

URL: <https://ecorner.stanford.edu/videos/changing-processes-for-climate-solutions-entire-talk/>

Dr. Lisa Dyson is the founder and CEO of Air Protein, a World Economic Forum Technology Pioneer company that is reinventing how food is produced in order to sustainably feed the global population, which is estimated to reach 10 billion people by 2050. Air Protein uses an innovative process that makes meat from elements of the air. In this conversation with Stanford Professor Tom Byers, Dyson discusses how her company is finding a totally new process to create a familiar product, and how innovations like these are part of solving climate change.



## Transcript

Woman Who you are defines how you build. 00:00:09,600 - I am delighted and just to get ahead of this 00:00:11,430 'cause I've been looking forward to this moment for a long time. I get to say Lisa Dyson is here. (audience cheering) (audience applauding) That's right. (laughs) So here I go, I'm gonna say a word, but then we're gonna watch a video and get into this. Let me just tell our audiences around the world about Lisa for a second. Dr. Lisa Dyson is the founder and CEO of Air Protein, which won the World Economic Forum Technology Pioneer Company. That is a huge honor. As you're gonna see in the video here in a moment, or maybe you read before coming today, it is reinventing how food is produced.

So this is gonna be really cool to get to talk to her about it. So let me tell you a little bit more about her though. She's also the founder and chair of Kiverdi, a biotechnology company working with corporations that make the circular economy a reality. We'll end up chatting about that, I hope. And let's talk about her background though. She has a PhD in such an easy subject, theoretical physics, strain theory. I'm sure you just read this for fun. How many people are majoring in physics in here? All right, there you go. Well, I honor you and I salute her as well, because it was my most difficult subject when I was a student at Berkeley many, many years ago. So she got a PhD in that from MIT.

She was a Fulbright scholar at the University of London where she received an MS in physics. And before that, we always like to celebrate even people's undergraduate education 'cause that's like many of you in the room, she has degrees in mathematics and physics from Brandeis University. But this is not her first time at Stanford in official capacity. You were here as a scholar in Leonard Susskind's Physics Lab a few years ago as well, as well as our, my alma mater, Berkeley. So it's really cool to welcome you back to campus. And I just listen to some of these accolades, Inc. Magazine's top 100 female founders, United Nations Global Citizens Award, Fast Company's 100 most creative people. Yeah, there was a good reason why we were clapping to welcome her and thank you for that. So Lisa, welcome my friend. - So wonderful to be here.

00:02:40,170 Thank you, thanks for having me. - Well, it was terrific to have 00:02:44,613 one of our Mayfield fellows last summer. - Jessica, yes. 00:02:53,580 when we did our site visit with her. But we're gonna try the impossible here. We're gonna play a little video here that, it's just two minutes long, but I think it will give you a real jolt. (soft music) Narrator For some, the sky is the limit. 00:03:12,000 For us, it's a starting point, because below the clouds, there's a world crying out for change, a change to using less land, less water, to transforming industries that have become leading causes of climate

change. At Air Protein, we focus on meat, but to fix it, we couldn't just fix the process. We had to create an entirely new one.

So we made meat from air. Introducing meta meat, a new food category pioneered by Air Protein. Using novel technology inspired by NASA, we convert elements in the air around us into protein using cultures, then turn those proteins into any meat imaginable. It's where cutting edge science meets bold ambition to reinvent the way we eat. Because we're not in the business of baby steps. We're here to take leaps, leaps that let us transform the future of sustainable food with solutions we never thought possible, leaps that deliver us to a world where meat is delicious and nutritious, and making it is carbon negative, massively scalable, and uses exponentially less land and water use today, and leaps that reimagine our relationship with the environment to ensure that it's something worth passing on to those who come after us. And if you join us on this relentless pursuit for more, changing the world will soon feel as natural as taking a breath. (upbeat music) Lisa Hey. 00:04:51,540 - I mean it doesn't get much more purposeful 00:04:53,910 or big and bold than that. So it's so cool we get to have a chance to chat with you.

We've prepared some questions for her and we'll do that for a little while. And after that, we'll open it up to everybody else in the room for the rest of the time. Fair enough? The usual style here. Okay, we put together about three categories of questions. So the first one, let's just jump right off of that. What makes this technology distinct? And why are you so motivated to bring this to fruition? - So, again, it's so wonderful to be back here at Stanford, 00:05:35,220 and it's so wonderful to be here with you all today. And so just to start with the why, and I'll talk about food in a way that we probably don't hear people talking about it a lot. And I'll say that the technology that we use right now to make a steak can take up to two years and it has the greenhouse gas footprint of a car. And that technology, as I'm calling it, of course, is a cow. And so it's hugely inefficient.

It's the same way that my grandparents made food. And that might sound fine, but when my grandparents were kids, there was 1.6 billion people on the planet. Now there's about eight billion people on the planet, and by 2050, there's gonna be about 10 billion. And so right now the food industry is one of the largest greenhouse gas emitters and it contributes to massive amounts of deforestation. So there's a lot of issues. As we get more people, where are we gonna get more land from to grow and for cattle-grazing, to grow crops, to feed the cows, and all the other forms of meat as well, and how we're gonna do this without breaking the planet. So that's really the why, why we're focused on protein, because protein is a critical part of our diets. We're gonna need to increase protein content or protein production for more people on the planet. So at Air Protein, we focus on doing it in a way that from cradle to gate is carbon negative, and that doesn't require any arable land, no agricultural inputs whatsoever. And if you allow me to go back to another invention that we're kinda following as well is back in 1898, the newly inaugurated president of the Royal Academy for the Association of the Advancement of Sciences gave a talk about why the 19th century farmer was struggling and it was because there wasn't a lot of natural sources of fertilizer.

And so he issued a charge for innovators, for scientists during his inaugural talk to create innovations to actually pull nitrogen out of the air to make nitrogen fertilizer. And that of course happened and it's so impactful. It's estimated that 50% of human tissue has nitrogen from this process that was created. The Haber-Bosch process ultimately was created to solve that problem, and Haber won a Nobel Prize for that. And so that was to pull nitrogen out of the air so that we can grow crops and do that more quickly. And now we have this huge issue where we're running out of land and with this population explosion as it were, we're running out of land and we have all these greenhouse gas emissions. So why not just pull food out of the air directly? - Wow, well, I'm thinking about this room. 00:08:10,050 We've had in previous ETLs in previous years, the founder, and I just was having a deja vu of Beyond Meat, and we had the founder of Impossible Foods in this series. How do you position what's going on with their protein with them? - Yeah, we stand on the shoulders of giants. 00:08:30,450 A lot of innovators have come before us and we're excited about the transition that we believe is happening and will happen to create things that are more sustainable for all, all of our future generations.

And so what's different about us is that we're innovating kind of at the core, we're innovating at the ingredient level. So we're creating proteins from a new source made from cultures, natural cultures, Think of yogurt and cheese. These are also made from cultures. The fermentation industry is an industry that's been around ever since we realized that beer tastes good. And so our process is a type of fermentation, a new type of fermentation that's called air fermentation, because we use, you need oxygen, you need carbon dioxide, you need a nitrogen source, we use fixed nitrogen. And then you add energy and water essentially, and you end up being able to create with these cultures the nutrients that we need for a balanced diet. - Well, we could spend the entire time 00:09:21,240 talking about the technology 'cause we're here at the School of Engineering Of course. But I'm interested about the relationship with Kiverdi which is you started that with a fellow named John Reed, right? - That's right. 00:09:37,140 - At MIT back what? 00:09:38,880 14 years ago, something like that? So what's Kiverdi have to do with Air Protein just in terms of the journey? - Air Protein is a spin-out of Kiverdi. 00:09:49,110 And so we're leveraging, first of all, we're leveraging work done by NASA during the space program back in the 60s and 70s where they were thinking about how do you make food for astronauts on long space journeys? And you have to figure out how to do it in a way that's super efficient, that's fast, and uses minimal space.

And then Kiverdi has leveraged that to build a suite of technologies, and Air Protein is the protein version of that. And so we've spun out of Kiverdi to build this company. - And I was reading Kiverdi 00:10:17,130 originally was thinking about jet fuel, right? That's right. And then your journey has led you to this. How did that happen? - So we started in, I'll call it clean tech version one, 00:10:30,210 and that was when there was a lot of excitement about creating biofuels and we wanted to do

it in, we wanted to figure out how we can be a part of the solution as well. And so the day that we, we were in our garage phase initially, myself and Dr. John Reed and the people that were on the team at that time. And for us that meant going to a lab that we rented from a couple that had an NIH grant that had some extra benches. And so we'd go there and we'd work on can we make jet fuel in this case from CO2? And happily the day that we ultimately got some funding and the day that we created components of jet fuel was super exciting. But the price of fuel dropped.

It crashed, in fact. And so the excitement about biofuels pretty much crashed with it. And so we had to pivot at that point. We had to figure out what what else can we do with these concepts, with this technology. - Yeah, I remember that moment 00:11:24,760 'cause I was involved in a company that was making biofuels out of grease, but in a really small refinery, one you could put in your parking lot, and take your grease and then make your diesel, and use that with your fleet. But 2008 happened. - Exactly 00:11:46,020 So we're here at Stanford where we're all celebrating the new school of sustainability. So I wanted to get to that 'cause it's in our minds right now with it. A new school doesn't come along-- Yeah. 00:11:57,233 - Very often.

00:11:58,387 Was a about 80 years, - Great moments. 00:11:59,314 - Something like? 00:12:01,920 And it must have felt gratifying to you because you've committed your life to this issue of climate sustainability. What do you have, there's a lot of excitement here. There's an accelerator with 40 members in it already, 40 teams. What do you say to them because you've been at this game now for a while post to, we're not in 2009, we're in 2022. What's your advice to them 'cause you're sort of out the shoot? But now they're thinking how do they redefine processes and rethink this in a way we do almost anything on this planet in order to avoid the catastrophe we're worried about? - Yeah, your ideas, your innovation is required. 00:12:46,380 That's the main thing that I have to say because, again, we're gonna be a 10 billion people by 2050. And the amount of plastic waste that's in the ocean is the size of a continent, the amount of greenhouse gases we're emitting, forests that are being removed, water issues, top soil issues. There's so many issues that are out there that needs great minds to come and solve them. So that's the main thing.

And then figure out what role you wanna play essentially in it. And to be an entrepreneur is not for the faint of heart. We happen to be in a moment where there is strong interest, for instance, in climate, and companies are making net zero claims, and they're looking for solutions. So we happen to be in that moment, grab that moment and like come up with solutions and work with those companies to figure out how to solve some of these problems. With plastic, there's regulations that single use plastics are being banned in many different geographies. And so companies have to do something about that. And so grab that opportunity and come up with some solutions. So that's what I'd say we don't know how things are gonna change over time, but, you can start a company, you can have an idea, you can join a company, you can join corporate America, you can join an NGO, policy maker, There's so many different ways in which you can get involved. - The co-host, the regular host of this series this quarter 00:14:04,440 and the leader of the course itself is a fellow named Ravi Belani, and he has a great way of talking about his love of the word resilience. And I think if you're gonna go into this space, you better be very resilient.

So here you are, you could be, I could be talking to you right now as a professor here. I mean you've gone down the path of getting into a tenure track position in the physics department. I'm sure that was an option for you here or some other peer school. But you've decided to be a founding CEO. I mean, yes, you are the entrepreneur of the other one, but now you've been at Air Protein since the get-go, and it's a different situation than being in the lab generating and creating knowledge. I mean, you now are responsible for a whole lot of stuff. So how's that been that this becoming a founding ceo? - So what I'll say, 00:15:09,750 and by the way, Kiverdi is still doing its thing and kind of have developed a platform technology as a result of all the pivots it had to make early on. - And do you have any operating role there? 00:15:17,393 - Just on the board. 00:15:18,226 - Just on the board, yeah. 00:15:51,120 so I'm very much not averse to risk.

I'm very much not averse to things not working. If I believe in something, I'll work really hard to try to make it happen and really focus on that. So I think that was important for me to see his example. At some point he was president of a chain of 55 hair salon. So he saw the ups and downs of his journey and I saw that with him. And so that was kinda critical for me I'd say. - Well, it's fascinating. 00:16:19,830 We don't normally meet people who could go really, really deep in some scientific field and be a star there, which you undoubtedly would have been if you kept to that to diving in and saying, okay, what does it mean to be a leader, not a laboratory leader, but a leader of a company. - Yeah, well, I didn't intend on 00:16:42,150 leading the company. (laughs) - Yeah, so when did that happen? 00:16:44,603 When did that little-- - Yeah, it was more 00:16:47,400 by necessity.

- Life pivot I would call it. 00:16:49,530 - Yeah, it was like where we have a vision 00:16:53,313 and we needed leadership, and so I stepped in to do it. But I am definitely the entrepreneur of the group. I am definitely the risk taker, the one who can kinda grab a vision and run with it no matter what challenges are in the way. But, yeah, and so building a company, there's so many different things that, as all of you have heard from others that you've talked to, probably some of your friends, but there's so many aspects of building a company. But the important thing is the people that you surround yourself with, getting a great group of people and creating a culture, actually that's going to be one that's gonna persist through challenges, through pivots, innovative, creative, and where there's a lot of trust. - Well, I met some of them when we visited Jessica-- 00:17:38,160 - Yes. 00:17:54,810 just you and me and we just got about 200 friends here. - Okay. 00:17:58,290 - What brings you joy in this job? 00:18:00,330 We're always asking, like, what's your worst nightmare? but let's flip it today.

What brings you such joy to want to do this pace? - So I was at a, a part of this group 00:18:11,340 called Unreasonable Group, which is really phenomenal, love it. And one of the mentors there, a founder, successful entrepreneur who sold his company and all that, came back to mentor those of us who are building companies. And after talking to him for a while, he said, "Lisa, it seems like "you have a burden on your shoulder "that you have to inspire your people." And he said, "Your people need to inspire you." And that little shift in thinking was so important for me because I began to shift and like look at the amazing people we have on the team and all the amazing things that they're doing. And my people are the ones that is, they're not my people, but the people that I'm privileged to get to work with are the ones that's inspired me on a daily basis. - Wow. 00:18:54,270 Can we go to third pasture or third dimension we were shouting about at the team and I hope it's okay with you, and that is the notion of pivoting, scaling. I threw in pivoting in your role. But this is pivoting and strategy, and we touched on it early on from jet fuel to here. Your job is to scale this thing. This is not a small business, I mean, anymore.

That's not the intention especially when you took on venture capital. It is now. But you were driven by more than that. You wanted to scale 'cause you wanna put a dent in the universe as you talked about in this problem that's brewing. So can you talk about a time when a pivot was necessary in order to seek the scale that you wanted that was particularly challenging? - I think it's that first one. 00:19:47,896 It's that jet fuel one. - Was it? 00:19:51,090 - That was probably, and there's been many since, 00:19:53,340 but the benefit of that, the benefit of saying, okay, the market is no longer ripe for investing in a new innovation in this area. What else can we do with this technology? And then we started working on palm oil. Actually when we were working on that, we were hitting some good milestones, and in the midst of that project, working with the corporation, the price of palm oil dropped by 2/3. (laughs) So we-- - Same sort of thing.

00:20:20,490 and we realized that there's so many different things that we can make with this technology. And Kiverdi works with corporations to help them kinda, does R&D, development projects. What's the molecule that you want? What's the material that you want? Can we make it in a way that's carbon negative from cradle to gate? Can we make it in a way that doesn't require any arable land? So that's what Kiverdi does. And Air Protein, we split out Air Protein to focus on this food issue because it's its own thing, and we're building, we have B2B opportunities, but we also have have B2C consumer brand. And that's a whole different skill set of people-- - I see 'cause I was gonna say 00:20:52,860 what is your business model for Air Protein? - Yeah, we wanna tell consumers our story directly. 00:20:57,570 We wanna connect directly with consumers on this new way of producing the nutrients that they enjoy. And so we're building both a B2C brand as well as, happily, because there's this strong understanding that climate is an issue and all these net zero promises that companies are making, they're looking for companies that can help them with their Scope 3 emissions, and that's essentially the emissions associated with materials in their supply chain. And we happen to be a company that can make ingredients and inputs in a way that lowers your Scope 3 emissions that's, in fact, that's carbon negative from cradle to gate. So that's a huge opportunity. We're excited about this moment where there's an interest in that and there's a focus, we're devoted, we've devoted our lives to this and we're happy now that corporations are seeking that.

- Well, as you could tell, I'm a fan, 00:21:49,020 but every company has risk. What's the white hot risk right now? Or the red hot that's burning a little bit that needs attention in the coming year or two? - Yeah, the main thing for us is scaling. 00:22:02,100 That's the main thing. Larger and larger facilities. We're working on our first facility. Our first demonstration unit now should come online very soon. We're at the tail end of that process. And then it's just going to the next scale, going to the next scale. And so with each scale up, there's time essentially that it takes to both scale up the facility and also to get it optimized at that level. And so that's the huge thing.

- And you get the right people who can scale, right? 00:22:26,560 - Absolutely, it's all about team, 00:22:28,920 it's all about people in the end. Execution. - And you have that. 00:22:34,260 So I don't know if you told anybody that you were gonna go to an ETL and meet somebody that makes protein food out of air, did you do that? 'Cause when I told people what I was doing today, they just looked at me like, are you what? Yeah, she makes protein food out of air. So it's real, it's real. And so before we open up, I've got one more. We've been emphasizing several themes in this seminar series, the seminar series has been around for 20 years. Up until about three, four years ago, we talked about finding product-market fit, we talked about how to raise money with minimizing delusion, all the kinds of challenges and dilemmas that CEOs like yourself face in your teams. But we pivoted and we started emphasizing the discussions around ethical dilemmas and how they manifest themselves. So is there a time where your values were such that you had a big challenge to solve a particular dilemma? A typical, in any given week, you got several dilemmas in any given month, period of the company, but is there one where it was, you could share with us because of our, we're emphasizing that ethical dilemmas are gonna be there no matter what.

It's how you handle them. So any comes to mind? - Yeah. 00:24:12,420 So what I'll say about that is when we started Air Protein, we wanted to be really intentional about the culture that we wanted to create. And we got together and we hashed through what are the values that we want people that are in this company to have, the people that we hire, the people that we keep. And one of the core values is protect people on the planet that emerge from many conversations about what we value. And that reveals itself in many ways. The planet side is pretty obvious. People join Air Protein because they're trying to have a positive impact on the planet. And then on the people side, it's everything from our employees to our partners to our customers and beyond. And how do you protect people on the planet? Like how do you do that? And one area that comes to mind is just safety.

Creating a safe operating environment, creating psychological safety. And for us, it was important for us to define that as a

core value so that when we got people in the company, that's something that they ascribe to and also it's something that would be a measure, we measure kind of our decisions against that. And what I'll say there is building a safety culture in an operating, manufacturing environment is critical, is really important. And one thing that we've started saying is safety is priceless 'cause one of the ways in which companies, if you look at some of these large companies, that have had issues, some of it is around cost cuts, like kind of making a choice based on profitability, based on what's the least cost, et cetera. We of course are for-profit so we focus on profit as well, but what's above that, all else is protecting our people, protecting people. So that's kind of one important thing. What I'll comment there is, and it kinda links up to people inspire me as well, is there's been a couple of instances where there's been a work team around us that haven't been implementing, practicing safety processes. And one project manager on our team went and reported that to their bosses, and in our team meetings where we talk about safety as kind of that's one of the core parts of the meeting, his comment was, "I had to say something "because just as a human. "They're not on our team, we can't affect their work, "but I can try to have an impact as a human." And in that moment he inspired me. - Wow, all right, that's fantastic.

00:26:34,470 Well, I suggest we move on to questions. Jay All right, hi, I'm Jay. 00:26:40,350 So I'd assume that the average consumer walking around in the grocery store probably doesn't care as much about the environment as someone like you or I do. So how do you convince them to buy an Air Protein product over like their normal burger or steak? Like is Air Protein, does it taste better? Is it cheaper? What's the main draw? - Yeah, I think there's a couple answers. 00:27:04,410 One is it has to be great, it has to taste great. Like there's no way to, one of the reasons why we're working on what we're working on is because we don't want there to be a compromise. We want, I'll make choices based on the environment, but the person, my husband loves me, (laughs) so he is my measure, he has to like it in order for us to actually, we believe, be successful for people like him to like it. And so taste is number one. And then secondly, it's about building a brand, building a brand that stands for something. More and more consumers today want to buy from companies that stand for something, and they may not know the details.

You're right. But that's what we're gonna do is build a brand and talk directly to consumers about what they're supporting as they support this brand. - Fantastic. 00:27:49,086 Man Hi, I wanted to ask about the circular economy. 00:27:49,919 - The circular economy, yes. 00:28:10,440 So you have to make your food there. And so you have to, and we're a carbon-based life form, and we get our carbon through our food, so that is the same thing as saying recycling carbon as an example. You have to figure out how to recycle carbon. On earth, carbon is recycled via plants and trees. And so there's a circularity as it were just naturally in our ecology, in our ecosystems.

And so circular economy is applying that to how we manufacture, how we make goods. It's recycling plastic for instance. It's just how do we recycle and reuse. In nature, one organism's waste is another organism's fuel. That's what it is in nature. And so how do we do that more in how we manufacture? Christine Hi, thank you so much for your talk. 00:28:55,830 My name's Christine and I'm actually a physics major here, and I'm interested in both research and entrepreneurship. So I was gonna ask how do you think having that background in theoretical physics, which is like highly technical, impacted your experience as a founder? And I'm also curious what that mindset transition was like from research, which is very conservative and cautious and detail-oriented, to the startup space, which favors a lot more boldness and risk-taking and kind of grand ideas? - That was so well done. 00:29:20,040 That was what I was trying to do earlier. How about next week you come up here? (laughs) That was perfect, that transition.

- So for me, the transition happened 00:29:31,997 at the Boston Consulting Group where after getting my PhD, I was thrust into a room with executives from a large company helping them plan their international expansion strategy. And so what I realized is that the scientific method can be applied to many things, almost anything. So you gather your data, you start with your hypothesis of course, you do your research, hypothesis, data analysis, conclusion, and you keep the cycle going. And that was a really good moment for me to really experience how I can help these executives from these global organizations solve business problems that I had never studied. And so that was a good transition. And the other thing was was the whole 80/20 rule. That's definitely not what a physicist focuses on. 80/20 is getting 80% of the answer, doing 20% of the work. And just diving deep and getting as far as you can quickly and forming your hypothesis or editing your hypothesis as a result of that. So I think that was, BCG served as that great transition for me to get to what you're talking about and ultimately launching my businesses.

- I think we have somebody right here. 00:30:43,920 Laura Hi, I'm Laura, I'm a freshman. 00:30:46,530 You had mentioned the Haber-Bosch process, and whilst it was an incredible invention, I know that there were lots of consequences like eutrophication, biodiversity loss, issues with the atmosphere. So I think my question was, with this being such a world-changing technology, are there any unintended consequences that you're either researching or taking into consideration, perhaps more specifically on the atmosphere if this is really scaled up in the future? - Yeah, that's a great question. 00:31:14,160 - That's another great question. 00:31:16,020 - Yeah, lots of good of questions. 00:31:17,880 - One I wish I had asked. 00:31:20,370 - Yeah, and it's important, I mean, 00:31:22,270 what we're dealing with really is we're addressing what's happening because, it's not because of Haber-Bosch, it's because people kept having children, but the Haber-Bosch enabled them to be fed essentially. And so that's important. Again this goes back to our core value as a company, protect people in the planet.

And that's just something, that's why we made that a value, so that if there are unintended consequences, we're alerted to

that early on. People in the team, they have the ability to raise their hand, and they have the obligation to raise their hand and say, we need to think about doing this differently. - I wanna introduce you to two faculty members 00:32:00,060 that are teaching a class, which I highly recommend to everybody, whether you're undergrad or grad. It's Engineering 148 for undergrads, sign up for 248, Engineering 248 as a grad. It's Jack Fuchs and Scott Sandell. You might know Scott Sandell's name 'cause he runs New Enterprise Associates. He's the managing partner. But that's the whole course is that, the discussion of what's the difference between values and principles? How do you take your personal principles to use in an organization, therefore the organization's values and ethics? And then there's of course the so-called societal ethics type of thing. So there's all these layers, but they go through this all in a case-based method, role playing, and it's been spectacularly successful the last four years. And that's just the sea change for us in entrepreneurship education is to put that in now and that these kinds of, these questions never came up 10 years ago.

And maybe they should have when we had that generation of entrepreneurs coming through this series. It was just, it really is good to see. - Yep, and just to pick up on that. 00:33:10,110 So, yeah, I mean, and again that's within an organization is the culture that you create, and you wanna create a culture where integrity is an integral part of that culture. And then on the question about this process, so plants pull carbon out of the air as well, and this is a way of doing it faster. And the question that we're trying to ask is how do we do what plants are doing and what animals are essentially doing through with plants as kind of the first step, but how do we do it in a way where we don't have to clear all this land? How do we do it in a way where we're not emitting more greenhouse gases? So we're actually just really trying to address problems with this. - Well, let's go out online to the internet, 00:33:48,973 find out what they would like to ask. Andy? Andy Question over here, 00:33:53,070 we have about a hundred students also tuning in on Zoom. So this is the most upvoted question. Curious to understand your production costs versus the standard meat production costs.

How competitive is Air Protein meat when it comes to the average consumer choice at the point of sale? How do you scale the business with such production limitations if there isn't? - Ah, the unit economics question. 00:34:15,900 - Yes, that's an important one. 00:34:16,890 Yes. - You betcha. 00:34:17,850 - And it's one of the reasons 00:34:19,800 why we're excited about Air Protein is because we did the techno economic assessment, we did it with third parties, and we believe that at scale, we will be lower cost than the alternatives. And so that's why we're excited about it. The process requires a few things and are following kind of these trends that we're seeing. And one of the trends is power generation becoming more and more renewable. We use a lot of power. That's kind of a key input for us and we focus on renewable power, and that's becoming more abundant and lower and lower costs.

And that's important. So as we scale and renewable power scales and becomes cheaper, our process also becomes cheaper. So that's something that we're piggybacking off of. - All right, good. 00:35:02,550 Do you have another one in here? Eva Hi, my name is Eva, and I was just wondering, 00:35:10,830 generally for your outlook on the potential market for Air Protein, are you mostly interested in individual consumers in the country? Are you interested in maybe making broader changes in terms of like industries like the restaurant industry? Or are you looking on like a global scale, maybe targeting areas of food where food is really scarce or food deserts within the country? Like how do you see kind of transitioning Air Protein maybe from just something that's sold in grocery stores to something that can solve larger issues in the world? - Yeah, good question. 00:35:42,030 And our vision is really as big as what you're summarizing there. We're starting in the US. That's where we are locally here. We're at the tail end of our grass process, our independent grass certification, and our facility coming online. We're starting here, but our vision is much bigger than this.

I mean, to the point about areas, this is a place, this is a technology where you can produce food locally. You can produce food using minimal kind of inputs and resources, water, energy, and elements of the air, our key inputs that can allow you to produce nutrients. And so that can be deployed in places where there's food security issues today, where there's supply chain disruptions today or tomorrow. So that's important. We want to scale a technology that can enable us to provide low cost nutrition to anyone. - How about another from Zoom? 00:36:36,660 Andy It seems that one of the challenges 00:36:39,210 in food distribution is logistics. How can Air Protein overcome that challenge and can it be produced locally? - Well, I answered that a little bit at first, 00:36:50,040 and so I'll say that to build on that, so we can produce locally, we don't rely on any agriculture. So right now if you're producing food, your inputs are coming from far away in many cases, and there may be issues associated with seasonality as well as with climate change, we're seeing more droughts, we're seeing the yield be affected by all that. So we don't have any of those constraints, any of those barriers. Our inputs are very simple essentially and they can be sourced locally.

So that part of the equation is immensely simplified by this process. And then once we start creating products, we have to deal with any other challenges associated with getting food out to consumers. But the locality of this, the ability to make it local is a huge benefit. - Well, I think we covered everything 00:37:43,320 our team wanted to hear, and these were really great questions. I would like to wrap up by asking you to imagine yourself 20 years old at Brandeis, sitting in a room like this, listening to someone like you. What do you hope that they heard from you today? - Okay, I think the most important thing 00:38:07,918 is that change is required. How we got into the mess we're in, the processes and the systems that got us here will not get us out of it. So we need new ways of producing, we need new ways of doing things. And so we need innovators, we need innovators and inventions, and we need people to work on those inventions. We need people to support sustainable alternatives.

So I think the main message is the time is now. We need to change and we need all of you to be a part of that. - Well, this was so fabulous. 00:38:41,640 I'm gonna, when we publish this later and do some editing and so on, and then we put it out to the world, I'm gonna send it over to the new dean at your school. - Okay. 00:38:52,680 - I have his email. 00:38:53,820 - Wonderful, wonderful. 00:38:55,080 - And urgent to have a look. 00:38:57,030 I think Arun would really, really like it. - Awesome.

00:39:02,370 on the behalf of the School of Engineering, and frankly, the entire university, but specifically what a perfect time given what's going on here. So everyone, how about, once again, give it up for Lisa Dyson? (audience applauding) (audience cheering) (upbeat music)..