



LanzaTech's commercial plant. Credit: LanzaTech.

Transition to 'Circular' Carbon Economy Now Underway

By Mark Fogarty

The carbon generated by direct removal from the air and carbon capture can be turned into ethanol and other fuels through a manufacturing process using bacteria. But it will take a definite transformation to accomplish it.

Dr. Wil Burns, co-director of the Institute for Carbon Removal Law and Policy and curator of its "Scrubbing the Skies" series on CDR, introduced the most recent webinar in the series by saying "One of the most imposing challenges of the nascent carbon dioxide removal industry, as well as society, faces is what to do with what ultimately may be hundreds of gigatons of carbon captured in facilities such as direct air capture and bioenergy capture with storage installations."

In recent years, he noted, "a number of companies have emerged in what has come to be known as the carbon capture and utilization or carbon capture and transport sector." He then introduced

Tom Dower, vice president of public policy at LanzaTech, Skokie, Ill., to speak on the topic.

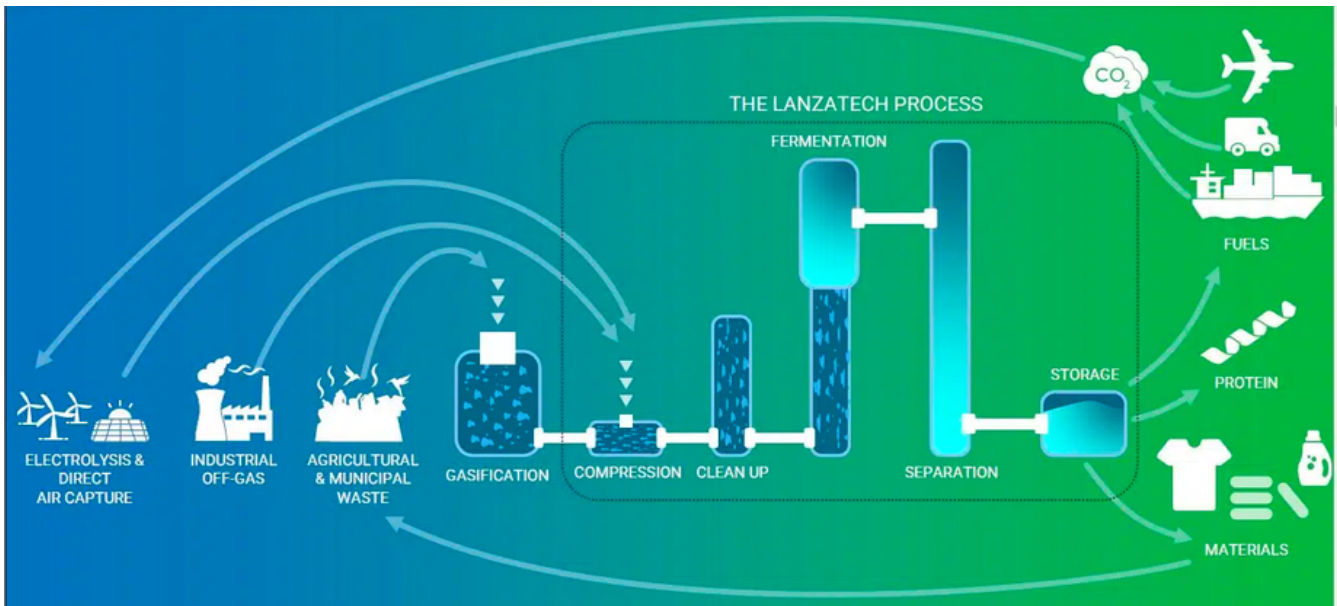
"We transform wastes into essential chemicals, fuels and products that still need carbon as their central molecule, even after we reach what we would call the decarbonized or as we say, the post pollution future," he said of LanzaTech, a New Zealand startup that has since moved to the United States.

What the firm does is "convert waste into useful sustainable products. We do this through biology and what is known as gas fermentation. So, at the heart of our process is biology, specifically a biocatalyst that is centered around bacteria, which wants to consume carbon monoxide, carbon dioxide and hydrogen in the form of gases."

Dower described what the company does as basically a manufacturing process.

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LanzaTech utilizes rabbit-gut bacteria to ferment captured gas pollution (containing CO₂), converting it into ethanol called Lanzaol. Credit: CarbonCredits.com.

“This is actually a continuous process, so, much more like a traditional manufacturing process than the batch type of process that one would typically see used to make alcohol from sugar and yeast, for example. In this case, we feed carbon and energy to bacteria.”

He continued “We do a little bit of gas cleanup, and a little bit of compression but our process is operating at near ambient temperatures and pressures because we’re dealing with biology here. So, this is not high temperature, high pressure environment that you would see with thermal catalysts, and industrial off gases are what we started with.”

Dower credited the firm’s founder, Dr. Sean Simpson, with looking at steel mill off gases in particular, and finding that they are the perfect food for the bacteria that LanzaTech uses.

Other products can be used as well, he said, such as agricultural and forestry residues and municipal solid waste.

The result is a lower-carbon ethanol that can be used for aviation fuel and other purposes. LanzaTech can also produce other products besides ethanol.

Dower called the result steps toward a “circular economy” that reuses original fossil fuel waste.

“The first version of our gas fermentation process makes ethanol as the product that comes out of the process, but not necessarily with the intention of using it as a gasoline additive,” Dower said. Aviation fuel is one use but there are also consumer products that can be made and sold by consumer-facing companies.

This is an ambitious goal. As Dower puts it, “In sum, we are taking every waste resource including carbon dioxide through carbon dioxide removals and direct air capture to make everything that we need. All the things in our lives.”

The Institute for Carbon Removal Law and Policy is located at American University in Washington, DC.

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Tom Dower, VP Public Policy for LanzaTech.

