

Also inside

A developer plans to create networking opportunities with a mixed-use project in his hometown of Elizabeth.

Page 2

QUIET TIME

Gov. Murphy and Democratic legislative leaders quickly agreed on a nine-month state budget with no intra-party squabbling. **PAGE 4**

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Spotlight: Manufacturing Day

Candy makers plan for a distanced Halloween; three CEOs talk about their green energy products; and two partners turn avocado pits into a business. **Page 11**

FUTURE POWER

Conversations with manufacturing leaders bringing cleaner energy to New Jersey

BY JEFFREY KANIGE
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Two prominent goals of the Murphy administration – fostering innovation and reducing the state's reliance on fossil fuels – creates opportunities for a variety of manufacturers. NJBIZ recently spoke with the leaders of companies taking advantage of those opportunities. First up is Joe Mastrangelo, the CEO of Edison-based Eos Energy Storage, which is developing an improved system – that is cleaner and cheaper than lithium ion batteries – for holding power generate from renewable sources. Then, we talked to Michael Stivala, the CEO of Suburban Propane in Whippany, which recently took a stake in Oberon Fuels, a California company working on an alternative fuel for vehicles and other equipment. Oberon CEO Rebecca Boudreaux joined that conversation.

Excerpts of those discussions follow. The interviews have been edited for length and clarity. Watch videos of the full discussions at [NJBIZ.com/njbizconversations](https://www.njbiz.com/njbizconversations).

Joe Mastrangelo, CEO of Eos Energy Storage

NJBIZ: What's wrong with lithium ion batteries? Why do we need an alternative?

Joe Mastrangelo. It's not that there's anything wrong. But I think when, when you look at the energy landscape, you always need a mix of technology. So lithium ion is a great technology for electric vehicles. It's a great technology if you want short bursts of power.

What we've developed, though, is a technology that can do long duration discharge and operate in harsh environments. We can go anywhere from Minus 13 degrees to plus 50 degrees without any heating or air conditioning being required.

Q. And that's a shortcoming of lithium batteries.

A. Lithium ion needs to operate, usually within a range of 18 to 22 degrees. And if you go outside that you can damage your system, whereas our system has operating flexibility to allow you to operate in the largest harshest environments around the world.



Mastrangelo

Q. All right, your batteries use zinc. Is there a different process that you use to build them? How exactly are they different besides just the material?

A. The battery in and of itself comes from five core commodities so readily available. ... our manufacturing process is relatively simple -- requires a lot of precision. But doesn't require expensive clean rooms to be able to manufacture batteries, like you see with lithium ion technology and at the same time, we have no conflict materials. There's no precious metals, the batteries are non-toxic and fully recyclable. So it's just a different chemistry. And surrounded by a simpler mechanical design that gives you the operating flexibility for stationary storage.

Q. It sounds like it must be significantly cheaper or less expensive to build, to buy and to use.

A. When you think about just the cost of initial purchase, we're on par with lithium ion with very low volumes. ... We think we create a capital costs or initial cost advantage from an operating standpoint because the system doesn't require the HVAC and because you have a wider operating range it becomes a lower cost, easier system to operate out in

the field. ... And you have a longer life cycle with the battery, because our life cycle is 15 to 20 years without with minimal degradation so it gives you a longer life solution.

Q. And where are you in production? Are you are you turning these things out, selling them, they're being installed? How big is the market?

A. Our headquarters in Edison, New Jersey, where we do all of our testing and R&D work.

We have eight systems installed around the world. We've got six of them in the U.S. and two outside of the United States. We've started what we call our gen 2.3 product which is which is a new product. We're 100 percent made in America and 80 percent of our materials come from the U.S. Our factory is in Pittsburgh, Pennsylvania. We moved into this factory almost a year ago to the day. So even with COVID and all the restrictions and downtime that we've had, we've gone from an empty building in an old Westinghouse factory to producing batteries and wrapping up production and our first system commercial system will ship later this fall.

Q. How much power do these things store

See **CONVERSATIONS** on page 14

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CONVERSATIONS

CONTINUED FROM PAGE 13

does it eventually go to businesses to residences, things like that -- the same electrical grid that everybody else uses?

A. You could make a residential system. We don't have that available right now, just because of where we are in our development cycle from a solution standpoint. But we do 20-foot standard shipping containers. We put two of those together, no 40 foot solution which gives you a little bit under a megawatt of power. You can scale those up to as big as you need, or because of the safety measures because our battery is not flammable you can put them in a standard warehouse with ventilation and put them on server racks and stack the batteries and create what we call a power warehouse.

Q. That was the next question. Beyond supplying electricity for everybody, are there other uses? Can they be smaller, bigger? What is the range that we're talking about in terms of the kinds of uses that these can be put to?

A. When the company started the goal was to co-locate this with solar. So what you were trying to do with solar is take the daytime solar and shift it into a battery that can discharge over four hours when the sun goes down. Since we've been operating, we found that we can do almost any application that requires two hours to 10 hours. So we do things

like grid decongestion, where you're storing you're not next to a power source, but you're pulling power off the grid when there's no demand and putting it back on when there is demand. We do applications where we co-locate with factories or commercial parks or office buildings to be able to provide power and right now we're pretty excited about that.

Michael Stivala, CEO of Suburban Propane and Rebecca Boudreaux, CEO of Oberon Fuels.

Q. How did a company based in Whippany find a company based in San Diego? How did you get together?

Michael Stivala: Well, actually, ... our headquarters is here in New Jersey and the business was founded -- the whole industry was founded in 1928 in West Orange, New Jersey, a couple miles from our office here -- we are in 41 states and we serve a million customers around the country. And we're actually quite large in California, which is where Rebecca and Oberon fuels are headquartered down in San Diego. So all that being said, we wound up meeting at a conference in Washington, D.C. focused on innovation in the propane industry.

Q. And Rebecca your company, as I understand it, what you are developing is a replacement or alternative to diesel fuel, is that correct?



Stivala

Rebecca Boudreaux: So what we're making is a molecule called DME. Yes it is a diesel replacement. But it's more than that. It's a molecule that can be used three different ways. [It is] oxygen, carbon, hydrogen. [But] because there's no direct bond between the two carbons, when it combusts in a diesel engine there's no soot. So it is an excellent diesel replacement -- cleaner burning that gives you the power and torque in the diesel engine.

It also looks very similar propane, the difference is propane has a carbon ... two hydrogens and an oxygen, so it blends very well, very similar to propane. ... Hence, the synergy with Suburban Propane and the infrastructure they have.

It's also an excellent hydrogen carrier. ... It's really hard to move hydrogen when it's separated attach it to the DME molecule it's very easy to move. So it's a molecule that can be used in three different ways.

Q. And Michael. How then would suburban propane use this molecule? What do you think you're going to get out of it?

Stivala: Traditional propane is already a very clean burning fuel, it's got much better qualities than gasoline and diesel for the transportation sector. It produces 60 to 70 percent less smog-producing hydrocarbons than gas and diesel in over-the-road vehicles so propane as it is as a story today is a low-carbon fuel. One of one of our strategies is to

continue to get that story out there and advocate for propane being recognized for its clean burning qualities in the conversation in those areas where lower carbon emissions is the goal and the appropriate goal to improve air quality. And climate change.

So what suburban has been working on is the next innovation to bring an even cleaner version of our product to the market. By taking what Oberon is producing and working on and blending it with propane.

The California Air Resources Board has already weighed in on the carbon intensity impact of that blend and the goal is to significantly reduce the carbon intensity of traditional propane with a 20 percent blend of renewable DME, which could bring us closer to almost carbon neutral, which would obviously achieve the targets that certainly California has set for itself and lots of other states in the union are already starting to push for.

Q. So Rebecca, tell me about the reception you're getting in California to this, both from regulators and from potential customers. What are folks saying to you?

Boudreaux: The company started on this 10 years ago and we approached the state of California because there were no regulations on DME as a fuel, no one had done it before. So the challenge is, there wasn't a pathway for a new fuel to get certified by the state of California.

See **CONVERSATIONS** on page 16

Adubato & Murphy

This Weekend

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