Battery + _Storage_ Podcast — Solid Flow, Strong Future
Host: Vaughn Morrison
Guest: Giovanni Damato
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Vaughn Morrison (00:03):

Welcome to the Troutman Pepper Locke *Battery + Storage* podcast. I'm your host Vaughn Morrison and I've got with me Giovanni Damato, president of CMBlu Energy US, here to talk about his long duration energy storage product and answer some questions for me about the role that long duration is going to play in the battery storage industry going forward. Giovanni, thanks for joining us.

Giovanni Damato (00:26):

Thanks for having me. I'm really excited to talk about CMBlu Energy today and how we're different from other energy storage solutions and technologies. I would say that our key differentiator is that we're purpose-built for the grid in terms of duration, being longer duration as well as being safe and reliable and also from a supply chain standpoint, locally produced from our chemical feedstock all the way to the manufacturing of the modules themselves. We're a company about 11 years old, founded in near Frankfurt, Germany. That's where headquarters is for our R&D as well as our first pilot manufacturing facility. And I'm here in the U.S. with a smaller team focused on taking advantage of the U.S. market and commercializing CMBlu's solid-flow technology here in the States.

Vaughn Morrison (01:28):

Very good. I want to make sure we spend some time on the operational use cases for your long duration technology, Giovanni. But given the enhanced focus on supply chain in our current geopolitical environment and with the new FEOC rules, maybe we can just go from cradle to grave with your product and start with supply chain, which it sounds like is pretty heavily integrated into the U.S., going all the way back to chemical feedstock. Maybe start us there and build up.

Giovanni Damato (02:00):

Yeah. So our supply chain, we started in Europe as I mentioned, in Germany, and right now our entire supply chain is inside of the EU. So mostly from Germany and Austria, we have a couple of the chemical feedstock suppliers across those two countries. So starting there at the very beginning of the active chemistry, it's abundant materials, there's really no critical minerals and of course no FEOC-related countries, at least from the U.S. perspective and also really in general geopolitical risk in terms of where the feedstock comes from. It can be produced locally at just about any market, but especially EU and the U.S. And then as we move up the manufacturing supply, it's really straightforward containers. We also have one moving part as

the architecture of a flow battery and that's a pump, and those are actually sourced through automotive manufacturers doing automotive fuel pumps, so pretty easy to source those as well. And we also produce all of our own cell stacks that actually produce the power that goes to the grid.

Vaughn Morrison (03:16):

Very good. That sounds really promising from a FEOC standpoint. Most of our listeners are familiar with the foreign entity of concern rules that if not followed, can disqualify you from the investment tax credit that would otherwise be available for energy storage. For purposes of the domestic content bonus for the investment tax credit, does CMBlue also have a product that qualifies for that bonus, requiring not just the avoidance of FEOC entities, but also the affirmative use of domestic suppliers in the U.S.?

Giovanni Damato (03:50):

So that's one of the key things that we're working here in the U.S. on is building up that supply chain and having the percentages that we need to get that bonus in the U.S. as well as having dedicated manufacturing facilities here in the U.S. We are looking at partners right now in locations that make sense across the country to put manufacturing capacity. Our first pilot production is in Germany now. We're also about to start construction on a 4 gigawatt-hour facility in Greece that has some EU funding as well. And we're gonna replicate that facility at the 4 gigawatt-hour commercial scale in the U.S. and working with some manufacturing partners that have brownfield sites already and being able to site those in advantageous locations across the U.S. Luckily, our siting for the facilities, they don't take a lot of specialized equipment or clean rooms or things like that that some of the other battery manufacturers might need. So we have a pretty small footprint and a pretty low capex investment because of that. So we're excited to be able to ramp that up pretty quickly. And we're targeting the Greece facility to start production as early as the end of next year, 2027, and then our facility in the U.S. to start in 2028.

Vaughn Morrison (05:17):

Fantastic. Very interesting. So one thing I always wonder about with long duration storage is whether your technology fits within the safe harbor table that the IRS has provided for battery storage, both for purposes of FEOC compliance and domestic content qualification, which that table of course was based around the prevalent technology at the time, which is lithium-ion. Does your technology map onto that table effectively or do you rely on an alternative compliance methodology?

Giovanni Damato (05:52):

So we're trying to follow that table as best we can and focus on being able to capture as much of the ITC per project as possible in each of the years where our projects are coming online. So we're really focused on that.

Vaughn Morrison (06:09):

You're letting the IRS tell you how to build your projects, huh?

Giovanni Damato (06:13):

Well, the good thing is that we always as a strategic focus in each of the regions that we want to be active in is being able to produce locally. And we see that as a competitive advantage for us and it's just part of our core strategy. So it fits well into what we're trying to do.

Vaughn Morrison (06:32):

Yeah, and there were significant segments of the industry that were shifting to domestic supply prior to the introduction of any FEOC regulations simply to help reduce geopolitical risk, de-risk their supply chains in that respect too. So there's myriad advantages to that for sure. So maybe moving from the supply chain, we can talk a little bit about your product's duration. What do you guys typically build and does it change as between use cases? Is it customizable by customer? Where do you fit in and all that?

Giovanni Damato (07:09):

Yeah, so the core architecture is a modular system, so we can start with smaller building blocks, kind of what the industry is used to now with the way lithium-ion does it with lithium modules. We have modules as well and they're a little bit larger in size, but in general, you can stack those depending on your power and your energy needs. So depending on the site, depending on the customer and the use case, we can develop a power-to-energy ratio that is best suited for the application at hand. We've seen that our standard product, what we see on the market today and what folks are asking for that we're talking to, we're really focused on starting at the 10-hour building block of nominal duration. Of course, you can discharge slower than that or up to that. But right now, that's what we're gonna do as our first product launch as commercial version. But we can also do kind of in the five-hour range, up to 12 to plus hours as well, depending on what the market needs are.

Vaughn Morrison (08:16):

That's really interesting, that level of flexibility. I think from my perspective, 10 hours is pretty clearly differentiated from the current generation of lithium-ion and next-gen lithium-ion. We're seeing maybe eight-hour duration. The ability to go to 10 and beyond, that's pretty neat. So for purposes of these 10-hour applications and upwards, who are your target customers? What use cases do you see your products fitting?

Giovanni Damato (08:46):

We've got three key customers or target use cases that we're looking at. One is utilities looking at higher penetrations of solar and other renewables as well as dealing with explosive load growth demand both from commercial, industrial and of course, data centers and AI data center load growth and being able to supply that load growth as quickly as possible. Then the data

centers themselves, kind of almost acting as their own utility and building up that energy and power capacity on their own to deploy as quickly as possible. And then other commercial and industrial customers, for example, Mercedes-Benz is one of our first commercial customers in Europe and it's at one of their facilities in Germany, a manufacturing facility where they're looking to reduce their high energy charges there in Europe for demand charges as well as time-of-use energy.

Vaughn Morrison (09:45):

Interesting. So on the C&I side, demand response and time-shifting applications. On the data center side, is your product providing backup power or voltage regulation or both? And can it be paired with renewables and given its duration, be sufficient to meet kind of round-the-clock load requirements without any backup gas generation as well?

Giovanni Damato (10:17):

Yeah, so if the primary use case and the one kind of 24/7, 365 days a year operation is pairing the 10-hour energy storage solution with the solid-flow battery that we have with PV mostly. I mean, it could be PV and wind, but we're looking at that use case as kind of the dominant request right now from the AI data center providers. And that is diurnal, picking up excess solar generation during the day and using it, spreading it out over the night. In the U.S., our first commercial project is with Salt River Project, SRP, in the Phoenix area. They have tremendous load growth, multiple reasons, but also very much so driven by AI data center growth. So there's a large data center going in. Google's a part of the project with SRP that they're looking to see how can we service that demand and the power and the energy needs from that data center with solar and longer duration energy storage. So we're doing a pilot project there at 5 megawatt, 50 megawatt-hours. Of course, that's a lot smaller than the, I believe, about a one-plus gigawatt data center that's gonna go there. But it's a step towards that to show how you can scale these things and be able to provide the energy and the power that these data centers need on a daily basis. And of course, you mentioned backup and power quality. Those are other things that we can assist with as part of the use case and kind of stacking benefits. But those are the smaller pieces of the puzzle, I would say.

Vaughn Morrison (12:02):

So the end goal would be theoretically you could have a CMBlu battery together with solar and you don't need anything more than that to run a data center.

Giovanni Damato (12:08):

That's right.

Vaughn Morrison (12:14):

That's really neat. And good shout-out to SRP. They've been a real leader in driving battery storage technology forward. We've seen them on a lot of transactions, particularly with nascent technology.

Giovanni Damato (12:27):

They're definitely forward-looking, and this project is really great to demonstrate kind of the 10-hour battery energy storage use cases with their high solar penetration in their service territory as well.

Vaughn Morrison (12:40):

Very good. And then in terms of the power quality aspects, I know there are kind of lithium-ion-based power packages that include voltage regulation services, kind of inverter-based. Is that a feature that is inherent in the CMBlu technology? And maybe part of that question is about ramp rate and response time. Is that kind of comparable to lithium-ion, or is that something that you would rely on other equipment to add to an overall power package?

Giovanni Damato (13:11):

So we're also inverter-based. So our response times and the things we can do on the power quality side are very similar to lithium-ion. It's really kind of at the inverter side of what the specifications need to be from the data center in terms of response time, what kind of power quality support can be given with inverter-based technology. And also, there are opportunities to pair multiple technologies together and take the strong suits of each. For example, supercapacitors, things like that for the sub-second time that maybe even inverters today don't necessarily meet the fast response rate that the data center requires. So even looking at our systems to be in the future to be DC-to-DC connected directly to the data center could be another option or use case down the road to make that response time even quicker and service the servers directly.

Vaughn Morrison (14:14):

Very cool, very cool. Well, I gotta ask the question that I know everybody's wondering about, which is how often do these things explode?

Giovanni Damato (14:22):

Yeah, that's I think an unfortunate aspect of the energy storage space with some of the things that have happened in the past with lithium-ion projects. There is an inherent thermal runaway risk with lithium-ion. There's some high-profile incidents in the U.S., in California, in SRP territory, one of the first in the U.S. incidents. What we do is our system as a flow battery is aqueous-based. So that means we're about 40% water and about 60% solid. So water is very difficult to burn. So we inherently don't have that thermal runaway risk. And what that does is allow us to site our technology, our solid-flow technology, close to the load, close to high-density areas without that thermal runaway risk or explosion risk. For example, we have a pilot project with WEC in Milwaukee, Wisconsin, where we're siting the energy storage, our modules, inside their gas-fired plant. And it's really only about... Some of the modules are only about 100 feet from the boiler unit. It's a combined heat and power unit in downtown Milwaukee. So that's just an example of how utilities can already see the advantages that you wouldn't be able to do with conventional lithium, or you wouldn't think about it, at least now, doing that type of thing.

Vaughn Morrison (15:52):

Yeah, yeah. I'm not sure that's safe for you, honestly. Sounds safe for them.

Giovanni Damato (15:57):

Well, I think we'll have bigger problems if the whole power plant goes down, so.

Vaughn Morrison (16:02):

Yeah. So is the Blu... I suppose that references the aqueous nature of the product. Is it actually blue in color?

Giovanni Damato (16:12):

No, it's a long story how the CMBlu came about from our founder combining a couple of companies that he founded, the names of companies early on in his career, as well as using Blu-ray technology to etch the original cell stacks that we were using in the very early days. So that's how it comes about. The liquid is actually more of a boring brown and yellow color. So it looks kind of like coffee.

Vaughn Morrison (16:40):

So you're telling me if I wanted it to be pink, you couldn't accommodate that request?

Giovanni Damato (16:44):

We could make the hoses pink, I suppose, and then you would think they were pink.

Vaughn Morrison (16:49):

I'll ask my daughter if that's sufficient. Good deal. Well, maybe I could ask you just to engage in a little bit of crystal ball about the battery storage industry in the U.S. generally. I'd be curious both for your thoughts on how you see the next five years going now that we have the final rules, most of the rules of the road that we're gonna be playing by from a regulatory standpoint over the next few years, and then project out as well 10 years, where a lot of folks see long duration maybe playing a more significant role. And then maybe we can talk a little bit about Europe as well.

Giovanni Damato (17:27):

So, I mean, I think in general, even before all the focus on FEOC, I think the utilities, the large energy users like the data centers, they're really interested in not putting all their eggs in one basket, one technology basket. They wanted to diversify their portfolio, didn't want to just rely on lithium because anything could happen. As we can see with tariffs or FEOC, those things can really affect the value proposition quickly and the supply chain. So I think there's a strong case to be made that there's a huge demand. The preponderance of all the different agencies out

there, consulting firms doing projections of how much energy storage is needed just by 2030, it's not gonna be one technology that can fulfill all that demand, or at least can't do it that quickly. So I think having multiple technologies to choose from is great, and then also the specific attributes of the different technologies. So I think lithium has its place in kind of up to the four-hour range, and maybe it can get a little bit higher than that economically. But I think a lot of the non-lithium players like CMBlu's SolidFlow technology, really good fit for the 8 to 10-hour range where we're seeing important use cases playing out now, like we mentioned with the data centers, with high penetration of renewables and solar at utility service territories and those types of things.

Giovanni Damato (18:57):

Also just regular reliability for extreme weather events for utilities. And then also I think we mentioned the safety aspects and things like that I think that the non-lithium players can bring as options to the full menu of solutions that can be available to all the different customers. And I think you asked CMBlu in particular, our focus area is on the longer duration, the 10-hour range now, and we can kind of follow the market as maybe that adjusts, maybe it continues to drift a little bit longer as well, and be very economic at that point. So we see ourselves as kind of being cost-competitive with lithium-ion at about the five-hour duration point, and then as you get more and more hours on top of that, becoming more and more competitive than lithium-ion. And of course, eliminating some of those other issues such as the FEOC concern that we have now in the U.S. to capture the tax credits, and then being able to do the entire supply chain locally within the U.S. from the feedstock all the way up to component manufacturing and capture the full ITC, also 45X and things like that with manufacturing in the U.S., and then eliminating some of those geopolitical that are just wild cards that we don't know in the future how they're gonna play out, and just having more options on the table to provide that energy security, energy dominance that we're all focused on today.

Vaughn Morrison (20:34):

Absolutely. So overall picture, energy storage demand is going to increase over the next 5, 10 years, and there's gonna be different needs within that market that can be met through a variety of products, more of which are coming available, including CMBlu, the next few years. Can you expand a little bit on what it is that makes lithium-ion's cost-competitiveness fall off after that five-hour mark, whereas CMBlu continues at that point?

Giovanni Damato (21:10):

Yeah, there's inherently built into the way the lithium-ion cells are built or manufactured is that you get a certain amount of power and a certain amount of energy, and that ratio is somewhat fixed. So what we can do with our SolidFlow technology is really decouple power from energy, so you don't have to spend more on power. What you need is the duration or the energy, you can have that nominal 10 hours in the battery as designed. So I think what I like to say is it's more purpose-built for the grid applications as opposed to more focused on the origin of being more mobility-focused, so either EV transportation or mobile devices, cell phones, laptops, things like that, that have a higher power need than energy needs. So the economics or the things that really drive it are that you're not buying things that you don't need to get up to the 10 hours. So I think that's the best way to explain where some of that comes from, as well as our

chemical feedstock in general is abundant low-cost materials. So it doesn't have the same cost basis as the lithium feedstock that goes into those cells as well. So kind of from two different angles is where we get that economies of scale when you're talking about scale-up in duration, as well as regular economies of scale too.

Vaughn Morrison (22:45):

It's very interesting. Pivoting for a second, for a lot of our listeners, there's a great deal of interest in comparing the U.S. market to other markets in battery storage. And as someone who's active both in the U.S. and in the EU, maybe give us a sense of your perspective on the differences between those markets and how you expect them to evolve over the medium term.

Giovanni Damato (23:10):

Yeah, so we have the advantage of CMBlu being active in the EU and the U.S. and seeing kind of day-to-day what the customers are asking for and being able to compare those. And one of the key things that we see is the difference between in the EU looking at turnkey battery energy storage purchases, and in the U.S. more tolling agreement or PPA-style or financial instruments to utilize the energy storage technology. So I think in the U.S., by doing it with a tolling agreement or a PPA-style, you're offloading some of the technology risk and maybe be able to move quicker for some of those high... And also the high demand or quick turnaround and speed to deployment that we're seeing with the data center loads and AI. Whereas in Europe, it seems that we've seen more uptick in those turnkey-type vehicles and purchasing the system for their own use. So those are some key differences. Then the other one I would say is the type of customer. So I think there's a lot more traction in EU right now for C&I, commercial industrial, where they're facing significantly higher energy costs in Europe than in the U.S. and some pretty rough demand charges and time-of-use energy structures that would be extremely painful if you saw those numbers in the U.S. So I think that's where a lot of focus is, although there's also data center activity in Europe as well. But it's nowhere near the unprecedented kind of scale load growth in the U.S., especially in markets like Texas and other places where you're looking at doubling their peak load in a 10-year timeframe.

Vaughn Morrison (25:04):

Yeah, and some of that probably has to do with the fact that power prices are currently so much lower in the U.S., amongst other things. In the U.S., for the IPP model, typically you're raising project financing, and if you're raising project financing, you need an offtake contract. So it's interesting that you haven't seen that have the same level of prevalence in the EU. Those are very confident C&I customers who want to buy and run their own equipment. I've got one more specific technology question for you that we can maybe splice into the broader engagement here. Is round-trip efficiency for CMBlu's technology consistent with lithium-ion?

Giovanni Damato (25:51):

So round-trip efficiency is, I would say, more difficult for most non-lithium technologies just because of the fundamental nature of lithium. It's kind of at the highest point of energy efficiency for electrochemical energy storage. But what we're seeing with our energy storage system is somewhere within the acceptable range that we're talking with the particular customers with and

comparing it to lithium-ion. So I think some of the factors are how you're able to use non-lithium systems versus lithium. So one of those aspects is can you actually go from 0 to 100% state of charge in your regular charge and discharge cycles, and does that impact round-trip efficiency? The other piece is where the state of charge needs to stay on average in order to continue to have your warranties, your performance guarantees, things like that. And with CMBLU's technology, you can operate in the full spectrum of the state of charge and leave it at different states of charge without impacting efficiency, without impacting the cycle life. So that's a really important aspect. And also just when it comes to looking at the total cost of a project and operating for, let's say, 20 years, we have a really high cycle life in kind of the 20,000-plus range. So it's more driven by calendar life as opposed to cycling. And you look at a 20-year horizon. So there's all those operation and maintenance pieces that go together with round-trip efficiency that come out to be, depending on how you use it, could be about the same in terms of impact.

Vaughn Morrison (27:39):

That's really interesting about the degradation piece as well, that it's more time-based than cycle-based. Do you impose annual cycling limits in order to maintain the warranty, or is there a little more flexibility there?

Giovanni Damato (27:54):

So with our higher cycle life, there's really not a need for the performance guarantees to have a cycle limit. It's more focused on keeping it in the temperature operational range of about negative 10 degrees Celsius up to about 50 degrees Celsius. So I guess that's 10 degrees Fahrenheit to like 120 degrees Fahrenheit. That's kind of a key driver for us. And that's pretty much covers most ambient temperatures. But for the most part, you can use the battery in any type of cycling. You can do smaller duration for frequency regulation up to that full 0 to 100% charge if you're doing a diurnal kind of application with solar, shifting the excess generation from midday to overnight.

Vaughn Morrison (28:46):

Interesting. And what is your typical useful life for one of your projects? Is it a 20-year, 25-year useful life?

Giovanni Damato (28:56):

Yeah, so our standard kind of long-term service agreement is focused on doing 20-year of service agreement where there's probably a point where we may need to replace the pumps depending on how it's cycled. Although we know very well, automotive fuel pump, their kind of performance curves, their life cycle curves. So we can anticipate when that will be needed depending on if you're doing more frequency regulation type activities as opposed to that diurnal time-shift application, and then potentially doing some refurbishing of the liquid electrolyte. So adding more to bring it from maybe an 80 or an 85% state of health at maybe year 10 back up to a 95, 98% state of health. And that's something that can be done in place and just adding additional electrolyte to the liquid solution that's in the module.

Vaughn Morrison (29:58):

Interesting. That's not the type of augmentation I'm used to but...

Giovanni Damato (30:02):

Yeah, it's not actually just adding more batteries. It's kind of being able to service the module itself.

Vaughn Morrison (30:09):

Nice. Well, Giovanni, any parting words before we wrap up here?

Giovanni Damato (30:14):

I would say just that it's definitely an exciting time in the energy storage space, and I think we're gonna see just that huge uptick in demand from all the various load growth factors. From just focusing on energy dominance to the AI data centers and the reliability and extreme weather events where energy storage can really help utilities and industrial and commercial customers be able to solve their issues that they're seeing and bring down their costs and increase the reliability and also speed to deployment. And we're really excited to be a part of that and helping get there.

Vaughn Morrison (30:55):

Very good. Well, thanks so much for joining us. We appreciate your perspective on long duration and look forward to seeing your SRP project come online.

Giovanni Damato (31:03):

Thanks for having me.

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