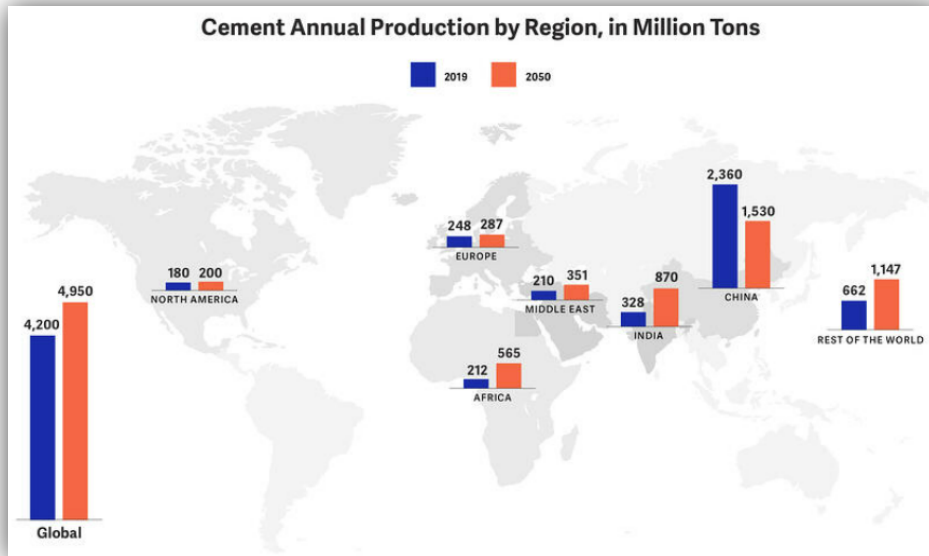


News

# ORNL, CHASM™ partner to drive decarbonization of cement



*With nearly 3 billion tons of CO<sub>2</sub> emitted from production of cement, there is potential reduction of 30 million metric tons of CO<sub>2</sub> emission in the USA alone.*

**Topics:** Low Carbon Cement, Decarbonization, Advanced Materials  
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The U.S. Department of Energy's Oak Ridge National Laboratory (ORNL) and CHASM™ Advanced Materials (CHASM) are joining forces to advance scalable decarbonization technologies from discovery through deployment through a new memorandum of understanding, or MOU.

The production of cement, an essential ingredient of concrete, is responsible for 8% of the world's anthropogenic CO<sub>2</sub> – nearly 3 billion tons per year. The high-temperature process (-1450 °C), known as calcination, converts calcium carbonate (CaCO<sub>3</sub>), the principal component of limestone, to calcium oxide (CaO), or lime, releasing CO<sub>2</sub>. CO<sub>2</sub> is released from both the heating process (40%) and the reaction during calcination (60%). Overall, the process emits more than 800 kg of CO<sub>2</sub> for every metric ton of cement produced and represents most of concrete's overall carbon footprint.

One common way to reduce concrete's carbon footprint is to substitute cement with other cementitious materials like fly ash, but the use of high volumes of fly ash can substantially reduce the overall stiffness, flexural strength and early compressive strength of concrete. Research has shown that the addition of very small quantities of carbon nanotubes (CNTs) led to the production of concrete with unprecedented improvements in mechanical properties, potentially offsetting the effects of high volumes of fly ash. However, these results were obtained using non-scalable processes to overcome the challenges of dispersing CNTs in the mixture.

CHASM Advanced Materials is a leader in creating innovative product platforms for a safer, more connected and sustainable world, and is actively pursuing partnerships to rapidly advance the development and manufacture of CNTs and CNT hybrids to decarbonize cement through its NTeC™ platform. CHASM is pursuing opportunities in applications that range from building materials to advanced manufacturing processes.

ORNL is actively involved in the development of materials with a broad range of applications from energy storage to advanced manufacturing. The purpose of the partnership with CHASM is to develop a collaboration roadmap to support CHASM's develop and deployment efforts, and to explore opportunities where CHASM's advanced technologies can help reduce carbon emissions associated with cement processes and materials.

"CHASM is proud to partner with Oak Ridge National Laboratory to accelerate scalable cement decarbonization solutions," Dave Arthur, CHASM CEO, said. "We are on a mission to develop low-carbon, low-cost, cement, and our partnership with ORNL will redefine what's possible for the national and global concrete industry."

Under the new MOU, the potential collaborative activities may include:

- Optimization of the proportion of CHASM's additive, NTeC, to maximize fly-ash usage and displacement of carbon-intensive cement in concrete.
- Optimization of the dispersion process of CHASM's NTeC additive to be compatible with construction practices in the field.
- Exploring the benefit of the demonstrated self-sensing property CHASM's NTeC additive imparts in concrete for stress monitoring and life-cycle management of structures.
- Developing a framework for deploying this solution across the construction industry.

UT-Battelle manages ORNL for the U.S. Department of Energy's Office of Science, the single largest supporter of basic research in the physical sciences in the United States. The Office of Science is working to address some of the most pressing challenges of our time. For more information, please visit [energy.gov/science](https://energy.gov/science).

CHASM Advanced Materials is a developer and manufacturer of carbon nanotubes (CNTs) and CNT hybrids - a new class of advanced materials for safer, more connected and sustainable living. Better connected smart cities, ice-free vehicle sensors and lights, faster charging and discharging EV batteries, greener concrete, and abundance of pure water are all innovations powered by CHASM. Our nanotube hybrids offer superior performance, lower cost and greater scalability versus using these materials alone or combining them using traditional methods. Applications include the decarbonization of concrete, transparent conductors, flexible printed electronics, rechargeable batteries, and automotive tires. For more information, please visit [CHASMtek.com](https://CHASMtek.com).

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