

CASE STUDY



Exploring New Biobased Feedstocks in a Sustainable Products Future

Cargill is a global agribusiness company headquartered in Minneapolis, MN that is focused on bringing consumers and producers of food closer together. Starting with a single grain elevator in Iowa, the company has grown to 155,000 professionals across 70 countries.

Cargill's Bioindustrial Group has a key mission to establish sustainability strategies for the business, which often involves interfacing with customers to understand sustainability opportunities and combining this role with an advocacy role. The customer-facing and advocacy roles overlap, requiring collaboration across product lines and different businesses including the food, and agriculture, food ingredients, animal protein, animal feed, and the grain origination part of the company (its legacy). Cargill's Bioindustrial Group serves industrial markets with agricultural based feedstocks, including performance chemical markets, binders and adhesives, personal care and new emerging markets, among others. Marty Muenzmaier leads sustainability and external affairs for the Bioindustrial Group and his expertise on climate change and sustainability provides a valuable perspective on these issues.

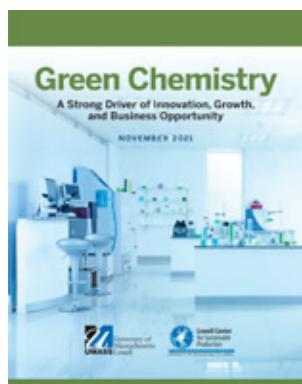
QUICK FACTS

- Cargill was founded in 1865
- Leader in agricultural commodities and transportation.
- Based in Minnetonka, MN
- Pre-acquisition revenue (2018) of \$115 billion

Cargill's legacy business has been focused on the grain origination and trading and this continues to remain a core part of their business. However, the company is also committed to sustainability efforts, regardless of the political trends going on throughout its history. Muenzmaier notes that, "even as the U.S. pulled out of the Paris Accord during the Trump Administration, Cargill

continued its focus on reducing emissions in our operations and supply chains. We kept going."

There are several areas where Cargill Bioindustrial is focused on sustainable innovation. The first is on construction and building materials, specifically binders and adhesives, as well as rejuvenators used in road construction. For binders, Cargill has been seeking a replacement for formaldehyde, which is



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used as a binder in wood products such as plywood. These are commonly used by furniture manufacturers and other composite wood companies.

The soy-based asphalt rejuvenator can be used in road construction. Specifically, when an asphalt roadway is on its last legs, with potholes, the rejuvenator can be added to recycled asphalt product to repave the roads in as good or better condition than virgin asphalt roads. This is a big problem in Cargill's headquarters state of Minnesota, where the winters are hard on roads.

Another product that is important to Cargill's portfolio involves dielectric and cooling solutions, which use vegetable oil as a feedstock for transformer oil in place of mineral oil. Dielectric and insulating fluids are primarily used by original equipment manufacturers and utilities, especially in the power utilities space, and is a product Cargill has sold for years.

A fourth part of Cargill's bioindustrial portfolio is in the area of performance chemicals. Cargill produces polyols for foam materials for furniture, including rigid foams used in the transportation sector. Cargill also has a candle wax division that uses vegetable-based wax to replace paraffin petroleum wax, as well as an emerging plasticizers part of the business. Cargill is constantly looking at new ways to employ biobased replacements in the chemicals sector; it is a big and important part of what it does.

In the personal care space, the company is emphasizing naturally-derived products for beauty, skin and hair care, and a variety of inputs such as jojoba, macadamia, red seaweed, and other exotic products which are used in beauty and personal care.

The last major area of focus is one that Cargill's leaders believe will be very important in the future: bio-intermediates. They target key steps within a chemical process to deliver desired attributes using nature-derived chemical intermediates to replace fossil-based chemicals. For example, they will utilize corn to convert dextrose into butane-diol to serve apparel, electronic and automotive sectors.

The green chemistry segment today is a minor portion of what Cargill earns on a global basis. However, the company's future strategy includes a focus on growing the bioindustrials business to meet the growing demand for more biobased products.

What Does Sustainable Growth Look Like?

Cargill provides products that are made with agricultural raw materials that are renewable on an annual basis or even double-cropped in some parts of the world. That is only the beginning of the sustainability value proposition. As the company's customers are seeking more biobased products in the marketplace that are composed of non-fossil materials, Cargill is well positioned to begin to provide those alternatives. Lower carbon profiles are also critical, as marketing experts see a future that is carbon constrained, where customers will seek a lower carbon footprint and

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a lower carbon intensity for products they buy. Cargill's core competencies can support the production of feedstocks which have sequestration as part of the photosynthesis process and have a lower carbon footprint than the products they are replacing. In fact, Cargill has its own carbon reduction goals to reduce its carbon footprint.

Cargill also has a team to find the right way to discover the application of new green chemicals to finished products. Their bioindustrial R&D lab in Minneapolis works directly with industrial customers to find applications and solutions, and another lab in Europe does the same for its personal care customers.

Cost Competitiveness is Key

Cargill realizes it must be price competitive with offerings in a market; however, if the product has value and is bio-based, there may be opportunities that command a premium, but only if customers understand the value. When the bioindustrial business group was formed, leaders knew their products needed to be price and performance competitive. For example, their asphalt rejuvenator product carries both a price and performance advantage. The repaired road will last longer than re-applying virgin asphalt.

Cargill has identified policy opportunities that could incentivize additional uses of the bio-industrial products it sells. For example, the establishment of a price on carbon could quickly add value to their products which often carry a lower carbon footprint than the fossil-based products it competes with. Cargill is also building its capabilities around the Life Cycle Analysis (LCA) field to gain a firm understanding of the environmental benefits of the production and use of its products in various markets.

Summary

Cargill's future strategic direction reflects the importance of its bioindustrial business as a key part of the future growth of the company. As the world increasingly sees the need to reduce carbon emissions, there will be a closer examination of the benefits that biobased products bring. Cargill is focused intently on meeting that challenge.