

Javiera McGuiggan



If we do our job right and people realize how good biobased solutions are for them, there'll be many others that come later and want to participate in the biodegradable biobased products market.

Photo: Javiera F. McGuiggan

Global Business Director for Power Systems
at Cargill BioIndustrial

Interview with **Javiera F. McGuiggan**

Alan Ross: My next guest is Javiera McGuiggan. She is the Global Business Director for Power Systems at Cargill. Thank you so much for joining me.

There's something new on the market - rapeseed oil. What is the rapeseed oil thing that you're doing with FR3?

Javiera McGuiggan: This week, middle of February, we are launching FR3r, which is like FR3's little cousin made out of rapeseed oil. Rapeseed is exactly the same as canola.

AR My next question is, why have another product when we know FR3 works? And it works really well.

JM It works fantastic. What is mostly driving this need is that it is pushed by the European market. They have this crop available, so they like the localized oil. That's one of the drivers. It's sort of already embedded in some people's head that soy could be damaging the environment. It doesn't, but we want to make it clear for people that this is not a better product, it's just different crops. Being such a big agent in agriculture, we can make the product out of anything. We know that soy is the best combination of performance and cost that is available right now. But if people

are interested in having a rapeseed version, and other customers in this market are using rapeseed, we don't want people to think they cannot get that solution from Cargill, because now they can.

AR That's excellent. I love the idea of a localized crop; everybody would want that.

JM Helping your own economy, avoiding moving things around too much, saving on transportation and reducing contamination - if we can do things locally, we will try to do that too. That's why we have so many plants everywhere. This will be produced at a new European plant.

AR Cargill has played a major role in decarbonization because you are using plant-based oils as opposed to mineral oils. I heard recently an argument that refining mineral oil now is a green. It's still mineral oil, a carbon-based product. Why would they try to equate mineral oil that's been repurposed to a plant?

JM Sustainability is a super important topic. There's no company that doesn't want to achieve that and contribute in some way. We can argue about life cycle analysis and

numbers and spreadsheets, but can you find anything that would be greener or better for the world than a plant? No.

For an LCA analysis, life cycle analysis, where you're measuring the amount of carbon that's emitted to the world, mineral oil as a petroleum-based solution contributes a lot to CO₂ emissions, which then leads to global warming. We want to avoid that, not only to the level of neutral, but hopefully to the level of negative. When you start from a plant, as the plants are alive, they have a biogenic property where they are absorbing CO₂, so they're literally doing the opposite effect. Some LCAs take in effect, the farming and the whole agriculture, and they ignore the fact that the plant was sitting there, breathing and absorbing CO₂. Then you consider all the normal farming processes, then the production of FR3, and you get to a number that's much better than mineral oil, because, again, it's a plant. Even negative, if you add the biogenic composition of the plant.

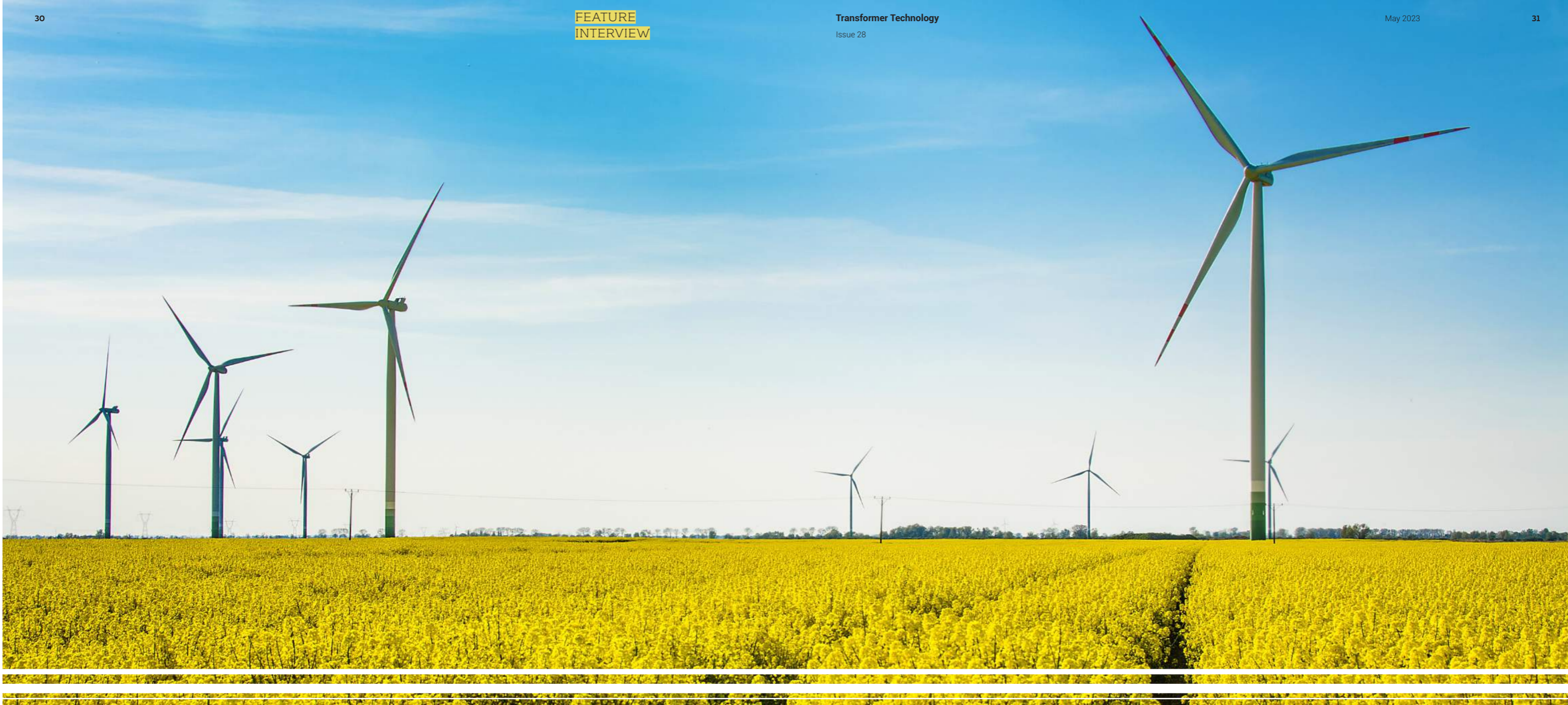
Petroleum solutions are claiming that they can reuse that product for something else, which, don't get me wrong, is fantastic. It's what the world needs, less waste. Reusing mineral oil - great. Can you reuse FR3 for other things? Also true. It doesn't take away from the fact of all the carbon that was emitted at the beginning to produce mineral oil.

I applaud the effort of anyone that makes something that contaminates the world and tries to reuse it for another purpose before it's thrown away. We can also do that with FR3, and that's not the point. The point is, I don't want anyone to get confused to the level of thinking that mineral oils are better than FR3, because we're comparing them to a plant, so there can't be anything greener. That's the end of the discussion.

AR You're the global head of Power Systems at Cargill, so you see the world from a different point of view. The world is not the same in adopting all of these things. Who's ahead, who's behind, who is really supporting biodegradables, and who is just nascently getting into it?

JM The ones that are the most ahead are linked to the most developed economies. The United States is the largest consumer of biodegradable biobased products. Then there's a very accelerated push in Europe. I feel Europe needed a little more of the proof that it works and how it's going to affect their pockets and if they can financially establish it. But they have aging grids, and a bunch of other benefits that they get from these biobased solutions, so they are in a very much accelerated pace compared to what they have

We know that soy is the best combination of performance and cost that is available right now. But if people are interested in having a rapeseed version, and other customers in this market are using rapeseed, we don't want people to think they cannot get that solution from Cargill, because now they can.



been before. And then also Latin America has been very much convinced that this is the right solution. In countries like Brazil almost 90% of their distribution grid is now all in natural esters. Those are the three areas that I would say are driving the change. Next to that, there are countries that are making really great efforts. South Africa turned all their grid into natural esters. The Philippines also established that.

Slowly but surely, all the rest are catching up. In Asia, Japan, Korea, China are dipping their toes into the water, but they'll catch up pretty quickly. Once they get into it, they'll go super fast.

I've always said, if we do our job right and people realize how good this is for them, there'll be many others that come later and want to participate in this market. And that, to me, is in general a good thing - having more competition - because at least we're all trying to defend

which is the best natural ester. I can raise my hand - I think I have the best one for sure. But at least I'm not still trying to convince people that it works, or to trust it. It's more of a wave of "we know it works". There's just more activity in the market, and I think overall, for the planet, it's a good thing.

AR I was the president of the Electric Power Reliability Alliance, we had a lot of labs that we worked with, and they were doing a lot of testing of FR3. As they began to build up the data, they began to see some benefits to FR3 that weren't there in mineral oil. Speak a little bit about those. Sell me on FR3.

JM If it's something related to lab analysis, one of the easiest things you could find is how FR3, just for the pure nature of the science of how vegetable oils work, deals with moisture and free water. The molecules of

soybean oil absorb the water into two separate components, so then it's not free water that can then get attached to your solid insulation. And that's how FR3 extends the life of a transformer. There is a chemical reaction with water that stops it from attaching to the solid insulation.

It's hard to explain, but FR3 is good at aging. It doesn't go brown; it doesn't get burned. You open a transformer with FR3 that's been working for 15, 20 years, and it almost looks exactly the same

At a utility in California, I met an engineer, and he says: "I don't like your fluid, because if I open a mineral oil transformer, I look at the oil, I know exactly what's happened to this transformer. I know what it's been through. I know how long it's been working. I know what could be failing. I open one of yours, and I can't tell anything." And I'm like, exactly. That's why you usually

like it. But he hated it because he would see no change in the oil. It's good with heat, robust.

AR I learned just recently that FR3 can withstand overheating significantly better than mineral oil. When you think about where we are right now, the demand on the grid is growing. Everybody is having to produce more. You can't get more transformers. They're three years out in some cases. And we've had a couple of transformer manufacturers here share with us the difficulty they're trying to ramp up. You've got to keep the existing infrastructure working. Therefore, you're going to overheat and overload your transformers.

What is the cost of retrofitting in comparison to the value of retrofitting with FR3? We know the safety issues, the fire retardancy. We know that if you're near water, you don't want mineral oil to spill in water.

JM How much value you get versus what the cost of it is a really great question, because when you think of a new transformer, the initial ratio of the price of the oil versus the total cost of a transformer is anywhere between 5% to 8% of the cost of the whole unit. So maybe initially when you're buying the whole unit and you have a fluid that's a bit more expensive than your incumbent mineral oil, you just elevate the cost of the whole unit. And you think, do I want to spend that money when I'm already having to buy all these transformers? After a while, mineral oil transformers either need a refresh, or retrofilling, or adding a couple of additives that have maybe worn out. In the case of FR3, that won't happen. When you just evaluate the cost of oil versus oil, it's such an insignificant cost compared to the labor of even doing this maintenance.

Another engineer in a utility in California said: "I want to just put this oil in there because then I know I don't have to touch it again." Labor cost for the maintenance of a transformer could be four times more, depending on the location of the transformer. You have the crew that has to go there, the time spent on shutting it down, getting it off the grid, doing this maintenance. Then on top of that, if you already have the transformer working and you can extend the life, then again, you have to buy units less frequently, which is another economic factor that is not easy for some people to integrate into their equations. They're just thinking about the initial cost, but it's much, much less significant as a maintenance operation to then do this retrofill compared to all the benefits that you would get out of it, because you get 90% of all the same benefits that you get from a new Transformer with FR3.

People always ask, if there's a little mineral oil left in there, would it still work? And yes, it does.

AR Last question. Labor is an issue now, right? You are on the steering committee of Women in Power Systems. Getting more women engineers into STEM, science, technology - you're a real champion for that, and Cargill is a real champion of that. But now there's just a huge problem of getting any staff. Yet, are you suffering from that same thing, is Cargill as a whole suffering from it? Or how do you help industry address it?

JM We even struggle with filling some positions in our team that are in a great company and exciting. But finding the right mix of the right energy to sell something that is changing the way people used to think about something is not just sales. It's telling a story. It is getting harder and harder to find

engineers working at our plants for all the capacity increases that that we need at our plants. We are, thankfully, good at retaining. It's a lesson for all of us to learn - treat your employees well and retain them, because it's not as easy as it used to be to just get new talent all of a sudden.

AR We did surveys as part of a group I'm part of, and what used to be the number one reason that people look for something new in their career was pay, benefits, job security. Now it is wanting to make a difference.

JM This generation wants to feel their job means something. And also, after COVID, they want the freedom that to me is a little scary - people don't even want to go to a work environment, to an office, or to a plant. They just want to work from home. I understand it, and I value the balance of a hybrid situation, but I think the interaction between people, the collaboration in person, and especially for newer engineering graduates, the need to gain that experience from the people that have been there before, is important. There's got to be an adjustment coming, hopefully soon, of people realizing that a hybrid system and a working from home situation are great, but we also have to embrace real life, transferring knowledge, transferring information, and just daily collaboration.

AR Another thing is what people want out of a career is community. They want to know they're part of something that does something for society, but they also want to know they're part of a community.

JM And you cannot be a part of a community when you're sitting just on the video screen. Especially when people don't turn it on so many times. It's understandable, but it's sad because then you don't get any connection if you don't even turn on your camera.

Sometimes it's hard, especially for women, to find a work life balance. You have your kids at home or you're doing something, and women have to get all pretty to be on camera. There is a lot more social pressure to look okay in front of a camera. I understand it, but when possible, at least that minimum interaction of the video being on is very valuable.

AR That's true. It has been a delight, as always.

JM Thank you so much.



The molecules of soybean oil absorb the water into two separate components, so then it's not free water that can then get attached to your solid insulation. And that's how FR3 extends the life of a transformer.