CANADA'S CLEAN50

PART 3 OF 3: CELEBRATING CLIMATE ACTION ON EARTH DAY

Friday, April 22, 2022 PRODUCED BY RANDALL ANTHONY COMMUNICATIONS WITH THE CANADA'S CLEAN50. THE GLOBE'S EDITORIAL DEPARTMENT WAS NOT INVOLVED.

FRASER ATKINSON

Convinced that zero-emission vehicles bring substantial environmental benefits, the CEO of the GreenPower Motor Company has helped to develop the most diverse suite of medium and heavy-duty all-electric vehicles of North America, including commercial vehicles for public transit, delivery, schools, shuttles and more.

JENNIFER SICILIA

Data intelligence services reduce emissions by optimizing the operation of buildings. RYCOM, led by COO Jennifer Sicilia, has driven significant impacts; for example, a partnership with the federal government has helped to reduce over 2,500 MWh of electricity and drive over $800,000 in savings to date.

GEOFF CLARK

Traditional oil recovery uses steam to warm up viscous oil so it can be pumped to the surface. Acceleware, led by CEO Geoff Clark, has patented a low-cost, low-emissions technology that converts existing ground water into steam, promising to clean up Canada's oil production.

MORE CLEANTECH LEADERS AT CLEAN50.COM

BOOSTING FOOD AND ENERGY SECURITY WITH SUSTAINABILITY IN MIND

Q&A WITH GAVIN PITCHFORD
Clean50 Awards executive director and CEO of Delta Management Group

WHAT ARE SOME OF THE CHALLENGES CLEAN50 WINNERS ARE WORKING TO ADDRESS?
Our overarching goal – to address climate change – is more critically important than ever. Yet recent events, such as the coronavirus pandemic and the war in Ukraine, have brought other key components of the clean economy into focus, food and energy security among them.

These are big and complex challenges, and we started the Clean50 because we felt addressing them requires collaborative efforts. Beyond sharing solutions, skills and knowledge, we also need to come together for inspiration and hope. That's why our community brings together leaders from different industries, from academia, government and non-profits. They approach the challenges from different perspectives and use different levers to work towards a common goal.

WHAT'S YOUR BIGGEST CONCERN ABOUT THE ENERGY TRANSITION?
Russia's invasion of Ukraine has driven oil and gas prices up to their highest level in nearly a decade. As the geopolitics of energy are being redefined, many countries are scrutinizing their energy supplies, and may take this opportunity to accelerate the shift to cleaner energy sources.

Other voices are using that challenge to call for cleaner fossil fuel extraction. Let's be clear: to meet this moment, the answer is to rapidly eliminate burning oil as an energy source – not just cleaning up extraction.

Transforming Canada's energy economy has long been a priority, not just from the perspective of reducing emissions but also as an economic opportunity. We know that the shift to clean energy can bring society-wide benefits. We all need to embrace that.

SO, WHAT IS THE STATE OF CANADA'S ENERGY TRANSITION?
Progress! Canada's clean energy sector is growing very fast and offers significant opportunities across the economy: generating, storing and delivering clean energy; reducing energy consumption in transportation, buildings and industry; and advancing low-carbon technologies. Every sector is pursuing net-zero and electrification.

There are also growing opportunities to clean up our fossil fuel extraction, which make Alberta and Saskatchewan some of the worst offenders in carbon pollution in the world. For example, Clean50 winner Acceleware developed low-cost, low-emissions radio frequency, renewable energy-powered technology that microwaves oil sands, eliminating use of fresh water, wastewater recycling and natural gas in extraction – huge potential to clean up oil production. We also see significant growth coming out of the hydrogen industry, particularly in B.C. And GreenPower Motors, which builds medium- and heavy-duty all-electric vehicles, is an example of a company that can't keep up with demand.

WHAT ABOUT FOOD SECURITY?
A strong food system doesn't just help to advance food security – it can also enable us to boost global sustainability. For example, we need to import less food from regions where agricultural production has a big environmental footprint.

I am excited about the impact of two Clean50 winners in particular: Ecoation's team is radically improving yields from greenhouses while dramatically reducing pesticide use. Their tech is monitoring over 3.3 trillion square feet of greenhouses worldwide.

In 2019, agriculture emitted 72.7 megatonnes of carbon dioxide in Canada. At a time when climate events are already negatively impacting Canadian farms, enhancing sustainability in food production requires efforts from governments as well as the industry as a whole. Tori Waugh of Conservation Ag Consulting is connecting with farmers with the goal to use soil more effectively to simultaneously improve soil quality, sequester more carbon and increase yields. She has already influenced an estimated 2,500 agricultural businesses in the way they treat soil across some 180,000 acres.

ENERGY CONSUMPTION HABITS GET A TECHNOLOGY-ENABLED MAKEOVER

In the southwestern Ontario city of London, a growing number of energy consumers are using a powerful tool to make choices that lower power consumption and reduce their carbon footprint.

Through an energy management app called Trickl – developed by London Hydro based on an open-data standard platform called Green Button (recently mandated in Ontario) – these consumers are opting to power their appliances and electronics, heat and cool their homes and, in some cases, charge their electric vehicles based on real-time information on available renewable energy resources.

Trickl alerts users to times during the day when demand for energy is at its highest or at its lowest, and maps out the region's distributed energy resources, including those that produce solar energy. Trickl also shows them, in real time, how much energy their appliances are using.

"It all comes down to empowering consumers by arming them with knowledge," says Syed Mir, chief information officer and vice president, corporate services, at London Hydro. "With the Trickl app and Green Button, energy consumers can carefully monitor their energy use and make informed decisions about their consumption habits."

The Green Button concept is one that spans borders and utilities. The long-term goal, says Mr. Mir, is to have all utilities and third-party providers sharing information in real time on an open-data platform that gives each Green Button contributor and user ownership and control of their data and potentially enable them to trade green energy credits in the future.

In addition to being a founding member of the Green Button Alliance – the non-profit organization behind Green Button – London Hydro holds the distinction of having the first certified cloud-based Green Button platform in North America, which is now also being used by six other utilities.

As part of its Green Button rollout, London Hydro installed solar panels at eight sites operated by London and Middlesex Community Housing (LMCH) and invited tenants to participate in a pilot project. Through the Trickl app, participants could choose which appliances to automatically turn down or off during peak hours, as well as log what they did daily – such as laundry or cooking – using solar energy.

"We had tenants who would normally not get a hydro bill raising their hands to participate simply because they wanted to do their part for the environment," says Mr. Mir. The 2021 pilot with LMCH resulted in 9,605 hours of net-zero emissions (achieved when the amount of greenhouse gas produced is cancelled out by the amount that's been eliminated), 12,000 kilograms of carbon offsets and 47,100 kilowatt hours of solar energy. In addition, seven tenants with solar rooftops saw their hydro bill reduced by 35 per cent.

Project participants were clearly engaged. A solid 90 per cent reported an increased knowledge of distributed energy resources, and 85 per cent said they timed their energy usage with the availability of solar energy. Almost all – 95 per cent – said they would participate in similar projects in the future.

London Hydro's other Green Button projects include an Enbridge pilot that uses hybrid heat pump systems that switch between traditional and renewable energy sources, as well as a use case that, among other things, gives users information on public and private electric vehicle chargers.

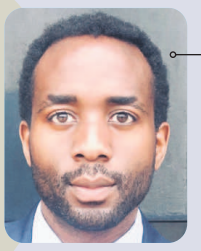
"We've been on this digital journey for quite some time," says Mr. Mir. "We believe that what's good for our customers and for utilities is also good for the environment."

APOORV SINHA

To tackle to enormous carbon footprint of cement production, the Carbon Upcycling Technologies CEO developed a pozzolanic additive that provides cement-like properties from CO2, reducing concrete's cement requirement and carbon emissions by 25 per cent while exceeding the industry's durability standards by 40 per cent.

AMANDA HALL

The geophysicist and Summit Nanotech Corporation founder and her team designed a nanomaterial that identifies and extracts lithium from a solution without first needing to remove other impurities, a process that has proven to double yield, conserve fresh water and reduce chemical waste.



BO SIMANGO

The CEO and cofounder of Aquafort has helped design and implement AI-powered solutions for sustainable aquaculture in the Atlantic region, with a predictive data analytics platform that optimizes fish health by predicting production ecosystem health and automating fish behaviour monitoring.

REDUCING EMISSIONS THROUGH ENERGY EFFICIENCY, RENEWABLE FUELS

The energy sector has a major role to play in helping Canada achieve net-zero greenhouse gas emissions by 2050, says Martha Hall Findlay, Suncor's chief climate officer.

The 2022 Clean50 honouree says that collaboration, innovative solutions, responsible production and "sheer investment" in new technologies are critical to the country becoming a leader in sustainable energy.

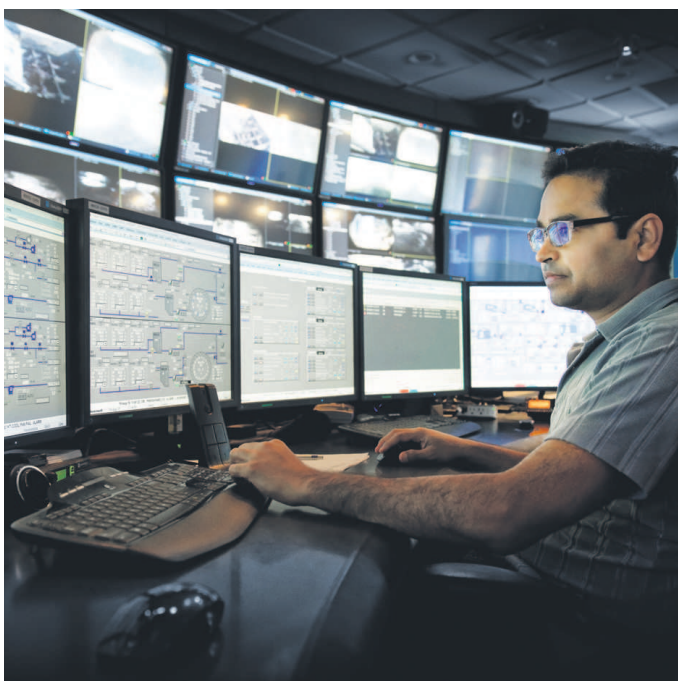
"If we don't do what's right from the environmental, social and governance perspectives, then we don't have a future," Ms. Hall Findlay says.

Fossil-fuel demand is expected to be significant right through 2050, she notes. "The question is how can we render the production and use of that net zero?"

Suncor released its 2050 net-zero plan last year, only once it had "the confidence that, although it would be challenging, we could see the path to get there," Ms. Hall Findlay says. The company's strategy involves three complementary approaches: reducing emissions in its base business through energy efficiency, fuel switching and carbon capture and storage (CCS); expanding lines of business in the low-emissions power, renewable fuels and hydrogen sectors; and working with its customers, suppliers and other groups to reduce their own emissions.

"Our competitive advantage is our ability to leverage our existing experience and expertise across all three avenues," she says. This is a "natural evolution" that builds on Suncor's two decades of renewable-energy efforts, its involvement in climate policy, longstanding commitment to GHG emissions reduction and investments in renewable fuels and clean-technology funds and companies.

Ms. Hall Findlay says the Clean50 award "is an acknowledgment that we are in this together and that the industry needs to do its part," and is testament to Suncor's efforts to reducing its emissions intensity. "It's an oil company, so having an organization like Clean50 step back and say, 'We can see you're making an effort to get emissions down and transition to a net-zero energy company,' that's great."



Efforts to improve the carbon footprint at Suncor include reducing emissions in its base business through energy efficiency, fuel switching and carbon capture and storage (CCS) and expanding lines of business in the low-emissions power, renewable fuels and hydrogen sectors. SUPPLIED

> "Meanwhile, oil sands producers have already implemented technologies in some projects that reduce emissions to levels below comparable production of heavy oil, and through Pathways we're poised to do even more.
>
> **Martha Hall Findlay**
> Suncor's Chief Climate Officer

She offers kudos to the federal government for taking "important steps" in areas such as carbon pricing and clean fuel regulations. However, Ms. Hall Findlay laments that Canada has a record of missing climate targets. "We're not even close."

Oil sands producers are a "big part of the solution," representing 10 per cent of Canada's emissions, she says. "It is going to take a lot of collaboration."

Suncor is a founding member of the Oil Sands Pathways to Net Zero initiative, an alliance of six companies that account for some 95 per cent of Canada's oil-sands production. Working collectively with the federal and Alberta governments, these "hard-core competitors" have come up with a phased approach that includes CCS, clean hydrogen, process improvements, energy efficiency, fuel switching and electrification, as well as emerging technologies. "Meanwhile, oil sands producers have already implemented technologies in some projects that reduce emissions to levels below comparable production of heavy oil, and through Pathways we're poised to do even more," Ms. Hall Findlay says.

Recent concerns about energy security, given disruptions in energy supply chains and the conflict in Ukraine, have brought calls for Canada to step up production, although we lack sufficient infrastructure to increase exports of oil and gas, she notes.

Ms. Hall Findlay says the crisis presents "an opportunity for like-minded countries to start thinking about how important energy security is," although climate "should not take a backseat" in the discussion. "This is an 'all of the above'; it's not an 'either/or,'" she adds.

A CANADIAN GREEN POWER SOLUTION

Vancouver's GreenPower Motors has just signed the largest original equipment manufacturer (OEM) medium-duty electric vehicle deal in North America.

The company, which builds electric vehicles and has the most diverse suite of medium- and heavy-duty offerings of any North American OEM, inked a deal to deliver 1,500 GreenPower EV Star cab and chassis to a company called Workhorse, a technology company that focuses on providing all-electric vehicles to the last-mile delivery sector.

"It's a firm order," says CEO and chairman Fraser Atkinson.

GreenPower builds a range of commercial vehicles for public transit, delivery, schools, shuttles and moving, and its EV fleet contains some of the safest, most durable and efficient vehicles available.

"We build vans, small trucks, logistics vehicles and so on, and when I say medium- and heavy-duty, that starts at class four and goes up to a class eight-type bus that could be a 40-footer or a double-decker," Mr. Atkinson says. "We started in the bus space and evolved to a broader focus as a result of developing our EV Star platform, which has multiple models, including passenger, wide-body and transport for those in wheelchairs. For cargo, we have vans, small box-trucks and a cabin chassis. GreenPower is our design; we use contract manufacturers to build it."

The EV Star platform has been its focus for three years, and recently it expanded to include school buses. The Battery Electric Automotive School Transportation (BEAST) was introduced last fall.

The American Federal Transportation Authority's bus testing program gave GreenPower's bus a score of 92.2, and Mr. Atkinson recently won a Clean16 award, which recognizes "exceptional contributors to the clean economy." The award, he says, was for "our team developing the largest suite of products that no other Canadian company has developed."

Vancouver-based GreenPower had to go stateside to find its first customers, but now has a number of deployments in B.C. and inquiries from across the country.

Mr. Atkinson says converting medium- and heavy-duty vehicles to zero-emission vehicles will have more of an impact on the reduction of emissions than almost anything else that humans can do. He stresses, however, that 75 per cent of vehicle-related emissions come from the vehicle itself, while 25 per cent come from powering it (either with fuel or electricity).

"Our vehicle is a zero-emission vehicle, not a zero-emission solution – we're not attacking that 25 per cent," he explained. "But if we were in Quebec or B.C., most of the power is coming from regenerative hydro type activity that's a huge positive on the 25 per cent element, so in some case we do have something very positive. Anecdotally, we are always very comfortable in saying that 10 per cent of the vehicles on the road account for 50 per cent of the pollution, and that pollution is from CO2 and NOx."

Converting medium- and heavy-duty vehicles to zero-emission vehicles will have a significant impact on the reduction of emissions, believes GreenPower Motors CEO and chairman Fraser Atkinson. SUPPLIED

VINAY SHARMA

Under his leadership, London Hydro illustrates how electricity distribution systems can combat climate change. In addition to implementing energy-smart programs and technologies and supporting renewables, he helped to develop and deploy a smart microgrid system that proves net-zero communities are feasible.

MATT HARPER

The co-founder of Invinity Energy Systems has, over the past two years, doubled production capacity for vanadium flow batteries, which excel in cost, performance and durability and present an ideal solution for smoothing intermittent power generated by wind turbines and solar arrays.

LYNN MUELLER

As president and CEO of SHARC Energy Systems, he pioneered the wastewater-heat-recovery industry and, in this and previous roles, contributed to the reduction of millions of tonnes of CO2 through deploying renewable energy systems and clean technology around the world.

MORE CLEANTECH AND CLEAN ENERGY LEADERS AT CLEAN50.COM

FINANCING THE PATH TO NET ZERO

Across the country, countless passionate people are working towards a common goal: to help Canada meet its climate targets by 2030.

"In the public and private sectors, in academia and not-for-profit organizations, many people are pushing in this direction," says Vince Gasparro, managing director, Clean Energy Finance at Vancity Community Investment Bank (VCIB). "And that's what we need: siloed sectors can't do it on their own. We all need to work together to turbocharge this green transition."

Among the measures that can help to address climate change are innovative projects that reduce emissions from energy generation, transportation and buildings, yet "nothing can happen without the capital to finance these projects," he suggests.

Wind and solar projects, now considered "plain vanilla," can access financing from all large financial institutions across North America, including VCIB. But support for other technology types – such as wastewater-to-energy, geothermal energy, battery storage, EV infrastructure or building retrofits – is harder to secure, and Mr. Gasparro notes that this is where VCIB, a subsidiary of Vancity Group, has built considerable expertise.

"We spend a lot of time finding creative solutions to help implement emerging technologies and finance complex projects," he says. "We've become the financier of 'firsts.'"

Among the trailblazing endeavours supported by VCIB are battery storage solutions in Ontario, an energy-as-a-service model, and the world's largest raw wastewater-to-energy conversion project, which will generate enough thermal energy to supply 90 per cent of the heating and cooling requirements at the Toronto Western Hospital.

The base technology for the project "checks all the boxes," says Dennis Fotinos, CEO of Noventa Energy Partners, the renewable energy company spearheading the initiative.

"At Noventa, we are energy geeks and engineers – and we're partnering with HUBER, an established wastewater technology company based in Europe. We became the exclusive distributor for their patented ThermWin system for North America."

Pairing HUBER technology with Noventa's proprietary DFSCTM process allows harvesting energy from raw municipal wastewater, which can then provide the hospital with a clean, renewable energy source, explains Mr. Fotinos. "We knew that by displacing natural gas, we would significantly reduce carbon emissions – and we already have many installations proving we can do this. What we didn't have was a funder offering reasonable terms."

What appealed to the team at VCIB was the substantial impact of the project, says Mr. Gasparro. "It's going to reduce the hospital's carbon dioxide emissions by 250,000 tonnes and will help save about $800,000 per year in heating and cooling costs for the next 30 years."

However, executing the ambitious $38-million project required more collaborators and "we had to get creative and bring in the Canada Infrastructure Bank to provide a capital structure that made the project more viable," says Mr. Gasparro. "It's our job to ensure we can help de-risk these asset types so they are bankable, and this can include bringing in other capital partners or stakeholders."

The Noventa ribbon-cutting event brought together key partners: Vince Gasparro, Vancity Community Investment Bank; Dennis Fotinos, Noventa Energy; Ed Rubinstein, UHN; Ron Swail, UHN, Abbas Chagani, Enbridge Gas; Cynthia Hansen, Enbridge Gas; Stephen Condie, Noventa Energy; and Ehren Cory, CIB (CNW Group/Canada Infrastructure Bank). **SUPPLIED**

As a result, the project now has a number of backers, including the Government of Canada, which will invest $3.3-million from its Low Carbon Economy Fund, and VCIB and the Vancity Group will provide financing of $15-million. The City of Toronto will offer support in the form of access to wastewater under a long-term lease.

In addition to providing tangible economic and environmental benefits, the project can also serve as an inspiration for other organizations, notes Mr. Gasparro. "Whenever we announce a project, this creates a positive feedback loop. People come to us to see how we and our network of partners can help."

Transitioning Canada's economy to net-zero emissions over the next 30 years comes with an estimated price tag of $2-trillion, roughly equivalent to Canada's annual GDP last year, according to a recent RBC report.

Private capital has to help finance this shift, and Mr. Gasparro says VCIB embraces its role as the only financier for asset types and clean energy projects in the $5-million to $50-million range to "help these types of industries and markets grow and scale clean energy solutions."

Projects of such size are important drivers of the clean energy transition, according to Mr. Fotinos. "With renewable energy, there's no one-size-fits-all," he says. "Wastewater-to-energy is a technology that works very well, but it's only one step in the right direction. The biggest part is finding partners like VCIB to allow us to chase our passion, which is developing kookier and wilder ideas for reducing carbon emissions."

There is a role for everyone, believes Mr. Gasparro, with efforts including industry adaptation measures, government regulations, Bay Street financing, climate activism and more. "We often focus on what divides us, but the fact is, we have to embrace and support the transition to a clean economy," he says. "And these achievements create real jobs and provide real environmental and socio-economic benefits."