

Low Carbon Concrete

FOR CITY CONSTRUCTION PROJECTS

Joint Sustainability Meeting

Tom Ennis, PE, LEED AP, WPD Sustainability Officer

August 28, 2019



**Concrete is the most abundant man-made material in the world.
As a result, cement production creates ~7% of the world's
CO₂ greenhouse gas emissions**



Cement Kilns are among the largest point sources for Ozone Precursors in the greater Austin area

“Andrew Hoekzema, CAPCOG air quality program specialist, said a cement plant in Buda is the largest point source in the Austin MSA for nitrogen oxide. Nitrogen oxide and volatile organic compounds are precursors to ozone. Nitrogen oxide forms in the presence of nitrogen, oxygen, and very high temperatures, so any kind of combustion will create nitrogen oxide. Coal and cement plants produce the most nitrogen oxide emissions on a per point source basis, Hoekzema said.”

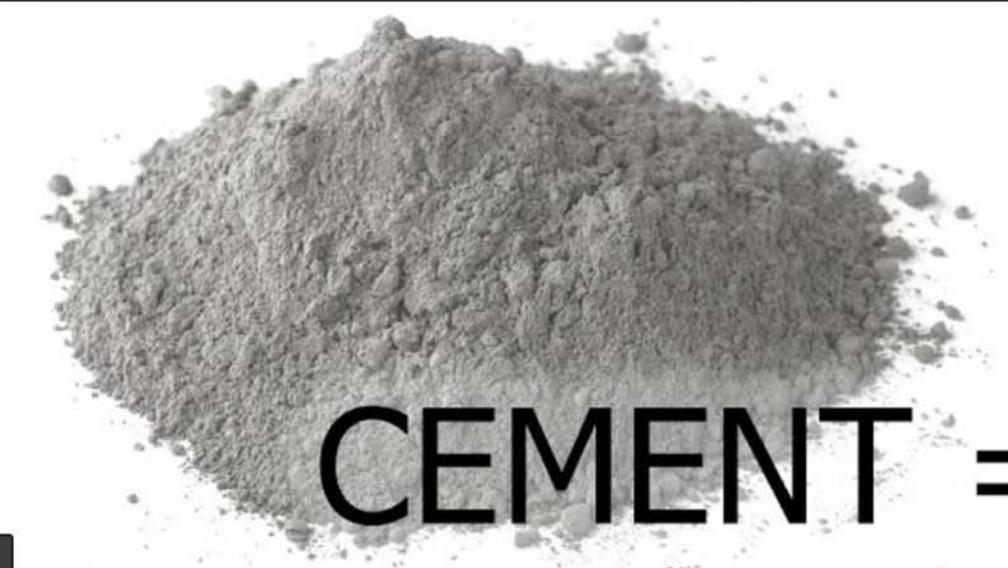
<http://smmercury.com/2011/12/19/austin-san-marcos-area-complies-with-ozone-regs-barely/>

BIG IDEA:

Low carbon concrete has potential carbon benefits in our region similar to those gained from our water quality protection lands (which took 20+ years & cost over \$150 million) but w/o upfront costs or maintenance fees.

Overview

- ▶ Fundamentals
- ▶ Intro video
- ▶ State of the Technology
- ▶ Central Texas Context
- ▶ What's Happening
- ▶ Q&A



CEMENT

=

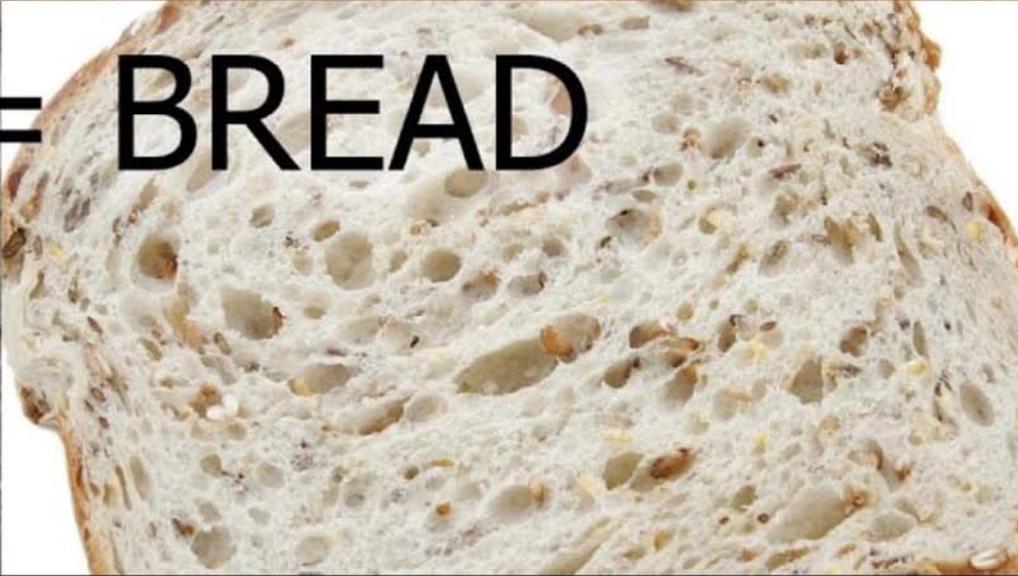


FLOUR

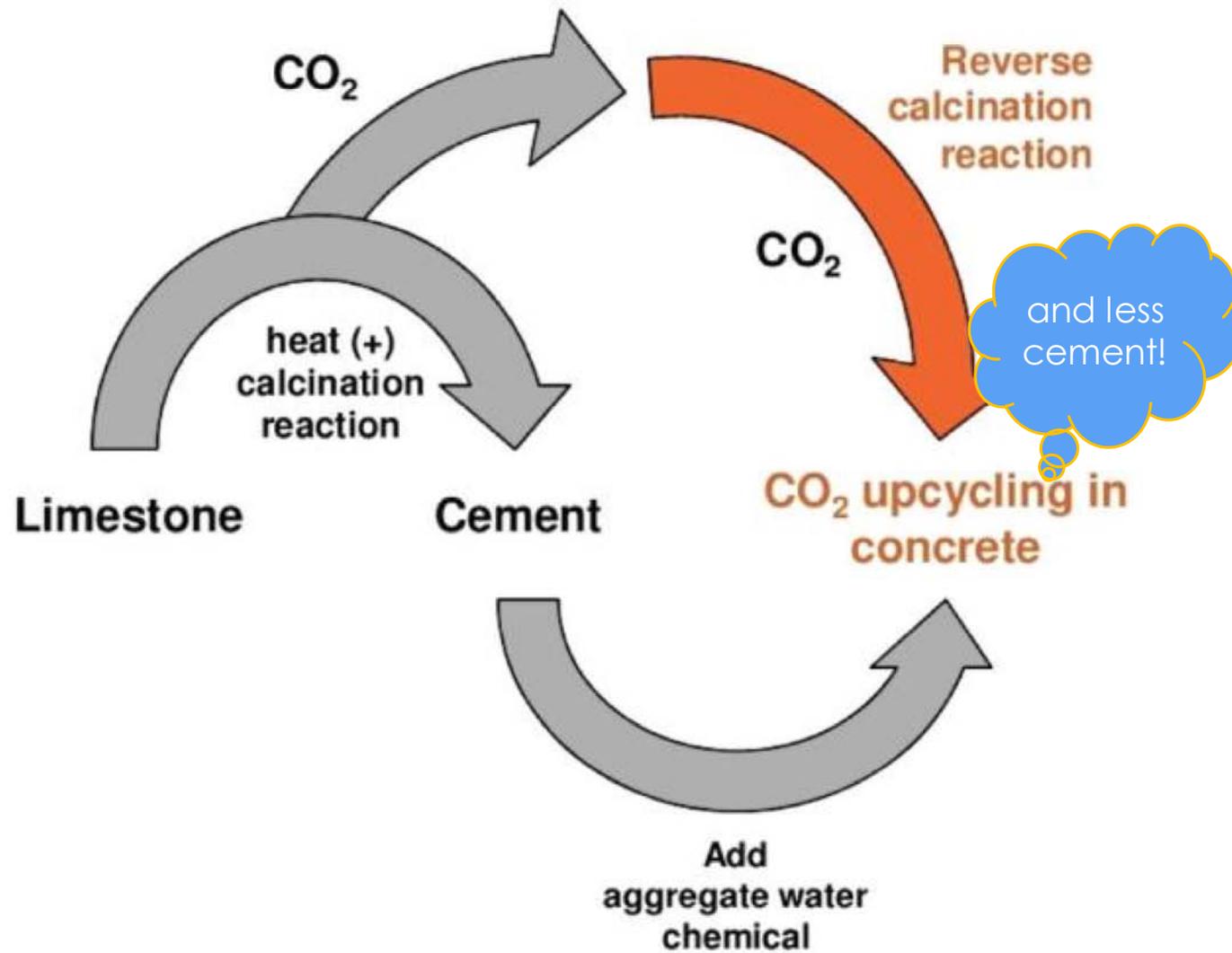


CONCRETE

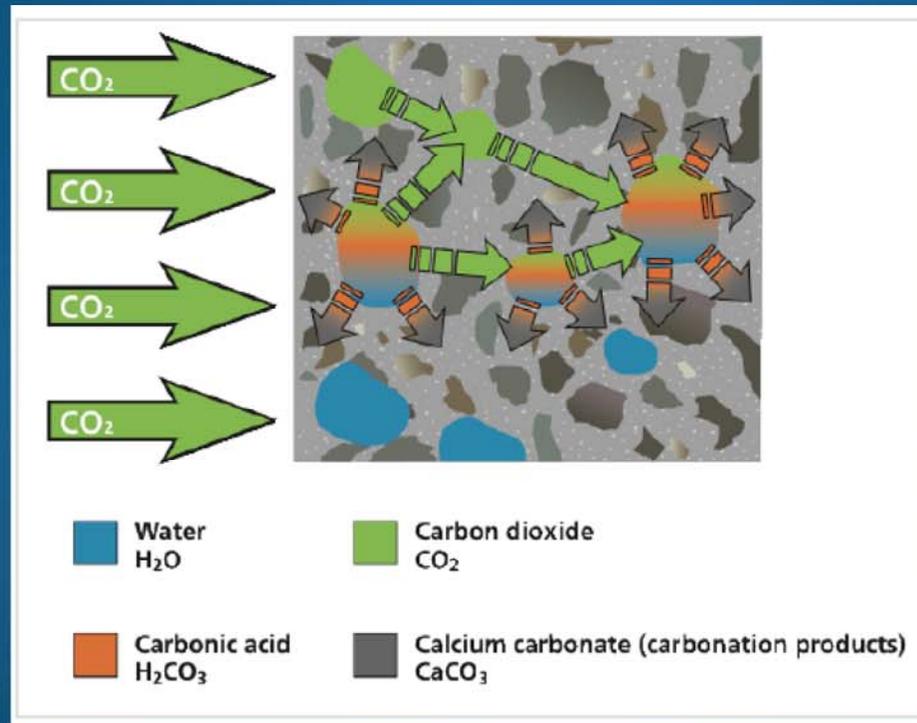
=



BREAD



CO₂ injection converts to calcium carbonate (limestone)





Play (k)

▶ 🔊 0:00 / 0:28

CC ⚙️ 📺 🖥️ 🗉

Use of the Technology

10

- ▶ 2007 Started in Canada
- ▶ In 126 concrete plants in US
- ▶ Ozinga Concrete in Chicago
 - ▶ Started 2016
 - ▶ 200,000 cubic yards done to date
 - ▶ Flagship McDonalds downtown
 - ▶ Coming soon: Advocate Hospital, SC Johnson headquarters





Unintended Consequences?

12

- ▶ pH?
- ▶ Chloride intrusion?
- ▶ Off-gassing?
- ▶ Workability?
- ▶ CO₂ contamination?



Central Texas Context

13

- ▶ 25 pounds of CO₂ per cubic yard of concrete
- ▶ About 5.75 million tonnes of concrete annually in Central Texas
- ▶ If fully realized, it would be the equivalent of about 36,000 metric tonnes per year of CO₂
- ▶ Or about the annual CO₂ output of about 8,000 cars

What's Happening

14

- ▶ June 19, 2019 Presentation to Environmental Commission. Motion to support evaluation unanimous.
- ▶ June 20 Local contractor agrees to install system at 4 facilities in Austin.
- ▶ June US Council of Mayors passes resolution in support of technology.
- ▶ Media: July 1 Austin Monitor [link](#); July 2 Reuters story [link](#)
- ▶ July 16 Installation begins at Lauren Concrete. Testing begins early August.
- ▶ August 14 Met with City Engineer's Office.
- ▶ October Test data presentation and submittal to City Engineer's Office.
- ▶ August 28 Presentation to Joint Sustainability Committee.
- ▶ Council recommendation? New Austin concrete alternative?

Questions...?

Thank you!

Thomas E. Ennis, P.E.,
LEED AP, ENV SP
Sustainability Officer
Watershed Protection
Department
512-974-2722
tom.ennis@austintexas.gov