



WILL BEVERINA
is assistant editor for
Lubes'n'Greases. Contact him
at Will@LubesnGreases.com

BASE STOCKS | WORLD

Not Your Father's Base Oil

The ever-growing emphasis on sustainability is pushing the lubricants industry to develop products that help achieve carbon neutrality. In the base stocks sector, where more environmentally acceptable products are already prevalent, manufacturers are looking for ways to optimize the performance of these offerings to compete with their more traditional counterparts. The latest breakthroughs could result in base stocks that are both better for the environment and better performing, leading the way to big changes in the lubricants world.

The quest for carbon neutrality will shape the next few years—and perhaps decades—of the industry, and some of the biggest finished lubricant producers are already making commitments to this cause. Shell announced in February that it would be offering a range of carbon neutral lubricants for passenger cars, heavy-duty diesel engines and industrial applications. The company set a target to become a net-zero emissions business by 2050.

“Shell aims to offset the annual emissions of more than 200 million liters of advanced synthetic lubricants, expecting to compensate around 700,000 tons of carbon diox-

ide-equivalent emissions per year, which is equivalent to taking approximately 340,000 cars off the road for one year,” the announcement said.

Carlos Maurer, executive vice president, global commercial at Shell, said the efforts are “the largest carbon neutral program in lubricants history.”

The very definition of an environmentally acceptable lubricant is changing, said Bill Downey, senior vice president of business development at Novvi LLC. The focus used to be mostly on biodegradability. New products, however, must have low toxicity and a low carbon footprint in addition to demonstrating acceptable biodegradability.

Base stocks play a key part in making an environmentally acceptable lubricant. To get to carbon neutrality in lubricants, it is vital to determine what the carbon footprint or emissions profile of the base oil is.

Vegetable oils and esters already provide lubricant producers with environmentally acceptable base stock options. These products, however, fall short in categories like oxidative stability, low-temperature properties and deposit control, often forcing finished lube manufacturers to choose between environmentally acceptable and high-performance formulations.

Downey said that a recent breakthrough at Novvi means that producers can now have it both ways. The company has crafted a new base stock product that consists of a hydrocarbon with no double bonds or esters. The new base stock is not crude oil-based, but rather is made with a plant-based material and actually filters carbon dioxide out of the air, making the base stock a carbon negative product.

On top of that, Downey said that the product—which the company is categorizing as an API Group III+ base stock—outperforms other Group III and Group III+ base stocks

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on the market today, environmentally acceptable or not.

"It's not your father's base oil," Downey told *Lubes'n'Greases*. "Vegetable oils and esters can't perform in the most demanding applications, but we think we've found a way: low toxicity, biodegradable, renewable, negative carbon footprint and

performs. We have Group IV performance, but the properties fit within the Group III definition."

Downey pointed out that part of Shell's journey to carbon neutrality in its products comes from the fact that it holds carbon credits, or permits that allow a company to emit a certain amount of carbon dioxide, a cap which is periodically reduced to

incentivize companies to lower their emissions.

That does not mean, however, that it is an empty gesture of any sort. On the contrary, "Shell has really put sustainability right at the forefront, and we think it's really important for them to be focused on that," he said. "This announcement shows that sustainability is an important part of what an environmentally acceptable lubricant is."

Other producers have made public announcements of their intentions for carbon neutrality. BP pledged to become carbon neutral by 2050, while independent supplier Fuchs said that as of January 2020 it was carbon neutral at all its manufacturing subsidiaries, with further plans to make its upstream supply chain carbon neutral by 2025.

But a new carbon negative base oil—its performance comparable to traditional offerings—could mark an important milestone in efforts to achieve carbon neutrality. Namely, it could make the path to carbon neutrality a lot more straightforward.

"The reality is that 70%-80% of the carbon footprint of a lubricant product itself comes from the raw materials: the base oil and the additives," Downey said.

Novvi, based in Emeryville, California, opened its first manufacturing facility a year ago with capacity to produce 25,000 tons per year of base stocks in Houston, Texas. Chevron is an equity investor in Novvi since 2016. Downey says Novvi's customers include a wide range of other lubricant suppliers, including some of the largest globally.

Some customers are already using the product, named SynNova, but the official launch of it will be later this year. According to Novvi, it is usable in a broad range of applications, including engine oils, metalworking formulations, process oils, driveline applications, marine applications and electric vehicles. ♦



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