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CLIMATE CHANGE INNOVATION

INDUSTRYANDBUSINESS.CA

Time for Canada's Banks and Pension Funds to Wake Up

In its first 150 years, our country built its economy, wealth, and quality of life on the backs of its abundant natural resources—furs, timber, fish, minerals, and of course oil and gas.

Canada's traditional energy sector today contributes a relatively minor portion of our GDP—about 7.3 per cent, according to Natural Resources Canada. But it plays an outsized role in our financial system, representing 27 percent of our equity markets. All of our major institutions, including the Big Five banks, have significant equity holdings and/or debt positions in the nation's larger oil and gas companies.

Pension funds are in a similar boat. The major funds including the Ontario Teachers Pension Plan and the Canada Pension Plan Investment Board—which has close to \$300 billion worth of assets under management—hold extensive fossil-energy positions.

This is perfectly understandable; with a few corrections here and there, the traditional energy sector has delivered solid blue-chip returns to shareholders for decades.

But those days are waning. The global energy economy is presently heaving under our feet, opening up our banks and the economy at large

to unprecedented uncertainty.

Specifically, new and emerging global, federal, and provincial climate policies are gradually correcting the costs of fossil-fuel production to more accurately reflect the societal impacts of those products. Once policy catches up to the science showing that two thirds of all fossil reserves cannot safely be extracted, valuations may be headed for a tectonic adjustment.

Meanwhile, larger market forces, such as decreasing renewable energy technology costs, innovations in energy storage and efficiency, and mobility are relentlessly chipping away on the demand side. Climate policy will impact the sector's growth and eventually, as the world beyond the United States ratchets up the ambition of the Paris Agreement, the risk of stranded assets will grow acute.

All of these factors are ripening the risk for Canada's financial institutions. How much risk are we talking about, exactly? Unfortunately, we don't know.

For the most part, the Big Five aren't telling us. Canadian banks and pension funds like to talk up their *green* credentials and their commitment to environmental, social and governance investing criteria, but when it comes to opening the carbon kimono and disclosing climate risk, they are among the most opaque in the world.



Céline Bak
President, CEO,
Analytica Advisors

A recent assessment by BankTrack, an international NGO based in the Netherlands, gave three of the Big Five banks a grade of D-minus for climate-related stranded asset risk. The remaining two scored an F. Meanwhile, Canada's pension funds scored poorly on the most recent Asset Owners Disclosure Project rankings.

Climate change is no longer an abstract and existential threat; it is casting a long shadow across the global economy. The just-released World Economic Forum's 2017 Global Risk Report cites climate as a leading risk to the global economy, noting its very high impact and probability. To mitigate this risk, investors need consistent, comparable, reliable, clear, and efficient data on carbon exposure.

Fortunately, the global financial community has now drafted a road map to guide us to a world of greater transparency.

In late December, as the financial world focused on a looming Trump presidency and little else, the Task Force on Climate-Related Financial Disclosures published its recommendations for voluntary climate-related financial disclosures. The idea is that such disclosures will head off the possibility of severe financial shocks and abrupt losses in asset values.

Except for a column in this newspaper which dismissed the endeavour as a make-work project for consulting firms, the recommendations received little attention in Canada. Only the Canada Pension Plan Investment Board and Blackrock participated from Canada.

Let's be clear: Canada has done a good job of funding innovations to deliver clean energy and efficiency. It's done so by leveraging the willingness of Canadians to leave the relative safety of corporate employment to start new companies to scale up solutions for everything from oil and gas methane emissions to light rail trains and resource recovery.

More than 55,000 Canadians are currently working on these solutions at roughly 800 innovative firms, approximately two-thirds of which could be viewed as "climate-tech." Such companies focus on alternative forms of energy for electricity, heating, and transportation; energy efficiency; the development of high-performance materials as enablers of low-carbon solutions; and the conversion of carbon into value-added products. It's one of Canada's best-kept secrets — their CEOs are building projects that are technically risk-neutral, and that can reduce climate-related financial risk for investors and lenders.

These companies could well form the future backbone of Canada's upcoming clean-growth century. But if we are to meaningfully participate — if we are to grow a lower-carbon economy based on scaling up intellectual property, instead of extracting raw resources — we first need robust disclo-

sure and transparency of the risks inherent in our current model.

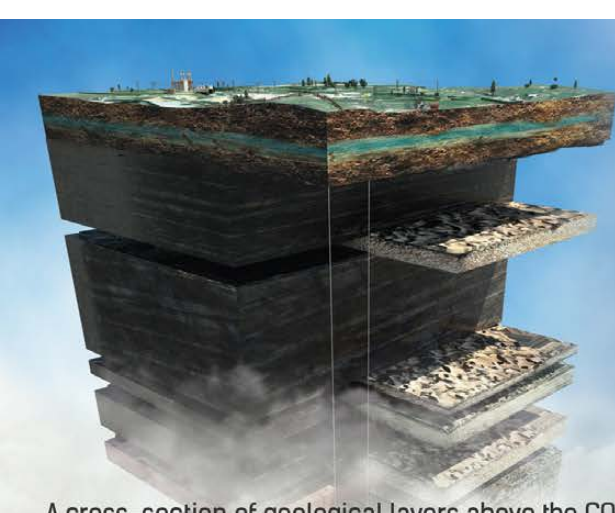
The race is on to establish leadership on sustainable finance. In London, Paris, Shanghai, and Hong Kong, the responsibility for environment sustainability and governance (ESG) disclosure and new policy development is no longer limited to a group of isolated experts in pension funds, banks, and private equity groups. It's a front-and-centre conversation.

To be sure, Canada's finance sector is in a tricky spot. As lead economies intensify policy action on climate, our banks and pension funds hold the purse strings on the fourth most greenhouse-gas intensive economy in the world. (Only Indonesia, Russia, and China are more exposed.) Instead of proactively addressing the risks that global climate action presents to some of the banks' bigger customers, and what those risks means for the health of our markets and the country's overall economic stability, CEOs appear to be opting for a *wait and see* approach.

Like a lost motorist, there's no shame in asking others for help. This is a chance to build together. If we wanted to, we could have the world's largest sustainable-infrastructure financial market. We already have three of the world's four largest infrastructure investors in Canada.

In the words of one central banker, Canada's major financial institutions need to start "getting comfortable with feeling uncomfortable." We need to stop hoping this problem will go away. The health of both our financial system and climate depend on it. **●**

Céline Bak



A cross-section of geological layers above the CO₂, injected at a depth of 3400 metres

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- A second phase would support Canada's initiatives in clean energy and climate change
- Investing partners access comprehensive and extensive datasets



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FIGHTING CLIMATE CHANGE

With the pan-Canadian agreement and the Paris Accord signed, Canada's next step is implementation.

We've been working hard alongside the provinces and territories, Indigenous peoples, environmentalists, businesses, youth, and really all Canadians to create an inclusive climate change plan and to ensure we progress toward our collective goals.

Working together, we can put our new made-in-Canada plan into action and position Canada to take advantage of the growing opportunity presented by the global clean energy market, while also working to meet our international commitments.

Mediaplanet Carbon pricing has raised heated debate on both sides of the topic. What are the advantages of its implementation, and what role does carbon pricing play in moving Canada in a climate-friendly direction?

Catherine McKenna Carbon pricing is definitely an issue that Canadians are passionate about, me included! I see it as putting a price on pollution. It makes sense. It sends a clear signal to consumers, businesses, and investors. Carbon pricing encourages businesses to find ways to reduce emissions — be it switching fuels, changing business processes, investing in energy efficiency, or figuring out ways to deliver more effective ser-

vices. As the costs of products that cause high greenhouse gas emissions go up, consumer choices will change. This initiative also helps position Canadian industry to compete internationally by responding to the growing global demand for clean technologies.

We agreed with the provinces and territories to price pollution in a way that makes sense for Canada, and in a way that creates incentives for innovation while making sure we protect vulnerable populations and keep our businesses competitive.

MP Cleantech is an area where Canada has a unique global advantage. How can we enhance our leadership in this area, and what steps are being taken to foster its economic growth?

CM The world is increasingly looking to find cleaner ways of doing things. In 2015, close to a third of a trillion dollars were invested globally in renewable power capacity — almost double the amount invested in fossil fuels. This represents a huge economic opportunity for Canadian clean technology companies.

Last December, I visited China to meet with my counterpart in the Chinese government. I brought a trade mission focused on profiling



Hon. Catherine McKenna
Minister of Environment and Climate Change

Canadian clean technology including, for example, carbon capture and storage technology from Saskatchewan and Ballard fuel cells. I'm planning to go back again next year, while also bringing a number of Canadian companies with me in a targeted trade mission.

On the domestic front, we're working with provincial and territorial partners to make smart investments in breakthrough technologies. We're also working to create the right conditions for Canadian clean technology businesses to succeed and making it easier for them to access government programs and services.

Pricing pollution will be a key element in fostering innovation, since it creates incentives for companies to be cleaner. It will give Canada an edge

in building a clean-growth economy, make Canadian businesses more innovative and competitive, bring new and exciting job prospects for middle class Canadians, and reduce the pollution that threatens our clean air and oceans, as well as our health.

MP Canada is a world leader in public-private partnerships for infrastructure. How are we adapting our nation's infrastructure and communities to be more climate resilient?

CM The impacts of climate change are already being felt across Canada. They pose significant risks to communities, our health and well-being, the economy, and the natural environment, especially in Canada's northern and coastal regions and in Indigenous communities.

Infrastructure is a very important part of the mix. Our government is investing in infrastructure that will protect Canadians against climate-related hazards like floods and wildfires. This means things like improving public transit and building flood walls, but also things like introducing codes to ensure buildings and other public infrastructure are built to withstand weather extremes. We have focused programs aimed at helping those in northern

communities through new technologies and better-adapted infrastructure. And we're developing targeted federal programs that focus on reducing climate change-related health risks, such as those related to extreme heat and infectious diseases. We're taking a whole-of-government approach.

MP Since being appointed Minister of Environment and Climate Change, what has, in your mind, been Canada's greatest success in the fight against climate change?

CM For me, our greatest successes so far have been the ones that brought people together to take action: the signing of the Paris Agreement and the agreement with provinces and territories regarding our national climate plan.

For the first time in Canada, we have a comprehensive, pan-Canadian plan to address climate change and support clean growth.

I'm proud of the work we've done so far, but this is not the end. There are major challenges ahead as we work to keep the momentum going on these issues. Working together, we can move Canada toward clean growth. **Q**

Catherine McKenna

It's Sunny Side Up for the Egg Industry and Environmental Sustainability

Farmers across Canada are producing more high-quality eggs, while using fewer resources than ever. According to Egg Farmers of Canada, which represents 1,000 farmers and farm families across the country, the industry has grown significantly in the last decade while embedding environmental sustainability practices into its business model.

Canada's egg industry recognizes a holistic approach is needed for sustainability, involving the environment, food safety, and quality — and egg farmers are proud of this approach and the fresh, high-quality, local product they produce. "We think the biggest opportunity for all food producers is the growing interest from the public in knowing where their food comes from and how it is produced," says Tim Lambert, CEO of Egg Farmers of Canada. "People want to know that their food is produced in a way that is environmentally sustainable. This isn't particularly new for the egg industry, as

we began adopting new practices to become more sustainable years ago."

Research spurs innovation, and the egg industry continually invests in research chairs at universities across the country. Each chair leads research in a different area, including animal welfare, public policy, and environmental sustainability. It's the last one that is creating a lot of excitement.

Led by Dr. Nathan Pelletier, an associate professor at the University of British Columbia's Okanagan campus and EFC Research Chair in Sustainability, innovative ideas are being extensively researched and developed, for implementation directly on farms. "Taken as a whole, food production is a major contributor to environmental issues," says Dr. Pelletier. "It's essential that the industry become more sustainable, and what is satisfying to me is knowing that the egg farmers recognize the importance of sustainability, and are serious about using the work of researchers to guide the future of the egg business."



Dr. Nathan Pelletier
Egg Farmers of Canada
Research Chair in Sustainability

One of the most pivotal pieces of research was an expansive study that evaluated the environmental footprint of the egg industry in Canada over a 50-year period. It showed huge improvements in efficiency and technology that have, among other things, led to better feed production, more efficient transportation, and better bird genetics. "The findings were very striking," says Dr. Pelletier. "For example, 50 years ago, farmers used more than three kilograms of feed to net one kilogram of eggs. Nowadays, it only ta-

kes two kilograms of feed. And hens are laying about 100 eggs more per year than they did in 1962."

Noting the value of the study, Dr. Pelletier continues. "What's good for the environment is good for business. At the heart of sustainability efforts is researching the entire lifecycle of the industry. This is critical, so researchers and farmers can see how sustainability is distributed in different areas, and identify the tradeoffs." As Dr. Pelletier puts it, one decision made in isolation could inadvertently cause more impact to the environment somewhere else.

Peter Clarke, a fifth-generation egg farmer, welcomes the focus on research and environmental sustainability. "Dr. Pelletier's research provides us with a useful snapshot of how far we've come as an industry and shows us the potential for future sustainability opportunities," he says. "These insights allow farmers to make informed decisions and to evaluate what best suits their unique situation and environmental goals."

New green technologies are already being implemented. An egg farm in Nova Scotia has installed wind turbines to create green energy and reduce energy expenditures, while another in Alberta is working toward a net-zero environmental footprint by generating more renewable energy than it uses. Clarke adds that Dr. Pelletier's work toward developing a tool for Canadian egg farmers to measure and track the progress of sustainability initiatives directly on-farm will be indispensable, because it will help even more farmers quickly implement new tools that can make a lasting difference in a farm's overall environmental footprint. Combined with new research and innovation, the egg industry is set to continue producing green eggs for Canadians from coast to coast. **Q**

Ken Donohue

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Publisher: **Daniel Singh** Business Developer: **Samantha Blandford** Managing Director: **Martin Kocandrlje** Production Director: **Carlo Ammendolia** Lead Designer: **Matthew Senra**

Contributors: **Céline Bak, Catherine McKenna, Ken Donohue, Gavin Davidson, Steve Kee, D.F. McCourt, Norm Sacuta, Jodi Woollam, Pierre Gratton, Jean-François Huc, Rob Cserynyk, Bernadette Conant, Steve Gombos, Chantal Guimont** Cover Photo: **David Dodge/CPAWS** Photo credits: All images are from Getty Images unless otherwise accredited.

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Schneider Electric Delivers Measurable Results to Iconic and Historic Fort Garry Hotel

Schneider Electric is a leading specialist in energy management and automation. Schneider Electric creates value and achieves growth by saving money for its industrial, commercial, and residential customers. It is able to achieve these savings by using building management systems (BMS) to reduce clients' energy consumption.

"One of the things that was very important to me when I joined Schneider Electric two years ago was that a commitment to innovation and sustainability in all its forms was at the core of the company's DNA and culture," says Schneider Electric Canada President Juan Macias. "We are committed to driving the company forward with a strategy that in a very significant way centres on helping our customers improve the reliability and efficiency of how they consume energy, which in turn has a direct effect on lowering overall energy demand."

And there are plenty of customers out there. It is estimated that residential towers, data management centres and industrial sites, all areas in which Schneider Electric is a global leader, account for 70 percent of the world's electricity consumption. The most exciting part, according to Macias, is the substantial future potential for savings — in both operating and energy costs.

"It's estimated by the Organization for Economic Co-operation and Development (OECD) that 82 percent of efficiencies remain untapped in buildings, while in infrastructure it is 79 percent and in industry it is 58 percent," says Macias. "So in general, there is still a lot of untapped potential to improve how we consume energy."



Juan Macias
President,
Schneider
Electric
Canada



Richard Henzie
Marketing
Director,
EcoBuildings
Canada

Schneider Electric is dedicated to growth through innovation

Schneider Electric is dedicated to helping customers improve the efficiency of their energy consumption by achieving innovation at all levels. This dedication to innovation, and in turn sustainability, is also at the heart of the company's internal strategy. In pursuit of maximum efficiency, Schneider Electric created the Planet & Society Barometer, which uses 26 indicators to measure the company's commitment to sustainable development on a quarterly basis. By the end of 2016, the company had already surpassed their internal 2017 sustainability goals.

"We are actually increasing some of our initial targets because as we build momentum we are making more progress than we originally expected to," explains Macias, referencing a current push for zero waste at their top 100 facilities. "The company's commitment to sustainability and strong leadership team have allowed us to go faster and do more."



It is this same inherent desire to go faster and do more that led to EcoStruxure, Schneider Electric's next generation of active energy management and automation architecture. EcoStruxure makes it possible for IT-enabled solutions to seamlessly connect, collect, analyze and act on data in real time, delivering enhanced safety, efficiency, reliability, and sustainability while realizing significant energy and cost savings.

"When a customer first comes to Schneider Electric, their main focus is typically the desire to reduce their energy spend," says Richard Henzie, Marketing Director of EcoBuilding at Schneider Electric Canada. "However, once we get to the source of the issue we often identify inefficiencies in the operations of the building and equipment, that once solved, will have a direct impact on cost savings."

Putting the Schneider Electric touch on a local legend

Schneider Electric is a global company with €24.7 billion in revenues (2016), with 28 percent of their business right here in North America. One of the most challenging and exciting projects they have worked on is Winnipeg's Fort Garry Hotel.

The project is a perfect example of what Juan Macias refers to as Schneider Electric's "focus as a company on helping our customers by automating their processes, measuring energy use, and doing everything we can to help them improve the efficiency and reliability of their systems."

Facing pressure from rising energy costs, increased regulation, and the need to improve operational standards in order to address a rising number of guest complaints, the Fort Garry Hotel was in need of both increased efficiency and reliability. As a century-old heritage building, the hotel was very energy intensive and not insulated to modern standards. Seeking a complete systems overhaul designed to improve operational efficiency and reduce labour costs, Richard Bel, the owner and operator of the hotel, contacted BARCOL, a Certified Schneider Electric Building Controls Partner.

"Overall this was a three- to four-year process," says Henzie. "In the end we were able to

complete all the upgrades with minimal disruption to the hotel, while ensuring the maintenance staff were completely versed and comfortable with operating their new Schneider Electric Building Management System."

Through the work done by Schneider Electric and BARCOL, energy use at the hotel was reduced by an astounding 20 percent. Even more incredible was the 25 percent reduction in maintenance staff hours, a significant cost savings for the hotel. Most importantly, by having a centralized and fully integrated system, the maintenance staff had the visibility to better manage and control the overall operation of the hotel, and the time to proactively address guest concerns, thereby eliminating the problem of systems-related guest complaints.

"I have worked with a number of building control companies over the years and without a doubt, BARCOL and the Schneider Electric Building Management System are far ahead of the other companies I've used," says Bel, who, with partner Ida Albo, took over ownership of the hotel in 1996. "We now have a modern hotel in a historic building — an old system with new brains."

But the true value of future-proofing buildings like the Fort Garry Hotel is not just to the owners of the hotel, or even its clients, but to all of us as Canadians.

"The key is in reducing overall consumption," says Juan Macias. "That has a direct impact on how much energy is required in the system, which in turn has a direct impact on carbon dioxide (CO₂) emissions and the overall health of our environment."

With sustainability and efficiency at the core of everything it does, Schneider Electric is one of the rare companies that is concerned not only with its profitability but also the bottom line of the world around us.

Gavin Davidson

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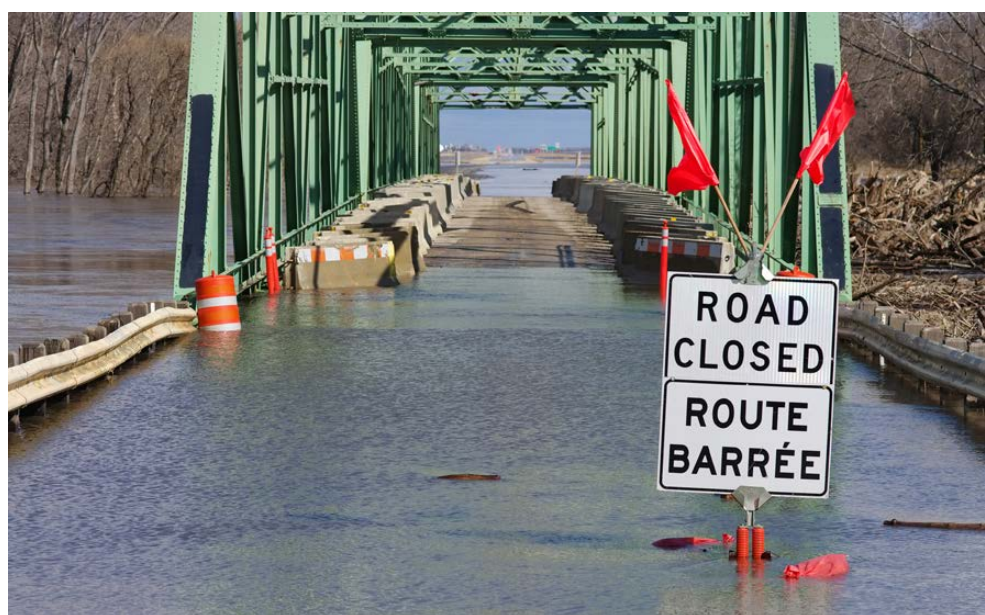
Climate Must Remain a Top Priority for Canada's Governments

Climate change has moved from future threat to present danger. It is affecting our country both environmentally and economically. Severe weather is already costing Canadian taxpayers hundreds of millions of dollars annually. We are seeing more rain, snow, storms, and flooding in almost every part of the country.

Last year was one of the most violent and costly in terms of severe weather. According to Catastrophe Indices and Quantification, insured damage for 2016 topped \$4.9 billion — smashing the previous annual record of \$3.2 billion set in 2013.

Insurance Bureau of Canada (IBC) data shows that the annual economic cost of disasters around the world has increased five-fold since the 1980s. From an average of \$25 billion a year in the 1980s, it increased to an average of \$130 billion a year in the 2000s. In Canada, federal disaster relief spending rose from an average of \$40 million a year in the 1970s to an average of \$100 million a year in the 1990s. In the first six years of this decade, federal disaster relief spending rose even more to an average of over \$600 million a year. In 2013, federal spending hit a record \$1.4 billion, largely due to the flooding disasters in Ontario and Alberta.

Moving forward, floods are expected to cause the majority of damages, largely as a result of multiple-day rainfalls across the Prairies



and Rockies. At IBC, we recently mapped the flood risk of people across the country. We found that 19 percent of Canadian households are at some level of risk.

Many people in high-risk areas find it difficult or impossible to purchase flood insurance. Therefore, as a nation, we remain exposed to the safety challenges and financial costs that will invariably accompany severe weather threats.

The Disaster Financial Assistance Arrangements program — operated by Public Safety Canada — is the primary source of fi-

ancial assistance for provinces in the event of emergencies. But according to the Parliamentary Budget Officer, the fund is not adequately supported in the government's current fiscal framework.

Policymakers must fully accept and swiftly adapt to this new reality — even as they continue with efforts to combat climate change over the longer term. Governments across Canada have ambitious approaches that take the first steps in limiting future damage. In particular, IBC commends several provincial governme-



Steve Kee
Director,
Media and Digital
Communications,
Insurance Bureau
of Canada

nts for their plans to fund strong resilient infrastructure and implement adaptation strategies which address the real, immediate effects of climate change.

At the federal level, the Government of Canada has committed more than \$21.9 billion over the next 11 years toward green infrastructure — including projects that deal with the risks associated with flooding and wildfires.

The frequency and severity of natural disasters related to climate change are having a significant impact on Canadians. Canada must build a culture of disaster risk reduction that resonates with consumers and engages all levels of government, businesses, and institutions. Canada's insurers will continue to work with the provincial and federal governments in the areas of mitigation, adaptation, and emergency management — all of which form the basis of a comprehensive climate strategy. **Q**

Steve Kee

Climate Change Is Here

Are We Ready?



Major flooding across Muskoka area. Photo: Flickr/ Ryan McGilchrist

When we talk about climate change, there are two misconceptions that we often hear. First, we frame it as a possibility on the horizon, rather than recognizing it as a clear reality that is here today. And second, we talk about preventing it, but almost never about making our communities more resilient to it.



Dr. Blair Feltmate
Intact Centre
on Climate
Adaptation (ICCA)

“Climate change is a done deal,” says Dr. Blair Feltmate, Head of the Intact Centre on Climate Adaptation (Intact Centre). “It is here to stay, and it is irreversible.”

While we can't say with certainty that any specific event, like the 2013 floods in Calgary and Toronto or the 2016 Fort McMurray wildfire, are a direct consequence of climate change, Dr. Feltmate compares the situation to a baseball player who goes on steroids and then immediately starts hitting five times as many home runs. He might have hit some of them anyway, but we know what's behind most of them. For seven out of the last eight years, catastrophic loss insurance claims for things like floods, wildfires, and ice storms in Canada have been over a billion dollars annually, whereas historically the average has been between \$200 and \$500 million. With numbers like those, a drug test would be a formality.

We can act on climate change now
“We should obviously do everything we can

to mitigate greenhouse gas emissions and slow the rate of change,” says Dr. Feltmate. “However, we also need embrace climate adaptation aggressively right now.”

Climate adaptation means securing our homes, businesses, and communities against severe weather events like floods, wildfires, and ice storms. It means building better infrastructure for water drainage and preserving the wetlands in and near cities that provide vital safety valves in the case of floods. Building a network of readily available information including up-to-date flood plains maps and disaster recovery plans is integral.

We have a lot of work to do. In an Intact Centre report card released last October, rating the flood readiness in provinces across Canada, the average grade was a C-minus.

“If you want to change the national conversation, you need to begin from a foundation of strong data-driven analysis,” explains Monika Federau, Chief Strategy Officer at Intact Financial Corporation. Intact

founded the Intact Centre with the University of Waterloo, with the goal of identifying gaps in preparedness and tangible solutions for communities.

“We spent a lot of time with the University of Waterloo focusing on understanding and projecting climate impact. The second step in changing the conversation is to bring a toolkit to the table where you can show field-tested solutions that actually work.”

Working together since 2010, Intact and the University of Waterloo first funded a set of 20 pilot projects under the Climate Change Adaptation Project. The best practices identified by these projects informed the development of the Intact Centre and its programs.

One of the Intact Centre's programs is the Home Adaptation Assessment Program (HAAP). “HAAP will help homeowners identify and implement simple home improvements that can make the difference between a dry basement and a flooded one when extreme rainfall hits,” adds Federau. Burlington, Ontario is the first city to pilot HAAP.

Climate adaptation is an economic necessity

Costs from severe weather events have increased in recent years. Only \$1 in \$4 is insured; the other \$3 has to come from disaster relief funds or other taxpayer-driven budget line items, says Federau.

“There's a direct economic benefit to Canadians if they understand this problem and encourage adaptation. It's simply a more efficient use of tax dollars to have them directed toward improving infrastructure to benefit all,” she adds.

Further, as Dr. Feltmate points out, every dollar spent on climate adaptation results in benefits that are felt locally. The costs of failing to adapt to climate change reach further than the insurance industry — there are devastating social costs to bear when families lose homes and community infrastructure becomes overwhelmed. Canadians need to be empowered to take action on adaptation now, in tandem with reducing our carbon impact. We must put our dollars where they can help us most against the coming storm. As Dr. Feltmate plainly puts it: “Not adapting is not an option.” **Q**

D.F. McCourt

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5 Lessons from Fort Mac

Preventing Future Catastrophic Loss from Wildfires

A member of Wildfire Management Alberta's Wild Mountain Unit out of Hinton, AB hoses down hotspots in the Parsons Creek area of Fort McMurray Friday, May 6, 2016. Fire conditions remain extreme, with 12 new starts across Alberta yesterday. A total of 40 wildfires are burning. More than 1,200 firefighters, 110 helicopters, 295 pieces of heavy equipment, and 27 air tankers are fighting fires across the province. Photo: Chris Schwarz/Government of Alberta

It's been nearly a year since a wildfire swept through Fort McMurray in Alberta, destroying thousands of homes and forcing the evacuation of the city. With total damages, insurance payments and secondary costs approaching \$10 billion, the fire was the single most expensive disaster in Canadian history.

It's now time to look back on this tragedy and to ask what Canadians can do to mitigate the damage from similar fires in the future. What follows are the key takeaways and lessons learned, as gleaned from a conversation with Glenn McGillivray, Managing Director of the Institute for Catastrophic Loss Reduction.

1 Climate change was a factor, and we can expect fires like this to become more common.

"Last year in Fort McMurray, things dried up faster than usual, and at the time of the fire, it was unseasonably warm for early May, and also quite windy," says McGillivray. "While climate change doesn't directly cause a fire like this, it makes the conditions for such a fire rife."

2 When the conditions for a wildfire are present, sometimes the forest will burn.

"We can't say for sure what caused the actual sparking of the fire, but it is suspected to be human caused," says McGillivray. "With those conditions, though, it could just as easily have been started by lightning, and there would have been no way to prevent it."

3 We must actively plan communities around the risk of wildfires, but individual properties are key.

"We need to build communities in the wildland-urban interface more resiliently. If a community is not flammable, the fire doesn't have anywhere to go," says McGillivray. The bottom line is that if you can prevent the embers that blow ahead of the fire from igniting, you can save a property. And that prevents that house from setting the house next door on fire and so on."

4 Embers land on roofs, and what those roofs are made of is very important.

"Roof design is a big thing," says McGillivray. "Wood shake roofs, of course, are absolutely horrible if you're living next to a forest that mig-

ht burn. Metal roofs are great, but they're costly. All you really need is a decent asphalt shingle roof. As long as the shingles are class A or class B rated, you're good to go."

5 In the end, it's the little things that make the biggest difference.

"We really need to get homeowners on board with understanding the risks and the simple things they can do to make their homes and communities safer," says McGillivray. "For example, screening below your deck so that embers can't blow in there and start a fire. Moving your wood pile away from your home. Not attaching a wood fence or wood gate to the side of the house. Not having a barbecue with a propane tank positioned right next to your

home. We have a lot of evidence from Fort McMurray showing that it's just these types of things that made a critical difference from one property to the next."

As the citizens of Fort McMurray continue to rebuild, Canadians coast to coast need to be looking at their own communities and homes, and asking if they are FireSmart. There are hundreds of communities at risk, especially those that abut forests or grasslands. And there's no excuse for not taking action when the things that make the biggest difference can be done easily and affordably. As McGillivray puts it: "It's elbow grease, mostly." **Q**

D.F. McCourt



WEATHERING THE STORM

Building Resilient Canadian Communities

As the climate changes, extreme weather events and natural disasters are becoming more frequent and severe. Large-scale, once-in-a-century catastrophic events now occur in the span of decades, profoundly impacting Canadians who are largely underprepared and uninsured.

The alarm bells are ringing

The role of insurers is to assess, mitigate, and price risk appropriately. Beneath our complex actuarial calculations, the equation is relatively simple: as the risk of damage increases, so too will the cost of insurance. Rising premiums are an alarm bell that signals more needs to be done to prepare for extreme weather by building more risk-adapted communities.

The price tag of these rapid changes is steep. Up until 2008, the Canadian insurance industry saw an average of \$400 million in claims payouts per year due to extreme weather, largely attributed to flooding. Since 2008, those losses have more than doubled, exceeding an



Rob Wesseling

President, CEO,
The Co-operators Group Ltd.

average of \$1 billion per year. Of course, this only accounts for insured losses. Disaster relief payments from the government are also on the rise, and ripple effects like impacts to mental and physical health, lost earnings, and damages to the environment render the real costs both immeasurable and immense.

Partnering for change

The effort to build resilient communities must occur on a scale that dwarfs the biggest and boldest actions of any single company, sector, or government. Extreme weather is a highly complex, multigener-

ational challenge that will profoundly impact the environmental, social, and financial well-being of communities across Canada and around the world. Because of this, building stronger, safer communities requires a collaborative and cross-sector approach.

As a co-operative insurer, we're guided by a concern for community and driven to be a catalyst for sustainability. We are an active participant alongside governments, businesses, researchers, and clients to mitigate risk, ensuring communities are better prepared and protected when disaster strikes.

Informing communities

To encourage resilient community building, Canadians must first be made aware of their increasing levels of risk. Yet our research shows that the vast majority who live in high-risk areas simply do not know that they are vulnerable to catastrophe.

In 2016, the University of Waterloo's Partners for Action (P4A), an applied research network of which The Co-operators is a founding

donor, assessed Canadians' level of preparedness for flood. This national survey engaged 2,300 Canadians who reside in flood-prone areas. Ninety-four percent of this high-risk group did not believe that they were at risk and/or were not aware. Without this knowledge, it is unlikely that they will make the decision to protect themselves against a major flood event.

Taking action

There are relatively simple steps Canadians can take to minimize property damage from extreme weather and natural disasters. Fire and flood-resilient landscaping practices, building retrofits, and weatherproofing can go a long way to minimize damage and costs.

At the same time, governments should invest in infrastructure that can withstand the increase in severity of extreme weather and natural disasters, and plan for the increased risks associated with a changing climate.

As insurers, it is our responsibility to inform clients about the risks they face, the steps that they

can take to minimize those risks, and the products that are available to protect their financial security.

Advocating for change

To ensure that messages of resilience hit home, we're working in partnership with a variety of stakeholders to raise awareness and inform Canadians about how they can mitigate extreme weather-related risk.

While we innovate products to offer more comprehensive coverage, conversations are underway around building better resilience — we have a lot of ground to gain to protect the financial security of Canadians over the long term.

By working together, and ensuring that Canadians are well informed, educated and ready to take action to mitigate risks, we will build resilient, sustainable, and risk-ready communities for tomorrow. **Q**

Rob Wesseling

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Workers stand in front of the Quest Carbon Capture and Storage Unit at Shell Scotford near Edmonton, AB (Shell Scotford, November 6, 2015). Photos: Shell

Sustainable Change Today, with Quest Carbon Capture and Storage

When people talk about carbon capture and storage (CCS) technology, no matter where they are in the world, it's likely you'll hear them mention Canada in the same breath.

And if you're asking yourself just how often people talk about CCS technology, well, you just might be surprised.

Canada has been breaking a whole lot of new ground in this field over the past decade, and it's got people talking. At the Quest CCS project near Edmonton, AB, people are coming from all over the world to see what it's all about. "We've just recently had CEOs visit from companies in Norway and Ireland, China, Italy, and Taiwan" says Tim Wiwchar, former Quest project lead with Shell Canada. "We've also had visits from the US Department of Energy."

Learning about Quest, it's not hard to see what's got everyone so interested. Since the facility began operation in late 2015, it has captured and safely stored over one million tonnes of CO₂. The CO₂ is captured at the point of production, in this case the Scotford bitumen upgrader, then compressed into a liquid, transported through a specialized pipeline, and injected into underground geological reservoirs for permanent storage. In this way, CCS projects like Quest substantially reduce the carbon footprint of existing operations. The immediacy is key. The reality of climate change demands sustainable solutions that can work with the infrastructure we currently have.

No blueprints to follow

When planning this project, there was not even a mould to break.

Nothing like Quest had ever been built in an oil sands context before, anywhere in the world. It was a massive and ambitious project, requiring a confluence of governmental support and corporate initiative.

"There was a lot of pressure being put on the oil sands regarding carbon intensity," says Wiwchar. "We at Shell had already started taking a serious look at CCS as a way to reduce our carbon footprint. At the same time, the provincial government in Alberta was putting together a \$2 billion fund for CCS demonstration. That really got the momentum going."

From the outset, any intellectual property or data generated by Quest has been publicly available, in collaboration with the governments of Alberta and Canada, to help bring down future costs of CCS and encourage wider use of the technology around the world.

This means that others can take the detailed engineering plans, valued at C\$100 million, to help build future CCS facilities.

For a pioneering project of its scale, especially one that was being integrated into an active facility, the construction went remarkably smoothly, coming in both ahead of schedule and under budget — a virtual unheard of combination. Still, Shell is confident that if similar facilities were built again, they could save another 20 to 30 percent by leveraging what was learned on the Quest project. And that's using the same technology. New technologies are in the works that could cut costs even further.

As the cost of CCS is coming down, the price on carbon emissions is simultaneously going up. Convergence is imminent and inevitable, meaning that future projects following in Quest's footsteps could be less reliant on government funding. "The Quest project was sanctioned at a \$15 per ton carbon price in Alberta," says Wiwchar. "We're now at \$30 per ton provincially, and federally they have recently announced that by 2022 the price could hit \$50 per ton. At Shell, when we evaluate things like CCS, we do look at what the immediate carbon price is, but we are always testing with a longer view as to where it's going."

The right idea, the right time, and absolutely the right place

The Canadian Prairies, as it turns out, are a perfect crucible for CCS innovation. "Alberta, Saskatchewan, and Manitoba have excellent reservoir properties where we can store carbon in what is known as the basal Cambrian sandstone," says Wiwchar. "If you go back two million years, this was a prehistoric ocean. It's very salty rock 2.3 kilometres down, and it covers an area roughly 1,500 kilometres by 1,000 kilometres. So there's a lot of room."

In addition to having the right geology, the Prairies also have the right people. People who, while maybe cautious, can recognize when a new idea is a good one and get behind it.

"We want this technology to flourish," says Wiwchar, "but you need public buy-in for that to happen. You can have a great technology, but if the public is not confident in it, it's not going to go anywhere."

And so in 2008, seven years before they even began injecting captured carbon, the Quest project began its outreach to the local community.

To build confidence and trust, they knew that transparency must be paramount. "We didn't just tell them that the project was low risk," says Wiwchar. "We walked them through various aspects and scenarios, and were honest with them about all of it. And at the end of the day, the farmers came to their own conclusion that, yeah, it's safe. And they said: Go build it."

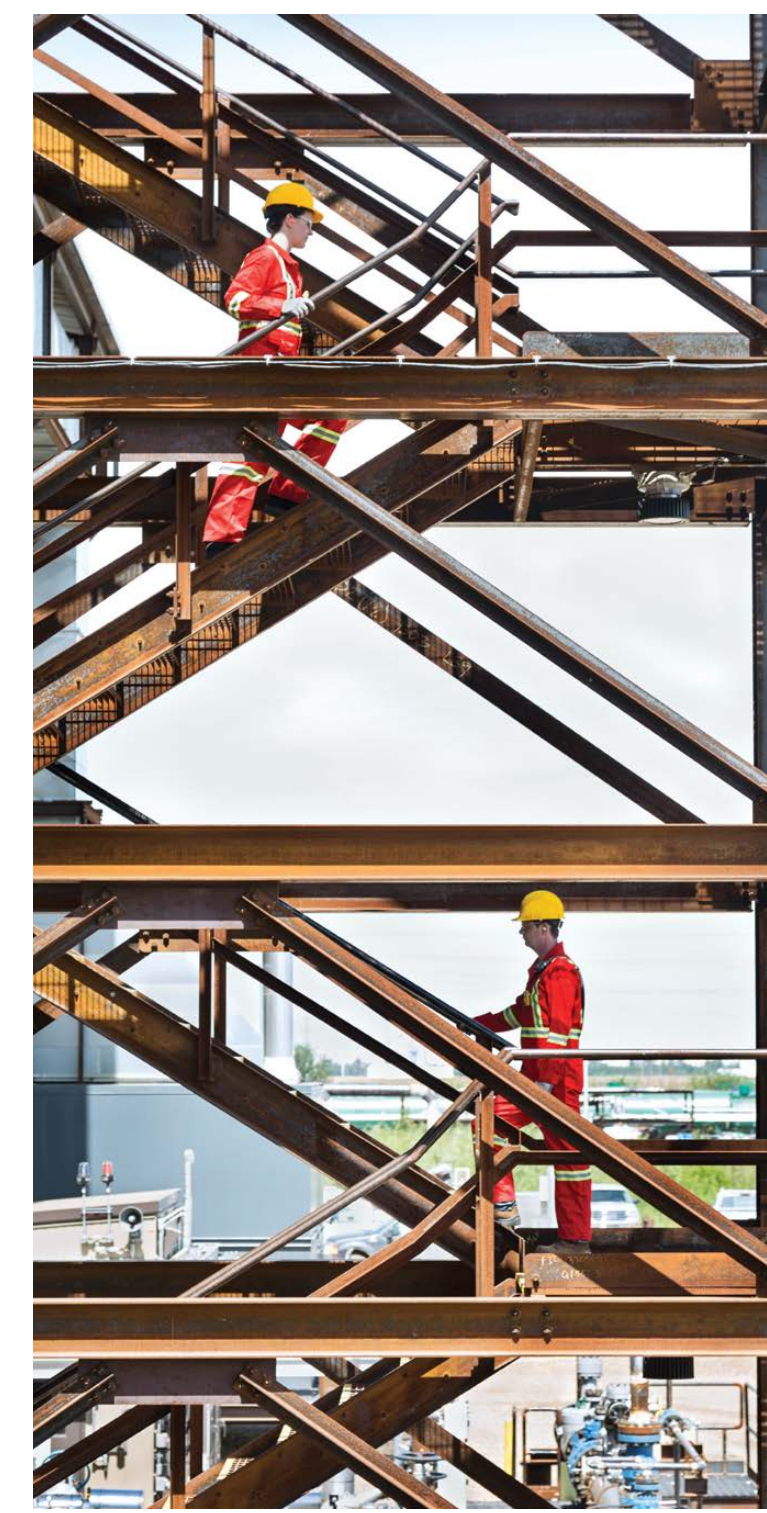
That's the attitude that has made Canada a world leader in carbon capture and storage technology. And today, in full commercial operation, Quest is happy to be sharing the fruits of this trailblazing effort with its international visitors. "There are still a lot of people who don't even know this technology exists," says Wiwchar. "We need to take every opportunity to show the world that carbon capture and storage is real, it's ready, and it's very effective." ●

"We need to take every opportunity to show the world that carbon capture and storage is real, it's ready, and it's very effective."

Quest was built by the Athabasca Oil Sands Project joint-venture owners Shell Canada Energy (60 percent), Chevron Canada Limited (20 percent) and Marathon Oil Canada Corporation (20 percent). In March 2017 Shell announced the proposed sale of the majority of its oil sands assets in Canada. If the proposed sale goes through, it is envisaged that Shell would remain as operator of the Quest CCS project and Scotford upgrader.

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Workers climb stairs within the Quest unit at the Scotford Upgrader, near Fort Saskatchewan (northeast of Edmonton), AB in June 2015.

How Canada Is Taking the Lead in the Fight Against Carbon Emissions

Gone are the days when people seriously questioned whether carbon emissions were worth worrying about. We all recognize that climate change is here. The question now becomes how we are going to stop making it worse.



Workers prepare a borehole gravity logging tool for deployment down the Aquistore injection well. One of many technologies in use at the site. Photo: Brian Zinchuk

While renewable energy and similar technologies offer a lot of promise, gigatons of carbon dioxide (CO₂) and other greenhouse gases are still being pumped into the air globally every month. We need to be talking about solutions that can help stem that tide today, not in ten years. We should be talking about carbon capture and storage (CCS).

“Everyone knows that ultimately we need to move away from fossil fuels, but right now we have an installed system that uses fossil fuels and is going to continue to use them for some time,” says Dr. Rick Chalaturnyk of the University of Alberta. “CCS is the one solution that allows us to effectively remove emissions from the atmosphere right now.”

Carbon capture and storage is a suite of technologies that first removes CO₂ from emission streams, whether that’s power generation or industrial sources like cement fabrication, then compresses it and transports it through pipelines to a storage site where it is in-



Dr. Rick Chalaturnyk
University of Alberta

“CCS is the one solution that allows us to effectively remove emissions from the atmosphere right now.”

jected into subsurface geological formations for permanent storage. Right now, it’s the only viable solution we have for directly mitigating the effects of large-scale emissions from fossil fuels.

Quest leads the way in Alberta

Over the past five years, Canada, already a world leader in fossil fuel production and exporting, has stepped up to become a world leader in CCS technology as well. As part of the At-

habasca Oil Sands Project, Shell Canada, Chevron Canada Limited, and Marathon Oil Canada Corporation recently built the ambitious Quest project, the world’s first oil sands CCS facility, near Edmonton. Construction started in 2012, and the site began commercial operation in 2015, capturing and permanently sequestering more than a million tons of CO₂ in its first year of operation.

As the team leading a trailblazing project, the people behind Quest take their roles as teachers seriously.

“Quest has implemented world class measurement, monitoring, and verification technologies in order to supervise all aspects of the operation,” says Dr. Chalaturnyk. “All that information is captured and is part of a knowledge-sharing agreement where Shell gives the data to the Alberta government and it’s then made available for anyone to learn from.”

CCS in Saskatchewan expanding in promising directions

In Saskatchewan, another CCS project is also pushing the envelope. The Aquistore project, attached to the SaskPower Boundary Dam Power Station near Estevan, is the world’s first commercial-scale CCS site for capturing post-combustion CO₂ from a coal-fired power plant. With thousands of new coal-fired plants in construction or planning worldwide, the message that CCS can work in this context is powerful and necessary.

The site is also a testbed for variable-flow CO₂ injection. “A large part

of the Boundary Dam’s economics is related to the sale of CO₂ to oil fields for use in enhanced oil recovery,” explains Dr. Chalaturnyk. “But because there are times when the oil fields can’t use all the CO₂ produced, there also has to be a storage component that can handle variable injection rates. On that front, Aquistore is fulfilling multiple objectives in a way that has rarely existed before.”

Carbon emissions are a global problem, and it’s only right that Canada take a leadership role in developing the technologies that can provide a solution today. That’s why it’s so important that we continue to invest in projects like these and the carbon pricing policies that make them commercially viable. “In a Canadian context,” says Dr. Chalaturnyk, “projects like Quest and Aquistore are providing such a great example to the international community and really showing them what’s possible.”

D.F. McCourt

Canada’s Smartest Underground Climate Project

Featuring the most comprehensive, multi-dimensional geological field laboratory for CO₂ storage in the world, the Aquistore Project has the ingenuity to reduce greenhouse gas (GHG) emissions and is being sought globally for its scientific expertise and innovation.

The Aquistore Project, located in the small town of Estevan, Saskatchewan, aims to advance and optimize carbon storage as part of Canada’s climate change mitigation efforts through the advancement of clean technology. Aquistore is demonstrating the safety, reliability, and economic advantages of injecting captured carbon into a 3,400-metre-deep saltwater-infused sandstone.

“Aquistore has already removed over 100,000 tonnes of carbon, which is comparable to planting 2.7 million tree seedlings grown over 10 years,” says Kyle Worth, Senior Project Manager at the Petroleum Technology Research Centre (PTRC), the organization that manages Aquistore.

With Canada’s international commitment to a low-carbon economy, decarbonizing non-renewables by storing carbon is becoming an important component of GHG reduction. In addition to the energy sector, other carbon industrial point sources such as cement and steel production, chemical manufacturing, and fertilizer production are also being called upon to be climate smart.

The Aquistore Project is proving carbon storage to be both viable and

essential in helping industries that have few other options to manage compliance-quality offsets of their GHG emissions.

“While renewable energy is the future, we should not be short-sighted and overlook the additional benefits of carbon storage for industries with limited options to reduce carbon emissions, especially when those industries support the development of renewables,” says Worth.

“Carbon storage is a feasible option for steel manufacturing used to build wind turbines, the petroleum products utilized in solar panels, the plants producing cement for hydroelectric dams and nuclear power plants that in turn fuel electric vehicles, and from fertilizer plants that support the growth of food.”

Global leader in carbon capture, utilization, and storage (CCUS) intelligence

Aquistore is valued for its knowledge, commitment to innovation, and unique and extensive data.

Industry and government partners in Japan, Korea, Australia, the United States, South Africa, and the United Kingdom have each been participating in the Aquistore Project in order to develop their homegrown intelligence. The Aquistore Project provides opportunities for capacity building through innovative research, training, and education to global partners.

“We’ve been developing highly qualified personnel here and it’s important to retain Canadian exper-

tise that we can then export,” says Dr. Chris Hawkes of the University of Saskatchewan, a member of Aquistore’s Science and Engineering Research Committee (SERC).

While a Canadian project, Aquistore has significant international impact. “The continued success of this project will have incredible implications for reducing carbon emissions throughout the world,” says London, England-based John Gale, General Manager of the International Energy Agency Greenhouse Gas R&D program.

“It’s important that we collaborate from a point of strength with global partners,” says Worth. “We can help to achieve Canada’s Mission Innovation with the trilateral agreement between Canada, U.S.A. and Mexico, via the North American Climate, Clean Energy, and Environment Partnership.”

Advances in technology

The project boasts an impressive monitoring measurement and verification program that’s advancing the understanding of carbon storage in the subsurface.

“The Aquistore Project is providing us with an opportunity to test emerging technologies in innovative geophysical equipment, including distributed acoustic sensing (DAS) fibre,” says Dr. Don White of the Geological Survey of Canada and Chair of Aquistore’s SERC. For the first time, DAS fibre is a technology being used to image carbon at such extreme depths. “This is significant to many industries and policymak-



A worker secures the Aquistore injection well following the insertion of one of many advanced monitoring technologies. Photo: Brian Zinchuk

ers because we are accelerating our understanding and verifying the safety of carbon storage.”

Aquistore is a full-scale project tied to real injection considerations — taking industrial carbon at variable and intermittent rates — associated with SaskPower’s carbon capture initiative. Aquistore’s knowledge will provide fundamental understanding of the reality for commercial operations regardless of the carbon point source.

Impact and investment

As understanding of the subsurface and impact of injected fluids improves, the Aquistore Project will have an important and critical impact on updating Canadian po-

licy, regulations, and standards for the safe long-term operation of permanent carbon storage across the industrial heartland.

Striving to continually advance innovation in clean technology with science-based facts, projects such as Aquistore are an important piece of the puzzle contingent on continued investment, research, and collaborations.

Norm Sacuta and Jodi Woollam

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Canadian Industries Can All Benefit from Climate Action

Photo: Tugliq

“Building a high-performance, low-carbon economy is a major economic opportunity and a vital environmental responsibility.”

It's not often that an established resource sector, like mining, finds itself on the same page as a bio-chemicals company. We both represent major industries in Canada, but each develops different products aimed at unique markets. Canada's transition to a low-carbon economy is a business opportunity for all of us, however, so here we are: sharing a byline and jointly calling for Canada to become a global leader in clean growth and climate change.

Why do we see clean growth as a major business opportunity? Because it's the direction the world is heading in, and if Canadian companies can be at the front of that curve, then other countries will look to us to supply the low-carbon innovations, products, and expertise they need. That will be good for business, good for jobs, and good for our economy.

Many Canadian businesses are already positioning themselves to capture this opportunity.

Canada's mining industry is one of many industries that are finding innovative ways to be more competitive with fewer carbon emissions. Mines such as Diavik in the Northwest Territories and Glencore Raglan in Quebec are pioneering renewable energy use, while Goldcorp's Borden gold mine, northwest of Sudbury, will be the first in Canada to switch entirely to electric vehicles for all of its underground operations. This will not only eliminate the emissions from diesel-powered vehicles but will also drastically reduce the amount of ventilation the



Jean-François Huc
Board Member,
BioAmber

mine requires, which can account for up to half of its overall electricity demand.

More innovations like this could soon make Canadian mining the cleanest in the world.

Other industries in Canada are making similar moves. Forestry has stayed competitive while reducing carbon emissions by a remarkable 66 percent since 1990. Oil and gas have been pioneering carbon capture and storage (CCS), a technology that the International Energy Agency says will need to account for one-sixth of all emission reductions by 2050. And the chemical industry has BioAmber at the forefront of innovation, a company that is competitively commercializing a renewable, sugar-based biotechnology process that cuts over 90 percent of carbon emissions from chemical manufacturing.

The clean growth opportunity is also being seized by Canada's growing clean-technology sector, which is dedicated specifically to developing products that improve environmental performance. The clean tech sector has already created over 55,000 jobs across Canada and is poised to supply a global mar-



Pierre Gratton
President & CEO,
Mining Association
of Canada

ket expected to be worth more than \$2 trillion by 2020. That's good news for Canadian innovators focused on everything from energy storage and carbon-neutral cement to portable water treatment, mini nuclear power reactors, and smart thermostats.

Now is the crucial time to build on these successes and seize the clean growth opportunity. We can increase Canada's cleantech exports and expand markets for cleaner products from our resource and manufacturing sectors, all while taking a giant step toward meeting Canada's climate goals.

Smart government policy is needed to realize this potential and to help further unleash private sector innovation.

First, a price on carbon emissions can be good for business. It's meant to help stimulate the innovation that will improve energy efficiency, cut costs, lower emissions, and make Canadian companies more competitive in the low-carbon economy. A carbon price, implemented properly, wouldn't add to our business tax burdens. Instead, it would incentivize carbon reductions by shifting

how taxes are paid. Moreover, it could do this while using the revenues to help businesses, particularly in trade-exposed sectors, to remain competitive while making the low-carbon transition.

Several provinces are already demonstrating that this approach can work for both the environment and the economy.

The government should also make a major investment in clean infrastructure. Our economy is in need of both new and renewed energy, transportation, and urban infrastructure, including in northern and remote regions. If done right, a major infrastructure investment could lock in a low-carbon advantage for Canadian industries, most of whom depend on public infrastructure at some point to produce and/or distribute their products.

Finally, the government can help spur clean innovation in ways beyond just introducing a price on carbon. Clean innovation faces many unique market barriers and failures. By providing incentives and helping to remove barriers, smart government policy could catalyze private sector innovation.

Building a high-performance, low-carbon economy is a major economic opportunity and a vital environmental responsibility. If you are noticing more and more industries coming together, it's because seizing this opportunity and fulfilling that responsibility are something that we can all get behind.

That's why the two of us joined over 100 other CEOs and civil society leaders last November in calling on Canada's Prime Minister and Premiers to be bold on climate action and clean development. The Pan-Canadian Framework on Clean Growth and Climate Change, announced in December, was an important first step. We look forward to working with our federal, provincial, and territorial leaders to make sure that this hallmark strategy is executed in a way that helps Canadian industries excel in the low-carbon economy of the 21st century. **Q**

Pierre Gratton and Jean-François Huc both participate in the Smart Prosperity Initiative, a movement to harness new thinking to accelerate Canada's transition to a stronger, cleaner economy. www.smartprosperity.ca

Pierre Gratton & Jean-François Huc

Supporting Partner



Photo: MacLean Engineering Inc.

Innovation in Clean Technologies Is Turning the Mining Industry Green

The Borden Mine, located near Chapleau, Ontario, is an example of an industry shift toward greener operations. In an increasingly competitive sector facing mounting pressures to embrace sustainable operations, Goldcorp has committed to eliminate diesel fuel, powering all of its Borden underground mining vehicles using electric power.

“This is a fundamental shift in the way we operate, and will provide a better, safer work environment for our employees, and reduce our energy use,” says Brent Bergeron, Goldcorp's Executive Vice President, Corporate Affairs and Sustainability. “This initiative is the first of its kind in Canada, one of the first worldwide, and there's significant interest from other mining companies in what we are doing.”

Goldcorp's leading work in the use of clean technology will have an incredibly positive impact not only on the health and safety performance of the mine but also on its environmental footprint. The electrification of underground mine equipment is expected to reduce greenhouse gas emissions at their

Borden site by 50 percent. Maintenance and energy costs will also be reduced, as the mine will require just half as much ventilation as a conventional site that uses diesel-powered equipment.

Driving the introduction of new technology

To accomplish this feat, Goldcorp is teaming up with its suppliers to provide battery-powered underground vehicles and equipment for the site, including drills and blasting equipment, electric bolters, personnel carriers, and ultimately 40-ton haul trucks.

“Some of the technology doesn't currently exist. For example, there are no electric haul trucks of that size on the market, but our suppliers are keen to work with our requirements and are working to accelerate development of this new equipment,” says Bergeron. “We're excited to introduce leading-edge practices that are environme-

ntally sustainable and will change how mining is done.”

Mining is a capital-intensive business, and so despite the upfront costs of electrifying the Borden site, the benefits to health, safety, and

the environment have provided the incentive to move forward with this initiative. For Goldcorp, it's the right thing to do. Bergeron says that as this new technology becomes available and is put in use, Goldcorp will see how additional battery-powered machinery can be integrated into its other existing sites.

More efficient operations and a greener environment

Mines are large consumers of energy, with as much as 15 percent of site operating costs coming from power consumption. Thus, Goldcorp is continually looking to see how it can be more efficient with its energy use, rather than simply looking to expand power supply. By moving away from using diesel at the Bor-

“The electrification of underground mine operations is expected to reduce greenhouse gas emissions at their Borden site by 50 percent.”

den mine and by achieving other reductions associated with the use of clean technologies, Goldcorp can reduce carbon emissions by more than 7,500 tons, eliminate the use of three million litres of diesel fuel and one million litres of propane, and save 35,000 megawatt hours of electricity every year. This is good for the bottom line and for the environment.

“It's important for us to be industry leaders in clean technologies, health and safety, and we're partnering with suppliers and government to achieve this,” says Bergeron. “Using the latest technologies will also increase the overall acceptability of our projects with governments and the communities where we operate.”

The first battery-powered piece of equipment will go into operation at Borden in the latter half of this year, during the advanced exploration phase of the project. This is the *mine of the future*, and it's being developed right here in Canada. **Q**

Ken Donohue

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PULLING CANADA TOWARD



A CLEANER FUTURE



Photos: Canadian National Railway Company

There is a Canadian industry that has reduced greenhouse gas (GHG) emissions by 40 percent while increasing workload by 80 percent. Long known as an efficient, safe, and environmentally friendly mode of transportation, this industry is well placed to support Canada's economic objectives while helping it meet its emission-reduction targets. It is our national railway system.

Railways: a vital spur of the Canadian economy

According to the Railway Association of Canada (RAC), which represents freight and passenger railway companies, close to 82 million passengers and more than \$280 billion worth of goods move by rail in Canada annually. Twenty-four hundred locomotives transport goods and people across more than 44,000 kilometres of track spanning nine provinces and one territory.

"We live in a geographically diverse country with a resource-based, export-focused economy that can compete internationally because of a safe, competitive, efficient, and environmentally friendly railway network" says Michael Gullo, RAC's Director of Policy, Economic and Environmental Affairs. "Canada's natural resource industry is poised for long-term success, and the railways are a big part of that story."

Transporting climate change policy into the future

Whether through a taxation-based system or a market-based cap-and-trade approach, carbon pricing aspires to reduce emissions at the lowest possible cost to Canadians. Under all systems, railways are subject to compliance costs as fuel users, which typically translates

into increased expenses for them and higher prices for their customers.

While the objectives of these frameworks are to limit the harmful effects of climate change, questions remain as to whether current pricing levels will lead to substantive emissions reductions in the transportation sector, which produces approximately 30 percent of Canada's GHGs.

As an energy-efficient and low-emitting mode of transportation, Canada's railway industry believes it can help Canada meet its GHG reduction goals. For example, a modal shift to freight rail from long-haul trucking offers a near-term solution to reducing GHG emissions while simultaneously supporting economic growth and prosperity. In Canada, rail can move one tonne of freight more than 200 kilometres on a single litre of fuel. A 100-car freight train carrying 10,000 tonnes of goods could remove more than 300 trucks from our congested road and highway network.

"A 10 percent shift of truck traffic to rail would translate to a 3.7-megatonne reduction in CO₂ equivalent, while 15 percent would result in a 5.6-megatonne reduction," says Gullo. "Both of those figures surpass the potential reductions that are going to be achieved by BC's carbon tax, which is envisioning only a 3-megatonne reduction by the year 2030."

How railways are part of Canada's climate change solution

Looking forward, Gullo believes policy-

makers should consider the approach undertaken in Quebec. Its PREGTI program aims to reduce freight transportation emissions by creating intermodal projects that promote the use of rail and marine transportation. Recent projects sponsored by the government include investments into railway track, transload facilities, and reload centres for prospective railway customers. "The government of Quebec has set a precedent in terms of using rail as part of their climate change solution by allocating money from their carbon pricing strategy into infrastructure for companies looking to make the switch from road to rail."

In Quebec, revenues generated from its cap-and-trade system are directed towards programs such as PREGTI, an initiative that facilitates improved fuel efficiency and emissions levels. From 2011 to 2015, the government awarded \$30.4 million to rail and intermodal infrastructure projects, resulting in reductions of approximately 210,000 tonnes of CO₂ equivalent.

"At CN, we are successfully leveraging the Quebec programs to incentivize companies to switch to rail," says Chantale Després, Director of Sustainability, CN. "We are also advocating for a similar national program in discussions with the federal government."

Carrying the load together

Canada's railway industry has a long history of working with the federal government, through a series of multi-year memoran-

dum of understanding agreements, to reduce emissions produced by locomotives. In addition, Canadian rail companies are active participants in the internationally recognized Carbon Disclosure Project (CDP), with CN and CP both awarded a position on the Canada Climate Disclosure Leadership Index in 2015, in recognition of their efforts.

More work remains, according to CN's Després, who says "the fact Canadians are not yet aware how fuel-efficient railroads are in moving heavy freight over long distances means we still need to be communicating the message to people and governments that moving goods by rail can be part of the climate change solution."

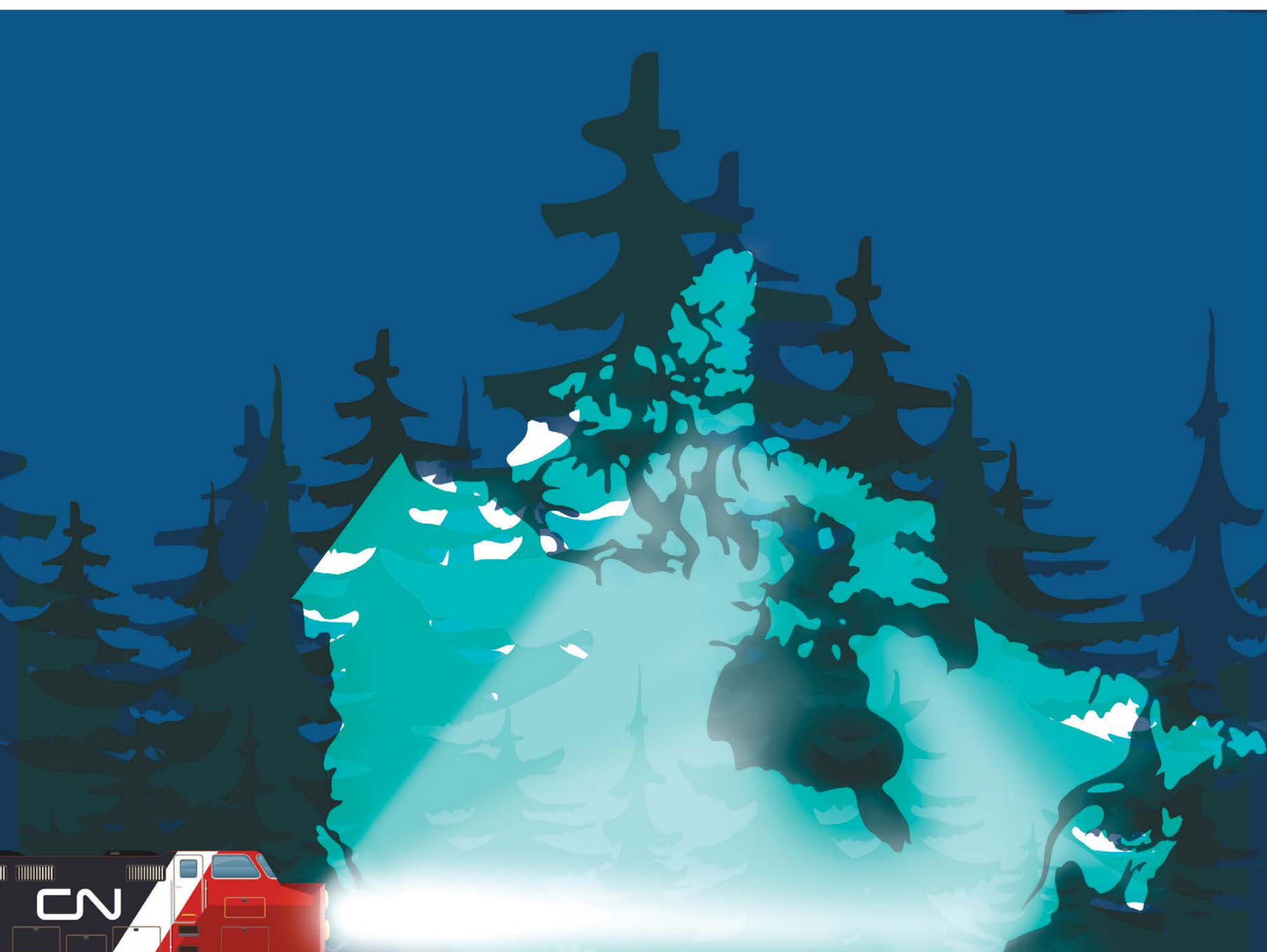
Staying on track to a cleaner future

The recent development of a pan-Canadian carbon framework provides an opportunity for Canada to reconsider how transportation emissions are regulated and what governments can do with revenues collected from their respective carbon pricing strategies. The GHG advantage that rail maintains over other modes of transportation provides serious food for thought for policymakers across all levels of government as they contemplate reinvesting their carbon revenues.

"Positioning railways as part of the climate change solution makes a lot of sense," says the RAC's Gullo. "Moving goods and people by rail is far more efficient than other modes of transportation, which can help the government meet its climate change objectives." **Q**

By Gavin Davidson

"Moving goods and people by rail...can help the government meet its climate change objectives."



For a sustainable future

The environment is a top priority for CN. With a strategy focused on emissions and energy efficiency, we aim to minimize our carbon footprint and engage our employees, communities, and customers so that we can all make an eco-responsible difference together.



www.cn.ca

Corporate Partnerships Help Keep Canadian Freshwater Supplies Sustainable

Canadians know that freshwater is an important resource, though a lot of basic water quality information remains inaccessible. Elizabeth Hendriks, Vice President of the Freshwater Program at World Wildlife Fund (WWF) Canada, and her team are working to change this.

“Even in some of Canada’s most densely populated and highly developed watersheds, such as the Great Lakes, we don’t know the health of the waters that underpin our wellbeing and our economies,” says Hendriks. “That’s why organizations like the WWF work diligently to protect this precious resource.”

To do this work effectively, it’s important for WWF-Canada to work with partner organizations, including corporations. Coca-Cola has been a WWF-Canada partner since 2007.

“The problems [with freshwater] are too big and complex for one group or set of individuals to tackle themselves,” says Hendriks. “This complexity requires different perspectives and expertise.”

Organizations like WWF-Canada work with a variety of stakeholders to develop solutions to tough conservation problems. Corporations like Coca-Cola bring the business perspective to the partnership, opportunities to scale up projects, and through their leadership signal the critical responsibility companies have in freshwater protection.

“It’s not just about moving forward... It is also restoring what has been lost.”

Freshwater management affects us all

Though the partnership between WWF-Canada and Coca-Cola was initially born out of a joint campaign to support polar bears and arctic habitats, in recent years they’ve focused their efforts on freshwater conservation. According to Jon Radtke, Water Sustainability Program Director at Coca-Cola North America, the reason for this focus is obvious.

“We rely on clean, fresh, sustainable water sources to make most of our products,” says Radtke. “Therefore we need to ensure that water is being managed in an effective and sustainable way.”

Freshwater management and preservation aren’t only important for a beverage producer like Coca-Cola. All companies, large and small, are affected by the abundance and health of freshwater supplies. Whether this is through an agricultural supply chain, manufacturing processes, or the health and sustainability of the communities where they do business, freshwater plays a role in every company’s operations.

With growing demand for food and energy, urbanization, and climate change affecting freshwater supplies, it is essential that everyone — companies included — forge a new relationship with water.

Water neutrality and restoration

One way companies can forge this relationship is by identifying ways to neutralize water use.

In 2007, Coca-Cola announced that globally they would replenish 100 percent of the water they use in their finished beverages and production by 2020.

In 2015, Coca-Cola reached this goal, becoming the first Fortune 500 company to achieve water neutrality.

“Maintaining 100 percent replenishment globally is something our company is focused on,” says Radtke. He notes that their recent success hasn’t caused Coca-Cola to slow down their efforts.

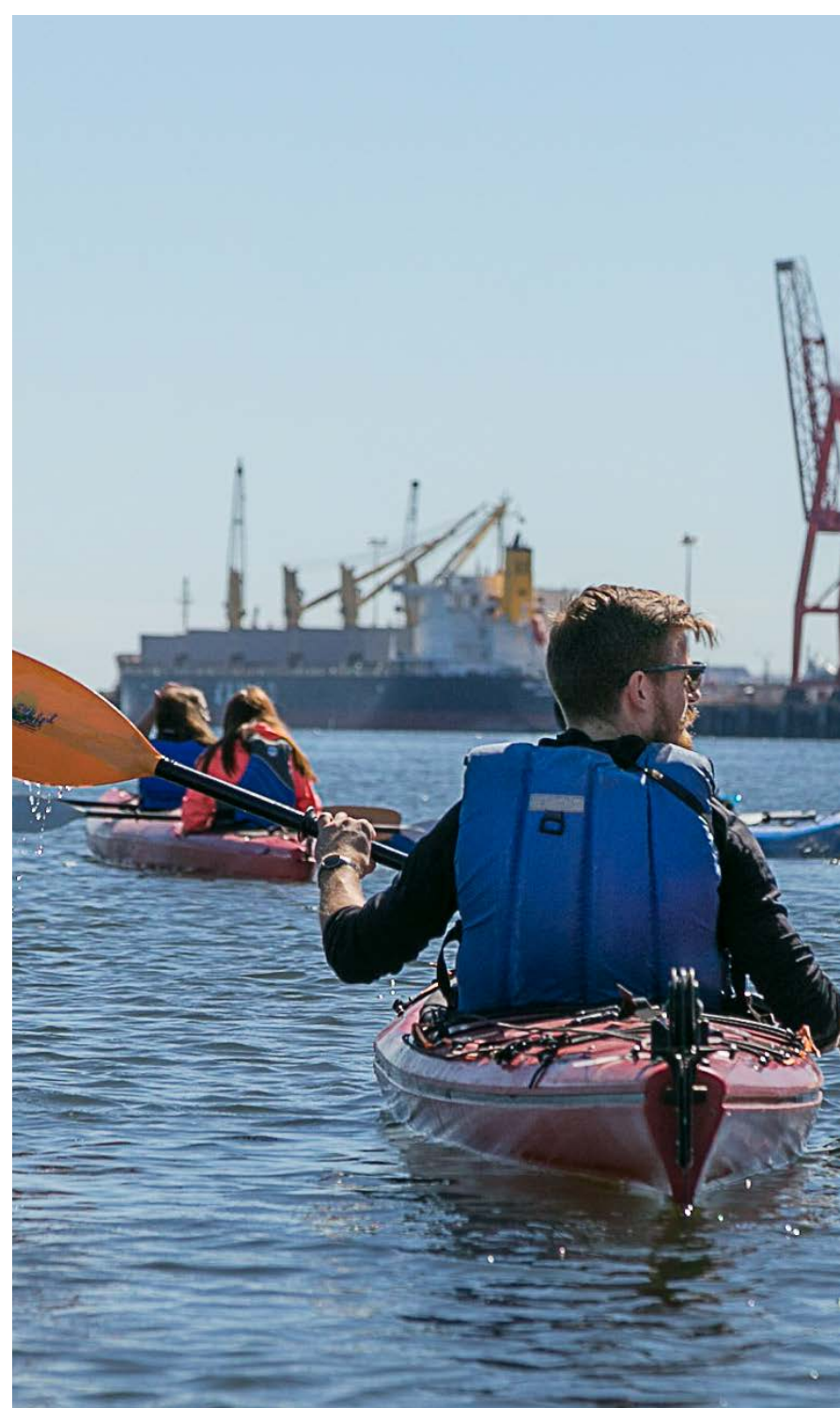
Coca-Cola maintains this replenishment ratio through actions taken at facilities such as improving water use efficiency and through community water replenishment programs, such as watershed restoration.

One joint restoration project with WWF-Canada was the St. Eugène Marsh project in Quebec. Restoration efforts focused on preventing the marsh from drying out, which helps water flow and fish movement, and revitalizing the aquatic life that inhabits the marsh.

“It’s not just about moving forward,” Hendriks says of the freshwater sustainability efforts. “It is also restoring what has been lost.”

Freshwater conservation and management aren’t merely an environmental initiative, but critical issues that affect corporate decision making and day-to-day operations. **Q**

Rob Cserynyk



A kayaker on the Saint John River, New Brunswick. Photo: Terry Kelly (© Terry Kelly Productions / WWF-Canada)

Our Goal:
For every drop we use, we give one back.

Globally, Coca-Cola has achieved the goal to replenish 100% of the water we use back into nature and communities five years early as confirmed by third-party assessors.

We are working to meet this goal in Canada by collaborating with a variety of not-for-profit organizations including WWF-Canada to invest in watershed conservation and restoration projects across the country. We are also working with our bottling partners to improve our water efficiency.

Follow us on our journey at Coca-Cola.ca.

Coca-Cola Canada



TIPS

Canada's Water Leaders Working Together to Find Solutions to Climate Change

Too little water, too much water, or both — climate change can lead to extreme weather swings.

Last year, farmers near Windsor, ON experienced an acute drought in early spring. In July the rain returned, along with sweltering heat waves. Two tornadoes touched down a month later, damaging homes and businesses in their path. Fall brought yet another surprise, when a torrential rainstorm deluged the region, causing nearly \$108 million in flood-related damages.

Like Windsor, many communities across the country are experiencing extreme weather swings. Regions like BC's rainforests and the Atlantic coast, which have not typically been prone to drought, will need to plan for a *new normal* that includes both flooding and water scarcity. Other regions will need to plan for temperature extremes, like the prolonged cold spell that caused pipes to freeze across Manitoba and Ontario, and the hot, dry conditions that fuelled a catastrophic wildfire in Fort McMurray, AB.

The cost of water crises can be profound. In 2013, flooding in Southern Alberta caused \$1.72 billion in insured damages and stranded more than 100,000 people. That same summer, an extreme rainstorm in Toronto cost \$943 million. The Fort McMurray wildfire is the most expensive dis-



Bernadette Conant
CEO,
Canadian
Water
Network

aster in Canada's history, with current estimates exceeding \$3.58 billion. Developing resilient systems will be essential to controlling costs, protecting public health, and minimizing disruption. Our drinking water, wastewater, and storm water systems are vitally important investments.

Finding solutions to climate change will require collaboration and leadership

Canada's water professionals have long recognized that it's not a matter of if climate change's impacts will be felt, but when and how. Close to a decade ago, Canadian Water Network created the Canadian Municipal Water Consortium, to bring Canada's water leaders together to address these challenges. Lou Di Gironimo, the General Manager of Toronto Water and one of the Consortium members, explains: "Like many municipalities, Toronto has experienced widespread surface and basement flooding from more fre-

quent extreme storms. Building resiliency into the existing storm drainage and sewer systems is a high priority and forms a cornerstone of Toronto's climate change adaptation strategy. The consortium is strategically positioned to engage municipalities in the dissemination and sharing of best practices, lessons learned and new technologies, as we work collaboratively to build resiliency into municipal infrastructure."

In May, water leaders from the Canadian Municipal Water Consortium will convene at Blue Cities 2017 to discuss proactive strategies for water management. They've also invited scientists, industry innovators, and utility leaders from the United States to share their knowledge and experience.

The future is going to hold some surprises, but I'm confident we can be ready. Canada's cities are tapping into their collective experience, and leveraging science and innovation to inform the difficult decisions that need to be made. Given the uncertainty that lies ahead, we'll need a clear picture of what we know (and don't know) in order to make the best choices, including how we will pay for them. Armed with this information, our elected officials must lead with confidence — for the sake of our environment, our economy, and public health. **o**

Bernadette Conant



Steve Gombos
Manager, Water Efficiency,
Region of Waterloo

WATER CONSERVATION TIPS

Whether you're a homeowner or business owner, it's important to remember that water conservation also means energy conservation.

Beyond the obvious things, like using 4.8-litre toilets, low-flow showerheads, and buying efficient front-loading washing machines, water consumption all through the system can be reduced to save energy.

The treatment and distribution of drinking water is energy-intensive, and a hidden contributor to greenhouse gas emissions. If you're buying plumbing fixtures, look for WaterSense-labelled products, which are proven to be 20 percent more water efficient without sacrificing performance. Metrics like gallons per minute (GPM) are important to note as well, and one should look to use fixtures in the 1-2 GPM range. Seek EnerGuide and Energy Star-labelled products to further maximize water and energy savings.

If you have a water meter, look closely at water bills. If your consumption suddenly or gradually goes up, you probably have a leak. Leaks can be costly, especially if you're not aware of them. A common culprit in both businesses and homes is leaking toilet flappers. An unnoticed toilet leak can cost as much as \$40 per day in wasted water. A simple way to check for leaking toilets is to put a few drops of food colouring in the tank and to wait and see if it leaks down into the bowl. To find out how much water you're losing to leaks, take meter readings (measured in cubic meters [m³], which is 1,000 litres) before and after bed, when there should be no consumption.

Beyond fixing leaks and using efficient appliances and fixtures, the best way to conserve water is to cut back on irrigation and other waste. A lawn only needs water once per month to survive, despite turning brown during dry spells. And if you take shorter showers, you will save lots of water and energy at the same time. **o**

Steve Gombos

Canadians Can Make a Difference by Buying an Electric Vehicle Now



The Minister of Transport, Marc Garneau, at the EVS29 Trade Show.

Climate change is an important issue that Canadians need to address now more than ever. We have all heard the long-term objectives and various methods discussed, and in the fight against climate change, there are a few concrete actions that everyday citizens can take to make a difference. Personal transportation is one area where our actions have direct consequences. Accelerating the shift to low- and zero-emission vehicles could be a crucial step in achieving our climate change goal of reducing greenhouse gas (GHG) emissions.

More and more electric vehicle (EV) models are now available, with improved range and increasingly affordable prices. In Canada, there are currently approximately 30,000 EVs on the road, which is a good start. At Electric Mobility Canada, we work with various stakeholders to accelerate EV adoption in all modes of transportation: individual vehicles, car sharing, fleets, and public transit. We are planning for a strong growth over the expected transition period of the next three to five years.

More awareness and communication are needed to reach Canadians and to show



Chantal Guimont
President, CEO,
Electric Mobility
Canada

them the benefits of EVs, guiding them with credible information and facilitating test drives. New cars are bought on a daily basis, and EVs should be prominently promoted to gain a greater share of the market. Trying out an EV is often the first key step toward adoption. Once people know more about an EV's technology, the pleasure of driving it, the savings ahead, and the environmental benefits, they're much more likely to consider buying one. As for questions on range, people should take into account their driving patterns, know that most of the charging is done at home, and determine if workplace charging is a possibility. You can always count on public charging if needed as well, as there are now more than 4,000 public charging ports available in Canada.

At the provincial level, Quebec, British Columbia, and Ontario are leading the way in offering programs for EV buyers. These programs help consumers adopt EVs by offsetting some of their costs, for example by offering rebates to buy an EV and install home charging stations. Although EVs still carry a price premium compared to conventional gas-powered vehicles, they offer the potential for real economies. Fuel savings, low-cost maintenance, and even insurance rebates make buying an EV a smart option for all Canadians. Government-funded rebate programs and incentives, together with the development of new public infrastructure, including a network of public fast-charging stations between and within cities, are making EVs more accessible and cutting down barriers for many shoppers.

At the federal level, public infrastructure has received an initial \$62.5 million investment, which started in 2016 with the beginning of the implementation of fast-charging infrastructure on strategic complementary sites.

To achieve our nation's objectives in GHG reductions, government and industry are working together to increase the availability and awareness of EVs. Through a partnership, the Ontario government is innovating by bringing together diverse strengths of many stakeholders to work toward innovative solutions.

More concrete actions are needed to support all initiatives. Cities, consumers, and public fleets can all play an active role in the adoption of EVs by leading by example and helping to showcase the benefits of this new technology. EV-ready new and existing homes, multi-unit residential buildings, and workplaces, including some government agencies, are all on the agenda.

Electric vehicles come with so many benefits. They're an innovative and efficient technology that provides smart energy management, cleaner air, and cost savings. It's time to take action and get results, and to lead the way to a sustainable future. **o**

Chantal Guimont



Industry Leaders
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ISPMO R17



Innovation that excites

Zero Emission

THE 100% ELECTRIC 2017 NISSAN LEAF®



SL Model Shown ▲

2017 LEAF S

\$36,088 STARTING AT

-\$3,000 NON-STACKABLE CASH WHEN PURCHASING OR FINANCING THROUGH NCF AT STD RATES*

\$33,088 AFTER ABOVE REBATES*

PLUS YOU MAY BE ELIGIBLE FOR

\$14,000 IN GOVERNMENT REBATES IN ONTARIO

\$8,000 IN GOVERNMENT REBATES IN QUEBEC

\$5,000 IN GOVERNMENT REBATES IN BRITISH COLUMBIA*

Nissan.ca/LEAF



Category: 100% Electric Vehicle

*The advertised price of \$33,088 applies to the 2017 Leaf S model. Freight and PDE charges (\$1,990), air-conditioning levy (\$100), manufacturer's rebate and dealer participation (where applicable) are included. The price includes the \$3,000 NCI discount eligible on cash purchases or when financing through NCF at standard rate (deducted from the selling price before taxes). †The \$3,000 NCI discount is only applicable to the cash purchase or finance through NCF at a standard rate, of a new 2017 Leaf S model. The discount will be deducted from the negotiated selling price before taxes and is only available for vehicles registered and delivered between April 1st 2017 and April 30th, 2017. *The \$14,000 incentive from the Ontario government Electric Vehicle Incentive Program (EVIP) (after tax amount of the incentive is deducted from the selling price after taxes) is only available to Ontario residents on the purchase of select new eligible models. Visit mto.gov.on.ca/english/vehicles/electric/electric-vehicle-rebate.shtml for more details. The \$8,000 Quebec government Drive Electric program rebate (deducted from the selling price after taxes) is only available to Quebec residents on the purchase of select new eligible models, when registered and delivered between January 1, 2012 and December 31, 2020. Visit vehiculeselectriques.gouv.qc.ca/english for more details. The \$5,000 incentive from the British Columbia government Clean Energy Vehicle for BC (CEVforBC™) Point of Sale Incentive is only available to B.C. residents. The point of sale incentives will be available for eligible vehicles sold/leased beginning April 1st, 2015 and until March 31st, 2018 (or when program funding is depleted, whichever comes first), on a first-come, first-served basis. Visit cevforbc.ca/clean-energy-vehicle-program for more details. ▲2017 Leaf SL model shown. Selling price starting at \$42,638. The Canadian Green Car of the Year Award is Canada's premier award recognizing vehicles with the greatest potential to minimize the overall impact of automobiles on our environment. Vehicles were evaluated for environmental benefits as well as their mass-market potential. For more information, see canadiangreencaraward.ca ©2017 Nissan Canada Inc.