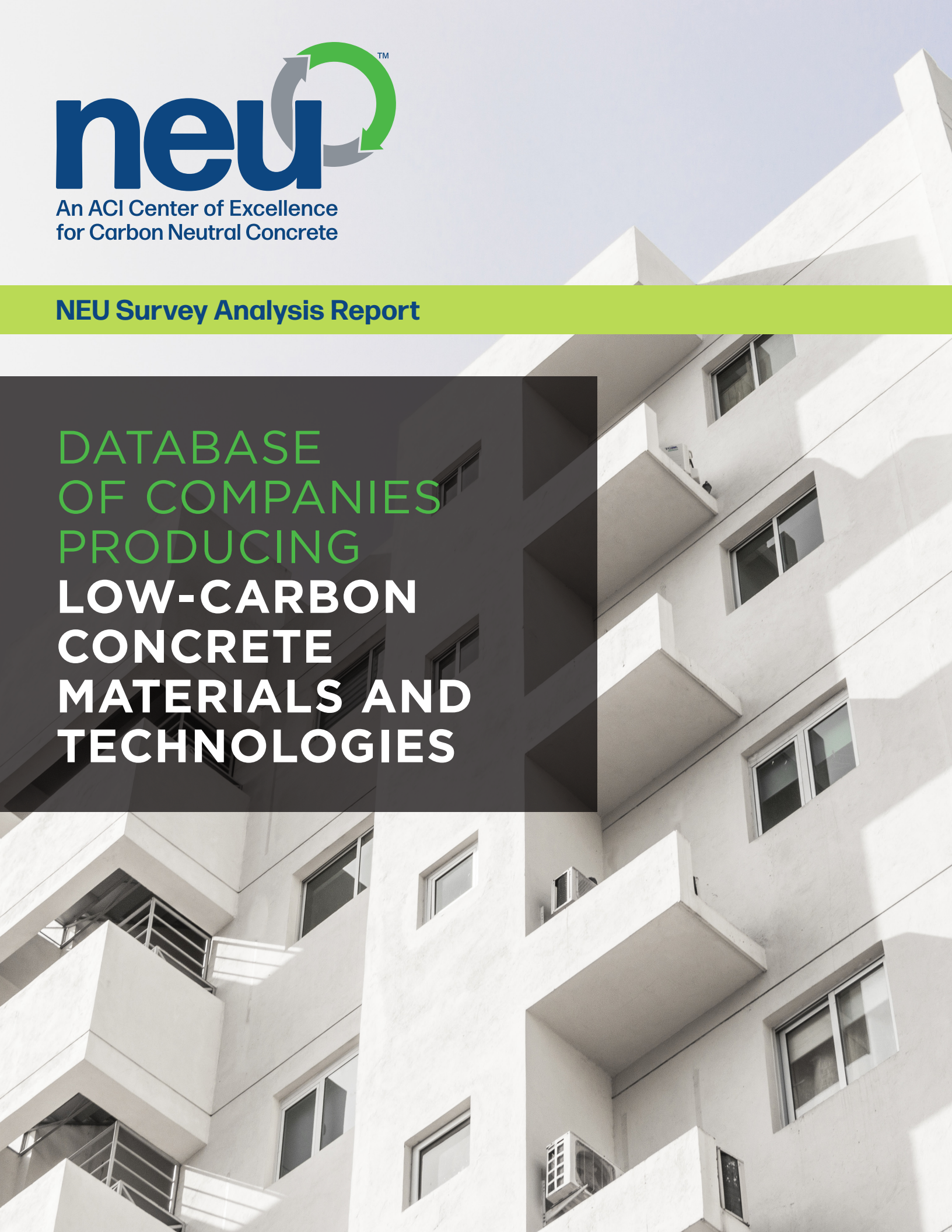
An ACI Center of Excellence for Carbon Neutral Concrete

NEU Survey Analysis Report

DATABASE OF COMPANIES PRODUCING LOW-CARBON CONCRETE MATERIALS AND TECHNOLOGIES



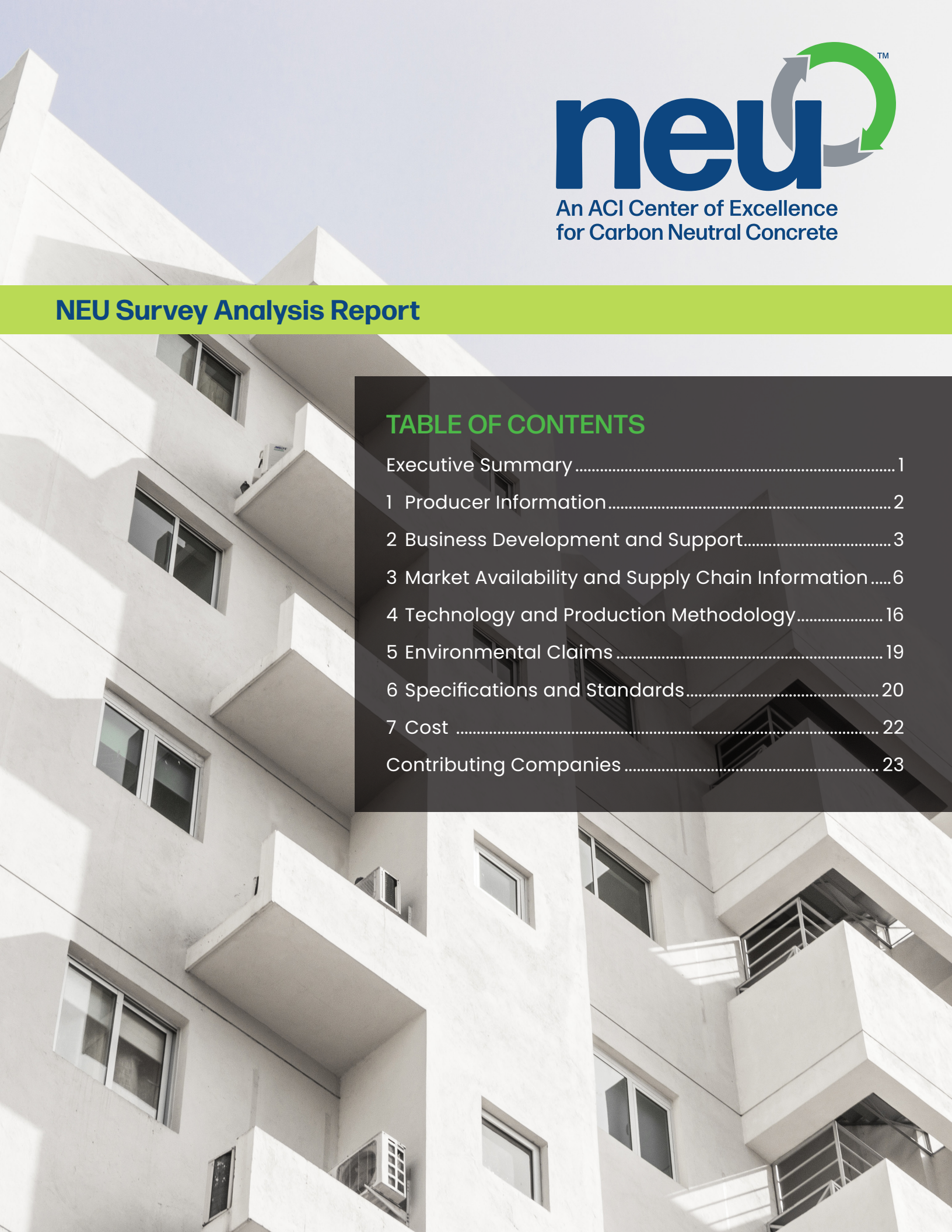


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TABLE OF CONTENTS

Executive Summary

NEU: An ACI Center of Excellence for Carbon Neutral Concrete was established by the American Concrete Institute to address advancing the reduction of carbon in the built environment. NEU leads the global concrete industry in advancing low-carbon and sustainable concrete technologies, empowering all stakeholders to create a resilient built environment.

To help move forward quickly to meet cement and concrete industry carbon reduction goals, NEU conducted a two-part online survey requesting information from innovative materials and technology companies to understand their product characteristics, manufacturing processes, availability and market presence, applications, and environmental performance.

A total of 48 companies responded to Part A of the survey, representing an 83% response rate. These responses cover 55 products. Additionally, 13 companies completed Part B of the survey. **This report details the findings of the survey data collected for Part A of the survey, followed by key questions.**

METHODOLOGY OVERVIEW

Data was gathered through a two-part online survey distributed via email between May 2023 and February 2025, targeting innovative low-carbon cement and concrete materials and technology companies, primarily established in the United States. The survey targeted manufacturers of innovative binders or cementitious materials; supplementary cementitious materials (SCMs); aggregate; chemical admixtures; reinforcement; complete concrete mixtures; carbon capture, utilization, and storage; or any other material or technology that helps reduce the carbon footprint of concrete.

A summary of the intent of the two parts of the survey is as follows:

- **Part A:** This survey covers basic information about business, market availability, technology and product information (non-specific), environmental claims, specifications met, and cost (broadly).
- **Part B:** This survey provides a place to share experiences, future production plans, technology compatibility, environmental claims, and performance, as well as the challenges and obstacles that a company is currently facing. For both parts of the survey, it was suggested not to provide overly long responses to any questions unless necessary. For the most part, general ballpark answers were expected. For any multiple-choice or checkbox question, it was recommended to select "Other" and add a comment if the offered answer options did not fit the situation. Also, it was recommended not to provide any confidential (proprietary) information. Contact information was collected for follow-up purposes.

KEY FINDINGS

- The current low-carbon cement and concrete production is dominated by market-ready players. Together, established businesses and venture-funded startups account for over 60% of entities.
- Nearly 90% of solutions are ready now, signaling immediate and near-term opportunities for deployment.
- A significant number of materials/technologies (46%) will be available in all U.S. regions in the coming years rather than being regionally exclusive.
- Low-carbon binders and SCMs lead material categories, with others trailing, highlighting a focus on CO_2 reduction.
- A large proportion of the materials/technologies can be used in any type of concrete product, with ready mixed concrete and precast concrete being the most frequently specified types.
- Most life-cycle analyses (LCAs) and Environmental Product Declarations (EPDs) focus on individual products, with fewer available for concrete mixtures and many still undeveloped. This raises concerns regarding global warming potential (GWP) reporting and may create barriers to effective implementation.

FINDINGS OF PART A OF THE SURVEY

Part A of the survey comprised 29 questions covering Producer Information, Business Development and Support, Market Availability and Supply Chain Information, Technology and Production Methodology, Environmental Claims, Specifications and Standards, and Cost, including both quantitative and qualitative items. A summary of the findings for each question is provided.

1 Producer Information

1.1 Company name.

Company name, address, and contact information were collected to identify producers and for future contact purposes. Companies that filled out Part A along with the company website link are as follows. Please note that some company information, including names and websites, may have changed since the original survey was conducted:

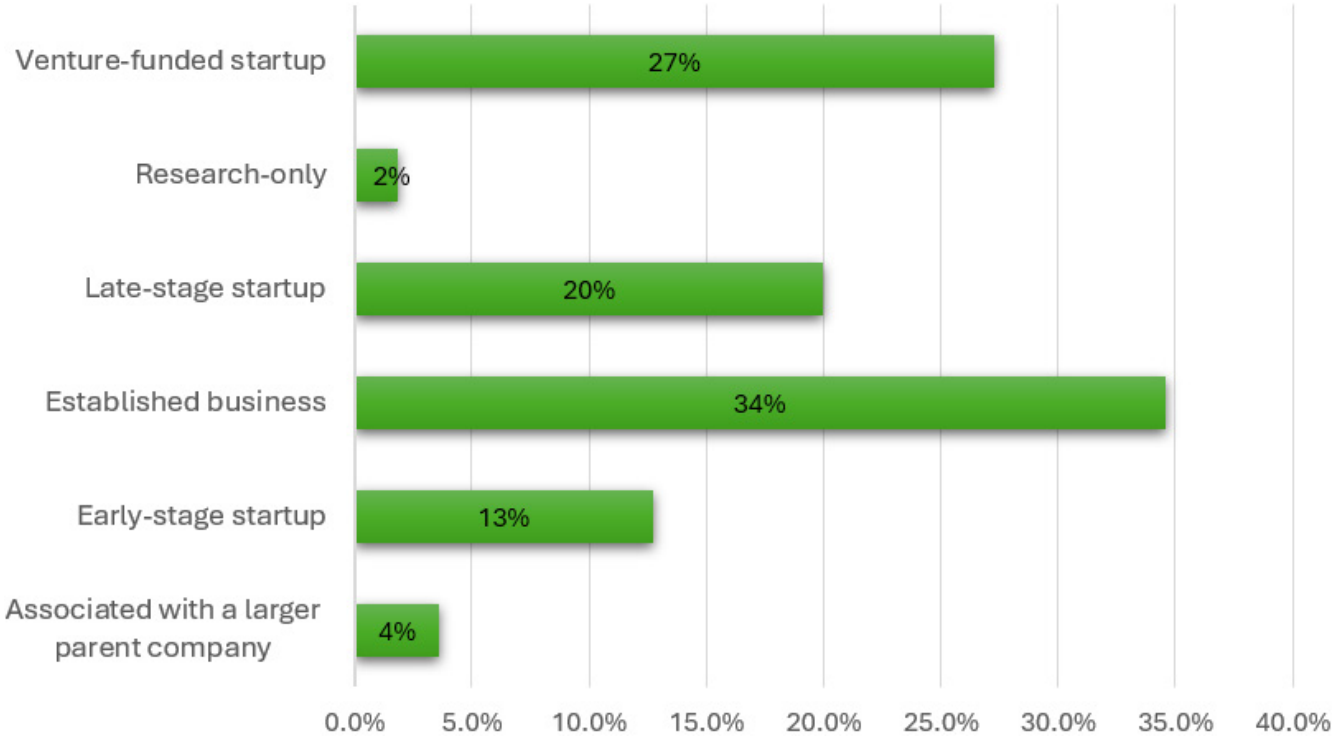
COMPANY NAME	COMPANY WEBSITE
AtlantisFiber	https://atlantisfiber.com/
BarChip Inc.	https://barchip.com/
Blue Planet Systems	https://www.blueplanetsystems.com/
Brimstone	https://www.brimstone.com/
CarbiCrete	https://carbicrete.com/
Carbix Corporation	https://www.carbixcorp.com/
Carboclave	https://www.carboclave.com/
CarbonBuilt	https://www.carbonbuilt.com
CarbonCure Technologies	https://www.carboncure.com/
Carbon Limit	https://www.carbonlimit.com/
Carbon Upcycling	https://carbonupcycling.com/
C-Crete Technologies	https://ccretetech.com/
ceEntek	https://ceentek.com/
CHASM Advanced Materials, Inc.	https://www.chasmtek.com/low-carbon-cement
Chement	https://www.chement.co
CTS Cement Manufacturing Corporation	https://www.ctscement.com/
E5 Incorporated	https://www.e5nanosilica.com/
Eco Material Technologies	https://ecomaterial.com/
Ecocem	https://www.ecocemglobal.com/
EnviCore Inc.	https://www.envicoreinc.com/
Exeed Precast	https://exeedprecast.ae/
FORTA	https://fortacorp.com/
Fortera	https://forterausa.com
GCP Applied Technologies - Chryso	https://gcpat.com
Geopolymer Solutions LLC	https://www.geopolymertech.com/
Heidelberg Materials	https://www.heidelbergmaterials.us/
Holcim	https://www.holcim.com/
Imerys	https://www.imerys.com/minerals/calcium-aluminate
KLAW Industries LLC	https://klawindustries.com/
Master Builders Solutions	https://master-builders-solutions.com/en-us/
MEGASLAB	https://megaslab.com/
Minus Materials	https://minusmaterials.com/
Modern Habitat Tech	https://modernhabitat.tech/
NuGreen	https://www.nugreeninc.com/
Outside the Box Materials Corp.	https://www.otbmaterials.com/

COMPANY NAME	COMPANY WEBSITE
Ozinga	https://ozinga.com/
Partanna Global, LLC	https://www.partanna.com/
Premier Magnesia	https://www.premiermagnesia.com/
Prometheus Materials	https://prometheusmaterials.com
Purebase	https://purebase.com/
Sioneer	https://www.sioneer.com/
Solid Carbon	https://www.solid-carbon.com/
Sublime Systems	https://sublime-systems.com
Terra CO_2	https://terraco2.com
Ultra High Materials, Inc.	https://www.ultrahighmaterials.com
Urban Mining Industries	https://pozzotive.com/
Yummet	https://www.yummet.com/
ZAH Technologies, LLC	https://zahtechnologies.com/

2 Business Development and Support

2.1 Please indicate your level of business development.

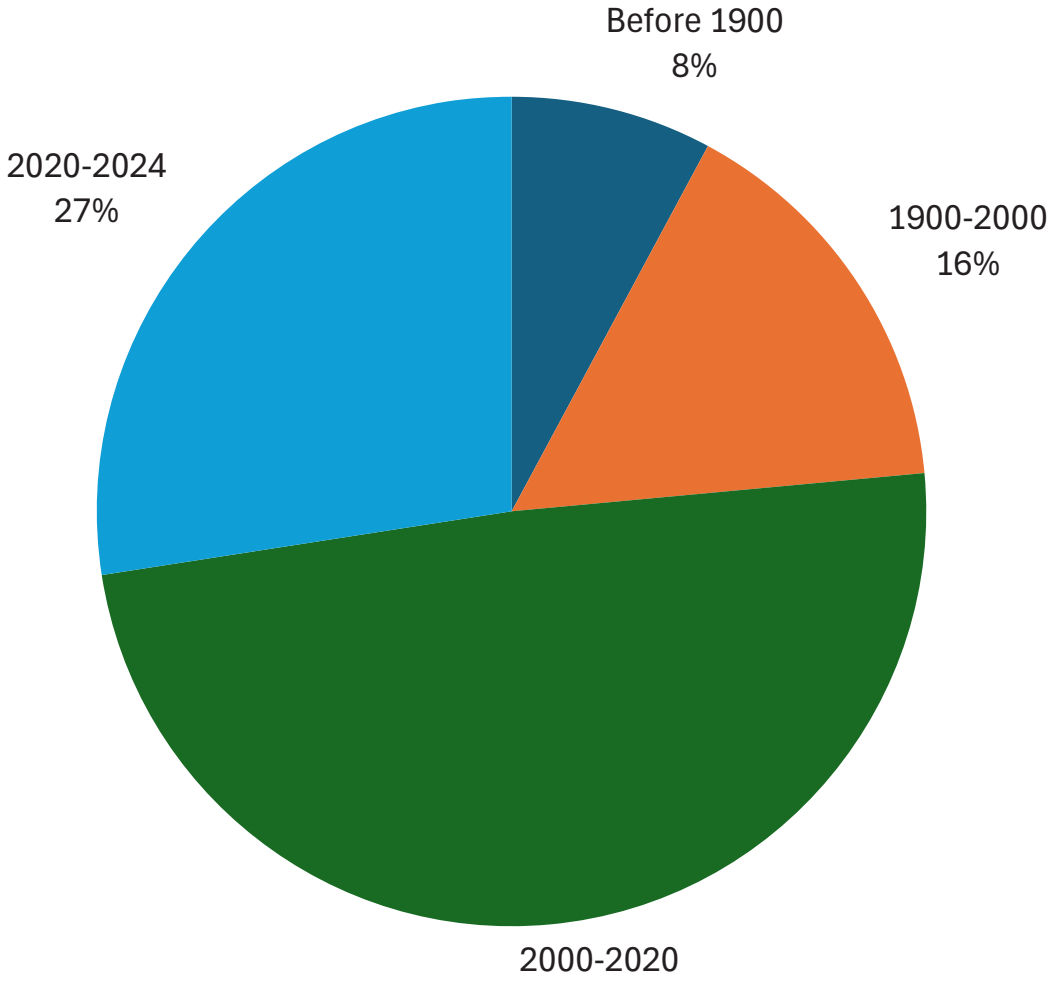
The following bar chart illustrates the level of business development based on the survey responses.



As shown in this chart, established businesses form the largest category among the entities surveyed, accounting for 34% of the companies/products. In summary, the graph shows that “Established businesses” and “Venture-funded startups” are the dominant categories, collectively accounting for over 60% of the distribution. Startups at various stages (early and late) also represent a significant portion (33%), while research-only entities and those associated with larger parent companies are less common.

2.2 What year did your company start?

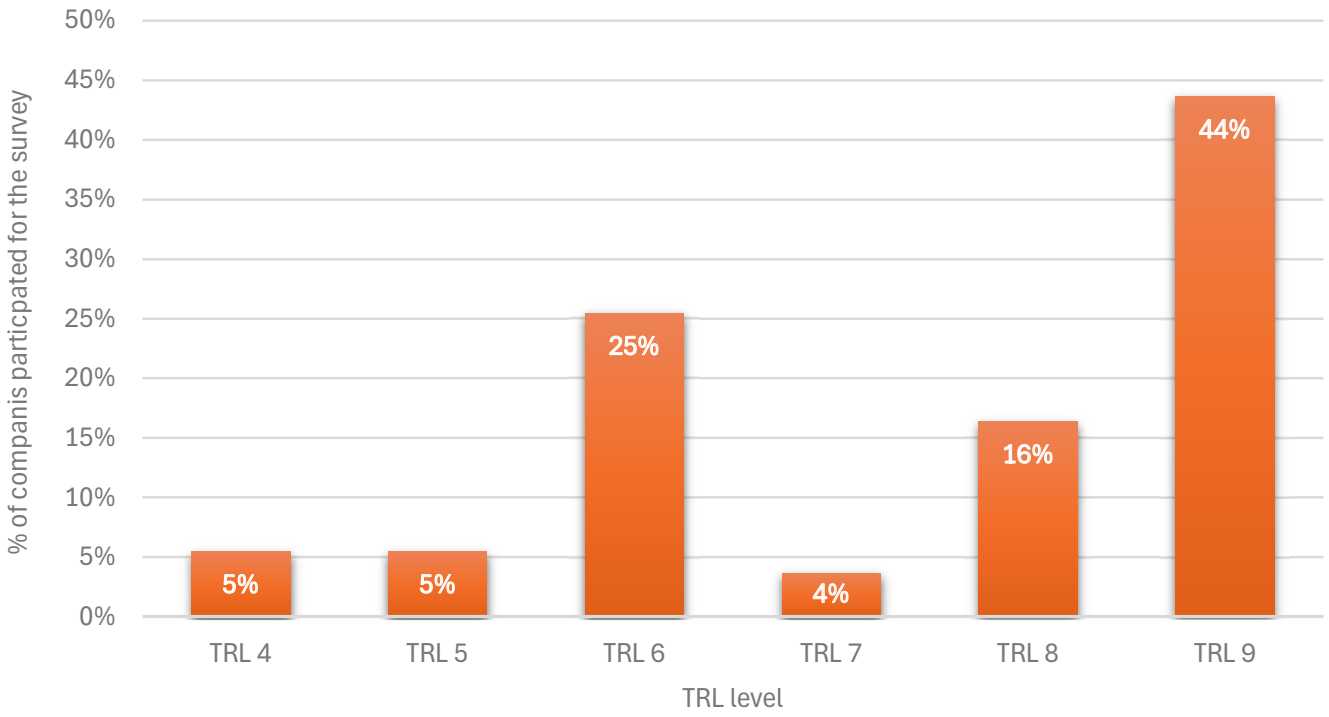
The pie chart illustrates the distribution of the establishment of low-carbon cement and concrete materials and technology-producing companies across four different time periods.



The periods from the year 2000 onward collectively represent the vast majority of the total, with 76% (49% + 27%). There's a significant increase in the percentage from earlier periods to more recent ones. The most recent period shown, 2020-2024, still represents a substantial portion (27%) despite being a much shorter time frame (4 years) compared to the 20-year period of 2000-2020 or the 100-year periods. This suggests a rapid acceleration in the focus on low-carbon cement and concrete technologies in very recent times.

2.3 Based on the following (slightly altered) NASA Technology Readiness Levels (TRL), where is your company?

- TRL 1: Basic material/technology principles observed
- TRL 2: Material/technology concept and/or application formulated
- TRL 3: Analytical and experimental proof of concept
- TRL 4: Material/technology validated in laboratory environment
- TRL 5: Material/technology validated in relevant environment
- TRL 6: Material/technology demonstrated in relevant environment (pilot project)
- TRL 7: Material/technology demonstrated in operational environment (full-scale project)
- TRL 8: Material/technology ready for full-scale production
- TRL 9: Material/technology at full-scale production



The bar chart shows the summary of the results for the TRL of company products. It should be noted that the companies that participated in the survey had a Technology Readiness Level of TRL 4 or higher.

KEY OBSERVATIONS

- **Dominance of TRL 9:** The highest percentage by a significant margin is at TRL 9 (44%), indicating that nearly half of the companies are at the highest level of readiness, meaning that these materials/technologies are at full-scale production.
- **High Activity at TRL 6:** A substantial percentage (25%) of companies are at TRL 6, suggesting a significant portion of companies have demonstrated their materials/technologies in a relevant environment.
- **TRL 7 and TRL 8:** Collectively, 20% of the companies are making great progress (TRL 7 and TRL 8), representing materials/technologies that are demonstrated in an operational environment (full-scale project) and ready for full-scale production.
- **Lower Readiness Levels (TRL 4, TRL 5):** TRL 4 and TRL 5 have smaller percentages (5% each), indicating fewer materials/technologies are at the initial stages of technology validation in a laboratory or relevant environment.

In summary, the distribution suggests a pipeline where a considerable number of materials/technologies have reached TRL 6 or higher, with a total of 89%.

3 Market Availability and Supply Chain Information

3.1 Please provide the brand name of the primary product you are producing.

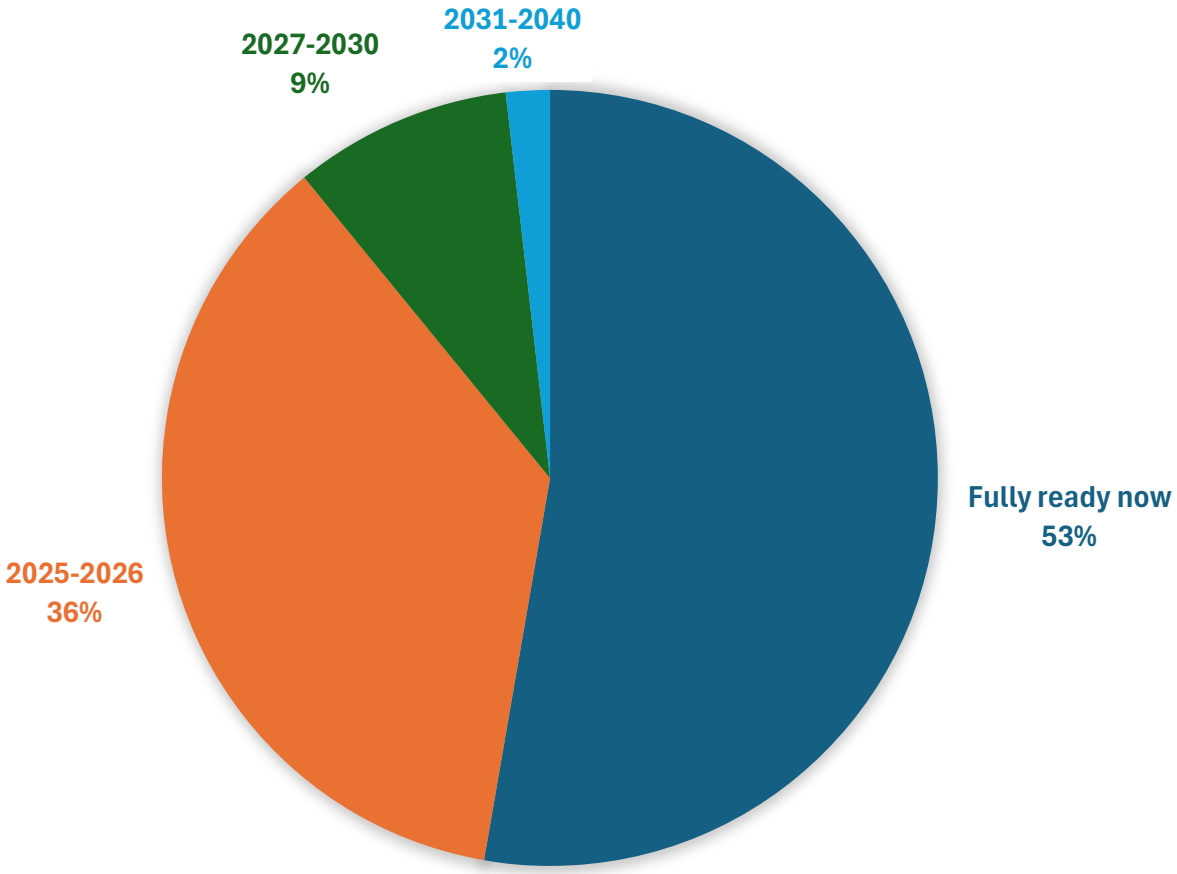
The table that follows summarizes the primary products offered by the respective companies. If a company produces more than one product, it was requested to provide information on such products. Entries have been left blank for companies that either do not have a branded product or have not provided that information.

COMPANY NAME	BRAND NAME
AtlantisFiber	SeismicFiber & EnviroGuard—100
BarChip Inc.	BarChip
Blue Planet Systems	Upcycled Aggregate
Brimstone	
CarbiCrete	CarbiCrete CMUs and CarbiFlo grid pavers
Carbix Corporation	
Carboclave	Carboclave masonry and hardscape products
CarbonBuilt	Reversa technology
CarbonCure Technologies	CarbonCure ready mix technology
Carbon Limit	CaptureCrete
Carbon Upcycling	CUT-Pozz
C-Crete Technologies	C-Crete's cement-free concrete
ceEntek	
CHASM Advanced Materials, Inc.	
Chement	
CTS Cement Manufacturing Corporation	Rapid Set Cement
E5 Incorporated	E5 Internal Cure, E5 Liquid Fly Ash
Ecocem	ACT
Eco Material Technologies	PozzoSlag and PozzoCem
EnviCore Inc.	
Exeed Precast	
FORTA	FORTA-FERRO
Fortera	Fortera ReAct
GCP Applied Technologies - Chryso	EnviroMix SE
Geopolymer Solutions LLC	Cold Fusion Concrete/Cement
Heidelberg Materials	EvoBuild Ready Mix
Holcim	ECOPact, ECOPlanet
Imerys	Ciment Fondu, Perlite ore, Metakaolin
KLAW Industries LLC	Pantheon
Master Builders Solutions	Green Sense Concrete, Master X-Seed, MasterSuna RCT 323
MEGASLAB	MEGASLAB
Minus Materials	Biogenic Limestone

COMPANY NAME	BRAND NAME
Modern Habitat Tech	MineralCrete
NuGreen	
Outside the Box Materials Corp.	TechCement RapidCast 100, TechCement RX60 RapidRepair
Ozinga	CarbonSense Cement
Partanna Global	Partanna's classic dry mix, Partanna CMU block, Partanna pavers, Partanna pre-cast range, Partanna pour-in-place concrete
Premier Magnesia, LLC	MAGOX XL
Prometheus Materials	Prometheus Materials Bio-block
Purebase	Purebase HP-SCM (internal name)
Sioneer	Centurion
Solid Carbon	BioLOCK, BioPOZZ, BioLOCK 2.0, BioAgg
Sublime Systems	Sublime Cement
Terra CO_2	OPUS SCM
Ultra High Materials, Inc.	Ultra High Materials
Urban Mining Industries	Pozzotive Ground Glass Pozzolan
Yummet	advanCEMENT
ZAH Technologies, LLC	ZeBar Basalt FRP Rebar; Chopped Basalt Fiber

3.2 In terms of full-scale market availability (or readiness), please choose the timeline that best reflects when your product will be ready for production and sales at scale.

The following pie chart illustrates a distribution across different market availability or timelines for different low-carbon materials/technologies.

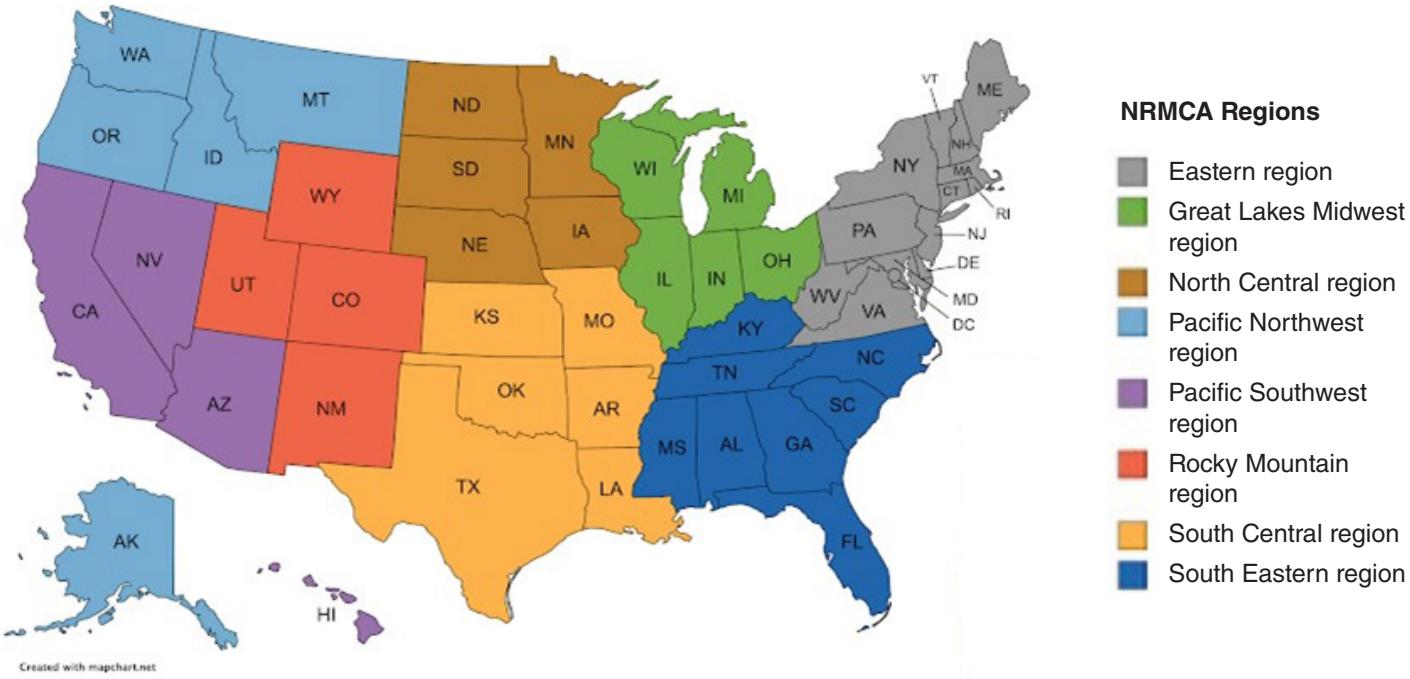


KEY OBSERVATIONS

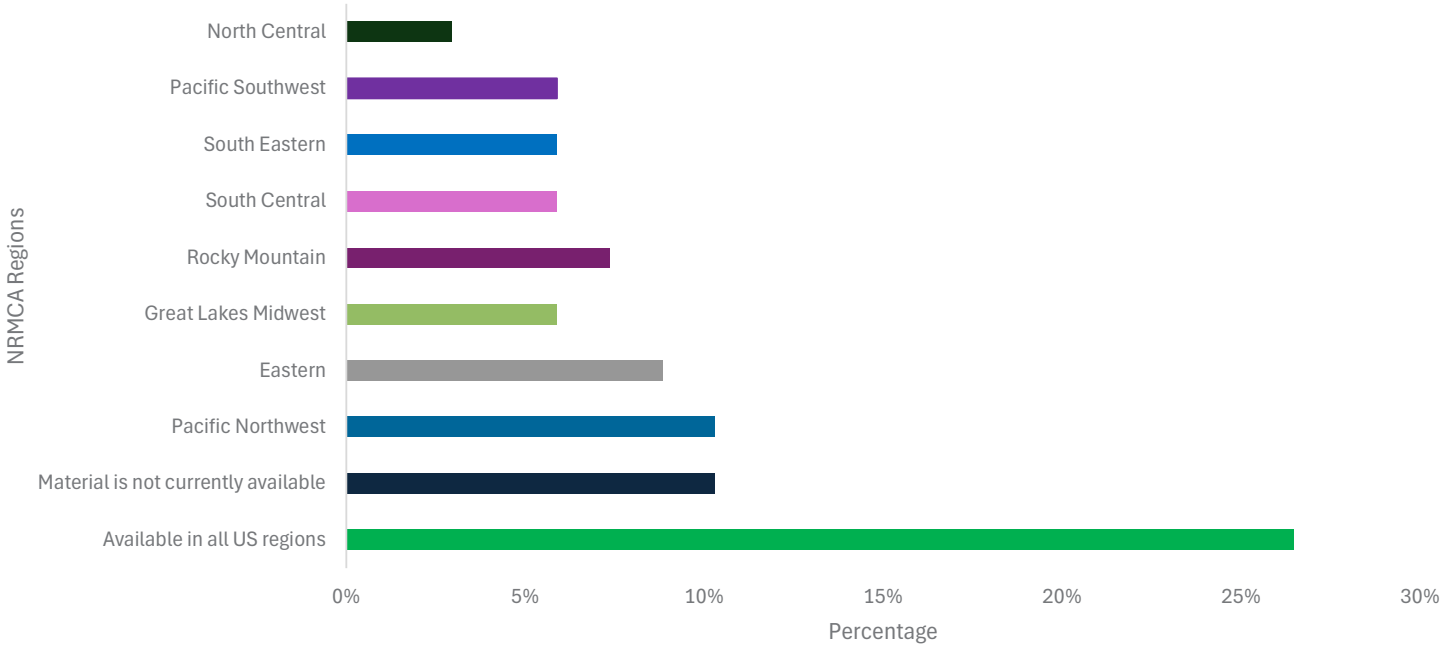
- **Ready now:** This category represents the largest portion, accounting for a substantial 53% of the total. This indicates that half of the materials/technologies are currently ready for production and sales at scale.
- **Near-Term Focus** (2025-2026)**:** Combining "Ready now" (53%) with "2025-2026" (36%) indicates that a total of 89% of the materials/technologies are either ready now or will be ready within this near-term window.
- **By 2040:** It can be observed that a few of the materials/technologies (11% of the total) are expected to be ready by 2040, falling within the 2027-2030 and 2031-2040 time frames.

3.3 United States: If your product or technology is currently available on the market in the United States, which region(s) is it available in?

The National Ready Mixed Concrete Association (NRMCA) regions map was provided to select the product or technology availability.



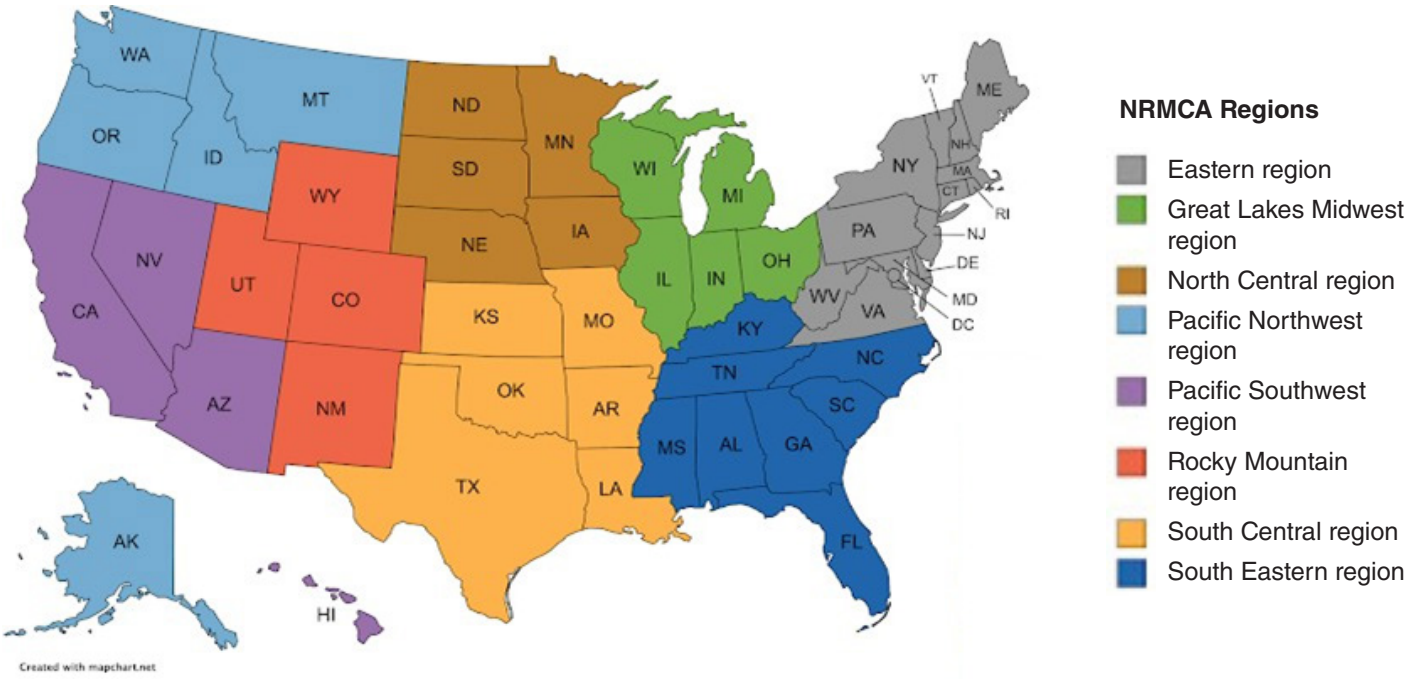
This bar chart illustrates the current geographic availability of materials across the various regions defined by the NRMCA. The data is expressed as a percentage of the total participating companies.



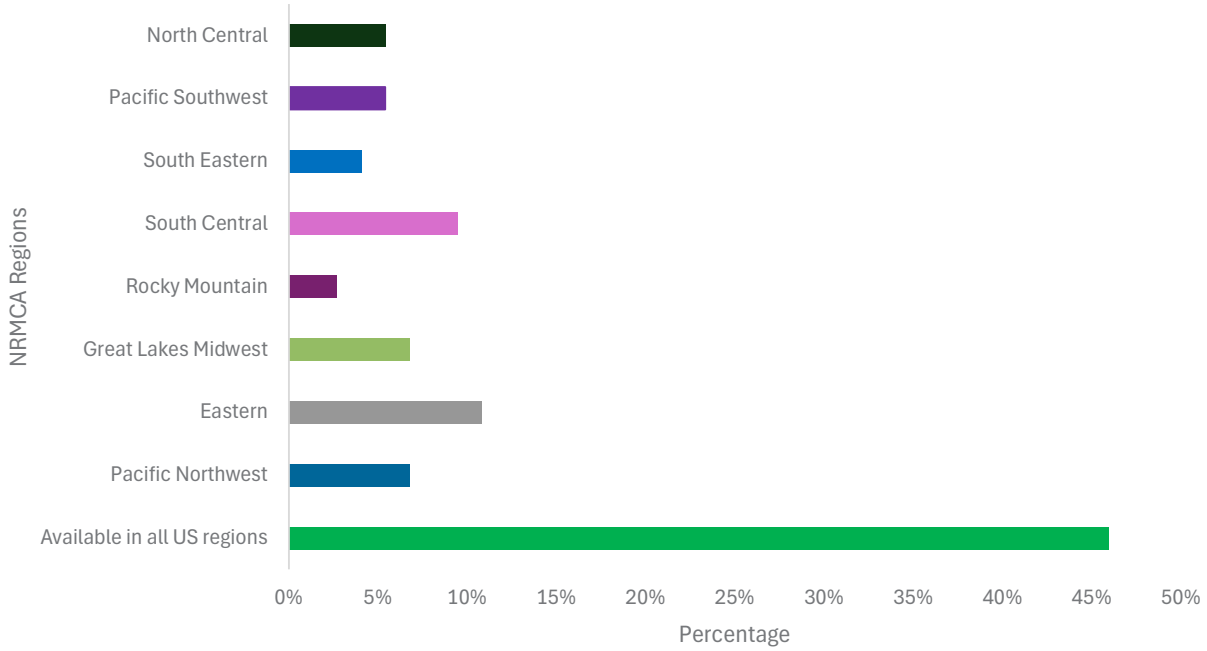
In summary, the graph shows a clear disparity in availability or distribution across different NRMCA regions, with a strong presence across all U.S. regions (26%) and a notable segment where the material is not available (10%). The North Central region had the lowest percentage, at 3%.

3.4 United States: In 5 years, in what United States regions do you anticipate your product or technology being available?

The National Ready Mixed Concrete Association (NRMCA) regions map was provided to select the product or technology availability.



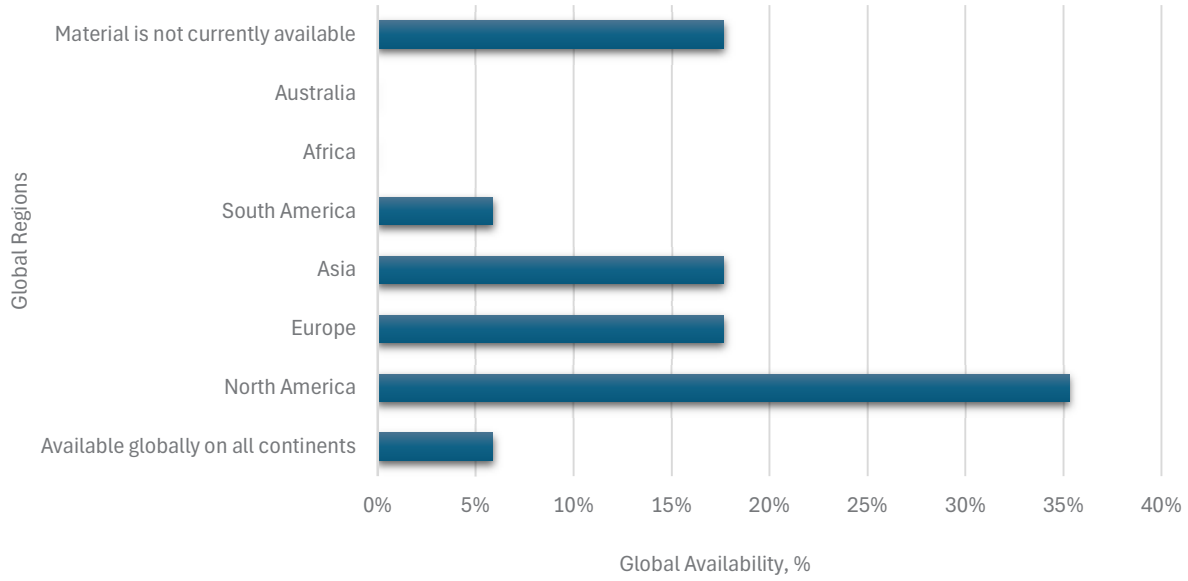
This bar chart illustrates the geographic availability of materials across the various regions defined by the NRMCA in the next 5 years. The data is expressed as a percentage of the total participating companies.



It is interesting to observe that a significant number of materials/technologies (46%) will be available in all U.S. regions in the coming years, rather than being regionally exclusive. Individual regional availability varies, with the Eastern and South Central regions exhibiting notably higher percentages compared to regions such as the Rocky Mountain region.

3.5 Globally: If your product or technology is currently available on the market outside of the United States, which general regions is it available in?

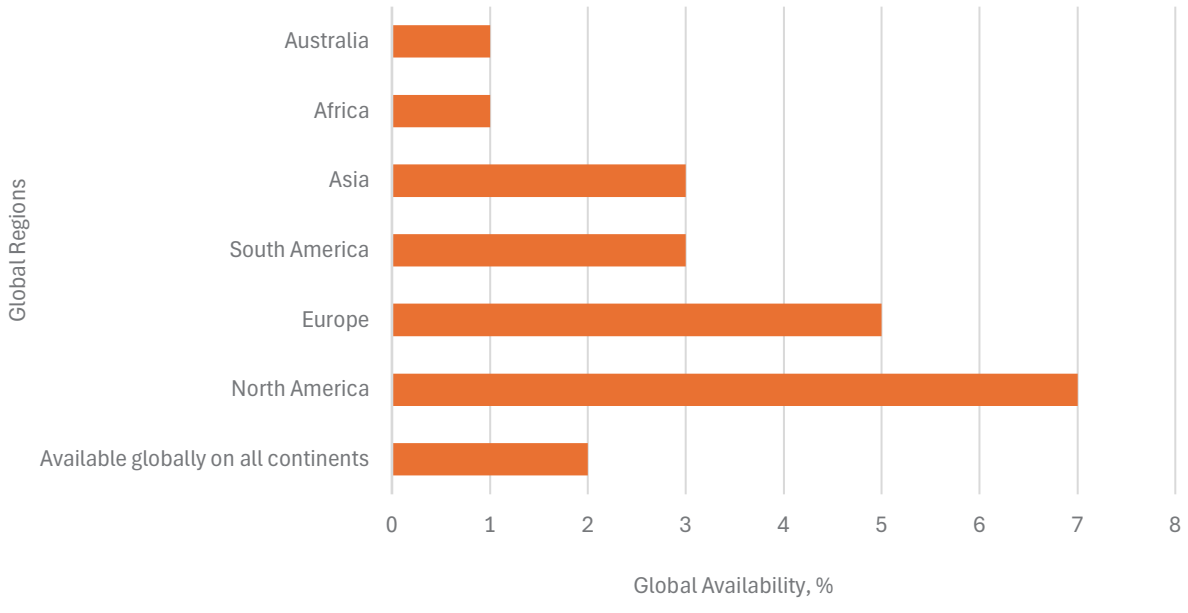
This bar chart illustrates the current global availability of materials/technologies. The data is expressed as a percentage of the total participating companies.



The materials/technologies' current availability is strongly skewed toward North America, a finding largely attributable to the survey's primary outreach to North American-based companies. Although they have some presence in Asia, Europe, and South America, the materials/technologies are completely unavailable in Australia and Africa, indicating that global availability has not yet been achieved for these companies. It's also important to note that a substantial amount of the materials/technologies remains inaccessible worldwide.

3.6 Globally: In 5 years, in what general regions do you anticipate your product or technology being available?

The following bar chart illustrates the global availability of materials/technologies in the next 5 years. The data is expressed as a percentage of the total participating companies.



The survey results suggest that over the next 5 years, the availability of low-carbon cement and concrete materials and technologies will continue to be heavily concentrated in North America, with Europe coming in second. The strong North American presence may be largely due to the survey primarily reaching out to companies based in that region. South America and Asia will also have notable availability, whereas Australia and Africa are projected to have the lowest individual continental availability. It is also noteworthy that many companies anticipate having their products available globally, at least across several regions, in the coming years.

3.7 Please list the city/state (city/country) location(s) of current production.

The following table provides the locations of current production for each company's material or technology. Entries have been left blank for companies that have not provided this information.

COMPANY NAME	CITY/STATE (CITY/COUNTRY) LOCATION(S) OF CURRENT PRODUCTION
AtlantisFiber	Vancouver, BC, Canada
BarChip Inc.	
Blue Planet Systems	Pittsburg, California
Brimstone	Oakland, California
CarbiCrete	Drummondville, QC, Canada
Carbix Corporation	Quincy, Massachusetts
Carboclave	Hamilton, ON, Canada; Cambridge, ON, Canada; London, ON, Canada; Montréal, QC, Canada; Dubai, United Arab Emirates
CarbonBuilt	Childersburg, Alabama
CarbonCure Technologies	North America, Latin America, Asia-Pacific, Europe, the Middle East, Africa
Carbon Limit	Boca Raton, Florida; Las Vegas, Nevada; California
Carbon Upcycling	Calgary, AB, Canada
C-Crete Technologies	San Leandro, California
ceEntek	Worldwide
CHASM Advanced Materials, Inc.	Norman, Oklahoma
Chement	
CTS Cement Manufacturing Corporation	Ciudad Juárez, CH, Mexico
E5 Incorporated	Green Bay, Wisconsin
Ecocem	Dunkirk, France
Eco Material Technologies	Texas
EnviCore Inc.	
Exeed Precast	Abu Dhabi, United Arab Emirates
FORTA	Grove City, Pennsylvania; Grand Rapids, Michigan
Fortera	Redding, California
GCP Applied Technologies - Chryso	Various
Geopolymer Solutions LLC	Conroe, Texas
Heidelberg Materials	Worldwide cement plants and ready mix operations.
Holcim	In most cement plants, Holcim operates in the U.S.

COMPANY NAME	CITY/STATE (CITY/COUNTRY) LOCATION(S) OF CURRENT PRODUCTION
Imerys	Lakeview, Oregon; Sandersville, Georgia; Norfolk, Virginia
KLAW Industries LLC	Binghamton, New York
Master Builders Solutions	California, Georgia, Ohio, and more states
MEGASLAB	Marietta, Georgia
Minus Materials	Boulder, Colorado; and San Francisco, California
Modern Habitat Tech	Andersonville, Georgia; and Bauxite, Arkansas
NuGreen	Miami, Florida; and Atlanta, Georgia
Outside the Box Materials Corp.	New Freedom, Pennsylvania
Ozinga	Chicago, Illinois
Partanna Global	Nassau, the Bahamas; Abu Dhabi, United Arab Emirates
Premier Magnesia, LLC	Gabbs, Nevada
Prometheus Materials	Longmont, Colorado
Purebase	Ione, California
Sioneer	
Solid Carbon	Wilsonville, Oregon
Sublime Systems	
Terra CO_2	Colorado
Ultra High Materials, Inc.	We license our formulations to existing cement and concrete manufacturers.
Urban Mining Industries	Beacon Falls, Connecticut
Yummet	St. Paul, Minnesota; and Hilo, Hawaii
ZAH Technologies, LLC	Spartanburg, South Carolina

3.8 What is the annual amount of product you are currently producing?

The following table provides a summary of the annual production of various low-carbon materials and technologies. It should be noted that these materials and technologies are at different TRL levels, and therefore, their production capacities vary significantly. Additionally, this information was provided only by a portion of the companies that participated in the survey.

MATERIAL CATEGORY	NO. OF COMPANIES RESPONDED	WHAT IS THE ANNUAL AMOUNT OF PRODUCT YOU ARE CURRENTLY PRODUCING?
Binder/Cement	9	5 to 10,000,000 tons
Supplementary Cementitious Materials	10	100 kg to 200,000 tons
Aggregate	2	1,000 to 7,000 tons
Chemical Admixture	3	30 tons; 600,000 gal.
Reinforcement	2	Millions of tons
Complete Concrete Mixture	4	50 to 7,000,000 tons
Carbon capture, utilization, and storage	1	14 million units of concrete masonry units
Other	1	50,000 tons of raw materials

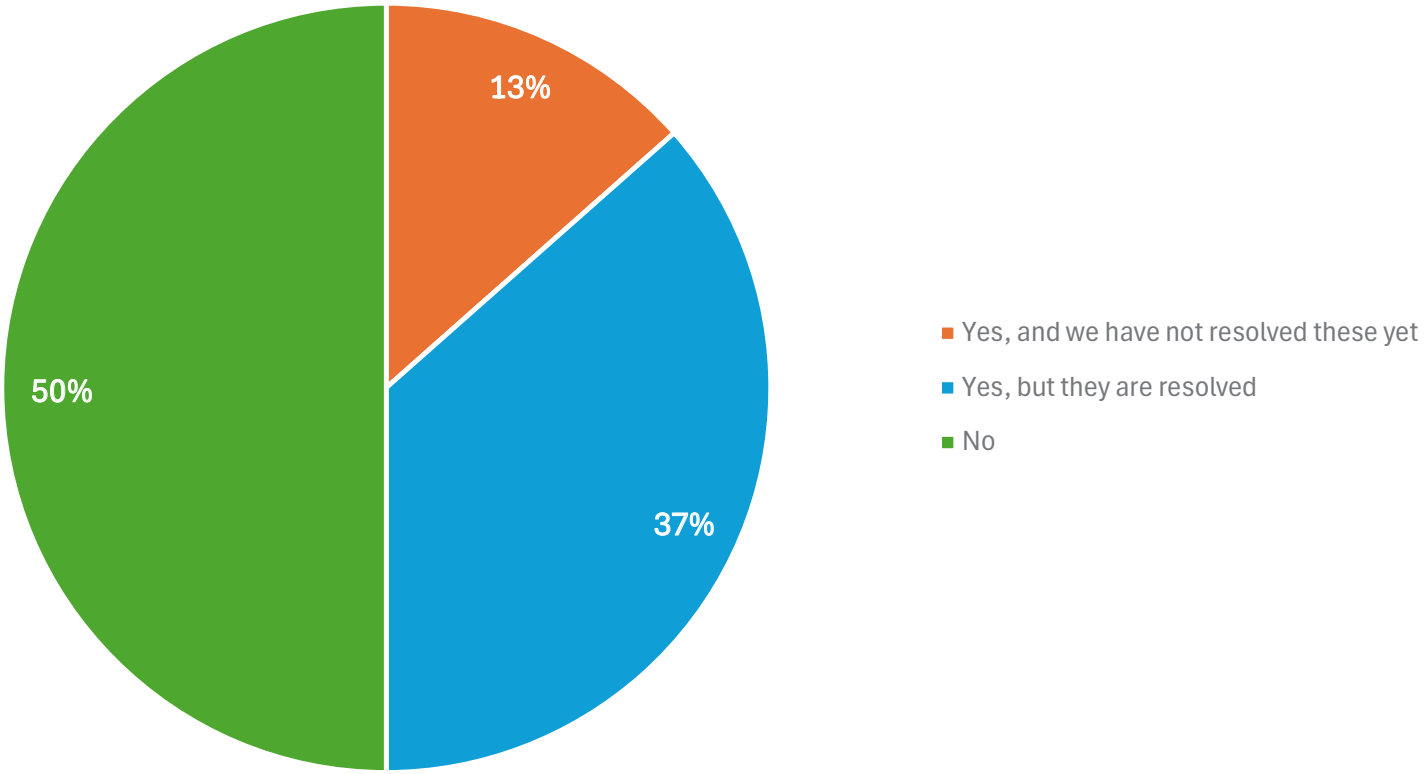
3.9 What raw materials or waste streams does this technology or product rely on?

The following table shows a summary of the responses that have been received for different materials categories.

MATERIAL CATEGORY	NO. OF COMPANIES RESPONDED	RAW MATERIALS OR WASTE STREAMS USED
Binder/Cement	19	Limestone, quartz, biofuels, slag, fly ash, pozzolans, waste glass, alumina waste, red mud, mining and agricultural biomass waste, industry waste, recycled aggregate, algae, municipal solid waste, wastewater processing waste, high-calcium waste materials, calcium-rich silicate rocks, coal fly ash, glass, various mining tailings
Supplementary Cementitious Materials	15	Calcium-rich silicate rocks, silicate-based igneous rocks (such as granite and basalts), unconsolidated sediments (such as sands and gravels), mafic minerals, slag, metallurgical slags, fly ash, shale ash, silica, silicates, clay, kaolin clay, perlite ore, metakaolin pozzolans, tailings, recycled concrete, waste glass, CO_2
Aggregate	1	Waste concrete, slag, fly ash, CO_2
Chemical Admixture	8	Ethylene gas, alumina, product packaging, cleaned polymer fibers from recycled tires
Reinforcement	2	Virgin and recycled polypropylene, basalt rock and rovings, pre-consumer scrap resin, pre- and post-consumer scrap steel, recycled pallets
Complete Concrete Mixture	4	Freshly mined minerals and waste minerals consisting of calcium and magnesium, fly ash, slag, red mud, ground-granulated blast-furnace slag (GGBS)
Carbon capture and storage	2	Ready mixed concrete
Other	2	Sunlight, seawater, CO_2, nutrients to produce limestone, magnesium carbonate to produce magnesium-based cements, steel slag, and CO_2 for making CMUs

3.10 Are there any known variability issues based on raw material supplies?

The following chart illustrates the status of known variability issues based on raw materials supplies, categorized into three groups. In summary, half of the products exhibit no potential issues. More than one-third (37%) have addressed and resolved variability concerns, while a smaller yet notable proportion (13%) still have unresolved issues.



3.11 Describe the possible supply chain issues you currently have or foresee with regard to production of your product.

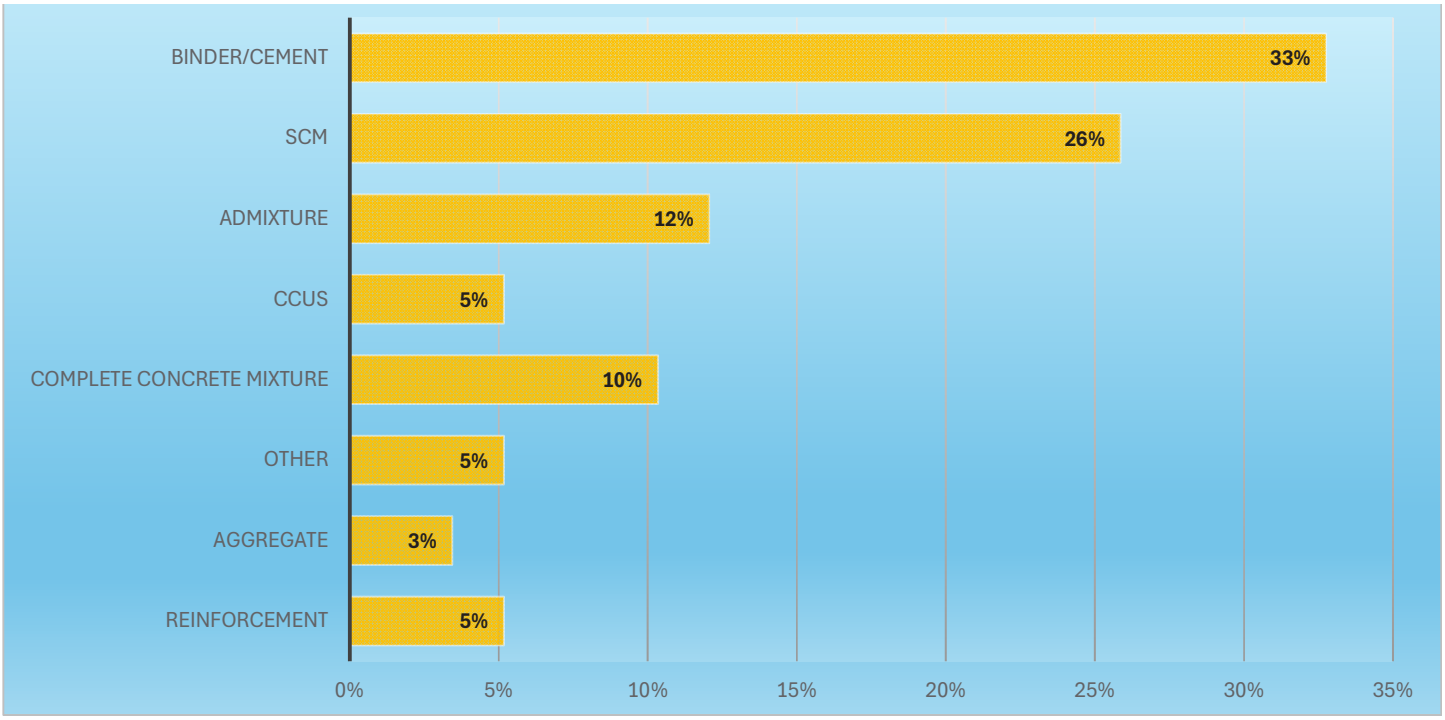
Some of the supply chain issues that companies are facing are as follows:

- Limited supply of raw materials (for example, slag, fly ash, and waste glass)
- Time and capital expenditure to scale up alternative supplementary cementitious materials (for example, calcined clay, and ponded ashes)
- Reliable and cost-effective shipping (trucking, rail, and barge)
- Large-scale production of algae
- Integration with cement and concrete
- CO_2 supply, if production facilities are located far away from a CO_2 source
- Variability in quality of recycled materials
- Integration with existing cement plants
- Volatility related to tariffs
- Logistics of ingredients

4 Technology and Production Methodology

4.1 Please select the material category that best fits your product or technology.

The following bar chart displays the percentage distribution of different material categories that best fit the product or technology.



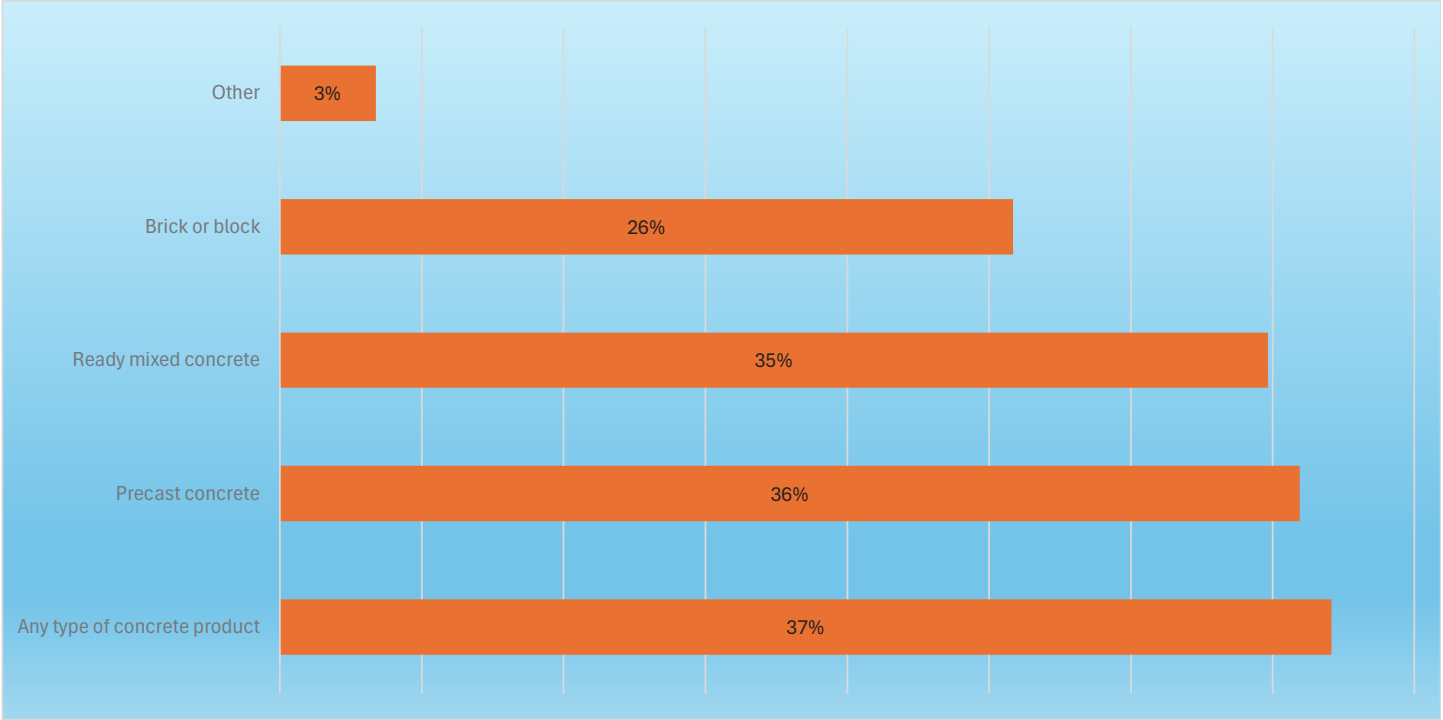
In summary, the chart indicates that Binder/Cement and SCMs are the dominant categories of low-carbon materials/technologies, accounting for 33% and 26%, respectively. Admixture and Complete Concrete Mixture also constitute notable portions, followed by Carbon Capture, Utilization, and Storage (CCUS). Aggregate and Reinforcement represent the smallest proportions in this particular breakdown based on survey responses. The results strongly imply a focus on areas where a significant reduction in CO_2 can be achieved.

4.2 Please provide a brief, easy-to-understand summary of your material or technology.

Answers to this question are specific to each company and product and are not included in this report.

4.3 What types of concrete products do you produce, or if your material is a component of concrete, what types of products could it be used in?

The following bar chart displays the percentage of respondents involved in different types of concrete products, based on the question. It should be noted that respondents were allowed to select all applicable categories.



In summary, the graph reveals that a large proportion of the respondents are involved in "Any type of concrete product," with precast concrete and ready mixed concrete being the most frequently specified types. Brick or block also represents a significant segment, while a very small percentage falls into the "Other" category, with responses including:

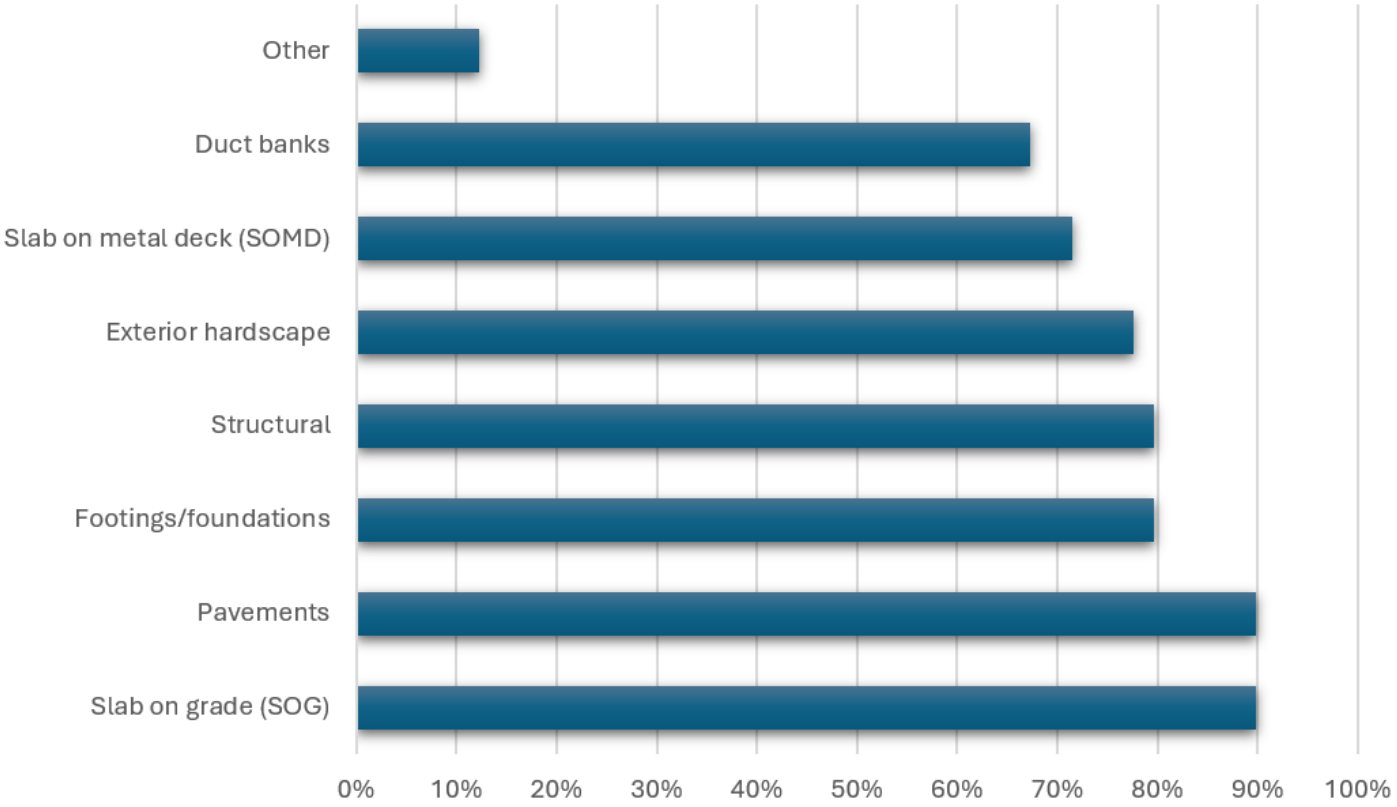
- Admixtures only
- Three-dimensional (3-D)-printed concrete
- Reinforcement products

4.4 What are the primary applications your product will be used for?

The responders were instructed to select all categories that applied to their product from the following:

- Slab on grade (SOG)
- Slab on metal deck (SOMD)
- Footings/foundations
- Structural
- Exterior hardscape
- Duct banks
- Pavements
- Other

The following bar chart illustrates the percentage of respondents involved in various concrete applications.



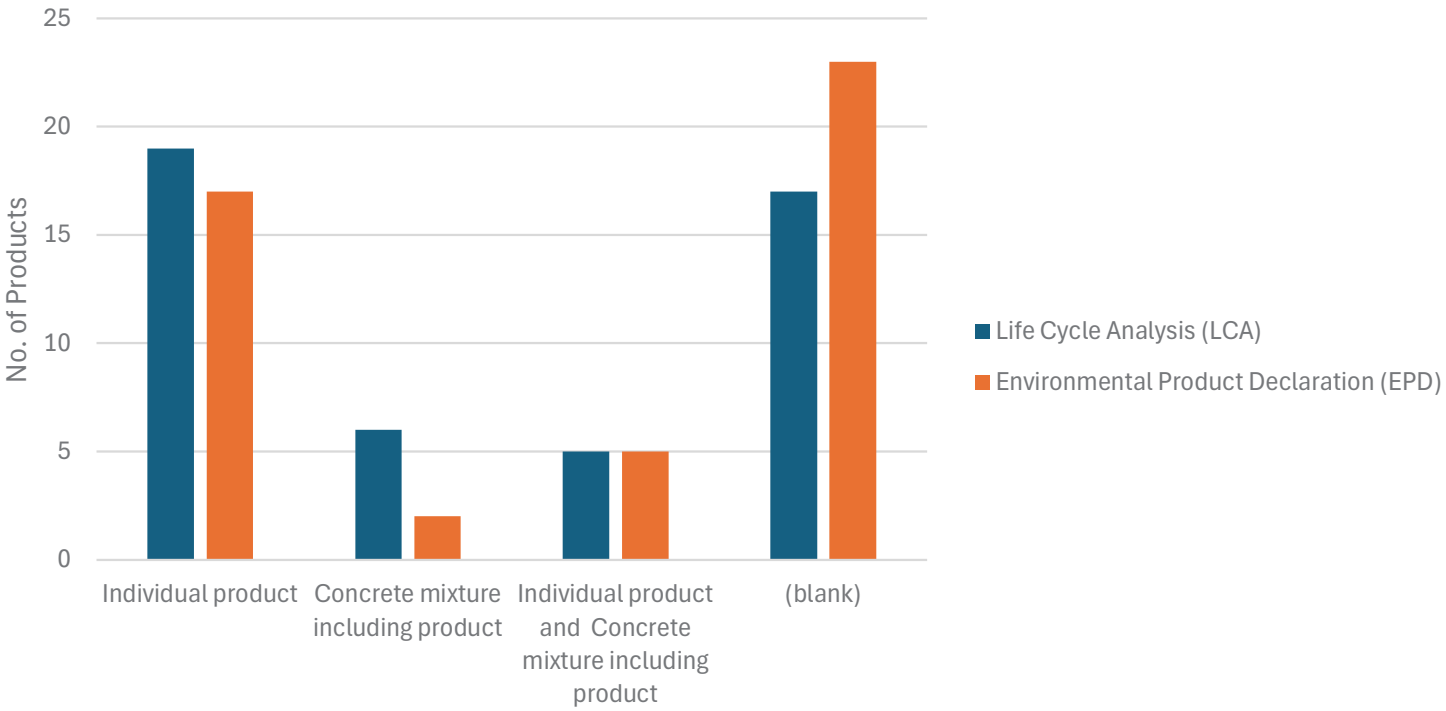
As shown in the chart, the surveyed group is engaged across a broad range of concrete applications. Slab-on-grade and pavements represent the highest levels of involvement, with 90% of respondents indicating participation in these applications. Footings/foundations and structural applications also demonstrate extensive engagement, with both reported by 80% of respondents. Exterior hardscape (78%), slab on metal deck (71%), and duct banks (67%) follow, reflecting substantial but slightly lower levels of activity. Overall, the results indicate that the respondents collectively participate in a diverse set of concrete construction applications. Additionally, 12% of respondents reported involvement in other concrete applications not listed among the primary categories. These include:

- Slope stabilization
- Shotcrete
- Temporary and permanent tunnel linings
- Formulated products
- Sewer
- Water and wastewater repair or replacement
- Slip panels
- Cladding
- Roofing
- Sprays and coatings
- 3-D-printed concrete
- Coastal defense

5 Environmental Claims

5.1 What types of environmental documentation have been completed for your product?

The following graph represents the data related to life-cycle analysis (LCA) and Environmental Product Declarations (EPDs) across different product scopes.



It can be observed that most LCAs and EPDs are conducted for individual products, highlighting a prevalent approach to product-specific environmental reporting. When concrete mixtures are explicitly mentioned, either alone or in combination with individual products, the numbers for both LCA and EPD are considerably lower than for individual products alone. Additionally, the large number of entries in the "blank" category indicates that LCAs or EPDs have not yet been developed for many products. This is significant for global warming potential (GWP) reporting, and understanding the barriers to developing LCAs and EPDs would be valuable.

5.2 What is the global warming potential (GWP) of your product?

To assess the environmental impact, respondents were requested to provide the GWP of their product using either "kg CO_2(eq)/metric ton" or "kg CO_2(eq)/m^3" as units. A key part of the instruction was to clarify if the GWP represented the product alone or a cubic meter of concrete incorporating the product. The reported GWP values showed a broad spectrum, ranging from carbon-negative up to 673 kg CO_2(eq)/metric ton for concrete mixtures. This wide range likely reflects the diversity in product types and the inherent variability of concrete mixtures. Notably, about 30% of the participating companies did not submit GWP information.

5.3 Aside from carbon reduction, please summarize any other environmental claims your company makes.

- Accelerate construction
- Accelerate finishing operations and thus openings to service schedule – economic
- Carbon mineralization in concrete
- Increase seismic resistance

- Increase solar reflectance index
- Increase durability and longevity
- Promote circular economy by using waste materials and recycling to produce cement or concrete
- Reduce polluting ground water
- Reduce transportation requirements
- Reduce concrete waste
- Reduce eutrophication, health and human damage, and loss of wildlife species
- Save energy
- Save water
- Scrubs SO_x, particulate matter (PM), and heavy metals from the cement producers' kiln emissions

6 Specifications and Standards

6.1 Please select all of the ASTM specifications or standards your product meets. Please add any additional specifications or standards not listed in the "Other" option (CSA/BS/EN/JIS/GB/ISO/other).

The following list of ASTM standards that are widely used in the cement and concrete industry was provided. The respondents were instructed to provide information on any additional specifications or standards that were not listed.

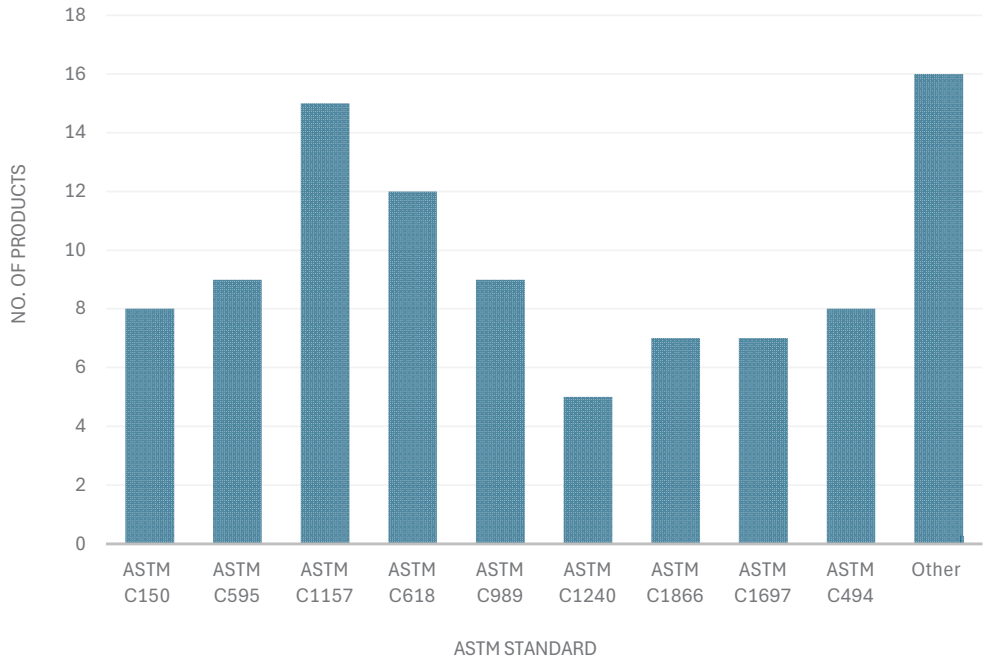
- ASTM C150/C150M: Standard Specification for Portland Cement
- ASTM C494/C494M: Standard Specification for Chemical Admixtures for Concrete
- ASTM C595/C595M: Standard Specification for Blended Hydraulic Cement
- ASTM C1157/C1157M: Standard Performance Specification for Hydraulic Cement
- ASTM C618: Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- ASTM C989/C989M: Standard Specification for Slag Cement for Use in Concrete and Mortars
- ASTM C1240: Standard Specification for Silica Fume Used in Cementitious Mixtures
- ASTM C1697: Standard Specification for Blended Supplementary Cementitious Materials
- ASTM C1866/C1866M: Standard Specification for Ground-Glass Pozzolan for Use in Concrete

The following bar chart illustrates the distribution of products across various ASTM standards. The number of products that conform to each respective standard is shown on the y-axis. There is a considerable variation in the number of products across the different ASTM standards, reflecting the diverse range of products considered.

The prominence of the "Other" category indicates that a significant number of specialized products don't fit neatly into common ASTM classifications. These standards are:

- ASTM A820/A820M: Standard Specification for Steel Fibers for Fiber-Reinforced Concrete
- ASTM C33/C33M: Standard Specification for Concrete Aggregates
- ASTM C90: Standard Specification for Dry-Cast Loadbearing Concrete Masonry Units
- ASTM C129: Standard Specification for Dry-Cast Nonloadbearing Concrete Masonry Units
- ASTM C260/C260M: Standard Specification for Air-Entraining Admixtures for Concrete
- ASTM C330/C330M: Standard Specification for Lightweight Aggregates for Structural Concrete
- ASTM C1116/C1116M: Standard Specification for Fiber-Reinforced Concrete

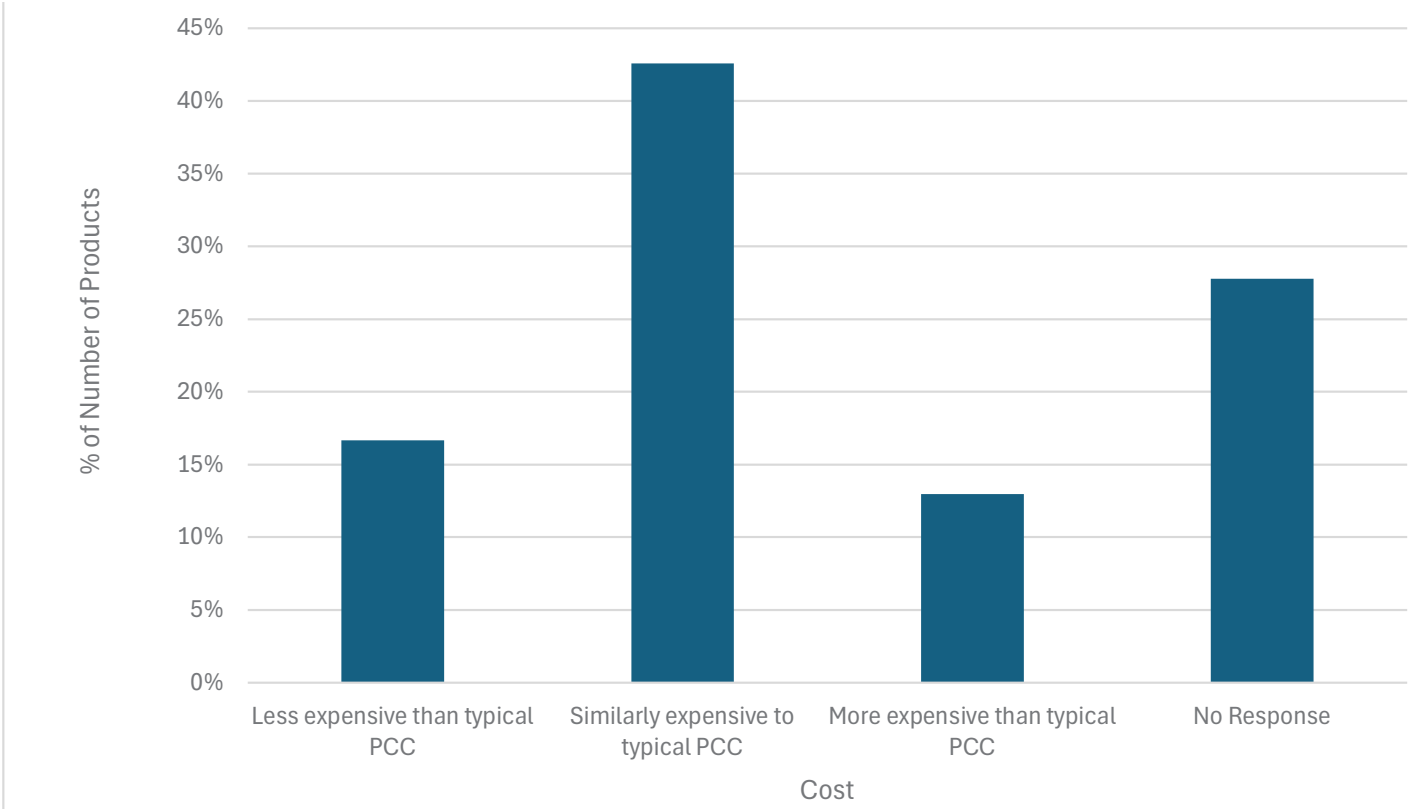
- ASTM C1600/C1600M: Standard Specification for Rapid Hardening Hydraulic Cement
- ASTM C1609/C1609M: Standard Test Method for Flexural Performance of Fiber-Reinforced Concrete (Using Beam With Third-Point Loading)
- ASTM C1709: Standard Guide for Evaluation of Alternative Supplementary Cementitious Materials (ASCM) for Use in Concrete
- ASTM D570: Standard Test Method for Water Absorption of Plastics
- ASTM D619: Standard Test Methods for Vulcanized Fibre Used for Electrical Insulation
- ASTM D695: Standard Test Method for Compressive Properties of Rigid Plastics
- ASTM D790: Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
- ASTM D2734: Standard Test Methods for Void Content of Reinforced Plastics
- ASTM D3410/D3410M: Standard Test Method for Compressive Properties of Polymer Matrix Composite Materials with Unsupported Gage Section by Shear Loading
- ASTM D7205/D7205M: Standard Test Method for Tensile Properties of Fiber Reinforced Polymer Matrix Composite Bars
- ASTM D8505/D8505M: Standard Specification for Basalt and Glass Fiber Reinforced Polymer (FRP) Bars for Concrete Reinforcement



7 Cost

7.1 In general, how does the cost of concrete made with your product compare to a typical portland cement concrete (PCC)?

The following chart displays the distribution of products based on their cost relative to a "typical PCC."



In summary, the majority of products (43%) are priced comparably to conventional PCC. This suggests that a significant portion of the products are priced in line with what is considered typical. It is noteworthy that cost information relative to PCC is unavailable for 28% of products. Among the remaining products, those priced below the typical PCC exceed those priced above.

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Contributing Companies

Please note that some company information, including names, logos and websites, may have changed since the original survey was conducted.

Atlantis FIBER
BarChip Inc. The Synthetic Fibre Experts
Blue Planet
BRIMSTONE
CarbiCrete
carbix TECHNOLOGIES
CARBOCLAVE Next Generation Cement Products
CARBONBUILT ULTRA-LOW CARBON CONCRETE
CARBON CURE
CARBONLIMIT
carbon upcycling
C-Crete TECHNOLOGIES
ceEntek
CHASM
chement
CTS
ecocem
ECOMATERIAL TECHNOLOGIES
ENVICORE
Exeed Precast
FORTA
fortera
gcp applied technologies
GEOPOLYMERSOLUTIONS
Heidelberg Materials
HOLCIM
IMERYS
KLAW INDUSTRIES
MASTER BUILDERS SOLUTIONS
MEGASLAB
Modern Habitat Tech
NV GREEN
OUTSIDE THE BOX MATERIALS
OZINGA
PARTANNA
PREMIER MAGNESIA, LLC
PROMETHEUS MATERIALS
Purebase
SiO2NEER
SOLID CARBON
Sublime Systems
TERRA CO2
Ultra High Materials
URBAN MINING INDUSTRIES
Yummet
zah technologies