

Podcast 77 – Accelera by Cummins

Brian: Hello everyone, and welcome to episode 77 of the Hydrogen Nowcast for September 8, 2023. The Hydrogen Nowcast is sponsored by New Day Hydrogen, who's helping fleet owners meet their zero-emission vehicle needs. If you're the fleet or transit operator and your fleet is wondering how to convert to zero emission vehicles but still meet your operational needs, New Day Hydrogen can give you the option of fuel cell vehicles by providing public hydrogen fuel stations near you and showing you the available fuel cell trucks, vans and buses. To find out more information about both vehicles and fueling, visit the newdayhydrogen.com website where you can also submit requests on the contact page.

Well, I expect that most of you listeners know of the company Cummins. Their diesel and gasoline engines are found around the world, powering everything from heavy duty trucks to construction equipment to marine and stationary equipment. Well, Cummins has been active evolving their technologies to reach zero emissions across their product portfolio. And key to that transition is a new brand for its new power business unit called Accelera by Cummins, which acts as the fifth operating segment for the company. And on the podcast today to give us an overview of these changes, we have two senior leaders from Accelera. The first is Allison Trueblood, the general manager for fuel cell and hydrogen Technologies. Allison, welcome to the show.

Alison: Thank you, Brian. I'm happy to join you today and share our view on the hydrogen space and some of the exciting things that Accelera by Cummins has been involved with as we're leading into this new era and how we're thinking about things going forward.

So maybe I'll start with a little introduction about myself, if that's okay. I've been with Cummins since 2007 and until the last few years have largely been in the internal combustion world. I spent the first half of my career on the industrial side of the business with customers in the construction and agriculture industries and then moved into the on-highway side of commercial vehicles. Most of my experience has been in the commercial and general management roles, so I'm by no means a technical expert, but I have been leading the fuel cell and hydrogen technologies business for about six months prior to this. I led our Europe on highway business for a couple of years based in Frankfurt and this is where I started to engage more heavily in the low emission space in close partnership with many of our Europe based customers and then transition to Accelera by Cummins which, as you mentioned, is our fifth business unit solely focused on zero emission technology. So thank you again for having me.

Brian: Well, thank you Allison, and thanks for your time to be with us today and to fill us in on some of the things that Cummins is doing. So next, I'd like to also introduce Alex Savelli, who's the managing director for Electrolyzer in the Americas. Alex, welcome to the show.

Alex: Good morning Brian, and again, thanks for having us on the show. Similar to Allie, I thought I'd just give you like a quick minute of background on myself as Allie. I've been with Cummins for a few years, nearly 30 years, and actually had the opportunity to work in a variety of commercial and general manager roles in both our engine business and our power generation business. So over time this has given me a good perspective on the full spectrum of our customer power needs. In my current role at Accelerated on the electrolyzer part of Accelera. So I'm really focused on standing up our electrolyzer business in the Americas from ground, know, really driving the scale up of the hydrogen economy as a way to help different industries decarbonize. So really look forward to talking about that in more detail today. Thanks for having us again.

Brian: Well Alex, thank you as well for your time to be with know, we've kind of hinted about some of the things that Cummins does, but why don't you start Alex, by giving us a broad overview of Cummins, the company today. I know that many of our listeners will know that Cummins acquired a majority share of the Canadian fuel cell and electrolyzer company Hydrogenics a few years ago. But how has Cummins structured the company to combine internal combustion engines, electrolyzers and fuel cells in order to provide net zero emissions power solutions for customers?

Alex: Yeah, I'll be glad to comment on that. So as you mentioned, Cummins has been around for quite a few years, actually more than 100 year history of innovation and dependability. And we are really at our best when presented with challenges. We power some of the most demanding and economically vital applications and have a deep understanding of our customer needs. And we really play a key role in the broader transition to a clean economy. So we take this very seriously.

Overall, we have this strategy called Destination Zero, which is the name for Cummins strategy to go further, faster, to reduce the greenhouse gas and air quality impacts of our customers and all stakeholders. And this commitment really requires changes to the full Cummins products and the

energy sources that power them. So Cummins' mission is to make people's lives better by powering more prosperous world and our ability to deliver on our mission is threatened by the world's climate challenges that we're experiencing today. So in March of this year, Cummins launched a new brand for its zero emissions technologies and as you mentioned, it's called Accelera. So it is the fifth business segment of Cummins. But what makes us unique, we're really focused solely on zero emissions technology.

So over the last 25 years, Cummins has reduced emissions by more than 90% and invested billions in building accelerate at zero emissions technology portfolio and expertise. The purpose of accelerate is very simple, it's to secure a sustainable future for the industries that keep the world running. And what makes us very unique. We're not betting on a single technology. We understand it will take multiple solutions to decarbonize the hardest working sectors of the economy. And as a result, we have the broadest portfolio of zero emissions products in the market, giving customers technology choice and a bit of flexibility. So just to talk a little bit about our portfolio, as part of Accelera's portfolio, we are providing end to end hydrogen solutions, solving on both sides of the chicken and egg equation. Right, so some of these technologies include electrolyzers for hydrogen production, which is the part I'm working in fuel cells that run on hydrogen, as well as technologies to complete the electric powertrain in a fuel cell electric vehicle or a battery electric vehicle. So things like e-axes and traction systems. And again, what's really unique about Accelera is that we bring all of these technologies together through integrated powertrain solutions. We do see hydrogen as one of the key pieces to decarbonizing major industries and hard to abate sectors. And hydrogen can definitely be used to decarbonize industries such as the heavy-duty transportation sector, industrial processes such as steel, cement, petrochemical fertilized production and many others.

Brian: Right, well thanks Alex, that really does help give us a good idea of what Cummins is up to these days. The good thing is that as of today, in 2023, we're seeing a lot of interest from governments in supporting hydrogen. And a current example of course of that is the creation of the hydrogen hubs here in the US. Now a lot of the emphasis has been on the generation of hydrogen, but we're now starting to see focus on hydrogen uses as well, which I think is really important because after all, we can't have a hydrogen market without both supply and demand. So could you touch a little bit on the importance of government partnership and policy?

Alex: Yeah, absolutely. I think that to really realize that decarbonized economy investment in hydrogen and electric infrastructure must dramatically increase. Right. And we really need the government policies to support and incentivize this infrastructure build out before zero emissions future is really within reach. And I think there has been quite a bit of that done over the last two years in the US. You touched on the hubs, I think there's two major pieces of legislation that are supporting this. Right. So the Bipartisan Infrastructure Law, BIL. And the Inflation Reduction Act. The IRA have really opened green hydrogen production opportunities and the Biden Administration's Hydrogen strategy roadmap further demonstrate that we are getting serious about a net-zero future. Right. In the IRA, the most important provision for acceleration is the Hydrogen production tax credit. It basically provides up to \$3 per kilogram production tax credit for clean hydrogen with an election to instead take up to 30% investment tax credit. On the cost of the electrolyzer though, the market is really driving the production credit. This is a ten-year credit with the credit amount based on the carbon intensity of the hydrogen produced compared to hydrogen made from steam methane reformation today. So it's really technology agnostic and really fosters adoption of sort of low to zero carbon hydrogen. The IRS is still developing the guidance for how the PTC will be applied. In questions are issues related to additionality how closely linked to grid renewables have to be temporality, how we match electricity consumption paired with hydrogen produced, and geography, are we measuring electricity by grid level, regional or more local? And in general? Our principle is that the tax credit should be as easy to access as possible to ensure deployment and ensure American competitiveness. Then touching on the second bill, the Bipartisan Infrastructure Law, the one actually is creating the hubs. Really, the most important provision for the electrolyzer business is about \$8 billion in funding for the hydrogen hubs. So these are networks of clean hydrogen producers, consumers, and connective infrastructure located in close proximity. And then there is also about a billion dollars available for electrolyzer manufacturing. Accelera is directly involved in various hydrogen hubs supporting the different states according to their business case. We're not necessarily directly leading project proposals, but instead we are showcasing our competitive advantages and capabilities and providing budget and competitive proposals on hydrogen equipment, be it electrolyzers or fuel cells. Since the passing of the US. Bipartisan Infrastructure Law and Inflation Reduction Act, Accelera has actually received committed orders for nearly 300 electrolyzer projects in North America. In total, these projects will produce (to give you a sense) approximately 150 tons of

hydrogen per day once commissioned by the end of 2026. So an expanding Accelera's electrolyzer manufacturing footprint to the United States really underscores our commitment to advancing North America's clean hydrogen economy. It is a milestone not only for Accelera, but an important step in advancing global decarbonization efforts. So policies like the IRA Act have definitely helped us spur this expansion.

Brian: All right. Thanks, Alex. Well, I'm glad you mentioned the 45 V production tax credit. I just did a podcast on that and also sent a letter of my own off to the IRS encouraging them to take a better look at some of those aspects of those criteria because I think it could be done a lot better. But thanks for those comments.

Well, Allison, let's turn to you. Now, of course, we're all aware of how California leads the nation in environmental progress and the deployment of zero emission technologies like hydrogen. But could you talk a bit about how technology is developing and how Accelera has seen success in both North America and the rest of the world?

Alison: Yeah, Brian, thanks for asking. I'd be glad to talk about that if I can describe how the technology is developing. In one word, I would say rapidly. We've moved pretty quickly through different iterations of our technology development and where we are currently at, Accelera is focused on our fourth generation already of fuel cell. Actually which will go into limited production in 2025. So coming up pretty quickly, this fuel cell engine, it will support multiple applications across both the on highway and the off highway market segments and this will be for the 150 kilowatt and 300 kilowatt power nodes or we're even looking at advancing to more power. Beyond that, we're thinking about this in terms of more kind of purpose built, if you will, in our approach. And we think that that will allow us to leverage the same core technology across various markets and help achieve some of the decarbonization goals which Alex talked about earlier on in the conversation. And optimizing our fuel cell engine that will run on hydrogen to support multiple heavy-duty applications. It will also help us accelerate the fuel cell adoption by leveraging the economies of scale and the fuel cell optimization across applications. So from a fuel cell standpoint, when we think about target markets, we're really looking primarily at North America and in Europe and in China, and this is where we're seeing the fastest adoption in the truck market, as well as strong demand also for hydrogen and rail actually. So to date we have deployed approximately 3,000 fuel cells globally, which we're really proud of at Accelerate by Cummins.

So let me talk about a couple of examples. In North America. We have several demonstrator trucks. We're partnering with early adopters in the truck segment. This is really helping us with technology learnings and demonstrating product durability, also building commercial credibility in an industry where, as you know, there are plenty of start-ups. So this is where we're really thinking about leveraging the core. The 100-year history of Cummins and all of the technology learnings that we've had along the way through our long-standing history is a century year old company class-eight fuel cell trucks are on the road in California, we are deploying with several Marquee fleet customers and this fourth generation fuel cell technology will be deployed.

You may have seen some of the announcements that we have had publicly with Scania in Europe and with Daimler trucks North America, right here in the US. We're powering North America's first hydrogen passenger train, which is a major milestone we think, and a significant step forward in that transition to a clean urban transportation in the Americas. The Cordia Island train went into service in June 2023 as part of a Demonstrator project to highlight the development and also the marketability of hydrogen propulsion technology right here in North America. And a key element of this project has not only been the utilization of Accelera fuel cells, but also green hydrogen. And so mounted to the roof of the train. The fuel cell works to convert hydrogen into electricity which powers the train. But the hydrogen that is used in the island train, which is manufactured by Alstom, one of our key rail partners, is produced by an Accelera electrolyzer as well. So dipping into some of Alex's business. This is how we're really looking at building the larger ecosystem in our portfolio across several lines of business here at Accelera by Cummins, Europe and the rest of the world. I mentioned we have trains in North America, the demonstrator train. We have several in operation in Europe as well. Also dump trucks and buses around the world, delivery trucks with grocery retailers and refuse trucks as well.

Brian: All right. Thanks, Allison. Well, you know, here in Colorado, I and a number of colleagues have been working for the past four years to deploy the hydrogen ecosystem, especially for transportation, and we're trying to make Colorado the next leader after California. Now, Allison, as I mentioned earlier, what lies before all of us is this need to develop a market for zero emissions energy, and that by market I mean both the supply and the demand. So what are your thoughts on how you see this ecosystem developing around the country and even around the world?

Allison: That's a difficult one, but I think the transition to zero emissions, although it will be complex, there are, if I think about it, several factors impacting the rate of that transition and also the development of the hydrogen ecosystem. A big piece is scaling, and that scaling requires us to look at the whole value chain and to invest in developing both sides of the equation in parallel. And we've talked about how Accelera is innovating to both drive the demand and the supply through an example that I just gave on green hydrogen and then the fuel cell engines. But there are several key factors, I would say, that are impacting customer adoption. The first one is ESG commitments. We see that customers across all industries and markets are announcing sustainability plans and commitments to their end customers and their stakeholders to decarbonize. But we think that these ESG commitments are an important factor in driving customer timelines for transitioning their fleets to low or zero emission technologies.

The second one that I might mention is technology readiness. Customers can make these commitments, but then their ability to transition their fleets is highly dependent on their access to the solutions that work and that are ready to be deployed effectively in their specific application as well as their own willingness. Also, some customers are early adopters wanting to lead in their industries with cutting edge solutions, and others fall into the late majority or laggards, and they need more extensive assurance and validation before considering these new technologies. So as I think about from a business standpoint, again, going back to some of our goals with these demonstrators is to continue to build that credibility so the market truly understands that the technology is ready, although we continue to iterate and develop better solutions for our customers.

The third one, I would say, is total cost of ownership. And for customers to adopt a technology into their fleets, it has to make economic sense. So when you think about those upfront capital costs and the cost of charging or refueling and any potential impact on payload, the ongoing operational and maintenance costs, all of this plays into the total cost of owning that vehicle over its lifetime. And as time goes on and adoption of new technologies increases, the supply chains become more mature and costs do come to parity. And the last one that I would say, Brian, is infrastructure, which is integral to both technology readiness and the total cost of ownership. It's the availability of a charging or a fueling network. And each of these are unique and require different infrastructure technology. So for low or zero emissions technology to be a viable replacement for diesel or other internal combustions, the fleet must be able to be charged and fueled with a comparable ease and accessibility to diesel fueling. And right now, this just isn't the case.

And a dramatic infrastructure transition is required, particularly here in the US. We're seeing some of this movement elsewhere across the world, which is enabled by various government policies. And this is a critical piece of our joint success here within America. But underpinning all of these factors is the policy that enables the investment and the buildout of the zero emissions ecosystem. So government partnership really is required to subsidize the massive investment that is needed to make the energy transition possible and enable that adoption. And the amount of this and the fact that how much the government I would say is willing to support varies dramatically by region, as I just mentioned, and all over the world and everything from cost of renewable electricity to investment in innovation and workforce is impacted by the unique policy landscape that our customers are operating in. Therefore their ability to transition to zero emission technologies.

Brian: Well, thanks, Allison. And I really want to compliment Accelera for recognizing that you've got to develop this entire market, the supply, the demand, infrastructure, and so forth. You'd be surprised at how many times I get calls at the Colorado Hydrogen Network of people who want to sell hydrogen, and they're asking where the market is. And I have to tell them, well, you have to earn it the old fashioned way: you have to go out and develop that market. So I'm glad that Accelera has gotten the memo on that. Well, let's see. Allison, could you tell us a little bit about the technology and applications and really how you see these markets developing? We already talked about scale a little bit, but how is Accelera addressing that?

Allison: Yeah, Brian, hydrogen can be used in many applications. School coach and transit buses, light, medium, heavy-duty trucks, passenger and freight, rail, marine primary and backup, stationary power. And as I mentioned here, at Acceleration, we are targeting North America, Europe, and China, which is where we are seeing the fastest adoption in the truck market, as well as the strong demand for hydrogen and rail.

Brian: Okay. Thanks, Allison. Alex, let's turn back to you. Could you talk a little bit about the ideas that Accelera has for scaling the company for greater production as these markets grow?

Alex: Yeah, I'm not sure Brian and I'll speak at it more from an electrolyzer perspective, but when I think about hydrogen producing equipment such as electrolyzers and the challenges scaling up, I tend

to think in two pieces, right? One is actually increasing the size of the machines or the electrolyzers we offer, and then the other one is working to increase our manufacturing and supply chain capacity to produce the full range of electrolyzers on the first piece. We currently today have a range of Alkaline and PEM proton exchange membrane electrolyzers that are capable of producing anywhere from a few hundred kilograms per day up to two tons of hydrogen per day. And we are currently developing our next PEM electrolyzer product, the HyLYZER 5000, which will be capable of producing ten tons per day. So just with this new product, it's going to be five times production of our HyLYZER 1000 and that will basically allow us and enable us to do even larger projects so that's on the product then moving on to the manufacturing capacity on the second piece. Accelera has experienced scaling production to meet increases in demand. And as I mentioned before, because of growing hydrogen economy and increase in government support, we began electrolyzer production at our existing Cummins facility here in Friday, Minnesota in April this year. So this is our first electrolyzer production site in the US. Where we actually have dedicated 89,000 existing facility for electrolyzer production. Our Friday plant today, it already produces quite a bit of our power generation product range, so some cases very large gen sets that actually resemble even what an electrolyzer looks like from a mechanical and electrical assembly. Right. And Friday really has experience in scaling up production. We know how to seamlessly move from stationary build to assembly build more as a flow line, which is what we actually have done with our large-scale generators. And we actually plan to do exactly the same thing with electrolyzers in the future. So Accelera's ability to leverage our existing manufacturing siding freely along with our engineering and sourcing knowledge, allows us to really meet this increased customer demand and continue to accelerate clean energy transition, which is very exciting to be part of and actually to really help the green hydrogen promise become a reality one day.

Brian: All right. Well, thanks, Alex. Listeners, I've been talking to Alex Savelli and Alison Trueblood of Accelera by Cummins and I want to thank both of you for taking the time to be with us today. Now listeners, the website for Accelera is [Accelerazero.com](https://www.accelerazero.com). That's spelled A-C-C-E-L-E-R-A-Z-E-R-O. All one word. But if listeners want to reach out to Accelera directly, Allison, should they do that through the website or is there someone in particular they ought to contact?

Alison: Directly, [accelerazero.com](https://www.accelerazero.com) is the best place to find out more information about our technologies and our applications and how we're accelerating the shift to zero emissions.

Brian: All right, great. Well, thank you. Well, is there anything that either of you would like to add before we end the podcast?

Alison: If I could just add one more thing, Brian. I want to talk a little bit about how we're continuing to innovate and invest across our entire portfolio of power solutions to help our customers through the energy transition. And we're pursuing new business models and opportunities that will drive Cummins' long-term growth well into the future. This includes advancing traditional technologies like the internal combustion engine and advancing zero emission technologies like battery electric and fuel cell electric powertrain solutions, and also hydrogen producing electrolyzers. We've had some notable firsts like powering the world's largest PEM electrolyzer in operation at 20 MW in Beckhamcore, Canada. And also Powering, North America's first green hydrogen passenger train, which uses Accelera's fuel cell technology in conjunction with green hydrogen powered by an Accelera electrolyzer.

Alex: I think just to add to that too, we also have some really exciting recent announcements. In July this year, Accelera and Bluebird actually premiered the next generation of electric school buses, which feature the Accelera 7000, the newest version of its electric powertrain system. And then the other project we also announced on the electrolyzer space was a 90-megawatt green hydrogen production facility that will actually use our new HyLYZER 5000, the largest PEM product that we will produce. That's the one that can produce ten tons of hydrogen per day for each machine. So there's five times more hydrogen than any of our PEM products today and can really accommodate the power needs for large scale hydrogen production. While we largely see bus as an application suitable for battery technology, we are working with customers on both battery and fuel cell solutions for buses to meet various needs. So these are just a couple of recent announcements. There's obviously a lot of work that we talked about that hasn't been publicly announced that we're not at liberty of sharing. But I can tell you there is a huge momentum across full range of Accelera portfolio, and we really look forward to continue to contribute here to accelerate the shift towards a zero carbon future.

Brian: Well, thanks Alex, and thank you, Allison as well. Boy, there's a lot of exciting things going on at Accelera, so encourage the listeners to take a look at the webpage, which again is [Accelerazero.com](https://www.accelerazero.com). So, listeners, if you enjoy listening to the Hydrogen nowcast, consider subscribing to the podcasts and also give us a rating in your podcast app. A good rating helps us be discovered

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