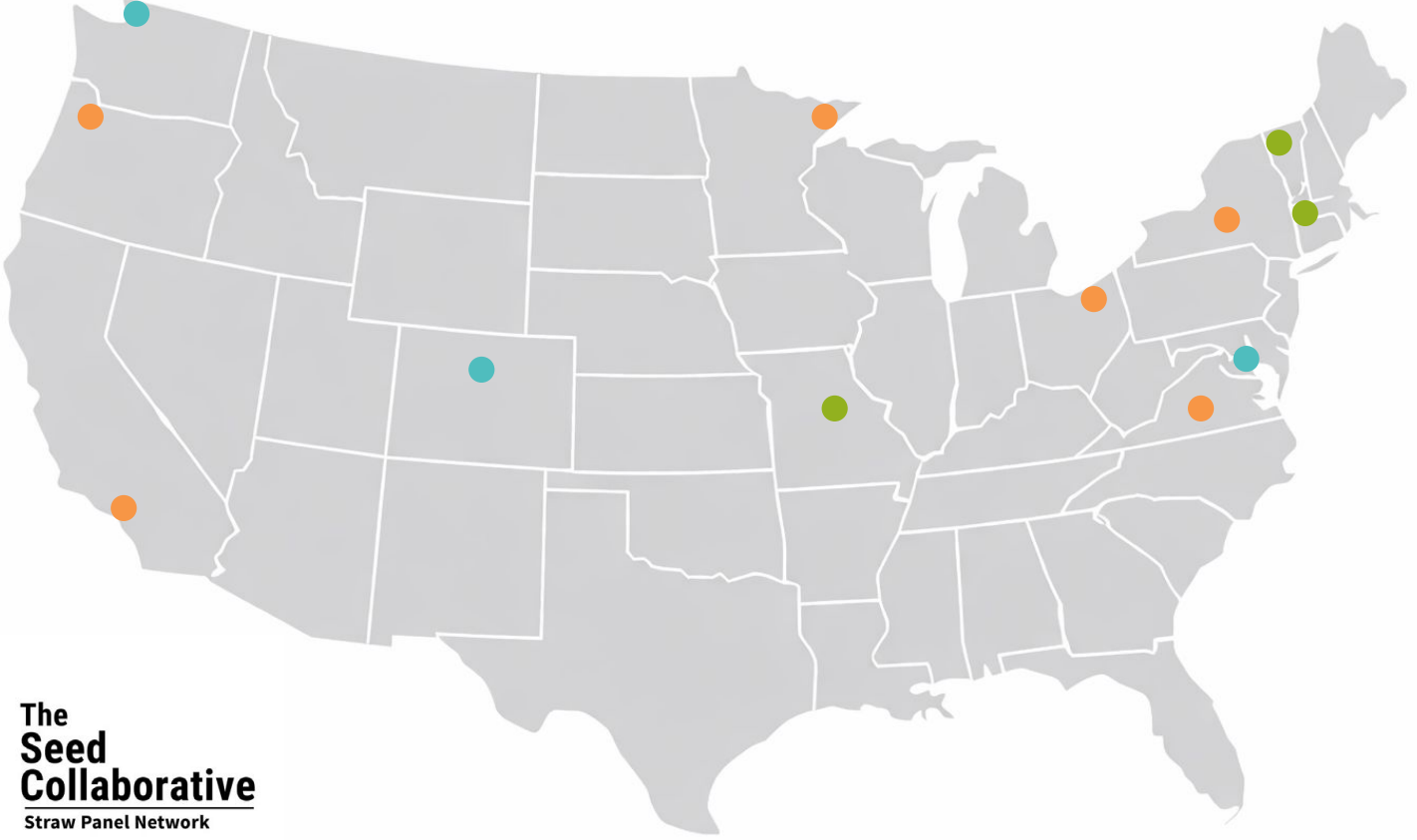
- 7 companies
- 66 people
- 6 states



# 2027 - The Seed Collaborative Matures

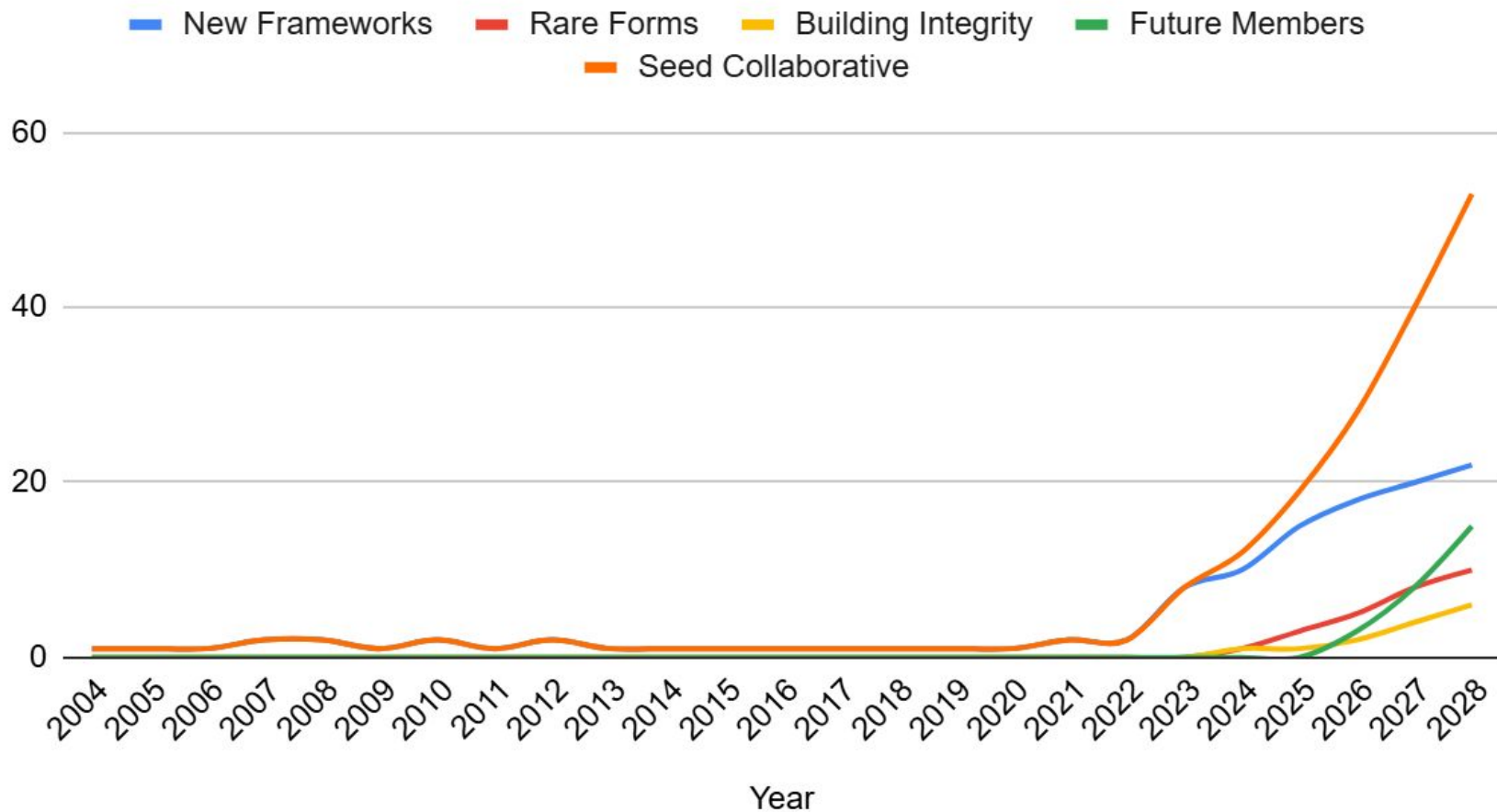


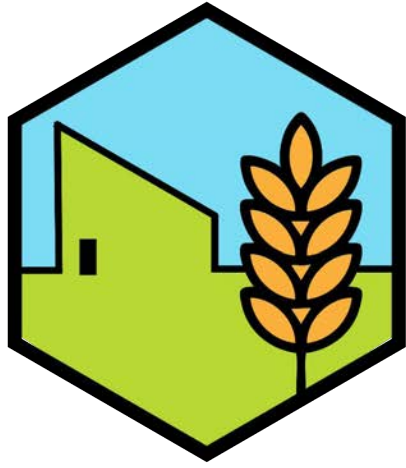
- 2024
- 2025
- 2026



**The  
Seed  
Collaborative**  
Straw Panel Network

# Straw Homes Produced Per Year





**The  
Seed  
Collaborative**  

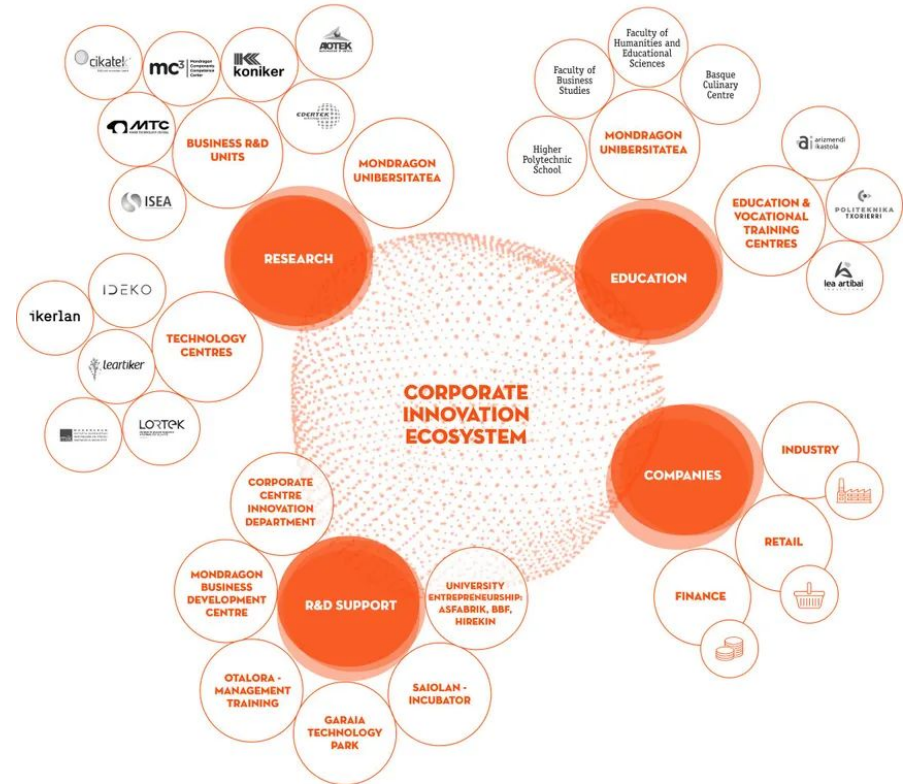
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**Straw Panel Network**

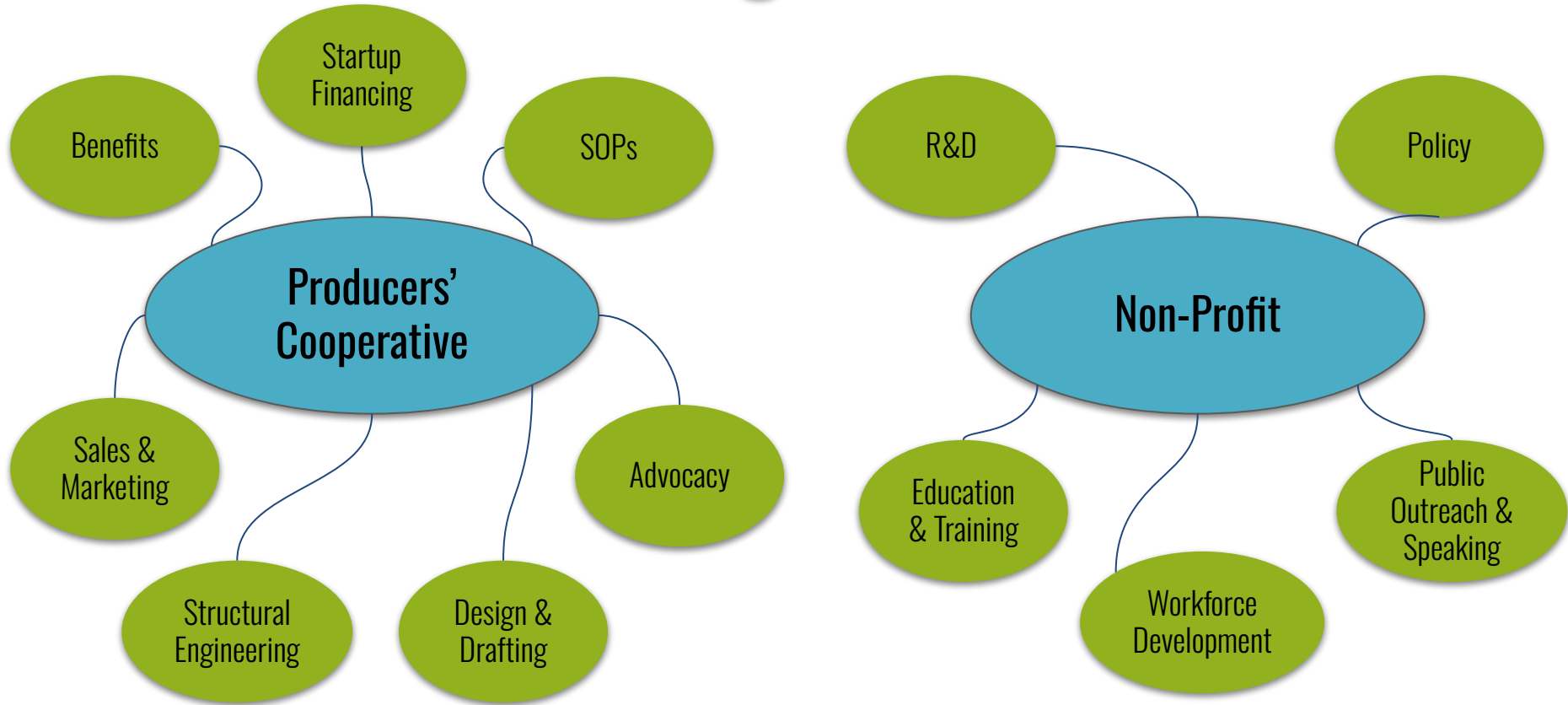
**The nitty gritty details**

# Mondragon - A Model For Success

- Founded in 1956
- 80,000+ worker owners
- 90+ cooperatives
- Shared Services
  - Finance, education, R&D
- Globally competitive local ecosystem of business



# Sister Organizations



# Producers' Cooperative

A woman with her hair in braids, wearing a denim shirt, is sitting at a desk in an office, looking at a laptop. The background shows a wooden chair and a desk with a computer monitor.

- Also called Shared-Services Cooperative
- Cooperatively owned by member companies
- National examples:
  - Trades: Amicus Solar Cooperative
  - Agricultural: Ocean Spray, Organic Valley
  - Media: Associated Press (AP)

# What Are The Shared Services?

- Sales & marketing
  - Common CRM Platform
- Public outreach & Advocacy
- SOPs
- Structural engineering
- Policy & advocacy
- Group Pooled Benefits
- Startup Financing (CFNE)

mark	description	unit	quantity	unit price	total price
001	PS&B	20"	100	1.00	100.00
002	PS&B	20"	100	1.00	100.00
003	PS&B	20"	100	1.00	100.00
004	PS&B	20"	100	1.00	100.00
005	PS&B	20"	100	1.00	100.00
006	PS&B	20"	100	1.00	100.00
007	PS&B	20"	100	1.00	100.00
008	PS&B	20"	100	1.00	100.00
009	PS&B	20"	100	1.00	100.00
010	PS&B	20"	100	1.00	100.00



Meeting controls bar including: a speaker icon, a CC icon, a 1X zoom icon, a settings gear icon, and a full-screen icon.

# What's NOT shared



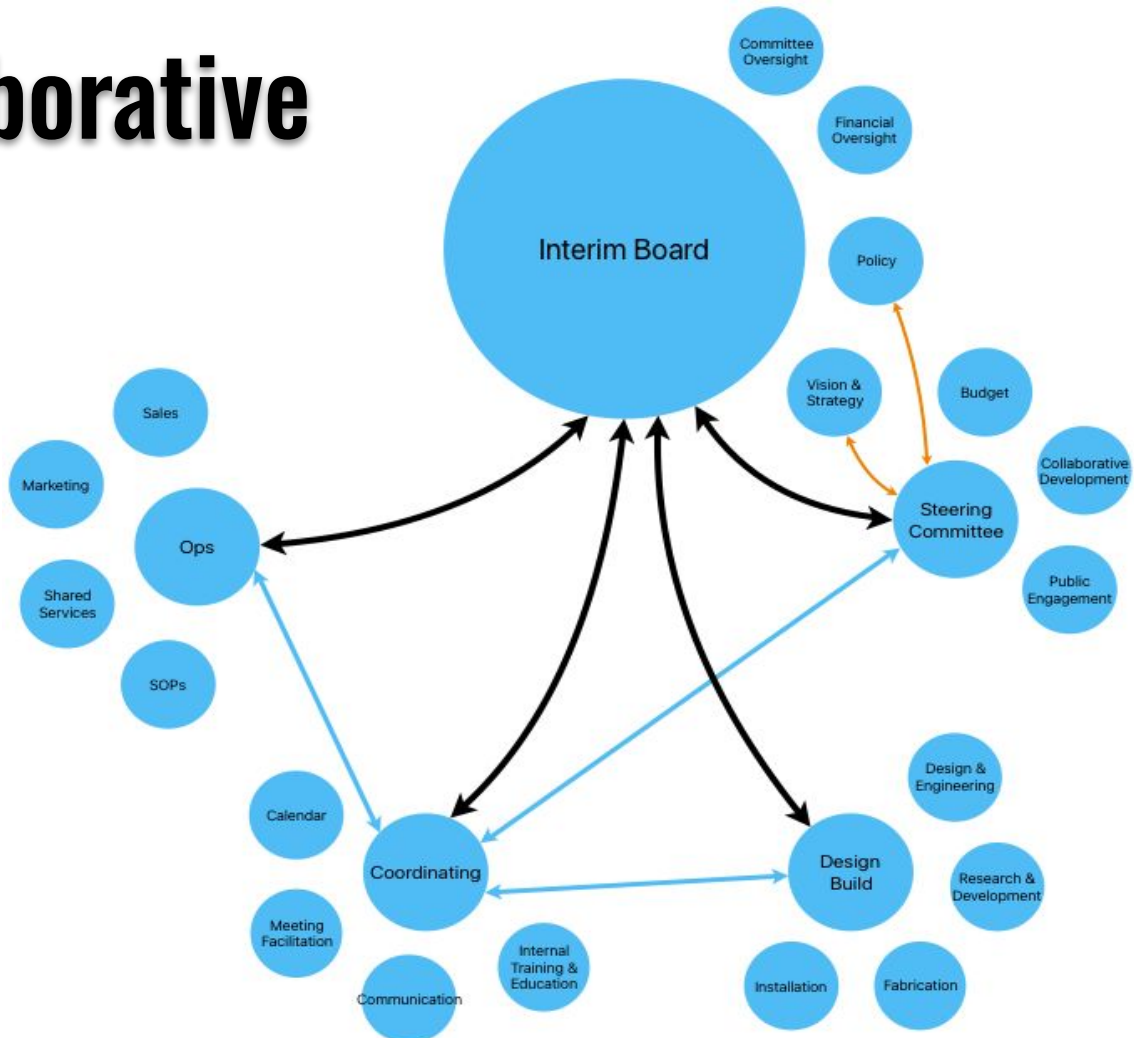
- Ownership of member companies
- Identity of member companies
- Work schedule determination of individual members
- Project level decision making of individual members
- Pricing of individual members

# What Is Happening Now



- **Piloting resource interchange / shared services between RF & NFW**
  - Tracking time with quarterly reconciliation
  - RF Handles all Casita Inquiries
  - NFW Handles panelization drafting
- **Problem solving on small scale before expanding**
- **Apprenticeship model**
- **Fabrication + Installation partnerships**
- **building or product example**

# Current Collaborative Structure



# What the Collaborative Enables



Mutual benefit & support

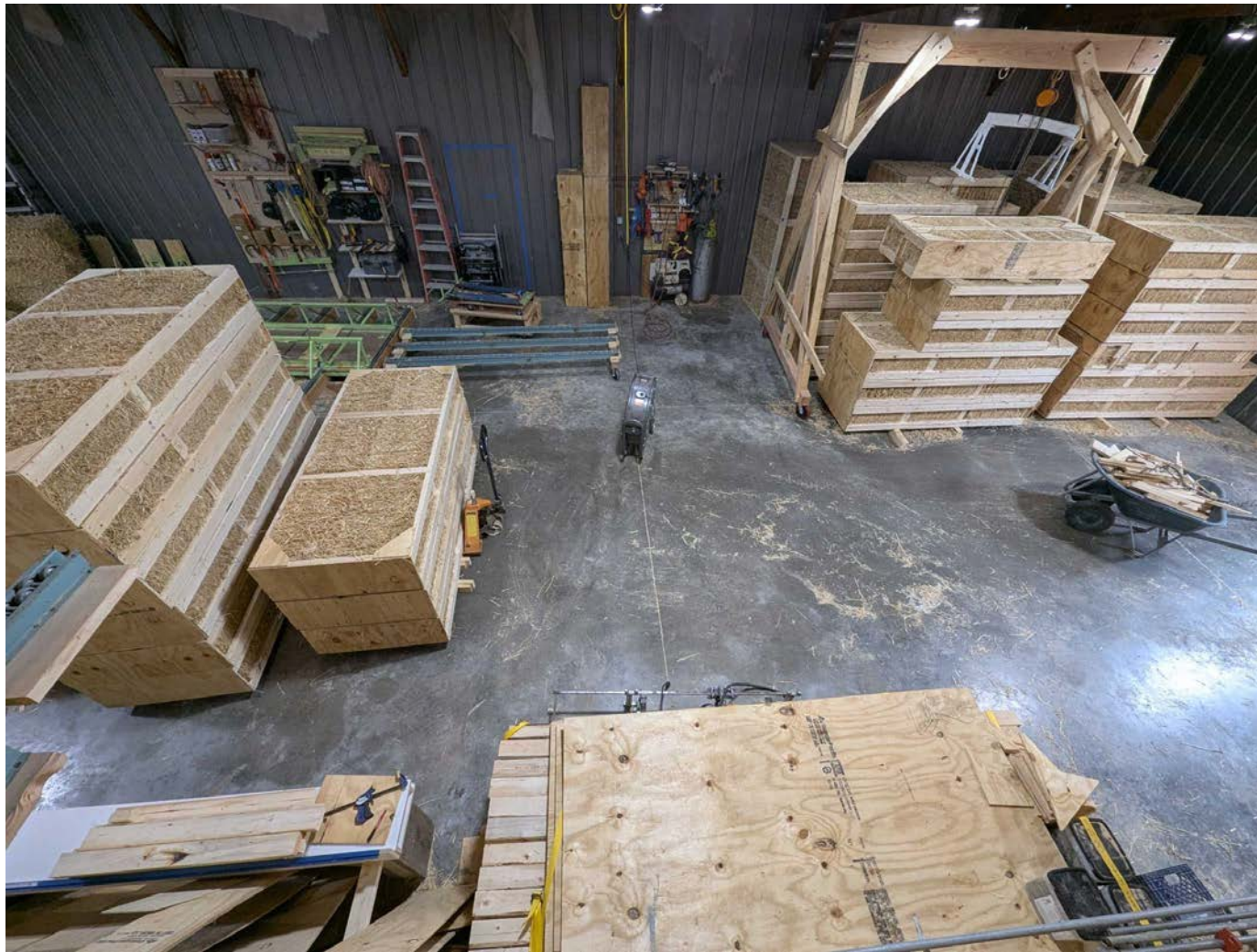
Innovation through  
shared R&D

Bulk material  
access

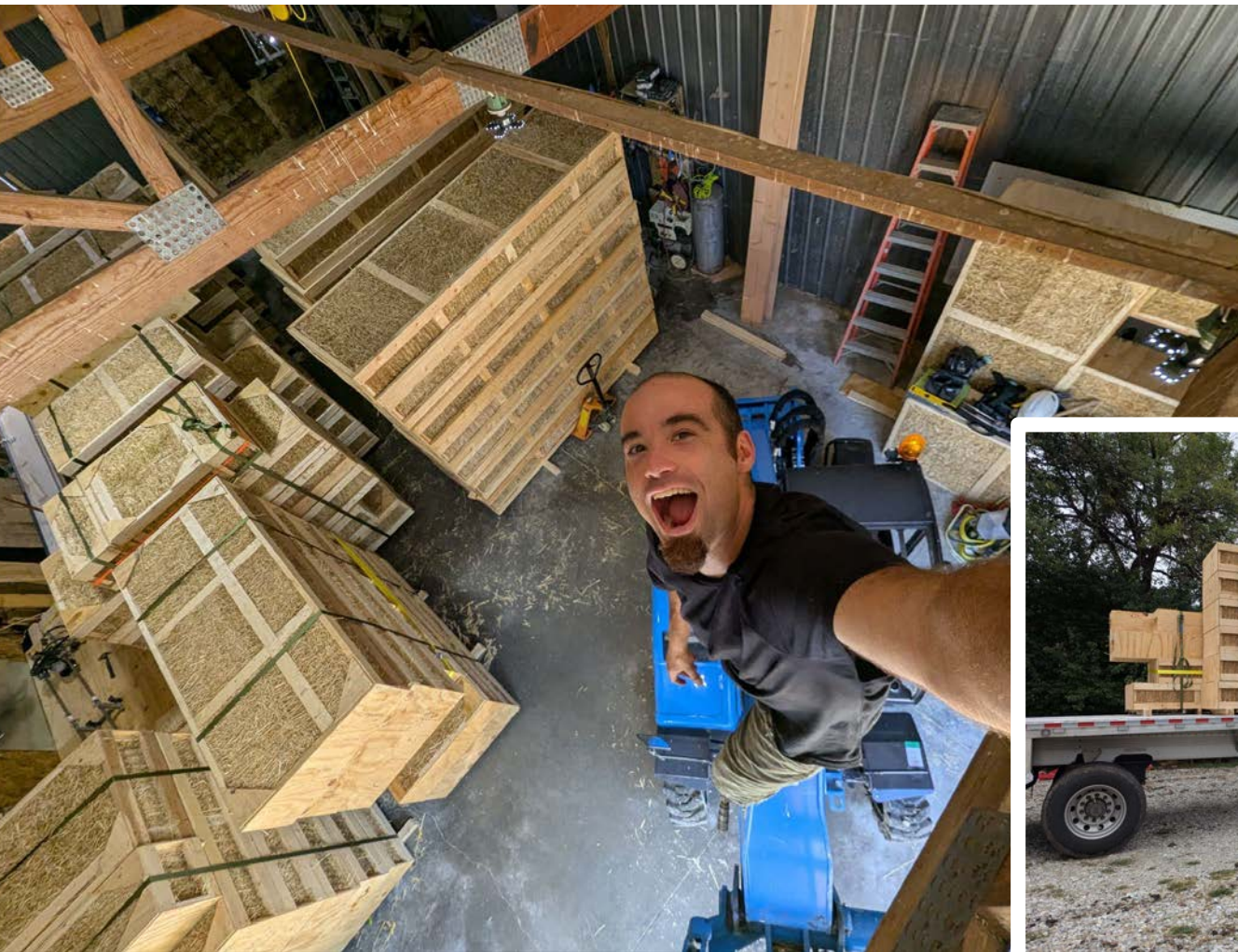
Speed without burnout

Resilience through  
redundancy

Equity through shared  
access



Summer 2025:  
New Shop!







# What's Hard & What We're Learning

- Building trust and honest feedback
- Governance and scaling decision-making
- Legal organizational structure
- Letting go of control and aligning capital with values
- Balancing innovation & open source with consistent, common product



# What's Next



## For Profit

- Expansion of shared services
- Pooled benefits

## Non-Profit

- Transition of Seed Program administration
- Structured & resourced R&D
- Policy
- Grant funding

## Expanding Membership

- New Cohorts
- New membership types / trades
- Applying the model beyond straw panels

# How can we apply this to other lines of business?

What would it look like if you were no longer competing with your peers in this room, but sharing capacity and collaborating with them?

- Regional contractors collective
- Response to shifting state/national policy
- Community support, solidarity, and resiliency
- What are the potentials that exist within our NESEA community to evolve and grow these types of alternative economic models for climate action in AEC industry?



# **Good News!**

**We don't need to work harder**

**We need to work smarter....  
together: Farther, faster, together**

**Focus on positive impact**

**Build the world we want... NOW!**

# Q&A

## Topics for discussion:

- **Cooperative & alternative business models**
- **Scaling climate solutions**
- **The Seed Collaborative**
- **Workforce development**
- **Housing & climate intersection**
- **Policy & market transformation**
- **Collaborative culture**
- **... and more!**



# BUILDINGENERGY BOSTON

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Please fill out an evaluation for this session



or: [nesea.org/eval](https://nesea.org/eval)

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Northeast Sustainable Energy Association (NESEA)