
BATTERY & STORAGE: S04 Ep02, MANGROVE LITHIUM / DR. SAAD DARÄ
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Bill Derasmo:

Hello and welcome back to the Troutman Pepper Battery and Storage Podcast. On today's episode, I'm very pleased to welcome Saad Dara from Mangrove Lithium. Welcome to the program, Saad.

Saad Dara:

Thank you for having me. I'm glad to be here. Looking forward to the conversation.

Bill Derasmo:

Likewise. Saad, you've got a Canadian background it looks like. You're from the University of British Columbia. You've got a bachelor's, a master's, and a Ph.D. all in the area of chemical and biological engineering, and you're now with Mangrove. Why don't I give you a chance to introduce yourself and talk about what you're working on and what we're going to discuss further on today's program?

Saad Dara:

Yes. My background and my training is as a chemical engineer. More specifically, I'm an electrochemical engineer. I am the CEO of Mangrove Lithium. Mangrove is developing and commercializing a technology that I've developed over my Ph.D. You mentioned the bachelor's, master's, and Ph.D., the most relevant work here is my Ph.D. Unfortunately, or maybe fortunately, depending on which engineers you ask, I don't work on the engineering side anymore. I do more of the business development, fundraising for Mangrove, and more of the commercial side because I've had the fortune of having some very excellent team members join me. I am bringing this technology forward and we are now growing as a company, but what we really do is we focus on lithium processing and refining to produce raw materials that go into batteries. So our technology works across the lithium supply chain. So we work with upstream mining companies, we work with battery manufacturers, we look to work with battery recyclers to take diverse feedstocks and convert them into a lithium hydroxide or lithium carbonate.

For your listeners that may not be as aware of the lithium processing supply chain, lithium is similar in many ways to the oil and gas sector where you get a crude oil and then you got to process and refine it to a hydrocarbon that can actually be used in something. Lithium is similar to that, and you get a crude lithium and refine it and process it. We are the refinery for lithium. Our differentiation is really on a novel electrochemical process that we're developing that we believe will have significant advantages on both costs as well as environmental benefits. So that's really what we are doing and a little bit about us.

Bill Derasmo:

Appreciate that. I have in my notes the electrochemical processing space that you use electricity, so maybe you could drill into that for a second, what's unique about your processing, without giving away your secret sauce, of course.

Saad Dara:

Oh, absolutely. My pleasure. You should be careful when you ask that question because sometimes people like me will never shut up.

Bill Derasmo:

No, that's okay. I think our audiences like to geek out on storage issues. Why don't you geek out for a second?

Saad Dara:

Yeah, no problem. The traditional way of processing and refining lithium is to use chemicals. And basically, chemicals that you would've heard of sodium hydroxide, which is caustic solution or soda ash, significant use of those chemicals in the processing and refining sector. Essentially what happens is they take a crude form of lithium and add those chemicals to convert it into lithium hydroxide or lithium carbonate. Chemical phase separation, so you add the chemicals, it changes essentially the pH of the solution, causes precipitation and separation of the different things that you're looking for. Now, that process has a few challenges associated with it. If you're working with lithium brines, which are the biggest reserves of lithium in the world, mostly in Argentina, Chile, and Bolivia. They cannot produce the lithium hydroxide that's required, they have to go through an intermediate process. So that adds cost, it adds capex. More importantly, if you think about adding your chemicals to the thing that you're trying to produce on a fundamental level, all the molecules are mixing with each other.

We don't do that. We don't use chemicals, we instead use electricity. We use electricity in much the same way a battery uses a chemical reaction to create electricity. We do the same and we use electricity to create the same chemical reaction that happens in a chemical phase separation process, and we use that electricity to generate essentially hydroxide ions which convert the lithium into lithium hydroxide. There's more nuance to that, but that's at a very high level what we do. And this has advantages. It improves the purity of the products we make. It also reduces the opex as well as eliminates certain parts of the supply chain. That's essentially the electrochemical process.

Bill Derasmo:

Very interesting. And you guys I have in my notes are working towards your first commercial plant since we last spoke. How is that coming? What are you looking at? What's coming down the pike on that front?

Saad Dara:

Yeah, that's correct. The technology has been developed for about 10 years now. So we are bringing this forward, we are working towards the first commercial plant. So this is going to be a plant that will go into the United States. We have identified two locations that we are working

there with. The one is in Nevada and the other is in North Carolina, South Carolina, Georgia area. And that's dependent on some of the people that we are working with or the companies that we are looking to work with to take feedstock and provide the final product back to them. It's coming along well and we're progressing towards it. We are now entering into some of the very detailed design stage before it gets into construction sometime later this year.

Bill Derasmo:

We should take a step back because we dove right in. The reason why obviously we're talking so much about lithium is that's the dominant battery chemistry, if you will. Now, you've got a twist on that with your electrochemical processing. But just to take a step back, when we talk about the battery space, we talk about transportation on the one side, the stationary market on the other side, or what you might call utility scale, in other words, to feed power into the grid, and then there's the mobility side, but both are heavily dependent on lithium-ion at this point in time. We've had some other companies involved with different chemistries like vanadium for example, or different types of iron processes. But the bottom line is lithium is still a dominant player. So the reason why it's so important with what you're working on is that can feed into the dominant part of the market right now for batteries.

I just wanted to reset really quickly there. And then in the second part, in terms of working towards your first commercial plant, it's an interesting moment in time because you've had the Inflation Reduction Act, which is a game changer for storage as well as renewables and a lot of things. But for storage in particular, it's a game changer, and we've seen a lot of activity in the sector, for instance, with people just say, "Okay, well, I need to build a battery factory. I'm going to locate here in the United States." A question occurred to me, as you guys think about what you're going to do, how much does it influence where other players in the battery sector they might be setting up their factory? In other words, they're going to be downstream from you, I would think. So I wonder if you could speak to that for a second.

Saad Dara:

Yeah, absolutely. The first part of your comment, absolutely, lithium-ion batteries are going to be the dominant battery for the foreseeable future, especially for mobility or anything that's transport or requires movement. Batteries need to be light for that application, and that's where lithium fits in really well. Whether that should be used for stationary applications where likeness is not important, we can have a separate conversation about that. The Inflation Reduction Act has made some real inroads in creating opportunities within North America for that. There are a couple of really important parts of it, in that there are now incentives for creating a domestically sourced EV. Essentially what that means is some materials that go into the batteries, materials that go into making the anodes and cathodes have some sort of domestic production and those enable tax credits to be acquired for different people. And that's really important, but I think we can take another step back to understand what's actually happening within the lithium space and more importantly, the clean energy transition.

So if you think about, we are talking about the clean energy transition, that is completely dependent on critical minerals. Lithium is one of them. In my opinion, maybe one of the most important, but it also includes cobalt and nickel and copper, and silicon. Any of the energy transition technologies, wind, solar, EVs, rely on those minerals much more than fossil fuel-based energy sources or internal combustion engine vehicles. Unfortunately, most of that

supply chain is currently in China. They have dominated that market for various reasons, including they invested ahead of everyone and maybe environmental standards are not as stringent, several different reasons. But we're getting to a point that it's a big geopolitical risk for the clean energy transition if we are completely dependent on external supply chains for this, and so lithium fits within that.

We are talking about China dominating about 80% of the downstream processing, refining lithium space. So if the IRA is trying to encourage EV manufacturing in North America or in the United States and you're making your cars here and you are making your anodes and cathodes here and you're making your batteries here, but all of your product for the raw materials that go into it is coming from China, then you haven't really done anything, you still got that bottleneck. That's what Mangrove is looking to play into. Where we locate with respect to the commercial plant is really dependent on the customers and partners we work with. We think that a few hubs are going to develop in the lithium battery space.

Bill Derasmo:

You could see the picture start to change already, because as we've said, in my experience, I've seen the activity now among the battery manufacturers, they're all trying to locate batteries in the United States. You've seen Form Energy announced they're going into West Virginia. You have Kontrolmatik and Pomega, their affiliate, and we work some with those guys, they're going to locate in South Carolina. Those are just two examples that I'm familiar with, I know there are many others. But that's interesting, now you see the battery manufacturing, the factory sector, there's real movement. Those factories are going to start popping up in the United States, and then you've got where you are that would feed into that presumably, and you're talking about locating here in the United States. You can kind of see how it might take a little bit of time, but things are moving fairly quickly so far, and you could see how changes in laws has consequences, and so the IRA is having a big consequence and it's reassuring, if you will, it seems like the battery sector here in the United States. It's an interesting thing to watch.

Now, we've talked a lot about business. We talked some about engineering and chemistry. You've said that more recently you've been able to focus on the business side. So what are some of the challenges in that regard? Are you talking about challenges on the commercial side or challenges on the finance side, or is it everything?

Saad Dara:

Yeah. Business side, so commercial discussions are always... there's a big legal component to it. I'm not a lawyer, so we get some very good advice from people like yourself maybe. The business model that Mangrove is bringing forward is slightly different, and so how we set up on a customer site or how we set up with a facility needs some thinking. So we work through that with our partners. We don't necessarily see them as customers that we're working with, but rather we see it as a problem-solving exercise that we're working with them on.

And so some of the challenges associated with that are obvious, if you're on a customer site, who has responsibility for certain things. If Mangrove is operating the plant or the customer is operating the plant and we are taking feedstock from them, providing product back to them all on the same site, how do you divide up where Mangrove ends, where the customer begins, or where customer ends, where Mangrove begins. A lot of those things require some thought into

it, and then that goes into not just the legal side but also the technical, commercial, insurance, business, building permitting, all of those things that come into that.

Funding, if you're in a startup, it's always something that you're keeping a close eye on. But we have very good investors. So Mangrove is backed by Breakthrough Energy Ventures, is founded by Bill Gates, BDC Capital, which is Government of Canada's entrepreneur bank, as well as BMW i Ventures. So we feel good about where we are, that as long as we keep executing, we'll have finances to work on it.

Bill Derasmo:

Those are certainly some big names in finance for sure, that's good to hear. When you were talking about the commercial side, I was definitely getting excited because those are the types of issues that we can help with. Yeah, and you went right to it. Those are legal intensive, and when you talk about where does Mangrove end and the customer begin, those can be interesting issues to try to sort out. It's interesting to hear how heavily involved you probably are in those areas.

Saad Dara:

Yeah, absolutely. And there's a business component, then there's the engineering and technical component, and all of that needs to be translated into a contract that's legal language that anybody could understand and hence describes the responsibilities and how we're going to work with each other. That part requires some very good thinking and words become very important there.

Bill Derasmo:

Oh, yes.

Saad Dara:

We all work on good intentions and good faith, but translating those into words for engineers like me is sometimes quite a big challenge.

Bill Derasmo:

Sure. And just having done this for a while, you're right, a lot of times relationships start off, everybody has good intentions, everybody has a common understanding in their head or just around the table. It's like, all right, well, we all know what this means. But these agreements are long-lived agreements, and what happens is, 10 years from now, something's going to happen that none of us can envision and then you got to go back to that contract that was signed in March of 2023 or whatever it was, and say, oh man, we didn't really contemplate this, did we? Well, but section 7.3, subsection A, sort of contemplate. You get into all those things because we're not clairvoyant and we just don't see it to the future, unfortunately, and so we can't predict what might happen. But that's the challenge for the lawyers and the engineers working together to try to account for as much of that as possible.

And my colleagues would probably tell me, and if you can't account for it, at least build into the contract, maybe a process to work it out. So like a management council under the contract or something like that that can resolve disputes. And sometimes I see contracts that don't have

any of that and you're just like, oh boy, it's going to be a challenge. But let me ask you this, as a CEO of the company, and I know this is a snapshot in time, what do you find yourself spending the most time on sort of on a daily basis? What does your daily day look like as you go forward?

Saad Dara:

Mostly being on podcasts, Bill. No, I'm just being facetious. I do spend a lot of time on calls. As the company has grown, over the last year and a half, we've gone from four people to almost 30, and we'll be 40 soon. So now my time has changed much more and I find myself a lot more not being able to do work or think unnecessarily in terms of the actual activities, but rather working with each of the department heads on each of the areas. Which is good, but it's also something that's different.

I spend a lot of time speaking with investors, spend a lot of time working with my main leaders in my team to figure out where we are going and what the issues are. I think people management has changed, where I used to be able to know exactly what donut everybody wants to now saying like, "Okay, well, we'll just have three dozen of whatever, and we'll figure out from there." So that's changed, I just don't have as many touchpoints. People management has changed in some of these ways. But it's good, we've gotten to a point where I've been very fortunate with the team that we have, so full trust in them not to do things. I definitely don't feel that I'm a bottleneck in the company anymore. Entrepreneurs, they have to find this delicate balance between becoming a bottleneck for the company as the company grows and becoming detached from the company as the company grows. So you're kind of trying to find a balance between that. I'm really enjoying it.

Bill Derasmo:

Well, that sounds great. That balance part that you just mentioned, I've observed from the outside council role that obviously we're all human, we all have our own style and everything, but it does seem like a challenge to find that right balance because I've seen some CEOs of either startup companies or young companies anyway, that feel the need to get involved in every single decision, and then I've seen the opposite end of the spectrum, whether it's sort of hands off, I'm going to delegate. And it's got to be a tough thing, especially when it's your baby, when it's your company. Obviously, you have investors that have come in, but you are one of the founders, it's your baby, and you got to try to let go to some extent, but at the same time, I'm sure you really have a desire to stay involved in all of the important decisions that happen. That's a challenge, I'm sure for you, but it's a challenge I guess, that any young company faces.

Saad Dara:

Yeah. And I think these are growing pains, right? So as you grow, there's always different problems that are going to come up. I would rather have this problem than not be growing. So the alternative is not at all exciting, this is exciting, this is progress.

Bill Derasmo:

Well, it has to be a great feeling to have created jobs, for instance, and also to be contributing to what the next generation of energy looks like. Those are all positive things, and that has to be a good feeling. Maybe that's scary sometimes because you've created these jobs, and I'm sure you feel a responsibility. But it's a positive thing and that's what entrepreneurship is all about, right? I just wanted to put that out there. I think we're already coming up on or close to the end of our time, but I wanted to let you if you have any sort of closing thoughts or anything else you want to say about Mangrove, where people can find out more about your company, why don't I hand the mic to you.

Saad Dara:

You can find out more about us on mangrovelithium.com. You can also connect with me on LinkedIn, or you can follow our Twitter or LinkedIn feeds. We continue to talk about the lithium supply chain on there. We don't really try to make it about Mangrove. We do try and talk about how Mangrove is important within the context but we try and cover a good educational review of the lithium supply chain and what's happening. So if you're interested in the lithium market, lithium segment, what's happening on a geopolitical level, good articles in that area. We continue to try and put some material out there. Feel free to reach out on LinkedIn. I can't promise I'll be responsive, but I will try my best.

Bill Derasmo:

There you go, audience. You can find out more about the lithium supply chain. You can find out more about Mangrove Lithium. Appreciate that very much. Dr. Saad Dara, everyone. Thank you for giving us half hour today out of your busy schedule. I know there's a lot going on as you try to run your company. And we appreciate you being on the program.

Saad Dara:

My pleasure. Thank you so much for having me.

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