



Alexa Fitzgerald: Hi, everyone, thank you for joining. We will begin in just a minute after everyone filters in. In the meantime, I'm going to read a brief disclaimer. Members of the media are not invited to participate any publication, distribution, reproduction, posting, sharing, or transmission of this information without the express permission of TD Cowen is expressly prohibited. As a reminder, we are not interested in receiving, and you should not disclose any confidential information. In the event that you inadvertently disclose such information, please notify us as soon as possible. And now I will pass the call over to Josh Buchalter.

Josh Buchalter: Thanks Alexa, and good afternoon everyone. Thank you for joining me in the latest installation of the ADI Uncovered series. Today, we're going to focus on the electrification ecosystem. We'll dive into everything electrification from energy storage, and generation from the grid to EVs and discuss how all throughout this process, ADI's products help, store, manage and convert energy.

I'm Josh Buchalter, semiconductor analyst at TD Cowen, very pleased to be joined by Dr. Greg Henderson, senior vice President of automotive energy communications and aerospace at ADI. I don't know if we left out any business groups there. Dr. Henderson will give an overview of his background. Mike's going to kick us off with a brief introduction, and then Greg's going to speak for about 10 to 15 min and walk through some slides before we dive into Q&A. ADI Team, Thank you for having me, and I'll turn the floor over to you.

Michael Lucarelli: Great thanks. Thanks everyone for joining us. I'll welcome you as Josh did. ADI uncovered is probably our seventh edition. This is the second one on sustainability. First slide. Everyone's favorite slide lot of words, not going to read them. So go to the next slide. So, if you saw us in June, we did a deep dive Uncovered on energy efficiency and industrial market and Giga factory. Today, we're diving on the next one... electrification - mobility and the grid. Currently, about 30% of revenues are associated with these sustainable use cases. Like I said, industrial and building efficiency in June. Today, we're going to dive deeper on electrification, mobility, and the grid.

And again, I was the 30% revenue that's growing quite rapidly. Greg will talk more about that. Really, if you look at the right side of this chart. Why is this the same use case the top part of the blue? The 2x was really about the factory and energy efficiency. Today we're dive more that 9x, how we get that 9x reduction and get to net zero from electrification, renewables, and that that type of stuff. And with that I'll pass it to Greg.

Greg Henderson: Yeah, great thanks, Mike. So, I think that this chart that Mike has anchors. You know what the world needs to do in efficiency and sustainable generation to get to net zero. If you zoom in a little bit just on the energy transition side and renewables. You know, the amount of investment that's needed to get to net zero is really massive. You see, a significant increase in, I would call it clean energy investment.

Significant increase investment from 2019 to 2023, you can see that increase. But estimates say that to get to net zero by 2030, you need to have nearly a 3x improvement in the amount of investment to 5 trillion dollars by 2030. And these are investments are all in these areas of electrification and grid areas that ADI plays in. EVs, meters, infrastructure, and storage, and we're going to talk about that today. So, if you zoom down one more into kind of that electrification as a business and Mike pointed this out, today ADI electrification is a business that's over a billion dollars, and it has a significant double digit growth rate.

If you look at the left-hand side, this is the historical growth of our electrification business, and, interestingly, you know, go back a large number of years, we were in grid, but it was relatively small, and it was growing kind of slowly. The EV market has grown significantly, and today more than 50% of our revenue in electrification is in EVs, but it's there is kind of a balance there between EV and grid. And actually, over time, we've started investing significantly in the grid side as well.

Over the next, say, 7 years, both the EV side and the grid side are going to drive growth, but the grid side will grow faster, and it's going to be about balance 50-50 revenue, we estimate in 2030. So, this is a double-digit growth business for ADI, and actually, the SAM for this market. This electrification market today for ADI is about 5 billion dollars. We estimate that'll grow to about 13 billion dollars by 2030.

And there's 3 main platforms that we talk about in electrification. And this is maybe a different way of thinking about it. We've talked a lot about our position in the EV, but we really think about it inside the business as platforms. And there's 3 main platforms: one is about energy storage, one is about energy management, and one is about energy conversion. The storage platform is really anchored around our BMS business. The bulk of the storage business today is in EV, so that's our battery management solutions in EV. But there's actually also solutions for the grid, and I'll talk about that a little bit more. So that's energy storage in the car and for the grid.

The second platform is about energy management and our energy management platform is a precision metrology platform. This is technology we've had for a long time. But the reality is we've upgraded this technology to be able to have best in class measurement, security and be able to simultaneously measure A/C and DC in a very cost-efficient way. And if you think about metering, traditionally, this kind of energy management was really just at an endpoint- it's a meter at your house, but as you have a sustainable grid, you need to manage, measure a lot more points across the grid. So, there's a large growth in energy management- that's our second platform.

And then the third platform is about energy conversion, and this is about high power, energy, conversion from a battery to the grid, from a grid to battery. This is an area where we have a relatively low share today, but we're starting to develop solutions, and we'll talk about that as well. And so, across these 3 platforms, they represent that 13 billion dollars SAM, and those represent the double digit growth that we're going to drive in this business. So, I'm going to dive down a little bit more, and just talk a little bit more about each of these platforms, and how they play an automotive and on the grid side.

So, starting an energy storage is our storage platform and EV. I'm not going to go into this in great detail, because we've talked about it a lot, but suffice it to say, you know, we are the market leader and battery management for EV. We're on our 8th generation solution you show over there that we're in 16 in the top 20 OEMS.

And our solutions, you know, we have a have leadership share across the market. Our solutions have leading technology to allow best in class range, support, advanced chemistries. And our 8th generation solution actually has advanced technology about edge sensing. So, we've evolved our battery management technology so it's no longer just about measuring the voltage on the cell and the current into the cell. Our latest generation technology actually has what is a little bit of a complicated term. But we call EIS that allows you to send a signal into the battery cell and extract information about what's going on inside the cell.

You can get information about the cell temperature. You can get information about the chemistry inside and get much more advanced information on state of charge and state of health. So, we're the market leaders in battery management for EV and the majority of our BMS business comes from EV, but actually, we have a significant BMS business that also comes from the grid. And today, about 15% of our revenue in battery management comes from the grid. It started out, we literally sold exactly the same solutions that we had for EVs into the grid. And you can see on the left-hand side of this chart that we anticipate significant increase in grid storage. Our solutions have already enabled over 80 gigawatt hours of storage to date, and we're a market leader in the grid side as well.

We started out selling our automotive solutions into the grid. Now, we've been optimizing these solutions for the industrial market specialized to make sure that they're supporting the chemistries that are being used in industrial use cases, have the functional safety that's required for the industrial use cases, and this is also going to be a growing area that's going to help grow that grid side of our business.

The second platform I want to talk about is our energy conversion platform. There's kind of 2 pieces to energy conversion inside of our electrification business. The left hand side of this chart talks about what I'll maybe call our more traditional energy conversion business, and this is ADI's power management solution inside of automotive.

We're the market leader in functionally safe power management solutions. So if you want to think about it anytime you go in the car from a battery to electronics, whether it's a sensor at the edge or you're powering a radar, you're powering a camera, or if you're powering a processor in the core of the vehicle, we have a market leadership in these functionally safe power management solutions and we're very well represented across the ecosystem.

That's a big part of our power conversion strategy. But on the right-hand side I'll talk about kind of a SAM expansion for AI and this is in that 13 billion dollars of SAM I showed you that's growing for us. We actually have a very low share in this today. But we're starting to develop solutions around high power energy conversion. So, this is where you're taking power say from the grid to a battery or from the battery to a grid.

And I have example here of a solution we're developing, which is our what we call our smart charger for an onboard charger that includes silicon carbide. It's a complete system, level solution for the onboard charger. It has significant advantages over the current solution that's out there in the market. It's about 50% smaller. It has advanced fault response, and also will support bi-directional charging so that your car can power your house just like you can charge from the house to the wall. And another thing, it's really important is not only is it 50% smaller, but if you've ever picked up one of these on-board chargers are really, really heavy. There's a lot of metal in there, and that reducing size is also reduction of metal and overall system cost. So, this is a SAM expansion for us that we believe could add up to \$50 of content per EV, so it's a big expansion area in our power conversion.

So, I hit energy storage as platform one, energy conversion as platform 2, platform 3 is about energy management. As I said, here this is about precision metrology, where we're accurately managing the flow and transition of energy when it's on the grid, on the grid or off the grid, or between something on the grid. So, for example, you're going from a solar system to a battery or from the battery to the grid, and as you get a sustainable grid, it's a lot more important that

you accurately monitor the flow of energy around the grid because there's a lot more variability. There's variability to the supply that's coming on.

There's also variability to load. Because when you plug in and EV, it uses a lot of power, so you need to know how the energy is flowing. And so, because of this metering units which are not any more just in your you know the meter on your house, but it could be in a charging station. It could be on your onboard charger; it could be other places. Metering units, we actually believe we're going to grow 17%, between now and 2030, and we have the highest accuracy metering solutions, and actually some very innovative technology to allow you to have a very low-cost system level solution for this metering. So, our solutions are well represented across the ecosystem. This is the third platform of the growth driver, and it's a significant content increase for us or what we had in traditional metering as we go to these advanced systems.

So, if you zoom out, you know, we talk about the impact. Mike mentioned this at the beginning-the electrification business, which is over billion dollars is a significant chunk of this 30% of revenue that comes from these green use cases. And this chart, the 30%, this came from our sustainability report that came out this summer, our 2022 ESG report. And in this we map these sustainable use cases and our revenue that goes to these clearly sustainable use cases.

What I show on the right-hand side of this chart. So, Mike talked about the 30% of revenue comes from that, and it's growing at the high end of ADI's growth. I would say, leads to the right-hand side of the chart. If you do a thought experiment and you said, okay, if you take these sustainable use cases that ADI is investing in. What's the potential impact on getting the world to net zero? And so, Mike talked at the very beginning that some of these sustainable use cases are about eliminating emissions - that's what I talk about here on electrification. Some of the sustainable use cases are about improving efficiencies. So that's reducing the energy that's used in a factory for example.

If you take these use cases for reduction and elimination, we estimate that this thought experiment, if these are fully adopted, so these use cases are fully adopted. So, for example, EVs are 100% adopted on the road, then we can attribute that those use cases could eliminate up to about half of the global emissions. So, in this way, I think, what's important. Now we look at this is that electrification is a great business for ADI, it's a double-digit growth driver, but it's also it's a great purpose that we have a clear role to play in enabling the world to get to net zero and with that it kind of hits the takeaways. You know, our electrification solutions are a key enabler to getting the world to net zero.

It's about a 13 billion dollar SAM, for Adi in 2030. That SAM is growing our share is growing, and we have 3 leadership platforms that I talked about energy storage, energy management and power conversion. And this is going to drive double digit growth in this 1 billion dollar plus business which is going to be a growth driver for ADI. So, with that hand it back to you.

Josh Buchalter Thank you, Greg. Really appreciate it. To start the Q&A guess I wanted to talk big picture slide 4, you showed the industry needs to grow from 1.7 trillion dollars of investment, which is frankly a staggering figure up to 5 trillion by the end of the decade. This is kind of a simple question. But where's all this funding coming from? And would you know you're out there speaking with customers every day. How much of that is coming from them? How much requires government investments? And essentially, how do we get from the 1.7 to the 5 trillion in the next 7 years?

Greg Henderson: Yeah, I think it's a, it's a great question, Josh. I think that there we think we're at this kind of tipping point. I mean, you can see it needs a tipping point to go up. But we're at this tipping point. First off there is a lot of government money. So, if you look at the like, you know things like the IRA in the US there is a lot of money for infrastructure for EVs and infrastructure. Then Europeans talking about the green new deal, so there's a lot of government money. But I would also say that our customers are requiring and demanding one thing you may have noticed, ADI actually, it was a publicly announced Apple has a renewable energy agreement that they announced suppliers have signed up to have 100% renewable energy for their products by 2028. ADI has signed up with that. But that's our customers saying that's something that they need. And that's not just that customer across our supply chain. Customers are saying, hey, we need green solutions. ADI ourselves are transitioning all of our factories to renewable energy. So, there are government drivers, there's policy drivers, there's government investment. But there's also a trend with companies, and the industry that's moving that way. So those 3 things together were bullish on the on the growth of this market.

Josh Buchalter: Got it. And so, you mentioned ADI is generating more than a billion dollars of electrification revenue today, half of that's coming from EVs. In my conversations every day, there's a lot of skepticism on EV attach rates and adoption, despite all the progress to date. That skepticism is range anxiety, charging infrastructure, or whether or not the grid can support this. What are the key challenges. You see what needs to happen, and where do you peg EV attach rates exiting the decade?

Greg Henderson: Yeah, look, I mean, EVs have grown very strongly. And we're still, we still have a strong growth model for EVs. And we believe that they're going to continue to grow. I believe it's a, I personally believe the next EVs are past the tipping point, you know.

Our view is that the technology is evolving to the point where EVs are becoming very cost competitive and becoming a better, a better value solution. The total cost of ownership is actually lower. Our role in that is we're developing our battery management solutions. Next generation solutions. We continue to evolve the total solution costs and the total cost of ownership for our customer. So, for example, the latest generation solution that has this EIS algorithms to measure state of health information about the battery and our wireless battery manual solution that simplifies the manufacturing flow. We're doing our part to reduce the overall system cost.

So, I would say, part of it is just the cost structure of EVs, which, if you look at it is coming down greatly, and we're doing our part for that. And then the second is about the grid. So, there are a lot of investments and grid that you know people have the range anxiety. But the number of chargers continues to go up. And again, we're creating the key technology to try to enable that. So, our view is that this will continue to grow, and so we're positive towards these trends of, you know, 30 to 40% adoption.

Josh Buchalter: I guess are you confident that the grid is ready, or is this going to be 2 steps forward, one step back type of adoption where we kind of have to see the used case before the grid catches up with EVs.

Greg Henderson: I mean, I think there's a, you know, it's interesting. You the grid is better than people think. And partly it's due to these technologies we talk about. Right? So, for example, you may remember, 3 years ago California had these brownouts, right? And so, they had these brownouts and then actually, this last year California had horrible heat, and but they didn't have any brownouts. Well, one of the reasons they didn't have brownouts is because a lot of people

have home storage units. And so actually, California has a system. You have a home storage unit. You can actually sell your power back.

And those home storages, there's analysis is those home storage units had a real material impact on keeping California grid from browning out and again interesting for ADI those home storage units that are in California. They have our battery management solutions in there. Also, the metrology of this metering that talk about this monitoring of energy are in those home storage rooms. So that technology is core. So, my view is that the grid is evolving, as the use case is evolving. The other thing to know, we talked about this, our onboard charger that allows for bidirectional charging. Once the utilities and the car makers enable cars to do bi-directional. That's going to also have a big impact on making the grid more stable and providing energy. Most people don't know, but as long as you don't run your air conditioning, your EV could run your house for a week. So, for people that don't have like a backup generator, and the power goes out like it does here in New England sometimes that's it. So, I think these things are evolving together where our view is the grid will be able to keep up. And actually, some of these technologies are, it's kind of this reinforcing.

Josh Buchalter: So, I want to dive into the products a little more explicitly now. Maybe there's a narrative for investor perception out there that because ADI doesn't have, high-voltage power discrettes, you're not an electrification play. You touched on it throughout the slide deck. But could you maybe walk us through some of the key products and technologies that ADI offers that you expect to benefit most explicitly from electrification from the grid to EVs?

A: Greg Henderson: Let's start with the silicon carbide question because you asked that. And we talked about this, I think. Well, I'll take the 3 platforms for a second our storage platform, we are a market leader today, a very high share in a very rapidly growing market. Our management platform this is a SAM expansion for us, because the number of meter points are going up significantly. So, it is going from traditional meters on your wall to this large amount of metrology. So that's a manage.

The third platform, which is the energy conversion. This is really untapped sample. And so, in that 13 billion dollars, there's billions of dollars of SAM that we really don't have share in today. This is about high power, energy conversion. So, we have a few small components we sell into a single chain. But now we're building system level solutions. So, for example, that on board charger, that's a complete system level solution for onboard charging, it does include silicon carbide. So, we don't manufacture the discrete silicon carbide. But we have supply chain partners that are providing that silicon carbide that we provide as part of the solution. Our value proposition, though, is in the complete solution there that includes that silicon carbide it's not in selling that discrete. So, we do have access to that technology, we're not in the market to sell discrete silicon carbide devices. But we are selling system level solutions that's based on that. And that's part of the growth.

Josh Buchalter: So many of the companies that do sell the silicon carbide power devices also have smaller analog IC businesses. Is that- do they have the advantage of the incumbency there with the power discrete. How does ADI sort of break into that system? And how important is software and usability to your customers in that equation?

Greg Henderson: Yeah, I think I mean, the way we look at that is that if the system is dominated by this discrete device, then that's not really the position for us. But if there's a lot of system level value that we can offer that saves our end customer money and provides value to them. That's the that's where we play. And actually, you know, ADI tends to be a high value

supplier. So, yeah, we have competition in all these segments and battery management with competition, all these segments. And there's always somebody that's trying to sell something, I'll call it similar, at a lower price. But the reality is that we try to optimize the system level solution and our approach is always to design system level solutions. The system solutions tend to have hardware and software that we provide to our customers. Our wireless battery management solutions, a great example of hardware software, our battery algorithms that go on top of the battery management system for making state of health measurements or temperature are part of that software.

But we always try to provide a benefit, so that the system cost to our customers is lower, so we are able to extract the value because we sell at value, but those need to turn into system level costs benefits to the customer. They can use a smaller battery pack for example, or in the case of the battery temperature cell temperature is a big part of fast charging. They can offer a faster charge than any of their competition that has a value to them. So that's kind of how we look at software and how we try to sell it out.

Josh Buchalter: Got it. So, it's clear from playing time with the team that you're investing a lot more in software, could you maybe, I guess, provide some more explicit examples of how that results in savings for your customers, and how that can serve as a moat for analog products. It is admittedly harder to conceptualize in the analog world than it obviously is in the digital world.

Greg Henderson: Yeah, so maybe take a few examples. Right? So, you know our, we, the majority of our revenue today and battery management from our wired battery management system. We talk about being on our 8th generation, but we have a wireless platform. We have a number of OEMs that are going to production with wireless battery management system today. But the value proposition of wireless is very different. Right?

So, the battery management system itself costs more. And you know, ADI collects more revenue for the semiconductors there, because you have all that wireless connectivity. And there's a lot of software in there, right? Because that wireless battery is a software stack solution for the connectivity. Basically. So, there's a lot of software that goes to that. And actually when we sell that solution. We sell both hardware and software to our customers.

But the value proposition to our customers is, for example, that they get to eliminate all the wiring harnesses, and that allows them to fully automate the manufacturing of the battery pack as opposed to having that people as part of the assembly. So, these are kinds of examples where there's a value proposition to our customers that's different than the cost of the problem and it's based on something.

Josh Buchalter: It's kind of a similar vein to the previous question. Your big unique is not having a scale microcontroller franchise, but I think overlooked within that is the fact that you have a very robust DSP business. Is that becoming more important? Can you talk about some applications where you know the I guess the new on. We might not fully understand the nuance between what a microcontroller would do and what the DSP would do and how that interfaces with your analog broader analog portfolio?

Greg Henderson: Yeah, I think you're. I mean, you know, we don't have a broad, based microcontroller franchise but we have a lot of processing capability. Right? So, we actually have in automotive. We actually have a DSP franchise which is for audio processing where we're the market leader and audio processing, not the topic of this conversation, but also a good business for ADI also investable theme. But we have a strong processing franchise, and

so our battery, our wireless battery management solutions have integrated processing and a lot of software that goes around it our latest generation battery management solution that does this state of health and stat of charge temperature solutions also has processing solution in it. So, we have processing capability. But we tend to provide them in these vertically integrated system level solutions.

We also have a complete reference design, for example, the meter and that complete reference design for the meter has processing in it, it has all of our metrology. So, these are areas where we offer where we have processing.

Josh Buchalter: I'll shift gears a little bit, and, I guess, dive into applications more explicitly. To ask a similar question to the product. But from an application standpoint, could you walk us through how Adi's content changes as we move from an ICE engine to an electric vehicle. And you gave some, you know, chunky sockets like the high voltage switch and BMS, but more broadly, as data and power need to be distributed and stored in a whole ton of new places in the vehicle. How does ADI's actual content benefit in the car?

Greg Henderson: Yeah. So, I mean, I think if you think about. We're just going to talk about the electrification side here, because actually, we have a big cabin experience business that is audio connected with hundreds of dollars of content in cars that goes with that. But here just talking about the electrification side. Right?

So, if you start with like traditional power train you know, we didn't have a lot of content, we had some but not a lot, so maybe \$10 to \$20 of content in kind of traditional power train. You go to an EV with battery management. Our solution about \$50. So, battery management, about \$50. And then our wireless solution adds, maybe another \$50 of content on top of that. So that's that. We're also now offering these advanced algorithms around state of charge, state of health so that adds on top of that.

And then we're adding other capabilities like this onboard charger that, I said. It's up to \$50 in content a car. So, you can see there's an additive factor that's well over \$100 of content in EV that compares to that 10 to \$20 back in an ICE car.

Josh Buchalter: Same kind of question. But you know, we struggle on the investing community side of trying to quantify industrial applications. And we're we get unit data for cars. It's harder to find for broader industrials. Can you walk us through what the content story is in applications like charging infrastructure, energy, storage and solar, and how meaningful that can be to the broader electrification business.

Greg Henderson: Yeah. So maybe you walk through the 3 platforms right? And kind of try to. It is more diversified and more complicated and industrial than like content per car, right? But if you start with like the storage side today, you know, thing to understand about BMS is to first order. There's kind of a cost per channel. There's advanced features. But even the features, like the algorithms kind of go per channel, right? So, there's kind of a cost per channel.

So, if you think about energy storage as you go to gigawatt hours, you think about how many channels there are. So, I think one thing to realize there is that would you know, we've enabled over 80 gigawatts to date. About 15% of our revenue and BMS comes from storage and it's kind of, you know, the economics are not that different in the channels of energy storage versus the channels of the car, so that it helps you kind of understand how to think about how to think

about the content in the storage system. It's really how many channels there are, and therefore how many, which relates the kind of gigawatt hours of capacity, I guess so that's one thing.

So, storage systems. You know, they could be from small home systems where it's smaller than a car to these very huge grid system, which is way bigger than the car. So that's a range that you know, it could be a fraction of a car to lots of cars. I guess that's the way to say then, if you go to the metering, I mean, I think you know, you can think about the metering solutions, tens of dollars, kinds of things, tens of dollars in metering platforms. It depends on. You know, higher end or lower end, and how much content. But then that's kind of that. And then I think if you. If you think you go to things like charging stations, you can have anywhere, from tens of dollars to hundreds of dollars, depending on how much content. You know, we're being used solutions like our smart silicon carbide solution. You can get hundreds of dollars into things like charging stations, right? If you think about it.

Josh Buchalter: Got it. I want to switch gears again and talk a little bit about competition less fun topic. But the elephant in the semiconductor universe right now is China. And there's widespread concern about increased investment and competition and mature. No semiconductors explicitly. I realize this is important market for you guys, EVs, for instance. Are you bumping into Chinese competition more and more? Can you talk about what you're seeing there. And are there any specific verticals or products where you're seeing more or less competition come on at increasing rate.

Greg Henderson: I mean, you know, we have a lot of competition globally. We have competition from all the regions, including competition in China. Right? I think one benefit for ADI is that we don't you know, we don't target being the product cost leader. We, we try to sell all the value and then have system cost benefits that come from our value. So that puts us at the top end of the market. Our strategy is – have best in class technology – be able to sell at a higher premium. I guess if people are that way because we're provided more value.

And so, we have strong share in all the regions, including in China. So, we do see competition from the domestic competitors in China. Just like other people do as well. But that, said the Chinese Customers, still value our technology, and as long as they're able to buy it they continue to want to use it. So, we're, you know, we're always mindful of competition everywhere. We're going to have competition. But we're comfortable with our position. And I think in some ways it's more painful for other people that have a different strategy than ADI here, where we have the most advanced solution.

Josh Buchalter: Well, I mean, are there other specific applications like consumer will see it faster versus auto, and then, you know again, just double clicking on it. There was a report out recently that BYD had shifted some of its BMS, solutions that were ADI to an internal solution. any background you can give on that. And then, you know, maybe, what led to that decision, and I guess how big of a risk.

Greg Henderson: I mean, I'm not the I mean I you know. I guess I I'm not the expert to talk about the relative. Say the consumer market to the auto market. Because I, the consumer, is not my business, but auto is my business. I mean, what it can say. Right? I mean is that we? We are seeing local competition in China for technologies like BMS, But, like I said, we still have the most advanced technology. Our generation has capabilities that everybody wants, including customers.

Josh Buchalter: Got it. I guess sticking to the less fun topics. And we spend a lot of time talking about big and important long-term investments that need to be made is going through a period of digestion. Right now. Can you talk about your customers? Willingness to invest as you walk through as you go through some of this digestion, I mean, how have your conversations changed for markedly over the last year or so? And then I, you know, want to ask also, you know, how big, how much can the electrification business grow underneath as you go through this digestion.

Greg Henderson: Yeah. So, I mean, it's clear that they're obviously through the supply chain crisis. There was inventory to some degree everywhere, right? And the auto, the automotive businesses working through some of that inventory. That said, you know, we kind of seem it's a long term. The auto and EVs are still a growth driver for ADI, and actually probably maybe in a better place than some of the other markets in terms of overall inventory. Because it was such the cars were so far down. So, the way we look at it is that EVs are still growing as a relative share. And so auto and EVs are still going to be a growth driver for ADI through this time. So, you know, we had to work through this kind of I'll call it short-term issues. But medium to long term were very positive.

Josh Buchalter: It sounds like you're still confident is that billion-dollar electrification business that has grown at a 40% CAGR the last few years. I know you put up a slide that said it should grow in a 10% CAGR through the decade. But you know we get questions from investors. And what about? They don't like to look out through the decade. Necessarily, you know. What about the one next one to 2 years? Again, as we walk through the digestion period and try to pin you down on how much the electrification piece can grow.

Greg Henderson: What I think I say first is, first, I just anchor that through that slide to 2030, electrification business is a double-digit growth driver. And so, you know, its teens, not 10%. So, it's going to grow faster. I think that's our view. And I would say, even for the next few years, so we see we see that electrification is going to grow for the next few years. It may not grow as much as it did last year in the next year, but overall. It's going to be a growth driver over the next few years. And on that trajectory of teens growth.

Josh Buchalter: This is going to sound ironic, given the last 2 questions I asked you. But how do you feel about your ability to secure and build out capacity over the next few years? I mean particularly given the like a big picture. You can't manage the business for cycle to cycle. But how do you feel about capacity? And how important is that to your customers more importantly.

Greg Henderson: I think couple of things. One is that we've done. We made massive investments in in capacity over the past number of years to secure capacity for ourselves also with our supply chain partners also put a lot of effort into resiliency. So, having geographic diversity to our capacity. So, we feel very strong about our strategy. We have this hybrid model, which is kind of a model combination of internal and external capacity that we can swing back and forth and specific to the electrification business. We have a strong position of capacity, both internal and with our suppliers to be able to support the growth strategy. So, we're not concerned

Josh Buchalter: Got it. And then, I guess, certainly back to BMS again. You call that design into 16 of the top 20 OEMs, and you shipped to nearly 20 million cars. How big is that business today? And what's a reasonable expectation for the growth rate. And then, in particular, any market share data you can give or and where are we in the adoption moving from wired to wireless? And how do you see that turning in the next few years?

Greg Henderson: So just a little bit of anchoring, right? So, the electrification business is over a billion dollars. So about 600 million bucks is our BMS business. So that gives you a relative percent. So that tells you that that BMS business is a relatively high percent of our electrification business today. But the other areas are growing.

The vast majority of that revenue today is all wired BMS, right? There were a lot of designs in in that multiple OEMs globally. So, we are in process of bringing OEMs to kind of volume production with wireless BMS.

Over time our view is that some let's call it 40 to 50% of the market is likely to be wireless. It's on. It's unclear right now. Some OEMs are very committed to wired. Some OEMs are very committed to wireless. Some OEMs are using both. They're trying to make sure how do they see the tearing of the market between the value proposition, so like our current model is about, is about half.

Josh Buchalter: And it was interesting. You call that earlier. Taking your BMS solution meant for autos and bringing it to energy storage. Where are we in that curve? How meaningful can that be over the next few years?

Greg Henderson: So, I think the way. And again, about 15% of our BMS business today is in energy store. Relatively speaking, that percent will go up because, relatively speaking, storage is going to grow.

So, it, you know, I think, for the foreseeable future the majority of BMS business still going to be in car. But storage is a significant thing, and there's different models to how fast that storage is going to grow. So, you know, if the faster models happen even more, it could be even more significant. But, relatively speaking, the sharing storage will go up but for the foreseeable future EVs are still the larger percentage.

Josh Buchalter: And is there a lot of R&D or software investments that you need to bring the BMS for the car to a wider range of energy storage applications.

Greg Henderson: I would say that the technology is highly leveraging. So, we are investing in customizing it. And that gives us a differentiation because we have kind of best technology. And let me customize it like, I said, for some of the chemistries and industrial. Some of the functional safety requirements. But it's a largely leveraging investment. So, we get a lot of leverage from that with small incremental investment.

Josh Buchalter: And I mean, speaking with BMS. I've been lucky to spend some time speaking with Patrick Morgan from your team, and one of the topics we spent time on was lithium ion phosphate in batteries. Can you talk about how that changes the requirements of a BMS solution. What are the implications for EVs more broadly for LFP chemistries?

Greg Henderson: The benefit of LFP right is that it doesn't have a lot of it. 2 benefits will be one is as well. It's cost. It's lower cost, because it doesn't have like nickel and cobalt, and some of these other more expensive metals. And also, some of those are conflict minerals are, you know, more challenging to acquire from maybe from a sustainability perspective. So LFP is a lower cost platform and it's also maybe a more sustainable platform. But the chemistry has challenges because of the, you know, the charging curves can be more complex. So, we've

actually, you know, we've developed a BMS solution to be optimized across the different chemistries that are being used.

So, we have solutions that are optimized to be able to accurately measure LFP, and that's one of the value proposition that we have as well.

Josh Buchalter: And is it a higher content opportunity for ADI?

Greg Henderson: I don't think there's a necessarily a higher content in an LFP pack versus a non LFP, pack per se, but more just that, you know, some of these more complex chemistries are difficult to measure. There's other people that are using other advanced chemistries for like energy density. So, for example, people are going to technologies like silicon anodes or high silicon content anodes. And these have a lot of other complexities that there's like a hysteresis in the state of charge, for example.

So, these complexities, they have higher energy density, but they're much harder to figure out state of charge. And this this next generation platform we talked about that has the EIS one of the advantages of that is, we can do things like state of charge or state of health for these advanced chemistries. And that's kind of where we see the market going. That's why we're investing more.

Josh Buchalter: And it's clear that charging infrastructure investment needs to ramp from our earlier discussion. Some of my colleagues' work have that they've done it suggested that we need a million and a 1.7 million charging port to solve the United States alone through the decade. How does your content opportunity here compare to a car, for instance? You said, it's 100s of dollars?

Greg Henderson: I think the thing about probably not. But I think the thing to understand is that we can have those hundreds of dollars of content. It depends on the architecture of the charging station or whatever. But I think that the message we want to leave bigger picture about this is today, over 50% of this business is automotive in our electrification. Both automotive and grid side are going to grow. We put charging on the grid side. They're both going to grow but actually, the grid side is going to grow faster. And actually, just a little bit of context. We have been in this. We made a decision a couple of years ago to combine the automotive of electrification in the grid side into one business that's focused on electrification. So, Patrick mentioned leads that business for ADI. So, we have one combined business focus on electrification. And I would say, at that time we did that a few years ago.

We were heavily investing in the auto side. We weren't investing so much in the grid side. Now, we're also investing in the grid side as well. So, the message I'll leave is that you know both the auto EV side are going to grow and the grid side. But over time the grid is going to grow faster and over time grid will become increasingly more important.

And that's also has, you know, EVs are in this inflection that will eventually start to the relative growth rate, slow down. The grid side will continue long past that time.

Michael Lucarelli: I'm hoping real quick cause I know it's confusing or auto industrial business and BMS, right? Top of automotive be about 600 million. That's automotive BMS, we also have a hundred 1 million dollar plus business and industrial BMS. So, it's that 15 total incremental to that. And Greg said, we manage that business internally as one. But for investors we split it out

into different end markets. So automotive BMS about 600 million plus industrial BMS 100 million plus those go into those end market buckets back to you, Josh.

Josh Buchalter: Thanks. Mike. Voice of God off screen. I yeah. Again, I was last couple of questions. competitive environment. We talk about China, but more acutely, I mean the spaces consolidate in a good amount over the last 10 years, and ADI has played an important role in that consolidation through Maxim. How you know, how is the competitive dynamics change over the last few years? In particular, it's been a while couple of years with shortages and end market shifts. And how are your conversations with customers different than a couple of years ago?

Greg Henderson: I mean, we always, you always, have competition. You know. The names on the names on the companies might change a little bit, but there's always there's always competition. Clearly, you know. Everybody knows that EVs are a growth driver we are the market leader. So, there's a lot of people that are chasing what we have. I would say. That's the reality.

I think that how the conversation has changed, though, is that we have evolved a lot from selling a chip that measures voltage of a battery very accurately over time to battery management system level solutions we have. We actually have battery labs we set up joint battery labs with a number of our customers where we have their cells in our lab. And we're making measurements on large numbers of cells to create a data set to train our algorithms for making temperature or state of health or something like that. So, the way it's changed is, it's much more now about the system level offering that we can offer, solving problems at the customer at a the application level like, how can we improve their charging so that them to get to a 5 min charging as opposed to, how can I measure my cell at 2 millivolts of accuracy? So, I would say, that's kind of how we see the market evolving. And also, that's our strategy to maintain our positions, to evolve, to do that kind of stuff.

Josh Buchalter: Last question, we spent a good amount of time talking about all the ways that semiconductor content is increasing on industrial and automotive applications. Pushback we get is that that has to correct? Can you talk about your how your conversation with your customers? What are the savings that they see? What's your push back to that argument? That semis are becoming too big of a cost basis within many of these applications, and that OEMs who have, you know, they have to answer their margin questions, too, are going to push back on that.

Greg Henderson: Again. I think the way we approach this is that we want our solutions to provide a system level cost benefit to the customer, right? So, they may pay more for it. And I think our wireless battery management is a great example. There's a lot more semiconductor content in that battery pack, but it solves a lot of other problems about manufacturing reusability, reconfigurability, and that's worth that has a value to the customer. And we've got a lot better about helping understand that value and explain it to our customers so that we can charge for that.

And as well you know, the way it works is we provide a solution like that that has maybe this much of a value for the customer. Then we share that right. They pay some of that value to us. They have to also be able to capture some of that value for themselves. So, their total cost of ownership you want to think about that is actually better.

That's, you know, that's how we view it. And I think the, you know, that's part of how semiconductors as well, or taking more share because they're providing more of the value solution.

Josh Buchalter: We're up on time, and if it's any last words you'd like to leave us with the floor is yours.

Greg Henderson: Okay, well, look, I think, thanks for having me on today and just close with the electrification business is a great, it's a great market opportunity for ADI. We have a role to play in getting the world to Net zero, and it's a great investment. So, call Mike and buy more stock.

Josh Buchalter: Well, Dr. Henderson, Mike, everyone on the line. Thank you. Really appreciated the opportunity enjoyed the discussion.

Greg Henderson: Thank you.

Josh Buchalter: Have a good afternoon.

Greg Henderson: Good to see you.