

Carbon Cure

January 12, 2022

Tools of Change Illustrated

- ▶ Financial Incentives and Disincentives
- ▶ Norm Appeals
- ▶ Overcoming Specific Barriers
- ▶ Vivid, Personalized Communication

Initiated by

- ▶ Carbon Cure

Partners / Clients

- ▶ American Meteorology Society (AMS)
- ▶ NASA
- ▶ National Oceanic and Atmospheric Administration (NOAA)

Location

- ▶ Head office is in Halifax, Canada
- ▶ Participating concrete plants are located world-wide

Results

- ▶ By 2021, over 300 concrete plants around the world have supplied 10 million cubic yards of CarbonCure concrete that captured 142,046,000 lb. of CO₂ over nine years, an average of 15,782,889 lb. / year.

Introduction

To meet global greenhouse gas targets, we will need to remove carbon dioxide (CO₂) from the atmosphere, not just slow down emissions. Carbon Cure was designed to promote a shift in specification and purchasing behaviors across the construction supply chain, to recapture a significant amount of carbon dioxide from the atmosphere and help abate climate change. This case study focuses on how the company has promoted the rapid adoption by concrete plants of a new type of concrete – one that in its manufacturing process, removes and permanently stores significant amounts of carbon from the atmosphere.

Background

Note: To minimize site maintenance costs, all case studies on this site are written in the past tense, even if they are ongoing as is the case with this particular program.

CarbonCure enables concrete plants to supply a product that, in its manufacturing process, removes significant amounts of carbon dioxide (CO₂) from the atmosphere and permanently stores it as nano-sized minerals within the concrete. The technology injects CO₂ captured by industrial gas companies into cement during mixing, enabling concrete producers to create high-performing, more sustainable concrete with a reduced carbon footprint while gaining a competitive advantage.

Social marketing has not shied away from businesses providing key products and services to meet program and societal goals. Since the early years of social marketing, health practitioners have promoted the use of condoms to reduce the spread of diseases and prevent pregnancies. Other programs have provided toilets in areas with sanitation problems and insulation to improve energy efficiency. This case study looks at the promotion of products and services that help

concrete plants significantly reduce the carbon footprint of the construction jobs they handle.

The concrete sector is the third-largest industrial energy consumer in the world, responsible for 7% of industrial energy use. It also has the second highest emissions of carbon dioxide (about 7% of global emissions) – more than three times the emissions from civil aviation. Cement is the key ingredient that gives concrete its strength, and concrete is the most widely used human-made construction material. World-wide production of cement is expected to increase between 12% and 23% by 2050.

CarbonCure pioneered the use of concrete to capture CO₂. Once injected, the CO₂ chemically converts into a mineral and becomes permanently eliminated, requiring a heat over 750°C to be released back into the atmosphere. Further, the mineral increases the concrete's strength, so producers can use less cement in their mixes without sacrificing strength and performance. In addition, CarbonCure for Reclaimed Water enables the re-use of slurry from returning mixes and washouts, yielding a superior product; by reducing the amount of new freshwater, solid waste disposal and cement required, it further increases profitability for the concrete producer. The retrofit technology uses each concrete supplier's existing concrete production equipment.

In October, 2019, Carbon Cure was one of two winners in a \$35-million Grand Challenge, organized by Emissions Reductions Alberta, to find the world's most innovative technologies that turn carbon dioxide emissions from a waste stream into valuable products in Alberta. The money was provided to support commercialization of their technology in Alberta.

In April, 2021, CarbonCure for Reclaimed Water was one of two winners of the \$20-million NRG COSIA Carbon XPRIZE, a prize to encourage the conversion of CO₂ emissions into valuable products.

Getting Informed

Founder, Rob Niven had graduated with a master's degree in engineering from McGill University, where he studied the benefits of introducing CO₂ to fresh concrete. That year, he attended a United Nations summit on Climate Change, where he saw a global demand for solutions to reduce carbon emissions.

He learned that there were three key barriers that might slow down adoption by the concrete industry.

- Investment in current technology and operations
- Risk to business of trying something different
- Specifiers and contractors are generally conservative and reluctant to switch from what they are used to

Setting Objectives

CarbonCure was established in 2012 to reduce embodied carbon in the built environment by 500 million tonnes annually by 2030.

Delivering the Program

Designing and Promoting a Scalable Solution that Addresses Key Barriers for Cement Producers

CarbonCure was established in 2012 to reduce embodied carbon in the built environment by 500 million tonnes annually by 2030. The company officially launched its new ready-mix technology at the 2015 National Ready Mixed Association's ConcreteWorks conference. While others in the industry were skeptical, a few cement producers tested, adopted, and further proved the technology.

The technology and its marketing approach have attracted widespread recognition for

being uniquely positioned to scale up and have a large impact.

1. Most importantly, the technology offers compelling profitability to participating cement suppliers. *(Financial Incentives)*
2. The technology and marketing approach were both designed to overcome key barriers to adoption by cement producers, as detailed in the Barriers Chart below. It can be quickly and easily installed in existing operations, with no upfront licensing fees. *(Overcoming Specific Barriers)*
3. The technology has benefitted from widespread attention, validation, and recognition by winning the high-profile and credible competitions described in the Background section, above. To compete in the Carbon XPRIZE and to expedite scaling, the company worked with players across its value chain to demonstrate the creation of value across all points of the supply chain. *(Vivid, Credible, Empowering Communication)*
4. There is strong demand, which has fueled expansion to additional plants operated by participating cement producers and helps convince additional ones to hop on board. Some end-use construction clients (e.g. Georgia Institute of Technology) have been able to get grants in part because of the low carbon footprint of the resulting buildings. *(Financial Incentives)*

Helping Cement Producers to Promote the New Cement

- Because the new cement has superior performance and is more profitable for cement producers, compared with regular cement, the cement suppliers generally have used it for all their orders unless otherwise specified.
- To ensure strong demand, the company worked with the producers to promote its new cement to leading engineers, architects, and contractors in their areas. *(Norm Appeals)*

Overcoming Specific Barriers

The following table summarizes the main barriers that discouraged participants from doing the desired behavior(s) and how those barriers were reduced.

Barrier	How it was addressed
Investment in current technology and operations	<ul style="list-style-type: none"> • The new technology is fast and non-disruptive to implement. Installation takes place over the course of one day and then becomes seamlessly integrated into existing software and operations.
Risk to business of trying something different	<ul style="list-style-type: none"> • No upfront fee licensing model • Compelling profitability if successful • Dedicated installation and maintenance teams ensure that the technology is working properly and producing cement with the desired characteristics
Specifiers and contractors are generally conservative and reluctant to switch from what they are used to	<ul style="list-style-type: none"> • The company worked with cement producers to promote the technology to leading engineers, architects, and contractors in their areas

Measuring Achievements

CarbonCure reduces atmospheric CO₂ by an average of 25 pounds of CO₂ per cubic yard (17 kilograms per cubic metre) of cement produced. The amount of CO₂ can be calculated directly by the amount sold.

Results

As an example of impacts on one construction project, Amazon saved 1,261 tons (1,144 tonnes) = 2,522,000 lb. of CO2 emissions by using CarbonCure cement when constructing its site in Arlington VA.

By 2021, CarbonCure concrete was used in over 300 concrete plants around the world, that supplied 10 million cubic yards of the new concrete. This resulted in capturing 142,046,000 lb. of CO2 over nine years. That is an average of 15,782,889 lb. / year, although sales per year have likely risen significantly over time.

In addition, it was recognized as *the most scalable CO2 Utilization technology* by the Global CO2 Initiative.

By demonstrating the practicality of engaging consumers to reduce CO2 in this way, Carbon Cure had inspired some governments to start requiring such purchasing behaviors. In 2019, the Honolulu City Council passed a resolution calling on the city to consider using carbon-injected concrete when possible, and the Hawaii Department of Transportation said it would use the technology in all flat work. In June 2021, the New York State legislature passed a bill requiring guidelines for procuring low-carbon concrete for state construction projects. New Jersey was considering a similar legislation.

Notes

- From a social marketing perspective, CarbonCure is a great example of a cost-

effective, scalable private enterprise approach that is influencing a positive change in behaviors along the supply chain, to meet societal goals (in this case, reduction of atmospheric CO2 and slowing down global warming.) We direly need more examples like this.

- The approach described is also innovative in engaging cement producers to remove significant amounts of CO2 from the atmosphere, and in demonstrating a cost-effective way for them to do so while improving their products, services, and profitability.

This case study was written by Jay Kassirer in 2021.

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For step-by step instructions in using each of the tools noted above, to review our FULL collection of roughly 190 social marketing case studies, or to suggest a new case study, go to www.toolsofchange.com

This case study is also available online at <http://www.toolsofchange.com/en/case-studies/detail/748>

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