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CARBON XPRIZE
FINALISTS
2019
REIMAGINE CO_2

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THE CARBON OPPORTUNITY

CARBON-TO-VALUE

Carbon is the backbone of the modern economy, but CO_2 emissions have become a serious liability. Today, there is a new opportunity to make productive use of excess CO_2 emissions. The market for products made from CO_2 is estimated to be over $1 trillion per year by Global CO_2 Initiative. Products and materials like concrete, carbon fiber, polymers, food, fertilizer, liquid fuels, graphene, and many others have the potential to offer superior performance, lower cost, and lower carbon footprint when made from CO_2. This emerging industry is known variously as "carbon-to-value", "carbontech", and "carbon capture utilization and storage (CCUS)". The long term vision is a new low-carbon economy built around recycling CO_2 emissions, producing superior products, and supporting a stable global climate.

INVESTMENT LANDSCAPE

Market activity in the space is accelerating, and the structural elements of a capital ecosystem have begun to form. Groups like Breakthrough Energy Ventures, Oil and Gas Climate Initiative, Y-Combinator, Carbontech Labs, Circular Carbon Network, CO2 Value Europe, and Lawrence Livermore National Laboratory are supporting and driving innovation, private investment, corporate engagement, and policy. A new $85 per ton U.S. federal tax credit ("45Q") for capturing and utilizing CO_2 is anticipated to support development of new large commercial projects. As a whole, we estimate that the entire sector has garnered a total investment of less than $250 million to date, despite the estimated $1 trillion market opportunity.

CARBON XPRIZE

The companies profiled here are finalists in the NRG COSIA Carbon XPRIZE, a $20 million global prize competition for conversion of CO_2 into products. Over the past year each company was vetted by independent engineering auditors and a panel of expert judges against the following performance metrics: CO_2 uptake, economic value of product, product market size, and environmental footprint. Now they are scaling their systems by 10X as they prepare to build and operate commercial-scale demonstration projects at either the Wyoming Integrated Test Center or the Alberta Carbon Conversion Technology Center.

The Finalists are seeking to close their current rounds of fundraising by the end of 2018. Investors and prospective partners interested in further information are encouraged to contact the founders directly for specific inquiries, or for general information, **carbon@xprize.org**.

TABLE OF CONTENTS

ADVANCED MATERIALS

CARBON UPCYCLING TECHNOLOGIES.....3

C2CNT.....5

POLYMERS AND BIOPLASTICS

C4X.....7

NEWLIGHT.....9

FUELS AND CHEMICALS

BREATHE.....11

CERT.....13

DIMENSIONAL ENERGY.....15

CONCRETE AND BUILDING MATERIALS

CARBONCURE.....17

CARBON CAPTURE MACHINE.....19

CARBON UPCYCLING UCLA.....21

Carbon Upcycling Technologies demonstrating their technology in Calgary, Canada. November 2017

CARBON UPCYCLING TECHNOLOGIES

AT A GLANCE

One-Liner:
CUT produces high value nanomaterial powder additives from cheaply available materials that improve the performance of a wide range of products

Location:
Calgary, Alberta, Canada

Vertical:
CO_2-to-Advanced Materials

Corporate Status:
Incorporated in Canada

Funding Needs:
CAD 4.5M ($3.4M)

Funding Stage:
Late Seed/Series A

Customers:
Precast concrete companies, plastic molding companies

Tech Stage:
Early Commercial

XPRIZE Test Site:
Alberta Carbon Conversion Technology Centre

Contact:
Apoorv Sinha, Founder and CEO,
apoorv@cutco2.com

OVERVIEW

Carbon Upcycling Technologies (CUT) converts CO_2 emissions into valuable solid powders. CUT's IP-protected process creates a portfolio of advanced materials from waste CO_2 and cheaply available solids such as graphite, fly ash, and petroleum coke. The resulting nanoparticle additives have a range of applications for the plastics, coatings, epoxy, adhesives, concrete, and lithium-ion battery industries.

MARKET

The concrete corrosion below-grade immersion service coatings market is $1.3B in North America. Current solutions for corrosion protection in the concrete sector more than double the cost of production and are prone to premature failure. Plastic nucleating agents currently amount to a $2B North American market. Current nucleating agents in the injection molding market are costly to implement and have only been adopted in small segments of the injection molding industry.

SOLUTION AND ADVANTAGE

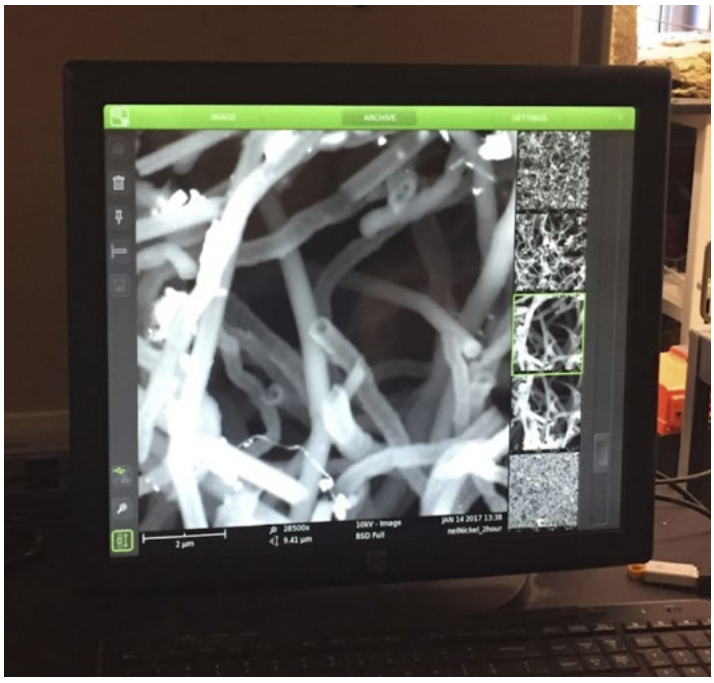
For the concrete market, CUT's concrete corrosion coating provides an easy-to-apply, cost-effective solution that shows superior adhesion compared to polymer-based solutions. The coating has already been approved for use in Miami-Dade, Florida and Portland, Oregon and is used by Red Lobster, Dunkin Donuts, Costco, and McDonald's franchises. For the polymers and plastics markets, CUT's plastics nucleating agent serves as an additive that enables injection and blow molders to reduce energy used in production and increase throughput by 10 to 30%.

BUSINESS MODEL

CUT uses a materials supply model, producing finished products that concrete or plastic injection molders customers can use on-site. In 2017, less than 2.5 years after inception, CUT began producing revenue from the corrosion protection product. The company launched a new processing additive for the plastics market in 2018.

TEAM

CUT is led by Founder and CTO, Apoorv Sinha. CUT's management team has over 30 years in advanced materials startups focused on coatings and composites. Current advisors and directors include a renowned plastics composite engineer, an ex-VP of marketing for North America's largest precast concrete company, and an ex-BP Ventures MD globally recognized as a thought leader in the field of CO_2 utilization.



C2CNT demonstrating their technology in Ashburn, USA. November 2017

C2CNT

AT A GLANCE

One-Liner:
C2CNT's unique process uses CO_2 to create carbon nanotubes at significantly lower cost

Location:
Northern Virginia, USA

Vertical:
CO_2-to-Advanced Materials

Corporate Status:
Incorporated in USA, 2017

Partnership Needs:
No venture funding needed at this time, but interested in non-dilutive philanthropic capital and strategic commercial relationships

Funding Stage:
Series A

Customers:
Steel, aluminum, textiles, ceramics and cement producers, manufacturing, packaging, and construction industries (packaging, batteries, electronics, non-metal construction)

Tech Stage:
Lab pilot

XPRIZE Test Site:
Alberta Carbon Conversion Technology Centre

Contact:
Dr. Stuart Licht, Founder,
SL@c2cnt.com

OVERVIEW

C2CNT has developed an inexpensive means of transforming CO_2 into carbon nanotubes (CNTs), which have remarkable properties of flexibility, high conductivity, and lightweight strength greater than steel. Carbon nanotubes can be used as lightweight, cheap replacements for metals; new bullet- and taser-proof textiles; stronger cement-composite building materials; and expanding applications in industrial catalysis, batteries, and nanoelectronics.

MARKET

C2CNT addresses the growing market need for stronger materials with a lower carbon footprint. The unique properties of CNTs, including the highest tensile strength of any known material, allow the company to target several markets, including the carbon nanotube ($250k/tonne, 25k tonne annual global market), carbon fiber ($40k/tonne, 125k tonnes), aluminum ($32k/tonne, 58M tonnes), and steel ($25k/tonne, 1.6B tonnes) markets. The CNT market alone has expanded rapidly, constrained only by the current high cost of manufacturing, and is projected to grow to $8.7B by 2022. CNTs are also expected to find applications in new products for the textile, building, medical, aerospace, transportation, battery, and electronics industries.

SOLUTION AND ADVANTAGE

C2CNT produces nanotubes 100x more cheaply than the current industry standard. Its process can use cheap and abundant flue gas input without separating or concentrating the CO_2, and produces a highly pure and compact material whose stable molecular structure sequesters carbon over the long term. Those nanotubes are valued at over $100,000 per ton, resulting in high revenue potential and a strong economic driver for greenhouse gas mitigation. Another advantage of C2CNT's product over metals is its relative strength and lower carbon footprint. Because fewer CNTs can be used to replace aluminum or steel, the realized cost is even lower. For example, at current prices, CNTs can be 17 times less costly than steel while remaining just as strong. Furthermore, 6.3 tons of CO_2 are emitted per ton of steel produced through current methods, resulting in significant emission reductions when replaced by CNTs.

BUSINESS MODEL

C2CNT's revenue model is based on direct sales of CNTs, licensing of C2CNT technology by industrial customers, and greenhouse gas reductions. Licensing includes ownership of the produced CNT product along with incentivized sales commissions back to licensee plants by C2CNT for their sales or use of the CNTs. C2CNT will design, build, and and demonstrate variously sized plants for specialized applications, including integrated units for gas, coal, cement, fertilizer, and corn-to-ethanol plants. Over the long term, C2CNT plans to incorporate direct CO_2 air capture technology, and is also designing off-grid ovens, which, when driven by biomass, will heat and cook without CO_2 emissions while generating CNTs for sale.

TEAM

C2CNT is led by Dr. Stuart Licht, Professor of Chemistry at George Washington University and former Program Director at the US National Science Foundation; he has been developing C2CNT's core technology for 30 years. The core team is rounded out by researchers at George Washington University.

C4X demonstrating their technology in Suzhou, China. November 2017

C4X

AT A GLANCE

One-Liner:
C4X converts CO_2 into high-value chemicals and bio-composite foamed plastics

Location:
Suzhou, China and Toronto, Canada

Verticals:
CO_2-to-Chemicals, CO_2-to-Plastics

Corporate Status:
Incorporated in China and Canada

Funding Needs:
$2M

Funding Stage:
Late Seed/Series A

Customers:
Manufacturers of textiles, plastics, lithium-ion batteries, packaging and automotive interior parts

Tech Stage:
Commercial pilot

XPRIZE Test Site:
Wyoming Integrated Test Center

Contact:
Dr. Wayne Song, Founder,
waynesong@ccccx.net

OVERVIEW

C4X's unique process converts waste CO_2 into a variety of chemicals and plastics, including ethylene carbonate, an essential material used in lithium-ion batteries, and ethylene glycol, a key ingredient in the packaging of textiles. C4X also produces microscopic CO_2 foamed plastics for use in applications such as car and aircraft interiors, packaging, and beverages. The process is powered using excess energy from coal and renewable generation in China that would otherwise be discarded.

MARKET

C4X is focused on the production of ethylene carbonate for the lithium-ion battery market, which is valued at $2B, and is expanding globally due to the increasing demand for electric vehicles. The global market for ethylene glycol is valued at $1.2B and the foamed plastics market is valued at $4.5B.

SOLUTION AND ADVANTAGE

C4X's conversion process is simple, efficient, mature, economical, and requires much less energy than current processes. Their process captures CO_2 at 90% efficiency, and converts it into ethylene carbonate and ethylene glycol at a conversion rate greater than 90%. C4X is also able to uniquely extract and purify hydrogen, a key ingredient for their process, from industrial flue gas to a purity of 99.9% at half the cost of traditional water electrolysis systems.

BUSINESS MODEL

C4X is pursuing a combination of licensing and strategic corporate investment to scale and deploy their systems. In China, C4X has partnered with CONCH, the largest cement maker in China, as well as SinoChem, Huaneng Power, Jinhong Gas, Wanli Group. In Canada, C4X has partnered with Ford Motor Company of Canada, Walkerville Brewery, and others to produce automotive interior parts, ethylene carbonate for Li-Ion batteries, and ethylene glycol for polyester.

TEAM

C4X's 18-person core team has over 30 years of R&D and industrial experience in eight industrial fields, with technology commercialization expertise inside China, Canada and other parts in the world. They are associated with six universities in Canada and China, and have the support of four key Chinese national labs. The management team is led by an experienced group with a combined over 50 years in global real estate and construction development, corporate engineering R&D leadership, technical sales, logistics, and technology development in the bio and chemicals industries.

Newlight demonstrating their technology in Huntington Beach, USA. December 2017

NEWLIGHT

AT A GLANCE

One-Liner:
Newlight converts greenhouse gases into biodegradable plastics

Location:
Huntington Beach, CA, USA

Vertical:
Greenhouse Gas-to-Bioplastic

Corporate Status:
Delaware C-Corporation

Funding Needs:
$15M

Funding Stage:
Series E

Customers:
IKEA, Dell, Hewlett-Packard

Tech Stage:
Early Commercial

XPRIZE Test Site:
Alberta Carbon Conversion Tecnology Centre

Contact:
Mark Herrema, Founder and CEO,
mdh@newlight.com

OVERVIEW

Newlight converts greenhouse gases into a high-performance biodegradable plastic replacement called AirCarbon®, a material that is estimated to have the ability to out-compete fossil-fuel based plastics globally on a price and sustainability basis. The company is commercializing its product with brand-name customers and supply agreements amounting to 74 billion pounds of AirCarbon® over the next 20 years.

MARKET

Fossil-derived plastics face increasing public backlash due to carbon intensity, ocean plastic pollution, and the persistence and toxicity of plastics at end of their life. The market for a cost-effective, high-performance, biodegradable, sustainable plastic material within the 900 billion pound global plastics market is vast and growing rapidly.

SOLUTION AND ADVANTAGE

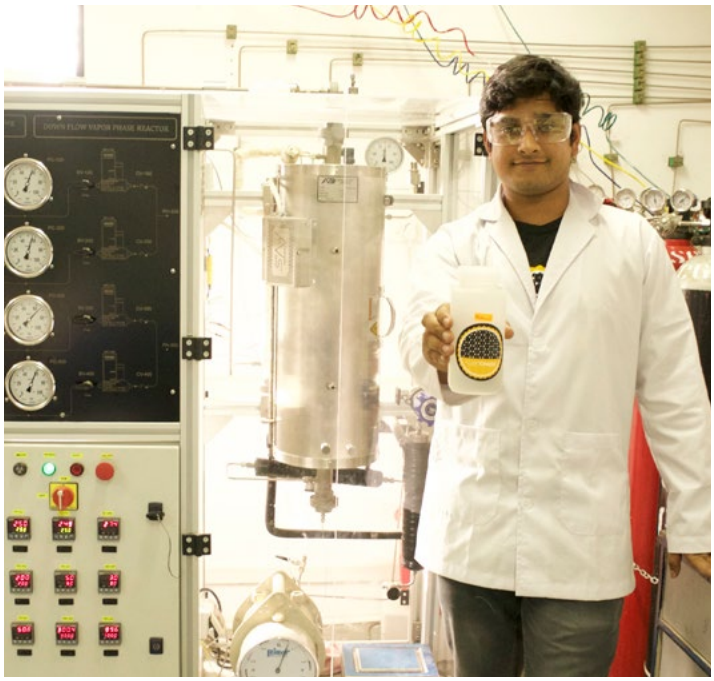
Newlight's breakthrough technologies convert methane and CO_2 into bioplastic materials that are cost-competitive, biodegradable, thermally stable, high performance, and can be carbon negative if made with renewable power.

BUSINESS MODEL

Since scale-up in 2013, Newlight has contracted over 74B pounds of direct supply or licensed production, including a 19B pound offtake agreement with Vinmar, and 10B and 45B pound production licenses with IKEA and Paques BV. AirCarbon® and AirCarbon®-based materials have been commercialized or adopted for commercialization programs by a range of Fortune 500 companies, including: Dell (packaging bags), Hewlett-Packard (packaging bags), IKEA (furniture), Virgin Mobile (cell phone cases), KI (furniture), and L'Oreal's The Body Shop (containers).

TEAM

Newlight was founded in 2003 under the leadership of Mark Herrema and Kenton Kimmel while at Princeton and Northwestern, respectively. Their team currently consists of 40 full-time team members. Newlight has been honored to receive a range of industry awards, including Innovation of the Year from Popular Science and Technology Pioneer from the World Economic Forum.



Breathe demonstrating their technology in Bangalore, India. December 2017

BREATHE

AT A GLANCE

One-Liner:
Breathe converts CO_2 into high purity methanol and carbon monoxide

Location:
Bangalore, India

Vertical:
CO_2-to-Chemicals

Corporate Status:
Incorporated in India, 2016

Funding Needs:
$2M

Funding Stage:
Late Seed/Series A

Customers:
Carbon monoxide and methanol customers

Tech Stage:
Lab pilot

XPRIZE Test Site:
Wyoming Integrated Test Center

Contact:
Dr. Sebastian Peter, Founder,
sebastiancp@gmail.com

OVERVIEW

Breathe Applied Sciences specializes in design and use of novel catalysts for converting CO_2 into high-purity methanol and carbon monoxide, which have a wide range of industrial, manufacturing, and chemical applications.

MARKET

Methanol, which in many countries is blended with gasoline to reduce emissions, presents a $37B worldwide market and $1B in India. Carbon monoxide represents a $380M market. Both chemicals are carbon intensive and expensive to produce. There is currently no commercial-scale, cost-competitive solution to produce these chemicals utilizing waste CO_2. Only 20% of India's growing methanol demand is met using local supply.

SOLUTION AND ADVANTAGE

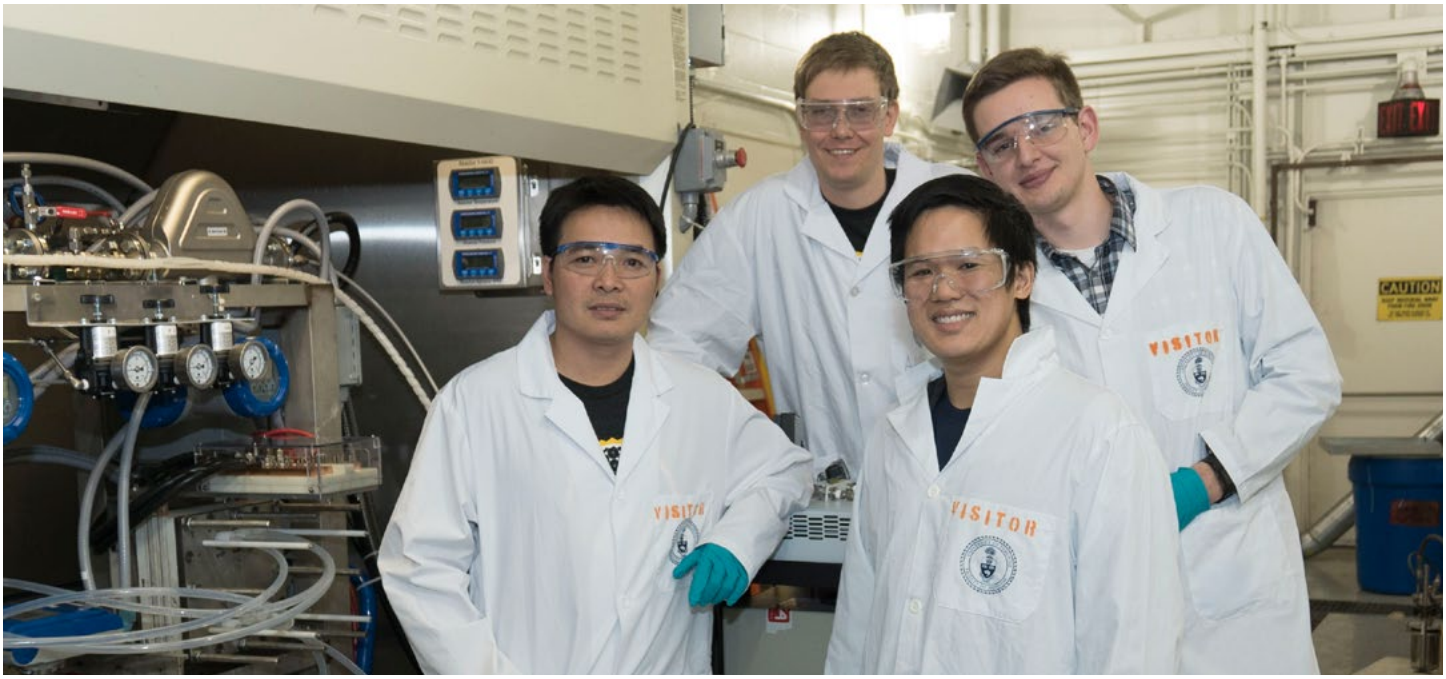
Breathe's reactors pass CO_2 and hydrogen across a range of copper, zinc, aluminium and iron-based catalysts to speed up a variant of the Fischer-Tropsch process, as used in the international space station. Novel and efficient uses of catalysts are Breathe's primary innovation and competitive advantage, which is in the process of being patented. At scale their end-to-end solution in India is projected to reduce methanol production costs by 25%, and carbon monoxide production costs by 50% relative to current industry standards.

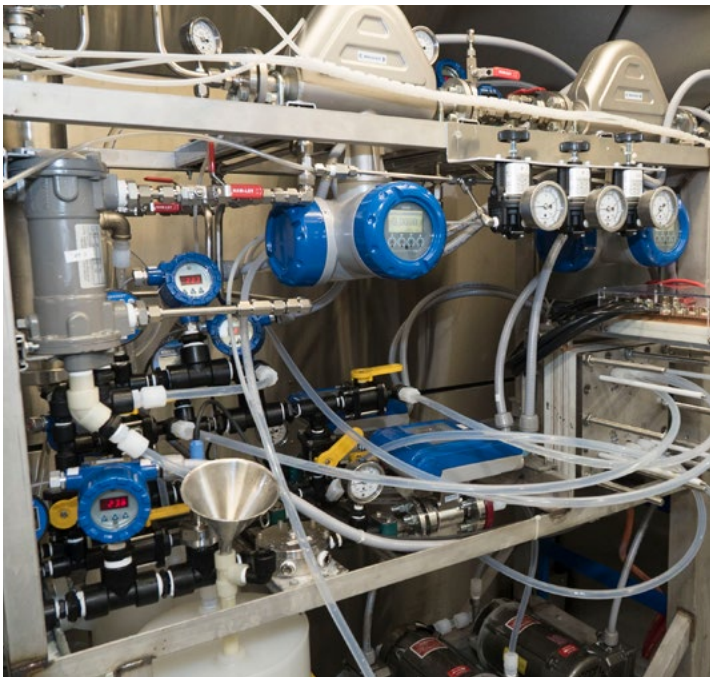
BUSINESS MODEL

Breathe's model relies on licensing as a primary source of revenue. Subsidies are not required to make this technology profitable. Their current customers and partners include Tata, Novomer, and Bhuruka gases. Breathe is also targeting domestic methanol production in India.

TEAM

The team is led by Dr. Sebastian Peter, recipient of the Material Research Society of India medal in 2016, and selected as a young research investigator by the American Chemical Society (2014), Royal Society of Chemistry (2016) and Institute of Physics (2016). His team is comprised of scientists and engineers with significant domain and business expertise, backed by the Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) in Bangalore, which is well known for material science research.





CERT demonstrating their technology in Toronto, Canada. December 2017

CERT

AT A GLANCE

One-Liner:
CERT converts CO_2 into chemical feedstocks and carbon-based fuels

Location:
Toronto, ON, Canada

Vertical:
CO_2-to-Chemicals

Corporate Status:
Incorporation and technology transfer in process

Funding Needs:
CAD 3.3M ($2.5M)

Funding Stage:
Late Seed/Series A

Customers:
Integrated oil & gas, petrochemicals, electricity generators

Tech Stage:
Lab pilot

XPRIZE Test Site:
Alberta Carbon Conversion Technology Centre

Contact:
Dr. Alex Ip, Founder,
alex.ip@utoronto.ca

OVERVIEW

CERT has developed a modular system for the electrocatalytic conversion of CO_2 into chemical feedstocks and carbon-based fuels, using only water and electricity. CERT's unique process operates at room temperature and atmospheric pressure, which can dramatically reduce the complexity of the system. CERT will target drop-in applications in chemical processes as well as opportunities for seasonal energy storage of renewable electricity.

MARKET

The petrochemicals market for ethylene, ethanol, carbon monoxide, and formic acid will be roughly $250B in 2020. The CO_2-derived fuels market is also expected to reach $250B by 2030. Demand for chemical feedstocks and fuels, particularly those that are sustainably sourced, is growing rapidly as a growing global population demands higher standards of living. While there have been significant advances in renewable electricity generation, current solutions to their intermittency, such as batteries, do not generally provide long-term energy storage.

SOLUTION AND ADVANTAGE

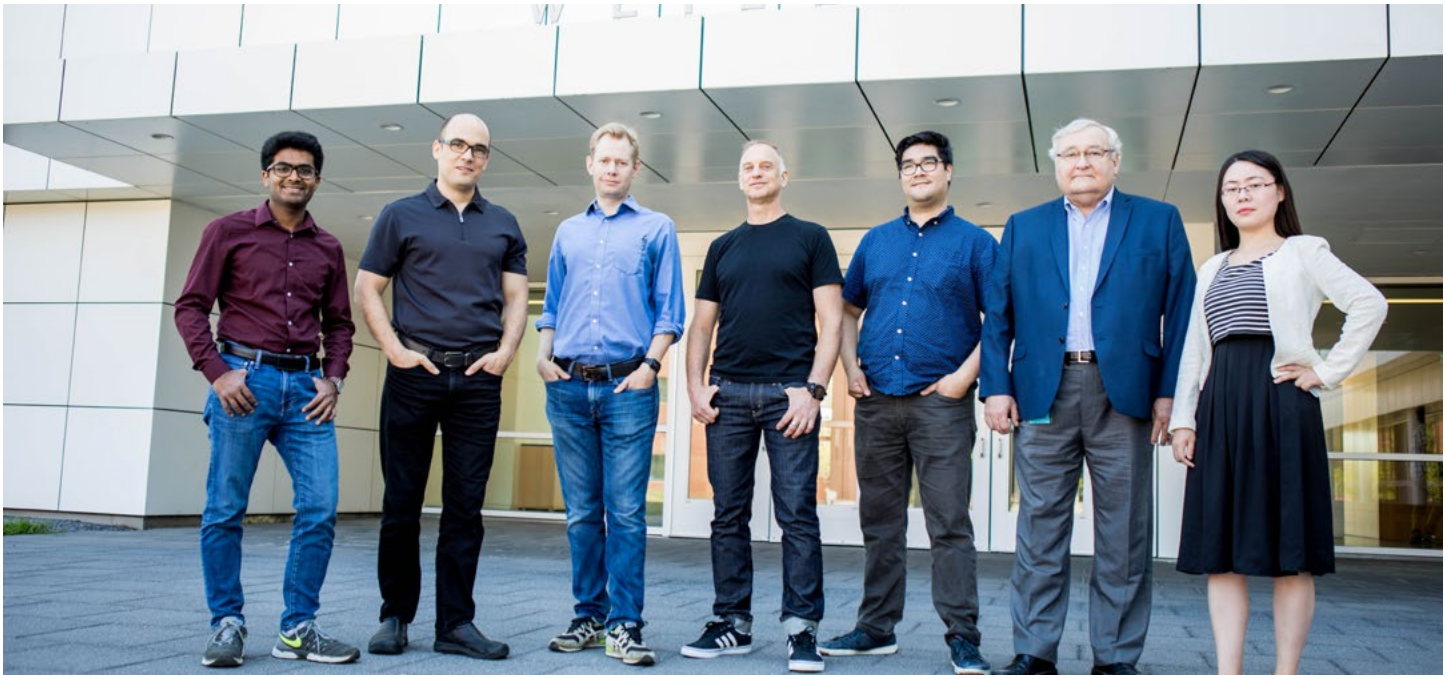
CERT's system uses proprietary catalyst formulations to enable highly efficient, selective, and stable carbon-negative synthesis. They reduce the need for expensive separation processes, since CO_2 contains fewer impurities and generates fewer byproducts than conventional naphtha or natural gas feedstocks. In addition, CERT's modular solution can provide large-scale, long-term energy storage in fuels such as ethanol or methane that can be transported using existing infrastructure.

BUSINESS MODEL

CERT anticipates licensing their technology to large petrochemical companies, enabling them to develop low-carbon versions of products they already generate and sell, and providing units to emitters looking to meet CO_2 reduction targets. This model fits into existing value chains.

TEAM

The CERT team consists of experts in catalyst design and engineering, and is led by two University of Toronto Professors, Ted Sargent and Dave Sinton, both Canada Research Chairs. They have previously scaled up tech companies, including Interface Fluidics and InVisage, which was sold to Apple last year.



Dimensional Energy demonstrating their technology in Ithaca, USA. December 2017

DIMENSIONAL ENERGY

AT A GLANCE

One-Liner:
Dimensional Energy is developing a platform for photochemistry to produce environmentally responsible polymers and chemical intermediaries with broad applications.

Location:
Ithaca, NY, USA

Vertical:
CO_2-to-Chemicals

Corporate Status:
Delaware C Corp

Funding Needs:
$2M

Funding Stage:
Series A

Customers:
Chemical, pharmaceutical, and fuel manufacturing

Tech Stage:
Lab pilot

XPRIZE Test Site:
Wyoming Integrated Test Center

Contact:
Jason Salfi, CEO
jason@dimensionalenergy.net

OVERVIEW

Dimensional Energy is currently scaling their HI-Light technology, a modular reactor technology that relies on photocatalysis to produce environmentally responsible polymers and chemical intermediaries for industrial partners. The scalable reactor platform, a novel variant on the shell and tube reactor, combines advanced optics for even light distribution with optimized photocatalysts. The high throughput reactor optimizes the interplay of feedstocks, catalysts, and sunlight for maximum conversion at low temperatures. To accelerate the development of light-driven reduction of CO2, Dimensional Energy has developed a lab-scale reactor test bed that we sell to university, national, and industrial labs worldwide.

MARKET

Dimensional's global market potential can be measured by combining the global market for Carbon Monoxide (CO), and the market for the onsite production of syngas, of which 40% is CO. It is estimated that the market for delivered CO is $400 million. The global syngas production capacity is approximately 115,000 MWth, representing a market of approximately $4B. Each year, several billion dollars of capital is deployed for massive syngas plants. Dimensional Energy has identified several opportunities to produce carbon monoxide upstream from onsite demand, leveraging the modularity and cost effectiveness of the platform.

SOLUTION AND ADVANTAGE

Dimensional Energy's HI-Light reactor is powered by direct sunlight and does not require grid electrons or therms to drive the photochemical reaction. The HI-Light platform utilizes the full solar spectrum, directing captured photons to drive catalysis and excess thermal energy for upstream and downstream product separation. The low temperature outputs require no additional cooling, which reduces the need for costly output heat management.

BUSINESS MODEL

Dimensional Energy will license their HI-Light technology to those seeking to utilize CO2 from upstream emissions. They intend to manufacture the most precise components of the system—reactors, catalysts, and optics, in New York State and ship internationally. They are also developing a lab scale reactor test bed for use by university, public, and private labs to encourage further development and partnerships in photocatalysis research.

TEAM

The Dimensional Energy team consists of Jason Salfi, CEO with expertise in bringing novel technologies to market and sustainable manufacturing, Dr. Miao Wang with expertise in catalyst synthesis, Mihir Gada with expertise in chemical and process engineering modeling, and Marcelo Motto with expertise in process optimization. HI-Light combines technology developed at the labs of Dr. Tobias Hanrath and Dr. David Erickson at Cornell University.

CarbonCure demonstrating their technology in Atlanta, USA. October 2017

CARBONCURE

AT A GLANCE

One-Liner:
CarbonCure provides commercial CO_2 utilization technologies for more sustainable and economic concrete production

Location:
Halifax, Nova Scotia, Canada

Vertical:
CO_2-to-Concrete

Corporate Status:
Incorporated in Canada (HQ) and USA

Funding Needs:
None, but seeking innovation and scaling strategic partnerships with corporates and governments

Funding Stage:
Series D (closed May 2018)

Customers:
Ready mix and masonry concrete producers

Tech Stage:
Growth

XPRIZE Test Site:
Alberta Carbon Conversion Technology Centre

Contact:
Jennifer Wagner, EVP Corporate Development,
jwagner@carboncure.com

OVERVIEW

CarbonCure is a Canadian CO_2 utilization technology company serving the global cement and concrete industry, with nearly 100 installations in concrete plants across North America. Their concrete has been used in the construction of hundreds of projects, from the California high speed rail line to commercial high rise buildings to simple driveways, and has supply chain partnerships with players in the construction chemical admixture and industrial gas sectors.

MARKET

The concrete market is dominated by the $530 Billion ready mix concrete segment, but CarbonCure is uniquely positioned as the only solution compatible with all cement and concrete product segments. The concrete industry is the largest industrial emitter of CO_2, accounting for 7% of global emissions. The global cement industry has set ambitious goals to reduce its emission intensity by 24% by 2050, and needs a pathway to do so.

SOLUTION AND ADVANTAGE

CarbonCure technologies can help the industry meet those goals while creating concrete material performance improvements, manufacturing cost efficiencies, and water use reduction. Their simple retrofit process uses existing production equipment and Portland cement chemistry to produce, in situ, a nano-sized mineral carbonate embedded within the concrete, all without impacting normal plant operations or supply chains.

BUSINESS MODEL

CarbonCure employs a licensing model with fixed monthly recurring payments and no upfront capital costs. The production efficiencies derived from using the technology exceed both monthly licensing fees and CO_2 supply costs, providing producers with an attractive opportunity to strengthen their bottom line without any capital investment. Moreover, each installed system is tethered to to a central network to ensure compliance and monitor performance for optimal value creation.

TEAM

CarbonCure Technologies was founded in 2007 by CEO Rob Niven who recognized concrete's potential to mitigate global carbon emissions. As of 2018, the CarbonCure team consists of 20 full-time members including Jennifer Wagner, Executive Vice President of Corporate Development, who leads the CarbonCure XPRIZE team. CarbonCure has been recognized as a 3-time recipient of the Cleantech Group Global 100 Company, and is a recipient of the Ernest C. Manning Innovation Award. CarbonCure's extended advisory team and board of directors include world-renowned concrete academics, concrete industry veterans, and globally recognized clean technology investors.

Carbon Capture Machine demonstrating their technology in Aberdeen, Scotland. December 2017

CARBON CAPTURE MACHINE

AT A GLANCE

One-Liner:
CCM produces high purity carbonate minerals with applications in construction, paper and other industries

Location:
Aberdeen, Scotland

Verticals:
CO_2-to-Carbonates,
CO_2-to-Construction-Materials

Corporate Status:
Incorporated in UK, considering USA

Funding Needs:
$2.5M

Funding Stage:
Series A

Customers:
Paper, plastics, pharma, & construction industries

Tech Stage:
Lab pilot

XPRIZE Test Site:
Wyoming Integrated Test Center

Contact:
Dr. Zoe Morrison, Founding Director & COO
z.morrison@ccmuk.com

OVERVIEW

CCM's proprietary mineralization process combines CO_2 with saline waters (brines) to produce carbon-negative Precipitated Calcium Carbonate (PCC), Precipitated Magnesium Carbonate (PMC), and other high value carbonate feedstocks.

MARKET

PCC is used in products as diverse as paper coatings, plastics, pharmaceuticals, and adhesives, and represents a $7B market. PMC is also used in an array of products, but CCM will focus on its use in manufacturing lightweight, insulating plasterboard, which has a total addressable market of $24B.

SOLUTION AND ADVANTAGE

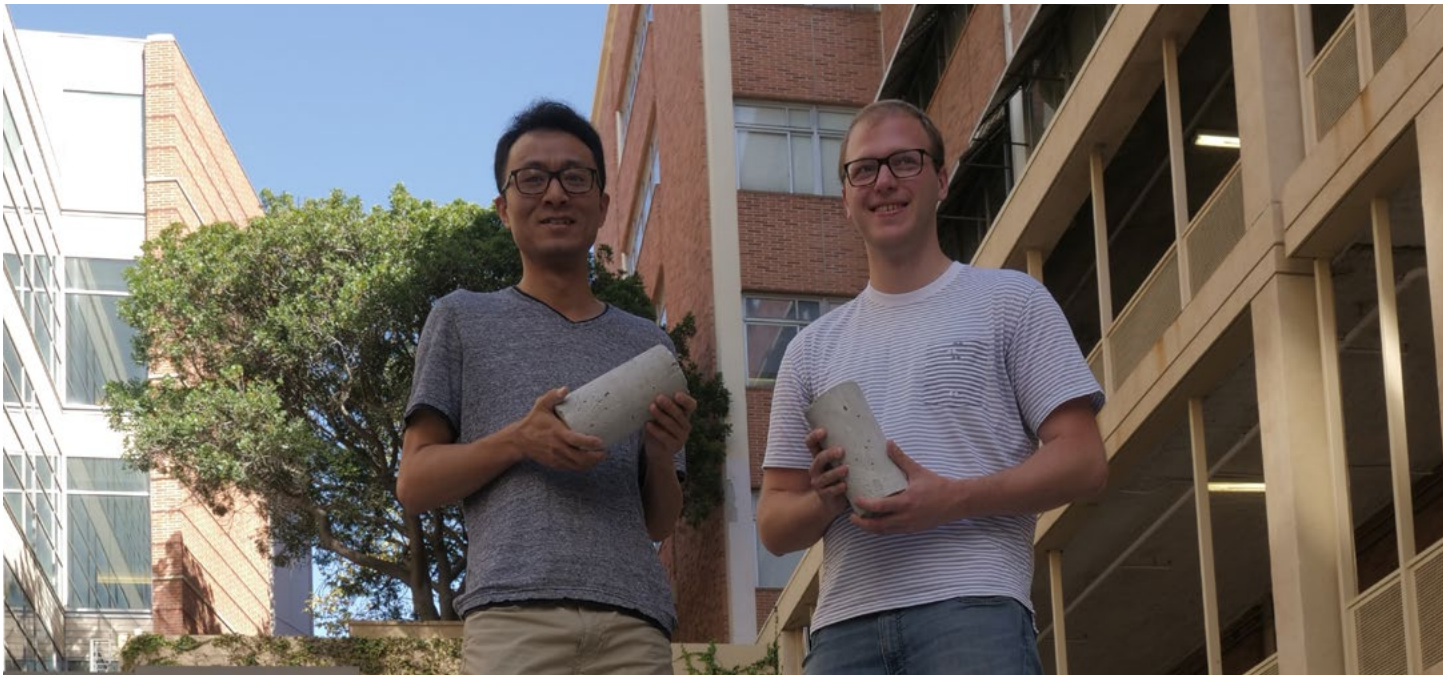
CCM's low CAPEX system uses only brine, slightly alkalized water, and flue gas CO_2 to produce high value, carbon-negative carbonate feedstocks. CCM plasterboard is as strong, lighter, better insulating, incombustible, and of higher quality than existing generic products.

BUSINESS MODEL

The company will leverage its IP to generate licensing and royalty revenues on machine sales and royalty fees on produced products. CCM already has agreed-upon terms with Omya AG, the world's number-one PCC producer. It predicts $8.3B of sales of both products by 2030.

TEAM

The CCM team is led by Dr Mohammed Imbabi, who combines degrees in civil, structural and building engineering with entrepreneurship, knowledge of successful business management and in-depth knowledge and expertise of sustainable materials and their application. The other core members and co-Founders of CCM (UK) Ltd are Prof Fred Glasser, an expert in cement science and Fellow of the Royal Society of Edinburgh, and Prof Zoe Morrison, a marketing specialist and leader of the marketing and commercialisation effort of the team. The Founders will help to direct and grow the business through its formative years by setting and driving the development of new processes and applications, including through the relationship formed between CCM (UK) Ltd and other strategic partners.



Carbon Upcycling UCLA demonstrating their technology in Los Angeles, USA. October 2017

CARBON UPCYCLING UCLA

AT A GLANCE

One-Liner:
Carbon Upcycling UCLA captures CO_2 in scalable, drop-in construction materials and products

Location:
Los Angeles, CA, USA

Vertical:
CO_2-to-Concrete

Corporate Status:
In process

Funding Needs:
$2.5M

Funding Stage:
Late Seed/Series A

Customers:
Construction sector (cement and concrete), power sector (coal and natural gas generators)

Tech Stage:
Lab pilot

XPRIZE Test Site:
Wyoming Integrated Test Center

Contact:
Dr. Gaurav Sant, Founder,
gsant@ucla.edu

OVERVIEW

Carbon Upcycling UCLA's breakthrough technology creates CO_2NCRETE™: strong, prefabricated components that directly substitute for standard construction products with a CO_2 footprint less than half that of conventional concrete. The technology offers unprecedented energy efficiency and scalability, and unlocks the potential to use abundant and cheap fly ash.

MARKET

Carbon Upcycling UCLA is initially targeting the $21B precast concrete and concrete masonry markets, which themselves are segments of the larger $900B global concrete market. Concrete production is responsible for 7% of the world's annual CO_2 emissions, and the industry is facing increasing pressure from customers and regulators to reduce them.

SOLUTION AND ADVANTAGE

Carbon Upcycling's process locks flue gas CO_2 into limestone within CO_2NCRETE™. The process requires minimal CAPEX, since it requires minimal modification of host facilities, avoids a capture system, and readily integrates into existing construction supply chains and workflows. Additionally, it can incorporate low-value fly ashes, including those stored in landfills and ponds, while providing engineering performance equivalent to typical concrete. The low cost of CO_2NCRETE™ is a significant advantage in the low margin concrete business.

BUSINESS MODEL

The team will license its technology to emission-intensive sectors as a more profitable way to produce concrete. Licensees can monetize the carbon reductions by securing carbon credits in eligible carbon markets, meet governmental, social, and corporate pressures to reduce carbon emissions, and market the CO_2-based products as a low-carbon alternative to existing materials. CO_2NCRETE™ also presents a unique ability to turn a supply cost – coal ash tipping fees – into revenue.

TEAM

The team features deep technical skills and strong commercialization experience, and has built an advisory board of leading experts representing various segments of the construction and energy sectors. Dr. Gaurav Sant is founder and CEO, and Associate Professor and Henry Samueli Fellow of Civil and Environmental Engineering at UCLA. Jim McDermott is co-founder and commercialization lead, runs a carbon-to-value investment fund, and has extensive commercialization experience, having led multiple successful lab-to-exit companies. Stephen Raab is COO, and has extensive experience in working with the coal power sector in environmental programs, compliance and regulation management, and project development. The technical team is rounded-out by five Ph.D. level researchers in materials engineering.

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