

PIONEERING ADVANCED MATERIALS TECHNOLOGY

For A Low Carbon Future

Headquartered in Switzerland, Nanogence has subsidiaries and production facilities in the US and India, with plans for **further global expansion**. We are committed to playing our part in revolutionizing the construction industry by providing sustainable, high-performance solutions that enhance material efficiency and reduce embodied carbon.

Our vision is to lead the global transition towards more eco-friendly, resilient, and cost-effective building technologies.

OUR MISSION IS TO
HELP DELIVER A LOW
CARBON FUTURE

Image courtesy of EPFL/Jamami Caillat - CC-BY-SA 4.0.



TABLE OF CONTENTS

INTRODUCTION	03
THE CATALYST PLATFORM	04
KEY BENEFITS	05
THE VALUE	06
THE TECHNOLOGY	07
CASE RESULTS	08
ABOUT US	09

INTRODUCTION

Headquartered in Switzerland, Nanogence has subsidiaries and production facilities in the US and India, with plans for further global expansion. We are committed to playing our part in revolutionizing the construction industry by providing sustainable, high-performance solutions that enhance material efficiency and reduce embodied carbon. Our vision is to lead the global transition towards more eco-friendly, resilient, and cost-effective building technologies.

Innovation with Real-World Impact

We drive tangible change—reducing costs by up to 20% and increasing cement binding efficiency by up to 30%, making sustainable construction more accessible. Nanogence is introducing a novel approach to construction by transforming the chemistry of building materials in a simple yet transformative way. Our transformative technology enhances cements and cementitious bound materials by extending the cement particle hydration phase—bringing benefits in strength, durability, and a lower carbon footprint.

Scalable, Practical, and Proven

Our technology seamlessly integrates into existing production processes, accelerating adoption without disrupting supply chains. This ensures a smooth transition and allows for quick, efficient implementation.

Foundation for the Future

The \$10 trillion construction industry is at a turning point. As global carbon reduction targets tighten, Nanogence provides a scalable, cost-effective solution that helps companies build with strength, efficiency, and sustainability. As individuals, businesses, or governments, we all have ways to reduce the impact of carbon on global warming and climate change. Nanogence is just one of the tools in the toolbox that can be adopted to play a small but impactful role in reducing the carbon footprint of concrete used in the construction sector.

Funding and Recognition

Nanogence has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101009387.



Nanogence headquarters in Vaud, Switzerland. Image courtesy of EPFL/Jamani Caillet - CC-BY-SA 4.0.

THE CATALYST PLATFORM

The Nanogence catalyst platform is built on foundation models for building materials. It provides a core technology that optimizes cement formulations for performance, sustainability, and cost-efficiency. By modifying cement hydration chemistry, the catalyst platform enhances strength, durability, and sustainability across various cement types, including OPC, blended cements, and alternative binders. Nanogence enables cement producers to reduce clinker content, improve workability, and cut CO₂ emissions—without infrastructure changes.

The catalyst platform impact is measurable, allowing predictive modeling for optimized cement formulations tailored to specific applications. As a platform technology for next-generation, low-carbon cement solutions, it opens pathways for carbon-negative construction materials.

Why Nanogence is a Game-Changer

- **Universal Applicability:** Works across OPC, blended cements, and alternative binders.
- **Optimized Performance:** Enhances strength, durability, and workability while reducing clinker or cement demand.
- **Scalable and Standardized:** For cement producers, construction firms, and infrastructure developers.
- **Data-Driven and Predictive:** Adaptable to specific aggregate and mix designs.
- **Economic and Environmental Impact:** Cuts CO₂ emissions while offering potential commercial benefits.

Impact on Data-Driven Construction

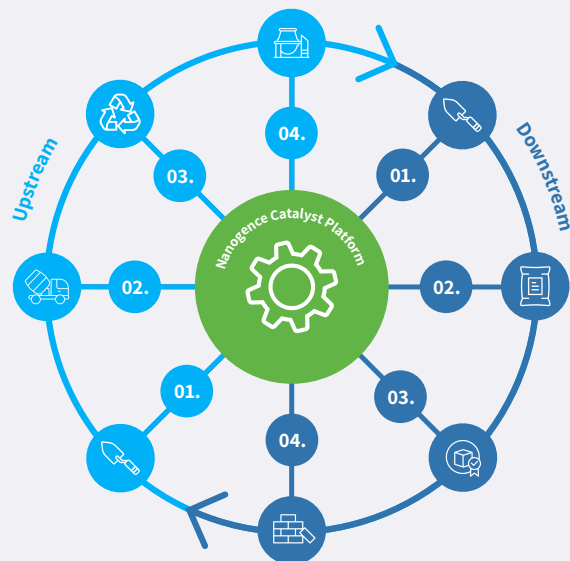
- **Real-Time Adaptability:** Adjusts cement formulations for optimal performance with minimal waste.
- **70+ Proven Formulations:** A robust foundation for diverse construction needs.
- **Predictive Modeling:** Refines mix designs based on project-specific data.
- **Enhanced Efficiency:** Helps construction firms streamline operations and reduce costs.
- **Lower Carbon Impact:** Supports sustainability goals by minimizing emissions.
- **Regulatory Compliance:** Ensures adherence to stringent industry standards.
- **Future-Ready Infrastructure:** Enables the next generation of sustainable, high-performance construction.

Serves a Diverse Range of Industries:

- **Cement and concrete manufacturers** benefit from a fundamental shift in material performance, applicable to both pure and blended systems.
- **Construction companies and engineers** experience stronger, more resilient structures with easy integration into their workflows.
- **Government and infrastructure sectors** rely on our chemistry-driven solutions to meet sustainability and compliance mandates.
- **Architects and dry goods sellers** gain access to next-generation materials that ensure long-term structural integrity.

Revolutionizes A Wide Array Of Applications:

- **Cement producers** can fundamentally enhance OPC, blended cement, and supplementary materials like slag and fly ash.
- **Concrete and mortar users**—from wet concrete, dry cast concrete, packaged products, to 3D printing specialists and road construction teams—benefit from stronger, more resilient materials that integrate effortlessly into existing processes.
- **Non-cementitious materials**, such as gypsum and bricks, also see enhanced performance through our innovations.



Upstream: 01. Dry Concrete and Mortar: Precast, Dry Cast, Blocks, Veneer

Stone. 02. Wet Concrete and Mortar: Ready Mix, 3D Printing, Recycled Concrete. 03. SMCs: Fly Ash C, Fly Ash F, Slag, Waste Valorization. 04. Cement: OPC (Slag, Fly Ash, Limestone, Pozzolana, Blended, AAM), Non-OPC (CSA, CA). **Downstream:** 01. Dry Concrete and Mortar: Precast, Dry Cast, Blocks, Veneer Stone. 02. Packaged: Mortar, Grouting, Masonry. 03. Specialty Products: CO₂ Mineralization, Gypsum, Bricks. 04. Projects: Contractors.

KEY BENEFITS

Key Benefits for Cement Producers

- **Higher Performance:** Strength, durability, and workability.
- **Lower Costs:** Can reduce clinker demand in cement, thereby helping to reduce the carbon footprint of cement.
- **Lower CO2 Emissions:** Helps meet regulatory requirements and enables low-carbon certification.
- **Easy Adoption:** Integrates seamlessly into existing cement production.
- **Market Differentiation:** Enables premium low-carbon cement products with ESG appeal.
- **Net-Zero Ready:** Supports the transition to low-carbon infrastructure.

Key Benefits for Cement Users

Added Value	Description	Competitors	Nanogence
CO ₂ Emissions	15 to 30% Reduction	✗	✓
Water Consumption	Up to 30% Reduction	✗	✓
Rheology	Tunable Setting and Fluidity	✓	✓
Strength	Increased Strength up to 200% for Ultra-High Strength	✗	✓
Versatility	Tailored for Any Cement Type	✗	✓
Compatibility	Allows Use of Supplementary Cementitious Materials	✗	✓
Green Chemistry	Natural Mineral Based	✗	✓
Lower Cost	Reduction of 17–202 lbs/yd ³ of Cement Use	✗	✓

Effortless Integration Into Production

- **Non-toxic:** No environmental permits required.
- **No CAPEX required:** Instant scalability with no costly modifications.
- **No training required:** Operators can quickly adopt the technology.
- **No disruption:** The catalyst platforms integrates seamlessly into production without altering workflows.

Adoption Process: From Storage to Transformation

- **Step 01:** Nanogence operates raw material storage and guarantees certainty of supply.
- **Step 02:** Third-party transports catalyst platforms, including liquid UBC-type options, in horizontal storage silos to the customer site.
- **Step 03:** The customer plugs the storage silo into the production process, with minimal technical maintenance requirements.

Note: Higher complexity in cement production may require more adjustments than in concrete use cases (e.g., adjusting volume throughput when reducing clinker production).



Proven Standards and Reliability

- **ISO 9001:** Quality management ensures that Nanogence products are manufactured to the highest quality standards.
- **ISO 14001:** Environmental management system compliance helps reduce environmental impact and promotes sustainable practices.
- **CE Certification:** Nanogence's products are CE certified, aligning with health, safety, and environmental protection standards in Europe.

Market Opportunity

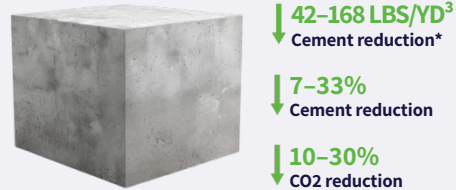
- **\$400BN Global Cement Industry:** A crucial sector facing increasing environmental regulations.
- **Decarbonization is Inevitable:** Nanogence can play a significant role in helping to decarbonize construction.
- **Defensible IP and Data Flywheel:** Proprietary formulations and continuous optimization.
- **Economic and Climate Value Creation:** Lower clinker use, energy efficiency, and ESG compliance.
- **Scalable B2B Model:** Seamless integration with existing production and supply chains.

THE VALUE

Reducing the cement content in a Nanogence-enhanced concrete mix provides opportunities for cost savings as well as a reduced carbon footprint. Our catalyst platform enables significant reductions, depending on mix design and regulatory norms. To put this into perspective, let's consider common concrete production metrics:

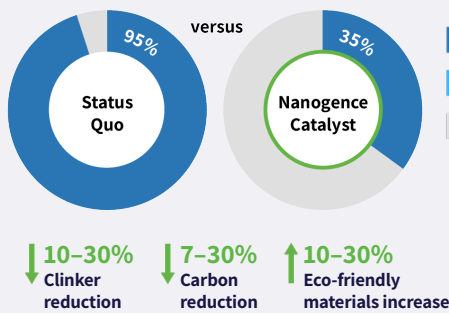
Standard concrete mixes typically use 500–675 lbs/yd³ of cementitious materials, including cement and supplementary cementitious materials (SCMs). A reduction of 42–168 lbs/yd³ represents a 8–33% decrease in cement usage, depending on the initial mix composition.

Beyond the cost savings, this reduction has a meaningful impact on the environment. For every pound of cement reduced, approximately 0.88–1.76 pounds of CO₂ emissions are avoided.

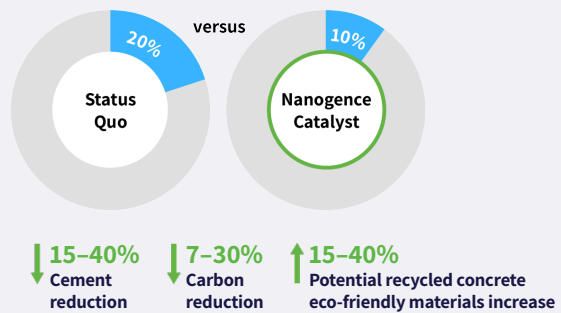


For Same Strength Performance

Cement businesses
(all cement types)



Cement based businesses
(pre-cast, concrete, mortar, mining, road)



	Control	Mix 1	Mix 2	Mix 3
	In lbs Unless Stated	Cementitious Reduction		
		10%	15%	18%
Cement	395	355	336	324
SCM	169	152	144	139
#57 Granite	1420	1471	1500	1512
#8 Granite	400	415	427	426
Nat. Sand	710	735	750	758
Man. Sand	710	735	750	758
Water	283	250	237	228
Type F WR (oz/cy)	11.28	10.15	9.6	9.26
NG 135 (oz/cy)	0	101.5	96	92.6

	Control	Mix 1	Mix 2	Mix 3
		Compressive Strength in PSI		
Days				
1	975	1406	1220	1110
3	2467	3015	2877	2641
7	4133	4965	4894	4425
28	5478	6012	5623	5197
56	5651	6448	6174	5620
Tested Per ASTM Test Method by an ACI-Certified Professional				
Air	1.60%	1.40%	1.30%	1.70%
Slump	4.75"	4.5"	4.5"	4.25"
Unit Weight	150.52	151.08	151.72	152.2

Long-Term Durability

Greater resistance to chloride penetration, carbonation, and shrinkage-related issues.

Enhanced protection against alkali-silica reaction (ASR), efflorescence, and acid sulfate reduction.

More durable, longer-lasting structures that require less maintenance over time.

Value-Added Benefits

Carbon Credits: Our clients can benefit from carbon credit systems as they adopt Nanogence's low-carbon solution.

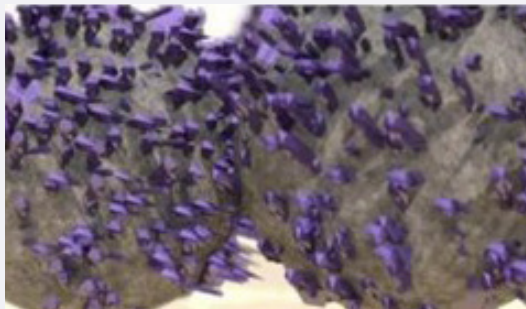
Green Building Certifications: The use of Nanogence technology can support projects in achieving LEED and other green building certifications.

Tax Incentives: By adopting Nanogence's catalyst platform, clients can access government-backed tax incentives aimed at supporting sustainable construction.

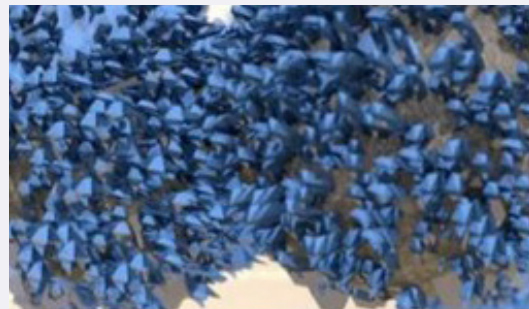
THE TECHNOLOGY

At the core of Nanogence is our advanced catalyst platform, which optimizes the cement particle hydration process at a nano-scale. This process allows the hydration phase to be extended, thereby creating the formation of crystals that provide the ‘glue’ within any cement matrix. This simple effect has benefits for both the strength and durability of the finished concrete in which it is used.

Hydration Chemistry: When cement is mixed with water, it hydrates and undergoes a number of chemical reactions, ultimately forming a matrix of interlocking crystals. In a concrete mix, these crystals bind the sand and aggregates together. When the Nanogence catalyst is introduced to the cement particle hydration phase, it is prolonged—meaning that a greater proportion of the cement is hydrated and can thereby contribute to the ultimate strength of the concrete.



Without catalyst.



With catalyst.

Cement Hydration

Cement and concrete have been used for thousands of years throughout the history of human evolution. However, the internal mechanics of how cement hydrates is fundamentally an inefficient process. Modern-day concrete can still contain up to 35% un-hydrated cement within its cured structure. Being able to utilize this residual un-hydrated cement makes both economic and environmental sense. This molecular dilemma is at the core of the Nanogence proposition—and is why the Nanogence catalyst platform offers great benefits to both the economics of cement and concrete use, as well as the potential for widespread carbon footprint reduction in cementitious materials.

This Process Directly Influences:

- **Thermodynamics:** Controls the type and quality of crystals formed during hydration.
- **Kinetics:** Accelerates the speed at which these crystals form, enhancing strength and durability.

Affordable, Scalable, and Sustainable

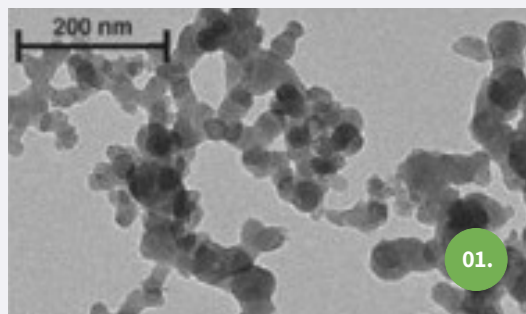
Affordable: Nanogence requires no new installations or changes to existing manufacturing processes, making it cost-effective for clients.

Impact on Cement and Concrete Production:

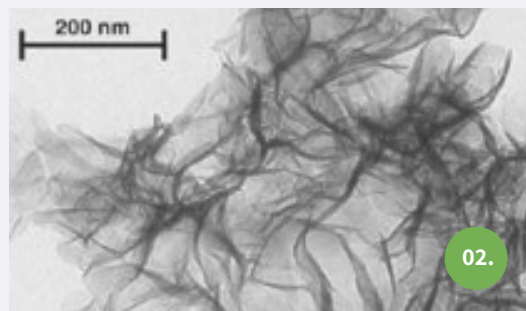
- **Cement:** Reduces clinker and energy by 20-30%, and CO₂ by 25-45%.
- **Concrete:** Lowers cement consumption by 10-20%, with no additional chemicals required.

Production and Delivery: Our fully automated in-house production system ensures efficient delivery of catalyst platforms to client sites, streamlining the process.

Clean Chemistry: Nanogence is built on clean chemistry principles, backed by two granted patents.



Starting point.



Controlled crystal growth.

CASE RESULTS

Our projects demonstrate how innovative technology and strategic partnerships drive measurable carbon reductions in large-scale infrastructure. From major airport developments to significant infrastructure projects, we collaborate with stakeholders to optimize material efficiency, lower embodied carbon, and streamline construction processes—all without compromising performance. For a deeper understanding of our work and the results we've achieved, please visit the case results section on the Nanogence website.

Client Type	Region	Objective	Optimized Dosage	Key Achievement	Status
Pre-Cast	EU	Reduce CO ₂ Emissions	2.00%	15% Strength Gain at 9h	Ongoing Trials
Cement	EU	FA Activation	1.00%	36% Strength Gain at 24h	New Product Dev.
Concrete	US-E	15% Cement Reduction	1.00%	15% Cement Reduction	Goal Reached
Pre-Cast	US-E	12% Cement Reduction	1.50%	12% Cement Reduction	Goal Reached
Concrete	US-W	15% Cement Reduction	1.50%	15% Cement Reduction	Goal Reached
Concrete	CH	Cement Reduction + Strength Gain (Recycled)	1.40%	9% Cement Reduction + 50% Strength Gain at 28d	Goal Reached
Concrete	CH	Cement Reduction (Recycled Aggregates)	1.50%	13% Cement Reduction	Goal Reached
Pre-Cast	CH	Ultra-High Strength Gain	1.40%	60% Strength Gain at 28d	Ongoing Trials
Cement	CH	Reduce CO ₂ Emissions	1.70%	5-13% Strength Gain at All Ages	Goal Reached
Cement	EU	10% Cement Reduction	1.00%	8% Strength Improvement With CEM III/A	Ongoing Trials
Dry Product	EU	LIC Replacement	1-2%	Strength Improvement at 21°C (2-24h)	Goal Reached
Dry Product	EU	Strength Gain & Workability (20 MPa at 24h)	1.70%	20 MPa Strength Gain and Workability at 24 hours	Goal Reached

Ernst Concrete (USA)

Achieving a 20% cement reduction and eliminating the need for any admixtures, while improving product strength.

Losinger Marazzi (Switzerland)

With Type C, we reduced cement usage by 36.3 kg per cubic meter, and with Type SCC, we saved 54.4 kg of cement per cubic meter.

Orlati (Switzerland)

Utilizing 60% recycled concrete and reducing admixture use by 25%, while improving product strength.

Noida International Airport (India)

India's first net-zero airport build, achieving a 24% direct carbon reduction and a 17% cost savings on the project.



ABOUT US

Be part of the change that's redefining building materials. We are ready to make an impact on a global scale—are you ready to join us?

Born from EPFL research, Nanogence was founded to help tackle the construction industry's inefficiencies and environmental challenges. Our Nanogence catalyst strengthens cementitious systems from within, improving material performance while significantly cutting costs and emissions. This is not a concrete admixture —it is a nano-scale catalyst that interacts with individual cement particles, offering a simple yet fundamental shift in how cement and cementitious materials are made, used, and maintained.



Abhishek Kumar, CEO/Founder Nanogence. Image courtesy of EPFL/Alain Herzog - CC-BY-SA 4.0.

Why Partner With Us?

- **Proven Technology:** Seamlessly integrates into your existing processes, delivering measurable results.
- **Scalable Solutions:** Meet the demands of a growing industry without compromising quality or efficiency.
- **Sustainability At Its Core:** Drive cost savings while reducing your carbon footprint.

Take The Next Step

Don't wait—secure your spot to collaborate with a leader in the future of sustainable building materials.

Further information:
hello@nanogence.com

Visit our website:
www.nanogence.com

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nanogence⁺
a material innovation company