

# An Overview of NEU



Sureka Sumanasooriya, PhD.

Technical Director at NEU: An  
ACI Center of Excellence for  
Carbon Neutral Concrete

May 22, 2023



An ACI Center of Excellence  
for Carbon Neutral Concrete

# Objectives

- Why do we need to focus on Carbon?
- Why NEU?
- NEU core functions
- Technology validation/verification program



# Global Movement

- Paris Agreement – targets limiting global warming to 1.5 degrees Celsius.
- U.S. goal is to reduce emissions 50% below 2005 levels by 2030.
  - 100% carbon pollution-free electricity by 2035
  - Achieving net-zero emissions by 2050

# Why Focus on Carbon?

- There is a lot more to sustainability than Global Warming
  - Environmental, Social and Economic factors all play into sustainability
- Concrete really shines in many areas related to sustainability
  - Resilience, thermal mass, durability, etc.
- Global warming is affecting everyone on the planet
  - Cement and concrete industry greatly contribute to CO<sub>2</sub> emissions
- Industry is in an excellent position to improve upon this area
  - We can measure the amount of CO<sub>2</sub> associated with concrete



# Basics of Carbon in Concrete



- 51 Billion Tons of Carbon is released into the atmosphere annually
  - 31% - how we make things (cement, steel, plastic)
- 8% of global carbon emissions are associated with cement and concrete production
  - Limestone + Heat = Calcium Oxide + CO<sub>2</sub>
- 96 M Tons of cement is produced in the U.S. annually
  - ~1.25% US carbon emissions come from manufacturing of cement

Emissions have no boundaries

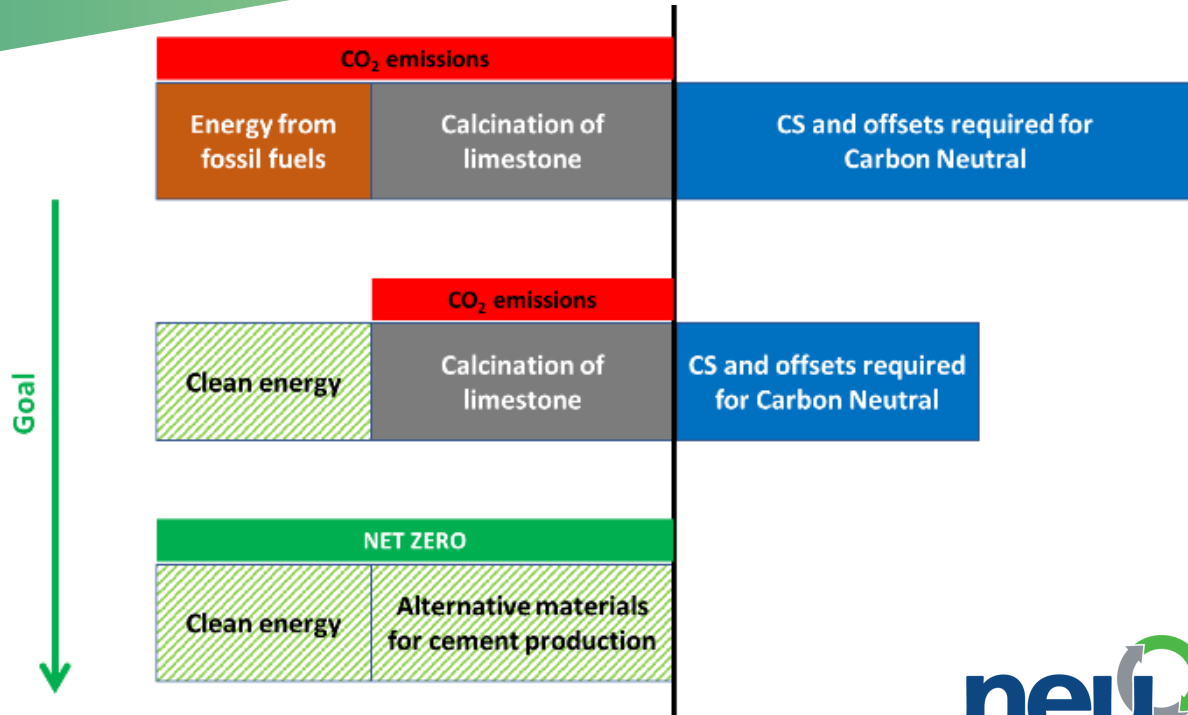
# What do we mean by Carbon Neutrality?



- The term Carbon represents CO<sub>2</sub> released into the atmosphere.
- Carbon Neutral: balancing carbon emissions with the absorption of carbon from the atmosphere through carbon sequestration, offsets, or sinks
  - Soil, forests, oceans
  - Concrete
- Carbon offsetting from emissions made in one sector and reducing them elsewhere
  - Renewable energy
  - Energy efficiency
  - Lower carbon technologies.
- Carbon reduction is necessary to reach neutrality

# Carbon Neutrality in Cement

- Carbon Neutral
  - A neutral effect of CO<sub>2</sub> on the atmosphere
- Net Zero
  - Releases a net of zero CO<sub>2</sub> into the atmosphere



# Cement and Concrete Industry Roadmaps

Various construction sectors, organizations, and global regions are creating roadmaps.

- Carbon Capture, Utilization and Storage (36%)
- Efficiency in Design and Construction (22%)
  - Design optimization, site efficiency, re-use, etc.
- Clinker Production Savings (11%)
  - Reducing traditional limestone use, fuel sources, etc.
- Efficiency in Concrete Production (11%)
  - Optimized mix designs, quality control, industrialized manufacturing
- Savings in cement and binders (using SCM's) (9%)
- Recarbonation (6%)
- Decarbonizing Electricity (5%)

*\*Global Cement and Concrete Association (GCCA)*



# What's a professional to do?

- Overwhelming amount of information.
- Concrete is a multi-faceted industry.
- Various professional knowledge levels from both the supply and demand side of the industry.
- Need for accelerated adoption of new materials and technologies.





American Concrete Institute  
*Always advancing*

## ACI's Influence for Cultural Change in the Industry

### ACI's leadership for over 100 years

- Non-trade association
- Education, training and certification
- Code and specification development
- Many start in the industry with ACI
- Strong student and international membership (100 countries)
- Aware of the urgency



**An ACI Center of Excellence  
for Carbon Neutral Concrete**



**NEU**

## Vision

The Center envisions a concrete industry where all stakeholders have access to technologies and the knowledge needed to effectively and safely produce and place carbon-neutral concrete and concrete products in the built environment.

## Mission

To drive education, awareness, and adoption of the use of carbon-neutral concrete materials and technologies.

# NEU Core Functions

- Material and Technology Validation/Verification Program
- Technology Transfer and Acceleration/Implementation
- Advocacy and Technical Support
- ACI Committee Assistance
- Training and Professional Development
- International and Student Outreach

# NEU Core Functions

## Technology Transfer and Acceleration/Implementation

- Webinars
- Carbon Neutral Concrete Summits
- FAQs and White Papers
- Sustainable/low carbon concrete guides
- Training and Certification Programs
- Educational slide decks
- ACI/Industry recourses

ACI is a recognized leader in this area, with an established network within industry and higher education institutions worldwide.

# NEU Core Functions

## Advocacy and Technical Support

ACI has long recognized that advocacy for the adoption of its resources is a major component for the success of its mission.

NEU will advocate for the use of sound technical information and the application of existing knowledge.

- Assist in advancing local jurisdiction adoption
- Keep an eye on local procurement and building code issues
- Assist ACI committees in developing language for guides, specifications, and codes associated with carbon neutral concrete materials and technologies

# NEU Material and Technology Validation / Verification Program



## Why Validation and/or Verification?

- With increasing focus on climate change, there are many companies making environmental claims in the marketplace to position themselves and their products as possible solutions to reducing carbon emissions.
- As a result, this environmental information is increasingly being used for decision-making by individuals and organizations.



# NEU Material and Technology Validation / Verification Program



## Why Validation and/or Verification?

- However, individuals and organizations using this information want to know if the environmental information being **claimed is accurate and reliable**.
- In other words, they are looking for **assurance** based on historical information, known as verification, and validation of these statements based on reasonable assumptions and methods.

# NEU Material and Technology Validation / Verification Program



## What is Validation and/or Verification?

- **Validation:** Process for evaluating reasonableness of the assumptions, limitations and methods that support an environmental statement about the outcome of future activities
- **Verification:** Process for evaluating an environmental information statement based on historical data and information to determine whether the statement is materially correct and conforms to relevant criteria
- In short...we are looking to help weed out greenwashing from the cement and concrete industries

# NEU Material and Technology Validation / Verification Program



## What Sort of Environmental Claims?

- ISO 14021:2016 Environmental labels and declarations — Self-declared environmental claims (**Type II environmental labelling**)
  - including statements, symbols and graphics regarding products
- ISO 14025 Environmental labels and declarations — **Type III environmental declarations** — Principles and procedures
  - Based on LCA, LCI, or information modules from ISO 14040-series
  - Can include EPD data
  - Using pre-determined parameters
  - Subject to administration of a Program Operator

# NEU Material and Technology Validation / Verification Program



## How does Validation/Verification program work?

- The NEU Validation/Verification Program provides an independent peer review of carbon reduction technologies.
- The Validation/Verification process is conducted by Subject Matter Experts (SMEs) to evaluate the accuracy of relevant technical claims related to reduction of carbon in concrete.
- NEU's advantage is its proximity to a pool of concrete experts who participate in ACI committees, etc.

# NEU Material and Technology Validation / Verification Program

## Governing Standards:

- The requirements for the Validation/Verification process are provided in the following international standards:
  - **ISO/IEC 17029:2019**, Conformity Assessment – General principles and requirements for validation and verification bodies
  - **CSA/ISO 14064-3:2020**, Greenhouse gases – Part 3: Specification with guidance for the verification and validation of greenhouse gas statements



# NEU Material and Technology Validation / Verification Program

## Governing Standards: cont....

- **ISO 14065:2021**, General principles and requirements for bodies validating and verifying environmental information
- **ISO 14066:2011**, Greenhouse gasses – Competence requirements for greenhouse gas validation teams and verification teams

# NEU Material and Technology Validation / Verification Program



## How does Validation/Verification program work?

- Organizations may submit applications to the validation process to verify specific environmental claims of their products.
  - Taking initial Applications now
- Validation / Verification Team members will be assigned to review the application (will typically be 2 or 3 SMEs + a reviewer)
- Upon application acceptance, a formal agreement will be established between NEU and the client, specifying the scope of the validation/verification process, criteria to be evaluated, fees, etc.

# NEU Material and Technology Validation / Verification Program

## Validation/Verification Application Information:

- Company Information
- Technology Category(ies)
- Description of the Environmental Claim(s) to be Validated/Verified
- Technical Criteria
- Description of Supporting Data and Source
- Application Fee: \$1,500 (non-refundable)
- Additional Fees Apply After Application Accepted

The image shows a screenshot of the NEU Application for Validation/Verification form. At the top left is the NEU logo, which includes the text 'neu' in a stylized font and 'An ACI Center of Excellence for Carbon-Neutral Concrete' below it. To the right of the logo is the title 'NEU Application for Validation/Verification'. Below the title is a paragraph of instructions: 'For material or technology Validation/Verification, complete all questions on this form and submit supporting documentation and/or test records. The application will be reviewed by NEU staff and the assigned validation/verification team members to determine if the submission is sufficient to move forward with the NEU Validation/Verification process. Procedures and costs will vary, depending on the type and complexity of Validation/Verification requested and the individual material or technology submitted. A quote will be provided upon the conclusion of the application review.' The form contains several sections with redacted information: 'Company information' with fields for Company name, Company address, Company phone number, and Website address; 'Technical contact information' with fields for Contact name, Address (if different than company address), Email address, and Phone number; and a 'Technology Category' section with a list of categories and checkboxes. The categories are: Cementitious Material, Supplementary Cementitious Material (SCM), Alternative Cement/Binder, Admixture / Alternative Admixture, Carbon Sequestration/ CO2 Mineralization / Carbon Capture, Utilization and Storage, (CCUS) Ultra-High-Performance Concrete (UHPC), Low-Carbon, Chromium Steel Reinforcing Bars, Non-Metallic Reinforcing Bars, Manufactured Aggregates, Reduced-Emissions Cement Manufacturing / Alternative Fuels and/or Energy Sources, Artificial Intelligence / Machine Learning / Mix Design Optimization, and Nanoparticles. At the bottom right of the form is the text 'Rev. 1.0 (3/29/2023)'.



# NEU Material and Technology Validation / Verification Program

## Validation / Verification Process:

- Validation / Verification Team will conduct the validation /verification
- Issue a report indicating the degree of assurance the team has in the environmental statement
  - Qualitative statement or no statement at all
  - Not an approval or certification
- Report will be reviewed by independent reviewer
  - Revisions may be requested of the Validation/Verification Team
- Final report issued to the client
  - Contents of the report are confidential – Scope is not

# NEU Material and Technology Validation / Verification Program



## Validation / Verification Process:

- Technology Categories include, but no limited to:
  - Cementitious products, alternative cements, SCMs
  - Manufactured/synthetic/recycled aggregates
  - CCUS technologies
  - Admixtures, nanoparticles, AI/machine learning, etc.
- No minimum Technology Readiness Level (TRL) is required
  - Validation Statement will include transparent, qualifying statements regarding the amount, manufacturing facility, material quantity, etc. (lab scale, pilot production facility details, date(s), etc.)

# NEU Material and Technology Validation / Verification Program

## Key points to the NEU Validation / Verification Process:

- NEU will be compliant with internationally recognized Conformity Assessment standards
- Impartiality, confidentiality, and fairness are top priority
  - NEU membership is not required
  - No discounts will be given
  - All Validation/Verification Clients will be treated equally
- NEU will not be conducting research
  - Identify research needs – YES
  - Conduct publication research - YES
  - Conduct laboratory material or physical testing - NO

# NEU Material and Technology Validation / Verification Program

## Key points to the NEU Validation / Verification Process:

- Intent of NEU is to quickly identify materials and technologies that can best assist with lowering the carbon emissions associated with concrete construction
- NEU is not an academic organization, but is instead charged with assisting with getting these materials / technologies to market and implemented
- NEU is currently seeking Subject Matter Experts to serve on the Validation/Verification Teams
  - Send email to [info@neuconcrete.org](mailto:info@neuconcrete.org) expressing interest

# NEU Material and Technology Validation / Verification Program

## NEU Validation / Verification Process Remaining Steps to Full Operation:

- Identify SME competency needs associated with Applications received
- Assemble group of SMEs to fill pool of potential Validation Team members
- Train potential Validation Team members to the ISO standards
- Run 2 or 3 pilot validations through the process to calibrate process
- Make necessary adjustments
- Full operation of the Validation/Verification Program

# ACI Center of Excellence on Carbon-Neutral Concrete

## Membership

- Project owners
- Specifying agencies
- Architects / engineers
- Developers
- Contractors
- Material / product suppliers
- Trade associations
- Educational Institutes

## Founding Member



American Concrete Institute  
*Always advancing*

# Members of NEU

## Sustaining Members



## Supporting Members



## Affiliate Members





# Allied Organizations

- NEU will work with industry collaborators through an allied organization level of participation.
- Mission aligned industry associations, govt. agencies, universities, etc.

## Allied Organizations

- International Code Council Evaluation Services (ICC-ES)
- Inter-American Cement Federation (FICEM)
- Concrete Innovation Hub – UC – Santiago, Chile (CIHUC)
- ASTM, International
- NRMCA
- CP Tech Center at ISU
- PCA



# Allied Organizations

- NEU will work with industry collaborators through an allied organization level of participation.
- Mission aligned industry associations, govt. agencies, universities, etc.

## Allied Organizations

- International Code Council Evaluation Services (ICC-ES)
- Inter-American Cement Federation (FICEM)
- Concrete Innovation Hub – UC – Santiago, Chile (CIHUC)
- ASTM, International
- NRMCA
- CP Tech Center at ISU
- PCA
- **SCA**



# ACI Center of Excellence on Carbon-Neutral Concrete

## NEU Team



Dean Frank, P.E.  
Executive Director



Dr. Andrea Schokker  
Senior Technical Consultant  
and Board Advisor



Ms. Kelly Dudley  
Assistant  
Executive Director



Dr. Sureka  
Sumanasooriya  
Technical Director



Kari Moosmann  
Director of  
Marketing



Dr. Mahmut Ekenel  
Director of Validation

# NEU News

- NEU SmartBrief
- Newsletter
- White papers
- Webinars
- Carbon Neutral Summit
- ACI convention sessions



**Carbon Neutral Concrete**  
*What does it really mean?*  
By Andrea Schokker, PhD, P.E., LEED AP



**NEU's Carbon Neutral  
Concrete Day – A Success!**

# NEU Upcoming Webinars/Events

- Overcoming Barriers to Adoption of More Sustainable Concretes
  - **Dr. Doug Hooton**, University of Toronto: May 25, 2023, 2:00 PM EST
- Impacts of Senate Bill 596 and other Low Carbon Policy Initiatives in California
  - **Tom Tietz**, California Nevada Cement Association: June 29, 2023, 10:00 AM EST
- Carbon Neutral summit/workshop – In DC – Sep. 2023
- ACI Fall convention session – Wednesday Nov. 01<sup>st</sup> 1:30-3:30 PM EST

# Thank you!

[www.neuconcrete.org](http://www.neuconcrete.org)

[info@neuconcrete.org](mailto:info@neuconcrete.org)

 NEU: An ACI Center of Excellence for Carbon Neutral Concrete

 @NEUCarbonNeutralConcrete

 @NEUconcrete

  
An ACI Center of Excellence  
for Carbon Neutral Concrete