

# Decarbonization Through BIM-Based Solutions with Michael Gustafson

## Transcript

Welcome to Green Building Matters, the original and most popular podcast focused on the green building movement. Your host is Charlie Cichetti, one of the most credentialed experts in the green building industry and one of the few to be honored as a lead fellow. Each week, Charlie welcomes a green building professional from around the globe to share their war stories, career advice, and unique insight into how sustainability is shaping the built environment. So settle in, grab a fresh cup of coffee, and get ready to find out why Green Building Matters.

Welcome to the next episode of the Green Building Matters podcast, where every week I interview a green building professional somewhere in the world. I'm in Atlanta, Georgia and my guest today is in Atlanta, Georgia. I've got Michael Gustafson to talk about decarbonization BiM technology. Just can't wait to unpack his story. Michael, welcome to the podcast.

**00:53**

Michael

Thank you, Charlie. Great to be here.

**00:55**

Charlie

We're connected in some circles here. That overlap between sustainability and technology is also part of my career path. Can't wait to just get everybody up to speed on what you're doing. But take us back first to that origin story. Where did you grow up and where'd you go to college?

**01:10**

Michael

I grew up in the Midwest. I grew up in Minnesota, Western Minnesota, on a farm. And some roots there, maybe in sustainability wise just by the nature of growing up on a family farm where you're thinking about being thrifty and resources and kind of make the best use of everything you have and. But I decided to go into engineering because it is really like math and science. Went to the University of Minnesota, got a civil engineering master's degree and did practice up there as a structural engineer at a firm, Eller B. Beckett, which got bought out later on by aecom. LRB Beckett was a well known, kind of missed national AE firm. And so there I really learned for six years the practice of structural engineering.

**01:59**

Charlie

Got it. Tell us a little more about that early career because as I understand from looking over your LinkedIn profile. Engineering, engineering. And then a jump into technology too. Tell us how that kind of happened.

**02:14**

Michael

I was practicing structural engineering, I really enjoyed it. It was kind of a balance too, of thinking about architecture. I really respected architecture. I was even thinking about that as a career at one point. I really saw my interest in skills as kind of the bigger business side. And it wasn't really any guidance of what I would eventually go to, like with technology. But I did start my MBA, so the Carlson School of Management up there in the Twin Cities is pretty well known, funded by the Pillsbury's, General Mills. He had three M and a lot of big corporate groups up there. But that really opened my eyes to things such as strategic planning and branding, marketing. And so there as I was working my mba, I saw an opportunity to go to the American Institute of Steel Construction for a regional engineer role. That's the steel trade association. And that was a great move. And then from there, that was a couple years, which then moved to Trimble, Tecla and

then Autodesk. Really, both companies for nearly two decades focused on technology for structural engineering and fabrication.

**03:28**

Charlie

Some really great companies in the design space. Okay, so that's how the career path was lining up. Sustainability, though, hey, all over your profile it says decarbonization. So growing up on the farm probably had an influence. But when did you realize, hey, whatever I do for the rest of my career, it's going to have some sustainability to it?

**03:49**

Michael

it was interesting that you asked that beforehand. And I was thinking there wasn't like one Eureka moment. And I remember even some interviews or some presentations I saw from Kate Simone about this with the Carbon Leadership Forum, like for her too. It was kind of a gradual process. But I think for me it was some events were just reading some books or seeing films like Inconvenient Truth, which is a couple decades ago, and Gaia by James Lovelock about ecosystems. And there was like some interesting data in there which I thought about later, back thinking back, was how the Earth, this is really interesting, how the sun is actually 20% hotter today than it was in millions of years ago because the Earth, the sun is always getting warmer, but over millions of years. But the Earth has actually stayed up to now, but generally at the same temperature over millions of years. So think about that. He was saying why is the Earth adjusting itself and making the prep proposal of being a living organism. But the part of the mechanism to do that was CO2 adjustment by the Earth itself. Over millions of years, as the sun becomes 20% hotter, can you imagine how much energy is 20% more energy of the sun? So to me, that was like that throttling of the earth by reducing CO2 is amazing. And so then when you think of how humans are trying to. We're messing around with that throttle. It's like, wow, it's a very sensitive device for impacting the climate. So those

are the types of things that really were shaping me. We're really messing with some parts of the Earth's throttling system and regulators that we need to be thinking about.

**05:46**

Charlie

So thanks for sharing that influence. That's big. When you just step back and just look at the math, look at the science. Not everybody does. So how about mentors? As we're putting together our careers, sometimes we mentor someone, we read their material, we see them from stage, they inspire us. It's someone that we get to meet with and they challenge us. They might open a door. Have you had any mentors along the way?

**06:08**

Michael

Yeah. Early days engineering. My parents were really great about telling me to reach out to mentors going into university and things. I did reach out with some practitioners in structural engineering while I was in university. And that was to kind of learn about structural engineering. Because it's not really an exactly defined career. It's part of civil engineering. One gentleman, Brian Paschino, who was with a forensics engineering firm in Minneapolis, he was a great mentor for me. He introduced me while I was in school to industry groups like this cool group called the Minnesota Concrete Council, which would meet every month and discuss everything's concrete between engineers, concrete builders, ready mix suppliers, these types of folks. And there were some great building engineering lessons that learned best practices on how to be good engineers in those events. By the time I got out to practice at Eller B. Beckett had already been rubbing elbows with what the industry is needing. At Irb Beckett, there's some really influential smart engineers really guiding you how to break down big projects. One project I worked on was the DeVos Place Convention center, which is a really great project to work on, but large. I remember one of the lead engineers, John Iverson, was really a great

leader and shepherding how to break down the problems on a big project and to kind of manage your time and be a good product project manager.

**07:42**

Charlie

Fantastic mentors and companies of different disciplines and different sizes too. Thank you for that. Let's look back a little bit more. What's on the highlight reel?

**07:54**

Michael

Yeah, when I was taking a step into where I'm at now someone has Autodesk. I'll say I was really influenced too from a sustainability standpoint, from the sustainability team and the things Autodesk was doing. There's some really forward thinking folks there and working on some of the initiatives there around sustainability. And that was great. And then I saw an opportunity with where I'm at now with Qnect. It was about two years ago a startup focused on a more focused space of structural steel construction around optimization. I saw the opportunity to reduce carbon with that. And so over the last two years we've been making a slight shift with the technology to be more focused upstream because we've seen the impact on reducing waste inefficiency, carbon more impactful, focusing more on say, owners, general contractors and structural engineers. So recently we've now started, we've released new technologies integrated on Autodesk Revit. Over the last year, we actually worked on a SBIR funded project by the DoD to look at how to reduce embodied carbon with steel connections specifically and embodied carbon. And now we're moving ahead with phase two. We got an award, close to a \$2 million grant from the DOD US army actually, specifically as part of one of their initiatives to commercialize an offering within Revit. Cloud based. It'll compare cost carbon, the cost impact and carbon impact of steel connections, how it relates to the steel framing. And so this kind of ties in with some of my background too. I did a lot of connection design when I was at Ellerby

Beckett on those big projects. It was kind of just something you do. I worked at AISC, which is very steel focused, and then at both Trimble Tech and Autodesk leading initiatives around technology. It's almost like my path is kind of led to this point. To kind of pull everything together. I'm really excited about what we're doing here with the industry. And what's great too is it's kind of working with the other, with industry folks, structural engineers, other technology providers, industry groups on how do we make this useful for structural engineers?

**10:32**

Charlie

I've had to learn a lot as I've shifted not just from green buildings to technology. Some might call this space. You and I are now prop tech or design tech or construction tech. Arguably there's what, five big players, right? Autodesk, Nemechek, Trimble, Bentley and Dassault. There's a couple others trying to get in, but you've worked with two out of five of the biggest. And so yeah, fill in a little bit more. You're on the engineering tool side, but with Tecla, a Trimble company, Trimble has SketchUp and a lot of other great tools. They bought SketchUp from Google and then of course Autodesk, the largest. So can you just tell us a little more about those software companies and then let's talk about the present day after that?

**11:17**

Michael

When I moved to Tecla, they were not acquired by Trimble at that point. So they were a global firm based out of Helsinki. Really great company. I really appreciated working with the folks there. And you know, we're focused on both steel, concrete engineering, and structural analysis software. They made some acquisitions throughout the years there. Actually their roots came back from structural analysis. The Tekla was started by a bunch of maybe like 10 or 12 structural engineers in Helsinki when the IBM mainframe computers came out and they provided a service to other engineers who couldn't afford to buy whatever was a hundred thousand

dollars mainframe. And so they were able to provide that by doing calculations with punch cards. So it was interesting they had that strong engineering background, a lot of structural engineers. I really felt connected there. Also their very customer centric way of working. And so but yeah, through the years they expanded with precast and rebar detailing where I would in the U.S. product management efforts. One of the most I was very proud to be a part of. Now there's a design guide about this in the model review. At Tekla we helped develop a new way of reviewing shop drawings using the model called in model review. It's got different variations but now it's. The steel industry actually has design guides to make it more of an industry practice. It's cool to see some of your technologies. Very early on, that was like 15 years ago. But it takes time for the industry to catch up with best practices and processes and things. And then at Autodesk it was a leap less from product management, more to business strategy. Looking at industry trends, looking at how we better go to market with solutions to the industry, working with industry partners. So there I was leading globally the structural engineering space, but also got to work closely with the generative design teams. So looking at generative design for Revit, other technologies that Autodesk was looking at for not just structural engineers, digital twins for building owners. There's so much going on in that ecosystem and it's really admirable how Autodesk continues to reinvent itself, kind of creating its own anxiety and challenging itself to reinvent itself so that nobody else comes in and disrupts. So they when you're a larger company, you have to continue to do that to remain successful.

**13:58**

Charlie

So thanks for giving us more context there. Let's talk about the present day. Tell us more about your company. Company and a day in the life of Mike.

**14:07**

Michael

Connect is about 11 years old, 12 years old. It was founded by three gentlemen up in Western Mass. And really an interesting story with the background of the founders. One is steel detailer background, really understanding the root cause of the challenge we have in connecting design and construction. Generally. And then Jeff Sharp, the CEO and Jeff Howister too, coming from outside the industries, but bringing business acumen, previous experience starting with startups and building and leveraging cloud database technology. So when qNCT was out 10 years ago, they were one of the first cloud based solutions in AEC that was interesting. And then being very focused on a very specific problem with steel. Connect has a patent on optimization technology. Because of optimization, there's a lot of different types of optimization out there, but an iterative design optimization method that optimizes out the waste on steel connections and that means a kind of balancing between what you call standardization and optimization. A lot of companies, when they design, and this is how you're kind of taught too by industries, use a lot of repetition. The more repetition you use there's simplicity for folks in the field and fabrication and things to build things. But the challenge with that repetition is excess carbon. And excess waste. And it can be that I struck E which is the UK Structural Engineering association. There's like a book that different folks or Tim Eibel and folks put out, they talk about waste. This is like in the UK, up to 50% of the steel in buildings is unutilized. And that's just not over capacity. But it's like process inefficiencies. It's risk mitigation built into the extra steel. And I think this rationalization approach that all engineers are taught to use is built into that. So at Qnect, we're looking at how we can help. Teams still have simplicity and some repetition, but not the extreme of what it is in the industry. And by doing that plus process efficiencies, we see if you look at using high strength steel too that the large steel mills are providing, you can easily get 10 to 20% less embodied carbon if you add up all those efficiencies. And so that's the space we're playing in, is helping teams reduce that embodied carbon through both material optimization and process efficiency.



**16:51**

Charlie

Yeah, I bet the entire farm on embodied carbon. I made a whole career out of LEED and green buildings and operating carbon. And there's still work to do there. We've got some mandates, we've got great programs pushing us on the efficiency side. But embodied carbon, Right. I think the statistics are by 2035, once we've done a better job running our buildings. The bigger energy hog, of course, is embodied carbon. At Schema, we're doing some work with Thorne Tomasetti and their AI tool for structural asterisks and Cove tool here in Atlanta. And I think sometimes you wait, do the design, then do a lifecycle model. When we need more real time, we need that information as we're designing. Can you tell us a little bit about some advancements there? How does that actually happen day to day and feedback, hopefully getting to a designer earlier?

**17:43**

Michael

I think that's valuable, having that kind of in context decision making. I think of an analogy there is when we were at Tecla and seeing when clash detection became, it was like this big thing, but it's like clash detection as a work process, which was this like batch process event after everything was designed, which was really not perverted, like more clash prevention. I actually worked with Stasis Capano and I remember at the time he was at Tecla and that was like a term that he was coining or we picked up in the industry. It's like clash prevention versus class detection. So the same thing applies to this in context design approach for carbon. We should be looking at things like cost, constructability, carbon as we're designing. I'll be honest, I think there's challenges with how a human, how does a designer process information and too many degrees of freedom at once. So generative design tools. I think the first generation there's been a lot of multivariable, multi-objective optimization and showing a lot of different dimensions at once. But I think there could be more research and these are

the things we're studying is how many degrees of freedom at once can you show to a person to make an informed decision. And maybe not showing everything at once, but maybe two at a time. There's studies in academia about why even engineers for years or architects work in 2D planes. Like breaking down a 3D model in reality, but into schematics like elevations and plans. There's actually an efficiency benefit for humans to abstract things because they're eliminating certain degrees of freedom to understand only what's in that context. You're eliminating one degree to two, so you're only working in two elements. Same thing with maybe comparing carbon and just maybe the building code requirements and then carbon to cost and then carbon to constructability and not having the designers have to look at all the dimensions at once. That's a challenge for us when we're thinking about UX design. But those are the type of things we're going to be looking at over the next year with cost. Carbon analysis is maximizing impact but also not overwhelming the user so they enjoy and understand. And it feels like an intuitive design experience.

**20:15**

Charlie

That's exciting. I can tell you light up around that because you've been in it for a while and it's like, look, this is the right way to do this and we're so close. So let's talk about carbon and educate the layperson. Listening now, I mean, is it just the structural items, the steel? Is it concrete? Is it low carbon concrete? Is it less steel, less CYA for the structural engineer that over-designed? You mentioned waste a lot. Like where should we be focusing right now? Where's that first big chunk of reduced carbon?

**20:45**

Michael

That's a good question. I've seen a lot of great work from a lot of structural engineers. I mentioned Thornton Tomasetti, but other leading firms around the US that are using good methodologies. And I think of that big rock

analogy. If you have a jar and you, how do you fill up the big rocks, medium rocks even?

**21:06**

Charlie

Covey. Yep.

**21:06**

Michael

Yeah, yeah, yes. So the big rocks I think are on these structural frame the grid layouts. The grid layouts, the spacing of columns, the orientation of the system, the type of system. I know there's a lot of discussion on how much carbon is in the mass timber versus steel and concrete, especially mass timber. There's a lot of things you have to understand deep into the supply chain to know before you can decide if going one way or the other. But a lot of systems are multi material anyway. So I know Don Davies has stated quite a bit that the most efficient system probably is something using the best of all the systems for that particular project. General kind of spatial geometry, you can have a 20%, maybe even 30% impact by looking at grid spacings and bay layouts and kind of the overall topology and then with the structural system. So that's kind of the big space. And we're connected. We're kind of downstream of that when you get into them, okay, like framing efficiency and looking at the impact of, say, connections on the steel, like, for example, reinforcements. A lot of engineers design moment connections, but they might just specify full pen welds and doubler plates and stiffeners. And this is very. You have to be a structural engineer to kind of understand what that is. But there's ways to make that less carbon intensive and less cost intensive. When I was at AISC, even 20 years ago, they had spreadsheets for engineers to use to kind of simplify that design and make it less costly, actually, and more streamlined for fabrication. But still, the industry, there's still gaps there. Engineers still aren't really using those design tools and things. Those are the type of things we're looking at with our technologies like the connect for revit, which we have now actually

checked those types of things. But on the concrete side, too, on a steel frame structure. It's like 40% of a steel frame office building is embodied carbon from the concrete, like the slabs actually have a big contribution itself. A composite metal deck floor slab, like the concrete really adds up.

### **23:29**

Michael

And so I very much encourage what firms are doing. I see in Boston a lot of great work happening, and Seattle, it's happening all over. Reducing embodied carbon through various admixtures, or from the sublime systems to carbon cure, which is capturing the carbon. There's a lot of innovations happening in the concrete space. Maybe not one silver bullet, but just see what's local, see what's there. When I was back to that reference to the Minnesota Concrete Council, when I was a young engineer there, we did research on aggregate gradation. And this actually helps reduce carbon. And at the time, we didn't talk about embodied carbon, but it's about using, again, that big rock analogy we said for making business decisions, you do that in the concrete with different size aggregates. It's using more sizes of rocks, differences of sizes of rocks in the concrete than makes it. So you don't fill it up with as much cement in between everything and the sand in between everything. You just fill it up, you have more rocks basically by using different sizes. And that's what that gradation uses and that was. But you have to have access to quarries and things regionally to make that make sense. So up in the Twin Cities area that grade 818 made sense based on what's available. But those are the type of innovations I think that really can have a big impact that you just gotta have those discussions regionally.

### **25:00**

Charlie

It sounds like you're looking at a 4, a 5 carbon even transporting those materials. How far? And I just love it, man. It's my world. One more question about current state strategy. Business development. Sales,

business development. Hey, who's your ideal customer today? Who knows, maybe they're listening right now.

### **25:19**

Michael

I say are ideally to talk to who see the benefit for reducing carbon, but also just inefficiency and waste. And you know, once engaging with owners, they can introduce you to engineers or contractors. And I think our industry, whether you're selling anything like reducing carbon or something else that's very innovative. Our industry if it provides value to somebody else upstream, the person you're selling it to, say like an engineer further downstream won't even go out, go to bat to sell it. Right. Because they don't want to disrupt the way things work in the industry. It's a very slow moving industry. This week I was actually at the ncsca, it's a national council of Structural Engineering and Las Vegas and KP Ready from Shadow Ventures actually was presenting about AI with some other industry folks and he made a comment about some drone AI tools. That's identifying cracks in infrastructure, bridges, roads. It's amazing. But what they decided early on is selling to civil engineers. They just didn't want to change anything about how they're doing forensic engineering. It just wasn't there. But then they went up, the startup went to the owners who actually see the full value of speeding up identifying risk areas and then using that technology. Imagine how much more you can streamline the inspection process. And I think that's just rinse and repeat. With this industry with very disruptive technologies, you need to go upstream to the owner who sees the value and then they can influence the project ecosystem to adopt that innovation.

### **27:03**

Charlie

I love it. I mean they had the right service, the right product, but weren't selling to the right part of the Stack there, that's a breakthrough. I love that, man. Well, let's talk about the future. I love to ask an expert like you, hey,

what are you kind of excited about that's coming at us a little bit down the road in this decarbonization, this green movement.

**27:21**

Michael

So yeah, no, that's a great question. From a bigger picture, I think artificial intelligence we know is this hockey stick that's really taking off. And I know there has been some concrete or AI technologies being used in that space. Like concrete AI out of the west coast is like optimizing material mixes and things. But I think there can be a lot more than just technologies. Maybe they're not even marketing it as AI, they're just using it to improve the results. And then also just firms, practitioners using AI to just maybe come up with new innovation. There's more to unpack there. It's just moving so quickly to know, pinpoint what's there now. But I really think there's an opportunity there. And then we're at qnect excited about, well, that we're hoping to be implementing or first assessing what the opportunity is and then implementing around AI. But this commercializing cost carbon analysis for steel connections and the interaction with framing, looking at commercializing that over a year from now, we're excited about that. And I also like to see what's going on in the concrete space as well though. Like what sublime systems and these other more efficient processes are great to see. And then on the steel side Nucor formed relationships with some of the larger Silicon Valley companies around using nuclear energy. I mean, for Nucor has been invested in NuScale, which are mini nuclear reactors technology for years.

**28:59**

Michael

I'm glad to see just other alternative energy sources because once we can say that the steel mills can plug into that into their energy generation, I mean that's going to change. 90% goes to zero. Of that, which leaves you talking about a four, a five. I mean that the fabrication erection logistics, that'll be there too. And we have to figure out how to get that down to zero

as well, kind of in parallel. The one thing I'm concerned about is the rest of the world with embodied carbon and how China's construction output is great and they're making strides with sustainability like their air quality efforts they did over the last decades with from the Beijing Olympics and impacts.

**29:49**

Michael

They're doing things and I think they'll have an impact, but their impact in terms of steel and concrete generation of embodied carbon is just massive. And what can we do even from. And not just technology companies trying to work there, but what can we do through partnerships or some other efforts to really work with other players in the world so we collectively reduce embodied carbon? I mean, to me that's, yeah, we can check the box and say, okay, we're doing our part in the US but honestly we have to, it has to be greater than that because we're not the biggest contributor anymore. We paid our dues. We've generated the majority of the hundreds of gigatons that are out in the atmosphere. It's still there.

**30:31**

Charlie

We luckily are cleaning it up. But you're right, hopefully others that model us around the world for innovation, capitalism, continued democracy, hopefully they'll model, okay, here's how we're cleaning up a mess we made with carbon. I hear you, man.

**30:49**

Michael

And maybe I'll say one last thing to add to that. Carbon capture then is the way that we could do, even to your point about the mess we created in the past, we could, if we really come up with new innovations and carbon capture that scale at the gigaton level, then we could not just clean up our mess. But the current ongoing emissions that China and other countries are doing, it's just we're five, 10 years away, probably estimates on that

unless we really find some big breakthrough. I'm optimistic too. I see there's so many cool innovations happening around carbon capture and natural sequestration through the oceans and forests and all that.

**31:34**

Charlie

So you're right, it's going to take a little of all that. There's not one silver bullet here. So that's good stuff, man. Let's get to know you a little more. I'm really enjoying our conversation here. Michael, how about some rapid fire questions? What would you say is your specialty or gift?

**31:48**

Michael

I think it's connecting people I think kind of on a more systems level. And I've worked at a lot of different companies and met a lot of different folks and so matchmaking ideas with people. I was at a conference recently where somebody was looking for some expert at a company on AI and it's like, okay, they were struggling to find somebody through their network, just matchmaking or if someone says they have a problem on something, I can connect them to somebody else. I was meeting with a New York GC who was focusing on dfma it's like, well, have you talked to Bridenwood in the uk or they had never heard of them before.

**32:25**

Michael

It's having that experience with AEC space in the global world and then different areas I can kind of match make folks and that's kind of exciting to see because they just that simple event can help them form something new and different.

**32:43**

Charlie



Match making. Not just networking, net weaving. One of my mentors called it. He just came.

**32:49**

Charlie

Net weaving, I love it. Do you have any good habits, routines, rituals that help you stay on point?

**32:54**

Michael

I think just keeping up on reading different books and philosophies on how to manage your time and doing that very routinely. Because creating action lists and managing our mediums of communication are always evolving and changing. I think exercising throughout the day when you're working can free up your mind to break through on certain problems. I think the way of working at a desk is just nonstop versus you know, being mobile, maybe taking calls remotely, going for a walk and having that physical aspect in your life, it's possible now too. Just the way we work and engage.

**33:36**

Charlie

So more and more walking meetings. Just get out, connect with nature, move your body. I work from home a lot. We do have co-working space in Atlanta. You gotta still just go outside. Thank you. Let's talk about bucket lists as we get to know each other more. I'm actually a real big fan of a bucket list. Not everybody has a bucket list, but if you could share a couple things maybe on your bucket list. Any travel adventure. Do you want to write a book? I don't know what's on the bucket list.

**34:01**

Michael

It was a great question when you said that before. What I had done. I enjoy traveling. I mean for years I wanted to go to the Inca trail and did that with

my wife over a few years ago and that was exciting. But just continue to travel and discover new places. The one thing I'd like to do is see a SpaceX launch. And actually I took my son and my father down to see a space shuttle launch many years ago and it got scrapped because of the weather. Right. You know, it's always a risk. They have clouds, you have storms. So we missed it. We drove down, my dad flew to Atlanta from Minnesota.

**34:38**

Michael

We drove down there, went to see it and weren't able to see it and since kind of missed that opportunity and I thought. But now the technology I mean, with SpaceX self and the technologies coming back and landing, it's like gotta be a whole different experience. I would love to get to Texas or if it's at NASA at Cape Canaveral to see that technology in action.

**34:59**

Charlie

Great man, Thank you for sharing. How about books or a documentary or podcast? I like to ask my podcast guests, just is there something you share with the audience? It didn't even have to be about buildings.

**35:11**

Michael

One book I read recently, and it's about sustainability, is by Hannah Ritchie called Not the End of the World. I'm not sure if you heard that book, but I came across it like Bill Gates was recommending it on his kind of blogs and posts that it was a very interesting book. It's very data driven. Hannah Ritchie, she's the head researcher at Our World of Data, which is kind of a data organization, and she really takes a different approach, synthesizes the sustainability challenges, but also opportunities by using data as the way to convey that. Kind of breaking down what is reality versus what we hear in the media with a lot of extreme things of what are happening. And some things might be actually happening like that, but some, but the

probability frequency of what's happening in the world and then where are the areas we should be focusing on based on the data and then also reflecting on where we've been successful at solving problems, maybe not as big as climate change itself, but like ozone depletion, acid rain, air pollution. These are things that we've done globally as global citizens to eliminate these problems. And so learning from that and being optimistic that we can solve this together, it's really. It was refreshingly great. There's some pod. She has a TED Talk on it if you want to proceed. The brief of what she talks about. Bill Gates has some interviews with her. It's pretty interesting.

**36:50**

Charlie

We're going to put links to that in the podcast Show Notes. Thank you for sharing that pro tip there, Michael. Hey, just a couple more questions as we start to wind down. As you look back on your career, is there anything you wish you'd have known earlier?

**37:03**

Michael

I think I'll even go back to high school. And the career counselor says, oh, do you want to be a doctor? Lawyer. All these lawyer things. And of course back then everything was different too. Some of the careers that were out there. I knew how to ask the question, it's not so much about what career you want to go into, but it's kind of like or what industry or something but it's what part of a business do you want to be a part of? So for example, do you want to be in the operations of the business or the business development, sales or in the human resources and those kind of go perpendicular or horizontal to the vertical of an industry. So for example I was interested in aerospace engineering at that point and okay went into civil and structural engineering which had parts that were similar to aerospace. But then I realized the reason I pivoted out of things is I was interested more in the business marketing side which I could have probably

been interested in that in another field. I could have been in mechanical engineering or some other industry and I would have made that same pivot. So it's not so much about that degree name but what type of roles in business do you want to be in a startup versus working for a big company. And I think some of that you're not going to know or you need to kind of go through the life experiences before you decide what is that fit.

**38:33**

Michael

So even knowing that information up front maybe is not. You're probably going to want to live through it to decide what you're going to do anyway.

**38:41**

Charlie

Great career advice there. Just don't forget the horizontal. These functions within a great company, within this industry, not just up here. And we don't know right early on we have no idea. So that's a good point is a little more view into those functions. So our last question. I can't wait to have coffee with you soon in Atlanta. You know I'm glad we're connected here. You know, let's say there's someone listening right now. Man, they're getting inspired by your story. Decarbonization, structural engineering. Just some great software companies and they're just now jumping in to this movement. Any words of encouragement for them as we come to a close?

**39:16**

Michael

I mean think about our impact even as global citizens. Do your research on where the impact can be, not just things like recycling but there could be other things with how we travel and then do that little thing and just do it every day. Be impactful and then encourage others to think about this. You know when you're having conversations with friends and family and sometimes it can be an uncomfortable conversation. Sometimes some people might not believe it, which hopefully that's a very small number of

people but just some are just impartial to it and without being looked at as being Fanatical. I mean, you were just trying to make it part of our daily life. I pull that back to growing up on the family farm.

**40:04**

Michael

I mean, you're just frugal about everything. I remember when you took a bath, you put just 2 inches of water in the bath. And I remember when I visited, stayed with some friends, cousins in the big city, and my cousins were filling the bathtub up to full. I was like, oh my God, what do you know, it's like that they're going to get in trouble or. But it's like that mentality of just, you utilize only what you can. And so, but how do you. It was somebody else who grows up with a different experience. How do you know, encourage them to be thinking in that mindset when they didn't have that opportunity to grow up with that mentality?

**40:42**

Charlie

So it's ingrained in you. It's part of your success. And yeah, we all need to be a little more resource conscious. So, hey, I've really enjoyed hearing your story today. I know our listeners will too. So to our podcast listeners, thank you for your loyalty every week. Please connect with Michael on LinkedIn. Check out what he's got going on today. And Michael, thank you for being on the podcast.

**41:03**

Michael

Yeah, thank you, Charlie. It was such a pleasure. Very much so.

**41:08**

Charlie

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