NETL-SPONSORED CO2-TO-CONCRETE TECHNOLOGY WINS **\$7.5 MILLION GRAND PRIZE**

A scalable process for upcycling CO₂ and coal combustion residues into construction products.

UCLA WINS RIGOROUS NRG CANADA'S OIL SANDS **INNOVATION ALLIANCE CARBON XPRIZE GLOBAL COMPETITION**

- In part through an NETL-sponsored project, CarbonBuilt Inc., a University of California-Los Angeles (UCLA) spinoff, won a \$7.5 million grand prize in the NRG Canada's Oil Sands Innovation Alliance (COSIA) Carbon XPRIZE Global Competition for their process that locked away and incorporated CO_2 from the emissions of power plants and industrial facilities into marketable, industrial-strength concrete.
- The NRG COSIA competition was a six-year global competition that began in 2015 and awarded innovators with breakthrough technologies for creating the most valuable product with the most CO₂ incorporated.



PRIZE-WINNING PROCESS SUCCESSFULLY INCORPORATED CO₂ FROM FLUE GAS INTO CONCRETE WITHOUT **UPŜTREAM CO₂ CAPTURE**

Demonstration at Pilot Scale

- The CO₂-to-concrete process was field tested at the Integrated Test Center in Gillette, Wyoming and the National Carbon Capture Center in Wilsonville, Alabama.
- Testing was successful with coal and natural gas flue gas without upfront CO₂ capture.
- Approximately 15,000 blocks were carbonated (Over 4 tonnes of CO₂ stored).
- Achieved in excess of 75% CO₂ utilization efficiency.
- CO₂ concrete product complied with industry standard specifications.



CARBON REMOVAL PURCHASE AGREEMENT SECURED

1st Commercial Project

 Stripe, a financial services company, will pay CarbonBuilt \$250,000 to sequester nearly 1,000 metric tons of CO₂.

2021 SCIENCE & TECHNOLOGY ACCOMPLISHMENTS

• The agreement will partially offset the cost of the firstof-a-kind commercial Reversa[™] process that stores about 0.75 pounds of CO₂ in each concrete block.



NATIONAL ENERGY TECHNOLOGY LABORATORY

THE PROBLEM WITH CONVENTIONAL CONCRETE

CO₂ Emissions

- 10% of global CO₂ emissions are due to cement production.
- ~0.9 tons of CO₂ emitted per ton of cement.
- ~4 billion tons of cement produced per year.
- Most emissions due to calcination





PROCESS OBJECTIVE AND CONCEPT

Upcycle industrial wastes and CO₂

 Produce low-carbon CO₂ concrete products from coal combustion residues, flue gas CO_2 , and low-grade waste heat.



$Ca(OH)_{2} + CO_{2} \rightarrow CaCO_{3} + H_{2}O$







Samueli Chemical & Biomolecular Engineering



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LOW-CARBON INDUSTRIAL SUPPLY CHAINS



