



Daniel Newman: Hey everyone. We're back. It's day three and we have an exciting track opening keynote for our ESG and DEI track here at the Six Five Summit 2023. I'm Daniel Newman, CEO of The Futurum Group and host along with my friend Patrick Moorhead of the Six Five. And we're super excited for this session. We're going to have Greg Henderson, he's Senior Vice President, Automotive & Energy, Communications, and Aerospace Group at ADI, Analog Devices. Greg, welcome to the Six Five Summit. It's great to have you here leading the track.

Greg Henderson: Daniel, it's great to see you today and good to be here.

Daniel Newman: So together we're going to talk today about the power of sustainability to drive growth. And I just want to set the stage a little bit for this track. We have a great group of speakers. We're going to be talking about this. I think we're going to really walk away, Greg, coming to a bit of a conclusion together about sustainability is good business. And over the last couple of years, I've spent a lot of time, we talked to hundreds of tech companies and we've watched especially during the pandemic, the rise of interest in talking about climate, about net-zero, about carbon, about ESG and social impact and doing good. And that's what this track today is really going to focus in on. We've also seen, and you are aware our theme here, Greg, of the event is navigating rough waters. We came out of multiple years of tech explosion.

You're in the semiconductor space, saw a boom like never before. And of course, the chip cycle with great booms come great slowdowns, let's say it nicely. And of course, with things like AI on the horizon, I think we have another big exciting boom coming very, very shortly and we're all crossing our fingers for that. So Greg, ADI has more than 125,000 customers across industries like industrial, automotive, communications. As your customers think about the future, what are their greatest challenges? What are the big things on the horizon that are keeping them up at night causing heartburn and stress?

Greg Henderson: Yeah, thanks Daniel. Outside of the short-term economic environment that you already brought up, I think one of the biggest challenges we hear from our customers across the segments is finding a way to decouple growth and technological progress from carbon emission. If you think about it and you look at it, we have had enormous technological and economic progress over the last 50 years, but a lot of that economic progress has come because we have access to low cost, carbon-based energy. And as a matter of fact, if you zoom all the way out, even back to the beginning of the industrial revolution, global GDP has gone up a hundred x since the 1800s and largely due to access to low-cost energy, which has really driven the technology revolution that we have been part of. So we've had this hundred increase in GDP, but we've had a 30 x increase in energy.

And because that energy is mostly based on carbon-based assets, there's been a downside to that growth, which is the impact to the climate. Carbon emissions have gone up 700 times between the 18 hundreds and today, and we're starting to see that impact. You already see one degree of heating. We already see many, many more climate disasters. If you look over the past 10 to 20 years, there's been spent trillions of dollars on recovery from these climate disasters. And we see that these things are happening faster. And there's some studies that show actually if we don't get to net-zero, if we don't get to net-zero goals by 2050, it'll have a massive impact on global GDP, which is going to affect all of us and our businesses. And that impact could be as much as nearly 20%. So there's a challenge that our customers have and that we have and that



we have as an industry and an ecosystem, which is how do we continue technological progress, economic growth, but decouple that from carbon?

And this is top of mind for all of our customers. I'll give you an example. One of our major communication infrastructure customers has told me that energy consumption and sustainability of their products, when they were selling their products to their customers, was always on the agenda for their customers. But it was like agenda item 15 and sometimes they would get to it and sometime they wouldn't. But now energy consumption and sustainability is agenda item one, and that kind of allegory is true, our customers across all the segments that we're in. And so for us at Analog Devices, we believe that this is an imperative and we're committed to working with our customers to get there. We're a founding member of the SEMI Climate Consortium and our strategy is to do our part to commit to getting the world to net-zero and finding a way to decouple growth from carbon.

Daniel Newman:

It's a big objective, Greg, and it's a big challenge. And I like the way you set the story about the decoupling. I do think I said in the top, and I think we're going to come to a fairly similar place when we say that it's good business, but at the same time, the idea that we would want to stop making progress towards ESG initiatives in any sort of interim period because of austerity in the marketplace is a very shortsighted view.

And I like that you tied it to GDP because like I said, we may be able to increase our margin by a few basis points short term by stopping spending on something. But if we see GDP drop by a few single digit points, let alone up to 20, you're going to see massive reductions in revenue, in earnings, and of course innovation. And candidly, a 20-point drop is catastrophic. It's globally catastrophic. So let's talk a little bit about how Greg, you're working with the ecosystem and your partners. How are you engaging them to solve these problems in emissions, sustainability? What's the approach you're taking at ADI?

Greg Henderson:

Yeah, I mean big picture, we've thought about our sustainability strategy and our big picture, we say our ambition, is to advance sustainable solutions that get to net-zero faster. And so we've built a multi-pronged framework of our sustainability strategy and there's kind of three main prongs to the sustainability strategy. First is about optimizing our operations. So this is about our commitment to getting to net-zero inside of our operations. So ADI is signed up to SBTi, the Science-Based Target Initiative. We've made our commitments to net-zero by 2050 and carbon-neutral by 2030. And so this is about reducing the carbon footprint of our operations and ultimately getting to net-zero. So we're upgrading our factories as we're buying capital for our equipment expansions. Actually, we're investing in capital that has a much lower carbon footprint than our previous equipment. We're also transitioning our factories over to fully sustainable energy. And this is our part of doing our part to optimize our operations. That's the first pillar.

But the second pillar we call is a lead with the industry to develop clear technologies that enable sustainable use cases. And we believe that for ourselves as a technology company, but actually for the whole industry, this is where we can have a much larger impact. So we're doing our part in optimizing our operation, but our carbon footprint is actually very small compared to the global footprint, but we're developing technologies for sustainable solutions and enabling sustainable use cases that can help get the world to net-zero. And there's five main sectors that we're investing in. First is in transportation. So that's about helping to build a decarbonized



transportation system that goes from ICE cars to EVs. The second is in grid. So it's not just about decarbonizing transportation, but also building a grid that's fully sustainable and based on renewable resources.

Our third segment is in buildings. And if you think about it, a massive percentage of energy usages in buildings. So it's about smart buildings, it's sensors and control systems to optimize the efficiency of buildings. As you would probably believe as many times buildings use energy lighting, heating, that's not optimized. So it's about optimizing that. Fourth sector that we work in is in automation and industrial automation, a lot of energy usage in factory. So this is about improving the efficiency of factory to get the same amount of output for lower energy. And the fifth is about communications, providing communications and connectivity in a lower energy footprint, really about reducing the energy per bit. So we're investing across those sustainable use cases and our strategy is to invest in sustainable technologies that help our customers get to that sustainable.

That's the second pillar and then the final pillar we talk about is engaging, and that's engaging with the ecosystem with our customers and our suppliers. We're part of the technology supply chain, but it's not enough for us to develop that technology, it needs to get to deployed in the real world. So it's making sure that that technology gets deployed with our customers, but also partnering with our supply chain because our commitments to science-based targets means that not only do we have to get to net-zero, but our suppliers need to get to net-zero. And so we have to work with our supply chain to decarbonize as well. So that's the three pillars. Optimize our operations, lead with the industry and sustainable use cases and engage with our partners and our customers.

Daniel Newman:

I like it. I like how you broke that down. It takes a village in the end, the ecosystems. And as we learned over the last year, the supply chains in the semiconductor space are incredibly distributed, and that means up and down that supply chain there are lots of contributors to helping get to a net-zero outcome. So I'm glad that you kind of painted these different pillars together. I've alluded throughout this conversation already, Greg, to the changing economic circumstances. We have companies that as we saw in 2021 and into '22, that were setting incredibly ambitious goals for their ESG sustainability efforts, oftentimes citing out to 2040 and 2050 things that they were going to do. And when businesses were growing at double digits without a whole lot of effort when the economy was expanding incredibly rapidly, it seemed really easy to do that.

And so that whole navigating rough waters theme, high inflation, high interest rates, expensive capital or low liquidity, companies are being more thoughtful about every dollar that gets deployed. With slowing growth and you working across so many industries, what do you see in terms of your customers? Are they continuing to invest or are they adjusting timelines? How is the changing macro impacting what you're seeing?

Greg Henderson:

Yeah, I think we see that our customers are still very committed to sustainability. And in many ways, as I said before, sustainability is really good business. One of the major things about a more sustainable solution is it's a solution that tends to use less energy for the same amount of output. And that in many of our sectors, that's a big part of the solution space. And with inflation and energy costs going up, that tends to be a big impact. So we see that our customers are still very committed, as I said in the first parts of sustainability. Secondly though, you can



look at the global dynamics, there's things that are changing beyond that as well. Governments are also committing in policy, but also in large amounts of investments to sustainable solutions. So if you look at the Inflation Reduction Act in the United States that was just passed, over \$300 million of investment is going to go to sustainable industries in the US like electric vehicles and charging networks.

In Europe, they've had the Green New Deal, and many of their COVID relief packages and budget pledges they have for the next cycles are going to have trillions of dollars of spending in sustainable use cases. Also in Europe, they've recognized that I think they're much too dependent on carbon-based fuels from other countries, and they really need to take control of their energy ecosystem and have a more sustainable energy, domestic energy ecosystem. So you put those things together where the sustainable solutions are often better cost of ownership anyway, and you put these government incentives together, the environment is right where sustainability is still really good business. And at ADI for example, we've analyzed our business to how much of our business comes from sustainable use cases today. And so we've actually mapped our business to the Russell 3000 Sustainability Index and looked at how much of our business comes from defined sustainable use cases like I talked about before like electrifying transportation or making a renewable grid.

And it turns out that over 25% of our business today comes from sustainable use cases. And when we look at those use cases, those also were over investing in them compared to our overall investment. In other words, those are investment areas for us that are going to drive growth. We talked a year ago about our long-term model that we see a long-term growth of high single digits, but these sustainable use cases are going to drive the high side of growth for Analog Devices. So for our customers and for us as a company, sustainability is not just an imperative, but it's a business driver and it's top of mind for all of our customers in the segments we're in.

Daniel Newman: Which makes a lot of sense. And one of the things I kind of take from that last answer, Greg, is that companies are still investing, at least the companies that you're finding to be your strong partners. You seem to get it, they seem to get it. Let's zero in a little bit on the automotive space though. This is an area... We talk a lot about electrification, and of course that has some meaningful impact, but as you see it, what are some of the more practical innovations in the automotive space that could more immediately help drive down carbon emissions?

Greg Henderson: Well, yeah, we actually think about automotive and automotive electrification in the bigger picture of electrification. And actually, if you use the Bill Gates terminology about carbon emissions, the categories of getting around and plugging in is like transportation and electrification. It's about 50% of global carbon emissions come from this ecosystem. So decarbonizing this ecosystem is very, very critically important to getting to net-zero. And so we've actually focused a dedicated business around automotive electrification and sustainable energy as a combined ecosystem. And that's because these ecosystems are very coupled together and what it takes, it's not enough to just make EVs, but you have to have a completely sustainable grid that can generate renewable power to support EVs and it needs to be a closed ecosystem. And in this business, we actually have three main platforms that we are investing in that we think are important to get that world to a more sustainable place.



And the first of these platforms is an energy management platform. So this is a precision metrology platform, which is about managing the flow and transfer of energy. So you're able to more precisely monitor energy flow. And if you're going to get to a fully sustainable grid, when the grid is fully renewable, you have a lot more variable sources and the sources on and off the grid are much more variable. But actually, as you get to EVs, the loads on the grid are also a lot more variable because when you plug in your EV, it uses a lot of power. And so there's a lot more variability of power going on the grid and power coming off the grid. So we make precision metrology solutions for monitoring the flow of energy on and off the grid. That's a platform around management of energy.

The second main platform that we're investing in is in storage. And this is about developing the solutions to enable energy storage in the car. That's about battery management solutions and storage in the car, but it's also storage for the grid. And at Analog Devices, we're a market leader in the battery management systems for storage. The majority of electric vehicles that are on the road use a Analog Devices system. And so these systems allow you to precisely monitor the charging and discharging of the battery in the car. And our early generation systems were really about precision measurement, just making sure you could precisely know how much voltage was on the battery and how much current went in. But the latest generation of these solutions were adding more advanced metrology features where we can actually send signals into the battery and extract information about what's going on in the batteries. For example, you can extract the temperature of the battery, you can look for early defects.

And so these things are important if this technology is going to be scaled. And the majority of that business today is in the automotive business, but we actually also have a lot of that that's also important for the grid. About 10 to 15% of our battery business is in the grid and some people feel that long-term energy storage on the grid might be larger than the EV segment as a whole. And finally, the third platform we have is about power conversion. And so this is about supporting energy conversion from batteries to the grid and from grid to batteries. So we're developing high power solutions and solutions to monitor and control the transfer of energy from the battery back to the grid or from your charger to your battery. And as a matter of fact, one of the latest products we have is a technology solution to allow for a very compact and efficient bidirectional charger.

So the idea is that not only do you plug in your car to your house so that you can charge your car, but you can also take energy from the car back to the grid if the utility is in a situation like happens sometimes in California where there's not enough energy on the grid or if you have a situation where you lose power to your house. So these platforms about manage, store, and convert is where we're investing in a lot of electrification and we believe that this is going to be a big growth driver, not just for ADI but for the industry as a whole. Right now, this business for us is over 10% of our overall revenue comes from this electrification business. The majority of that today is in the automotive sector, but we're investing in the grid side and that's going to grow probably even faster than automotive over the next few years.

Daniel Newman:

Yeah, it's really interesting too how you tie the two things together. As we have this growing fleet as a percentage of overall vehicles that are moving from traditional combustion to electric, that electricity as these cars are being plugged in are all connecting up to the grid that's creating a different utilization of carbon. It's not the same as the emission of carbons from fossil fuels, but it still has an impact. So I think sometimes we sort of want to make it a bit binary like electric



good, fossil bad and it's like, well both are using and I think, so it's really interesting to kind of have that discussion, Greg, 'cause it's not black and white.

Greg Henderson: Yeah, like you said, it turns out if you have EVs, even if EV is running from carbon-based electricity, it has a lower footprint than if you're burning gasoline. So that's still better. But to your point, it's not enough. You need to get fully electric transportation, but you also need a fully sustainable grid that's not based on carbon. So the whole ecosystem has to work together and there's a lot of complexities, as I said, to how that's all going to work together.

Daniel Newman: So you sort of naturally were shifting me in this direction because you talked a little bit about industry earlier, you talked about smart buildings and cities at some point here. So I want to bounce from automotive to industry. Industries are known for being huge consumers of energy, huge emissions outputs. What do you see there, shifting from automotive to industry, what do you see as the greatest opportunity for industrials to meaningfully be more sustainable?

Greg Henderson: Yeah, so industrials is a big segment for ADI, it's almost half of our revenue, but also industrial is a big sector for energy usage. Almost half of global energy is used in factories. And actually, if you look at the sustainable use cases I talked about before, there's two main impacts that you have to be able to do to get to the kind of targets of net-zero. One is you need to come up with technologies that eliminate the use of carbon. So the electrification I talked about before, those are technologies to eliminate the use of carbon. You're not burning gasoline, you're not burning coal, you're building an electrified ecosystem that eliminates the carbon. But also it's not enough. If you plot the trajectory of how do you get there by net-zero, it's not enough to just have sustainable energy.

You also have to have significant efficiency improvements in the ecosystem. So you need to get to where you can build things with a lot less energy. And so a lot about sustainability and in the industrial case is about improving the efficiency of a factory. It's generating the same amount of output but consuming a lot less energy. And so there's a number of areas that we're investing in in the industrial ecosystem for that. The first of this is in kind of connected factories. So you hear about the digitization and industrial 4.0. But if you can better connect the factory, and we have technologies like time sensitive ethernet and we call our industrial IO, that can better connect the factory where all the equipment in the factory is interconnected and controlled, you can optimize the energy usage. You have equipment that you can idle for short amounts of time.

You can make sure that you're not using that equipment when you don't need to. So a fully connected factory can provide you a big efficiency improvement. The second major area that can provide an efficiency improvement is that about smart motors and variable speed motors. So it turns out that most motors that are used in a factory are kind of dumb motors that don't have the capability of adjusting the energy input to the load. And if you have a variable speed motor, then you have the ability, if you can precisely monitor the speed and torque that you need, you can control the amount of energy that's in and you can significantly improve the efficiency of that motor and you can get a 30 to 50% improvement in the efficiency of a motor by doing that, and we're developing the technologies for the sensing and control of those motors.

So by digitizing your factory and using variable phase motors, you can get significant Improvements in factory efficiency, maybe up to 30 to 50%. And that's even in kind of



brownfield factors with some of these kinds of upgrades. And so the areas we're focused on in industrial is in improving factory efficiency. And our industrial customers tell us that sustainability is top of mind for them. There are industrial customers that really are anchoring their business around sustainability and how much energy consumption you use and what the footprint of what you buy is a big part of all of our customers in that industrial space.

Daniel Newman:

So Greg, as we sort of wrap this up, first of all, I really appreciate you kind of breaking down the industries. I think sometimes what we don't as a society fully come to appreciate is the mechanics of actually being more sustainable. It's not just putting your stuff in recycling. It has to be very thoughtful. There's a lot of planning involved, there's a lot of strategy, there's partnerships, there's ecosystems, there's materials, there's a lot of science and physics and engineering that is going to be required for us to do better.

And so I hear in your tone, first of all that it's becoming a very critical part of ADI's business, helping the world move to a more sustainable energy platform and strategy, cause you mentioned at least two industries making up a huge component of your revenue. But I also, I kind of caught a sense of optimism in your voice. And given that this event is about navigating rough waters, a tougher macro environment, I'm hearing optimism in your voice. What is giving you that optimism, Greg?

Greg Henderson:

Yeah, I mean look, we all have to maybe navigate the whatever short-term challenges, but we are very optimistic because it's clear from us that this is something that has to happen. Our customers see it as an imperative and technological solutions in technology is going to be key to get there. Interestingly, we kind of did a thought experiment at Analog Devices that said, "Hey, what if these sustainable use cases that we've talked about, what if these sustainable use cases are fully adopted?" So you go for example in electric vehicles, you get a hundred percent adoption electric vehicles and you no longer have carbon based cars. What could be the impact? And the global emissions are a little over 50 gigatons, maybe 52, 53 gigatons of carbon. So we did a thought experiment, said, "Hey, if the sustainable use cases that we're investing in with our customers are fully adopted, what would be the impact of that?"

And it turns out that through the elimination and reduction of energy would account for an elimination of about half of those global carbon emissions, which is a really pretty big impact. And that's what we're working on today, that we know about today if it were fully adopted. So the technology is there, the customers are available. Also, we talked about this environment where governments are investing, so the government investing is there, our customers see it as an imperative. And because those things are happening, we have interesting dynamics.

For example, in the energy space today, if you're going to build a new power plant, it's actually across the threshold that if you're going to build a new power plant today in the United States, your lowest total cost of ownership is to build based on renewables rather than fossil-based fuels. And one of the big advantages you have in renewables is you have the investment cost to build your plant, but then once your plant is up, the source of energy is free, it's wind and solar, et cetera. So you put all those dynamics together and we are very optimistic that the time is right, the technology is there, the political will seems to be there. Our customers are demanding it. And so we're very optimistic that we're on the right path to be able to get the world to net-zero.



- Daniel Newman: Well Greg, it's great to hear from you both the sort of vision and the more practical, pragmatic approaches that companies are taking. At the kind of core of so many industries right now is going to be semiconductors. And that's across all process nodes, across all the different technology archetypes. And it's really good to see and hear from you on how this can be accomplished. So over the next few years as I believe we will see that cycle go to a boom, there's no way with all this momentum on topics like generative AI, security, defense, that we will not see so much more compute intensive requirements. And of course, things like we talked about today, building out the grid, creating smarter cities. This is all going to be done with technology like that coming from ADI. So I want to just say thank you so much Greg for attending, for speaking, for kicking off our day three ESG track here at the Six Five Summit.
- Greg Henderson: Great. Thanks Daniel. It was really great to be here and look forward to the rest of the day.
- Daniel Newman: And we look forward to it too. Everyone out there, I want to thank you so much for tuning in. This is the kickoff session for the day three track on ESG and DEI. Stick with us, a lot more great speakers to come.