

Climate Change — Adaption —



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Inspire change and create new sustainable outcomes.

HOW THE CIRCULAR ECONOMY TURNS WASTE INTO RESOURCES

According to some estimates, nearly four million tonnes of plastic are used each year in Canada, yet less than 12 percent of that is collected for recycling. Much of what is collected, however, isn't recycled. And it's not just plastics — virtually every industry is tied to the traditional linear economy, whose model is to make, use, and dispose. Many Canadians are justly concerned, but how do we adapt and get ourselves out of the swirling whirlpool of waste? The answer is the circular economy.

Today's waste, tomorrow's economic driver

The circular economy promises a more environmentally and economically-sustainable future by getting the greatest possible value from resources. Operating in a closed loop, the circular economy keeps resources in use as long as possible, and then regenerates products and materials at the end of their useful life. By designing waste out of our system, we can protect the environment and create new, innovative business models that

fuel jobs and opportunities we never thought possible.

As a sophisticated, modern nation, Canada has an opportunity to be an early and successful actor in building a sustainable, zero-waste circular economy. But there is a pressing need to have a coordinated, trusting, and innovative approach among policymakers, businesses, and the research and scientific communities. It's not about recycling more, but rather undergoing a system-wide transformation in the way we design, produce, and use products.

To accomplish this, we will need to combine the commitment, resources, and ideas we need to invest in best-in-class research. We will need to discover groundbreaking science and encourage broad engagement across silos and create dialogue between partners.

Embracing a new way of doing business

This is where the recently established Circular Economy Leadership Coalition (CELC), a not-for-profit alliance of leaders in the business, academic, and non-governmental sectors,



comes in. The organization provides bold thinking on how to take a systems change approach and how to bring innovation to a national scale. This will help accelerate profitable, zero-waste solutions that will ensure Canada rises as a leader in the quickly-emerging global circular economy.

While the circular economy may be a new concept for some, many Canadian companies across various industries have already embraced the model and are turning what traditionally was considered waste into products with value. The CELC notes that there are more than 200 facilities processing and recycling plastics, some of which are using new, emerging plastics chemical recycling technologies that have recently been commercialized or are on

the verge of being commercialized. Canadian businesses are also taking approaches such as producing plastics from renewable sources without harming biodiversity, developing markets for secondhand products, and finding ways for products to last as long as possible.

There is an economic and environmental impetus for us to support scaling the reaches of this innovation so we can have a thriving circular economy in Canada.

Ken Donohue

To learn more about the Circular Economy, visit circulareconomyleaders.ca.

Circular Economy Leadership Coalition

Circular Economy
Leadership Coalition

Accelerating sustainable, profitable,
zero-waste solutions for Canadian
leadership in the global circular economy.

circulareconomyleaders.ca

Q&A WITH MINISTER CATHERINE MCKENNA

Hon. Catherine McKenna, Minister of the Environment and Climate Change, spoke to Mediaplanet about how Canada continues to lead the way towards global climate adaptation.

Mediaplanet How does the Canadian government plan to continue leading the world towards greater climate change adaptation in 2019?

Hon. Catherine McKenna Last October, we helped convene the Global Commission on Adaptation to elevate the political visibility of this issue. The Commission is led by Ban Ki-moon, Bill Gates, and Kristalina Georgieva, CEO of the World Bank. That same year, in December, Canada played a leading role in the negotiation of the Paris Rulebook, the framework that gives countries the rules and transparency guidelines needed to meet Paris Agreement targets.

Our country is doing its part to help developing countries fight climate change and adapt to its impact and have committed \$2.65 billion to support the poorest and most vulnerable populations impacted by climate change. Part of that funding will help protect over 20 million people in the world's most vulnerable countries manage climate risks, adapt and build resilience to climate change's impacts, and sustainably manage their natural resources.

MP In your experience, what do you believe is the biggest misconception when it comes to climate change in Canada?

CM That it's not an urgent problem. We've had the science for decades and yet some conservative politicians want to take us back to the decade of inaction under the previous government despite the fact that Canadians are feeling the effects of climate change every day. Extreme weather is affecting us from coast to coast, from forest fires to floods, drought, extreme heatwaves, and our melting arctic. And Canadians are feeling the costs, too.

The cost of property damages from climate change averaged \$405 million per year between 1983 and 2008 but have risen dramatically to \$1.8 billion a year since 2009. We're the first generation to feel the impacts of climate change and the last generation that can do anything about it.

MP Why is it so important to encourage growth in the clean tech sector?

CM I always say, "Climate change is our biggest challenge, but it's also our biggest opportunity." Canada has made historic investments in clean tech supporting our engineers and entrepreneurs, inventors, and investors. Canadian companies are already proving to be global leaders in clean tech, with 12 of our companies on the Global Cleantech 100 list this year.

Last year, we formed an Expert Panel on Sustainable Finance to make recommendations on how the financial sector can harness its resources to build the clean economy. *Corporate Knights* estimates that, by 2025, the annual revenue attributable to the sustainable finance opportunity for Canada's financial sector could be between \$27 billion and \$110 billion but the transition to this new economy is not easy work. New policies will encourage private and public sectors to reinforce each other, unlocking private capital, and ensuring that Canada is competitive in the world's future low-carbon economy.

MP What is the government's plan for conservation in 2019?

CM Canada is one of five countries that hold a majority of the world's remaining wilderness so we're working to double the amount of protected



“
CLIMATE CHANGE IS OUR BIGGEST CHALLENGE, BUT IT'S ALSO OUR BIGGEST OPPORTUNITY.
”

nature across Canada's lands and oceans. In fact, protecting our nature accounts for one-third of the climate change solution. In *Budget 2018*, we made an historic \$1.3 billion investment in Canada's ecosystems, landscapes, and biodiversity, including species at risk.

Nature is a fundamental part of Canadian identity and we are working hard to preserve and protect it for the generations to come.

We will also be hosting a Nature Champions Summit in Montréal, from April 24 to 25, 2019, to ramp up global action to protect nature.

The Summit will bring together major philanthropists, business leaders, non-governmental organizations, United Nations agencies, Indigenous leaders and environment ministers from around the world to build a high-ambition coalition and drive global nature protection forward.

espiegle/Getty Images



**NUCLEAR
POWER TO
THANK FOR
END OF COAL
IN ONTARIO**



John Barrett
President & CEO,
Canadian Nuclear Association

On Nov. 23, 2013, former US Vice President Al Gore, who is known for his climate documentary *An Inconvenient Truth*, appeared on stage in Toronto with Kathleen Wynne, the premier of Ontario at the time.

Gore was there to help celebrate Ontario nearing its goal to put an end to coal-fired electricity generation. "Ontario has distinguished itself as a leader in Canada and around the world," Gore said. "It is heartening to see the tremendous progress that has been made here and it is my hope that others will quickly follow suit."

It was a proud moment for Ontario. But the end of coal came not from renewables, as some have tried to suggest. It came from the phasing in of nuclear energy.

An effective approach

In 2007, the Ontario government adopted the Integrated Power System Plan, guiding the province's energy choices over 20 years. The plan aimed to stabilize prices, double renewable energy, and increase conservation. Its central goal was to replace coal with cleaner power.

At that time, coal represented a quarter of Ontario's electricity generation. The challenge was for Ontario to provide enough clean electricity to make up for the shortfall in power caused by the closure of the coal-fired plants.

Hydro was not an option, as Ontario had reached nearly 90 percent of its hydro capacity. Renewables such as wind and solar represented only a tiny fraction of the province's power supply and could not be scaled up to the levels needed. Furthermore, as solar and wind sources cannot produce steady power around the clock, they rely on natural gas as back up, leading to higher greenhouse gas emissions.

The solution came in the form of nuclear power that was available thanks to a decision, after 2003, to modernize three of Ontario's

nuclear reactors — Pickering A Unit 1 and Bruce Units 3 and 4 — and return them to service. With this new, substantial wave of clean electricity entering the grid, Ontario was now free to start closing its four coal-fired plants — starting in 2010 and concluding in 2014.

A lasting solution

Today, Ontario no longer uses coal to generate electricity, resulting in cleaner air and smog-free days. Cleaner air meant better public health. Smog days — an all-too-common occurrence in the early 2000s and a bane to so many Ontarians, especially asthma sufferers — were now history.

And it will stay that way. Ontario's nuclear-generated, clean electricity now makes up over 60 percent of the province's power mix. This is compared with 37 percent back in 2000, before the nuclear fleet scaled up to fill the void left by the gradual phasing out of coal.

This is how Ontario became the first jurisdiction in North America to shut down coal-fired generation. Moreover, with the refurbishment programs now underway at the Darlington and Bruce nuclear stations, Ontarians can count on having clean air and clean power for decades to come.

This is real de-carbonization in action, driving down carbon emissions while cleaning the air of smog and dirt from fossil fuels. It is a testament to the enormous impact of nuclear energy as a solution in fighting climate change — if we understand the facts and learn from them.

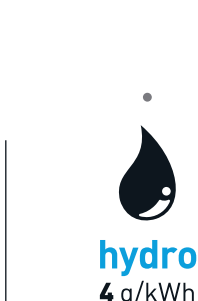
Thanks to nuclear power, Ontario has indeed "powered past coal". We should be proud of this achievement.

John Barrett



To learn more, visit cna.ca.

serious about **climate change?** get serious about **nuclear!**



On a lifecycle comparison,
nuclear generates less CO₂ than
solar and all of the fossil fuels

cna.ca

Source: Intergovernmental Panel on Climate Change

cna canadian nuclear association

4Rs reduce greenhouse gas emissions by up to 2-3 megatonnes CO₂e annually in Western Canada alone.

Learn more about the 4R Climate Smart Strategy at fertilizercanada.ca



Garth Whyte
President & CEO,
Fertilizer Canada



Karen Haugen-Kozyra
President,
Viresco Solutions

4R NUTRIENT STEWARDSHIP: A CANADIAN INNOVATION WITH GLOBAL REACH

By 2050, the United Nations projects that the global population will be nearing ten billion. To feed all those mouths, we will need to double our food supply over the next three decades, with little to no new agricultural land available.

Under the leadership of Fertilizer Canada, a framework has been developed to provide the extra crop efficiency we need while fighting global climate change at the same time. “We have this great program supported by 10 years of scientific research looking at different soils, crops, fertilizers, and climates,” says Fertilizer Canada President and CEO Garth Whyte. “This climate-smart agriculture approach is based on 4R Nutrient Stewardship: right source of fertilizer, at the right rate, right time, and right place.”

The 4R Nutrient Stewardship framework is an essential component of a Climate Smart Strategy for Canada, which holds the promise of reducing greenhouse gas emissions from the agricultural sector. Reducing emissions and improving productivity go hand-in-hand. “Growers have an opportunity to reduce greenhouse gas emissions by improving efficiencies in the system,” says Karen Haugen-Kozyra, President of Viresco Solutions, Canada’s leading consultants in low-carbon and sustainable agriculture. “From a quantitative point of view, the most recent science shows that growers could reduce their greenhouse gas emissions by up to 35 percent if they fully implement 4R practices. In Western Canada alone, that would be the equivalent of eliminating two to three megatonnes of carbon dioxide emissions.”

Federal leadership is needed

Fertilizer Canada has existing agreements within six provinces (Alberta, Saskatchewan, Manitoba, Ontario, Quebec, and Prince Edward Island) to encourage farmers in the use of sustainable 4R practices. Three of those six provinces have also included 4R Nutrient Stewardship in their official climate plans, and the message is spreading worldwide. The 4R framework has been endorsed by the UN and the World Business Council for Sustainable Development, providing Canada with the opportunity to position itself as a world leader in agricultural climate science.

This could be a truly powerful moment for climate-smart agriculture if all of Canada embraced the 4R framework as a pan-Canadian strategy to fight climate change and accelerate the prosperity of farmers around the country. Rarely does such an opportunity arise to benefit so many with a single initiative.

“The beauty of 4R Nutrient Stewardship is that it is a holistic approach,” says Whyte. “It reduces greenhouse gas emissions, improves crop yields, protects our precious water resources, and puts nutrients back into the soil, replenishing it for future generations. It’s good for the environment, it’s good for the grower, and it helps feed the world.”

D.F. McCourt



Demonstrating a sample measurement for N₂O emissions from a gas chamber.



THE FUTURE OF FARMING: HOME GROWN IN SASKATCHEWAN

Climate change and global food security are arguably the two most important issues of our era, and they are deeply intertwined. The agriculture industry is the source of about 10 percent of Canada’s total greenhouse gas emissions. It can also be one of the most critical vectors of carbon capture and conservation when managed through efficient processes and technology.

Thirty years ago, the Government of Saskatchewan realized that an advocate was needed for the province to benefit from the new era of biotechnology. This led to the creation of Ag-West Bio, a member-based not-for-profit that serves as a catalyst and connector for the commercialization of emerging technologies

in the agrifood sector. “We interact with many organizations to promote and advocate for good science in agriculture,” says Ag-West Bio President and CEO, Dr. Wilf Keller. “We are about building the agrifood sector in Saskatchewan and beyond.”

For Dr. Keller, the changes in agricultural science have been significant. “There are three main areas where science is promising improvement,” he says. “The first is genetics and genomics, which give us tools to breed crops and livestock that are more efficient; the second is digital technology, which allows for smarter decision-making; and the third is smart engineering which makes machinery and fertilizers more amenable to environmental needs.”

The Carbon Cycle: Earth’s heartbeat

At the heart of all these efforts is the carbon cycle we all learned about in primary school. The ultimate goal is a stewardship system that keeps this cycle in balance while preserving the quality and sustainability of our agricultural land.

“We ask many things of our ecosystem,” says Dr. Henry Janzen, a research scientist with Agriculture and Agri-Food Canada. “It provides our food, our fuel, our water, our air, our livelihoods, wildlife habitat, and aesthetic appeal. What we are trying to do as researchers, as farmers, and as a society, is maintain that ecosystem in a condition that will serve us — and those who come after us.”

If the land is to remember us kindly, we must look to the lessons of the past while embracing the opportunities of the future, Dr. Janzen emphasizes. “We all have a part to play in ensuring the continuity of these ecosystems,” he continues. “We are ephemeral, but the land stays and the soil remembers.”

In Saskatchewan, there are long-term agriculture sustainability experiments that have been running — in some cases, for more than a century — as well as cutting-edge research built on technologies developed in the last decade. Combined, they are helping us find the best path forward for managing the many interlocking gears in the agriculture ecosystem.

Plants, animals, human society: All one ecosystem

Take cattle farming as an example of this

reciprocal relationship. As cattle digest their feed, they produce an excess of hydrogen, which their gut biome then converts into methane — a greenhouse gas about 20 times more potent than carbon dioxide. “The focus of the science has been on how we can control these metabolic pathways to push that hydrogen into things other than methane,” explains Dr. Andrew Van Kessel, head of the Department of Animal and Poultry Science at the University of Saskatchewan.

New science like this, combined with ongoing efforts to improve efficiency, is already demonstrating noteworthy gains. “We’re using fewer resources: less land, less feed, less fossil fuel, and more efficient animal stock,” Dr. Van Kessel explains. “By increasing efficiency in these ways, the milk and beef industries have reduced their carbon footprint by around 20 percent.”

That’s the sort of progress that will help us tackle climate change while also securing our food supply and encouraging economic growth in the decades to come. And this progress is built by combining the hard-won wisdom of Canadians farmers with the insight and innovation of Canada’s top scientists and engineers, in Saskatchewan and across the nation.

D.F. McCourt

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BUILDING SUSTAINABILITY FROM THE INSIDE OUT

Sustainability used to be a clever buzzword cited by early environmentalists and climate change forecasters before becoming recognized as something that needs to be carefully considered and incorporated into our daily lives. With an increasing population, nowhere is this more important than in the buildings sector.

Sustainable Buildings Canada (SBC) — a non-profit comprised of architects, designers, construction engineers, builders, academics and policymakers — was established in 2003 to support sustainable building practices.

“We’re advocates for greater environmental performance measures in the built environment,” says Mike Singleton, Executive Director at SBC. “This includes new and existing buildings. There are many buildings in Canada that were built before environmental impacts, resource depletion, and climate change were considered. We want to not only reduce the environmental footprint of buildings, but also find ways to have them give back to the environment by collecting and re-using resources such as water and solar power. In combination, buildings can become part of the climate change solution.”

Getting the public involved

The agency focuses its activities on education, advocacy, research, and program delivery to encourage Canadians to adopt sustainable practices in their own lives. Held this year on Oct. 8th in Toronto, the Green Building Festival attracts a wide range of individuals, from architects and engineers to building owners and operators who are interested in learning about practical ways to decrease our environmental

footprint from some of the best practitioners in the world.

“We bring in national and international speakers who inspire attendees by introducing leading-edge technologies, green building design and construction, and operational best practices while showcasing the associated benefits to both the environment and individuals,” comments Singleton.

While working to inspire those in the building and design sectors, as well as those in energy, environment, and policy development Singleton acknowledges that living sustainably is a complex issue that encompasses both how efficiently we use our resources and what we use them for.

“There’s no one answer, but there are many little things that can be done to conserve resources and engender a more environmentally-conscious lifestyle,” he remarks. “I’m a big believer in starting at home. It can be as simple as lowering your thermostat, turning off lights and appliances when they aren’t being used, or using public transit instead of your personal automobile if you can. More broadly, I often ask myself if I really need to own the latest consumer product or gadget — many times I find that I don’t.”

Janice Tober

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To register for the Green Building Fest, visit sbcanada.org/conferences/green-building-festival-2019.

WHEN IT COMES TO CANADA'S FUTURE, TREES REALLY ARE THE ANSWER



Rob Keen, RPF
CEO, Forests Ontario

Of all the services our forests provide, their ability to fight climate change via carbon sequestration is one of the most important. Trees really are the answer. In fact, their significance is so great, it's no longer a question of, “Should we plant more trees?” but instead, “How do we plant more trees?”

Forests Ontario, a not-for-profit charity, is dedicated to making Ontario's forests healthier through restoration, stewardship, education, and awareness activities. The organization delivers the Ontario government's 50 Million Tree Program, a program designed to reduce eligible landowner tree planting costs and provide technical assistance for large-scale plantings.

have helped plant more than 24 million trees under the 50 Million Tree Program. This translates to 19,000 tonnes of carbon sequestered every year, equivalent to the emissions produced from driving more than 80 million kilometres. This carbon benefit will only increase as more trees are planted. Tree planting also creates jobs and contributes significantly to rural economies, providing a three-to-one return on investment for every dollar the province invests. Planting trees is a wise investment from both an environmental and socio-economic standpoint.

It's time for Canada to start talking about planting more trees and developing a national tree planting strategy.

A measurable difference

To date, Forests Ontario and its partners



To learn more about the program, visit forestsontario.ca/50MTP.

As trees grow, they absorb carbon dioxide (CO₂) from the air, and produce oxygen (O₂) for us to breathe.

Trees use CO₂ for growth. Over 80 years, the average Canadian tree absorbs 200 kg of CO₂.



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