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UBS Global Energy Transition Call with Carbon Revolution
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Jon Windham:

Perfect. Thanks Zoltan and welcome everybody to the latest installment of the UBS Energy Transition Call Series. This is your regular host, Jon Windham. I head up Alternative Energy and Environmental Services here at UBS. And in this call series, which we've been running since 2018, done about 350 calls, we try to connect energy experts and innovative companies that are in some way enabling or driving the energy transition with UBS institutional investors, and maybe here on a sort of midday on a Friday after a crazy week, not a bad time to step away maybe and think about companies rather than just watching credit default swaps.

So, I really appreciate everyone being here today. Today, we're going to talk carbon fiber wheels with Carbon Revolution. This is a little bit of background. The company's founded in 2007. Carbon Revolution is a global technology company and tier one auto OEM supplier, which has successfully commercialized the supply of lightweight carbon fiber wheels.

Just as a little bit of background, on November 30th of 2022, Carbon Revolution announced a definitive business combination agreement with Twin Ridge Capital Acquisition Corp, ticker TRCA. And I believe the transaction is expected to close in the first half of this year.

On the call, we've very happy to have with us from Carbon Revolution, Jake Dingle, who's CEO, as well as Gerard Buckle, the CFO. In addition, happy to have with us from Twin Ridge Capital Acquisition Corp, Sanjay Morey, who's the Co-CEO of that company.

Before I hand it over to Jake for some opening comments, just a few logistics. There were some slides circulated relative to this call about 20 minutes ago. Do have a look at that. I think it's going to be more of a freeform sort of a Q and A today, but do have an eye out for that. They're really informative on the background of the company.

And the second is, later in the call, Zoltan will provide you with instructions on how you can ask any questions if you like. I know many of you prefer to email me questions. Do feel free to do that and will I ask them anonymously as time permits. You've found your way here. I'm sure you have my email, but it's jon.windham@ubs.com.

Alrighty. With that, why don't I bring Jake on. Jake, thank you so much for being here today. I'll let you sort of open up with maybe a quick introduction to Carbon Revolution and then we'll take the conversation from there. Really appreciate you here sharing your story.

Jake Dingle:

Yeah, great. Thanks Jon. And thanks for the opportunity. Carbon Revolution started, as you said, founded over 10 years ago now with a team of pretty talented engineers, guys with backgrounds in automotive technologies and composite materials. And by combining those skills, we've set about trying to significantly improve the efficiency and performance of vehicles by really dramatically reducing the weight where it matters most.

So, rotating unsprung mass, which sits below the suspension, is considered to be the most important mass on a vehicle, and wheels are the most important piece of that mass. So, very important place to reduce weight on a vehicle because it's so dynamic. Weight that's taken from there has a transformative effect really, whereas static weight taken from other parts of the vehicle just doesn't.

So, like a lot of other automotive technologies that are now considered quite mainstream, our technology and the market entry point has been in the high performance vehicle market. You can see that on things like the recent Z06 Corvette, which uses the efficiency it gets from our wheel technology to dramatically improve performance.

In fact, General Motors stated that with the 41 pounds of rotating unsprung mass that we reduce on the vehicle, they've been able to reduce the lap times of that vehicle by about two seconds on a two-minute lap, which is really quite a massive difference. But that's the use of efficiency for performance. Really a big part of our future is the use of that efficiency for economy and for range extension.

I guess in introducing the company, not only were we ultimately successful in solving all the challenges involved with engineering with all the complexities of carbon fiber wheels, but concurrently we engineered all of the complex, apart from the product elements, we engineered them concurrently with all of our own invented manufacturing processes to enable us to fully automate and scale up, not just produce wheels at a niche scale, but to scale up and produce at a high volume. And that's really the stage we're at, at the moment.

It was always the intention to be a scale producer and to be a disruptive technology rather than a niche technology. And I guess that's great context for why we are doing this merger with Twin Ridge and scaling up and re-listing in the US market really where a big part of our demand is coming from, for the future, particularly driven by the EV market.

Jon Windham:

Perfect. Thanks Jake. With that, why don't we bring, maybe just to start off putting Sanjay into the conversation, I'd be really interested in your perspective on what attracted Twin Ridge to Carbon Revolution?

Sanjay Morey:

Thanks. Thanks a lot. So, I'd say it was really kind of three critical attributes that we were focused on, and the first being trying to find a business that was selling to a large target market with significant macro tailwinds, which this company obviously does, particularly given all the trends happening in electric vehicles.

The second was companies having a sustainable competitive advantage with leading market positions. And there's no real competitor to this business at all, which we find very attractive. And finally, businesses with established customer relationships and with contracted volume. And so this company has very high visibility into its revenues for the next few years. And so that certainly increased our confidence level regarding the company's ability to achieve its projected results, which is just so important for a public company.

And so Carbon Revolution exhibits every one of these attributes in spades. And so we found that very, very attractive. And we thought on top of that the company would benefit greatly from having access to the deep and liquid capital markets in the United States. So, we're thrilled to be partnering with this business.

Jon Windham:

Great, thanks. Maybe start here at a high level, Jake, just sort of understand the opportunity here. Can you talk a little bit about how the electrification of vehicles plays into your product? How important is the conversion of EVs for lighter weight wheels? Can you just talk a little bit about that, that'd be helpful?

Jake Dingle:

Yeah, absolutely. So, obviously there's a very significant and rapid shift over to EVs and a disproportionate amount of our new business is coming from that segment as all of the major global OEMs shift across. So, as I said, while we found our first market entry in the performance end, it's really a transition into the EV market that that's going to drive our growth into the future.

Penetration of EVs is expected to be well over 20% by the end of this decade. And in certain markets it'll be even higher than that again. In fact, we recently reached the final sort of formal award stage for our first EV program, which is for a significant North American electric SUV. We've got more of those in the pipeline coming through the formal award.

So, really what's driving that is there's obviously a significant weight reduction driven by our wheels. So, on some of these larger vehicles, we're able to save up to or over a hundred pounds of weight, and that's an astronomical amount of weight to take out of the vehicle. It can increase range by between five and up to 10% if it's fully integrated. The range extension, obviously in a world where range is a really important currency for all the OEMs transitioning to EVs and things like range anxiety, consumers are driving a lot of the decision making.

Lightweight wheels are a bolt-on technology that does not require significant investment, certainly not investment in the production lines and those sort of things to apply it. And those sort of weight reductions are very significant, offset the kinds of massive weight increases that we are seeing in EVs due to battery size and battery mass.

So, as I said, over a hundred pounds of weight save, wheels are getting larger and larger and have been for at least the last three decades. And as these vehicles, particularly some of the large SUVs and pickup trucks are coming to market with wheels coming in the sort of 22, 23, 24 inch ranges, they're getting very, very difficult to engineer in aluminum just because of the pure weight and some of the structural challenges that that's causing.

So, quite apart from range, there are structural issues with using conventional technology to reach these levels, particularly as the vehicles are getting heavier and heavier. And that's also creating regulatory problems with weight classes and actually achieving the targeted weight class for a vehicle, which can create problems with CAFE credits and meeting CAFE regulations as well.

So, weight is the fundamental driver of adoption of our technology in the EV space because it is such a large, such a steep change in weight, 40 to 50% weight reduction, delivering that five to 10% range improvement, which is always our target. We work very, very closely with the engineering teams and the program teams at the OEMs to make sure we can optimize that massive weight save and get the best out of it for the vehicles.

One of the things that's interesting as well is that it's beyond weight, beyond just the pure weight save of the material, we can provide aerodynamic structures at a very efficient weight, where aluminum particularly isn't able to do that. So, aerodynamics are a key part of range at high speed, whereas weight and inertia are very relevant to acceleration and deceleration.

So, on top of just pure weight, we can provide efficient aerodynamics, which further increases range. And then interestingly, carbon fiber composites are quite a, they're a very quiet material, a very dense material. So, the transmission of road noise through a carbon fiber composite wheel is much less than it is through a metal wheel, particularly aluminum or steel tend to transmit noise.

And three of these where there's no engine under the hood, the transmission of road noise into the vehicle is a very significant factor that OEMs are grappling with, the car makers are grappling with. They're putting sound bending materials into tires and increasing the amounts that already exist in the body structures in order to try and attenuate or reduce noise. So, it's actually a hidden knock-on benefit that enables further weight and further cost to be reduced by applying this technology.

So, there's a number of important factors, and the relatively low investment required or very low investment required to apply our wheels as a bolt-on technology is a very attractive way, which compares very favorably to other weight saving measures, like removing a seventh seat, which have a massive negative impact on what the consumer experiences with the car or with the vehicle and the attributes of it.

So, these are the tailwinds that we're seeing, we are seeing a value parity equation where our customers understand that, in the same way they did with aluminum versus steel and have done for decades now, aluminum wheels are probably about three or more than three times more expensive than steel wheels, that the world has transitioned over a few decades very much to aluminum. And we see exactly the same thematic with carbon fiber, which is dramatically lighter than aluminum again.

So, we see that as being a value parity equation that is very favorable for the car makers just because of all the attributes I talked about and their ability to solve problems, particularly as they transition to EVs.

Jon Windham:

Got it. And when we think about your volume today between traditionalized and EVs, any sort of general idea of what that split is and how you think that evolves over time?

Jake Dingle:

Yeah, so we are seeing a disproportionate number of our new programs coming from EVs, as you would expect, and they're getting larger. So, coming out of obviously our customer base that are publicly announced, including Ford and Ferrari, General Motors and Renault. The programs that are already in the public domain are largely all performance and sports vehicles.

Shortly in the next couple of months you'll see a launch of our first SUV program, a prominent SUV program that will come to market, and then the majority of the programs that are coming up to that are EVs, as you would expect. And they're moving into more and more of the SUV pickup truck range. So, larger vehicles and bigger platforms, frankly, larger volume overall. Whilst we will still be at the premium end of those platforms for some time, there are much bigger wedges of the market that we are addressing with our technology.

And so of the market of well over 400 million wheels a year that are put on new cars each year, so around about just below a hundred million new vehicles are produced each year, the immediately addressable segment of that that we see is about 10%. So, about 40 million or just north of 40 million wheels a year, at the moment. And as I said, by the end of this decade, 20% of those are expected to be EVs. And in the markets that we are participating in, we expect that proportion to be even higher. But we are displacing aluminum in both ICE and EV.

But as you can see, the market's really transitioning very quickly to EVs now. And fortunately for us, the advantages that we offered to vehicles prior to the EV replacement cycle that's going on at the moment has now been really accentuated and increased for EVs. We offer even greater benefits for EVs.

Jon Windham:

Yeah. And sort of makes sense that it's a product for the time, right? Reducing weight because the battery weighs so much and range anxiety being a pretty significant hurdle for consumers to adapt to. Anything that gets a higher range on the automobile has more demand for it, so makes sense.

Maybe if we could sort of level set a little bit and just understand, it's basically competing with aluminum, traditional wheels. Can you talk a little bit about the differences? Is it a more complex manufacturing process? What does the bill of materials look like? What's the ultimate ASP difference between them today and maybe where you think you can get to as you ramp up?

Jake Dingle:

Absolutely. So the manufacturing process is more complex than aluminum wheels and this probably reflects why we are as far ahead of anybody else that's trying to do this as we are, which is probably in the order of five to 10 years, given the scale that we've achieved now.

So we've put probably close to 70,000 wheels on the road, through these major customers, up to this point, which is obviously very, very small proportion of the overall global wheel market. But the complexity of the material itself, the sophistication that's required to work with that material and solve all the challenges required for a complex structure like a wheel, which has to deal with impact, has to deal with fatigue, and it has to be aesthetically within the requirements that the studios, the demand of the studios with the OEMs, it's a non-trivial exercise to design a structure as complex as this from a material that's as complex and sophisticated as carbon fiber. And then turning the design of the product into a series of processes that come together to complete the wheel, and at a level of quality that can be controlled, is also extremely challenging and complex.

And so I think if you look at the number of steps in our process compared to a traditional metal wheel, either of steel or aluminum, you would see that there are more steps. It's more complex, probably more like looking at a powertrain plant or a general assembly line than looking at a more simple component plant or component manufacturing operation. But we've set out from the beginning to ensure that all of our processes can be automated and fully industrialized. And that's really where we're at at the moment. That's the stage we're at now, is scaling these up to automation and efficiencies.

And then that's what enables us to be able to provide the product at a price. And you asked about the sort of ASP and what the value proposition is for customers. We're able to sell the product at a price that is attractive. And obviously, we've achieved what I'd call a clearing price for the technology into the performance segment, which is still at a significant premium to aluminum.

As we scale up and perfect the industrialized level of manufacturing that we now have, and we're producing from our first Mega-line, what we call a Mega-line, which is a level of the highest level of industrialization that we've achieved in our technology. Which really means taking all of the discreet manufacturing processes that we've invented, over the past more than a decade. In order to create each of these steps, we're now linking them all together with state-of-the-art transport and conveyor systems, with a digital backbone, in order to remove a lot of the non-value adding and inefficient labor, and to automate in between the processes rather than just the processes themselves, and to run the factory in a digital fashion that enables us to be as efficient as possible.

And that unit of production, the first Mega-line that we're now commissioning and producing wheels from here in Australia, and we'll be scaling up through the course of this year and the years to come, becomes the template. This is really becomes the pilot plant that is a template for us to be able to then expand ultimately offshore in locations that are more strategically appropriate for higher volume programs to our major OEM customers, where we can take advantage of location to reduce logistics costs, lower labor costs where there's still labor in the process, and shorter supply chain and raw material costs and higher volumes.

And that will really drive the cost of this product to a point where it will be truly disruptive. So we've done the challenging invention stage on both the product and the processes. Here in Australia, we're now commissioning our first really large scale unit of industrial production in order to then be able to duplicate that in locations that make sense over the coming years.

Jon Windham:

Got it. I have a couple of questions. One's very basic, and excuse me for the basic question, but me, along with a lot of people here to learn, what are the inputs to carbon fiber? Like your bill of materials, what are the actual materials that go into it? And how readily available are they? Are they mostly commodity? Just some basics on carbon fiber would probably be helpful for a lot of people. Thank you.

Jake Dingle:

Sure, sure. So the wheel itself, the bill of materials for the wheel is carbon fiber, a resin system, which is a two-part structural resin, which is what forms a composite structure. So the carbon fiber and the resin come together and cure to form the one piece structure. And then there are some aluminum components that finish the wheel off, particularly around the way it bolts to the hub of the vehicle.

And in addition to that, all wheels, whether they're aluminum or carbon fiber or steel even, are all painted. So there is some paint that goes on the surface as well. And for our high performance wheels, that have to deal with the extremes of brake temperatures, we have an aerospace type of thermal barrier coating, which is actually a plasma applied aluminum and ceramic coating that goes over the wheels.

But the majority of the inputs really relate to the carbon fiber itself and to the resin. The most expensive part of that and the most significant is the carbon fiber itself. Carbon fiber is produced from a number of different raw materials, the most common of which is something called acrylonitrile. And there are a number of activities going on around the world to improve the renewability of the inputs to carbon fiber.

But it's a raw material produced in a high temperature process. So a polymer that's turned into fibers and then oxidized to create carbon fiber, which is obviously an extremely strong but directional material. Each strand of carbon fiber is about a 10th the size of a human hair, but it's about 13 or 14 times stronger than aluminum. So you can understand why it's such a great material to work with, because it's so strong, but it's very challenging. Because unlike aluminum or steel, which is strong in all directions, carbon fiber is extremely strong in only one direction. So for us to turn that 13 to 14 times strength advantage into a 40 to 50% weight save, we have to be able to utilize a lot of very advanced engineering techniques and tools to deliver that outcome.

And the carbon fiber that we use, as I said, we made decisions very early on in the development of the business to ensure that we were able to automate and scale up our technology, and that included decisions with how we utilized raw material. So there are a number of, particularly aerospace applications of carbon fiber, that use forms that are pre-impregnated with resin and quite complex, difficult to handle, very, very difficult to automate, if not impossible. Whereas we have chosen to use a less processed form of the carbon fiber.

So we use dry carbon fiber. Uninfused. In some instances we use it in a fabric form. So we purchase it from suppliers that convert the fibers themselves into forms of fabric or other secondary processes. In some cases we use it directly as fiber, so it's even at a lower level of processing. And then we do the value add ourselves. So we then architect the wheel using our bespoke equipment and machinery, to create the complex architectures that come together with those fibers in a dry form and then inject the resin into it.

So the highest cost material that goes into our product is the carbon fiber itself, but we use the lowest cost or least processed form of that fiber and do the value-adding ourselves. And then in addition, obviously, to those input materials, we have the labor cost that goes into it as well, which, as we progress with our automation and industrialization, we're driving that labor input per wheel down from a time perspective all the time.

Jon Windham:

Got it. You mentioned I think 70,000 tires of production to date. Can you talk a little bit about what are the production plans in terms of annual output or however you think about it? And then that plan over the next several years? And then how much of that is expected to be fully funded post the closing of the deal?

Jake Dingle:

The cumulative volumes that we've put on the road, of wheels, is around about 70,000. Our last financial year, we reported around about 15,000 wheels of production through that year. But one of the attractive things, and I think Sanjay mentioned it early on, is that we have a lot of contracted business now, which really gives us good forward visibility of volumes and revenue.

And so, with the business that we have booked with existing customers, that's to be produced out of our Australian plant, we will get to approximately 70,000 wheels a year from this plant, possibly slightly higher than that. As you'll see from the recent presentations that we've put out, we expect, in terms of revenue over the next two years, a compound annual growth rate of about 78%. So we'll be at about 90 million of revenue through next calendar year, in that trajectory.

And that's obviously a steep growth curve. The next two years are very, very high visibility and highly booked of revenue. I think this current year, a hundred percent next year, around about 95% revenue is of actual awarded programs. And pre-award, the programs are in an engineering stage where they're virtually certain to progress to a fully nominated program.

And so, what we are seeing is we have business now that we see as being sufficient to fill the plant. There is some capital that we will spend to complete the expansion of the plant in Australia, and that's all accounted for in our plans and projections. But at some point, we will be, and we've already got some initial planning and we've had some initial planning undertaken, and we will look to expand our production offshore in the coming years. And so, we haven't stated exactly when that will be, but certainly in the dialogue we're having with customers, who have really driven us, and I guess this merger is a reflection of our customers, over the past year or two, really looking to us to demonstrate our capacity for growth and how we're going to do that. The access to capital that we will achieve by doing this merger provides us with greater certainty and the ability to give our customers comfort that we have a plan to, and we will have the balance sheet to expand.

And so, through the middle and the latter half of this decade, we expect to be adding manufacturing capacity offshore, as well as the plant in Australia. And as you can see from the volumes we're talking about here, relative to the entire global market, we're still talking very small volumes relative to that. And so, the car manufacturers are indicating aspirations to take on more and more of this technology and to drive as a much more disruptive technology, particularly as they transition to EV. So we have significant aspirations for that.

Fortunately, the growth that I've talked about in Australia, taking us up to those levels, will see us break through key profitability milestones. So the business, as a standalone in Australia, will be a profitable business and cash flow generative. And so, further capacity expansion offshore will be done off the basis of the profitable business.

Jon Windham:

That's great. Thank you, Jake. I definitely want to talk about the customer wins and where that's going in a moment. But just one more manufacturing, the production-side question. The topic over the last couple of years is obviously delays and ability to get certain things, to get the equipment on a timely fashion or the cost of those things as we're dealing with an inflationary environment, just a little bit of cost about what you're seeing and able to successfully execute on the manufacturing expansion. Thanks.

Jake Dingle:

Yeah, so we've certainly been affected with the COVID delays over the last few years, mainly the last two to three years, I should say. Mainly, that has been as a result of our customers delaying programs, and in some instances, having challenges with their own supply chains, things like semiconductor chips and other components coming out of regions where there are delays. And that certainly delayed our progress. Frustratingly, but understandably, a lot of the programs that you're seeing and we'll see come to market with our wheels over the coming period have been the subject of those delays. But now what we are seeing, you see it in our backlog, it's just in the last couple of months we've announced an expansion of our backlog or our forward order book from 335 million up to 460 million. And we expect that to keep increasing through the course of the next few months you'll see increases to that, which really reflects the fact that the automotive industry is coming back on strongly, having weathered the challenges of COVID, and in some ways, I think using it to more decisively transition over to an EV future.

So we are positioning ourselves to be able to match that growth. Fortunately for us, the lifecycle of the program with a vehicle manufacturer from award is typically a around about 18 months before it's launched. And during that time, the engineering and validation, engineering development and validation, prototyping, testing, all of those things are done prior to the start of production. And what that gives us is ample time to expand our capacity. So back to the manufacturing expansion question, within that timeframe, we have plenty of time to deal with the lead time of the equipment. Our processes have been developed to be relatively modular, which means that once the infrastructure is there, which it is now for our first Mega-line in Australia, we can then, in a fairly orderly fashion, we can add units of capacity in a modular fashion as our demand justifies it.

And we have, as I've said, very good forward visibility of demand. So it means that we can manage our capital flows and our ordering lead time and equipment specification, in advance of meeting that for start of production for these vehicle programs. And that gives us good forward visibility. It enables us to provide our customers with comfort and certainty that will have the capacity available. And then to your previous point, there is a point where the size of programs or the scale exceeds where we would expect to get to in Australia, and that's where we look to transition to potential offshore locations. But there's a lot of volume and capacity that we are able to fill in Australia first. But it's a subject of a very detailed set of plans that break it down process by process. And so we have very good visibility of the timing and the capital that that's going to require. And that's really based on known demand that's been shared with us, with our customers.

Jon Windham:

Got it. Got it. And maybe can we dive a little bit more into the backlog where it is today? I know you mentioned, I think Ford and Ferrari. What specific models are there? The project wins you've got to date, and then we'll get a little bit more to what the go-to-market strategy looks like for expanding that in a minute.

Jake Dingle:

Sure. So the backlog, you mentioned Ford and Ferrari. General Motors is the other major customer that is announced and in the public domain, and they've obviously just launched the Corvette in the last few months with our wheels on it, which has been a great success. We have multiple programs with Ford and Ferrari. I think Ford with the Dark Horse Mustang announced recently, that's the fourth program with Ford. We have multiple programs with Ferrari as well. I'm not, unfortunately, able to disclose any unannounced programs that are sitting in that backlog, but you can be assured that the size and the scale of the programs that are coming through from these and other customers that are not announced yet, they're increasing in scale, and that's creating quite a lot of leverage on the size of the backlog as programs are rewarded. And typically, these programs last for somewhere between six and eight years, which is great as well from a planning point of view.

We're specified to particular vehicle programs. So when the program teams and the engineering teams identify that the vehicle platform will have a carbon fiber wheel, they identify at what trim level or how that's going to be integrated into the vehicle, what their assumed volumes are going to be, and over what period of time. And that becomes a subject of how we contract with them for that period. And that's what gives us that good forward visibility of the volume that we're going to need to be providing for each of those, and it gives us the ability to provide a backlog number, as we have done. But the actual breakdown of it is, unfortunately, it's difficult to provide a lot of detail. And certainly when we're awarded programs, it is usually quite some months before they're actually announced. And these programs and the vehicles tend to be high profile, and the subject of major announcements by OEMs who certainly wouldn't thank us for blowing their cover and announcing things before they're ready to do so. But yeah, as I said, the size of the programs and the numbers is now increasing again post-COVID. Yeah.

Jon Windham:

It takes a long time to design and get a mass market car built. And so that gives you that... So I believe you said there was 18 months from basically awarding of the order to really start delivering, but I'm just curious on how early you get involved in the process in almost a consulting way, right? As they're designing the car, it would strikes me that you would need to be in there sort of early on, selling the attributes from it and just working on consulting on why to use these wheels today on cars that may not be available for five years. Does that sound right, where you're involved very early on this concept, or do I have that wrong?

Jake Dingle:

No, that's a great question, Jon. 18 months to two years is typical, whether it's an aluminum wheel or a carbon fiber wheel. That's really the planning horizon where enough of the vehicle design... And you're right, it's four to five years typically for a new platform. They do have mid-cycle refreshers where they add new content to refresh vehicles, but typically, that's about the right cycle time. And so wheels, they will make decisions about what wheels they feel need to be on the vehicle. And typically, that 18 months to two years that I mentioned is what you would assume is the timeframe under a normal cycle. What we do have is, and it's a great advantage actually, is that because our wheels have such an impact on the dynamics of the vehicle, we are getting involved earlier and earlier. And as you put it in almost in a consulting fashion, because this is a technology that's unique, it has a dramatic impact on the vehicle from either a performance or an efficiency point of view.

And if it's fully integrated, and I talked about a range of... It's easy to see a 5% range extension just purely on weight and mass, but getting up to 10% of range is achievable through full integration and taking all of the benefits into account, whether it's being able to tune suspension, strength, aerodynamics, and also the acoustic treatments in the vehicle and design geometries that are optimized to this material rather than designs that might have been more traditionally what you would see in aluminum.

If you put all that together, and we get involved earlier, which we are now doing, the OEM can have a better outcome. And so it's a really important difference between what we supply as a very technical product, and we are really a technical advisor in supplying that product and a problem solver, versus a more commoditized competitive product, which is aluminum wheels. It's a very competitive market, and there's a lot less differentiation between different suppliers because the material has really been optimized over the years and has got to a stage of real maturity. So it's a very good point in designing these new platforms and starting to understand the value that we can provide in terms of weight classes, solving proper structural problems and extending range. It's an advantage for the OEMs to have us involved earlier and to be in there as really part of the technical team, the extended technical team.

Jon Windham:

Thank you.

Jake Dingle:

And we do have a very intimate relationship with our customers in a way that you wouldn't expect from a normal commodity supplier of conventional wheels.

Jon Windham:

Yeah, I'm going to admit, Jake, I'm not a real car guy that gets deep into it, although I am in a Rivian order book. I should be getting my R1S here in about six months. I'm looking forward to that, very excited about that car. But one of the things, just as an observer, whatever's in your high end cars 10 years ago, whether it be like the higher end Mercedes or BMW, end up being in the RAV4 six years later, whatever features they are or performance sort of trickles down from the high end down to low end. It's a question about what's the competitive dynamic?

Because if I'm a traditional sort of wheels maker and I'm watching these higher end to high performance cars sort of transition to carbon fiber and to this ability to increase range as we go to EVs, that would concern me. So when you think about the competitive dynamic, do you think the threat here, you're competing with is other current carbon fiber names or traditional makers potentially converting over? Just how do you see the competitive dynamic? Sorry for the long question, but hopefully it gives a little context of what I'm trying to get at.

Jake Dingle:

No, it's a great question. There has certainly been a lot of attempts to do this, and others have been in the market and tried to offer a similar or equivalent technology. And it's a massive market, so there's certainly room for more than just one supplier. I think we would be naive to think that we'll be the only supplier of this for an extended period of time, although I must admit, we're surprised that there hasn't been a closer competitive environment than what we've seen. But I think the complexity of doing this and the number of things that need to be brought together from a technical point of view, and a business point of view to be able to deliver on this, really, it is now being reflected in the leadership position that we've achieved. And certainly, it is so different to producing aluminum wheels that a regular aluminum wheel producer would not naturally be able to just transition over to this technology.

And also from a composite material point of view, it is quite a specialized application. A wheel has to do a lot of things, and it's a very, very key part of automotive technology, given how safety critical it is. And what's important there actually, and it's a very important entry barrier from our point of view, is that the car manufacturers or the OEMs are very risk averse when it comes to safety critical technology. Wheels are clearly a safety critical technology. And so the investment that was put into ensuring that in partnering with us, they were getting a product that works and a company that had the right levels of quality control and capability to deliver to quality every time, at scale, they made significant internal investments themselves to validate that and to ensure that that was the case. They're not necessarily going to have an appetite to keep making that on a repeated basis.

So we'd expect somebody else to come along with an equivalent position. And as I said, we would expect to see competition emerge, and I'm probably a little surprised that we haven't seen more competition, but our aim is to remain the best products possible, so the best attributes, the best weight reduction, the most opportunities for aesthetic advantages and styling benefits that the designers can use and be excited about. And that is a key part--from a wheels point of view, they need to look good. And to have the most efficient cost base. So to achieve a level of industrialization, automation, and an efficient supply chain, that means that regardless if we do see competition, or when we eventually do, we have a long-term sustainable leadership position. And you're right, this will trickle down. It's a classic trickle-down technology. We're already seeing it move from performance vehicles into premium SUVs, premium EV SUVs.

And over time, like I said, as we are able to finish off the industrialization and achieve scale benefits with our supply chain and locate manufacturing more strategically for larger programs, this will become more and more affordable, and it will become something that can offer benefits to the RAV4s, as you mentioned, rather than just to the top end of the market. But fortunately for us, the top end of the market is absolutely enormous, so supply constraints are going to be a factor for us, rather than an issue with demand as we see it for the quite some time into the future.

Jon Windham:

Got it. Perfect. And Zoltan, can you give participants instructions on how they can log any questions and I'm going to start blending in a couple of the email questions with questions I have.

Zoltan:

Yeah, of course. Thank you, Jon. So everyone, if you'd like to ask a question, please just press start one on your telephone. Thank you.

Jon Windham:

Zoltan, feel free to interject if someone has a question line, but one of the questions we got, which actually was on my list as well, just an understanding of what this looks like to consumers and they're asking, is this likely to evolve as an option for a consumer? Like meaning, "Hey listen, I want to buy the lighter wheels, give me a little bit more range. I'll click on that button and have that in my car and someone else can choose to do a traditional aluminum wheel if they would like to." Or do you think it becomes more of a standard feature?

Jake Dingle:

Well, we've already been sold in almost every different way possible. So the first two Mustangs that we were featured on, we were a standard fitment. So the GT 350R, which was the premium end of the Mustang range, we were a standard feature on that vehicle, not an option. And it was the same for the GT 500 at that derivative level. For the Ferraris we were on, we are an option, and it will vary from vehicle to vehicle. So consumers already have a choice in aluminum wheels as to which size and which style they want to choose. I think what we will see play out here is that because aluminum really has hit limits in terms of size, so our customers are now demanding 22, 23, 24 inch wheels. I don't know if you've ever tried to change or lift a wheel of that size or change a tire on something that size, they're really becoming almost untenable without major re-engineering and weight being added to the vehicle.

So one thing I think that'll play out here is that the larger wheel sizes that consumers already have the option to choose when they're selecting a vehicle. Increasingly, as our customers adopt our technology, they will potentially only be available in carbon fiber, and so that will increase the potential demand within those platforms. The fact that we're able to offer a 23, 24 inch wheel for the mass of something much smaller in aluminum like 18 inches, which nobody's buying for these sorts of vehicles anymore, means that it's more straightforward for the OEM just to offer wheels in that size in carbon fiber, and the consumer will pay for them as well.

So it's not just a cost that they're absorbing, they're able to pass that on to the end consumer, which from a managing-a-bill-of-materials point of view is also a real advantage. This is a technology that offers huge value to the OEM in designing it into the vehicle, but it's also something that there's revenue benefits because the end consumer is willing to pay incremental revenue and a premium to have this technology, whether it's for range, whether it's for aesthetics, whether it's for the driving performance, whether it's a combination or all of those things. But it's certainly been shown as being something that's desirable, and as you say, it will continue to trickle down through the range as it becomes more affordable and disrupts the market on a bigger scale, following the same theme as a lot of other automotive technologies have in the past.

Jon Windham:

Thanks, Jake. Maybe just one question on the transaction, and I'll leave it to you if you want to answer this question or pass it on to a member of your team. Is someone unique with the merger agreement and that Carbon Revolution's already listed Australia, correct? So just is trying provide a little bit of details on where we are, the details of a transaction, timeline. I think investors will be interested in that. Thank you.

Jake Dingle:

That's a great opportunity for me to introduce Gerard Buckle, our CFO to jump in and answer that question. Gerard, if you're there?

Gerard Buckle:

Yeah, hi all. Look. The transaction's progressing really well. We lodged our F-4 for a couple of weeks ago with the SEC, so that's going through the review process at the moment. We envisage the review process they're taking the next month or so to get that completed. We have a process here in Australia as well, which is similar, so we produce a scheme booklet as it's titled here in Australia for our shareholders. We're producing that at the moment. We'll have that ready for shareholders in another month or so. And so then we'll have both the F-4 document ready for shareholders in the US, we'll have the scheme booklet ready for shareholders in Australia, and probably go through the voting process in June.

We're looking for completion in the back half of June, all going well, depending on the review process from the SEC. Realistically, we're probably somewhere sort of mid-June through into early July by the time we complete. Process is going really well. I think on both sides we had the SPAC extension there a couple of weeks ago, so that's been completed and yeah, we're all tracking on.

Jon Windham:

All right. Great, and simple question for me. Will you have two listings or will just be listed in the United States post the deal?

Gerard Buckle:

Yeah, we'll just be listed in the US.

Jon Windham:

All right, perfect. Thank you for that. Zoltan, we only have a few minutes left. Are there any questions on the line, or were they all emailed?

Zoltan:

Yes, there is one question on the line and this one comes from William Grippin, please go ahead.

William Grippin:

Thanks very much. Pretty interesting presentation. Appreciate you being on the call here. My first question was just, given the application here focused on EVs, is there any impact of reduction in wheel weight on regenerative braking?

Jake Dingle:

Yeah, that's a good question. Obviously we're adding efficiency to the whole system, so the vehicle mass is really dominated by what's in the static mass of the vehicle and you get a disproportionate inertia benefit from the wheels because they rotate as well as being translated, to get into a bit of physics. Now the regenerative braking, which is a function of slowing the bulk of the vehicle down and putting that energy back into the battery, it's just as relevant with carbon fiber wheels. In terms from a max point of view, there's some optimization and differences in how that actually works, but ultimately the fact of having a lighter vehicle overall and probably the best maths in terms of what is the range worth. If you think of some of the vehicles that we're putting this technology onto and saving north of a hundred pounds of weight, the amount of weight taken out of the vehicle just to our wheels, if that weight was applied directly back into the battery, because batteries, the life or the range that a battery provides is directly proportional to its weight given how they're produced.

So if you put that weight back into the battery, you can see a up to six or 7% range extension just by having additional battery weight. So regenerative braking is actually a function of the system. It can get quite complex. It's obviously an important feature of range extension for EVs, but the most important fact is how much energy density is in the battery and what's that doing to actually reduce the range by adding weight? And so the simple matter, I'll use a kilogram example, but if you can take 50 kilograms out of a vehicle with an 800 kilo battery and put that 50 kilos back into more battery, which is not necessarily the way that it would transpire, but in simple math terms, that adds about 6.25% of range, and the regenerative braking will apply in just the same way.

William Grippin:

Got it. Thank you. And then lastly, it sounds like you're pretty squarely focused on selling through OEMs, but I'm curious, have you looked at or possibly considering in the future selling into the high performance aftermarket? I would think maybe that might be a bit better margin, but perhaps at the trade-off of lower volumes or lower visibility, just curious how you're thinking about that.

Jake Dingle:

No, it's a great question. Early on when we were first introducing the technology, we had aftermarket shipments, and they were for those high performance vehicles that you talked about. And that gave us visibility, it gave us the ability to trial the product and also was something that we could supply for the OEMs that produce those cars in the first place. The aftermarket is very fragmented and really quite a difficult market to address and not secure in terms of revenue. So it's a very different dynamic, and the reason we are focused on OEM business is really just volumes and volume of security. And in fact, the margins and the risks of those margins is a better place to be in terms of volumes and the industrialization strategy that we have and that we're implementing at the moment.

Aftermarket reproducers are typically really quite small and subscale just because of the nature of that market. Into the future though, I think as our brand develops, there are probably certain platforms where a product that we developed could be offered directly to end customers or end consumers, but it's certainly not a focus at the moment. We have that much demand coming at us from global OEMs and that's how we've set our business up to be a tier one supplier.

The performance requirements and validation requirements of the product and the validation and quality certification required of our factory to service OEMs is several orders of magnitude higher than is required for supplying to the aftermarket, particularly in North America, but globally really. So it is an important differentiation between the markets that we're servicing. And you see with companies like Brembo, they do have aftermarket presence, but it's a very small proportion of their overall business. The majority of which is with the global OEMs. It doesn't hurt to have a brand though and to be able to talk about yourself and to be able to explain what your technology's doing, and if that in the future translates to something which is a slightly different channel to market at a point in time, then we would look at that if it made sense at the time.

William Grippin:

All right. Very interesting. Appreciate the comments. I'll turn it back over to Jon.

Jake Dingle:

Thank you.

Jon Windham:

All right, with that we are at the top of the hour.

Zoltan:

As I can see, Jon just disconnected.

Jake Dingle:

Okay. Sorry. We're finished? Thank you.

Zoltan:

Thank you, everyone. That concludes your conference call. You may disconnect now. Thank you for joining, and again, enjoy the rest of your day.

Information about Proposed Business Combination

As previously announced, Carbon Revolution Limited ("CBR", "Carbon Revolution" or the "Company") (ASX: CBR) and Twin Ridge Capital Acquisition Corp. ("Twin Ridge" or "TRCA") (NYSE: TRCA) have entered into a definitive business combination agreement ("BCA") and accompanying scheme implementation deed ("SID") that is expected to result in Carbon Revolution becoming publicly listed in the U.S. via a series of transactions, including a scheme of arrangement. Upon closing of the transactions, the ordinary shares and warrants of the merged company, Carbon Revolution Limited (formerly known as Poppetell Limited), a private limited company incorporated in Ireland with registered number 607450 ("MergeCo"), that will become the parent company of the Company and Twin Ridge, are expected to trade on a national exchange in the United States, and Carbon Revolution's shares shall be delisted from the ASX.

Additional Information about the Proposed Business Combination and Where to Find It

This communication relates to the proposed business combination involving CBR, TCRA, MergeCo, and Poppettell Merger Sub, a Cayman Islands exempted company and wholly-owned subsidiary of MergeCo ("Merger Sub"). In connection with the proposed business combination, MergeCo has filed with the U.S. Securities and Exchange Commission (the "SEC") a Registration Statement on Form F-4 (the "Registration Statement"), including a preliminary proxy statement of TRCA and a preliminary prospectus of MergeCo relating to the ordinary shares of MergeCo, par value $0.0001, to be issued in connection with the proposed business combination. The Registration Statement is subject to SEC review and further revision and is not yet effective. This communication is not a substitute for the Registration Statement, the definitive proxy statement/final prospectus, when available, or any other document that MergeCo or TRCA has filed or will file with the SEC or send to its shareholders in connection with the proposed business combination. This communication does not contain all the information that should be considered concerning the proposed business combination and other matters and is not intended to form the basis for any investment decision or any other decision in respect of such matters.

BEFORE MAKING ANY VOTING OR INVESTMENT DECISION, TRCA'S SHAREHOLDERS AND OTHER INTERESTED PARTIES ARE URGED TO READ THE PRELIMINARY PROXY STATEMENT/PROSPECTUS AND THE DEFINITIVE PROXY STATEMENT/ PROSPECTUS, WHEN IT BECOMES AVAILABLE, AND ANY AMENDMENTS THERETO AND ANY OTHER DOCUMENTS FILED BY TRCA OR MERGECO WITH THE SEC IN CONNECTION WITH THE PROPOSED BUSINESS COMBINATION OR INCORPORATED BY REFERENCE THEREIN IN THEIR ENTIRETY BEFORE MAKING ANY VOTING OR INVESTMENT DECISION WITH RESPECT TO THE PROPOSED BUSINESS COMBINATION BECAUSE THEY CONTAIN IMPORTANT INFORMATION ABOUT THE PROPOSED BUSINESS COMBINATION AND THE PARTIES TO THE PROPOSED BUSINESS COMBINATION.

After the Registration Statement is declared effective, the definitive proxy statement will be mailed to shareholders of TRCA as of a record date to be established for voting on the proposed business combination. Additionally, TRCA and MergeCo will file other relevant materials with the SEC in connection with the proposed business combination. Copies of the Registration Statement, the definitive proxy statement/ prospectus and all other relevant materials for the proposed business combination filed or that will be filed with the SEC may be obtained, when available, free of charge at the SEC's website at www.sec.gov. In addition, the documents filed by TRCA or MergeCo may be obtained, when available, free of charge from TRCA at www.twinridgecapitalac.com. TRCA's shareholders may also obtain copies of the definitive proxy statement/prospectus, when available, without charge, by directing a request to Twin Ridge Capital Acquisition Corp., 999 Vanderbilt Beach Road, Suite 200, Naples, Florida 60654.

No Offer or Solicitation

This communication is for information purposes only and is not intended to and does not constitute, or form part of, an offer, invitation or the solicitation of an offer or invitation to purchase, otherwise acquire, subscribe for, sell or otherwise dispose of any securities, or the solicitation of any vote or approval in any jurisdiction, pursuant to the proposed business combination or otherwise, nor shall there be any sale, issuance or transfer of securities in any jurisdiction in contravention of applicable law. The proposed business combination will be implemented solely pursuant to the BCA and SID, in each case, filed as exhibits to the Current Report on Form 8-K filed by TRCA with the SEC on November 30, 2022, which contains the full terms and conditions of the proposed business combination. No offer of securities shall be made except by means of a prospectus meeting the requirements of the Securities Act.

Participants in the Solicitation of Proxies

This communication may be deemed solicitation material in respect of the proposed business combination. TRCA, CBR, MergeCo, Merger Sub and their respective directors and executive officers, under SEC rules, may be deemed to be participants in the solicitation of proxies from TRCA's shareholders in connection with the proposed business combination. Investors and security holders may obtain more detailed information regarding the names and interests in the proposed business combination of TRCA's directors and officers in the Registration Statement, TRCA's filings with the SEC, including TRCA's initial public offering prospectus, which was filed with the SEC on March 5, 2021, TRCA's subsequent annual report on Form 10-K and quarterly reports on Form 10-Q. To the extent that holdings of TRCA's securities by insiders have changed from the amounts reported therein, any such changes have been or will be reflected on Statements of Change in Ownership on Form 4 filed with the SEC. Information regarding the persons who may, under SEC rules, be deemed participants in the solicitation of proxies to TRCA's shareholders in connection with the business combination will be included in the definitive proxy statement/prospectus relating to the proposed business combination, when it becomes available. You may obtain free copies of these documents, when available, as described in the preceding paragraphs.

Forward-Looking Statements

All statements other than statements of historical facts contained in this communication are forward-looking statements. Forward-looking statements may generally be identified by the use of words such as “believe,” “may,” “will,” “estimate,” “continue,” “anticipate,” “intend,” “expect,” “should,” “would,” “plan,” “project,” “forecast,” “predict,” “potential,” “seem,” “seek,” “future,” “outlook,” “target” or other similar expressions (or the negative versions of such words or expressions) that predict or indicate future events or trends or that are not statements of historical matters. These forward-looking statements include, but are not limited to, statements regarding the financial position, business strategy and the plans and objectives of management for future operations including as they relate to the proposed business combination and related transactions, pricing and market opportunity, the satisfaction of closing conditions to the proposed business combination and related transactions, the level of redemptions by TRCA’s public shareholders and the timing of the completion of the proposed business combination, including the anticipated closing date of the proposed business combination and the use of the cash proceeds therefrom. These statements are based on various assumptions, whether or not identified in this communication, and on the current expectations of CBR’s and TRCA’s management and are not predictions of actual performance. These forward-looking statements are provided for illustrative purposes only and are not intended to serve as, and must not be relied on by any investor as a guarantee, an assurance, a prediction or a definitive statement of fact or probability. Actual events and circumstances are difficult or impossible to predict and may differ from such assumptions, and such differences may be material. Many actual events and circumstances are beyond the control of CBR and TRCA.

These forward-looking statements are subject to a number of risks and uncertainties, including (i) changes in domestic and foreign business, market, financial, political and legal conditions; (ii) the inability of the parties to successfully or timely consummate the proposed business combination, including the risks that we will not secure sufficient funding to proceed through to completion of the transaction, any required regulatory approvals are not obtained, are delayed or are subject to unanticipated conditions that could adversely affect the combined company or the expected benefits of the proposed business combination, or that the approval of the shareholders of TRCA or CBR is not obtained; (iii) the ability to maintain the listing of MergeCo’s securities on the stock exchange; (iv) the inability to complete any private placement financing, the amount of any private placement financing or the completion of any private placement financing on favorable terms; (v) the risk that the proposed business combination disrupts current plans and operations CBR or TRCA as a result of the announcement and consummation of the proposed business combination and related transactions; (vi) the risk that any of the conditions to closing of the business combination are not satisfied in the anticipated manner or on the anticipated timeline or are waived by any of the parties thereto; (vii) the failure to realize the anticipated benefits of the proposed business combination and related transactions; (viii) risks relating to the uncertainty of the costs related to the proposed business combination; (ix) risks related to the rollout of CBR’s business strategy and the timing of expected business milestones; (x) the effects of competition on CBR’s future business and the ability of the combined company to grow and manage growth, establish and maintain relationships with customers and healthcare professionals and retain its management and key employees; (xi) risks related to domestic and international political and macroeconomic uncertainty, including the Russia-Ukraine conflict; (xii) the outcome of any legal proceedings that may be instituted against TRCA, CBR or any of their respective directors or officers; (xiii) the amount of redemption requests made by TRCA’s public shareholders; (xiv) the ability of TRCA to issue equity, if any, in connection with the proposed business combination or to otherwise obtain financing in the future; (xv) the impact of the global COVID-19 pandemic and governmental responses on any of the foregoing risks; (xvi) risks related to CBR’s industry; (xvii) changes in laws and regulations; and (xviii) those factors discussed in TRCA’s Annual Report on Form 10-K for the year ended December 31, 2021 and subsequent Quarterly Reports on Form 10-Q, in each case, under the heading “Risk Factors,” and other documents of TRCA or MergeCo to be filed with the SEC, including the proxy statement / prospectus. If any of these risks materialize or TRCA’s or CBR’s assumptions prove incorrect, actual results could differ materially from the results implied by these forward-looking statements. There may be additional risks that neither TRCA nor CBR presently know or that TRCA and CBR currently believe are immaterial that could also cause actual results to differ from those contained in the forward-looking statements. In addition, forward-looking statements reflect TRCA’s and CBR’s expectations, plans or forecasts of future events and views as of the date of this communication. TRCA and CBR anticipate that subsequent events and developments will cause TRCA’s and CBR’s assessments to change. However, while TRCA and CBR may elect to update these forward-looking statements at some point in the future, each of TRCA, CBR, MergeCo and Merger Sub specifically disclaim any obligation to do so, unless required by applicable law. These forward-looking statements should not be relied upon as representing TRCA’s and CBR’s assessments as of any date subsequent to the date of this communication. Accordingly, undue reliance should not be placed upon the forward-looking statements.