THE ROLE OF CHEMISTRY IN A CIRCULAR ECONOMY FOR PLASTICS

CHEMISTRY INDUSTRY ASSOCIATION OF CANADA

"WHILE PLASTICS ENABLE OUR MODERN WAY OF LIFE, THEY BELONG IN THE ECONOMY AND NOT THE ENVIRONMENT."

ABOUT THIS PAPER

JULY 2020

This paper identifies the value that plastics bring to our modern and sustainable lives, the urgent global issue of managing plastic waste in our oceans and environment and the chemistry and plastic industry's role in solving this issue.

The federal government has committed to take action toward a resource-efficient lifecycle approach to plastics waste management. The chemistry sector, which includes plastic, has a long, well-established history of innovation to solve society's most pressing needs by developing new processes and solutions.

Our industry supports the transition from a linear economy to a more sustainable approach that prioritizes the extension of product life cycles, extracting maximum value from resources in and after use.

Canada's chemistry industry and its highly skilled workers are uniquely positioned to provide innovative solutions to avoid and extract value from plastic waste. But these ambitions will not be easy to achieve and will require significant investment and cultural shifts towards a more circular economy. Our industry is stepping up to provide workable solutions.

INTRODUCTION

CHEMISTRY IS VITAL TO THE CANADIAN ECONOMY

Canada's nearly $54 billion chemistry industry transforms raw materials into the necessary building blocks to manufacture the more than 70,000 products that ensure our quality of life. It converts and adds value to raw resources such as natural gas, crude oil, minerals, and biomass, creating intermediate products that are used as inputs in almost all other manufacturing sectors. With key clusters in Ontario, Alberta and Quebec, the Canadian chemistry industry produces $35 billion in exports, making the sector the second largest manufacturing exporting sector in Canada, trailing only automotive products in 2019. Chemistry is directly responsible for 88,600 jobs in Canada, while industry employees are highly skilled and well paid. Statistics Canada has estimated that for every job in the chemistry industry, another five indirect jobs are supported in complimentary sectors. In total, the industry supports almost 525,000 jobs in Canada. It is the fourth largest manufacturing sector in Canada. With the potential to attract up to $30 billion in new investment over the next decade, Canada's chemistry industry is poised for growth. The growth is fueled by a strong demand for chemicals, which is expected to triple over the next 20 years.

$54 BILLION
INDUSTRY IN CANADA WITH $35 BILLION WORTH OF EXPORTS

DIRECTLY REPONSIBLE FOR
88,600
=
525,000 JOBS

CHEMISTRY HAS THE POTENTIAL TO ATTRACT
$30 BILLION
IN NEW INVESTMENT IN THE NEW DECADE

MANAGING PLASTICS

More than 95 per cent of all manufactured products rely on chemistry and many of these include plastic resins. From wind turbines and solar panels, to vehicles and building materials, to the packaging that protects our food and allows us to feed the world, plastics chemistry is vital to our economy.

These products that enable our modern way of life, however, do not belong in our waterways or in the environment. Today in Canada, as a result of inadequate sorting, contamination, limited end markets and not employing all the technologies available, 86 per cent of all post-consumer plastics end up in landfills – three million tonnes annually. The current approach to producing, using and disposing of plastics poses a real threat to the environment and results in a significant loss of value, resources and energy.

86%
OF PLASTIC WASTE ENDS UP IN LANDFILLS
=
3 MILLION TONNE'S
ANNUALLY

THE LOST OPPORTUNITY COST OF PLASTIC MATERIAL NOT BEING RECOVERED IS
$7.8 BILLION
(2016) AND IS ESTIMATED TO RISE TO **$11.1 BILLION** BY 2030

PLASTICS ENABLE OUR MODERN AND SUSTAINABLE WAY OF LIFE

FOOD PACKAGING

Roughly one-third of the edible food produced for human consumption is lost or wasted globally. The Toronto Food Policy Council reports that $31 billion worth of food is wasted in Canada each year, representing 40 per cent of food produced in Canada annually.

This amounts to 1.3 billion tonnes per year, according to the UN Food and Agriculture Organization (FOA). Advanced packaging, namely plastics made possible by chemistry, can help reduce food waste and its related emissions by significantly extending product shelf-life and preventing damage during transportation.

For instance, plastic film helps increase shelf life of fresh meats up to 21 days or more, and plastic vacuum packaging extends shelf life 10 times longer than store-wrapped meat, resulting in 75 per cent less food waste. In addition, using lighter-weight plastic packaging requires anywhere from two to eight times less energy than alternatives. Because of reduced weight and size, the capacity of every container is increased, resulting in fewer trucks on the road and reduced fuel emissions.

Additionally, protective food packaging helps ensure consumers have access to safe, sanitary food products. (**novachem.com, dow.com**).

1.3 BILLION TONNES
OF FOOD WASTED PER YEAR

LIGHTER-WEIGHT **PLASTIC PACKAGING**
USES **2 TO 8 TIMES** LESS ENERGY THAN ALTERNATIVE PACKING MATERIALS

"Plastic packaging is used in the food supply chain because it supports the safe distribution of food over long distances and minimizes food waste by keeping food fresh for longer."
– The Conversation

MEDICAL MATERIALS ALL RELY ON PLASTICS

MEDICAL EQUIPMENT

Plastics play a vital role in medicine in Canada. As was made clear during the COVID-19 pandemic, plastics played an essential role in the production of personal protective equipment (PPE). Without plastics, much of modern medical practice would not be possible, including materials used for vascular and heart surgery, joint replacement, prosthetics engineering, surgical reconstruction of new tissue, bone replacement, artificial muscle and organs.

Likewise, medical materials such as stethoscopes, IV bags and tubing, oxygen-supply tubing, oxygen tents, catheters, examination gloves, labware, plastic clips, splints, casts, body braces, sterile drug and equipment packaging, all rely on plastics. These materials can be transparent, easily sterilized and resistant to chemicals used in medicine, making them ideal for medical use. Plastics are even in the pills we swallow. Evonik produces a polymer coating for oral pharmaceuticals to ensure medicine is released at the optimal point of digestion. (**evonik.com**)

ENERGY CONSERVATION AND SUSTAINABILITY

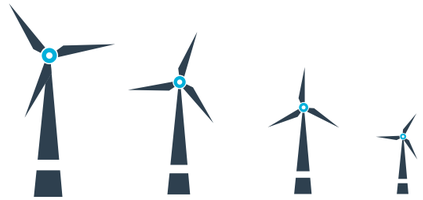
Chemistry is a critical part of nearly every renewable power generation source. From the composite materials in wind turbine blades, to solar panels, battery casings and components, insulating materials, and even nuclear and hydropower, plastics are essential.

SOLAR POWER

Solar system installations are expected to grow at an average rate of 15 per cent over the next five years. Recent advances in chemistry have transformed solar into a viable commercial energy source. UV-resistant, non-corrosive plastic resin makes durable, strong and cost-effective components for solar panels as well as polymer mounting systems. (**dupont.ca**)

WIND POWER

Chemistry allows energy producers to use windmill blade components that are lighter, stronger, longer and more cost-effective. In fact, more than seven tonnes of plastic resin can be found in a single 17-tonne wind turbine. Blades also require a chemical coating for durability because they are constantly exposed to the weather. (**akzonobel.com**)



HEATING AND COOLING OUR HOMES

Insulation, window coatings, reflective roofing and other innovative chemistry-based materials dramatically lower emissions from the building sector by reducing heat loss and the demand for cooling. With a combination of better energy efficiency standards and applied chemistry solutions, average energy savings of more than 25 per cent are achievable by using insulation, most commonly plastics. For example, three key plastic foam insulation materials — expanded polystyrene, extruded polystyrene and polyurethane — have been shown to reduce energy use and avoid 233 tonnes of CO2 emissions for every tonne emitted in their manufacturing, installation and end-of-life management. (**dow.com, dupont.ca, basf.com**)

233
TONNES
OF CO_2

LIGHTER VEHICLES

Reducing a vehicle's weight by 100 kg cuts its GHG emissions by 10 g/km through improved fuel efficiency. New polymers and high-tech plastics- based solutions, such as glass and carbon fiber, are designed to replace metal in cars and airplanes without compromising performance, comfort or safety. Many lightweight plastic automotive parts and components, including engine covers, front- end modules, lower bumper stiffeners, transmission cross-members, turbo charged engine pipelines, oil pans and body structural inserts, have already been commercialized. There are even prototypes of all- plastic wheels that reduce a car's weight by three kilos per wheel. (**basf.com**)

100 KG

RESPONSIBLE CARE®

SUSTAINABLE AND INNOVATIVE CHEMICAL MANUFACTURING

For more than 35 years, Canada's chemistry sector has been at the forefront of the journey toward responsible and sustainable chemical manufacturing. Founded in Canada in 1985, Responsible Care, the CIAC's UN-recognized sustainability initiative, is now practiced in 73 countries and by 96 of the 100 largest chemical producers in the world.

Through Responsible Care, CIAC member-companies have committed to continuous innovation to improve their products, processes and reliability. The ethic and principles for sustainability cover all aspects of a company's business, over the entire life cycle of its products.

Through the Responsible Care ethic, Canada's plastic resin producers are obligated to ensure sound stewardship of resin pellets during manufacture, transport and distribution. The industry is upgrading and implementing its Operation Clean Sweep® protocol to eliminate the escape of plastic pellets from industry operations, with a focus on preventing leakage into rivers and oceans.

Efforts to increase recycling rates, implement eco-efficient waste management systems and reduce the amount of litter entering the world's waterways and landfills are important aspects of the Responsible Care ethic of continuous improvement and social responsibility.

All CIAC Plastic Division members have made the commitment to be signatories to Operation Clean Sweep by 2022.

Our members also work with their suppliers and customers to prevent product loss while also working to innovate for new products and processes that add value to society while reducing risks to human health and the environment.

For more information on Operation Clean Sweep, please visit **opcleansweep.org**. For more on Responsible Care, please visit **canadianchemistry.ca**.

Responsible Care®
Our commitment to sustainability.

THE CURRENT STATE

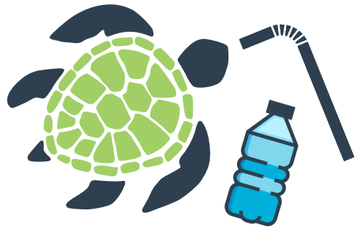
MARINE DEBRIS TOP OF MIND

On December 31, 2017, China stopped accepting nearly half of the world's shipments of recyclables, meaning much of this waste has since either been diverted to landfills or to other countries that lack the infrastructure to properly dispose of the materials.

There has been intense attention placed on the mismanagement of plastic waste by the public, governments and civil society. Numerous municipalities, territories and nations around the world have grappled with how to tackle this issue.

Much of the recent attention has focused on marine litter with images of waterways clogged with plastic bottles and sea animals choked or injured by straws, fishing nets and other improperly disposed plastics, inducing public outcry in both Canada and abroad.

Plastics in the marine environment have also become top of mind for our federal government. In February 2018, in Davos, Switzerland, Prime Minister Trudeau announced that Canada's Presidency of the G7 would see a focus on oceans and ocean health. Shortly after that, former federal environment Minster Catherine McKenna announced she would be leading efforts to develop a G7 Plastics Charter. In June, five of the G7 countries signed on to the Charter at the summit in Charlevoix, Quebec.

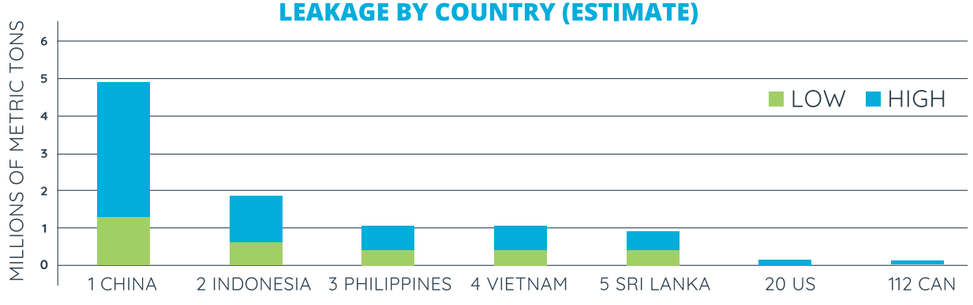


CANADA'S PLACE IN THE WORLD REGARDING MARINE LITTER

Research has found that 90 per cent of mismanaged plastic waste comes from 10 rivers in five Asian countries: China, Indonesia, the Philippines, Vietnam and Thailand – plus two African rivers. These five Southeast Asian countries have economies with growing middle-class populations but lack the waste management infrastructure to cope with the surge in plastic waste. Canada, which has the world's longest coastline, on the other hand, ranked 187 out of 192 countries when looking at per capita leakage into the world's oceans (U.S. was #138).

Canada was also far down the list in terms of raw numbers as the 112th-worst offender for contributing to marine litter. However, this does not diminish the need for Canada and other industrialized nations to play an important leading role in providing solutions for mismanaged plastic waste in our environment, both at home, and where the significant waste leakage is happening.

MOST PLASTIC ENTERS OCEANS FROM MISMANAGED WASTE
LEAKAGE BY COUNTRY (ESTIMATE)



Science Magazine, Feb 2015, Jambeck et al, (http://science.sciencemag.org/content/347/6223/768)

WHAT CANADIANS WANT

In June and July 2018, through Earnscliffe Strategy Group, CIAC and its partners in the G7 Plastics Sustainability Coalition conducted a survey of 1,550 people across Canada to gauge their view on plastic waste and what they see as solutions to this issue.

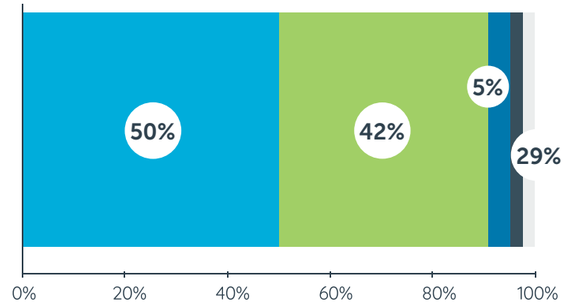
The polling found that virtually all respondents (92 per cent) were concerned about plastic waste. The greatest specific concerns about these plastics include that they are not biodegradable, they are not disposed of properly and that they could be replaced by an eco-friendly alternative. The majority (58 per cent) also felt consumers who fail to recycle properly are to blame for plastic waste in rivers, lakes and oceans. In short, Canadians are frustrated by the amount of plastic pollution in their lives and by the lack of solutions being presented to them.

When asking about potential solutions, the vast majority of those surveyed said the best way to reduce plastic waste was to improve recyclability and recoverability of plastics.

A full 78 per cent of Canadians favour actions to improve waste management and recyclability of plastics, including recovering and reusing plastic products by developing new technologies.

CONCERN ABOUT PLASTIC WASTE

Is plastic waste something that you are very concerned about, somewhat concerned, not very concerned or not concerned at all?

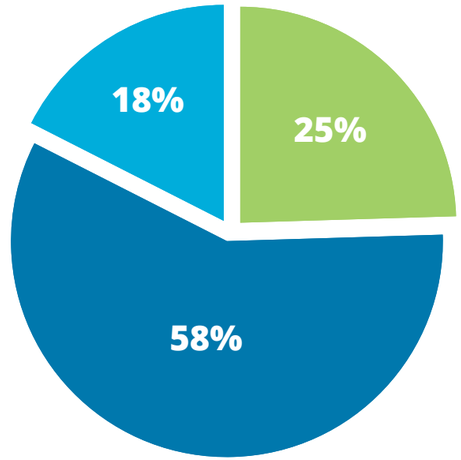


RESPONSIBILITY FOR PLASTIC WASTE

The majority feel consumers who fail to recycle properly are to blame for plastic waste in rivers, lakes and oceans.

Who do you think is mainly responsible for the plastic waste that ends up in rivers, lakes and oceans?

- The companies that make and use plastics in products and packaging
- Consumers who do not recycle these products properly
- Government that have not provided the proper waste management systems



PROBLEMS WITH ALTERNATIVES

In the search to reduce the amount of plastic waste in our lives, some have turned to using alternative materials such as paper straws or cloth bags. There are some applications where alternatives could be used in place of single-use plastic.

However, it is important to ensure the full life-cycle analysis of a product is considered, otherwise we could end up with an application made from a material that can be recycled but has a much larger overall environmental footprint.

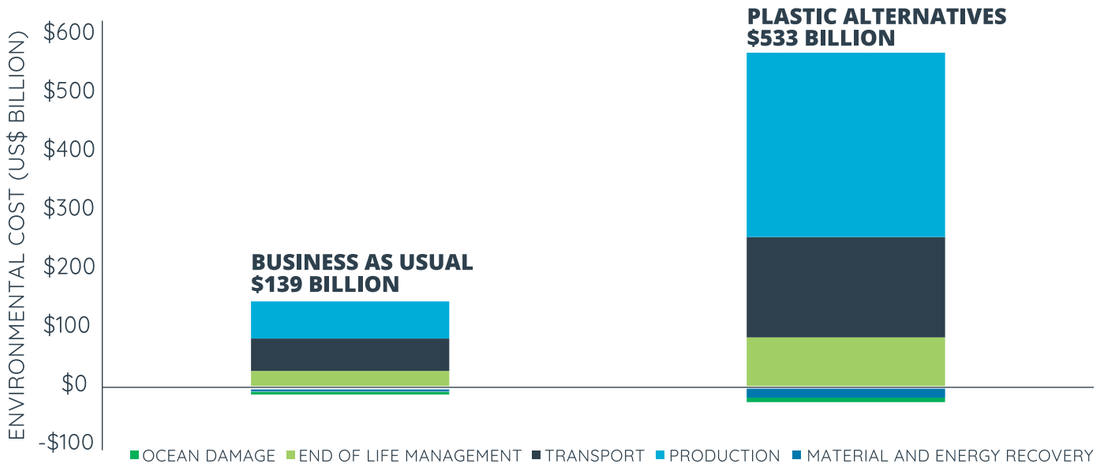
Some alternatives may not be a sustainable choice given their addition to greenhouse gas emissions, energy consumption and other environmental impacts during production and transportation.

Trucost found that replacing plastics in consumer products and packaging with a mix of alternative materials that provide the same function would actually increase environmental costs to society up to four times from $139 billion to $533 billion annually. The finding is not surprising, given the original drivers for using plastics: lightweight, energy efficient, mouldable, durable, and cost effective.

CLOTH BAGS AND PAPER STRAW ALTERNATIVES

PLASTICS AND SUSTAINABILITY

ENVIRONMENTAL COST OF PLASTIC USE IN CONSUMER GOODS IS 3.8 TIMES LESS THAN ALTERNATIVES



Source: Trucost, Plastics and Sustainability: A Valuation of Environmental Benefits, Costs and Opportunities for Continuous Improvement, July 2016.

BIOBASED PLASTIC

Biodegradable bioplastics and compostable plastics have surged in popularity in recent years. These are typically used in short-life applications like single-use food packaging and utensils. Biodegradability and composting are opportunity areas but pose their own unique challenges and alone will not solve the problem.

- **Biobased plastic:** These products are not necessarily biodegradable or compostable, but a percentage of the material is made from renewable sources (such as soy, corn, wheat, etc.). This can have environmental benefits in the production phase, but it does affect end-of-life management.

- **Biodegradable plastics:** These can degrade in natural environments. However, typically these degrade into methane, which is a potent greenhouse gas 25 times that of CO. Biodegradable does not mean compostable or recyclable.

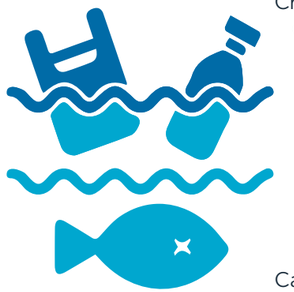
SUPPORTING THE FEDERAL GOVERNMENT'S EFFORTS TO REDUCE MARINE LITTER AND PLASTIC POLLUTION

Canadians are looking to government and industry to provide real, workable solutions to this issue. Since 2018, there has been growing common ground and recognition of the need for cooperation between the plastics industry, governments, brand owners, businesses, NGOs, and concerned citizens to protect and restore the health of the world's oceans and land-based environments.

For instance, in June 2018, CIAC and the Canadian Plastics Industry Association (CPIA) offered support for the oceans and waterways focus of the Ocean Plastics Charter, which was endorsed by five countries at the G7 Summit.

The Charter included commitments to:

- Ensure that plastics are designed for recovery, reuse, recycling and end-of-life management;
- Strengthen waste diversion systems and infrastructure;
- Stimulate innovation for sustainable solutions, technologies and alternatives across the life cycle; and other actions.



In September of 2018, along with the American Chemistry Council and CPIA*, CIAC again provided support to the Canadian federal government in their announcement of the G7 Innovation Challenge to Address Marine Plastic Litter. CIAC stated that the Innovation Challenge will incentivize the development of new technology and processes, generate new ideas and build on the successes and innovations happening now in the plastics value chain. Challenges include finding solutions for construction waste, separation of mixed plastics, recycling of glass fibre-reinforced plastic, food packaging, sustainable fishing and aquatic gear, and others. Many of these solutions will involve chemistry.

Additionally, Canada's chemistry and plastics industries are fully supportive and aligned with the efforts of the Canadian Council of Ministers of the Environment's (CCME) Strategy and Action Plan on Zero Plastic Waste. We agree there are many steps that must be taken to achieve Canada's collective goal for a zero-waste economy for plastics.

*On July 1 2020, CPIA became the Plastics Division of CIAC

SOLUTIONS

THE CHEMISTRY INDUSTRY'S AMBITIOUS TARGETS TO REDUCE PLASTIC WASTE

CIAC members have ambitious targets that underscore our member's commitment to a future without plastic pollution. Representing the broad value chain in Canada, our members have announced the following waste reduction targets:

A NEW ASPIRATIONAL GOAL OF
100% OF PLASTICS
PACKAGING BEING REUSED, RECYCLED, OR RECOVERED BY
2040

AN AGGRESSIVE INTERIM GOAL OF
100%
OF PLASTICS PACKAGING
BEING RECYCLABLE OR RECOVERABLE BY
2030

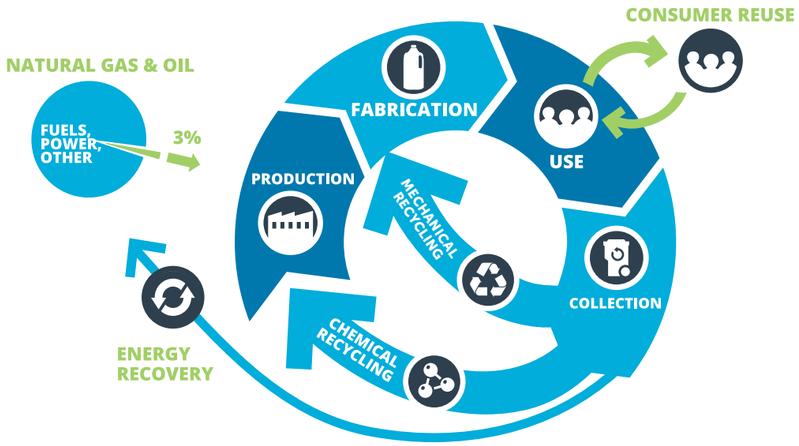
THE CIRCULAR ECONOMY

We currently live a linear economy for plastics, a take-make-waste approach where products that start as raw materials are used and discarded. The chemistry sector is supporting the transition from a linear economy to a circular economy — one that prioritizes the extension of product life cycles, extracting maximum value from resources in use, and then recovering materials at the end of their service life.

An important principle of the circular economy is increasing the capture of materials in waste streams so that they can be recycled, recovered and reused in new products. But a circular economy involves far more than just upgrading traditional mechanical recycling — it's a new economic model where, ultimately, the waste of one process becomes a feedstock for another process, and ultimately, waste is eliminated. The guiding principle is to use products and resources in the best way possible without any loss in performance and value or any increase in environmental life-cycle impact.

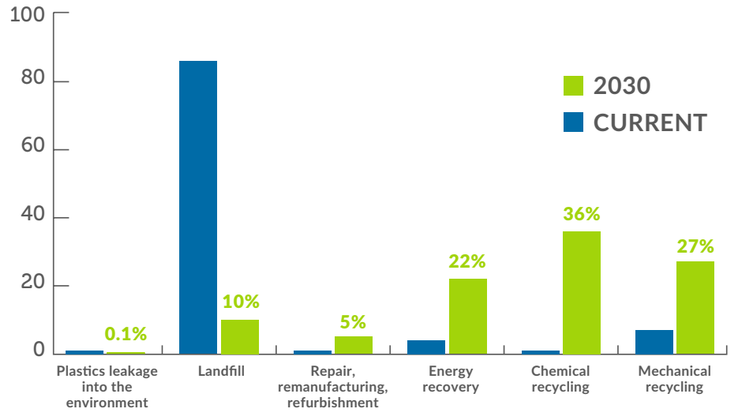
We will never be able to reach 100 per cent diversion/zero waste goals from mechanical recycling alone. Other waste management options of energy recovery and chemical recycling are needed to advance a circular economy.

PLASTICS IN A CIRCULAR ECONOMY



REACHING OUR GOALS

These goals will not be easy to achieve. Today in Canada, the cold reality is that 86 per cent of post consumer plastics end up in landfills. This is partially due to inadequate sorting and lack of viable end markets, but also due to lack of infrastructure to collect and process items in order to be recycled and recovered. It is important to note that Sweden diverts up to 90 per cent of its plastic waste today through a combination of recycling and recovery options.



FUTURE SCENARIOS: THE PATH TOWARDS A 90 PER CENT DIVERSION OF PLASTIC WASTE

*Information taken from 2019 Study performed by Deloitte for Environment and Climate Change Canada titled Economic Study of the Canadian Plastics Industry, Markets and Waste.

In envisioning a zero waste economy, CIAC supports a future scenario such as the one illustrated above whereby 90 per cent of plastic waste is diverted from landfill by 2030. In order to move towards this zero waste scenario, the chemistry industry sees opportunities to significantly increase mechanical and chemical recycling rates, noting that this shift will take monumental changes to product design, consumer behaviour and waste management activities in Canada. The industry sees some opportunities for energy recovery by converting hard-to-recycle plastic waste to energy," recognizing that there is less public desire to increase this share.

Innovations in plastics recycling to fuels (e.g. disel) and chemicals, via advanced conversion technologies will be key. Where plastics can't be mechanically recycled, industry is exploring capabilities to process these materials back into chemicals used as feedstocks to manufacture new items. Where that isn't possible, plastics can be converted into fuels to replace coal and coke in the cement industry, used in industrial boilers and furnaces, or they can be converted into liquid fuels to lower the greenhouse gas footprint of diesel and heavy fuels.

These solutions are not in a distant future – many are already happening today. Our member-companies continue to lead the charge but require government acceptance and support to make commonplace, waste management offerings.

GLOBAL ALLIANCE TO END PLASTIC WASTE

In January 2019, an alliance of global companies from the plastics and consumer goods value chain launched a new organization to advance solutions to eliminate plastic waste in the environment, especially in the ocean, and to do this by transitioning to a circular economy for plastics.

The Alliance to End Plastic Waste (AEPW) committed over US$1.5 billion over the next five years to help end plastic waste in the environment. Made up of over 50 members from around the world, the Alliance is a not-for-profit organization that includes companies that make, use, sell, process, collect and recycle plastics, including chemical and plastic manufacturers, consumer goods companies, retailers, converters, and waste management companies. The Alliance will develop and bring to scale solutions that will minimize and manage plastic waste and promote solutions for used plastics by helping to enable a circular economy.

CIAC members NOVA Chemicals, BASF, Dow, Procter & Gamble and Shell are founding members of the Alliance. For more information, please visit **www.endplasticwaste.org**.

INNOVATING TO ENABLE THE CIRCULAR ECONOMY

IMPROVING TRACEABILITY OF RECYCLED PLASTICS USING BLOCKCHAIN TECHNOLOGY

In February 2020, BASF launched a pilot platform in British Columbia called reciChain. The platform combines the power of blockchain with a digital badge and loop count technology that enables the secured sharing of data among market participants, while improving the sorting, tracing and monitoring of plastics throughout the value chain.

The result is a more competitive circular supply chain rather than a linear one, extending the lifecycle of plastics. Additionally, due to the increased transparency reciChain brings, the platform can provide better assurance to brand owners of the validity of the certificates they purchase from recyclers and converters. For more information on this initiative, visit **basf.com**.

CURBSIDE RECOVERY OF HARD-TO-RECYCLE PLASTICS

Dow Chemical has teamed with municipal and industry partners to implement an innovative program to collect hard-to-recycle plastic items — like juice pouches, straws, stir sticks, candy wrappers and plastic dinnerware — and convert them into valuable resources such as low-sulfur diesel and waxes, ultimately keeping waste out of landfills.

Through the Hefty® EnergyBag® program, residents in several North American municipalities, including in London, Ontario, are putting these plastics into special orange bags, where they are picked up and sent to a local material recovery facility, sorted and sent to locally approved energy recovery facilities.

By recovering the embedded energy in plastic to make new products, Dow and its partners are helping keep plastic waste out of our landfills, reduce greenhouse gas emissions and extract maximum value from our resources. Since its inception in 2016, the program has officially diverted over one million pounds of hard-to-recycle plastics from landfills. (**Yahoo! Finance**)

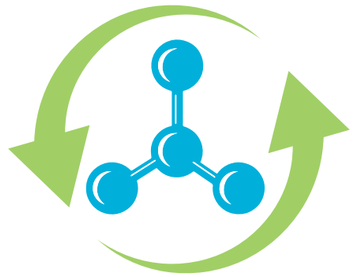
FULLY RECYCLABLE STAND-UP FOOD POUCHES

As the leading suppliers of polyethylene in the Americas, NOVA Chemicals and Dow Chemical have developed a versatile, all-polyethylene (PE) version of the popular stand-up pouch package used for food products.

The structures are compatible with #2 HDPE recycling streams — which are widely accepted at recycling centers — while retaining the performance, processability and cost-competitiveness of existing mixed-material structures.

The stand-up pouches are used for a wide variety of applications including dry foods, frozen foods, liquids, confectionery, pet foods and non-food items. However, most existing stand-up pouch packaging is made from mixed materials and therefore cannot be easily recycled.

Using this same concept, NOVA and Dow have also developed an easily recyclable, oxygen-barrier film for food packaging. Meat, cheese, nuts, and other food have traditionally required rigid or non-recyclable mixed- material packaging but can now use recyclable flexible packaging technologies instead. (**novachem.com, dow.com**)



RESINS MADE WITH RECYCLED PLASTIC

In October 2019, Dow announced the development of a new resin made with 70 per cent recycled plastic. The innovation new solution, called AGILITY™ CE, is the first post-consumer recycled (PCR) product offering of Dow's plastics circularity portfolio to incorporate a high percentage of post-consumer plastic waste. This new resin consists of a low-density polyethylene (LDPE) into which recycled plastic shrink film is incorporated without sacrificing material quality and functionality in the final application. This will enable converters to incorporate more than 50 per cent recycled content in the formulation of their final film, without altering its functionality.

CONVERTING POLYSTYRENE

ReVital Polymers, Pyrowave and INEOS Styrolution announced a partnership in 2018 to recycle polystyrene packaging collected in consumer curbside and depot recycling systems as well as other sources such as restaurants, offices, schools and universities.

This made-in-Canada collaboration will use advanced recycling technology from Pyrowave that will recycle single-serve polystyrene packaging and use recycled polystyrene in the manufacturing of new products and packaging. This Canadian solution will help reduce the amount of polystyrene packaging going to landfill regardless of colour, food residue or odours. (**ineos-styrolution.com, revitalpolymers.com, pyrowave.com**)

In early 2020, it was announced that Pyrowave will receive $3.3 million in funding from Innovation, Science and Industry Canada to support their continued development of clean technologies that help reduce plastic waste, while building healthier communities and transitioning into a modern, circular economy for plastics.

With polystyrene being such an important building block to many plastic products, its exciting to know research and technological advancements are quickly leading to a future where, potentially, no polystyrene items will need to end up in landfills. Additionally, Regenyx partnership between AmSty and Agilyx that is focused on bringing polystyrene recycling to the market.

MADE-IN CANADA SOLUTION

PROJECT STOP

In 2018, NOVA Chemicals announced a three-year investment of nearly $2 million to prevent plastic debris from reaching the ocean. The investment supports Project STOP, a new global initiative to reduce marine plastic pollution especially in countries with high leakage of plastics into oceans.

Project STOP was co-created in 2017 by Borealis, a sister company of NOVA Chemicals, and SYSTEMIQ, a firm that invests in innovative solutions for sustainable land-use, material and energy systems.

NOVA Chemicals' investment supported the first city partnership in Muncar, a coastal fishing community located in Banyuwangi, Indonesia.

With minimal waste services in place, many citizens are forced to dump their waste directly into the environment. Muncar was chosen as the first STOP location due to the seriousness of the challenge, coupled with strong leadership and environmental commitment at national, regency and local levels. (**novachem.com**)

$2 MILLION
INVESTED TO PREVENT
PLASTIC WASTE IN OCEANS

OCEAN CONSERVANCY AND CIRCULATE CAPITAL

Dow has been a long-time supporter of global initiatives to combat plastic wastes. Dow is a founding member and investor of $100 million in Circulate Capital to keep plastics out of the natural environment while promoting prevention and remediation. Dow has also been a lead sponsor of Ocean Conservancy's International Coastal Cleanup program for over 20 years, and jointly formed the Trash Free Seas Alliance to analyse and address causes of ocean plastic pollutants. Dow also recently committed $1 million to Ocean Conservancy to further support scalable waste collection and recycling solutions in Southeast Asia. (**dow.com**)

ADVANCED RECOVERY OF PLASTICS

Since 2010, GreenMantra Technologies, located in Brantford, Ontario, has been transforming hard- to-recycle materials such as grocery bags and film, and converts them into high-value waxes and other specialty chemicals. These materials have a broad range of applications in the coatings, plastics processing, adhesives, roofing and paving industries.

In one example, GreenMantra works with local schools to collect dried up writing markers and through a process of chemical recycling, converts them into valuable polymer additives used as an ingredient in high performance, polymer modified asphalt shingles made by Malarkey Roofing Products. The shingles have enhanced flexibility and performance in extreme weather conditions, and the polymers also provide the shingles with the highest levels of impact resistance and granule retention for exceptional durability. By creating value from plastic waste, innovators like GreenMantra are helping to drive a more circular economy

where plastics are beneficially reused rather than landfilled. (**greenmantra.com**)

CHEMCYCLING BY BASF

BASF has taken up the challenge of chemically recycling plastic waste through their global ChemCycling project. Plastic waste which currently is landfilled or incinerated can and will be recycled. Mixed or impure plastic waste is transformed into syngas or an oil using thermochemical processes by partner companies. The oil can then be fed into BASF's production Verbund and partially replace naphtha as feedstock to produce all kinds of new chemical products. This can save fossil resources. The project is still in the pilot phase but holds huge potential for creating a circular value chain. (**basf.com**)

GETTING PLASTICS RIGHT: POLICY TO ENABLE A CIRCULAR ECONOMY FOR PLASTICS IN CANADA

In 2019, CIAC and its partners started the Getting Plastics Right initiative. This multi-faceted program was developed to educate Canadians and bring stakeholders together with the goal of Getting Plastics Right. A website, **GettingPlasticsRight.ca**, and campaign were launched that promote key, tangible steps to help Canada develop a circular economy for plastics, which in turn will help reduce and eliminate plastic pollution from entering the environment while supporting a robust, innovative Canadian economy.

Implementing a circular economy for plastics will enable society to sustain economic growth while improving the environment for future generations, as we strive to use products and resources in the best way possible without loss in performance or increase in environmental life-cycle impact.

Achieving goals to eliminate plastic waste in Canada will require major shifts in resources and policy.

Below are our recommendations to ensuring efforts to create a circular economy in Canada are successful.

IMPROVE AND STANDARDIZE WASTE COLLECTION AND DIVERSION

The mantra of "reduce, reuse, recycle" must also include "recover." Getting to 100 per cent diversion of plastic packaging will require radical innovation, and the use of both recycling and recovery options. It will require a whole of society approach with significant support and investment from not just industry but governments and stakeholders as well. Specifically, industry needs investments in collection and mechanical recycling, chemical recycling using pyrolysis and gasification technologies, energy recovery and enabling regulations.

Consistency in waste collection across jurisdictions to facilitate recycling and recovery for residential, commercial and institutions is imperative to our goals. It is also important to standardize and harmonize definitions and policies across Canada to recognize plastic recovery and conversion to energy as diversion (e.g. Nova Scotia recognizes materials diverted from landfill to advanced facilities to make new plastic feedstocks, fuel replacement as diversion).

Recommendations:

- *Working with provinces and municipalities, the federal government invest in improvements to standardize waste collection and sorting in Canada.*
- *Federal and provincial governments should promote well-designed, industry-led extended producer responsibility systems to inform consumer behaviour and help establish markets.*
- *Federal and provincial governments should review, revise and standardize policies that currently provide disincentives to the processing and use of waste materials as feedstock, such as value-added recovery.*
- *Federal and provincial governments should develop standardized, supportive policies across jurisdictions that consider energy recovery (or resource recovery) where non-recyclable plastics today can displace coal/ pet coke (e.g. cement) or petroleum fuels (e.g. plastic to diesel fuel).*
- *Federal and provincial governments need to recognize that acceptance and use of non-combustion energy recovery technologies such as pyrolysis are needed for chemical recycling (i.e. making new plastics from old plastics).*
- *All levels of government should treat post-consumer plastics as a resource, not a waste.*

PROMOTE INNOVATION

PLASTIC TECHNOLOGY INNOVATION FUND (PTIF)

In August 2019, CIAC asked the Government of Canada to commit to the establishment of a new Plastic Technology Innovation Fund (PTIF) with an initial allocation of $200 million to promote the research and development of ground-breaking technology in plastic recycling and recovery innovation.

When adopted, this fund will leverage technology investments in the chemical sector to more effectively help Canada meet its zero plastic waste goals by developing technologies to support the infrastructure for a circular plastics economy. Building capacity for a circular economy will increase the availability and demand for recycled plastics, thereby improving the sustainability of the Canadian plastics industry.

The PTIF comprises of three distinct, yet interrelated components: product design, value recovery technologies, and end market development. Improvements in innovative product design will ensure that a circular economy for plastics remains viable while new products maintain their integrity for safety and security, durability, and cost. Advancements in all value recovery technologies including mechanical and chemical recycling, and energy recovery, will enable their development into pre-commercial applications.

Growing and developing domestic end markets for recycled material, encouraging producers to make recyclable and recoverable products, and supporting demonstration projects to normalize the use of products made with recycled/recovered plastics will ensure the stability and integrity of a circular economy. Advancements in all three components will be essential to developing strengthened and robust infrastructure to support a circular economy for plastics.

Recommendation:

- *Establish the Plastic Technology Innovation Fund (PTIF) with an initial allocation of $200 million and operated by Natural Resources Canada to further research and development into groundbreaking plastic technology applications in Canada.*

ENSURE SCIENCE AND LIFE-CYCLE DECISION MAKING

In February of 2020, the Federal Government published a "Draft Science Assessment of Plastic Pollution" which summarizes the current state of the science regarding the potential impacts of plastic pollution on the environment and human health.

Canada's chemistry and plastics industries are fully supportive and aligned with the efforts of the Canadian Council of Ministers of the Environment's (CCME) Strategy and Action Plan on Zero Plastic Waste as well as the G7 Ocean Plastics Charter. We agree that there are many steps that must be taken to achieve Canada's collective goal for a zero-waste economy for plastics. While the Government of Canada has pledged to ban certain single-use plastics, other instruments are preferable to regulatory prohibitions. Any rush to judgement could have serious implications on our ability to create a circular economy for plastics that supports a national zero plastic waste agenda.

CIAC remains a strong partner to the Government's Chemicals Management Plan (CMP) under the Canadian Environmental Protection Act (CEPA) as we support evidence-based policy that strengthens the management of risks associated with substances. The CMP is a world-leading initiative and a Canadian success story because of its evidence-informed, risk-based approach to science. In this spirit, any government decision for regulating plastic pollution under CEPA should be backed by a thorough chemical risk assessment.

We are encouraged by the Government's commitment to implement the funding and strategic steps needed to build the infrastructure for a circular economy for plastics. With that being said, we suggest caution as the Government develops its plans for regulating plastic pollution, to not pre-determine the outcome. Therefore, CIAC recommends against a Schedule-1 designation for plastics under the Canadian Environmental Protection Act.

CEPA is not an appropriate tool to address the challenges of managing post-consumer plastic waste. CEPA is a criminal law statute that was designed to manage the risks associated with facilities and individual substances in order protect human health and the environment from the effects of toxic substances, pollutants, and wastes. CEPA was not designed to manage and regulate products like plastic products. Plastics are an inert material and are not inherently toxic.

Furthermore, a CEPA-toxic designation and associated ban on certain plastics does not consider the problem with alternatives. It is important to ensure a full life-cycle analysis of a product is conducted in order to avoid regrettable situations where alternatives are used that have a much larger overall environmental footprint. Some alternatives may be found to be unsustainable once a full suite of factors is considered including contributions to greenhouse gas emissions, energy consumption, and other environmental impacts during production and transportation.

CIAC supports the development of new legislation that combines all the aspects of the circular economy. Such legislation could set recycled content standards for industry, incentivize industry towards recovery of the plastics they produce, set rules for municipal recyclers, define the life cycle assessment of products, and regulate activity that upcycles waste plastic into fuels or other feedstocks. Furthermore, such an enabling piece of circular economy legislation would be in full support of the CCME Action Plan on Zero Plastic Waste and the G7 Ocean Plastics Charter in their vision for a circular economy model for plastics. A circular economy legislation would directly conglomerate these plans into one eloquent, legally binding framework that would unify the Government's objectives for a national zero plastic waste agenda.

CIAC believes bans will have a disproportionate impact on certain businesses, including many small and medium-sized Canadian companies' which focus solely on producing plastic products that safely and efficiently meet the needs of Canadians. The Government will need to take the needs and concerns of these companies and their thousands of workers into account as they would feel the full effects of such decisions. The chemistry and plastics industries will continue to support the case that plastic pollution is better regulated through a new circular economy legislation, or other parts of the Canadian Environmental Protection Act, rather than through the sections of the Act that are designed to address toxic substances.

Recommendations:

- *Ensure that policies for reducing plastic waste are set upon a foundation of evidence-informed risk-based decision-making. Such decisions should consider the full life cycle of a plastic product, resin, or packaging, including the use of alternatives.*
- *Any Government decision under CEPA for plastic pollution should be backed by a thorough chemical risk assessment. Consider alternative solutions to a CEPA Schedule-1 designation for plastic pollution including the development of a new piece of circular economy legislation or other sections of the Act.*

PROMOTE RESPONSIBLE CARE®

There is tremendous alignment between the principles of Responsible Care and the federal government's broader societal agenda in regard to reducing waste. CIAC members are signatories to Responsible Care — the Association's UN-recognized sustainability initiative. Responsible Care inspires its members to take actions that improve the sustainability of their operations and reduces harm throughout the entire life cycle of their products.

Committing to the ethic and principles of Responsible Care is a condition of membership in CIAC. This commitment extends through to their transportation and service company partners. The initiative's codes influence the decisions CIAC member-companies make every day.

Recommendations:

- Investment and other supports by governments at all levels should be tied to companies committed to meeting Canadian's expectations and global standards for social responsibility through participation in initiatives such as Responsible Care.
- In line with the United Nations Environment Programme, all levels of government should recognize and promote Responsible Care so that the Canadian chemistry sector remains a world leader in responsible and sustainable manufacturing and in energy and resources efficiency.

Responsible Care®
Our commitment to sustainability.

NOTES:

ABOUT CIAC PLASTIC DIVISION

CIAC Plastics Division rerpresents the entire plastics value chain. Our members span the country and are involved in every step of the plastic production process, from the production of resins and pellets to producing final products including Personal Protective Equipment (PPE), packaging to ensure protect food and reduce spoilage, automotive parts, computer and electronic casing, and components for solar panels and wind mills, and that's just the tip of the iceberg.

With the manufacture of these products comes the responsibility to make plastics in a sustainable way that limits or eliminates plastic pollution while working toward a circular economy for plastics.

CHEMISTRY INDUSTRY ASSOCIATION OF CANADA

GENERAL INQUIRIES:
Tel: 613-237-6215
info@canadianchemistry.ca
350 Sparks Street, Suite 805
Ottawa, ON K1R 7S8

MEDIA INQUIRIES:
Devon Babin
Manager, Communications
Tel: 613-237-6215 ext. 225

MEMBERSHIP INQUIRIES:
Bob Masterson
President and CEO
Tel: 613-237-6215 ext. 234
membership@canadianchemistry.ca