# Life Sciences Caucus Meeting
May 21, 2025
7:30am

Co-chairs:
Senators Sawrey and Chaudhuri
Representatives White and Reives

Meeting will begin shortly

# Agenda

Welcoming remarks by Chairs

History of NC's Life Sciences Industry

Laura Gunter, President, NCLifeSci

Joe Lanier, Principal, Milestone Strategies and NCLifeSci lobbyist

National Security Commission on Emerging Biotechnology and NC's opportunity

Carson Billingsley, Business Relations Partner, Novonesis

Heather Smith, Head of Regional Strategy, Novonesis

Disrupting the Construction Industry

Benjamin Griffin, PhD, Vice President R&D, Biomason

NC Life Sciences Organization

*Advocate. Advance.*

# NCGA Life Sciences Caucus Meeting
# May 21, 2025

Laura Gunter, President
Joe Lanier, Milestone Strategies

# North Carolina's Life Sciences History

- Why early investment
  - Overall economic development strategy to diversify from historical reliance on tobacco, textiles and furniture
  - Agriculture and medicine – two NC's largest industries were ripe for technological reform

# North Carolina's Life Sciences History

- NC Biotechnology Center in 1984
  - Strengths in research universities, medical schools, a large research park, capable workforce, and progressive business climate
  - First state-sponsored initiative in biotechnology development
  - Ongoing bipartisan investment

# North Carolina's Life Sciences History

- Early 2000s – inflection point
- Investment in NCBioImpact to form BTEC, BRITE and BioNetwork
  - Public – private partnership – Golden Leaf Foundation
  - Resulting in:
    - $27.5B investment
    - 11K jobs

# Statewide Life Sciences Growth

**Genentech** – A Member of the Roche Group
May 2025
Holly Springs (Wake County)
420 new jobs
$700M investment

**groninger**
January 2025
Charlotte (Mecklenburg County)
60 new jobs
$15.1M investment

**AMGEN**
November 2024
Holly Springs (Wake County)
370 new jobs
$1B investment

**Frontier**
November 2024
Wilmington (New Hanover County)
300 new jobs
$800M investment

**Johnson&Johnson**
October 2024
Wilson (Wilson County)
420 new jobs
$2B investment

**reckitt**
September 2024
Wilson (Wilson County)
289 new jobs
$145.6M investment

**IDEXX**
July 2024
Wilson (Wilson County)
275 new jobs
$147M investment

**NIPRO**
July 2024
Greenville (Pitt County)
232 new jobs
$397.8M investment

**novo nordisk®**
June 2024
Clayton (Johnston County)
1000 new jobs
$4.1B investment

**solvias**
May 2024
Morrisville (Wake County)
170 new jobs

**FUJIFILM Diosynth biotechnologies**
April 2024
Holly Springs (Wake County)
680 new jobs
$1.2B investment

**SCHOTT PHARMA**
March 2024
Wilson (Wilson County)
401 new jobs
$371M investment

**KYOWA KIRIN**
February 2024
Sanford (Lee County)
102 new jobs
$530M investment

**Lilly**
January 2023
RTP (Durham County)
100 new jobs
$450M investment

**Catalent**
December 2022
RTP (Durham County)
201 new jobs
$40M investment

# Today's Inflection Point

- Bio Economy
  - Biological solutions to industrial issues
    - Plants, foods, detergents, gasoline, building materials, defense needs, cosmetics, etc.
- NC need/opportunity
  - Pilot scale facility
  - Train workforce, provide growth opportunities for existing companies, and attract new companies with resources

# National Security Commission on Emerging Biotechnology

- Bipartisan, bicameral legislative Commission
- **Top line:** Biotechnology and biomanufacturing are imperative for national security, economic power, and securing supply chains
  - Tremendous positive impact to revitalize manufacturing and create jobs

Final Report


49
Recommendations

Pillar 1: National organization
**Pillar 2: Mobilize the private sector to scale biotech**
Pillar 3: Biotechnology for defense
Pillar 4: Strategic innovation
Pillar 5: Workforce of the future
Pillar 6: Allies and partners


Sen. Young
(R-IN)


Sen. Padilla
(D-CA)


Rep. Bice
(R-OK)


Rep. Khanna
(D-CA)

Congressional Supporters

# NSCEB Pillar 2: Mobilize the private sector to scale biotechnology

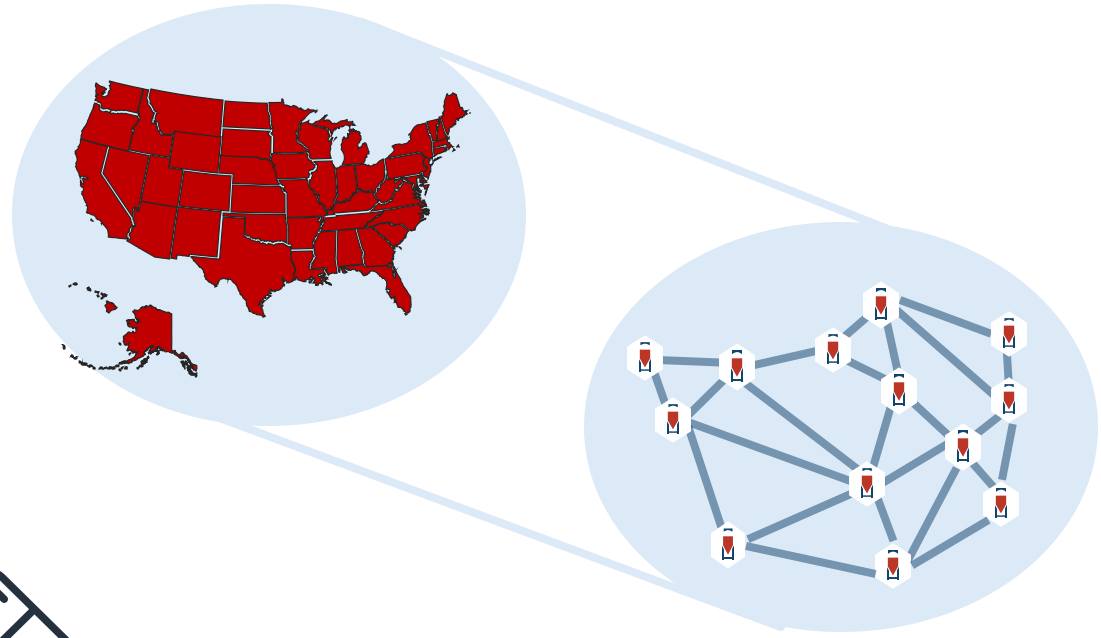
NSCEB
National Security Commission on Emerging Biotechnology

"American companies, particularly early-stage ones, mainly use overseas manufacturing capacity to scale processes for commercialization during the initial stage of bringing a product to market" - NSCEB

**Recommendation 2.3A:** Congress must authorize and fund the **DOE** and the **DOC** to develop a network of precommercial bioindustrial product scale-up facilities.

**Recommendation 3.2:** Congress should continue support for **BioMADE** to create a network of precommercial bioindustrial facilities.

**Recommendation 4.3C:** Congress should initiate a **grand research challenge** focused on making biomanufacturing scale-up predictable, rapid, and cost-competitive.



Food

BioAg & BioControl

Biofuel

Chemicals & Materials

Feed

Pharma

# A coalition has formed around industrial and agricultural biotechnology





















# Pilot facilities bridge the valley of death to spur growth

**III. Full-Scale Manufacturing and Commercial Operations**

**Multi-user, shared piloting infrastructure**

e.g. BioMADE

**I. R&D and Initial Investment**

**"The Valley of Death"**

**II. Initial Commercialization and Production**

# North Carolina has every reason to be the next state


Benjamin Griffin, PhD
Vice President R&D

***NCGA Life Sciences Caucus***
*May 21, 2025*

Benjamin.griffin@biomason.com

# We've built our world with concrete, And we're still building.

**Concrete is strong, versatile, and cheap, but manufacturing concrete requires mountains of cement.**

**Production of cement requires heaps of heat to break down raw materials and bind them again.**

**Cement production is responsible for 8% of global carbon emissions**

**For every ton of Portland cement produced, ~ 870 kg of $CO_2$ is released[1]**
**87% of $CO_2$ emissions come from clinker production (calcination in kiln)**

[1]Portland cement production emissions vary based on fuel/kiln types and can range between 1.2 to 0.78 kg CO2 eq / kg cement. Argonne National Lab reports 868 kg as the US average.

# Biomason’s solution eliminates the majority of cement carbon emissions in concrete

## Biocement® built with carbon + calcium

## Powered by Biology

# Biomason pioneered commercialization of biocement to address the 8% of global $CO_2$ emissions from cement

**Nature-based solution that replaces traditional cement, sequesters carbon, and addresses industry's 2050 net zero targets**

**High Compressive Strength**
**7,500+ psi L-Barrier** Cylinder Cores
**9,300+ psi Paver** Cubes
**20,000+ psi Cut Tiles** from Paver

**Freeze/Thaw Requirements Achieved without Additives**
**EN1339 Passed**, Average 0.34 kg/m$^2$ Mass Loss (< 1kg/m$^2$)
**EN14617 Passed**, 60% of samples retained >80% initial flex strength

**High Flexural Strength**
As high as **10.5+ MPa**

**Aggregate Flexibility**
**Multiple aggregates used** with similar results

**Better Alternative to OPC**
Estimated material **costs competitive** to OPC
Estimated **GWP reduced** compared to OPC

1. Scope 1 (direct emissions), as defined by the Greenhouse Gas Protocol

# Ending the world's dependence on carbon-emitting construction materials by bringing the revolution to cement

| The world's most advanced, proprietary biocement... | ...that can compete on quality and cost... | ...and deliver a superior $CO_2$ profile to traditional cement |
|---|---|---|

*68 granted patents, 60 pending*

*> 1.5 years of industrial manufacturing*

*> 750 sqm of tiles installed commercially*

## ✓ High performance

**Compressive strength of >4000 psi**
**Flexural strength of >4 MPa**

## ✓ Low cost

**Raw materials 35% cheaper than traditional cement**

## ✓ Carbon removal

**Biological sequestration of carbon in concrete**

**Today**

**Estimated 60% reduction in $CO_2$ emissions**

**Future potential**

**95% reduction in $CO_2$ emissions**

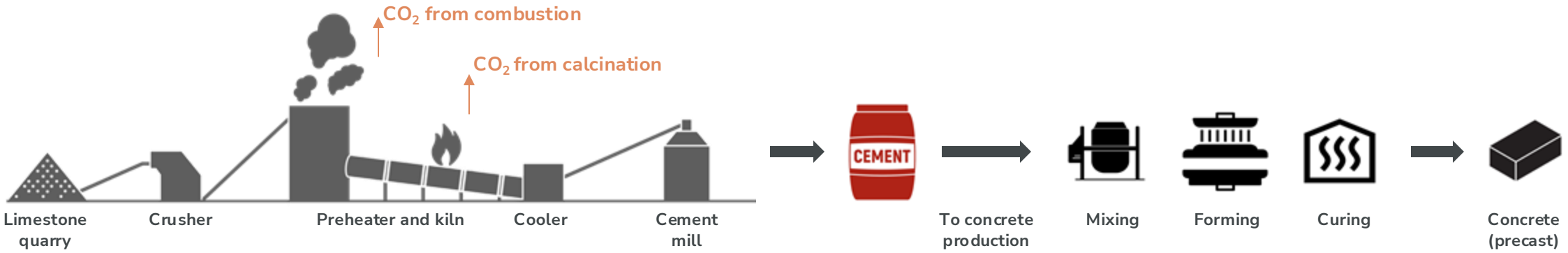
Note: Data based on precast tiles

# The Technology

# A nature-based solution to produce concrete without traditional cement

## The industry has been producing carbon-emitting Portland calcium silicate cement for 200 years

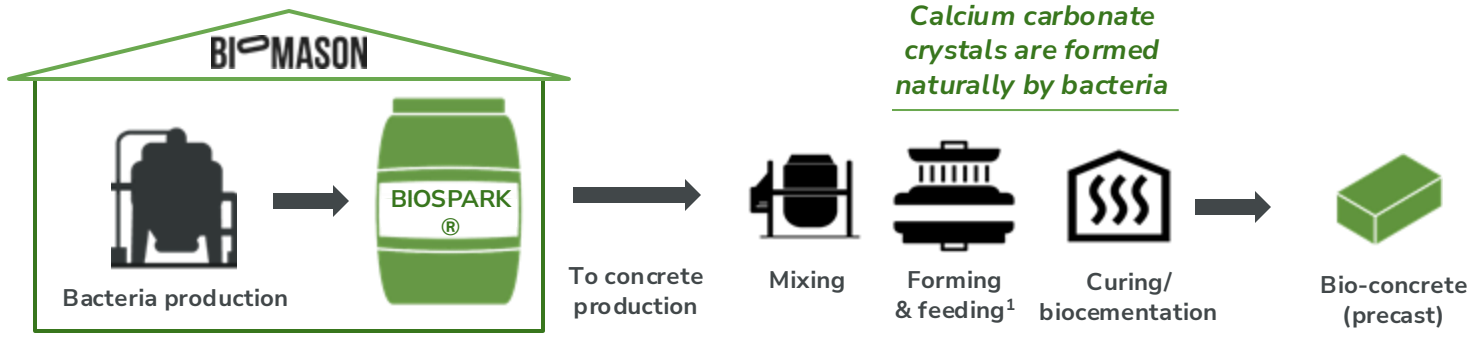
$CaCO_3$ + heat + minerals ⇨ CaO + $CO_2$




## Biocement harnesses nature's billion-year-old method of forming calcium carbonate crystals

Ca-salt + $CH_4N_2O$ + natural bacteria + nutrient ⇨ $Ca^{2+}$ + $CO_3^{2-}$ ⇨ $CaCO_3$

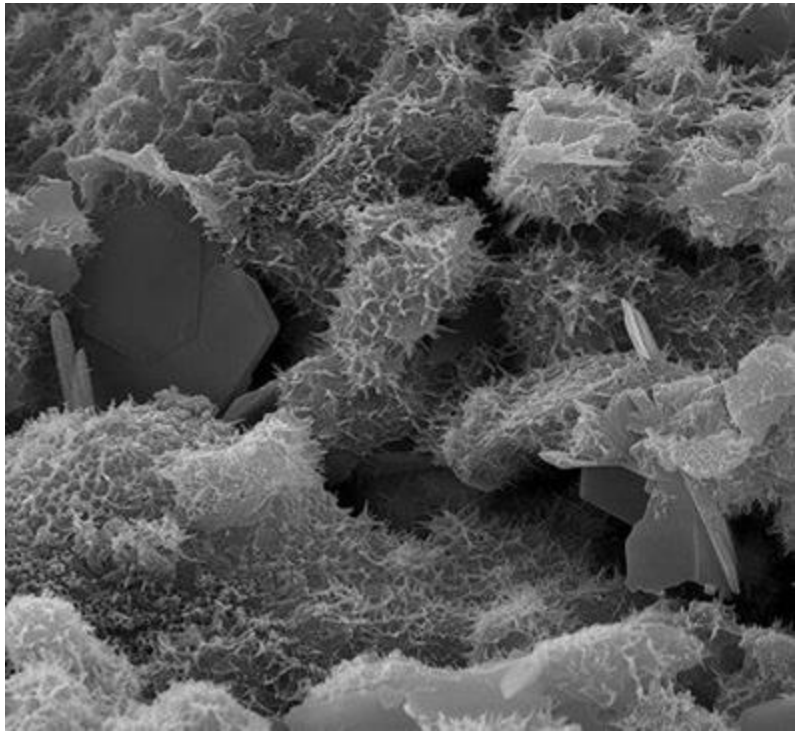
(Urea)



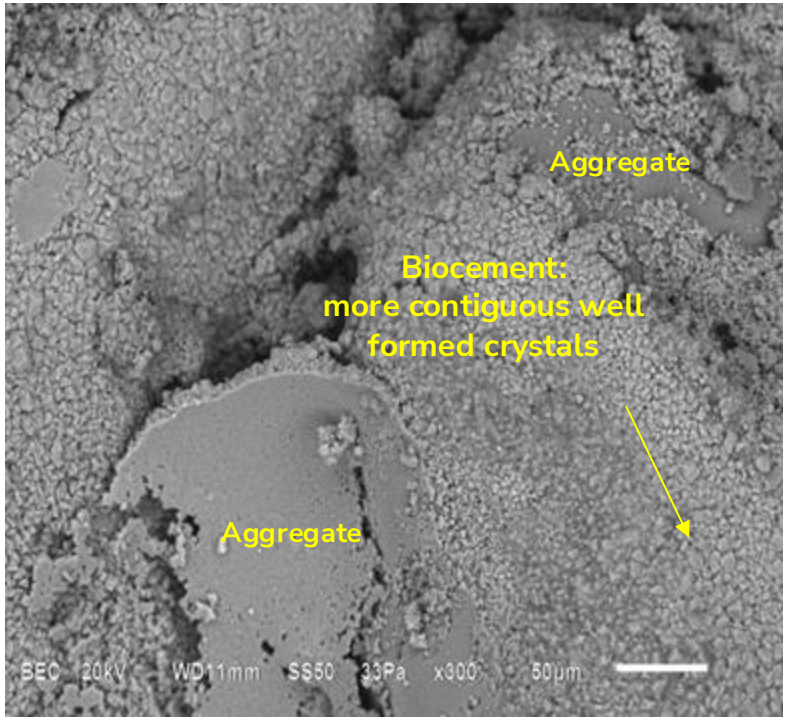

1. Feeding entails adding calcium salts and urea

# Biocement crystals bind aggregate into high-strength concrete

## Portland Cement



## Biocement




Biotech developments achieve high conversion rates of $Ca^{2+}$ and urea to $CaCO_3$, robust well formed crystals that deliver strength and durability. $CO_2$ is bound in the biocement.

## High Performance Binder

- Flexibility to use many aggregate types of different particle size distributions
- Curing takes 2 days (or less) versus up to 28 days for traditional cement products
- Compressive strength and flexural performance greater than or equivalent to traditional cement
- $CaCO_3$ crystals are clear and precast elements are the color of aggregates or can be pigmented, compared to gray in cement.

# Products

# Tiles installed in Europe and US

Tower Bridge Court, London, UK

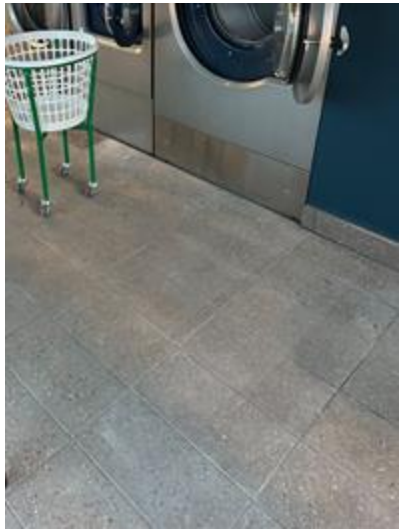
LivingLab, Aarhus, DK

JM Showroom, Solna, SE

ONX Showroom, Florida, USA

PAE Living Building, Portland, OR, USA

LivingLab, Aarhus, DK

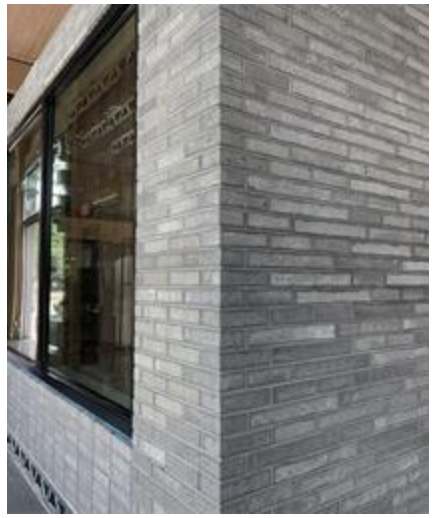


H&M HQ, Aarhus, SE

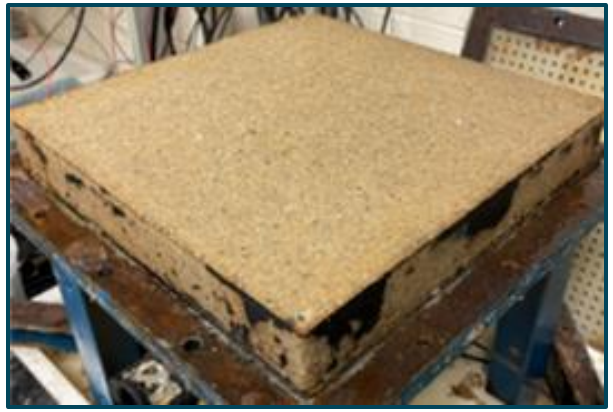
Biomason HQ, RTP, NC, USA

Martin Marietta HQ, Durham, NC

HITT Co-Lab, Falls Church, VA



# Pavers and large precast moving through development pipeline



## Paver prototype

100% biocement
Max compressive strength >9000 psi
Max flexural str. >11.5 MPa
Passed freeze-thaw testing (EN1339)

## L-barrier prototype

100% biocement
4ft Tall, 3ft Wide, 4” thick walls
Max compressive strength >7500 psi (cores)

## Bremer/ T-wall prototype

100% biocement + reinforcement
6ft Tall, 2ft wide, 1ft thick
Mass over 850 kg

Crisp edges and corners

# Commercial Manufacturing

# World's first biocement factory is shipping tiles to customers

*First licensing partner*

I·B·F

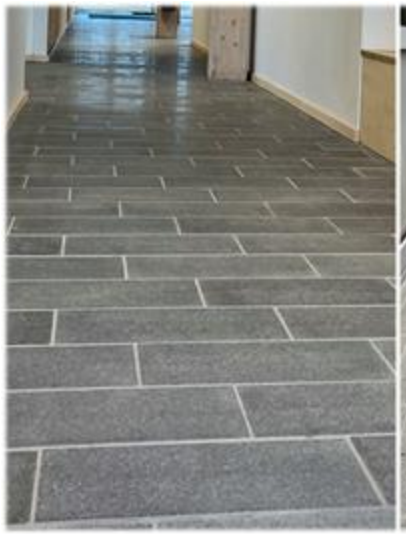
*The largest precast concrete producer in Denmark*

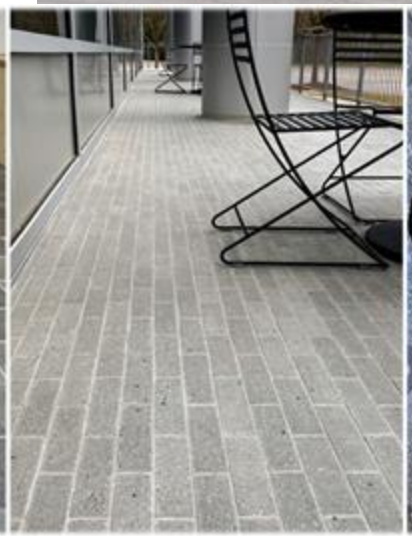
**Biobeton ("Bio-concrete") Factory - Ikast, Denmark**

*Current demand*

**+1,000%**

*of annual capacity*





## … and our green cement technology is already installed in real-world settings

# Factory expansion project underway to keep up with orders

## Mixing

**Industrial; online since Jul. 2023**

Aggregate is mixed with Biomason Biospark bacteria prior to feeding

## Forming

**Industrial; online since Jul. 2023**

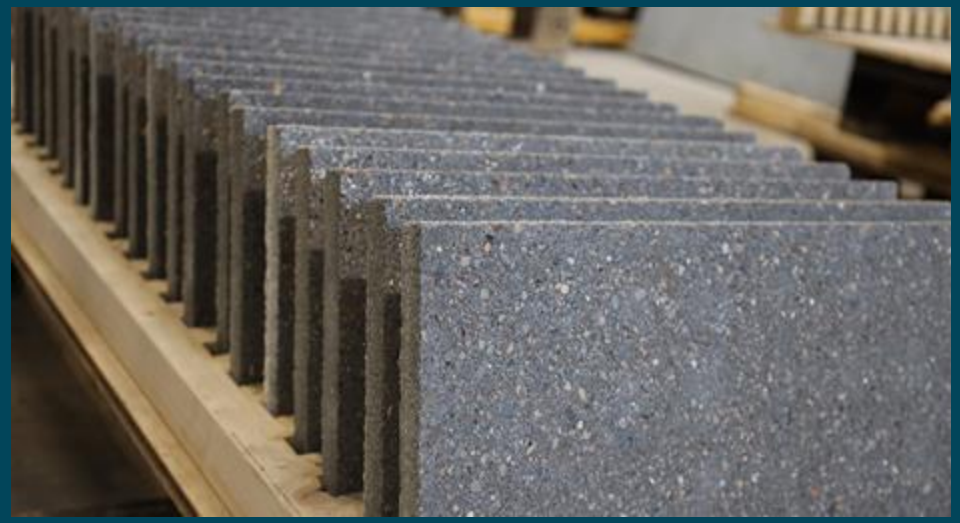
After forming, tiles are conveyed to biocementation feeding system

## Biocementation

**Expansion finalized; online Mar. 2025**

Feeding, conveyance, and biocementation systems being expanded and upgraded

# In operation and expanding to full industrial set-up



Benjamin.griffin@biomason.com

# Thank you!