Episode Six Transcript

Clear Breakthroughs: How Elise Strobach Is Revolutionizing Energy-Efficient Windows

Intro:

The entrepreneurial journey is rarely straightforward. It's unpredictable.
Challenging.
Collaborative.
Risky.
Transformative.
And often deeply personal.
The VentureWell Voices Podcast offers an inside look at the change makers using science and technology to solve the world's greatest challenges. Hear their stories of the messy, meaningful path from idea to impact.

Christina Tamer: Welcome to *VentureWell Voices.* I'm your host, Christina Tamer. Today, we're going to talk about sweaty palms. Writing a book while on maternity leave, and what it means to be a scrappy entrepreneur. If any of those are interesting to you, please stick around, and please join me in welcoming my colleague, Véronique Pfeiffer. Welcome, Véronique.

Christina Tamer: Welcome back to Venture World Voices. My name's Christina Tamer, and today I am joined by the co-founder and CEO of AeroShield Materials, Elise Strohbach. Welcome, Elise!

Elise Strobach: Christina, very excited to be here.

Christina Tamer: Happy to have you. So, I want to invite our listeners to imagine or recall a time where they're in a... maybe an older home, in a colder climate. I'm in Massachusetts, I know, Elise, you grew up in Wisconsin, so lots of harsh winters, and those older, single, maybe double-pane windows, you can sometimes feel the draft, feel the breeze coming in through them. You just know that your heat is going out through that window, and you're losing some energy. And on a larger scale, it accounts for about 30% of our home heating and cooling energy use in the U.S, and in addition to that, it's uncomfortable. There are triple pane windows, but they're big, bulky, expensive, and there are some older coatings on the market, but for the most part, the technology hasn't advanced in the last 50 years until AeroShield came along. So, AeroShield has developed a transparent aerogel, and when added to a double-pane window, it can boost the thermal efficiency by up to 65%, it outperforms the triple pane windows, and is thinner and lighter. So, a win overall, and you're nice and warm.

Christina Tamer: Elise, how did I do on describing the problem, and what's your connection to this problem? Why did you want to solve it?

Elise Strobach: Yeah, you did a fantastic job, and I... I love that, you know, we get to work on a problem at AeroShield, that people can feel and they experience every day, whether, you know, hot climate, cold climate, you just want to be comfortable inside. For me, this connection to how I came to... to be in this position at AeroShield working on this problem actually started, for me, with a passion. Or, you know, really trying to find an understanding of fundamental, like, things like heat and mass transfer, and think about how we can apply them to problems, to make our homes and lives, you know, more comfortable, more affordable, just better.

Elise Strobach: And for me, I think in particular, I was really excited about the idea that, you know, we can apply this fundamental understanding of science in a way that helps us live a little bit more harmoniously with nature. So, originally, I actually started by being really interested in renewable energy, and as I decided to go to undergrad to become a mechanical engineer, I think, you know, during that education, really starting to get an understanding that, you know, energy is not just about making energy and having lots of it, but also how we use it. And so that was where, I think, sort of two things came about, where, you know, this understanding that the problems that we have, like having enough energy to keep our homes really comfortable, that it's not just about making lots of energy, but it's also thinking about how we use it.

Elise Strobach: And that also, that the scope of these problems are huge, that it's not just as simple as saying, oh, I'm gonna go into the lab, and I'm gonna make a device, and then it's gonna be great, and everybody's just gonna want it, and it's gonna change the world tomorrow. It's really this... this, you know, concept of to start at the fundamentals meant that, you know, when I got to the end of my undergrad, I realized that I can... I can just barely start to understand why these problems exist in the world, and I can, you know, just start to see that there are solutions that we could be developing. But how you actually take those solutions and apply them in a way that people can access them, where that... that problem is also your solution can be delivered to solve that problem in a way that is effective when you look at that holistic view of not just taking that fundamental understanding. Applying it or making a device, but then actually making sure that the person who uses or is having that problem solved is aware and can make that choice to have a better technology.

Elise Strobach: So for me, that actually started by the journey to Aeroshild and focusing on... on windows and this aerogel, this transparent insulating material. I actually started by, as I got done with undergrad, really thought that I was going to be, you know, renewable energy on the generation side, and so joined a research group called the Device Research Lab in mechanical engineering at MIT to work on a solar energy harvesting project that was using this really exotic material, an aerogel, which is basically a super nanoporous glass, which enables the material to be super insulating, incredibly lightweight. You know, more than 95% of this material is air, trapped inside of pores that are small, small, small, nanometer size, so orders of magnitude smaller than even the wavelengths of visible light. So, a really exotic, and it has a lot of unexpected properties, and at the time, we were looking at trying to optimize it for this solar thermal device, thinking about, hey, if we could have this, if we could harvest that sun's energy, put it into the thermal, we can store it, we can convert it into whatever form we need.

Elise Strobach: But in order to make that device efficient and cost-effective, we need to be able to collect the sun's light and trap it, and then use it. And so that was where I joined this group with a lot of really talented scientists looking to design, build, and actually test a device like this out in the field. And so we physically had to learn how to make these aerogel materials that were invented by NASA almost 100 years ago, but we were making them at the lab in these really small sizes. And so as we... as we started to, you know, me specifically getting into this project and trying to understand how do we optimize this material for the solar device meant that I had to get this fundamental understanding of not only the aerogel material, but also the thermal properties of how this whole device and how that aerogel would impact it.

Elise Strobach: And then, as that project advanced, as we got better and better at making the aerogel, it then started to become the question of, okay, but then can... if all these pieces in the device come together, and this... this technology, this whole device to collect solar energy were out in the market. Would people actually use it? Would it be...

Christina Tamer: cost-effective.

Elise Strobach: There are enough physical materials in the world to make enough of these to make a difference. And that, at the same time, happened as we had a bit of an accident in the lab with this aerogel recipe that we were making. And long story short, we were... we were trying different variations of recipes. We just sort of read one of the ingredients wrong, so we just put more of a catalyst in than we normally did, and what we got out was something that just looked very different—really, really transparent as it, you know, these small samples that were just sitting out, and we sort of looked at each other as it came out of the, the, you know, production process, and we said, “This looks very different. I bet you this doesn't have any of the properties that we need to make this solar device work.” And as we tested it, we found that it actually had all of the properties that we needed thermally. It was still just as insulating as the other forms of this aerogel that we'd been making, that others had been making for decades now. But the real difference was, is that was very, very clear, and even more transparent than glass. So, as I was doing this...

Christina Tamer: Like, a eureka moment.

Elise Strobach: Yeah, and then it was a little bit of, like, the, oops, do we, you know, do we, do we throw this out?

Christina Tamer: Let's test it first.

Elise Strobach: Glad we did. And so, from there, it was a little bit of the iteration of first trying to look at, hey, we've got this new set of properties. Is that useful for this solar thermal device?

Christina Tamer: Hmm.

Elise Strobach: And the pretty quick answer was, it does make it a little bit better, but not enough that this fundamental innovation and a combination of something that really is ultra-clear.

Christina Tamer: So how did you discover the Windows application, then?

Elise Strobach: Yeah, so... so we were continuing to... to share updates. We were actually... the solar thermal project was funded by ARPA-E, so the Advanced Research Project Agency for Energy. And, in particular, there are a couple of milestones within that grant that require us, as we're doing the fundamental research, to say, okay, why should we keep funding this? How is this going to get out into the world, in the U.S. in particular, and help us advance, you know, needs that are core to American citizens? And so that is things like, you know, can we make materials that give us energy and help us save energy in the U.S?

Elise Strobach: And can we do that cost-effectively? And so, as we were looking at this material and doing some of this research on solar thermal, going out into the world and saying, okay, now if we could do this solar thermal energy harvesting better, would that solve this problem? We were getting very mediocre answers that were a lot of pieces around... There are actually logistical challenges to solar thermal energy harvesting. Where are you going to put these fields? You're going to put them in a place where maybe the energy isn't being used. And so some of our program, you know, managers sort of said, you know, we've seen this happen many times before, we think that this is a really important part in the project, it's required by some of your grant requirements, that you go out and look at other applications than the one that we funded you to explore.

Elise Strobach: And so, I had had some prior experience working at Johnson Controls in a building efficiency group. So I reached out to my former supervisor there, and he jumped on a call, and I basically, you know, didn't give him all the fundamentals, just sort of said, you know, we're working on this cool material for solar thermal, now we found a way to make it really transparent. Just want to understand if this is something that we should look at for the window market. And almost his immediate reaction was like, yes, we need better,

transparent, insulating materials. And that was enough that, you know, when I brought those results back to my research group, my advisor, as well as these program directors, that was sort of the trigger for them saying, “We agree. We look at a lot of different technical areas. We agree that you should look at this window application more.” And that was sort of, for me, you came right at the transition between master's and PhD.

Elise Strobach: It was ultimately actually one of the things where I came back to my advisor and said, I think solar thermal is great. But I want to stay for my PhD to work on Windows, and explore this, and take this groundwork that we have with the Aerogel, and figure out if this solution would be better for Windows, while some of my colleagues in the lab still were working on solar thermal in parallel. So a little bit of divide and conquer.

Christina Tamer: Yeah, that's great. ARPA-E was really supportive and instrumental in this... in this sort of journey for you. And then, let's jump ahead a few years. You... you pursued your PhD—I think we met at that point. When did you then take the leap into founding a company and really leaning into entrepreneurship?

Elise Strobach: Yeah, so I would say that it's easy to look back on it now and go, oh, it's so obvious, and, you know, all these pieces in the story that, you know, just like, you made this material, and then you found where it'd be applied, and then you decided to start a company, and then you made the company, and now we're making types.

Christina Tamer: There's a lot more pain and suffering that happened in that time, I'm sure.

Elise Strobach: And a lot of... a lot of time, to be honest with you. A lot of... like, for me, it was, you know, hearing this positive reinforcement from ARPA-E, and, you know, from my former supervisor, who had this specialty in building efficiency, and that was enough of a... we'll say a poke to get out into the world, get out of the building and go talk to people that work with windows, that work with buildings, that work with all kinds of transparent materials that also have insulating properties, and learn from them. And so, I would say that then sort of started an arc where then I also started to take courses at... starting with MIT, and then eventually, you know, found other resources like VentureWell that, as the vision of what the company around this technology needed to look like to be able to deliver this solution into the market to create impact.

Elise Strobach: you know, started with, some fundamental courses where I didn't even bring this aerogel material in. I actually worked on somebody else's technology, because I went...

Christina Tamer: Yeah, yeah.

Elise Strobach: Separate from me studying and working on this all the time, I just want to see if I'm... if I can understand entrepreneurship and what it takes to build a business around. And I think a little bit of what happened when I look back on it now was I did that again, and then took a different course where we actually formed a group and worked together, and I just continued to have success, whether it was talking with the market, talking with grant funders, talking with people who wanted to join and work on the project.

Christina Tamer: Mmhmm.

Elise Strobach: Even, you know, donating their time. And I think all of those were signals that, one, you know, welcomed all that input and that help, so it made a more robust. And, I think got... got... There were a lot of things that... that other people could give advice on and say, you know, I've seen this happen, this isn't gonna work, you should at least consider trying something different. And so I think a lot of that, you know, this vision of what AeroShield,was by the time we came to, you know, we had... we had started to go through the VentureWell programs, we had started to win some early tech-to-market transfer grants, some early commercialization grants, both from federal government, from the state, and from some really great entrepreneurial clean tech entities.

Elise Strobach: And I think, you know, there came this point where, you know, no matter how I presented the technology and its ability to solve these problems in the window market. And all of the different ways that we could build AeroShield, up around to deliver that solution. I think there were... no matter what, we kept coming back around to people really liked the idea. They wanted to help with it. They believed, at its very core. The fundamental breakthrough we had, why nobody had done it before, those things all resonated, and I continued to hear this positive feedback of not only, hey, this could be a great company, the world needs this solution. But there also started to emerge this thread of, nobody else is going to care or understand at this moment to form this company and bring it out of the lab.

Christina Tamer: Mmhmm.

Elise Strobach: As much as you, Elise, being this PhD student that has worked on it.

Christina Tamer: Yes, yeah.

Elise Strobach: And so I think that, combined with having won the MIT Clean Energy Prize, which is now the Climate and Energy Prize. You know, was really... we've got capital now,

we can actually start forming this business and spinning out. So I would say that the moment that we actually signed those incorporation papers.

Christina Tamer: Yeah.

Elise Strobach: What that started was the moment where it was, oh my gosh, up until then, it was almost like looking at the data and going, well, of course, this is what the data tells us we should do. We should, you know, we should go get more, you know, support and letters of support from the industry, and then we should go apply for these grants that would help us do research to translate this out of the lab.

Elise Strobach: And then before you knew it, there was almost like, look at all this momentum. How could we say no to this opportunity to have a small chance to change the world?

Christina Tamer: That's amazing. And when did you incorporate? Was it around 2019?

Elise Strobach: Yeah, the fall of 2019.

Christina Tamer: Great. So, I think a great way of illustrating that is when we were... when we met around that time, you were talking about 11-inch samples, like, pretty small samples, and then maybe you had plans to get to 12 by 24-inch sheets. So, can you tell me about where you are now? Because I think you're a lot... a lot bigger now.

Elise Strobach: Yeah, yeah, absolutely. So, so one of the aspects of how you make an aerogel is it does require a manufacturing step that, basically, you can think about it like a high-pressure, medium-temperature vessel.

Christina Tamer: Mmhmm.

Elise Strobach: And those, like, we don't have big, big vessels just lying around in the university. And so, you know, up until, you know, 2019, early 2020, I was still, you know, primarily working on my PhD. That point in time was focused on grants that were, you know, for example, like from the Massachusetts Clean Energy Center, explicitly looking at trying to translate these technologies out of the lab. And, and in particular, like, was... was trying to... pretty much we had answered all of the other fundamental questions of, you know, from what we know today, could this be cost-effective? Would it have performance? Are there enough ways to integrate this material into the existing way that we make windows today, so that we could at least get started before maybe we even think about how an aerogel could revolutionize the way we think about windows?

Elise Strobach: We just want to prove that this material can get out there and do what we said first. And so, you know, one of the things that we did is we were making samples this big. We had gotten them up to about 6 inches.

Christina Tamer: Okay.

Elise Strobach: One of these questions was still, do your models at these small scales, does that work at large scale? So before we could spin out of the university, so in 2020, then AeroShield formed, we ended up buying a used vessel. Somebody else who was using it for a little bit different of an application, and we started to be able to make 14 inch by 20 inch, and that was, you know, the biggest transparent aerogel that we'd certainly made to date. Before then, we'd actually just cut out these small samples and tiled them together. And I can tell you that it makes... it takes 46-inch discs to be able to cut off enough hexagons to make a 1 foot by 1 foot aerogel. And so by the time that we got to this, you know, buying this first vessel, we actually sized it just so that it could make the industry standard test size sheets. We knew that being able to make bigger than that would have definitely convinced people earlier that, that it would be cost-effective. But to take on all that risk all at once, you know, we needed to be able to do this industry standard testing to be able to engage with customers in a meaningful way. And we knew that if we then could get customers to engage in a meaningful way, we could raise more capital, or we could work for them to get the resources that we need to physically scale up to even larger sizes.

Elise Strobach: So that real first battle of getting out of the lab was just to be able to look at the industry and say, okay, what's the minimum size that if we could prove this, it would give a step change to your confidence that we can solve this problem?

Christina Tamer: And they would take your call and take you a little bit more seriously, right?

Elise Strobach: Absolutely, and I can say even now, you know, because I also mentioned that we spun out, you know, end of 2019, beginning of 2020, so we also had a little bit of this, you know, hitting the COVID of, you know, that whole first year in 2020. We used it to make these industry standard test samples. And so for us, it was such a step change when we started to be able to go visit people in person that we get this little portable sample that we bring around, and we could have small samples of the material that people could play with and go, this is like nothing I've ever felt or touched before. I believe that this is a nanomaterial unlike anything I've seen. Yeah. But then to show them a window and have them go, I don't see what you've put in here that's different.

Elise Strobach: And that was something that, when we were in the lab for the 6 years of my PhD, that we tried to convince people in the market, you know, big window companies, other, you know, other grant funders, we kept saying, like, no, this is the clearest aerogel, like.

Christina Tamer: Yeah.

Elise Strobach: And they said, well, you can make it clear at small sizes, but we just don't think that you're going to be able to scale that up, or if you can, it won't be cost-effective. And so that was why these industry standard test sizes/ It got us into this mode where we could interact directly with customers.

Christina Tamer: Yeah.

Elise Strobach: It meant that the funders, whether it's investors or grants, they started to listen to the customers. They have known about aerogels for many, many years, and so when we showed them a sample, and they said, I can't see it, that was a pivotal moment, and it brought a lot of different people to the table, and gave us a lot of different options for how to get more resources to help us grow beyond that phase.

Christina Tamer: Yeah, yeah, it was kind of like, you have to not see it to believe it, almost, you know? Yeah, it's... it's to your advantage that you were able to, you know, bring this, because it's that word, clear or transparent, you know, people can say, sure, yeah, it's probably mostly transparent or mostly clear, but it actually is at the scale required. And, you know, you had to face this doubt of, sure, you can do it at a small scale, but replicating this for our needs, for a large window, is a different target hurdle to clear. So, you mentioned earlier, you know, the system of energy and energy efficiency. There's also the complex value chain of the whole Windows industry, you know, what I described at the beginning around a person in a home versus the decision makers on the materials for a window. Can you share how you took your systems thinking approach and used that to understand the whole value chain of the Windows industry to get to those decision makers?

Elise Strobach: Yeah, and that's a... that's a... I think that's such a great question, and I also just want to call out that, you know, the VentureWell support was, I think, something that really helped change my thinking from, you know, we've got this technology, it's ready to go, it can solve the problem. Like, the technology can just solve the problem, like, just get it out into the world. And then, I think, you know, one of the things that VentureWell helped

us really do was take a holistic look at... it's not just about the technology, but it's what you're building around it to deliver that solution.

Elise Strobach: And, you know, one of the pieces that I found interesting, and a little bit frustrating, especially in the beginning, was how, you know, the window industry has been an established technology running a lot of processes that, even if you rewind 75 years ago, they really don't look a lot different than the way that we make windows today. And I... and I... and, you know, there have been a lot of technical advancements and a lot of, you know, better performance and, taking... taking technologies like low-E coatings, or the way that we make double panes, and making them better, or making them cheaper, or offering them in more ways that... that everybody can access them and have more windows in their home.

Elise Strobach: But a true breakthrough, you know, fundamental different technology hasn't really penetrated the window market yet. And so that was... that was one of the things that, as we started to look at why that was true, that was where we started to see this complex system and stakeholder chain. This idea that you have to... if this is the stakeholder chain that you're trying to either disrupt or work with to get this technology delivered, then you have to understand the motivations, and for me, that's that word value proposition. Like, we want them to change their behavior. We want them to take this technology and either add it to something they're doing today, or replace something alternative with it. And so we need to understand it's not just about this, you know, amazing technology that, oh, if only they could understand it, they'd love it. It's actually, we had to learn about how they were doing things today, and why the way that they were doing things today had to exist. And one of the nuances that I just found super interesting is, you know, most of the windows, 90, you know, more than 90% of what we make today in new windows in the US, is this double pane. So two panes of glass with an air gap that's sealed.

Elise Strobach: And I didn't realize until we got in, toured those facilities, saw how they were made, and then visited these different manufacturing, you know, spaces all over the country, that things like shipping over the Rockies. You can't do that once you've sealed a window. So that means even if I wanted to make all the windows in one big consolidated manufacturing in the central of America, like, I couldn't... I couldn't ship it over the mountains, no matter what. So somehow, you know, this double-pane solution has to have some level of distributed manufacturing.

Christina Tamer: Yeah, yeah.

Elise Strobach: And that was something that, you know, from an Aerogel perspective, never thought about those logistics. Never thought about why these window makers or glass makers were located or positioned where they were for supply chains. And as, you know, just started to get curious. It led to me asking more questions. And I think if I'd have gone in, you know, explicitly saying, you know, my job here is only to ask the questions that I think validate or invalidate what I believe is true about AeroShield's technology and how it can solve their problems, I don't think that I would have started to understand that each stakeholder is motivated a little bit differently. It's like your glass maker, who, you know, might make just the glass, but might make and coat the glass with a special coating to help insulate your window, they might sell, but they also might make their own insulated glass unit. That might be sold to one of the big window brands that we know in our homes. That also might be delivered to a window brand that you don't know, right? That might be doing something a little bit different and more exotic. But that glass pane could be made from the same upstream supplier.

Christina Tamer: Yeah.

Elise Strobach: It's just starting to say, well, if we want to come in and disrupt that. 1And there are a lot of different people with a lot of different needs, and that doesn't even consider, you know, us as homeowners who ultimately get to make that decision of, do I want a new window or not, and which one if I do? And so from that standpoint, I think it was... you know, Initially, a little bit of... of... of... oh, we'll do a couple interviews, and we'll understand.

Christina Tamer: Yeah...

Elise Strobach: will know how to deliver the solution. And I think one of the happiest places I've been to be proven wrong is that there's just a lot of nuance, and that there's a lot to just be curious about.

Christina Tamer: Yeah.

Elise Strobach: But as we got more curious, we started to hear things from these different stakeholders that, you know, if you think about somebody who's making glass. And then selling it to somebody who coats, who's sealing it into a unit, who's selling it to somebody else who puts it into a window, who sells it to somebody else who makes sure it gets installed in your home, so that you, the person who actually writes that check and pays for the window, and then deals with it in your home. That... that while those... the people that make the glass do the research, and they understand, you know, what the homeowner

wants, because that's important to them. Elise Strobach: Understanding is different, and they're motivated to understand that homeowner differently than anybody else in that value chain. And then... and differently than AeroShield. And so I do think that that's one of the things that has been really helpful in understanding where should we start to deliver this solution, and once we have it in the market, how do we grow it from there? But I think that there's also just this, like, engineering brain approval. It's not just about this technology, it's about looking at each one of the barriers or motivators for each one of those stakeholders, and trying to say, my greatest odds are for success. I can make sure every one of those stakeholders loves and wants my technology because I'm solving a problem that they care about. They... they want to have solved.

Christina Tamer: Yeah. Well, your example about, you know, the shipping challenge over the Rockies is such a great example of something that, if you were sitting at your desk, or if you didn't go out and observe and really understand your customer's experience or your partner's experience in the value chain, you never would have thought to ask that. Like, that never would have come up, and it's not something that, you know, someone not from the industry would have been able to... they might not even have thought to tell you that, you know what I mean? You would really need to go out and observe that firsthand yourself, so that's a great example of something I always say. If you're, as an entrepreneur, telling me something that I've never heard of before about the industry, that really tells me that, like, you've gone out there, you understand. So that's such a great indicator, even though it's not a checkmark on the journey very clearly, it's such a good indicator that you've immersed yourself, and you understand what motivates your customers or your partners, and how they can be successful, and what all the different incentives are that interact with each other, and I gotta say, the Windows value chain is probably one of the more complicated ones out there, because there are so many different materials and stakeholders, in addition to the homeowner involved, so hats off to you for navigating that. It's really impressive.

Elise Strobach: Really appreciate that, and again, just want to call out that, you know, there were a lot of resources, you know, especially during my graduate degree, I think two things I would just highlight of, one, you know, if I were to show up and introduce myself to the people that have given me some of the best information about the market; you know, if I show up and I... and I go, I'm the CEO of AeroShield, you need to have my technology, and I'm here to tell you why you need it. But instead, coming as a... as the PhD student, which is a lot of times where I'd start from, and saying,I just really want to understand how you do things today. Where are your biggest problems? What do you wish more people that aren't in this market, that aren't in this space doing your job, what do you wish more people

knew, or... or changed their behavior differently that would help us deliver better outcomes to everybody? But just even going in with that curiosity, it, like... it definitely yielded better results, but it also just was, like, so much more enjoyable to have that conversation with these experts, and it... I think it drew the right people to... to me and to AeroShield. Yeah.

Christina Tamer: Yeah, those are definitely the questions to ask. Like, that is the perfect list of starter questions if someone's struggling. Those are the types of things... it gets people to talk about themselves, or tell a story, and that is where you get the most rich information, that is not just a checklist of yes-no questions, so... I want to also recognize now, you know, you're leading a team of 25, you've got a facility in Massachusetts, and you now have a new award from ARPA-E, $14.5 million, which is amazing. But, you know, we're now in the present, we've been talking about several years of work, and I want to maybe give you a chance to talk about any stress tests you face along the way. That's an exercise we run in our investment readiness program where it talks about all the unexpected things, the unpredictable things that maybe have nothing to do with what you were focusing on or could never have anticipated. Did anything like that come up for you in the last few years?

Elise Strobach: Yeah, I... first, I would just say that... that it feels like most of my job is stress tests. So... so at some point, you start to look at those as... as, like, learning opportunities. So, just want to call out that I think, you know, having the... having VentureWell teach us how to do that early, and do it in a place where it was... it was... it cost us a lot less to fail, has been one of the things, because those... those kinds of stress tests just get bigger and more existential, it feels like, as... as you do make progress towards... towards proving or disproving whether this technology can change the world. One of the... one of the stress tests that... that I can talk about, that it's still... it's still playing out is, like, customer partners and relationships. And, you know, I think one of the pieces when we were still even in the university, I think, you know, before I had really internalized this idea that, you know, I was going to be a founder, and we were going to spin this technology out, and AeroShield was going to be the one to really get this technology into market. I think that there was this idealism of, you know, as we were talking with a lot of the big players in the industry, and small players, we kept hearing really positive reinforcement for what we'd uncover. Still a lot of skepticism about the scaling.

Elise Strobach: But, you know, as I kind of mentioned in that story, you know, coming in with that PhD, I was just so impressed by how people said, oh, come out for a facility visit. We'll give you a little crash course, we'll introduce you to our company, we'll talk about what we do, we'll talk about our innovation group, we'll give you a tour of how we make glass and coated glass, and insulated glass units, and we'll show you where we test them,

and we'll test a small sample for you for free, if you want. And it was... it was like, oh, yes, we're gonna be a part of this big group that wants to solve this problem, and this technology's gonna get out there, and I'll get to play this role that I'm very comfortable in now, which is this researcher who can help, you know, kick off a tech-to-market transfer conversation. But, you know, I've never scaled a company, I've never, you know, started a company or built a manufacturing pilot, so that's gonna be one of these big market players who's gonna really take this technology and get it into the world. And I think in a really positive way, you know, the more people that we talked to in the industry, we forged individual relationships with individual people in roles within these big companies, and they were incredibly positive and supportive. And then, as AeroShield started to do better and better as a company, and we started to get closer to product and market, and something that, you know, you could look at as, you know, with these potential customer partners, as being something where we could work together. There's some part of this that AeroShield, from an innovation standpoint, can do best.

Elise Strobach: And there's some, you know, part of this that the mass market is scaling and having facilities and supply chain relationships that they could do best. But these individual people that we were talking with in these big companies are still part of this big company. And the way earlier that I was talking about, you know, AeroShield is based on a technology, but the technology alone can't solve the problem. These big companies are set up the same way, and they have, you know, different competing priorities, and AeroShield, is, you know, especially at the time that we were talking with some of these big companies, a drop in the bucket.

Christina Tamer: Yeah.

Elise Strobach: And so one of the things that happened was, you know, it came down to we were a finalist for a grant application, actually, one of the early scale-up grants. We applied 3 times before we won that ARPA-E $14.5 million.

Christina Tamer: Way to stick with it, yeah.

Elise Strobach: We were... we were... we... we started to learn to use those grant applications as a great way to also do some internal planning. So it started to be like, we're not even going to guarantee that we're going to win this, but we're going to put our best application, because we'll follow that plan whether we win this grant.

Christina Tamer: Yeah, yeah, that's great.

Elise Strobach: But what ended up happening is in the second iteration, so, about 2 years, 2 or 3 years ago. We got to the... one of the requirements for the grant is having customer partners and having them help, you know, with cost share to the finalists, and, you know, one of the last attestations before we advance into the final presentations was just reaffirming with all those customer partners that they were on board.

Christina Tamer: Yeah.

Elise Strobach: And about 12 hours before one of those deadlines came, one of these big customer partners came back to us and said. you know, the point of contact was like, you know, we... we... we can't... we can't, we can't support this. I'm, you know, it's coming from the top down that we just... we're just at a place where this just doesn't fit within our priorities, and we can no longer support. And so they ended up pulling out, and that was a very interesting lesson in, you know, those people and our understanding of that company. We had, you know, we saw real things that were supported by data, but there was still this sort of unknown over the top where the company had to make a decision as a collection of people.

Christina Tamer: Yeah.

Elise Strobach: And there was no way we could have saw that coming. The interesting piece was we had been told to be a little bit, you know, protect ourselves from big players for this very reason since 2019, back when, you know, thinking about spinning out of the university, so... We had... we didn't, you know, we didn't put all of our, all of our, our, you know, relationship investment into one relationship. So we did have a small market player who, you know, I want to say that it was, like, 12 hours before we had to submit to ARPA-E that we had these customer partners, that this big player dropped out. We called up this small market, you know, smaller market player, but still a leader in their area, and we didn't get ahold of them until the morning before, about 4 hours before the deadline. They put together the letter of support, they replaced the other customer partner, and since then, that has then... that relationship has continued to build, and now this is our public customer partner, ODL Windows and Doors. It's been phenomenal. They were a core partner when we won the... when we won this $14.5 million. In this... the third round around that we applied for it, they were... they were a partner with us.

Elise Strobach: And I share that example because that has now happened to us in, you know, larger and smaller. That was probably the most devastating.

Christina Tamer: Yeah.

Elise Strobach: Ripping the band-aid of the first time experiencing that.

Christina Tamer: Yeah.

Elise Strobach: dancing with an elephant and getting stepped on, is a little bit of the way I think about it. But there are small examples of that happening throughout all of AeroShield, of understanding that even an investor, you know, even somebody who is working directly with us as a point of contact isn't the only person who makes that decision, and so understanding that, you know, we always have to trust people at their word, but we also understand that there are other dynamics around, which is why we then have, you know, we look at risks, like, what if our... what if our biggest customer partner has to... has to stop engaging with us, for whatever reason. What do we do then? And so now that's a... that's an intentional part of, you know, looking at the different risks and talking about, okay, how would we know if this risk is... is being realized? And if it is, what... what... what can we have ready to help us, you know, react quickly?

Christina Tamer: Yeah, and it's... and you can never prevent those types of situations, but all you can do is be prepared and have some contingency plans, and maintain really strong relationships, which it sounds like you have done really well. You never want to, you know, burn a bridge, you want to make sure that you're being transparent with your partners, to the degree that you can, and just expect and understand that there are other factors at play. It's not that that person, that point of contact had anything against you, it sounds like they were up in a tough situation where the company maybe didn't have the resources anymore, so it's never, you know, usually not going to be bad intentions, but it's good for you to, you know, take that for what it is, and then have a backup plan, and just, you know, sort of continue to be nice, and have those relationships be in good standing, so you can pivot if needed.

Elise Strobach: Yeah, and I would just call out that, you know, that entity that, you know, three, four... about three years ago, you know, we went through this with... we are... I think we're... we still have a pretty healthy relationship with them. We don't engage, and, you know, it's a lot more... we have a lot more protections about the way that we engage with them now, but, you know, and especially that point of contact, like, still have a really great relationship.

Christina Tamer: Yeah...

Elise Strobach: Still a supporter, yeah.

Christina Tamer: You both still exist in the industry, right? So, you know, that's still... even if something goes wrong, you don't want to cut somebody off entirely in an industry like this, right? It's, good to stay... to stay, you know, polite and civil and friendly, so...

Elise Strobach: Yeah, yeah, and I think, you know, that... that everybody always says don't take it personally, but I think it's...

Christina Tamer: It's hard not to, though.

Elise Strobach: It is hard not to, and I think now, knowing that, you know. I... I will say that it was not a... it was not a happy night before we got ODL to come in and replace that partnership, you know. Definitely took that moment to... to, you know, go home, sit in my room, have a good cry, frustrated rant, and... but then also realizing that that... that anger, that frustration, it's not directed at the company, it's not directed at any person, but it is... it is directed into, like I'm... I'm gonna do my best not to make that... have that same outcome again. I'm gonna be prepared for that next time, and that actually might be something that, you know, I also look at it now going, the things that... that big company was... was worried about and risks, we've just we've tackled a lot of them really efficiently, and I sometimes wonder if they have internal conversations of, you know, should we have... should we have made that move? That I hope that there's a little regret in there.

Elise Strobach: But then also looking at, you know, but AeroShield, also could now, if we did it again, do a better job of making it really clear that you're gonna miss out on a world-changing opportunity if you don't stick with us. So I think that there are also, like, acknowledging that if that frustration is focused on the system, and again, looking at, you know, there are barriers to why, you know, the technology that AeroShield is bringing to market hasn't been done before. And starting to just go, oh, that's one more... that's part of the value proposition, is helping this big company, you know, understand why it's important to invest in this kind of innovation. We could have made that point of contact's job maybe a lot easier if we went through that.

Christina Tamer: Yeah, when you have a champion, it's your job to help that champion be the best champion they can be. Give them all the information to understand and advocate for you internally. Yeah, it sounds like you really learned from that experience and have taken that with you. And, you know, want to acknowledge that was a hard, hard day for you, and, you know, you've been through a lot in the last, you know, almost 10 years. So what's something you do to take care of yourself in all of this?

Elise Strobach: Yeah, I would say, you know, a big piece, and it... it... it waxes and wanes in terms of, like how much time I have in my schedule, but I'm... I'm a... I'm a maker, like a hobby person. So, you know, making small decorative elements for my home and, you know, family and friends, making things like... like jewelry. And... and, you know, some of those have gotten a little bit more amplified, like, after going through mechanical engineering, you know, learned how to use power tools and different adhesives and materials properties, so there's a lot of really interesting exploration that I don't really get that... I don't get that opportunity as much in my day-to-day. But what's really interesting is that, you know, getting... the more that I get away from work, or have that opportunity to, you know, kind of... I use the word dissolve into...

Christina Tamer: Mmhmm...

Elise Strobach: or into something creative like that, it not only helps me, I think, unpacked, you know, definitely stay grounded, but it's also, like, I'm always surprised at how I'll be working on a, you know, a craft project, and then some, you know, great insight about, you know, a better way to do things at AreoShield will just sort of pop up. So it's almost like I've found that, you know, in grad school, I think there was a lot of pressure of, like, if I just do more, if I just, you know, study the aerogel more, that will be the difference. And now I'm starting to realize that, oh, you know, taking care of yourself and, you know, connecting with other parts of your brain and physically, like, your body. For me, there's also some physical elements to the... to the crafting that just get you out of the sitting at a desk looking at a screen. Those have all been, I think really helpful. But always looking for more things that... that help, help manage the stress. It's a game of, like, always, always talking to other people and asking, and asking what they're doing. So I appreciate getting the chance to share with others in case that's... that's something they want to try.

Christina Tamer: Yeah, yeah, it sounds like you get into a bit of a flow state, and if you just let your mind kind of meditate and go where it wants to go, you can solve some problems and think of some solutions for your day-to-day work. Yeah. Well, thank you, Elise. It was always, great to watch your journey. You know, I've known you for a long time now, and I'm so impressed with where you've ended up. I'm so proud of where you've ended up, and I hope you're proud of yourself, too, and your team has been really great to work with, and I wish you nothing but the best, and I'm looking forward to having some aerogel, transparent gels in my window someday, so... thank you so much, Elise. It was great to work with you.

Elise Strobach: Yeah, I really appreciate it, and would just, you know, call out again that, you know, things like the Venture Well and the Aspire program were... were so important early on, and again, still reference a lot of those documents even now, share them with my team, so I think in a lot of ways, also want to say thank you for continuing to make those programs available, especially to the kinds of people that really need them. Definitely was one of the things that helped convince me that you know, tackling this challenge, and... and learning from it, and being able to share with other people who want to give this career path a try. I... I think we... I think we both get to take some... some credit and some pride in for where AeroShield is at today, so really appreciate the opportunity.

Christina Tamer: That's really kind of you to say. Thanks, Elise. Well, great, thank you so much, and we'll see you soon.