Battery + Storage Podcast, S04 Ep02, The New Generation of Batteries With Kunal Phalpher, Li-Metal Corporation
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Host: Bill Derasmo
Guest: Kunal Phalpher, President, Li-Metal Corporation

Bill Derasmo:

Hello, welcome back to the Troutman Pepper *Battery + Storage Podcast*. Today, my guest on the program will be Kunal Phalpher with Li-Metal Corporation. Kunal joined Li-Metal in 2022 as president. Welcome, Kunal.

Kunal Phalpher:

Thanks for having me.

Bill Derasmo:

It's nice to have you on the program. You've got an interesting career story, and certainly, your company is in an interesting space with the lithium-ion next generation battery development. Why don't you tell us a little bit about your career journey? I know you started out in the renewable space and now you're with next generation batteries. Appreciate it if you could just walk through how you went from where you started to where you are now.

Kunal Phalpher:

I spent about the last 15 years in, let's say, clean tech as an umbrella term, and as William was saying began more on clean energy, so I was doing some stuff in solar and wind, and I was actually living in Germany for about five years. Naturally, as those two technologies started to come onto the top of ground energy storage and batteries became more prevalent. I latched onto that and transitioned to talk more, and think more, about batteries on a day-to-day basis.

Worked for a battery company for some time, here in Canada, and then eventually joined, in various capacities, from board member then to executive at Li-Cycle, which started about six years ago as a lithium-ion battery recycler. At that time, lithium-ion batteries were just entering the market in various forms from energy storage to EVs. I helped scale that company over the last years from a startup to really a growth company that's now public and operational assets.

Then, last year's opportunity came to look at just like I looked at recycling as a "What's next?" question. Li-Metal, which has been working on some cool technologies for three – four years, and now looking at scaling up towards commercial scale with new anode technologies. I had the opportunity to come over as the president and help with various functions, including my core expertise in more strategy, business development, and work towards building out Li-Metal as a player in the new generation anode space.

Bill Derasmo:

Well, it's probably a good segue into Li-Metal's battery chemistry, or makeup, if you will: this lithium metal anode. If you could talk about that for a minute, and we could maybe geek out on the engineering, and how that differentiates your battery, and why you call it a next generation battery.

Kunal Phalpher:

What we see in the market today is all really focused on lithium-ion. It comes into different few flavors and is what's powering today's EVs, or energy storage batteries. All the gigafactories we hear about are scaling up and one common theme within those batteries is they all have graphite on the anode side, that's one side of the batteries. It's graphite and copper fairly consistently across those batteries. What we're seeing is that a lot of work has been done on the cathode side — change chemistries, improve performance — but really in the next cycle of battery technologies, whether it's solid state or lithium sulfur, or something in between, the work is really on changing out that anode side and using different materials to improve performance, safety capacity of the batteries.

Li-Metal was founded about four years ago, seeing that a lot of those new anode technologies require lithium in the form of metal. And there's a real gap in the market — in terms of production of lithium metal, particularly, in the western world in North America, Europe — to satisfy that eventual demand. There are other uses for metal in aerospace and primary batteries are your little coin cells that aren't rechargeable, so an existing market as well.

In developing that lithium metal technology, understood that the groups really looking at these New Age batteries, or focused on the whole battery construction, but they do have trouble building the anodes themselves. Then, the company started to look into how do we improve the process and technology to produce anode, which is basically plating. For example, the lithium onto copper or other metals. That's how we entered and started to develop that technology. One's more raw material processing, transitioning less chemicals into metal, and two is, then, to build really a component for the battery and all geared towards this next cycle of battery technologies.

Bill Derasmo:

Explain to our audience what's the significance of that is. You were saying there was a tremendous amount of focus on the cathode side and a lot happened on the cathode side. What's the significance, now, with what's happening and what your company's doing on the anode side? For the uninitiated maybe, I think I know what you're talking about, and I think probably a lot of people who are listening, but maybe some people won't know just the basics of anode, cathode, separator. Just maybe walk through some of that, if you will.

Kunal Phalpher:

You're really testing my limits on chemistry, but very simply, cathode is your positive side and anode is your negative side. Just like when you see on your AA Duracell or Energizer battery; the little positive, negative. Cathodes today are typically made with nickel, manganese, cobalt, also the iron phosphate, but they all are lithium containing. As I was saying before, the anode is just a very simple graphite pasted on copper. You don't want those two pieces touching, because that creates a short circuit and blow up. The separator, as you pointed out, is a piece of, basically, polymer or sometimes ceramic, or ceramic coated polymer that keeps those two separate.

Basically, your lithium is transporting itself from the positive to negative side to create the electricity. Now, by taking that graphite out and you're actually putting lithium on the negative side, you're creating a larger mount lithium in the battery, which means you can have more per area, more energy transported. That's the real benefit is that you could basically make the same capacity battery half the size, or half the weight potentially, or just make a smaller battery now for vehicles, and get the same amount of range.

It also unlocks new technologies, like lithium sulfur. I mentioned cathodes, nickel, manganese, cobalt. There are groups looking at using a sulfur base, which actually, then, makes the battery even cheaper. If that technology is to work and scale, it's a significant shift in how we make batteries through all these applications.

Bill Derasmo:

When we talk about energy density, then, that's what this is getting into. For the EV side of things, this is a critical development?

Kunal Phalpher:

Yeah. There's two ways to look at it, which I alluded to. One is the talk on EV's, which has died down, is about this range anxiety. Is there enough range? If you get into a 300-mile or 500-kilometer range, do you really need the thousand-kilometer? That's a debate. This technology would either say, "Okay, in the same space in the vehicle, I can now get closer to the thousand-kilometer range," or you can take the opinion to make batteries and EVs more accessible. Now, it can make the battery half the size. Yes, you're using more lithium, but you're also reducing, in parallel, your nickel and cobalt. Interior over time, you could potentially reduce the cost of the battery by making a denser battery, because your material usage is less.

Bill Derasmo:

What effect does that have on the weight for the vehicle?

Kunal Phalpher:

If you went with the same range, but smaller battery, you can reduce the weight of the car. If you have the same performance battery on a lower weight car, then your car is even faster now, too.

Bill Derasmo:

No, it's interesting. Sounds like you guys have found a niche, and another way to come at this problem, of range, energy density, weight, all positive developments on the EV side. That's the part of your background that talks about applied science and electrical engineering. Now, let's talk about your other part of your background, the masters of business administration. Where are you on the business side of this, in terms of forming partnerships and scaling up this idea?

Kunal Phalpher:

I'll talk about the anode side. That's one component into new technology batteries that are being formed by other companies. I would say the next generation battery companies, they've looked at say a cell as a whole, the plate around different components, like different electrolytes and cell designs.

They're all in a growth startup phase. They're trying to achieve first deliveries, or samples, to their customers. The automotive OEMs were just starting to put cars on the road with lithium-ion batteries.

You are some years away from these batteries getting on the road, but on the road doesn't mean you're a commercial business, because there's so many steps to get to that point. You can start in the phases of qualifying and testing, start to deliver a significant amount of material ahead of that, in order to get it into the vehicle and approved for, say, road worthiness.

Most of the customers, or potential customers, are startups or early stage, or even if it's a larger company, it's an early-stage technology. That piece will take time to scale lockstep with our customers, who are dependent on their customers. We're two steps away from the OEM, and that's similar in the primary goal for a lot of them is to get into electric vehicles. I think some of them have a focus, or a secondary focus, on electric, which I would say I would read about before I started this job. Obviously, I tried to dive a little bit deeper, because the ability to reduce the weight of the battery and have different performance characteristics, lithium mineral anodes really help enable that for aviation applications.

I guess there's two aviation applications. One is hybrid electric for short haul flying. One is EV tall, which is, again, split into two. There's helicopter replacements. We've seen Archer announce this route from, I think, Newark to New York City that's a helicopter replacement. Maybe that's a little bit more feasible in near term than autonomous taxis, like Ubers in the sky, which is a little bit more down the road. There's a lot of potential, and avenues, and enablers there, but it's uncertain timeline, I would say, that has various dependencies for the EV business.

Bill Derasmo:

What do you see as your next steps, now that you've got the idea established? Where are you going in the business world with this?

Kunal Phalpher:

Both the metal production and the anode production, we're working at different stages of demonstration. The anode business, we're already sampling material to customers. We're working closely with them on their ramp up time, on their demand for the material, and how that fits into our ramp. The metal side, we're working still on moving that into a demonstration scale, where we would then also have a different subset of customers.

We can either feed our own needs with metal, but there's other demand for metal that we could actually more quickly, I would say, and more certain timeline scale that to a commercial business in the next couple years, where we're selling metal, whether that's two batteries or not. Otherwise, in North America and Europe, you're importing metal from China. Localized demand, or localized production, is advantageous for security of supply chain reasons.

Bill Derasmo:

Certainly, with the passage of the IRA, the Inflation Reduction Act, that is a concern that's front and center now, too, in terms of North American supply chain. I think that's an issue where you guys are well positioned, it would seem. I don't know if you had any thoughts about that. Certainly, directionally that puts some wind at your back, I would say.

Kunal Phalpher:

I think even before the IRA having been in the industry and talking to OEMs the last two, three, four years, everyone was looking to have a more... If you look at their existing parts supply around a car factory, they're all within a certain range. The battery and the battery cell shouldn't be any different. Then, the question becomes where the material's — the lithium, or nickel, or cobalt's — coming from. The IRA helps accelerate that. Europe has its own battery directive. You also have the intercountry agreements with U.S. MCA, so you're really trying to have that secure supply chain to be able to build your vehicles and deliver the vehicles.

Right now, it's hard to get any type of vehicle new for a few months. I think companies are aware of that and trying to help make sure that, in this industry, you have that ability. Obviously, people are keen on having the metal produced in North America for these types of batteries. Then, the next question is, "Okay, where will the lithium carbonate come from?" Right now, there aren't major sources yet, but with all the investment that's been going on in the last one to two years, eventually you've able to also get the lithium sourced within the region and have a completely North American supply chain, for example.

Bill Derasmo:

I think there's a lot of policy makers who are focused on that right now. As I said, with the IRA passage, it puts wind at your back in that regard. In terms of also financing, I think the Inflation Reduction Act creates options and advantages, maybe some tax advantages. I don't know if you guys have done a lot of thinking about that, but that's certainly an area for future consideration or future discussion. Then, beyond those issues, in terms of business development, business relationships, where do you see the partnerships forming? Is it with the OEMs or is it with other battery manufacturers?

Kunal Phalpher:

Right now, we're talking to all of them — the OEMs and the battery makers. From my previous experience, the car companies were taking a more active role in say their lithium, nickel, cobalt supply chains, and security of supply. I don't think that can be ignored that we need to make sure that we're talking to the OEMs. Most of the technology development of these new batteries is going on outside of the OEMs, so we need to also be plugged in there.

I think, over time, we'll see how that develops, because a lot of the new generation battery companies are also funded or have investments from some of the major autos. We know also some of the auto companies are also developing, in-house, some battery technologies. It's an all of the above scenario to pay attention to all of it, and see where the actual demand comes from, as not every new technology being scaled is going to pan out. We have to see which are the ones that will eventually grow.

Bill Derasmo:

With your Canadian background, do you envision centering on the Canadian market, the American market, or internationally? Just talk for a second about your Canadian background and if that has any impact on where you guys are focusing your attention.

Kunal Phalpher:

We're headquartered here in Canada. There's a lot of metals and mining expertise. Particularly, on metal production, the skillset, the engineering, the workforce you need is easily found here in Canada. Everyone talks about the IRA, but I'm constantly in touch with people from the federal government in different workshops to help establish the battery supply chain. We've seen all the cathode active material companies actually have come to Canada to set up shops.

There are definitely opportunities for us to build out some of our capacity here to serve the North American market. More on the metal side, I would say the anode business, as I said, it's really the front end is the first step in battery production, and likely even with our technology would be inside a battery plant at the customer side. We're a bit dependent on them there.

Bill Derasmo:

Interesting. Yeah, there's a tremendous amount of activity right now in the United States, in terms of battery factories. A lot of clients have expressed interest in that. If you just watch the news, there's a lot of companies who are looking to set up shop, in terms of battery production here in the states, and then you've got the various states fighting over where those factories are going to be located. There's just a tremendous amount of activity in the space right now. You guys have a component within the overall battery chain. Curious as to where you think that you'll set up shop producing your components.

Kunal Phalpher:

I would separate, again, metal versus anode metal. The two key inputs are carbonated and electricity. If it's close to carbonate supply, or cheap electricity, those are guiding factors. You could ship it around North America, wherever. Again, the anode side would be customer dependent. Are there five customers in a certain state where we could build one plant and serve them all? Is there one customer that's important in different state and we just build something in-house for them? I'm sure our customers are being contacted, and I've been in that situation, where all the state economic development groups are calling you to say, "Come to our state." Similarly, metal, I think particularly in Canada, that is also an opportunity to build it here potentially. There's no restriction in that sense.

Bill Derasmo:

This has been an interesting discussion. Why don't we just take a second here, if people want to learn more about your company, where do you suggest they look? Things like that. I think it's an exciting initiative that you're working on and you've certainly carved out an interesting spot in the supply chain. Why don't I give you the floor here to let people know how they can find out more about your company and yourself?

Kunal Phalpher:

Our website, li-metal.com, has general information, updated corporate presentation, and also, we are always posting on LinkedIn any new updates, et cetera. You can follow LinkedIn, the company or myself, and you'll get all the news that we're putting out and know what's up-to-date.

Bill Derasmo:

We appreciate you being on the program. It's been an interesting discussion, and maybe we'll have you on again a little later, once things develop a little bit more. How's that sound?

Kunal Phalpher:

Love to be back and pleasure chatting with you today.

Bill Derasmo:
Absolutely. Thanks, everyone.