



Used cooking oil becomes biofuel

The demands for new eco-friendly fuels are increasing rapidly. The Spanish company Bionor has managed to turn a potentially hazardous waste product into biodiesel.

TEXT: ULF WIMAN PHOTO: MARKEL REDONDO



Alfonso Ausin, Bionor president and CEO.

WHILE THE WORLD'S NEED FOR transport for goods and people continues to grow, researchers are at work trying to find new types of fuels that do not harm the environment. Research and development of alternative fuels such as various biofuels is well under way, and although the development of biofuels has encountered numerous obstacles, the industry is seemingly cleaning up now, and new, innovative and sustainable solutions are emerging.

One example is biodiesel processed from by-products and waste products. The Spanish company Bionor Transformación SA is setting a good example for the future, producing biodiesel from potentially hazardous used cooking oil.

"Used oil is a problem," says Alfonso Ausin, Bionor president and CEO. "It's waste that must be collected."

If not collected, the used oil is generally thrown down drains, Ausin says. "After providing a food source for vermin, it eventually finds its way to treatment plants, and oil is one of the most difficult products to treat and eliminate at those plants. So using spent oil to produce biodiesel is

environmentally friendly to an extremely high degree."

Ausin says the annual consumption of used cooking oil at Bionor's plant is equivalent to about 80,000 tonnes of oil.

Bionor was founded in 2000 and is 25 percent owned by the public sector and 75 percent owned by private companies. The company's biodiesel production plant in Berantevilla, in northern Spain's Álava region, opened in May 2003. Today it produces 30,000 tonnes of biodiesel annually. It employs 20 people. The company now has more than 70 distribution points at service stations and four exclusive area distributors, all of which are identified by the brand Bionor MX 15-Via Oil.

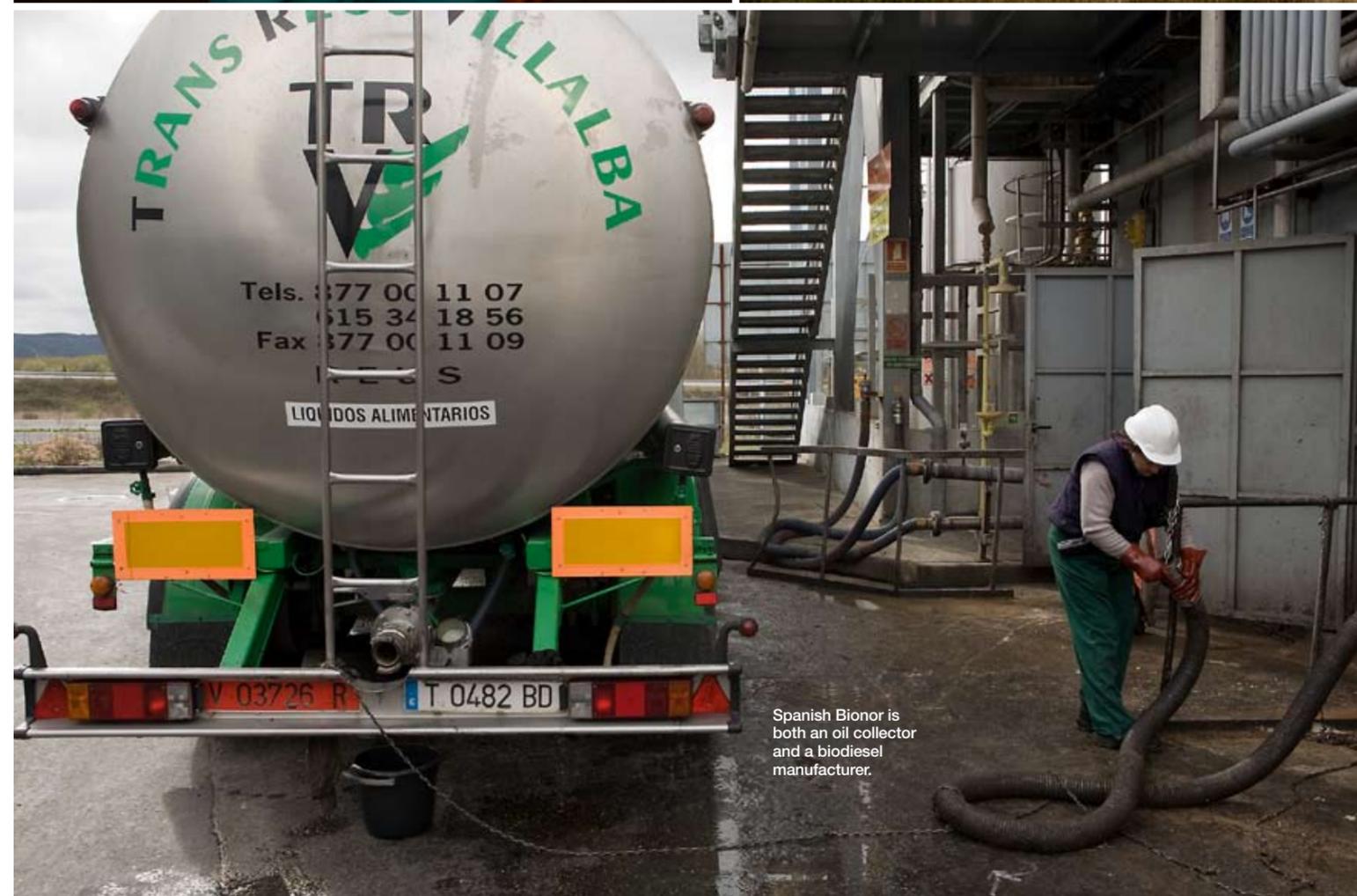
Bionor is one of the few companies using used oil for biodiesel production.

"There are two reasons for this," Ausin says. "First, there is a limited supply of used oil, and not all the oil used is collected. The second reason is that it takes a far greater amount of technology and investment to produce acceptable biodiesel from used oil than from virgin oil."

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At Bionor, Cristina Rodriguez works to turn used cooking oil into biodiesel.



Spanish Bionor is both an oil collector and a biodiesel manufacturer.



Bionor is setting a good example by turning a waste product into biofuel.

►► www.alfalaval.com/here/biodiesel/bionor

A quest for new feedstocks

While the debate rages on about the economic, environmental and moral aspects of biodiesel production, some companies are working to find sustainable solutions. Alfa Laval is among them.

"Biodiesel processors is a rather new Alfa Laval customer segment," says Seppo Hyvonen, Alfa Laval's newly appointed global biodiesel business manager. "Biodiesel is a politically driven issue, and the current feasibility is most often based on some form of governmental involvement. However, with oil prices rocketing, it's really interesting to find new, non-food biodiesel raw material solutions, and this is one of the things we help our customers achieve."

One such customer is Neste Oil plc (included in the Dow Jones Sustainable World Index) from Finland. Alfa Laval supplied Neste with engineering and main components for its new pretreatment plant. Instead of the transesterification process, which is normally used in producing biodiesel, says Hyvonen, "Neste uses a bio-to-liquid process to break down the raw material into waxes, giving an excellent end-product quality."

The pretreatment plant makes it possible for Neste to use any feedstock to produce biodiesel, including non-food raw materials such as jathropa and

algae or used cooking oil, yellow grease, chicken fat or brown grease. However, given that some of these raw materials are really low in quality, pretreatment is crucial.

Alfa Laval is also looking at "second generation" biodiesels, which are synthetic and don't use vegetable oil or animal fats as a raw material. "The new technology will help biodiesel production from, for example, trees and weeds," says Hyvonen. "We've already launched many new products for the biodiesel segment, and there are still more in the pipeline to meet the future demand, including a flash column for pretreatment and biodiesel decanters."

Alfa Laval is working closely with both key customers and academia to come up with tomorrow's biodiesel solutions.

"We're cooperating with the Technical University of Denmark," Hyvonen says. "Our R&D is very active, and we're continuously involving our customers at their plants with their components and engineers, because that yields the best results."

Despite the current issues surrounding biodiesel, Hyvonen is positive about its development. "It went too fast for a while, and now the first big bang is over," he says. "With the non-food raw materials and second-generation processes, the future for biodiesel looks promising." ■



Alfonso Ausin, Bionor president and CEO, acknowledges the need for environmentally friendly fuel solutions.

>>> The used oil collection focuses on two main areas: the restaurant trade and the domestic sector. Almost all Spanish restaurants have a collection system in place, but the domestic collection industry is in its infancy. The oil is collected mainly by small companies that make arrangements directly with restaurants, bars, schools, factory canteens and so on. Though starting out as biodiesel processor, Bionor has decided to work across the board.

"It is not enough just to be manufacturers," Ausin says. "Just as Bionor has gone forward to be distributors, we must go backwards to be collectors. We're moving into the oil collection business, so we not only purchase from other collectors but are now also engaged in the acquisition of several collection companies."

BIONOR WAS FOUNDED more as an environmental company than an energy company. Its original purpose was to take care of collected used cooking oil. "We had to decide what to do with it," Ausin says. "Biodiesel was the answer, and that's what we founded the company to do."

Accordingly, the company's environmental impact is a very sensitive matter.

"First of all," says Ausin, "this is an industry that works with environmental concerns, so we have to start by setting an example ourselves. Major environmental impacts include, for example, the water used in the process. This water has a chemical demand for oxygen of 15,000 ppm, and before it can be discharged into the river it has to be brought down to 100, which is a major challenge. The other two main points are reduction of water consumption by reusing water to minimize clean water intake, and process improvements to reduce our consumption of catalysts and methanol, which are both expensive and highly contaminant."

Alfa Laval has been involved since the beginning, supplying both equipment and process expertise.

"As far as equipment goes," Ausin says, "it's no secret that in the world of technical and chemical machinery for oil, Alfa Laval is a real No.1. That's certainly true of the equipment we are using at our plant. As far as people go, our impression is extremely favourable. That is particularly true for the commercial staff and the design staff who worked with us to identify initial problems."

WHEN ASKED ABOUT THE FUTURE of biofuel in general, and biodiesel specifically, Ausin is reluctant to make predictions. "To forecast this you'd need a crystal ball," he says. "This is an emerging industry, and the rules of the game have yet to be established. And we don't really know who the players are. It's still uncertain what environmental drawbacks there may be in the raw materials used. These are turbulent times, but that could even be positive because it will filter out some of the players, leaving only the best. If you ask me whether there will be a biofuel industry in 2020, I'll answer 'yes certainly.' There will be lots of ups and downs along the way, and only sound, well-placed, correctly sized projects equipped with the proper logistics and sufficient financial muscle will survive." ■

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ALFONSO AUSIN, BIONOR PRESIDENT AND CEO



Alfa Laval manager Isaias Vinaroz (right) assists a Bionor employee.

Facing up to the challenge

Alfa Laval has been a preferred supplier to Spanish company Bionor since 2003. "Originally we just supplied heat exchangers," says Isaias Vinaroz, Biodiesel, Oil & Protein segment manager at Alfa Laval Iberia. "But based on our knowledge of their processes, we were able to solve some process difficulties and have since worked together with Bionor on both thermal and separation solutions."

The main challenge at Bionor's biodiesel production plant has without a doubt been to achieve acceptable biodiesel quality from the used cooking oil – a raw material that changes characteristics from day to day.

"The biggest challenge is to take that permanent heterogeneity and turn it into a fine end product," says Alfonso Ausin, president and CEO of Bionor. "This takes a great deal of work. There is a lot of pretreatment required, and a lot of

separation work using centrifuges. That is precisely the challenge we have met using Alfa Laval equipment."

To date, Alfa Laval has delivered 10 separators and a lot of heat exchangers in addition to decanters and mixers to Bionor. The equipment has resulted in better reliability and longer uptime as well as better yield and less waste.

"Our equipment lets Bionor save on costs in several ways," Vinaroz says. "For instance they use our spiral condensers to reduce methanol consumption. They increase the yield of their plant by using our separators to separate glycerin, and by using our mixers they're able to reduce the amount of water they use in washing the biodiesel."

"One advantage of working with Alfa Laval," says Ausin, "is how well we work together. It's the difference between working with a supplier of machines and a supplier of solutions." ■