MaRS

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## Women in Cleantech

# The new leaders of climate impact

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# The new leaders of climate impact

## The Women in Cleantech Challenge accelerates game-changing innovations.

For the fourth year in a row, Canadian clean technology companies have featured prominently on the Global Cleantech 100 list — second only to the United States in terms of representation — as the ones most likely to make a significant impact on the market over the next five to 10 years. Research by the U.S. Cleantech Group also ranked Canada fourth in the world for its ability to commercialize its cleantech innovations.

So, what's holding the country back from achieving true leadership in the global cleantech space? For one thing, a lack of women leaders.

Only 16 percent of small and medium-sized enterprises (SMEs) are owned by women. According to the 2018 and 2019 National Cleantech Survey, only 19 percent of cleantech companies in Canada have at least one female founder, while just one in 10 cleantech founders is a woman, with some subsectors, including energy efficiency and transportation, having even fewer women at the helm.

"There's a clear underrepresentation of women as entrepreneurs, notably in tech," says Frank Des Rosiers, assistant deputy minister of strategic policy and innovation at Natural Resources Canada (NRCan). "Women account for half the population. If you're a coach and you're trying to get the best team out there, it's just not smart to leave half your firepower on the side."

And the Women in Cleantech (WIC) Challenge has shown what can happen when the best team is on the field. The results of the three-year program are — or should be — impossible to ignore. In 2018, to help address the disparity in cleantech, NRCan funded the Women in Cleantech Challenge and partnered with MaRS Discovery District to announce the Challenge, a national initiative to encourage six innovators in the space. The program offered

At Dispersa, Nivatha Balendra is scaling her high-school science fair project to new heights. The company is developing non-toxic, biodegradable biosurfactants — active agents that are used in cleaning products, cosmetics and consumer-packaged goods.

**"We are incredibly proud to be part of the Women in Cleantech Challenge, which has successfully amplified the leadership of women in a field that has traditionally been dominated by men. It has been inspiring to follow the journeys of the six finalists, and to see how an approach that includes financial, business and technical support helped to advance these companies."**

— **Drew Leyburne**, Assistant Deputy Minister of the Energy Technology Sector at Natural Resources Canada

access to lab facilities to develop their technology, a stipend that would allow them to focus full time on their business, curated curriculum, as well as targeted introductions to investors and ecosystem partners. In late 2021, the entrepreneur who has come the furthest and has shown the greatest potential in achieving commercial success will be awarded a $1-million prize.

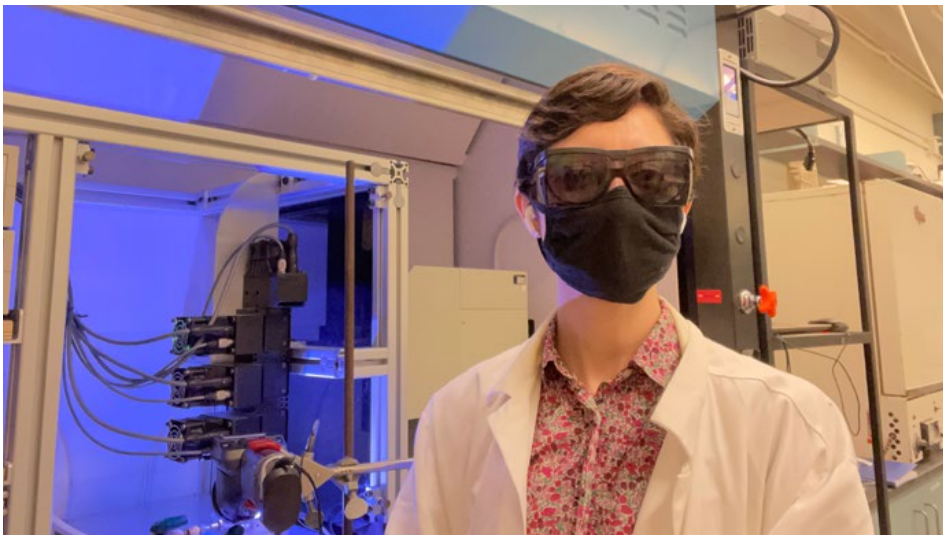
The women's visions had roots in everything from a high school science fair project and a PhD dissertation to a rowboat trip on the open seas. Their work started in school labs, garages, basements, and barns. But those visions and their determination along with access to lab facilities to develop their technology as well as MaRS' mentoring, networks, financial aid and business support — not to mention the help the finalists gave each other — resulted in six game-changing innovations and some extremely strong new Canadian cleantech companies. And in less than three years, two of the finalists are raising or have closed their Series A funding, and others are working on their seed rounds — a testament to how the commercialization of clean technology can be accelerated.

## Supporting the finalists

The Women in Cleantech Challenge offered the six finalists much more than a chance to win $1 million. Over the three-year course of the program, the cleantech entrepreneurs received:

- An annual $115,000 stipend to cover living expenses, travel costs for program events, lab visits and meetings with potential investors, customers and partners
- Lead business and technical advisors to build the business and develop the product
- Access to scientific equipment and researchers at the federal government lab best suited to their needs
- Introductions to domestic and international investors and corporations
- Networking opportunities
- Workshops and training sessions in such areas as negotiating, governance, communication, public relations, public speaking and more
- Access to all the market intelligence, talent, communications and education support services offered through MaRS Discovery District

"Every one of these amazing entrepreneurs has surpassed my expectations," says Jane Kearns, vice president of Growth Services and senior cleantech advisor at MaRS. "That they have been able to move these really, really deeply technical companies forward so quickly, including through the COVID-19 pandemic, is a victory for every single one of them."



Alexandra Tavasoli, CEO of Solistra, was named a Clean 50 Emerging Leader for her work on developing a nanomaterial that helps transform greenhouse gases into lower-carbon fuels.

## How gender diversity helps the bottom line

Attracting more women to cleantech is about more than achieving gender parity. It's about good business. Diversity of thought is a key driver for growth, the 2020 State of Women's Entrepreneurship in Canada report found. The report cites a Boston Consulting Group study that found that gender equality among entrepreneurs could increase the global GDP by up to six percent, adding between U.S.$2.5 trillion to U.S.$5 trillion to the global economy. In Canada, research shows that an increase of women-owned SMEs by only 10 percent could add $198 billion to our GDP.

"I'm a real believer that success in business has a lot to do with the diversity of input," says Annette Verschuren, CEO of Canadian energy-storage company NRStor. "And when you have that, I think it's the ultimate advantage to every institution and organization."

## Accelerated growth

Over the past three years, the six finalists in the Women in Cleantech challenge have made huge strides.

Collectively, **the ventures have raised $52.5 million in funding**.

The number of paid workers employed by **the ventures have increased by 725 percent**.

The impact of having a woman at the top can be almost immediate. A 2019 report, When Women Lead Firms Win, looked at the performance of companies that had female CEOs and CFOs. In the two years that followed their appointments, the female CEOs' companies had a 20-percent increase in stock prices, and the female CFOs saw a six-percent increase in profitability and eight-percent-greater stock returns.

Shirley Speakman is a senior partner at Toronto-based Capital Cycle, a venture capital company. Both at Cycle Capital and through Beyond the Billion — an organization of venture capital firms committed to investing in female-led companies — Speakman has consciously sought out women-led organizations. "From our perspective, they are good hunting grounds for deals because you can find really good entrepreneurs who are very solid and who may have otherwise been neglected," she explains. "In venture, you're always looking for that which differentiates you from everybody else in the market. From my perspective, being conscious about it is a competitive tool."

Despite the explosive growth of cleantech, there are issues that are holding back the industry in Canada. For one thing, it's expensive, harder to scale and commercialize, and therefore not as competitive or as attractive to investors. In addition, according to one report on cleantech by Canada's Economic Strategy Tables, the domestic market for cleantech is "risk-averse," and women and Indigenous people are underrepresented in the industry.

"Diversity of thought, which comes from diversity of background is critically important for any industry, but especially for an emerging industry like cleantech because we need to be ultra-creative about what we do," says Jodie Morgan, CEO of advanced recycling company GreenMantra Technologies.

At Genecis, Luna Yu and her team are developing a method of creating a better plastic using food waste as the main building block.

At Summit Nanotech, Amanda Hall has developed a more sustainable way of extracting lithium for use in batteries.

"The dollars never go quite far enough, the challenges are always a little harder because no one's done it before you, so you can't just go and find an expert because there isn't one yet."

And because Canada has committed to achieving net-zero greenhouse gas emissions by 2050, cleantech has never been more important. According to a 2018 report by a government advisory group, the global market is expected to be worth U.S.$2.5 trillion by 2022, and Canadian exports for cleantech goods and services could hit $20 billion by 2025 — almost triple what they were in 2018. Women entrepreneurs have a huge role to play in helping Canada achieve its goals.

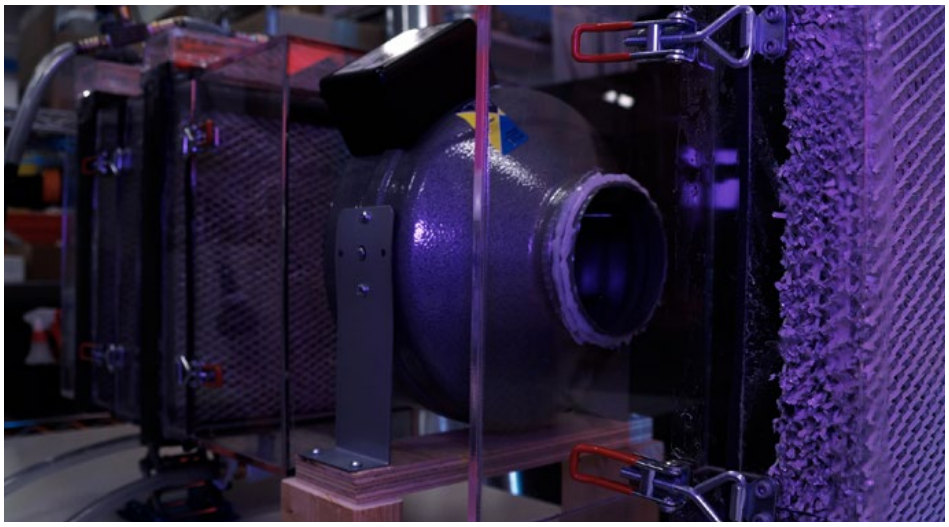
That was one of the goals of the Women in Cleantech Challenge, according to NRCan's Frank Des Rosiers. "We see cleantech industries as being critical not just for their own sake but to help other large established industries, such as natural resources to be greener,

cleaner and more in line with the government ambition with regard to climate change and sustainability," Des Rosiers says. "We also want to inspire women and girls. When we would look at the senior leaders in cleantech, we kept going back to the usual folks. And we said we've got to deepen the bench and show graduates that this could be an appealing career."

## The barriers women face in cleantech

There continue to be roadblocks for women entrepreneurs in tech, including cleantech. For one thing, it's more difficult for women to receive financing than it is for men, according to a study by Canada's Women Entrepreneurship Knowledge Hub. More than 83 percent of women used their own money to start their SME.

Challenge finalist and Summit Nanotech CEO Amanda Hall sold her house to start her business; finalist Luna Yu used her savings to get Genecis Bioindustries off the ground. "Women still get questions like, 'What are you going to do about child care?'" says Speakman. "Progress is being made but is it as fast as all of us would like? I think no, but change takes time."



Evercloak CEO Evelyn Allen and her team have developed a nanofilm that can help industrial and commercial buildings reduce their cooling costs by as much as 70 percent.

The study also found that male-owned firms were four times more likely to have received venture capital than firms entirely owned by women. Male-owned firms more often used trade credit, capital leasing, venture capital and/or angel funding while female-owned companies relied more on government loans, grants and subsidies. According to one U.S. report, on average female business owners receive about a quarter of the amount of venture capital funding they seek, compared to male owners, who receive about half.

"The challenges women in the technical sectors are facing are fundamentally anecdotal — there's no big event

### Pipeline of talent

At the post-secondary level, women continue to be underrepresented in STEM studies. While more women are attending post-secondary institutions than men (women enrollment has held steady **at 56 percent** over the past decades), only 15.3 percent of Canadian women with a bachelor's degree studied in a STEM field, compared to 37.5 percent of men, according to the 2016 Census. **Research** has also indicated that women in STEM fields tend to earn less than men in comparable positions.

**16%** of small and medium-sized enterprises are owned by women

**19%** of cleantech companies have at least one female founder

**83%** of women entrepreneurs use their own money to start their SME

Male entrepreneurs are **four times** more likely to have venture capital funds than firms owned by women

The projected market for Canadian export of cleantech goods and services by 2025 is **$20 billion**

At the start of the challenge, Open Ocean Robotics CEO Julie Angus just had a prototype for a solar-powered autonomous boat in her garage. Now, the venture has a staff of 14 that works out of a 4,000-square-foot facility.

that drives women from leadership positions," says Challenge finalist Alexandra Tavasoli. "And unless we're willing to start taking those anecdotes more seriously, then we're stuck at this 20-to-30-percent women-in-leadership ceiling, where we've been since 1995."

But the Women in Cleantech Challenge has demonstrated that with the right supports, female-led companies can go from zero to 100 in record time. When the six finalists came into the Challenge, their companies didn't exist or were barely out of the gate. In record time — and during a pandemic, when access to labs and other necessities was limited — all six made huge strides in developing their technology and have attracted big interest from investors and clients. Several are raising or have raised Series A or preparing for a seed fund. They are all a testament to how the commercialization of cleantech can be accelerated.

"It takes a community to build a startup," says Challenge finalist Nivatha Balendra, CEO of Dispersa. "And that definitely is true for us. We're just incredibly grateful for the number of supporters and partners who encouraged us and continue to encourage us on this journey."

## Building on each other's success

### The six finalists created a strong support system

In addition to making connections with their advisors, investors and other scientists, the six Women in Cleantech finalists also formed deep bonds with each other. And while they were all competing for the $1-million prize, they supported each other along the way.

Jane Kearns, vice president of Growth Services, and senior cleantech advisor at MaRS Discovery District, has been amazed watching the friendships develop. "They have been a true team through all of this," she says. "When one of them had experienced an issue, they'd take those learnings and use them to help all of the others when they hit the same stumbling block. It has been truly remarkable to watch."

The six women were all basically at the same stage in terms of building their companies, experiencing similar hardships and successes. Whether it was prepping a client proposal or figuring out product-market fit, having that peer support helped immeasurably.

"Any time any of us are struggling, we help each other," says Summit Nanotech CEO Amanda Hall. "You wouldn't even know we were competing with each other, honestly."

At one point during the Challenge, Solistra CEO Alexandra Tavasoli had to lay off some staff including, she says, "one employee who was a real superstar, and her dream was to work at a cleantech startup." But all it took was a quick call to the other finalists, and that employee was hired.

"It's very important to have a network of peers, as well as mentors, to support you — maybe even more so if you're underrepresented in an area," says Open Ocean Robotics CEO Julie Angus. "To have that support from one another is great."

## A victory for each of the finalists

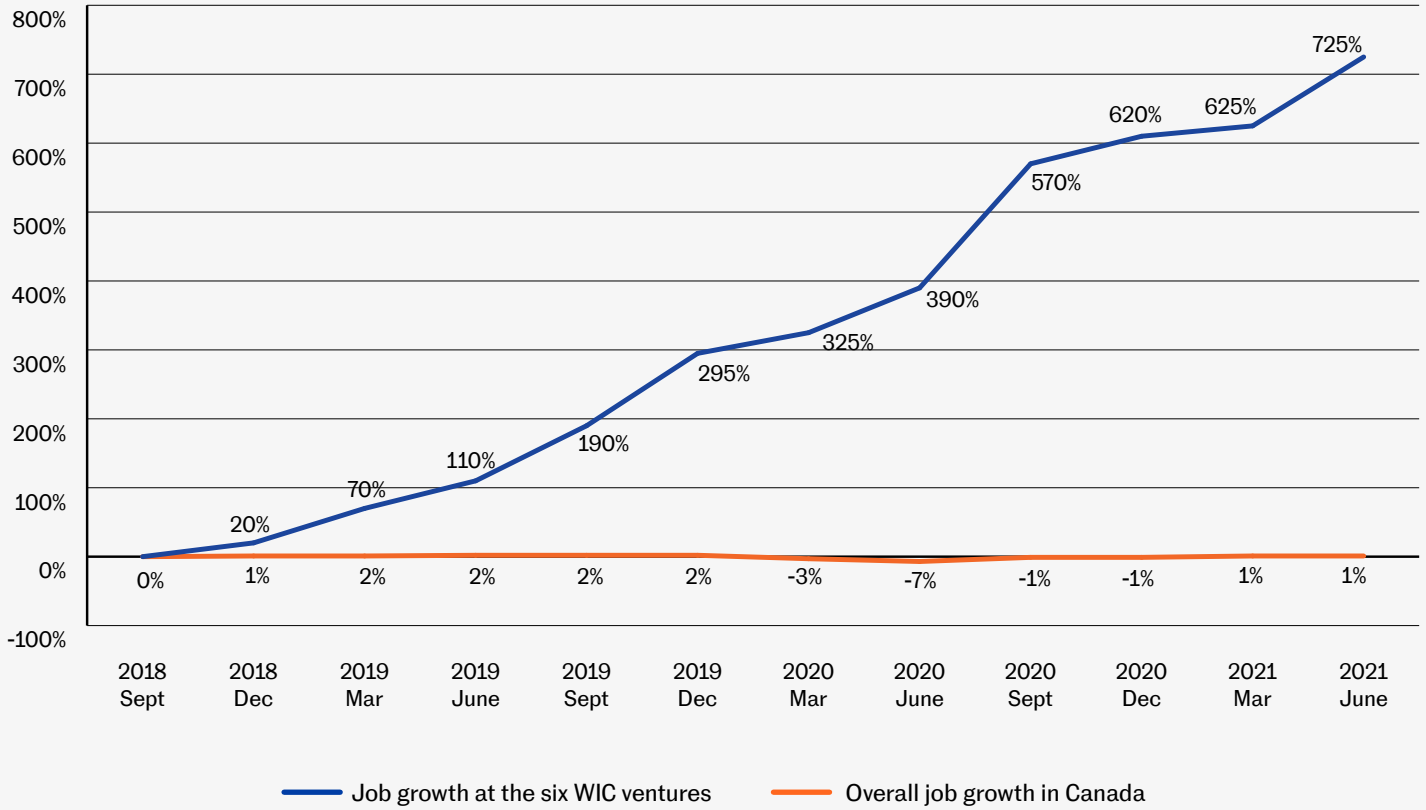
Even with a pandemic thrown in to add to all the entrepreneurs faced as they scaled up their businesses, the Women in Cleantech Challenge set out all it was designed to do and more. By taking the day-to-day financial pressure off the women and by providing a network and mentors plus business, technical and emotional support, the Challenge created six successful entrepreneurs — and, perhaps equally important, six role models for future generations of young women and girls.

For everyone involved, the Challenge has been a positive experience — "widely seen as a resounding success in government circles," according to Des Rosiers, and a victory for each of the finalists. "They all came in uncertain, lacking in confidence, all very passionate about what they were doing but not really certain how to do it," says Kearns. "And they've become these incredibly grounded and determined and confident entrepreneurs. It's quite something to have watched that."

They have also experienced real-world success. Since the Challenge began, the ventures have attracted $52.5 million in investments. The number of paid employees cumulatively grew from 10 to 82.5 — a growth of 725 percent over three years. That sharp increase is even more impressive when compared to the job metrics seen in the overall economy: Over the same three-year period, jobs grew in Canada by just 1 percent. And these ventures are poised to increase Canada's ability to gain a greater share of the global cleantech market.

The six finalists have had to navigate difficult situations, negotiate complicated deals with customers and investors, and learn how to manage people — all while developing complex technology. "It's not usual to see such consistent progress from entrepreneurs building deeply technical companies," Kearns adds. "I have mentored hundreds of companies while I've been at MaRS, and these six are incredible."

### Job Growth 2018-2021



# The finalists and their companies

# Evelyn Allen

## CEO, Evercloak, Waterloo

**Founded:** 2018

**What it does:** Develops nanocoatings and nanofilms for HVAC, batteries and more

**Key milestones:** A $4.5-million collaboration with Environmental Systems Corp., funded by NGen, in 2021

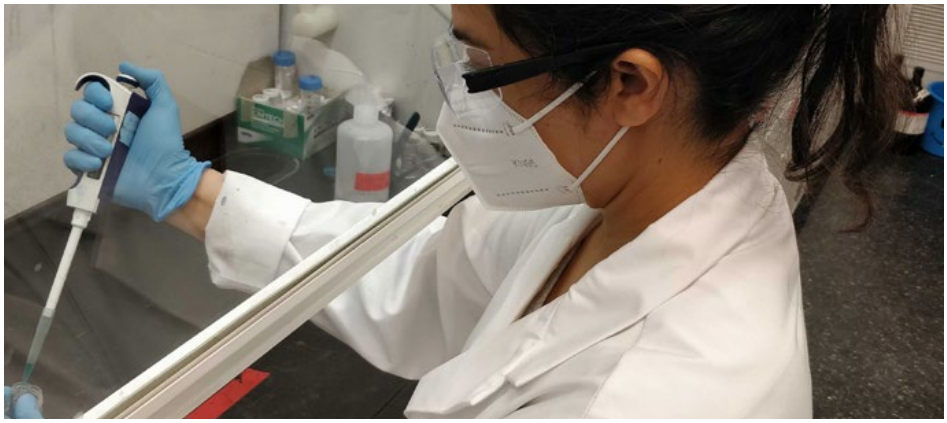
By the time Evelyn Allen started Evercloak in 2018 with her stipend from the Women in Cleantech Challenge, she had worn many hats — she worked as an electrical engineer at a consulting company, developed wastewater treatment technology, launched a $5-million program as part of a OMAFRA and University of Guelph partnership, and was a key member in delivering a $60-million project to help get water technology off the shelves and into the hands of the users at the University of Waterloo. After moving into managing strategic corporate research partnerships there, Allen says, "I just wanted to go back to building and doing things again."

When she came across the posting for the Challenge, she jumped at the opportunity. "I'd always wanted a company," she explains. "I'd been looking for that product-market fit but was never in a position where I could leave my job to do that. The WIC program was really valuable because it came with a stipend and took away the financial risk."

Rather than develop a project, Allen went through the University of Waterloo commercialization office and picked a technology that had been developed there by Michael Pope, a professor of chemical engineering. That involved making a thin, two-dimensional, nanomaterial coating using materials like graphene, which are not yet used in commercial products because they can't be made at scale at a reasonable cost. "This technology was a way to do that very simply, using less energy, at low cost," Allen explains, "and that unlocked the potential of these materials so they could be introduced into commercial applications."

The stipend started the ball rolling: Allen was able to leverage that money to get more money. And to date, Evercloak has raised $9.45 million, more than $8.5 million of which is from non-dilutive funds, from over a dozen programs and competitions. Evercloak's nanofilms dramatically reduce the energy required — and greenhouse gases emitted — for commercial and residential air-conditioning and dehumidification systems.

The company's aim is to help industrial and commercial buildings reduce their costs by as much as 70 percent and the expended energy in hot, humid areas by



Evercloak's nanofilm technology can be used to produce more efficient batteries, solar cells as well as antiviral coatings.

up to 78 percent. The technology can be used to produce different types of nanomaterial coatings and nanofilms for more efficient batteries and solar cells as well as antiviral coatings.

During the Challenge, Allen and her team realized that their coating was not working as well as they'd hoped in HVAC applications. So, they came up with a second one. Scientists at CanmetMATERIALS, a federal research institute in Hamilton, built four prototypes for Evercloak to scale up the initial coating approach and another two for the new approach. "We demonstrated that we could go from a tiny little area to a coating of up to 12 inches in a continuous way," Allen says, a massive achievement.

Evercloak recently announced a $4.6-milslion collaborative project with Environmental Systems Corp., a provider of building technology solutions, and funded by Canadian non-profit NGen, which promotes digital transformation in advanced manufacturing.

The company is also launching a Series A investment round in the fall. "This would not have happened without the WIC program," she adds. "The support and the training, especially early on, was really valuable."


Evercloak has raised more than $9.45 million in funding and is starting a Series A funding round.

# Julie Angus

## CEO, Open Ocean Robotics, Victoria

**Founded:** 2018

**What it does:** Designs and builds autonomous solar-powered boats

**Key milestones:** Recipient of the Solar Impulse Efficient Solutions label and this year's B.C. cleantech Industry Icon Award

When you spend five months rowing across the Atlantic Ocean, you've got a lot of time to think. And that's exactly what Julie Angus was doing with her partner, Colin Angus, when the idea that eventually became Open Ocean Robotics started to percolate. Angus has spent much of her career on the water — *Explore Magazine* counted her as being among North America's leading adventurers, and *Canadian Geographic* named her one of the country's Greatest Women Explorers. "One of the things I've recognized through expeditions is how challenging it is to be out on the ocean," Angus says, "how beautiful they are but how difficult it is to understand them and, as a result, protect them."

In 2018, in the corner of their garage, Angus and co-founder (and CTO) Colin Angus drew on both their vast experience on the water and as entrepreneurs of a performance-rowboat company to develop the prototype for an autonomous solar-powered boat that could map, explore and monitor the unknown 80 percent of the ocean. "Oceans absorb 90 percent of the heat that's emitted as a result of greenhouse gases," she says. "We depend on them for a vast majority of our protein and sustenance. Ninety percent of goods are shipped on oceans, so it's hugely important for our economy. And for our oceans to continue to do these things, we need to ensure we're not taking out too many fish, that we're not polluting beyond what it can manage and that we are able to forecast the impact it's going to have for reducing the effects of climate change."

The two formed Open Ocean Robotics in Victoria after Angus was named a finalist in the Women in Cleantech Challenge. The company's solar-powered unmanned surface vehicles (USVs) are equipped with sensors that can monitor ocean conditions and listen for everything from whales to other vessels, sending back the collected information in real time. Each boat can run for six months without stopping.

Now Angus employs 14 people and has customers in the United States and Canada, with the self-righting vessels used for illegal-fishing enforcement, marine-mammal monitoring and defence, among other things. "They're able to do many of the things a normal crewed ship could do but at a much lower cost and without any of the greenhouse-gas emissions," Angus explains.


Open Ocean Robotics has customers in the United States and Canada.

Currently, Open Ocean Robotics has five USVs in different stages of development, including a commercial vessel that the company is using for mission services. A $3-million seed round will enable it to scale that commercialization. The Women in Cleantech Challenge was the kick-off point, but the company has received significant support since then, including substantial grants from Sustainable Development Technology Canada, Western Economic Diversification Canada and the Industrial Research Assistance Program.

“I can see a future where our oceans are visible, where we’re almost looking at a digital ocean, where we have autonomy and sensors providing us with insights so we can ensure we have a healthy ocean that supports us,” says Angus. “Now more than ever, people understand the importance of our oceans and the urgency in protecting them. We’re seeing a great adoption of autonomous technology and the use of big data to solve some of the problems. The tide is turning.”

And the company has been well-recognized for its technology, innovation and leadership.
“We were really honoured to receive the Efficient Solutions label from [Swiss environmental foundation] Solar Impulse, highlighting the impact our technology has on reducing greenhouse gas emissions but also its viability as a commercial product,” Angus says. She has received this year’s Industry Icon prize at the B.C. Cleantech Awards and the 2020 BCBusiness Women of the Year Innovator award.

“I think I’m one of the luckiest people in the world,” she adds. “I love my job. I get to meet with customers and help them solve their problems, which not only impact their business but improve sustainability of the oceans.”

Open Ocean Robotics' autonomous boats are used in illegal fishing enforcement, marine-mammal monitoring and defense.

# Nivatha Balendra

**CEO, Dispersa, Montreal**

**Founded:** 2019

**What it does:** Makes natural alternatives to petroleum-based and synthetic surfactants

**Key milestones:** The Plug and Play Fall Summit 2020 New Materials & Packaging award, one of four startups chosen from more than 100 globally

If anyone ever doubted the importance of a high school science fair, they need look no further than Dispersa Inc., the brainchild of a then-17-year-old Nivatha Balendra. In 2013, a freight train carrying millions of gallons of crude oil derailed in the Eastern Townships community of Lac-Mégantic, near her hometown. The resulting fire and explosions killed 47 people and destroyed the town centre, contaminating the area with petroleum. "Hearing about this oil spill that was so close to home really opened my eyes to how massive environmental challenges are," says Balendra. "And that's when I started to look into what solutions exist in terms of remediation of oil spills."

What intrigued Balendra was the strength of the tiny organisms that were used to clean contaminated sites. "I found new strains of microbes that produced this interesting compound known as a biosurfactant," she explains. "It just blew my mind that these tiny things we can't even see have so much potential impact in our lives and the way we live as consumers."

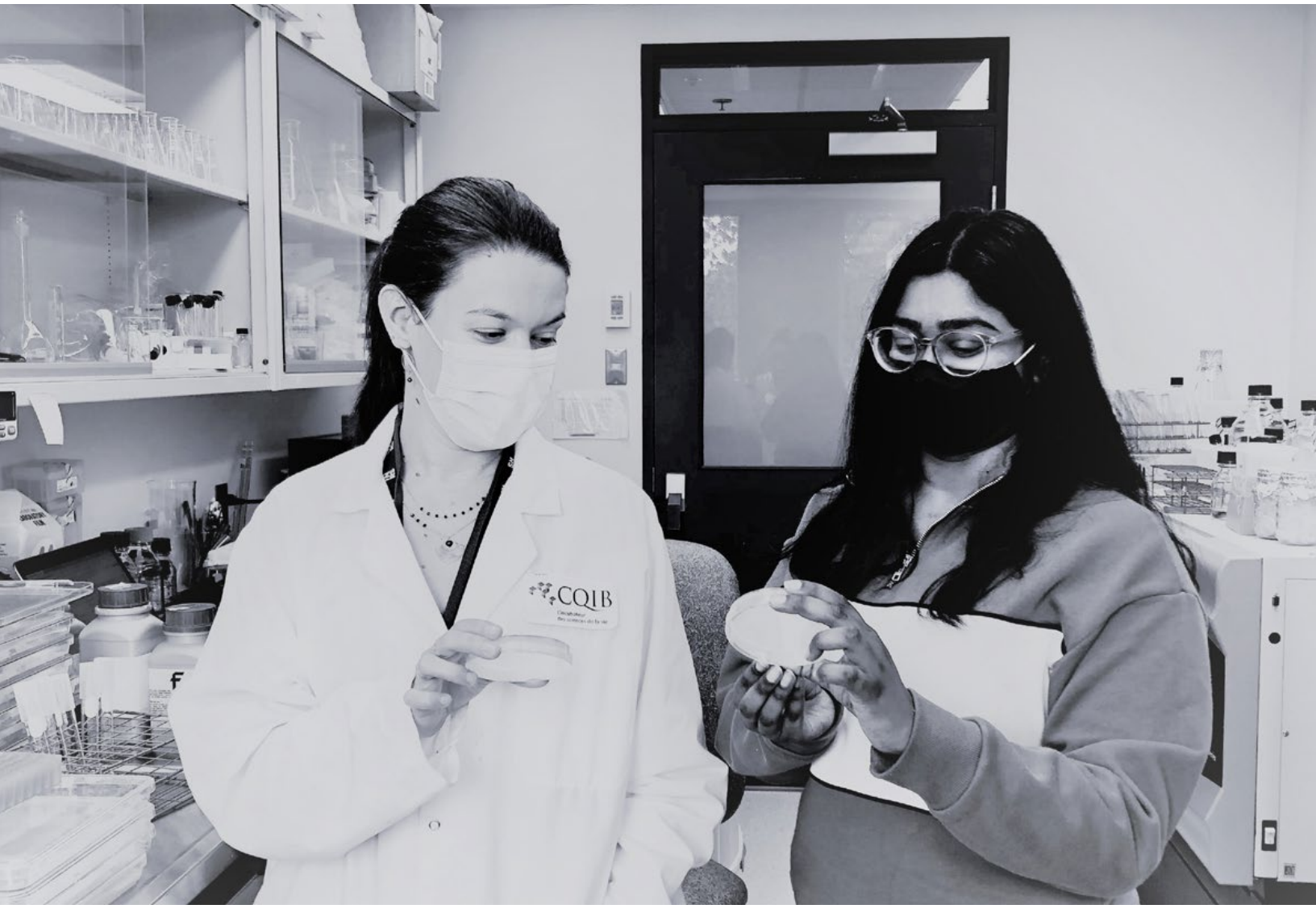
Those microbes, combined with the ones Balendra isolated for the science fair, are what Dispersa uses to create non-toxic, palm oil–free, biodegradable biosurfactants — active agents that are used in cleaning products, cosmetics and consumer packaged goods, among other things. They can be readily integrated into end-user formulations across a variety of applications, including cleaning products, detergents and cosmetics, and function as well as chemical surfactants. So, while Dispersa started with technology intended for the oil and gas sector, Balendra soon realized she could pivot into an ingredient startup.

Advisors at MaRS and NRCan provided the main support. "Just the amount of guidance we had was incredible, from the one-on-one advisory support through various workshops and different opportunities to expand our networks in the cleantech ecosystem," says Balendra. As she slowly expanded her team and the technology started to develop, Balendra got to know more stakeholders in the cleantech

community, as well as local and global incubators and accelerators, and provincial and federal organizations. “It takes a community to build a startup,” she adds. “And that definitely holds true for us.”

Even the COVID-19 pandemic proved to have a silver lining for Dispersa, thanks to an increased demand for soapy products. The company sharpened its focus on consumer-packaged goods as an area where it would first be able to deliver its ingredients and, as a result, launched PuraSurf, its line of biosurfactants. Since Dispersa’s launch, Balendra and her core team of eight have secured $2 million in non-dilutive funding and have just launched their first private financing round. They have also established a partnership with CanmetENERGY in Alberta, the main oil and gas research centre in Canada.

“The WIC program opened doors to many other funders,” she says. “It’s very exciting for us and we’re so grateful for all the generous contributions and support we’ve received.”




To date, Dispersa has raised $2 million in nondilutive funding and employs eight people.

# Amanda Hall

## CEO, Summit Nanotech, Calgary

**Founded:** 2018

**What it does:** Develops green lithium-extraction technology

**Key milestones:** Winner of the Solar Impulse Efficient Solution label

Geophysicist Amanda Hall had worked in resource extraction in the mining and oil and gas sectors for 18 years when she had an existential crisis and quit. "I was wondering what kind of legacy I wanted to leave behind, and what did I want my kids to be proud of when they say, 'My mum did this,'? " says Hall. "Drilling 200 oil wells a year didn't feel like the right one."

In 2018, Hall formed Summit Nanotech, four months before applying for the Women in Cleantech Challenge. The focus of her company is lithium, a market rapidly growing to keep up with the demand for electronics and electric vehicles. "It was the perfect place to set my sights because I could see a lot of problems in the existing extraction processes," she says. "They were really archaic and they needed an upgrade, and I knew I had the expertise to do that."

Her idea was to use membranes to filter extracted lithium from its brine, in a much more efficient and sustainable way. A year into the research, however, Hall and her team had to do a swift pivot: what had worked well in the lab did not work in the field. But that process taught them what they needed to do. And in the end Summit's team created two different processes — one like a lithium flypaper and one like a lithium sponge. "It was an explosion of potential because it doubled our ability to enter the market just by creating the second product," Hall explains. The rapid extraction process is patent pending.

To start the company, Hall sold her house and used the $400,000 to access non-dilutive funding in the form of various grants. The Challenge offered a "trifecta of support." The first was the access to CanmetENERGY Laboratory in Devon, Alta., the second was the funding and the third — almost the most important for Hall — was the CEO training. "That's where I really learned how to lead and grow the company in a healthy way."

When COVID-19 shut Hall and her team out of the lab, they found a lab space in the basement of a barn in Calgary, where Hall and 16 full-time employees continue to work today for customers in five countries and counting. Summit Nanotech has won six awards for its business model and business ideas, but the most important one to Hall is the Solar Impulse Efficient Solution label,

Summit Nanotech now has 16 full-time employees and is gearing up to launch a pilot project in Chile.

an accreditation for sustainability. “It gives us credibility on our ESP metrics, and it’s third-party validated,” she adds. The company has joined forces for a pilot project starting in late 2021 with Lithium Chile — an important first step on the road to commercializing the technology.

Hall maintains the company would not be where it is today without MaRS and the WIC Challenge. “It pushed me into places that I wasn’t comfortable going, but I didn’t know why they were important at the time,” she says. “It exposed me to things about running a company that I didn’t even know I needed to know.”

Summit Nanotech uses a physics-first approach to extracting lithium, which generates 90 percent less waste compared to traditional chemical refining.


# Alexandra Tavasoli

## CEO, Solistra, Toronto

**Founded:** 2018

**What it does:** Develops a nanomaterial that produces clean carbon products from two greenhouse gases

**Key milestones:** Named a Clean 50 Emerging Leader; Named a Top 30 Under 30 sustainability leader in 2019 *Corporate Knights* magazine

For any entrepreneur, setbacks are common. For entrepreneurs trying to get startups going during a pandemic, the challenges are even greater. Alexandra Tavasoli was in the third year of her PhD in material engineering at the University of Toronto when she was named a finalist in the Women in Cleantech Challenge, so there was a dissertation to finish (even though her labs were locked) as well as a company, Solistra, to get off the ground. And that wasn't the end of it.

The technology for Solistra came straight out of Tavasoli's PhD studies. "Transitioning our chemical industry into a sustainable operation really is a matter of sustainable resource use and management," says Tavasoli, "so what natural resources do we have and what can we do with them in an environmentally friendly way?"

The answer? A solar-activated nanomaterial to produce resource-efficient clean carbon products from two greenhouse gases — carbon dioxide and methane gas — instead of fossil fuels. "Viewing carbon dioxide as a natural resource rather than a waste product that's just ruining the Earth seemed to be a really good fit for my interests."

Solistra elicited interest from potential investors, and Tavasoli received grant funding from both the Canadian government and the Natural Gas Innovation Fund, as well as awards for her work. But she couldn't carry through with Solistra because she was not allowed to license the intellectual property from the University of Toronto and therefore was not able to get investors.

"It was just time for me to walk away," says Tavasoli, who has recently joined the MIT Energy Initiative in Cambridge, Mass., to work on more carbon dioxide technologies. "It's possible the university prefers to license the technology to more established external companies so it has a better chance of becoming commercialized. But that remains to be seen."

Alexandra Tavasoli received grant funding from both the Canadian government and the Natural Gas Innovation Fund.

There is nothing but praise for Tavasoli both from her friends and fellow finalists and from her advisors at MaRS. “What Alex was trying to do was the hardest technically and it’s the hardest from a business perspective too, and without the University of Toronto’s co-operation it’s almost impossible to make it work,” says Kearns of MaRS. “But Alex navigated so much complexity with real strength, and she was really wise and calm in her decision-making. It was a smart but hard decision on her part.”

And Tavasoli gained a lot from the WIC experience. “The program is really excellent,” she says. “It definitely grew me as a person. As a young professional, you make all sorts of mistakes in the beginning until you figure out how to operate in the world. It was good that I made those mistakes under the protection of the program.”


At Solistra, Alexandra Tavasoli developed a solar-activated nanomaterial that could produce clean-carbon products out of carbon dioxide and methane gas.

# Luna Yu

## CEO, Genecis Bioindustries, Toronto

**Founded:** 2017

**What it does:** Develops bacteria to convert organic waste into a bioplastic

**Key milestones:** Genecis was one of the youngest teams to receive a multimillion-dollar grant from Sustainable Development Technology Canada

Every year, 18-billion pounds of plastic pollute the world's oceans, and Luna Yu is on a mission to change that. Through her company Genecis Bioindustries, she and her team have reprogrammed bacteria to convert organic waste into a bioplastic called polyhydroxyalkanoates (PHA).
"The whole premise of doing this was so we could upcycle food waste so it doesn't end up in landfill," Yu explains. According to the Commission for Environmental Cooperation, when food waste ends up in landfill it creates methane, which is 25 times more potent than carbon dioxide. In fact, the Commission reports, if food waste were a country it would be the third worst emitter of greenhouse gases in the world.

To found Genecis in 2017, Yu — who has just completed a master's degree in environmental science — used $15,000 of her own money plus, eventually, about $250,000 of non-dilutive funding from pitch competitions and roughly $200,000 from angel investors. "In the very early days, before we had all this grant money, we had to literally build prototypes of bioreactors so we could culture our bacteria," she recalls. With a little tweaking, ordinary kitchen rice cookers did the trick. "We had six rice cookers running in parallel and we housed them, at first, for free at the University of Toronto. Most of our setbacks came with just not having enough money so we literally had to build around it."

Even during the application process for the Challenge, Yu was struggling to keep her company afloat. "It's hard to convince investors that a bunch of kids straight out of university who don't really have any industry experience could make this work. Most investors thought of us as a cool science project." The week before she was chosen as a finalist in the competition, Yu was down to her last two weeks of payroll.

"Because of the stipend, we were able to secure a loan right away," she adds. "It really literally saved us." Her company's advisors at MaRS helped Yu figure out how to generate early revenues without a huge production facility and without being able to produce a lot by adopting a custom-product model used in the synthetic biology industry. "Now, we have close to $1 million in R&D revenues plus $10

million of commercial supply orders locked in, so that's what we've achieved with the WIC program in the last year and a half."

While the core bacteria cultures are a trade secret, Genecis has patents around its process innovation and this year filed a patent for a second-generation engineered bacterium — the world's first recombinant bacterium. Yu says help from her MaRS technical advisor was instrumental in its development. In addition, MaRS connected Genecis with StormFisher so that Genecis could piggyback its technology onto the London, Ont.–based biogas plant's infrastructure, massively reducing Genecis' capital expenditure.

Also, with the help of MaRS advisors, Genecis was one of the youngest teams to receive a multimillion-dollar grant from Sustainable Development Technology Canada, a government body that funds cleantech companies. Genecis was also awarded $6 million in collaborative funding from NGen to help scale up its technology. "Honestly," says Yu, "this program has been so, so great for us."

To date, Genecis has brought in close to $1 million in R&D revenues, plus $10 million of commercial supply orders locked in.

# Impact of the Women in Cleantech Challenge

For the finalists, the Women in Cleantech Challenge was a life-changing experience. The education, the mentoring, the financial support, the contacts and networking, the experiences, the friendships — all the entrepreneurs say they wouldn't have been able to accomplish as much as they have nearly as quickly by themselves. "A program like this is just what we need in terms of providing support, not only at the beginning but throughout an entrepreneur's journey," says Dispersa's Balendra. "It's really what helped us accelerate our development."

The challenges for each of the entrepreneurs are far from over. But the strong sense of community that the women created among themselves and with their MaRS advisors will continue far beyond the Challenge. And MaRS remains committed to supporting female cleantech entrepreneurs. This year, MaRS and RBC welcomed a new cohort as they launched the inaugural Women in Cleantech Accelerator, a year-long program during which a diverse group of 10 female entrepreneurs is given the full weight of MaRS support in the form of mentorship, educational programming and access to top government laboratories, investors and corporate partners.

And the six Women in Cleantech Challenge finalists signed up immediately to pay it forward by mentoring the group. "They're already planning to give back," says Kearns. "Plus, they're all very visible and all delightful. They're perfect role models."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"The amount of guidance we had was just incredible, from the one-on-one advisory support through various workshops, and different opportunities to expand our networks in the cleantech ecosystem," says Dispersa CEO Nivatha Balendra.