



Origin Materials, Inc. (Nasdaq: ORGN)

Investor Q&A Video Part 3, April 25, 2024

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Participants

Ryan Smith, Chief Product Officer and Co-Founder

John Bissell, Co-CEO and Co-Founder

Ryan Smith: So, this is a follow-up segment, one-on-one with John, dedicated to catching the remainder of the questions that were addressed to him that we couldn't get to in the segment with John, Rich, and Matt. So, John, I'm just going to pick up where we left off with a couple of questions that had come in.

John Bissell: Do it.

Ryan Smith: All right. Top of the list here: "John, do you think we are going to be rich, or really, really rich?"

John Bissell: You know, if you look at the history of chemical companies that successfully develop a new chemical platform, it's basically like reading the list of old money families. The other ones that creep in are banking, railroads, and oil. So, you know, I guess take that how you will.

Ryan Smith: That's good. Alright, next question here. So in previous updates, I think quarterly earnings call updates, you've highlighted key hires and team members that are a secret sauce for success. And the investor is asking: Can we do this again in upcoming earnings releases? It says that they're curious about what the team looks like after the layoffs or reduction in force.

John Bissell: Yeah, absolutely. That's a great idea. You know, one of the interesting things, too, is that our team is really deep. So, there are people with extraordinary capability that, you know, for whatever reason we just haven't had a chance to talk about yet, or maybe a reason to talk about explicitly. We've tended to have something happen or make a hire, right, or something like that. And then that



triggers us to talk about somebody, even if it's just briefly. But, you know, sometimes there are people that we just haven't talked about because there wasn't some triggering event. And so I think that's a great idea and we should definitely do it. And maybe it's, you know, to be clear, I think that's both, as we continue to hire new people, that's one, but two is people that, you know, have incredible capability, that are on the team that we just haven't talked about publicly that much yet.

Ryan Smith: Yeah.

John Bissell: Some of those people we haven't talked about, because they're a little bit shy, so.

Ryan Smith: Right. Sure.

John Bissell: I have to like, reveal them, despite their desires.

Ryan Smith: Yeah, I know, I like this idea a lot. Alright. So, now the next question, I think there might be some limits to what you can say here. But I'm going to ask you, it's: What can you say about how the caps are made?

John Bissell: So, there are limits to how much we can talk about this right now. Those limits will go away relatively quickly. So not like days and weeks, but on the order of months and quarters, and not lots and lots of months and quarters. I think we'll be able to give a lot more guidance there. What we're really doing right now is trying to give ourselves as much running room to, you know, get stuff filed, and get stuff working, and not impede ourselves with public announcements which become prior art, for example, and all those kinds of things when it comes to getting our intellectual property squared away as much as we possibly can, and not giving somebody else a head start on what we're doing. So yeah, definitely will talk about it more. I don't think we're very far from talking about it quite a bit more, but it's just not something we can do yet.

Ryan Smith: Understood. And when you say filing, you mean filing patents around the technology?

John Bissell: Yep.

Ryan Smith: That makes sense. All right. Now, this next is another technical question. I'm not quite sure what it's rooted in. But someone is asking: "For this CMF to paraxylene process, are there any troubles or problems associated with that pathway, or that technology?"

John Bissell: So I sort of commented on this in the joint discussion where – I mean frankly, there are always things for any given technology. It's a question of extent. You know. I'll say, generally speaking, if you're dealing with chlorine – So I'm going to sort of say some general things that are, you know, can lead you to draw some conclusions if you would like, that would be reasonable, if you had some you know, industry and chemicals specific knowledge. So, you know, chlorine characteristically is difficult for catalysts to handle it. Chlorine is sort of an amazing element. Organic chlorine is incredibly functional and gives you lots of chemical versatility, but it also, probably in some ways related to that chemical versatility, as I think about it, it has some pretty fundamental limitations and constraints. It likes to react with metals. That means that you have limitations on your materials of construction. It also means that it tends to interact with catalysts. And so, selection of catalysts that are really effective and long-lived is a characteristic challenge with chlorine and, you know, I wouldn't be surprised if for the lifetime of this chemical platform, you know, even if it lives a hundred, 200 years, 300 years, if it's still in practice, that improving the activity and lifetime of the catalyst that

touched chlorine will continue to be an avenue of effort. It's just sort of the way it works when you're dealing with chlorine and you're acting on the chlorine itself. So that would be one sort of characteristic area.

Another is, you know, Diels-Alder chemistry is really interesting. Again, this is sort of fundamental Diels-Alder characteristics. But the Diels-Alder chemistry tends to be— it prefers to operate at low temperatures because it likes a relatively low temperature, low entropy environment. And yet, of course, you want it to go fast industrially, and usually the way you make things go faster industrially is by running them at higher temperature. And so, you have a bit of a push-pull situation with that reaction. And so, I think, my guess is that will be sort of the characteristic continued direction of development and improvement over, again, a long period of time, with that kind of chemistry. The Diels-Alder chemistry, by the way, is going from the furan to the aromatic ring. And so again, I think it's a question more of what are the things that we continue to work on there? More so than, you know, one specific issue that is a problem, right? I mean, they're sort of opportunities, problems, issues. However, you want to describe it. Performance.

Ryan Smith: And these sort of performance characteristics. I mean, this is pretty typical of chemical processes, right? I mean when paraxylene goes to terephthalic acid, there's like, this longstanding effort to sort of reduce the amount of solvent that gets oxidized in that process, right? Like there's just – every process has its own sort of special thing.

John Bissell: Exactly. Yes, that's exactly right. Yeah. So to your point, as a good example, not counter example, but example of the rule, is with terephthalic acid, which has been operating for 60 years – something like that – you're constantly optimizing conditions and catalyst in order to minimize the amount of acetic acid, which the solvent, from getting oxidized or burned off. That's sort of a characteristic challenge associated with that particular process, and people will probably continue to be working on that particular aspect of that oxidation for a long time.

Ryan Smith: Right. Alright. So now, switching gears a little bit to less technical, actually, kind of a communications question here. “John, Rich, and Matt” – and we've got you right now – “John, retail investors have been voicing their wish for more active investor relations for a long time, but over the past 6 months Origin actually seems to be getting even quieter. Is Origin resistant to more actively using social media to tell its story and to educate about its products? As shareholders this is something we would love to see.”

John Bissell: Yeah, I think there are a couple of things there. No, we're not particularly resistant to using various channels like social media to engage with investors. I think the thing to understand there is that we – and I've sort of said this in a couple different ways – but we really want to bias in favor of giving investors kind of fundamental information, maybe, is the way to think about it. Where we're telling you what we're seeing and what we're doing. And over time we will also sort of try, you know, give projections and things like that about how we see things evolving. But we want to be as careful as is reasonable to not over-commit on those. You know, everybody uses the phrase, you know, under promise and over deliver. Well, and I've said this before, and I don't think it was on the joint interview just a day ago, I think it was maybe on something else a couple of weeks before that. But you sort of have to take – if you're if you're in a position where you're changing some things around, which we are, right? Obviously, we are emphasizing the caps program more. That's partly in response to the increase in capital cost that has made it more challenging to build the plant that we had



originally expected to build several years ago, on the timeline that we expected to build it. And so as we reformulate that project and re-engineer that big project, we're pushing on some of these other avenues that are more, sort of, easily monetized in this sort of macro environment. But as we change those things, we don't want to make a bunch of new promises based on what we think we see right now. We would like to see it play out a little bit more. And so I think what people are seeing is, actually, we're getting a bit more conservative in the way that we communicate philosophically.

But that increase in conservation also is happening while we are making some changes to the business and to the strategy and the plan, and as a consequence, you know, those two, the product of those two is a little bit less communication for a little while. And our preference was – and this was an explicit choice – and our preference was, well, if we're going to have a period of time where we don't communicate very much let's have it be one period of time, not communicate a little bit more, and then have to pull back and then communicate more and then pull back. So I think that's sort of the way to interpret this. You know, one of the things that's kind of interesting is, I think a lot of people have a different characteristic timescale that they're expecting communications than what our business really drives. A lot of ways, our business is one that evolves over the course of quarters and years. It's not one that evolves over the course of weeks. And so, I think there's a little bit of a mismatch there, and that's just accentuated by us, sort of, steering, a little bit, the business through all the stuff that's going on – Origin specific and not – and us being a little bit more conservative with the way we make call outs right now.

Ryan Smith: That makes sense. And I think the – your comments about being conservative and sort of taking that line lines up really well. But I think there's also this piece that's like, even this conversation right here, I think we continue to look for opportunities to, sort of, teach people more about what we're doing where we can and where it makes sense. Does that... How would you respond?

John Bissell: That's a good point. You know, I think there's also... We're learning what are good avenues for us to talk through? What are the right channels to the right audiences? What audiences, you know, different audiences care about different things. Different audiences look for different channels, and so the right content, let's call it, to put through the right channels to get to the audience that cares about that content is, you know, maybe that seems like something that should be a no brainer, it wasn't for us, necessarily. And so we're experimenting with that. And sometimes we experiment with it and the response that everybody gives us is “We didn't hear anything, what the hell are you guys doing?” And well, that's a data point. We go back to the drawing board. So I think we are trying to figure out – and this was the point you were making – we are trying to figure out what are the right ways for us to do that without boiling the ocean at the same time, right? Where we try to do everything all the time, which is not tractable from a resource perspective.

Ryan Smith: Yeah. Makes sense. Great. A couple of caps, PET cap questions here. One is: “What, if any, are the immediate financial incentives for bottlers to switch to an all PET cap?”

John Bissell: Well, that's an interesting question for a couple of reasons. The first is because not all bottlers are the same, and it's a bit difficult making really generic comments there. And the second is because a lot of people don't understand what a bottler is. So I think it's first, maybe, worthwhile decomposing the concept of bottler into a couple of different players in the supply chain or value chain. There's the brand owner. There's the franchisee in many cases of the brand owner. There's the



ultimate retailer who is the person, you know, this is a store that the product is purchased from. The franchisee is the person who happens to be operating with the label, making the – and this is what sometimes people mean by bottler – but making the, let's say, soft drink, or something like that. The brand owner is the one that everybody knows the name of, and then there are also immediate suppliers, which can be everything from a toll manufacturer for a brand owner or for a franchisee in making the product but is not actually the owner of the franchise or the brand. It can also be the supplier of a part going into that product or a component of the product in some other form or fashion. And so, the incentive is different, depending on exactly who you're talking about. But the driver of a lot of these decisions is going, you know, it tends to be the brand level. That's not it. It's not only the brand but, you know, it's a different value proposition all the way through here. I think, you know, some of the most important components of it are increasing the recyclability of the product on the other side. So, you know, the product or the package on the other side. So really being able to, you know, if you look on most of these bottled beverages, or something like that, you can go see that there's a little asterisk that says, you know, 100% recycle except for label and cap. Well, we're going after the cap.

The next part is incorporating recycled content. So, there are really some challenges around – and I talked about this recently, too – but there's some challenges around being able to incorporate recycled content into a bottle. It's not impossible, but it's also not easy. And so being able to put in the cap where when the cap is made out of PET is a big deal, too. So, it allows you to put more recycled PET into a bottle package.

There's also a supply chain and purchasing simplification. So, if you're already buying PET for the bottles, why not also just be buying PET for the cap instead of having a whole other material supply chain that you're purchasing from. That's a big deal.

And then finally, you're also getting just, you know, some functional benefits associated with the cap itself like, for example, it has a better shelf life. It's lighter. All those kinds of things. So there are other benefits there, too. You know, all of those are good for the whole value chain for the most part. But some of them are more important for some parts of the supply chain than others, or value chain than others. I guess the final one is that there's sort of a narrative arc of history towards packaging that enables you to see the product. If I can steal the concept. And so really anytime you can get a transparent package, over time that's often going to perform better than an opaque component in the package. And people will argue about it at the introduction point, but it just seems like that always ends up being the case. Consumers just like being able to see the product as well as they possibly can. They don't particularly like just looking at the package. So, I think that's another fundamental advantage of PET.

Ryan Smith: That's great, and I can't help but add a little bit – I want to add, just make the point that, you know, when it comes to recycled and recyclable content. There is regulatory pressure in some regions to do that. So that's sort of an additional incentive, and I want to make sure we don't sort of rush by too quickly on the shelf life component. That's a big deal for certain applications. And I think there is a kind of relief in being able to use PET where that wasn't an option before.

John Bissell: I think that's right. You know, to your point on shelf life, in particular, there were a lot of products I don't think people appreciate that many products that you use now are actually infeasible without somewhat modern packaging technology. And so, as you introduce something like a cap that



improves the shelf life, you know, it may look like it's just a purely quantitative, great, it's a longer shelf life and so that enables some supply chain benefits. But actually, what frequently happens is that those kinds of shelf-life improvements, or whatever else, right, other kinds of packaging technology improvements actually enable whole classes of product to be made that weren't really feasible before that. And so that'll be interesting, too, right, to see what having a PET closure does to certain product categories in terms of new entrants.

Ryan Smith: Yeah, there'll be a kind of knock on effect. That'll be really interesting. There was another – let me find it here. Here we go. There was another PET question. Someone was wondering, “Are PET caps more prone to leaking than HDPE?”

John Bissell: It's a good question. Leakage is something that happens relatively infrequently for these kinds of closures anyway. So I think – and it's going to be very design specific, too. I think that's probably less of a question about the material, because none of this leaks through the material, right? It's leaking around the mechanical seal. And so it's more of a design question than it is a materials question. We haven't seen that. But, you know, sometimes you have to look at really large numbers to see if there's an impact there. Certainly, it's low enough that if it does end up being more prone in some fashion, it's a low enough propensity that it's not noticeable at the, sort of, tens and hundreds of thousands of containers level.

Ryan Smith: That's helpful. And I think, just kind of looking at the question, it looked like they had been responding to, like, a rumor or some claim circulating about this and what you're saying is this wasn't an issue that was popping up.

John Bissell: If people have data on it, it's not data I've seen.

Ryan Smith: Same, same.

John Bissell: Not data we generated I don't think.

Ryan Smith: Alright. Here we go. So, an Origin 1 question. There's a perception that Origin 1 was designed to not be profitable following the conclusion of its primary use as preparation for Origin 2 scale-up and further market development. Do you anticipate Origin 1 having the ability, if needed, to later generate a gross profit?

John Bissell: So, we think that it probably can be a cash flowing, profitable plant over time. But that, to the point of the question, that was not the way that it was originally intended. It was originally intended to be roughly break even. But frankly, we didn't think it was going to matter very much whether it was exactly breakeven, or burning a little bit of cash on a net basis, or making a little bit. It just didn't matter. That wasn't the primary purpose, that was way down in the stack. Now it's really close to the top of the stack, at least for the next few years. And so we're sharpening our pencils in a very serious way. And we have some really good ideas about how we think that – and when I say idea, right, that's not just, oh we just brainstormed on a piece of paper but, you know, coupled with market feedback and supply chain understanding and discussion with customers, all those kinds of things – We have some really good ideas about exactly how we think we can get that to generate cash on a net basis. But it's going to take a little bit of maneuvering to get it there, right? We've got to change some ways – some parts of the supply chain post-OM1. We've got to do some things a little differently.



But we do think that it can do that. We're pretty excited about it. But think — don't take that as a forecast, right? We're working on it. We think it's possible. But we don't know yet.

Ryan Smith: Right. Alright. This is a different question on biofuel. It says, “What Origin intermediate would go into biofuel?”

John Bissell: It's what we call the oils and extractives stream. So I mean, there are applications where you could imagine a CMF-derived intermediate like methylfurfural or dimethylfuran, or something like that, going into fuels as well. But that would be more like an additive than as a primary fuel. It wouldn't be because of the energy content, I don't think. But that fraction that we call the oils and extractives fraction, which by the way, we're making no matter what, right? If we're making CMF, we're making oil and extractives. We make more of it in some cases than we do others. So, depending on the feedstock or the way we run it, you can make more or less, but the oils and extractives stream is the one that we imagine going into the biofuel stream. So it's a valorization of a stream that we were already making. Now, there are things about going into a liquid fuel stream that would be externally used, of course, that are, you know, challenging and more expensive than just using it internally. So, sort of the alternative use case, there is that we combust it ourselves, and we use this energy for the plant. Which was the way that we thought about that, you know, 5 years ago, was we thought we were going to do that with it. But we're interested and excited about doing more with it.

Ryan Smith: That's great. For the next question. This is a kind of licensing question. It says, “When licensing, does Origin plan to do engineering in-house for process design packages?”

John Bissell: So for process design packages specifically, if somebody – I'm going to take that presuming that somebody actually has a reasonably good understanding of the licensing process – we would do quite a bit of the process design package work in house. Probably not 100% exclusively Origin folks, but we would be very meaningfully involved. We're not a house of just chemists who typically would not be putting together a PDP. We have a lot of engineers and very capable engineers, and a pretty wide range of, sort of, the execution chain of engineers. We don't have a bunch of detailed engineers in house, right? So we're not going to do something like that. But for a process design package? Yeah, we would do a meaningful amount of that work.

Ryan Smith: Alright. So, this next question, it's actually quite long. I don't think I'm going to read it all. I've got a sort of a summarized version of it here. It's asking about Avantium and Avantium's technology. And I'd put it this way. It asks, “What part of the process, CMF, FDCA or beyond, relies on the success of Avantium's flagship plant, and what alternatives exist if Origin Materials tech is ready to be deployed for FDCA derivative applications before Avantium's technology effectively scales?”

John Bissell: So, the part of Avantium's technology that's really interesting to us is the conversion of a dechlorinated furan, let's call it, so not CMF directly, but something after CMF, that is oxidized using Avantium's technology, which is – Avantium's technology, if you stand back and squint even just a little, is basically mid-century style oxidation. Mid-century style oxidation is the dominant way that paraxylene is converted into terephthalic acid, right? And it's slightly modified in order to work well for furans instead of for paraxylene. And the fact that they have spent the time and technical effort and money to go through and figure out all of the adjustments you've got to make to do that kind of oxidation – that's interesting. And we have a lot of respect for their technical capabilities. They're a very strong organization on that front. And so that's where we're interested.



You know, how dependent is that technology on their flagship plant? You know, it's a complicated question to answer. It's probably not one that's really easy to sort of talk through all the puts and takes there. Mostly, yeah, everything gets a lot easier if demonstration-scale plants, of whatever sort, work. If they don't work – which has happened in the history of the chemical world, sometimes demonstration plants don't work – usually, if they don't work, that technology, really, it's difficult for somebody to justify picking it up and running with it. On the other hand, you know, it's hard to believe that mid-century oxidation wouldn't work for furans. I mean, we've all – I think much of the industry has looked at that kind of oxidation at small scales over the years. So the real question for you, and maybe the important way to frame this is, well, it matters a lot if it doesn't work. And, by the way, to be really clear, we have no reason to believe that that plant would be challenged. Again, we have a lot of respect for Avantium's capabilities. But just entertaining the hypothetical for one moment, you know, it would matter why a demonstration plant doesn't work, right? It's not just binary: works, doesn't work. It's why. So that's the slightly longer answer.

Ryan Smith: Yeah, no, that makes sense. There's a fair amount sort of built into the hypothetical there. So another kind of long question, but I think this an interesting one, for sure. “John, when licensing, many companies require performance guarantees and are hesitant to proceed with novel technologies. How does Origin plan on navigating performance guarantees? This seems particularly tricky when the technology can leverage multiple feedstocks, which likely provide a different slate of products and present their own challenges. Additionally, few of the potential feedstocks have been tested at scale. Can we assume OM1 is being used to provide a baseline of yields, conversions, and characterization of the core process?”

John Bissell: So, for the latter question, yes.

Ryan Smith: I can read parts of that back if it helps.

John Bissell: There's one part that I'll pick out that is probably, maybe, helps resolve a lot of the core concern of that question, which is that a given plant is relatively unlikely to switch feedstocks on any sort of regular basis, right? So when we talk about a plant being feedstock flexible, what we're really talking about is the technology can in concept be used for lots of different feedstocks. It doesn't mean that you are going to be feeding, you know, one feedstock one month and another feedstock another month into a given plant. And that's for a lot of reasons. One you've got to have different handling systems for the front end. You might choose to intentionally feed two different feedstocks into a given plant but you're not just choosing it on the fly, you've decided that you are going to build a plant capable of multiple feedstocks. So, as a consequence, you know, I think data from OM1 is really important in that whole licensing arena.

But it's important because you need to be able to give the baseline, not because you need to demonstrate, you know, multiple different feedstocks for a customer to be willing to license the technology, right? And similarly, from a performance guarantee perspective, same thing, right? You're licensing a technology for which there is known performance because it's been demonstrated at various scales. You're not licensing and guaranteeing performance on any feedstock, or any of a large list of feedstocks, for that plant. That's just not the way that that would make sense.



Ryan Smith: And is it fair to say that if a partner was interested in a very particular feedstock that hadn't been developed or demonstrated there could be some deliberate work to develop that in the context of the process?

John Bissell: And we've done that, actually, right? There are examples of us doing exactly that, where a partner had a very specific feedstock that they were interested in and wanted to look at a plant and they wanted to evaluate whether this was going to make sense. And we can go do that testing at, again, you start at the small scale, and you work your way up, and it can go relatively quickly when you have all the assets, and you're confident in the way that the feedback is going to perform. And so that's exactly how that works. And then, of course, we're not going to provide performance guarantees on something that we haven't tested before. We're only going to do it for something that we tested.

There's another component of that question, actually, which is sort of getting at how much demonstration is required by a given by a licensor right? Or licensee, I should say, sorry. And that really depends. So there's a broad market where you can engage with basically any company on a specific set of licensing terms. We don't have to be in that market in the beginning, right? And there are also similarly lots of companies which are very capable of engaging earlier in the development stage for a technology like that. And development in this case doesn't necessarily refer to any particular technology level, of sort of like, characterization level. Or I should say, maturity. It's more about, you know, are they willing and capable of engaging in the engineering? At what stage, FEL 3, FEL 2, later, earlier, right? All those kinds of things. And so when we talk about asset light, we're talking about engaging with partners in a general sense, not necessarily a licensing package model where we're going to go out, and we're going to stamp out as many licensees as we possibly can, with some sort of clearly defined single SKU product, if that makes sense, you know, where we've got a package and we just fire it off to whoever comes next. That's sort of not the way to think about it.

Ryan Smith: I think that's a really important call out. So the types of partners that you engage with could be, as the example we had, it could be feedstock based partners. They could be product-based partners. They could just have an interest in developing pieces of the technology with us at different stages of maturity.

John Bissell: Right, and perhaps multiples of those parties coming together at the same time.

Ryan Smith: Right, yes. Alright. OK: "John, is the company still pursuing O&E biofuel production? Will this be a licensing strategy or in-house built?"

John Bissell: So, we are still interested in that, and we do still have a team that is working on that. We view it very much as part of the overall technology package for core biomass conversion. You know, as we described before, we believe that we can segment that into sort of staged plant builds, but it's still part of that overall bucket, right? It's one big glob of, sort of, wood refining technology, if you want to call it, or biomass refining technology. And so, yeah, as long as we're in the business of developing technology for converting biomass into fuels and chemicals, we're going to be looking at fuels.

Ryan Smith: Alright. So this one came in for you and Rich but I'll just ask you. "Can you tell us how your confidence in the biomass conversion technology as well as its ability to function in its originally



expected way to deliver on your 10-billion-dollar order book has changed, based on where the company is right now? Are you as confident as you have ever been?"

John Bissell: Yeah, it's interesting. I think – In the technology, I'm more confident than I've ever been, because we have more data demonstrating that it works and we've seen more of it. You know, sure. That means we've also had to adjust more, because, as you learn more, you adjust stuff. That's just the way it works. But certainly more than I have ever been up until this point. Also, you know, as the world changes in a variety of ways, the view of how to use that technology shouldn't be static. I think, so, in that sense, the way that – I was thinking about the way the question was framed, it was a little bit like, is my view of the technology in the context of 2020 the same – or, am I just as confident in the technology in that 2020 context now as I was then, if not more so? And I think the context is different. So, in that sense, I don't know that I would say, "Oh, yeah, everything is exactly the same or better" from 2020 because the world has changed quite a bit around it. And we've even seen the market change, right? So, you know, talking about the 10 billion dollar order book, a lot of that is around PET and other products there. But I think the other products part occupies a lot more of my mindshare now than it did before, which we've tried to sort of talk about over the years. But that's because those products are kind of incredible. You know, some of those are extremely highly performing products that have the ability to really change certain applications dramatically, both in just a performance way, but also in a sustainability way. And so I think my view has changed quite a bit around some of those things. But I think if the intent is just to get a technology, pretty clearly the technology works.

Ryan Smith: Alright, this is kind of a similar question, just in terms of its topic. "John, how confident are you that the biomass conversion technology is in a sufficiently developed state that licensing is truly attractive to partners in the near term, parenthetical, less than a year?"

John Bissell: Well, I think given my answer to the prior question, it depends a lot on who the partners are. You know, I'm quite confident that there are partners who are interested in this. In using the term licensing there – especially with the sophistication of some of the earlier questions about precise points in licensing – we called it asset light and said that we were looking for partners for a reason, because we really don't see this as, you know, like, mass manufacturing licensing packages, right? That's not the way we're thinking about this. And so you know, I would not want to make it seem like we have - Oh yeah, technology is good, we've got a package, we're going to fire it off, we, you know, throw it over the fence. We do a little bit of extra, you know, tweaking on it for that particular use case, and we're off to the races. That wouldn't be realistic without a reference plant at commercial scale. But that's not the way we're thinking about it, and we're trying to be careful about not talking about it that way either.

Ryan Smith: That's, I think that's helpful. Alright. Now this next one is, it's a technical question that I'm not – we'd probably give a little information here. John, could you give some idea of the desired expected ratios of production for OM1, specifically feedstock to HTC to CMF? It's kind of hard to disclose the specifics there, but...

John Bissell: Yeah, you know, so mostly no. I know there's some reports out there that have looked at the literature and done some analysis on our public statements that do have some good estimates on those kinds of things. So I think if people want to go fish around, they can go find something that'll give them an idea of sort of how a particular feedstock translates through to a ratio of CMF and HTC. And you can certainly find good indicative literature in the academic publications. But we don't really



want to publish that. You know, even with refineries, the particular ratio of products coming out of a given refinery, you know, often not necessarily something that is well published – for good reason, right? That’s really competitive information, and so we would prefer not to do that. Someday, maybe. I could foresee a situation where that makes a lot of sense, but I don't think that's something that we will do in the near term.

Ryan Smith: That works, alright. OK, so this next one, I think there was either a grammar, a typo sort of embedded here, but I'm going to do my best to sort of represent the question. So: “John, if” – and I think it's revenues – “John, if revenues scale like you anticipate they might, where do rates need to be for Origin to build out capacity themselves and maintain margins?” I think this is intended, “as opposed to the asset light strategy.”

John Bissell: Where do rates need to be? You mean like, rate of what?

Ryan Smith: Like I think borrowing rates is what's implied here.

John Bissell: Oh, oh, I get you! I was not thinking that. Yeah, I don't – we don't see it as – the overarching view of Origin's rollout doesn't, isn't something that we see as particularly rate dependent. However, it obviously – it caught us somewhat off guard, the increase in capital cost, and that is somewhat dependent on rates. Not entirely. It's, I'd say, loosely coupled to rates. That rates are – there's one component which is a direct driver of capital cost. But the other major components are more loosely coupled to rates. So we don't see it as – a given plant may be impacted. But generally speaking, you get equalization of pricing and cost if rates stay stationary for a little while, but they can operate, you know, you can get cost increases before you have price increases if you have excess capacity. And so that's one component of what can happen there. But I think we're, I'd say we're more worried about the, rather than financial rates, what we pay more attention to is the ratio of price to capex is the more important thing in the industry as a whole. How much does it cost to build a plant in general versus how much are chemicals selling for, right? That's probably more important for something – a product like paraxylene and PET than your average, your lending rate. And then, of course, as you get into these more performance-differentiated products, that doesn't really matter at all, it's just not important.

Ryan Smith: And when you say capex versus price, you mean that on a per unit basis for both of those, so they tie. Makes sense. Got it. Okay, great. Couple more for this segment. Okay: “John, the original guidance for OM1 revenue was 120 million a year” – I'm not sure if that's right. “Why did Origin scrap that original plan, now saying OM1 is more for customer and OM2 R&D?”

John Bissell: So, couple of things: One, when we put that guidance out originally that was for sort of the fully baked supply chain for OM1. And it was presuming a particular product. And that was going to be a polyester product. What we found – and we did talk about this over time, but I'll sort of recite the narrative for it – what we found was that CMF and the products that can be made from CMF are much more interesting and varied than we had thought they would be. Well, I should say: They were much more interesting and varied earlier than we thought they would be when we put that plan together. And when we started to set up that supply chain. And so, consequently, when we started to shift our products away from polyesters at OM1 as a proportion, let's say, that really quite dramatically changes the aggregate revenue associated with OM1. You know, our goal is to shift it, and has been to shift it towards things that are more profitable and which are more important in the



earlier years of rolling it out commercially. So, things that we can deliver on that are, you know, well priced and have really differentiated performance, that's what we want to be shifting OM1 production towards. And now, of course, as we were talking about earlier, that can generate, that we believe can generate cash flow off of OM1. But it just turns out that even though those may perform better on a cash flow basis, they're not as high of revenue. And the revenue delta there is because, you know, in many cases these are formulated products, or some version – you know, you could use the formulation mathematics the way you want, right? We're putting some of our product in some other product in order to get the final component – final material – and then depending on how much other stuff we have to put in, that could change the revenue pretty dramatically, even though the mass of material coming out of OM1 may not have changed.

Ryan Smith: And so compared to then, now there's more of a focus on getting to sort of profitable products. Is that the right way to think about it?

John Bissell: Profitable products, products that we believe are strategic for demonstration overall, and then products that – and this is, these are all, they tend to be all linked, right? – products that we think perform in a really differentiated way.

Ryan Smith: Right, alright. And this last question overlaps a bit with one of the prior ones around biofuel but is just different enough that I'm going to ask it on its own. “John, can you elaborate on what class of biofuel you are collaborating to produce at OM2 phase 1? Is the product of OM2 phase 1 intended to be a standalone fuel, an additive to existing fuels, or both?”

John Bissell: So we talked about it as marine fuel. We think that's an interesting place to put it for a variety of reasons. Some of those are technical in terms of what's the, you know, what's the easiest thing to make? What fits with existing technology? And then what fits with the direction of the industry? You know, some of the really interesting things about marine fuels are that those engines are very robust and can burn a lot of different fuels very effectively. But, of course, they also require some serious testing, because those engines are expensive. But on balance our view is marine fuels is very interesting. It's also a place where you can have high impact, right? So, there's a lot of stuff that gets burned in order to drive ships around. And so if we can have an impact there, that's valuable. So that's the spot that seems to make the most sense for us initially. But we don't see that as, you know, limited over the long term to just that. I mean, the reality with many of these markets is, look, if we get to the point that we've saturated the market, even for just our component of what we feed into the market...

Ryan Smith: That's a good problem to have.

John Bissell: We have a great problem, right? So sometimes I think it can be a little bit... I don't want to say... wrongheaded, maybe not the right word. It can be counterproductive to try to think past some of these bigger markets. It's maybe giving you opportunities to make mistakes that aren't necessarily, sort of unforced errors by trying to plan for a market that's past one that's already winning if that makes sense. I don't know, I'd have to think about that a little bit more. That's just an intuitive thing. But so, I think, you know, marine fuels is the way we think about that. It doesn't mean it's limited to that, you know, it depends on what you want to do with that fraction. And there are different things you can do to it. Certainly, you can get it to something that's pretty reduced or hydrogenated. And you could do a lot of things with that, right? And you could feed it into a refinery if you wanted to make a



particular thing and do a bunch of additional processing. You know, we'd rather not, we'd rather try to do as little processing as possible and get it into a market. But yeah, so marine fuels could probably go other places, but that's the one that seems like the right spot initially.

Ryan Smith: Great. Well, John, we hit everything. You had, you know, twice as many of these as Rich and Matt so, you did a great run. Thanks for your time. This was fantastic. Really good conversation.

John Bissell: Yeah, thank you. Thanks for moderating.