

Blended Cement and New SCMs: The pathway to success



Matt Spencer & Cheng Qi
Ash Grove/CRH

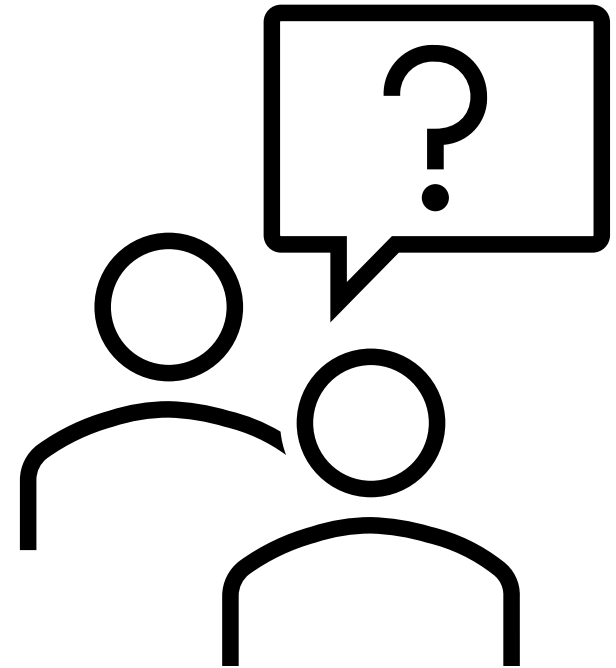
08-28-25



An ACI Center of Excellence
for Carbon Neutral Concrete

Presentation Notes

- Find presentation slides and post event recording at:
 - <https://www.neuconcrete.org/events-and-education>
- Attendees are in listen only mode.
- Ask questions via the Q&A dialog box in the zoom platform



Disclaimer

As with all concrete mixtures, trial batches should be performed to verify concrete properties. Results may vary due to a variety of circumstances, including temperature and mixture components, among other things.

You should consult your materials, cement, and concrete professionals for design assistance. Nothing contained herein shall be considered or construed as a warranty or guarantee, either expressed or implied, including any warranty of fitness for a particular purpose.

Today's Speaker



Speakers:
Matt Spencer



Matt Spencer is the Vice president of Customer Solutions for Ash Grove. In this role Matt is responsible for research and development, new product and technology development and the customer experience. He has spent a 25 year career in the building products industry in a variety of technical and market facing roles. Matt is a graduate of Northwestern University with a MsE.

Cheng Qi

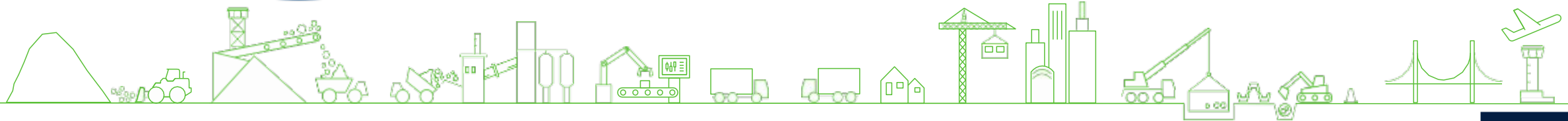


Cheng Qi is the Director of R&D at Ash Grove. He has 20+ years in cement and concrete business, supporting trouble shooting, product development, quality excellence and sustainability advancements. Cheng graduated from Purdue University with a PhD specializing in cement and concrete materials.

Introducing CRH

**CRH is
the leading
building materials
business in
the world**

- CRH manufactures and supplies a range of integrated building materials, products and innovative end-to-end solutions for the construction industry
- CRH products can be found throughout the built environment from major public infrastructure to homes and commercial buildings
- CRH has a long standing and proven commitment to sustainability and is ranked among sector leaders by Environmental, Social and Governance (ESG) rating agencies
- Our materials, value-added products and building solutions play an important role in shaping a more sustainable built environment
- CRH has been included in the Fortune Global 500 list for 20 consecutive years



CRH VALUES



PEOPLE
are our priority

We build enduring relationships
and we care for each other's
safety and well-being



CHARACTER
is our strength

We do what we say,
we live by our word and
we collaborate to deliver
as one team



PERFORMANCE
is our commitment

We achieve impact globally
through local delivery,
entrepreneurial drive and
environmental stewardship



INNOVATION
is our way forward

We strive to shape
the next generation of
sustainable building
materials and solutions

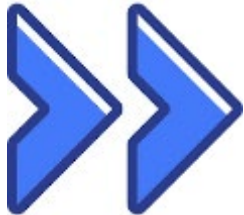
From small beginnings to a global leader

1970

95% in Ireland

51 millions in Sales

5350 Employees



#1 Building materials
in North America

#1 Building materials
in Europe

Regional leadership
in Products

Fortune 500
Company

FTSE 100 & EuroStoxx 50
Indices

DJSI Europe & CDP
ESG ratings



\$35.6bn*

Sales in 2024

c.79,800

Employees

28

Countries

*CRH Sustainability Performance Report 2024

CRH's products portfolio

Products & Services



Aggregates



Lime



Cement



RMC



Pipe &
Precast



Asphalt



Constr.
Services



Outdoor
Living



Composite
Products



Constr.
Access.

Our approach to integrated solutions

- Uniquely integrating materials, products & services across the value chain & construction lifecycle
- Collaborating with customers to develop more value-added solutions & building practices

Our aspirations

*Become best in class partner in the Construction Value Chain
driving value through innovative sustainable solutions,
which address present and future customer pain points*

Introducing Ash Grove



A CRH COMPANY

1882

Ash Grove White Lime Association incorporated in Ash Grove, Missouri to produce lime for construction and sanitary uses.



1908

First cement plant built in Chanute, Kansas.



1951

St. Lawrence Cement builds cement plant in Quebec for construction of the St. Lawrence Seaway.



1960s and 1970s

Modernization and expansion of Chanute and Louisville plants.



1983

Acquisition of cement plant in Durkee, Oregon.



1984

Acquisition of cement plant in Seattle, Washington.



1987

Acquisition of cement plant in Montana City, Montana.



1992

Modernization and expansion of Seattle Plant.



2000S

Modernization and expansion of Chanute and Foreman plants.



2015

CRH acquires Holcim (Canada).



2020

CRH Canada and Suwannee American Cement adopt the Ash Grove brand.



1850

1900

1950

1980

1990

2000

2010

2020



1929

Second cement plant built in Louisville, Nebraska.



1956

Second cement plant built in Mississauga, Ontario to serve Canada's largest market.



1976

Acquisition of cement plant in Joliette, Quebec.

1985

Acquisition of cement plant in Foreman, Arkansas.

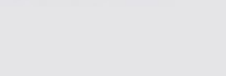


1989

Acquisition of cement plant in Leamington, Utah.

1994

Acquisition of cement plant in Midlothian, Texas.



2009

St. Lawrence Cement rebrands to Holcim (Canada) Inc.



2018

CRH acquires Ash Grove Cement.

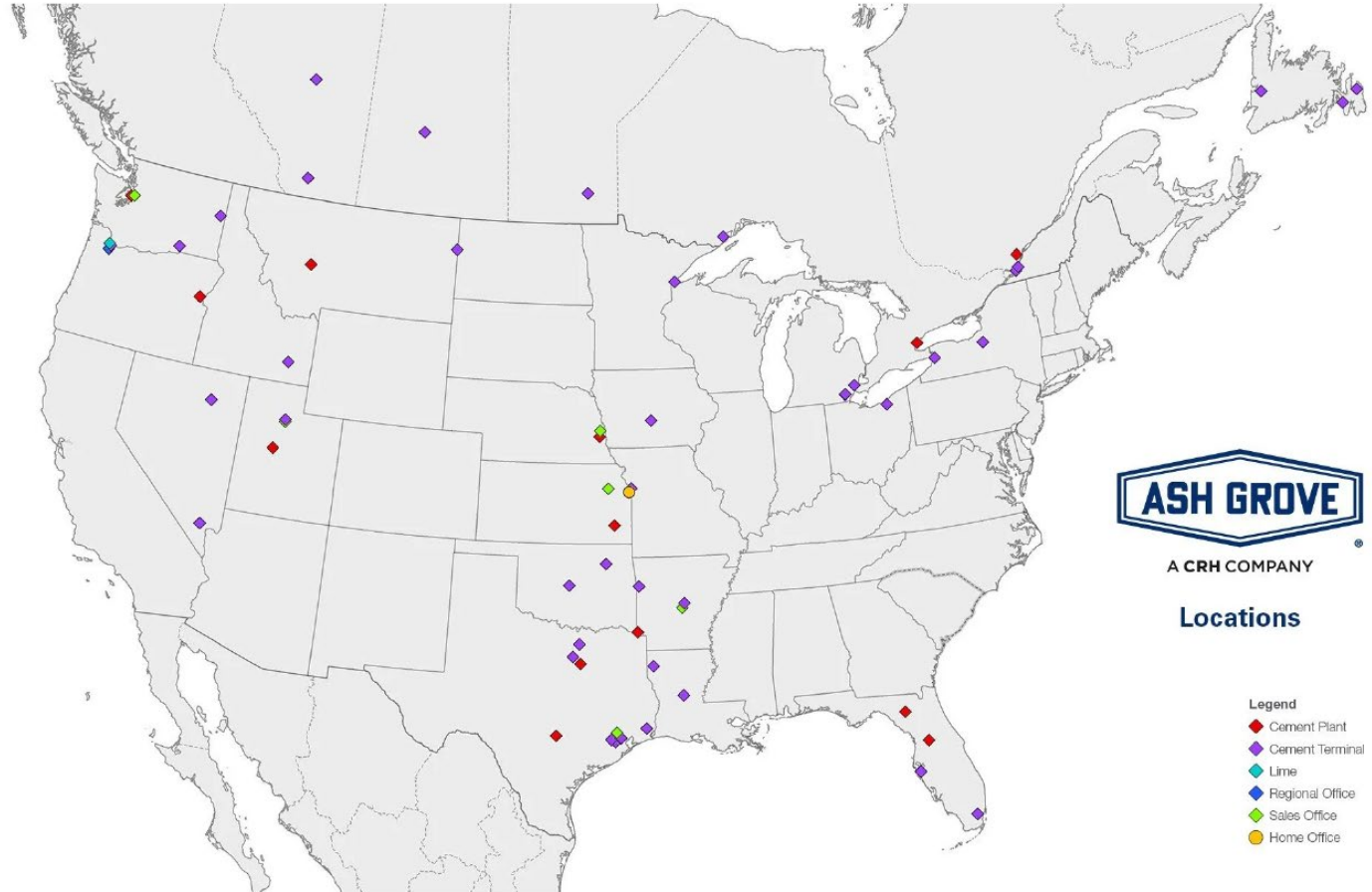
CRH acquires Suwannee American Cement.

Introducing Ash Grove



WE STAND TOGETHER TO REINVENT THE WAY OUR WORLD IS BUILT

- For over 143 years, we have provided **cementitious materials** to construct the highways, bridges, commercial and industrial complexes, homes, and other structures fundamental to the nation's economic vitality and quality of life.
- Ash Grove is known for quality, reliability, and a commitment to safety



Delivering through priority areas
Aligned to our sustainability framework & industry challenges



Taking the lead on decarbonization

- Long track record of **industry-leading** emissions reduction
- Raising our **ambition** & accelerating our efforts with best-in-class new target
- **30% absolute reduction** in group-wide emissions by 2030 (on a 2021 baseline) ... the only metric that matters
- Target covers Scope 1, Scope 2 **and** Scope 3
- **SBTi validated** & aligned with ambition to be carbon neutral by 2050



Innovation
Fund

A dedicated Innovation Fund
to be invested on internal
projects and external
partnerships

CRH **VENTURES**

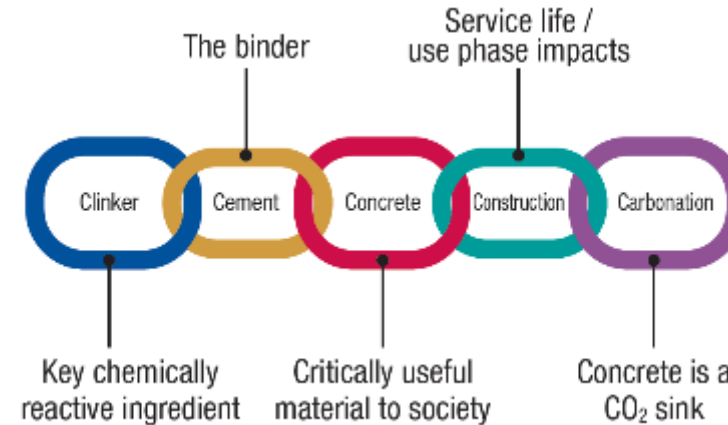
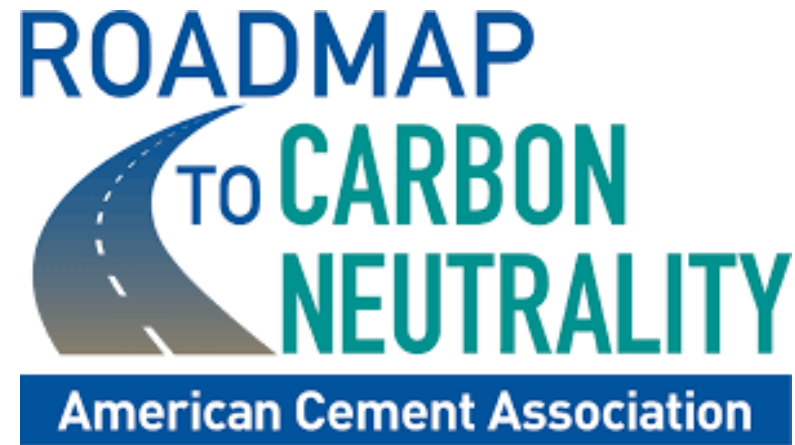
The Corporate Venture Capital arm
of CRH to partner and invest in
start-ups

An aerial photograph of a coastal road and pier. The road, paved with dark asphalt, curves from the bottom left towards the center of the frame. A yellow construction vehicle is visible on the road. The pier extends from the road into the sea, supported by several dark, cylindrical pillars. The sea is a deep blue-green color with gentle waves. The sky is filled with large, white and grey clouds, and the sun is setting behind them, creating a warm, golden glow. The overall scene is serene and picturesque.

Blended Cement and New SCMs

The pathway to success

Blended cement and SCMs, where are we at?



Blended cements provide **immediate opportunities**

*

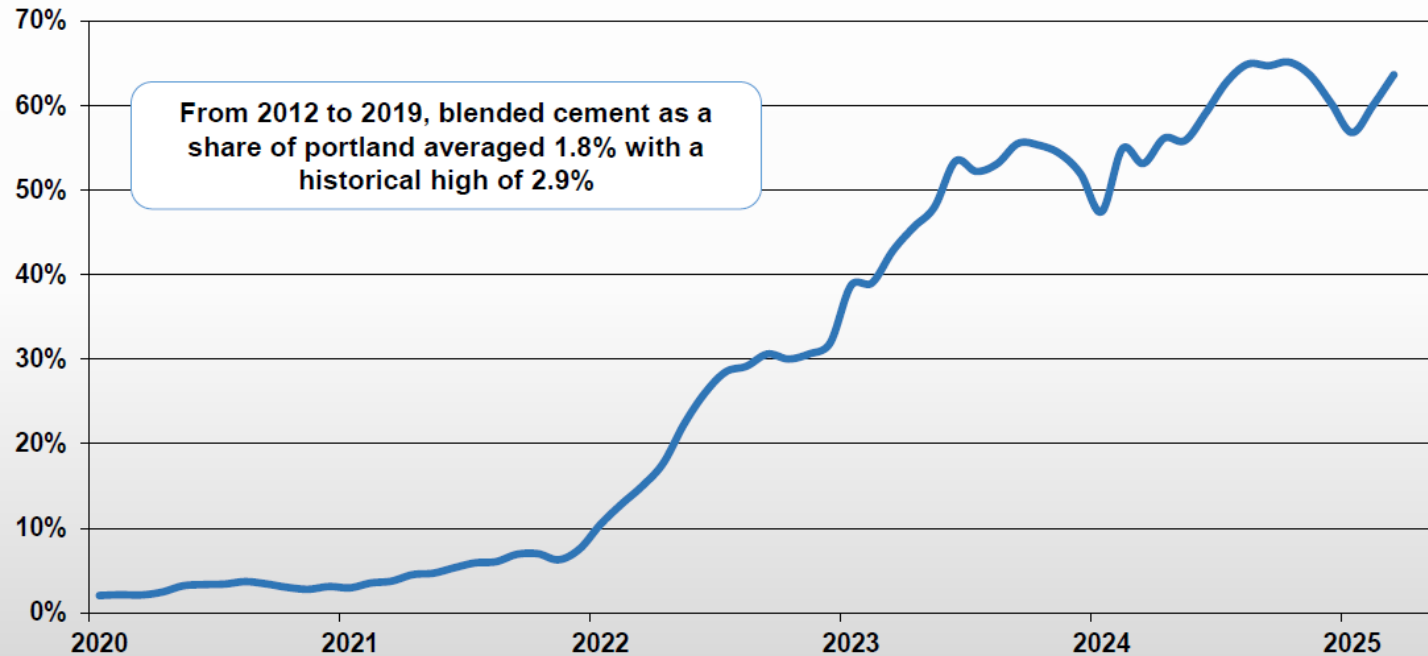


Carbon neutrality **requires increased acceptance and adoption of all blended cements**

*Adapted from Jamie Farny (ACA) presentation at Spring 2025 NCC, "Blended Cements Survey of NCC Member State DOTs" Contact: jfarny@cement.org

Blended cements are making the real impact

Blended Cement as a Share of Total Cement - US



Traditional & new SCMs: the enablers for blended cements



Coal Fired Power Plant



Steel Blast Furnace



Volcano Eruptions



Reactors

Traditional Supplementary Cementitious Materials

- Inorganic materials that contribute to the properties of a cementitious mixture through hydraulic or pozzolanic activity, or both

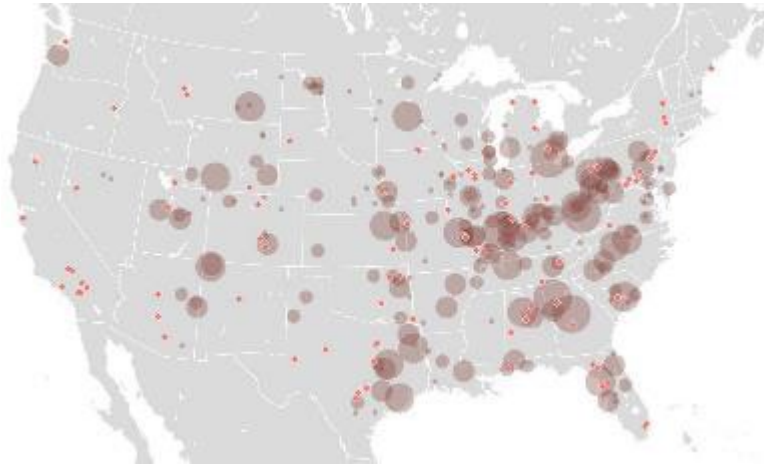
New SCMs

- Different feedstock, process, activation mechanism
- Requires a new performance-based standard to evaluate suitability in cement and concrete
 - Focus on performance, not prescription
 - Advocate sustainability benefits

**Impact of Cement Content and SCMs
on CO₂ per Cubic Yard of Concrete**

Cementitious lbs/yd ³	% SCM	CO ₂ lbs/yd ³
564	0	527
470	0	442
376	0	356
564	25	404
470	25	351
376	25	271
564	50	282
470	50	234
376	50	190

Geographic distribution of SCMs



Coal ash production



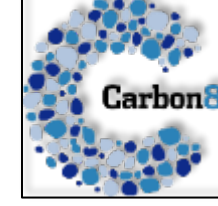
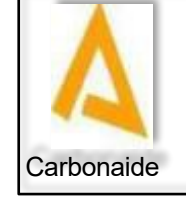
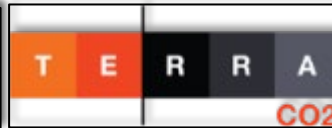
Slag production



NP deposits

*Adapted from Jamie Farny (ACA) presentation at Spring 2025 NCC, “Blended Cements Survey of NCC Member State DOTs” Contact: jfarny@cement.org

New binder developments



Pathway for blended cements success

- Prioritize Sustainability and Resilience in the Built Environment
- Adopt Performance-Based Specifications
- Optimize Concrete Mix Designs
- Invest in Training & Workforce Skills
- Demonstrate Successful Projects
- Collaborate across Supply Chains



Choose the right opportunities to pursue



A lot to unpack...

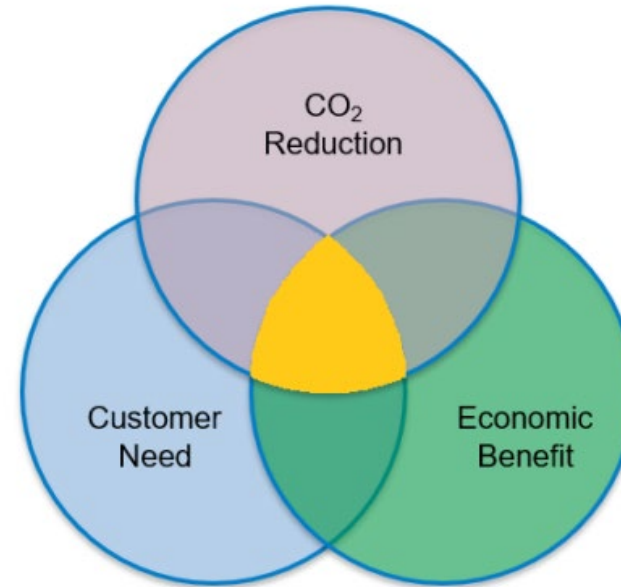
- How will it improve our products for our customers?
 - Is there a specification it could fit in?
 - How does it perform in concrete?
 - How much is available?
 - How much will it cost?
 - Can the plant infrastructure handle the material or is major CX required?
 - And many, many others...
-
- ✓ Logistics
 - ✓ Storage & discharge constraints
 - ✓ Drying and milling process



Choose the right opportunities to pursue

Follow Product Development Stage Gate Process

- Hydration process
- Additive and admixture uses
- Product uniformity
- QC/QA practices
- Fresh concrete properties
- Hardened concrete properties
- Field construction practice changes
- Additional training and technical support



A photograph of an industrial facility, likely a calcined clay development plant. The image shows several large, horizontal, rotating kilns (cylinders) supported by a complex metal framework. The kilns are painted a reddish-brown color. In the background, there is a large, multi-story industrial building with a corrugated metal facade. A white pickup truck is partially visible in the bottom right corner. The sky is blue with some clouds.

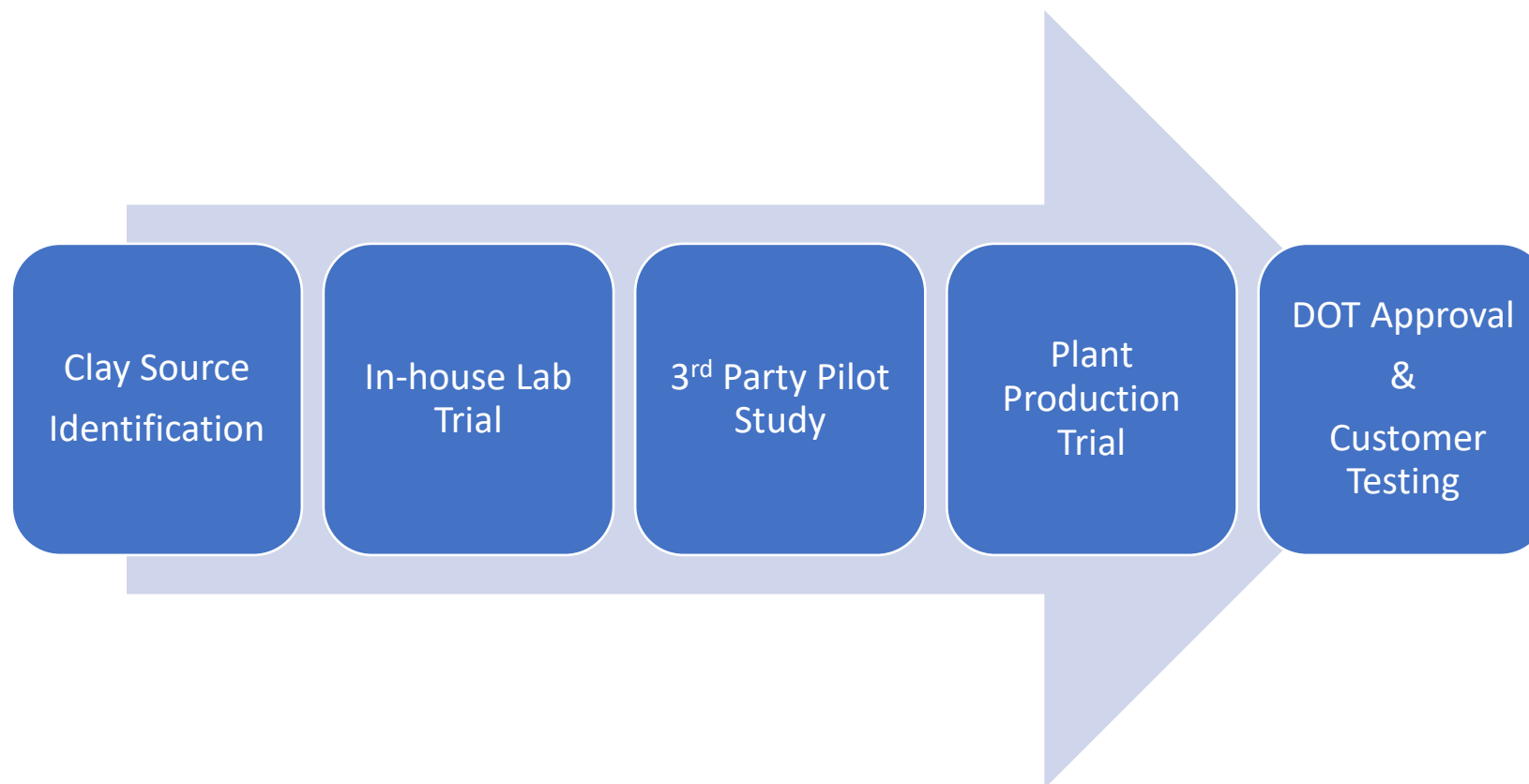
Case Study:
Ash Grove
Calcined Clay Development

Solutions to customer pain points

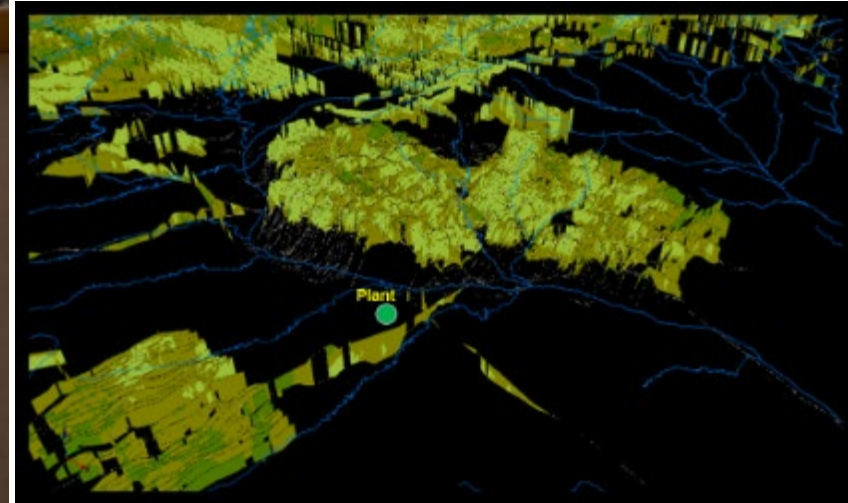
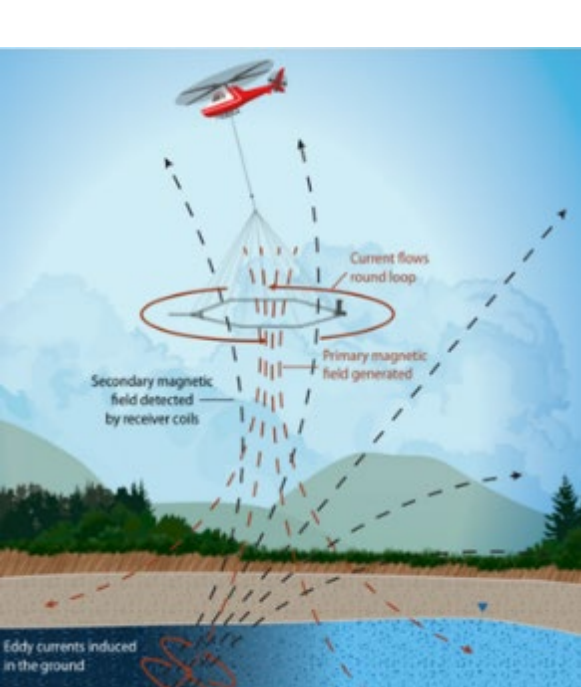
- In the 1990's, the Nebraska Department of Transportation experienced these...
 - Cements with high alkali levels
 - Local reactive sand & gravels
 - Non-reactive aggregates were not readily available
- Ash Grove actions
 - Experimented with various supplementary cementitious materials to mitigate ASR
 - Conducted extensive research and pilot projects
 - 1993, Ash Grove, in conjunction with the NDOT, developed an inter-ground blended cement providing successful ASR mitigation solution
- Outcomes
 - NDOT specified blended cements for all paving projects



Calcined clay: product development process

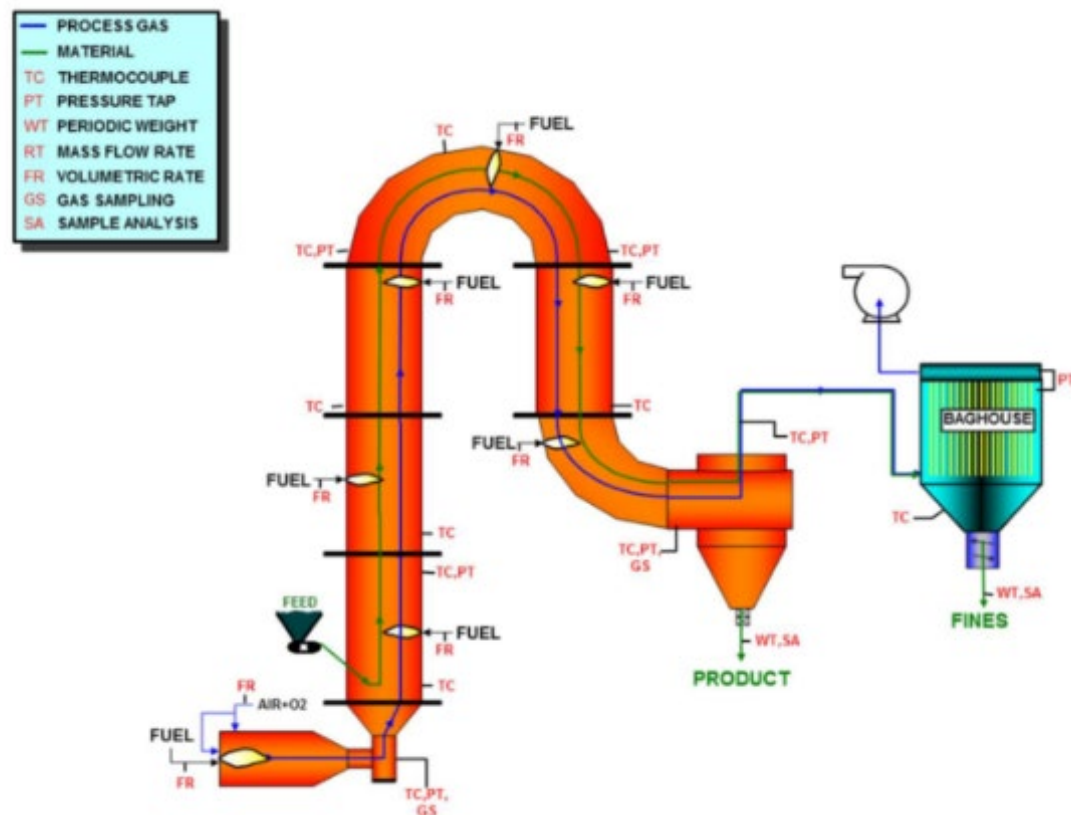


Understanding the reserves

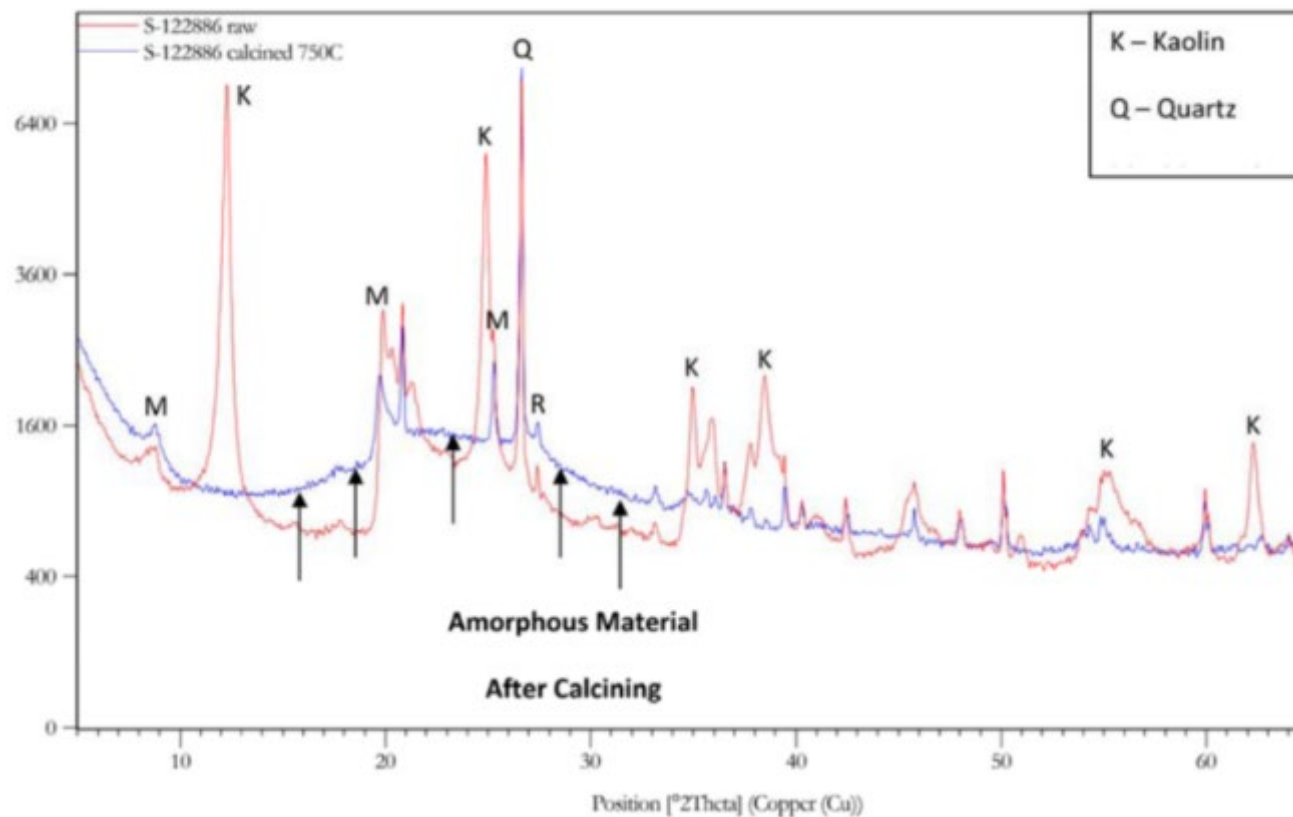


Low-grade, locally sourced clay when properly calcined delivers excellent strength and durability performances

Identifying the right process choices



Fine tuning the clay calcination/dehydroxalation process

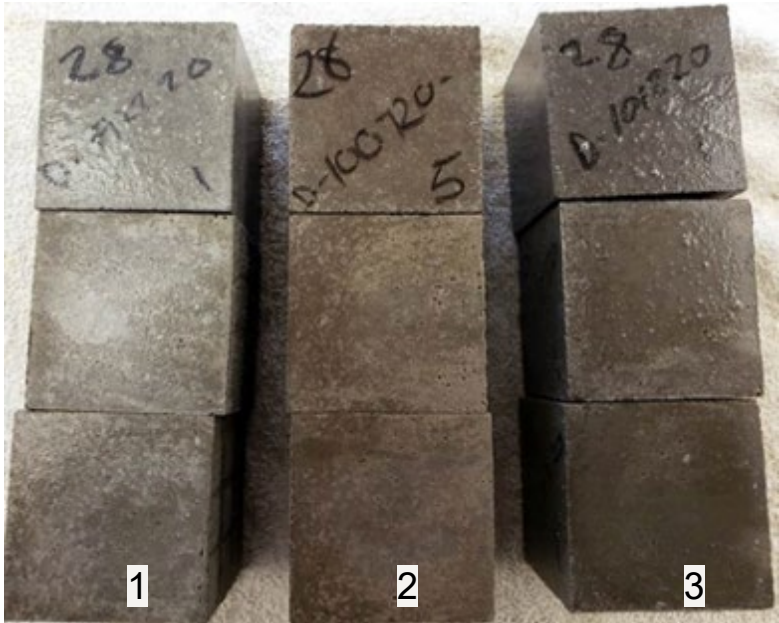
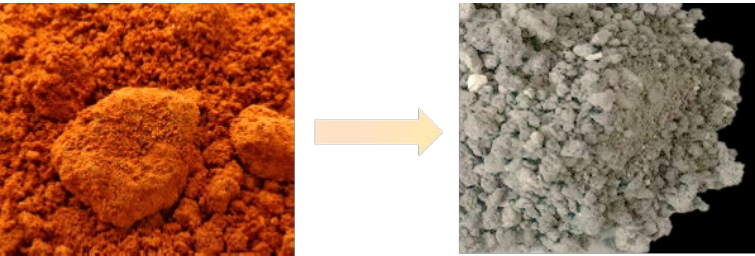


*Ash Grove product development data

Embracing the challenges



Working out the right solutions



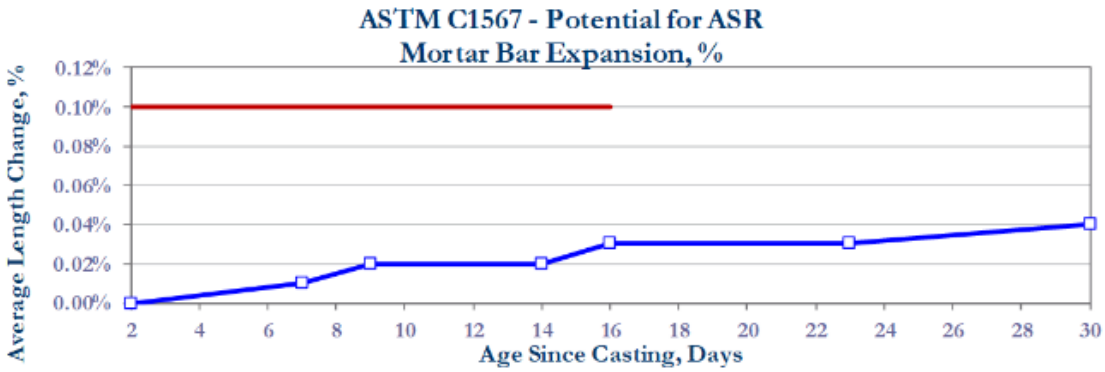
- 1. Type I/II cement
- 2. 30% calcined clay
- 3. 30% color managed calcined clay

Calcined clay: strength and durability solutions



Sample ID	Date Tested	Diameter, in. (mm)	Length, in. (mm)	Area, in. ² (cm ²)	Mass, lbs. (kg)	Load, lbf. (N)	Strength, psi (Mpa)	Type of Fracture	Age, days
D-122120-2 47B mix	12/28/20	4.00 (101.6)	8.10 (205.7)	12.57 (81.1)	8.52 (3.9)	67,600 (300,700)	5,379 (37.1)	Type I	7
	12/28/20	4.00 (101.6)	8.06 (204.7)	12.57 (81.1)	8.47 (3.9)	66,580 (296,163)	5,298 (36.5)	Type I	7
						Average	5,340		
	01/18/21	4.01 (101.9)	8.08 (205.2)	12.63 (81.5)	8.48 (3.9)	87,530 (389,353)	6,931 (47.8)	Type I	28
	01/18/21	4.00 (101.6)	8.10 (205.7)	12.57 (81.1)	8.53 (3.9)	88,120 (391,977)	7,012 (48.4)	Type I	28
	01/18/21	4.00 (101.6)	8.07 (205.0)	12.57 (81.1)	8.50 (3.9)	92,160 (409,948)	7,334 (50.6)	Type I	28
						Average	7,090		
	02/15/21	4.01 (101.9)	8.05 (204.5)	12.63 (81.5)	8.51 (3.9)	97,950 (435,703)	7,756 (53.5)	Type I	56
						Average	7,760		
	03/22/21	4.01 (101.9)	8.10 (205.7)	12.63 (81.5)	8.49 (3.9)	95,380 (424,271)	7,552 (52.1)	Type I	91
						Average	7,550		

ASTM C1202 - Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration						
Standard Curing						
Sample No.	Diameter, mm	Charge Passed, C	Corrected Charge, C	Qualitative Equivalent	Date of Test	Age, days
D-122120-1	102	1,063	922	Very Low	02/18/2021	59
D-122120-1	102	1,105	959	Very Low	02/18/2021	59
D-122120-1	102	1,049	910	Very Low	02/18/2021	59
no admixtures 0.50 w/cm		Average	930	Very Low		
D-122120-2	102	756	656	Very Low	02/18/2021	59
D-122120-2	102	873	757	Very Low	02/18/2021	59
D-122120-2	102	676	586	Very Low	02/18/2021	59
47B mix		Average	666	Very Low		



*Ash Grove product development data



Demonstrating successful projects



MnROAD
SAFER, SMARTER, SUSTAINABLE PAVEMENTS
THROUGH INNOVATIVE RESEARCH



Photo Credit: Eric Giannini



UCPRC
UNIVERSITY of CALIFORNIA | PAVEMENT RESEARCH
Davis • Berkeley CENTER



Photo Credit: Somayeh Nassiri

Blended cements success: it is a team effort

PURPOSE

WHY WE EXIST

WE STAND TOGETHER TO

REINVENT

THE WAY

OUR WORLD

IS BUILT

VISION

WHERE WE ARE GOING

To develop sustainable solutions
that build, connect and improve our World



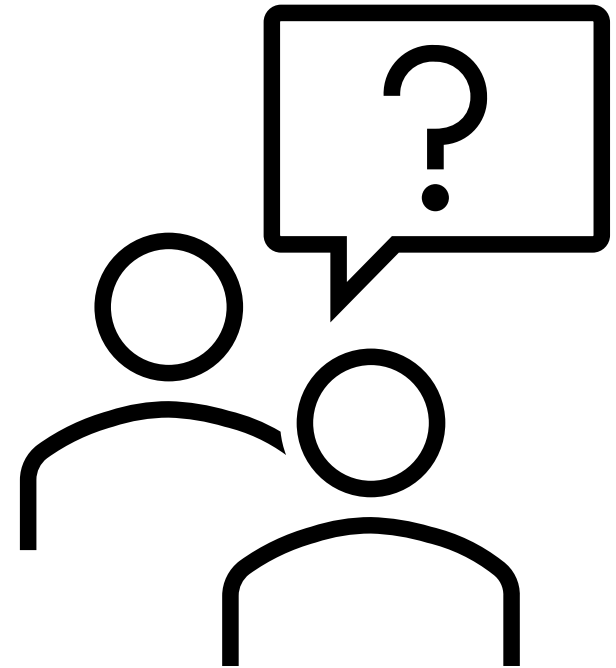
THANK YOU!



A CRH COMPANY

Questions?

- Ask questions via the Q&A dialog box in the zoom platform



Thank you!

www.neuconcrete.org

info@neuconcrete.org



NEU: An ACI Center of Excellence for Carbon Neutral Concrete



@NEUCarbonNeutralConcrete



@NEUconcrete

