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Dr Jennifer Holmgren: I like to work on things people say can't be done

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I believe in what Mr Thomas Edison has said, "Vision without execution is a hallucination". I was born in Colombia and my father decided our family would go to the US when I was nine-years-old. I was already excited by science and the US by then. I had followed the NASA space program through the news in Colombia and like every child at that time I wanted to be an astronaut. The year man landed on the Moon was the year I went to the US. I am a product of the US school system and I am grateful to the system for the opportunities it provided me. I did my undergraduate BSc degree at Harvey Mudd College, my PhD at the University of Illinois at Urbana-Champaign and subsequently did an MBA at the University of Chicago.

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- Dr Kanyawim Kirtikara, executive director, Biotec, Thailand
- Dr Anu T Singh, director, R&D, Dabur Research Foundation, India
- Video message from women leaders in bioscience

After my studies, I joined UOP, a multinational headquartered in Illinois, US, and worked there for 23 years until I joined LanzaTech. During my time at UOP I discovered my passion for technology that could have a big impact. LanzaTech attracted me because I recognized its technology could have a real and significant impact on the future of energy in a way that was environmentally sound, didn't threaten food security and could democratize global energy distributions systems by also providing off grid solutions.

I have always been interested in what new possibilities coming out of the latest research, but I learned early in my career that the key to success is not just having a novel technology with a lot of potential. You also need to be serious about deploying it into the global economy. You have to make a business out of it.

At UOP I founded and championed the strategic R&D portfolio. I decided to get the company into renewables, including biofuels and especially aviation biofuels. When we subsequently needed to launch that technology I became the vice-

president of that business and led it from its inception through to the achievement of significant revenues from the commercialization of multiple novel biofuels technologies. I was proud to work on the first renewable aviation fuel projects and be part of the team that really made history by revolutionizing aviation fuel. The notion that a renewable aviation fuel could be produced and certified for flight was completely novel and everyone said you couldn't do it when we started the tech program. I like to work on things people say can't be done.

My interest in commercializing LanzaTech's technology goes further than a significant business opportunity. Too many developing countries lack meaningful supplies of energy. Our option to take waste gases and produce renewable fuel or power will help democratize energy supplies, providing a way for millions of people to not only decrease their reliance on imported sources of fuels and energy, but actually enable a greater number of people to access a previously unobtainable standard of living.
I love working with the technology and the business, but my job gives me and the rest of LanzaTech's team great joy to know that the benefits of a successful renewable energy business will go far beyond the profits we will report.

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I tend not to think of one person having a major contribution within a company-more like everyone can bring significant knowledge and experience to the table for combined success. For me, creating a team culture where all members' contributions are valued and an environment of communicating our shared achievements is probably the main thing I would highlight as having brought to the company. My experience in taking new technologies to market when people have told me that it can't be done, has shown me that having a great team behind you, which works well as a whole, is of fundamental importance to getting your product from a concept to a reality. There are two major milestones that I can think of straight away: going to the US to live and marrying my husband. I would have been a different person if hadn't moved to the US. These are the two things that define me - help make me who I am.

Throughout my career and my education I have been fortunate to have professors, managers and peers who have pushed me to be the best I can be. I have also been blessed with a naturally positive outlook - I tend to see the potential for good outcomes rather than the risks associated with failure. In the business I am in now, you need to be aware of the risks, but you must continually focus on the prize. So I don't consider things as a challenge in a negative sense. If you make the wrong decision then you make a change and you learn from your experience. I don't think of anything in my life as a major problem. I usually have a back-up position.

Throughout my life I have been fortunate to be pushed, pulled, supported, mentored and inspired by so many people. If I had to name a few, I would say, my dad taught me that you can succeed beyond your means by working hard, my mom gave me my social conscience and the need to make a difference, my husband taught me patience. I have had teachers from elementary school through to University who have believed in me and helped me succeed. Professionally, at UOP, Dr Stanley Gembicki, our CTO, taught me to dream the big dream and Dr Carlos Cabrera, our CEO, taught me that good ideas aren't enough, you need to execute if the idea is going to be a commercial success. I also knew that it was possible to be successful as a woman as I had two women role models - Ms Mary Good and Ms Edith Flanigen. Mary was VP of Allied Signal's R&D and became US Under-Secretary for Technology in the Clinton Administration. She taught me that indeed, a woman could be a good leader and Edith Flanigen, the inventor of a petroleum refining method and one of the most innovative chemists of all time, taught me what it really takes to innovate (vs just invent).

My husband and I have two greyhounds, which were retired from racing and we rescued them. If we are not walking them, we like to go tramping. I don't consider managing professional and personal life as easy or hard. It is what it is. The key is having a supportive family, friends and coworkers.

To the young women in the field, I want to say that you should do what you want to do and make your own decisions. I was told my career was over because of a decision I made. Of course my career wasn't over. You should go with your gut instinct and make personal decisions that you think are right for you. You should listen to people and take advice, but what they see as your trajectory and the path you choose do not have to be the same. When we have finished building LanzaTech into a globally successfully renewable's company I am going to retire and spend my time with my husband and our dogs.
(As told to Vipul Murarka)