



PLASTIC RECYCLING: THAT'S NOT A THING.

How the federal government's proposed approach to plastic waste leaves the public holding the bag on industry pollution.

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GREENPEACE

The federal government's proposed approach to plastic waste is built on the myth of recycling. The approach hurts communities and leaves the public holding the bag for continued industry failures, while missing opportunities to "build back better" from covid-19 by making a truly circular economy part of the promised green and equitable recovery from the pandemic.

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CREDITS

Plastics Recycling: That's Not A Thing. How the federal government's proposed approach leaves the public holding the bag on industry pollution.

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Foreward

A message from Aamjiwnaang, the first front line of Canada's plastic and petrochemical pollution crisis.

I'm Beze Gray from Aamjiwnaang First Nation.

I'm bear clan, and a cute mix of Anishnaabe/Oneida/Lunaape and I'm Two-spirit. Aamjiwnaang is a First Nation reserve on Anishinaabek Traditional Territory surrounded by Canada's Chemical Valley. The cluster of petrochemical facilities and industry makes up 40% of Canada's petro-chemical industry.

When I was young, I thought clouds came from smoke stacks in an industrial facility. We called them cloudmakers because well, we all thought at one point they created clouds. Did you grow up next to a creek, river or waterway? I did, but I wasn't allowed to touch it, there were signs around it saying it was toxic and caused illness. I grew up surrounded by petrochemical facilities in the centre of Canada's Chemical Valley and as an Indigenous two-spirit, it confused me. I held what teachings I got as sacred knowledge because at one time our teachings and ceremony was criminalized or we were FORCED to forget through the residential school system.

So I cherished the understanding that water is sacred, and the land is a mother of mine. Bears are literally my family. Like many Indigenous people globally that have experienced cultural and political disruption due to colonialism, there was a disconnect to my own cultural teachings, language, and governance system. Access to a healthy landbase is an integral part of Indigenous health. [1] My connection to land has been systemically disrupted / severed due to pollution affecting what I am able to directly interact with or understand as natural.

This is my reality and although it unsettles people to learn about Canada's ongoing colonial violence, I strive to live in a healthy environment. I want community members to be able to have gardens without worrying about toxic contaminants in the soil. I want to be able to pick cedar for tea without worrying about heavy metal contamination. There have been benzene spills into the community daycare. Pets have been exposed to toxins, suffering stillbirths and birth defects.

Anishinaabek homelands predate and expand across the Canada-US border, but on the Canadian side of our territories is where we experience the destructive processes of oil being extracted and refined. Many products come from oil, including chewing gum and asphalt, and most commonly, plastic. In this region Indigenous people have a long-standing struggle with oil.



Aamjiwnaang, an Anishinaabeg community near Sarnia, Ontario, is surrounded by Chemical Valley, the largest complex of petrochemical conglomerates in Canada [2]. Community members' constant exposure to harmful emissions and contaminants from industrial operations results in some of the highest morbidity and mortality rates for cancers and respiratory and neurological diseases in Ontario [3].

**See next page for citations.*

Foreward (continued)

A message from Aamjiwnaang, the first front line of Canada's plastic and petrochemical pollution crisis.

The petrochemical industries have turned into multi million dollar industries that profit off the harm to Indigenous communities and lands. The slow colonial violence that began as microscopic damage has accumulated into lasting harm on the living, humans and nonhumans, lands and water. These industries have been running 24/7 everyday, night since the 1880s and release 1,000s of chemicals each day. There is not a single part of our territory, including our bodies, that has not felt the impact of these industries that give us noise pollution, air pollution, and water pollution, making their way through ecosystems and into living beings.

We disproportionately face respiratory illness and rare cancers in our community, tests have confirmed that PCBs (polychlorinated biphenyls) are in our blood, and chemicals have impacts on genes lasting generations. As well, the birth ratio in our community is skewed due to petrochemicals impacting the sex of our babies in utero, we have a 1 boy being born for every 2 girls. As Indigenous people our language, culture, and knowledge is based on the land. If our land is impacted, our people and our way of living is impacted as well.

Our homelands have been changed forever by Chemical Valley. It's hard for us to imagine a world without industrialization, capitalism, and colonialism, but less than seven generations ago my ancestors could survive and thrive off the land. Aamjiwnaang has long experienced the direct impacts of plastics and the petrochemical industry, but now the rest of the world is slowly beginning to face this hard truth too.

The pollution generated in Aamjiwnaang doesn't remain here, we are connected to the rest of the world by our reliance on the air and water systems. Plastics do not just go away, without preventative action, pollutants will only continue to accumulate, just like the colonial violence in Aamjiwnaang.

Calls to action for Prime Minister Trudeau

1. A payment be given to Aamjiwnaang every time one of the industries spills.
2. Stricter air pollution regulations.

BEZE GRAY, AAMJIWNAANG FIRST NATION

Citations from previous page

[1] Richmond, C., and N. Ross. "The determinants of FirstNation and Inuit health: A critical population health approach." *Health and Place*, 15(2), 2009 403-411. doi.org/10.1016/j.healthplace.

[2] Luginaah, I., K. Smith, and A. Lockridge. "Surrounded by Chemical Valley and "living in a bubble": The case of the Aamjiwnaang First Nation, Ontario," *Journal of Environmental Planning and Management* 53(3), 2010, 353-370, doi.org/10.1080/09640561003613104

[3] Atari, D. O., I. Luginaah, X. Xu, and K. Fung, "Spatial variability of ambient nitrogen dioxide and sulfur dioxide in Sarnia, "Chemical Valley," Ontario, Canada," *Journal of Toxicology and Environmental Health* 71(24), 2008, 1572-1581, doi.org/10.1080/15287390802414158.

GLOSSARY

Chemical depolymerization: A chemical recycling process that reduces plastic polymers to monomers or shorter polymers and filters out contaminants, using a catalyst. Suitable for a range of plastic resin types (PET, PU, PA, PLA, PC, PHA, PEF), but can only be used with monostreams (feedstock of single resin type). Resultant monomers must be re-polymerized and thus produce virgin quality resin. There are yield, by-product and other chemical safety concerns.

Collected plastics: All of the plastics separated from the waste stream by consumers because of perceived eligibility in the recycling stream, and gathered for sorting.

Contamination:

1. Non-recyclable plastics that end up being collected into the recycling stream.
2. Non-plastic materials that end up being collected into the recycling stream;
3. Chemicals such as plasticizers, colourants, or flame retardants that are added to plastic resins;
4. Non-plastic materials that end up in plastic resin, such as paper from labels.

Cracking: A process of thermal depolymerisation by which plastic polymer chains are cut in a non-selective way to produce a wide range of different molecules, leading to a product similar to petroleum fractions; also referred to as 'plastic-to-fuel' even though it can potentially produce new plastics if the right conditions are in place.

Diverted: Separation of materials from the waste stream at the source (eg., in people's homes) with the intent that those materials will be recycled

Durable plastic: Plastic that is not intended to be disposed after a single use (eg., in construction uses, cars, toys).

EPR: Extended Producer Responsibility Program: a policy approach regulated at the provincial/territorial level under which producers are given significant financial and/or physical responsibility for the treatment or disposal of post-consumer products. In a Packaging and Paper Products EPR (**PPP EPR**), materials covered could include: paper and paper packaging for dry goods; cartons and paper cups; plastic containers; aluminum containers; steel containers; glass containers; plastic bags and overwrap; foam packaging; other flexible plastic packaging. In the case of British Columbia, the program extends to all consumer packaging and paper products and does not include packaging or paper products related to industrial, commercial, institutional, or construction activities.

Feedstock: The supply of material used to create new items. In this report feedstock is mostly used to describe a supply of sorted, processed, post-consumer plastic that will be converted into recycled plastic resin. Feedstocks can be of single or mixed resin types depending on the intended use of the final product, and can even be further narrowed to be sourced from specific types of items (eg., beverage bottles).

Gasification: Is a process whereby mixed after-use materials (plastics and, possibly, biomass) are heated, in the presence of limited oxygen. Gasification can be used to treat almost every feed composed of organic material. The process has the same challenges as pyrolysis plus it is also energy-intensive and requires large volumes of waste of the same composition and moisture levels. The process is most likely to be used to produce fuels and fertilisers.

Monomer: Monomers are the basic building blocks of polymers. They join with other similar monomers via a process called "polymerization" to form polymers, the building blocks of plastics. Monomers may be either natural or synthetic in origin; examples of monomers are ethene and propene.

Non-durable plastic: Plastic that is designed to have a limited lifespan such as single-use products and packaging.

Plastic resin abbreviations:

- **PE:** Polyethylene

- **HDPE:** high-density polyethylene, #2 recycling symbol (detergent bottle, pipes, milk jugs, outdoor furniture)
- **LDPE:** low-density polyethylene, #4 recycling symbol (bread & trash bags, cling wrap)
- **PET:** Polyethylene Terephthalate, #1 recycling symbol (Carpets, cups, jars, textiles, water bottles)
- **PP:** Polypropylene, #5 recycling symbol (auto parts, cups, straws, juice bottles, hangers)
- **PS:** Polystyrene, #6 recycling symbol (cups, to-go containers, keyboards, packaging, fridge liners)
- **PVC:** Polyvinyl Chloride, #3 recycling symbol (pipes, vinyl siding, packaging, pool liners)
- **PU:** Polyurethane (foam cushions & insulation panels, gaskets, skateboard wheels, bushings, surface coatings, spandex)
- **PA:** Polyamides (nylon, kitchen utensils, sportswear)
- **PLA:** Polylactic Acid, #7 recycling symbol (3D printing filament, to-go food packaging, medical implants, upholstery)
- **PC:** Polycarbonate, #7 recycling symbol (electronic applications, glasses lenses)
- **PHA:** Polyhydroxyalkanoates (a form of bioplastic)
- **PEF:** Polyethylene Furanoate (a chemical analogue of PET, and a potential alternative for packaging applications such as bottles, films and food trays)
- **PMMA:** Polymethyl methacrylate (Acrylic), #7 recycling symbol (shatter-proof glass substitute)

Polymer: A polymer is a naturally occurring or synthetic substance made of many repeating units. Many polymers are hydrocarbons. A plastic material is a polymer, typically modified with additives, which can be molded or shaped under reasonable conditions of pressure and temperature. Examples of polymers are polyethylene and polypropylene.

Product Stewardship Program: An end-of-product-life management program where responsibility falls to provincial/territorial or municipal governments and either legislated fees or public funds are used for funding of the programs, rather than producer financial responsibility. Examples of Product Stewardship programs include those for automobiles, tires, electronics.

Pyrolysis: A process whereby plastics are broken down into a range of simpler hydrocarbon compounds by heating them in the absence of oxygen at temperatures between 300°C and 600°C. The process can be used on mono- or mixed/contaminated feedstocks, but some plastics should be avoided for safety (PVC) and yield (PET); PE and PP are preferred resin types. Degradation is not controllable, outputs are largely hydrocarbon mixes that can be used directly or processed using conventional refining technologies; consequently turning plastics processed this way back into plastics is unlikely as it requires additional, and energy intensive steps

Resin: The polymer feedstock (often in the form of pellets or pastilles), which is processed to create plastic materials and items. The processing of virgin resins could involve adding things like colourants, flame retardants or stabilizers. “Resin” can also refer to post-consumer plastics processed to create recycled polymers, ready to be formed into new products.

Recycled: A material that has been used before and is then put through a process so that it can form a new product.

Solvent-based purification (solvolysis) : A chemical recycling process that uses a solvent to dissolve plastic resin back into its component polymers and separate them from impurities (ideally, not always perfectly), which then become a waste product. Comprises technologies that reduce plastic to its polymer stage. Solvolysis is capable of decontaminating plastic but cannot address polymer degradation. The processes work only with monostreams (single resin feedstock) and are suited to PVC, PS, PE, and PP.

Thermal depolymerization: Thermal depolymerization can take one of three forms (depolymerization, pyrolysis or gasification), requires heat (300° - 1500°), and can be used to treat mixed feedstocks. Unlike the other processes outlined above the thermal depolymerization process can create unwanted byproducts (eg. H₂S, NO_x, PHSa, dioxins). With the exception of a specific process called “controlled thermal depolymerization (used to treat PMMA and PS) across the board the primary products of thermal depolymerization processes can be used directly as fuel. PE, PP, PS and PMMA are the resins most suitable for processing in this manner.

EXECUTIVE SUMMARY

The mountains of plastic pollution Canadian companies generate every year shows no signs of abating, even with recent federal measures designed to tackle the problem. Canada introduces roughly 4.67 million tonnes of plastic into the domestic market each year.¹ Of this, over 3.2 million tonnes end up as waste.² Roughly 86 percent of this waste is dumped in landfills.³

The impact of this plastic and petrochemical production, along with the pollution, brings harm to the environment and nearby communities. As expressed in the *Foreward* by Beze Gray of the Aamjiwnaang First Nation, surrounded by a cluster of industry making up 40 percent⁴ of Canada's petro-chemical industry, "the pollution generated in Aamjiwnaang doesn't remain here, we are connected to the rest of the world by our reliance on the air and water systems. Plastics do not just go away, without preventative action, pollutants will only continue to accumulate, just like the colonial violence in Aamjiwnaang."

The COVID-19 pandemic, declared by the World Health Organization on March 11, 2020, has compounded the problem of plastic pollution, with skyrocketing use of single-use plastics driven by the need for personal protective equipment and other plastics. Similar to jurisdictions in the U.S. and U.K.,⁵ Canada announced in May that its ban on

single-use plastics may be delayed.⁶ Meanwhile, even after health professionals reassured the public that reusables can be utilized safely by employing basic hygiene,⁷ industry extolled the benefits of plastic packaging and other products.⁸

Against this backdrop, on October 7, the federal government finally announced its proposed single-use plastic ban list and a discussion paper outlining its *Proposed Integrated Management Approach to Plastic Products to Prevent Waste and Pollution* (the "Approach").⁹ The plan has the overarching goal of reaching zero plastic waste by 2030 and proposes a three-pronged approach of managing, banning or restricting single-use plastics; establishing performance standards on minimum recycled content and rules for evaluating whether products conform to those standards; and expanding and improving Extended Producer Responsibility across Canada.¹⁰ The government hopes to reach the following objectives: (1) At least 50% recycled content in plastic products by 2030; and (2) Ban or restrict 6 harmful single-use plastics as early as 2021.

Greenpeace Canada criticized the *Approach* for ignoring the recycling failures and for centring a business-as-usual scenario based on industry interests, rather than scientific evidence.¹¹ This report provides further evidence in support of

¹ Deloitte and Cheminfo Services, [Economic Study of the Canadian Plastic Industry, Market and Waste](#), pg. 2, 2019, Environment and Climate Change Canada, Government of Canada. Based on the year 2016.

² Ibid., pg. 2.

³ Ibid., pg. 2.

⁴ MacDonald, Elaine and Sarah Rang, [Exposing Canada's Chemical Valley](#), 2007.

⁵ McCormick, Erin, ["It's all on hold": how COVID-19 derailed the fight against plastic waste](#), *The Guardian*, 9 July 2020; Evans, Judith, ["Plastic straws and stirrers ban delayed because of coronavirus](#), *Financial Times*, 15 April 2020.

⁶ Rabson, Mia, ["Canada's new climate targets, plastics ban likely to be delayed due to pandemic](#), *Canadian Press*, 19 May 2020.

⁷ Laville, Sandra, ["Reusable containers safe during COVID-19 pandemic, say experts](#), *The Guardian*, 22 June 2020.

⁸ Masterson, Bob, ["Chemistry and plastics sector can help guide nation through post-COVID transition](#), *Postmedia/The Owen Sound Sun Times*, 11 September 2020.

⁹ Government of Canada, ["News release: Canada one-step closer to zero plastic waste by 2030](#), 7 October 2020.

¹⁰ ECCC, [A proposed integrated management approach to plastic products: discussion paper](#), 2019, Government of Canada.

¹¹ See [statement](#) by Sarah King, Head of the Oceans & Plastics Campaign at Greenpeace Canada, on 7 October 2020.

Greenpeace Canada's position by exploring, in depth, the myth of recycling and scrutinizing data relied upon by the federal government.

This report's key findings include:

- **The current federal *Approach* is not equipped to get us to zero plastic waste by 2030. To meet its ambitious recycling targets, the *Approach* assumes a rapid expansion of unproven recycling technologies over the next decade.** The *Approach* fails to provide adequate measures to curb virgin plastic production and focuses on handling the waste; this does not put Canada on a path toward a circular economy.
- **Greenpeace's investigation into the biggest mechanical and chemical recycling facilities in Canada reveals they are, in a best-case-scenario, equipped to recycle less than 17% of the total plastic waste produced annually in Canada.¹²** This is the amount of plastic that is turned into other plastics at facilities that handle most of Canada's recycling.
- **Even the best-case scenario is failing.** British Columbia's Extended Producer Responsibility program, which puts the onus of collection and recycling on producers, is further ahead than the rest of Canada, but **BC is still losing more than half its plastic waste to landfills, and an additional 30% turning plastic into fuel, annually.¹³**
- **Investments in more recycling and so-called "chemical recycling" aren't the solution.** Chemical plastic-to-plastic technologies are specific to resin type and do not exist for all plastics (multilayered, for example). Often, where they do exist, the processes are expensive, difficult to perfect, energy intensive and produce unavoidable waste — as such they are not circular. It's also likely that companies will default to dirty plastic-to-fuel methods.
- **The climate impacts of the federal government's commitment to plastic production and "recycling" have not been transparently accounted for in the *Approach*.** From production to disposal, especially plastic-to-fuel and waste-to-energy (incineration), plastic pollutes and emits greenhouse gases. This undermines federal commitments to a low carbon economy.
- **The federal government's proposed *Approach* to plastic waste and pollution further entrenches us in a linear and fossil fuel dependent system that prioritizes industry, not people.** A focus on improving recycling and ensuring plastic as a mainstay in the economy fails to meet basic principles of the zero waste hierarchy, a truly circular economy, and environmental justice.
- **Greenpeace found \$334 million in spending on virgin plastics producers since 2017, plus millions more in spending on the plastic industry following the onset of the pandemic.¹⁴** Federal and provincial funding sources continue to spend on virgin plastics manufacturing (despite the federal government promising to eliminate certain fossil fuel subsidies¹⁵).

¹² See Appendix 2.

¹³ See Section 2.2 on page 19 of this report.

¹⁴ See Appendix 3, Table A.

¹⁵ Rabson, Mia, "[Review of federal fossil fuel subsidies appears to be behind schedule](#)," *Canadian Press*, 14 November 2019.

These failures can be addressed in a way that creates opportunities in a green and just recovery from COVID-19 — a missed opportunity in federal recovery plans, so far. Greenpeace Canada is calling on the federal government to stop dragging its heels on the inevitable transition toward reuse-centred models. We propose the following solutions be taken up, starting in 2021.

Recommendations:

1. **Strengthen A Proposed Integrated Management Approach To Plastic Products to Prevent Waste and Pollution**, including by phasing out all non-essential plastics by 2030, stopping the production of common single-use plastics in 2021, and setting time-bound targets for reducing plastic production and for increasing reuse/reusable models across sectors, as outlined below.
2. **Recognize that there is no circular economy for plastics. Make building a zero waste, reuse-centred economy part of COVID-19 green recovery plans**, starting with investments in the 2021 Budget and ensuring a just transition for plastics/petrochemical workers, as outlined in Chapter 3.
3. **Consult with Indigenous, BIPOC and frontline communities** impacted by plastic production, recycling, incineration and disposal about federal plans — including by ensuring opportunities to design and benefit from a circular economy, and by increasing funding for Indigenous-led and community-led solutions.
4. **Ministers Freeland and Wilkinson should be transparent about and end subsidies** and investments for petrochemical and

plastics production,¹⁶ as well as waste-to-fuel and waste-to-energy disposal.

5. **Ensure that governments and private companies are transparent** with the public about current and planned plastic production, recycling capacity, public funding and harmful emissions, including those contributing to planetary heating.

Worldwide, roughly 90% of new plastic products are made from fossil fuels,¹⁷ making the elimination of unnecessary plastics at the source — and not just dealing with the waste they create, as the federal government currently proposes — an urgent priority for addressing climate change and the human health threats¹⁸ it presents.



¹⁶ Identifying and ending subsidies was [recommended](#) by the federal Standing Committee on Environment and Sustainable Development last year (see recommendation 13). As noted in Appendix 2, we have tried to compile subsidies based on publicly available information, but the federal government has the access to information and means to do this more fulsomely.

¹⁷ ECCC, "[Moving Canada toward zero plastic waste: Closed consultation](#)," Consultation closing 21 September 2018, Government of Canada.

¹⁸ See, for example, the health threats caused by climate change in Howard, Courtney, et al. [Lancet Countdown 2018 Report: Briefing for Canadian Policymakers](#), 2018, Canadian Medical Association and Canadian Public Health Association.

1. CONTEXT & BACKGROUND

Since Prime Minister Justin Trudeau's Liberals came into power in 2015, the story of the federal government's action on plastic pollution has been one of disappointed hopes. Despite pledges at the national and international levels since 2017,¹⁹ **Canada produces over 3.2 million tonnes (t) of plastic waste each year,**²⁰ with rates of plastic use much higher than in many parts of the world.²¹

It is well reported that **only about 9 percent of the country's plastic waste is recycled,**²² while the vast majority winds up in landfills. Not only does this mean that the costs of waste disposal pile up on taxpayers (whose municipal taxes or fees usually cover such services), but it perpetuates the yearly demand for **3.8 million t**²³ of virgin plastic resin (the building blocks of plastic products), which globally, is made overwhelmingly from fossil fuels.²⁴ Not only does this plastic production harm our environment, it has very real impacts on human communities.

¹⁹ In 2017, the federal government [prohibited](#) the manufacture, import and sale of toiletries containing plastic microbeads. The following year, as G7 president, the federal government [championed an Oceans Plastics Charter](#). Canada further launched a public consultation on a zero plastic waste approach and a [strategy and two action plans](#) resulted (2018–2020), culminating in the *Proposed Integrated Management Approach to Plastic Products to Prevent Waste and Pollution* of October 2020.

²⁰ Deloitte and Cheminfo Services, [Economic Study of the Canadian Plastic Industry, Market and Waste](#), pg. 2, 2019, Environment and Climate Change Canada, Government of Canada. Based on the year 2016.

²¹ See, for example, plastic waste rates (calculated per capita) in India, Southeast Asia and Scandinavia in: Buonsante, Vito, [Drowning in Plastic: Ending Canada's contribution to the global plastic disaster](#), Oceana, 2020

²² Deloitte and Cheminfo Services, pg ii, 2019. Cited also in the [Toronto Star](#) and [Globe & Mail](#), for example.

²³ Deloitte and Cheminfo Services, pg. 4, 2019.

²⁴ ECCC, ["Moving Canada toward zero plastic waste: Closed consultation,"](#) Consultation closing 21 September 2018, Government of Canada.

Indigenous, racialized and Global South communities are on the frontlines of plastic and petrochemical production and pollution, which is part and parcel of continued colonization. It impacts communities' environments, food chains²⁵ and health.²⁶ Here in Ontario, Canada, Land Defenders Vanessa and Beze Gray from the Aamjiwnaang First Nation have worked to do "Toxic Tours" and public awareness that familiarize people with the 40 percent of Canada's petrochemical industry that surrounds their community, impacting people's health, from cancer to reproductive issues to life expectancy.^{27,28,29} What's more, Canada continues exporting plastic waste and recycling to poorer nations³⁰ — a practice dubbed "waste colonialism."³¹

²⁵ For a Canadian example, see reporting on the Civic Lab for Environmental Action Research Dharssi, Alia, ["Newsletter: Plastic pollution is a social justice issue,"](#) *The Discourse*, 26 February 2020.

²⁶ Georgescu, Calin, [A Visit to Canada: Report of the Special Rapporteur on the implications for human rights of the environmentally sound management and disposal of hazardous substances and wastes](#), pg. 12, 4 September 2020, UN. Human Rights Council.

²⁷ See [Aamjiwnaang Solidarity against Chemical Valley](#), a grassroots collective of Anishinaabe Land Defenders connecting the environmental struggles of Indigenous frontline communities, asserting Indigenous Rights and Sovereignty, and using both nonviolent direct action and education to raise awareness about environmental injustice.

²⁸ MacDonald, Elaine, [Return to Chemical Valley 2019](#), Ecojustice, 2019.

²⁹ Cabana, Ysh, ["In Canada's Chemical Valley, a tour sheds light on tragic toxicity,"](#) *Philippines Reporter*, 25 October 2019.

³⁰ See Greenpeace's [investigating and analysis of waste exports to Malaysia](#) as well as see the a *CBC Marketplace* investigation by Szeto, Eric et al., ["We don't want to be the next cancer village: Canada's plastic recycling dumped and burned overseas,"](#) *CBC Marketplace*, 27 September 2019.

³¹ Liboiron, Max, Dr. ["How Plastic Is a Function of Colonialism,"](#) *Teen Vogue*, 21 December 2018.

Today, the COVID-19 pandemic (declared by the WHO on March, 11, 2020) ³² is exacerbating the problem of plastic pollution. Around the world, plastic use spiked, driven by the demand for personal protective equipment (PPE), such as disposable face masks, gloves, and gowns, as well as food packaging for take out meals.³³ According to the United Nations, it can be expected that about 75 percent of the used masks and other pandemic-related waste will end up in landfills or oceans.³⁴

Canada was not immune to this changing context. Similar to the U.K. and parts of the United States, officials announced that the highly-anticipated federal ban on single-use plastics may be delayed.³⁵ Meanwhile, some recycling centres had to close or suspend operations due to the pandemic.³⁶ In May, the city of Edmonton reported that about a quarter of what is collected in recycling bins goes to landfill due to a lack of staff capacity.³⁷

Appearing to exploit the public's health anxieties, the plastic industry has taken the opportunity to promote its products. For instance, even after health professionals reassured the public that reusables can be utilized safely by employing basic hygiene,³⁸ industry has extolled

the benefits of plastic packaging and other products.³⁹ The Chemistry Industry Association of Canada (CIAC), for example, has continued to tout recycling as a key solution and positioned government funding as a main hurdle.⁴⁰ CIAC is the main lobby group for plastics and petrochemicals in Canada. As part of its pre-Budget 2021 recommendations, CIAC further requested that Natural Resources Canada create a \$200 million "innovation" fund for plastics, a request that was also part of a CIAC-endorsed industry-led coalition for such a fund to "accelerate innovation in product design and advanced plastics recycling and recovery technologies such as chemical recycling, pyrolysis, gasification and energy recovery".⁴¹

These developments are symptoms of a larger problem. While the federal government launched some efforts to deal with pandemic waste,⁴² systemic failures to address plastic pollution at the point of production, alongside the refusal to oppose industry spin and acknowledge the categorical failures of recycling, are all bottlenecks to fixing the problem once and for all.

Greenpeace Canada has long been calling for industry and regulatory change. Given the setbacks posed by the pandemic, now is the time to redouble efforts to tackle plastic pollution. Since April, Greenpeace has recommended that investments in building a truly zero-waste, circular economy be part of a green

³² WHO Director-General's [opening remarks](#) at the media briefing on COVID-19 - 11 March 2020.

³³ Adyel, Tanveer M., "[Accumulation of plastic waste during COVID-19](#)," Science, Vol. 369, Issue 650 (2020), pp. 1314-1315 DOI: 10.1126/science.abd9925

³⁴ United Nations, "[Five things you should know about disposable masks and plastic pollution](#)," UN News, 30 July 2020.

³⁵ Rabson, Mia, "[Canada's new climate targets, plastics ban likely to be delayed due to pandemic](#)," Canadian Press, 19 May 2020.

³⁶ See, for example: La presse canadienne, "[La pandémie nuit aux mesures de protection de l'environnement](#)," Radio-Canada, 23 May 2020.

³⁷ St-Onge, Josee, "[Quarter of Edmonton's recyclables going straight to landfill during pandemic](#)," CBC, 03 May 2020.

³⁸ Laville, Sandra, "[Reusable containers safe during COVID-19 pandemic, say experts](#)," The Guardian, 22 June 2020.

³⁹ Masterson, Bob, "[Chemistry and plastics sector can help guide nation through post-COVID transition](#)," Postmedia/The Owen Sound Sun Times, 11 September 2020.

⁴⁰ See comments by CIAC in Nielsen, Mark "[Single-use plastics ban not a concern for petrochemical plant developer](#)," Toronto Star, 15 October 2020.

⁴¹ See Task Force for Real Jobs, Real Recovery, [Securing Canada's Economic Future](#), pg. 73, 2020 [endorsed by CIAC]; a funding request reiterated in CIAC's [pre-budget 2021 submission](#).

⁴² See, for example, the [challenges](#) launched through the Innovative Solutions Canada in October.

and just economic recovery from the pandemic.⁴³ As this report will describe, however, current federal plans are not equipped to get us there.

1.1 Zero Plastic Waste by 2030: What's the plan?

On October 7, 2020, the federal government announced its *Proposed Integrated Management Approach to Plastic Products to Prevent Waste and Pollution* (the “Approach”) alongside plans to list “plastic manufactured items” on the Toxic substances list under Schedule 1 of the Canadian Environmental Protection Act (CEPA).⁴⁴ Achieving the designation of “plastic manufactured items” on the Toxic Substances list will facilitate the regulation and banning of plastic items and materials that meet the requirements to be designated as items of concern. At present, six types of single-use plastic (SUP) have been evaluated as meeting the criteria for management via a ban and are slated to be restricted as early as 2021.

This *Approach* is part of the federal government's overall strategy to achieve zero plastic waste by 2030. The intent to do so was announced in a 2018 zero waste strategy (and two successive action plans) by Canadian environmental ministers.⁴⁵ **In the rationale⁴⁶ for its management approach, the federal government relies in large part on improvements to recycling rates and strengthening markets for domestic production.**

The *Approach* is outlined in a discussion paper that is the focus of a public consultation that

⁴³Greenpeace Canada, [Principles and pathways toward a green and just recovery](#), April 2020 (updated in June 2020).

⁴⁴ Government of Canada, “[News release: Canada one-step closer to zero plastic waste by 2030](#),” 7 October 2020.

⁴⁵ Canadian Council of Ministers of the Environment, [Strategy on Zero Plastic Waste](#), 2018. See also 2019 Phase 1 Action Plan and 2020 Phase 2 Action Plan, also accessible via that link.

⁴⁶ See ECCC, “[Discussion paper: A proposed integrated management approach to plastic products: discussion paper](#)”, p. 3, Government of Canada, 2020.

ended on December 9, 2020.⁴⁷ Its overarching goal is to reach zero plastic waste by 2030 in part by meeting the following objectives:

1. Reaching at least 50 percent recycled content in plastic products by 2030; and
2. Banning or restricting 6 harmful single-use plastics as early as 2021.

The *Approach* covers SUPs that are defined as “designed to be thrown away after being used only once.” SUPs are broken down into the following categories: packaging (e.g., food wrappers, shampoo bottle, and plastic bags); convenience items (e.g., utensils, disposable cup lids, straws, quick-serve containers); and essential items (e.g., masks and latex gloves for medical use). Also recognized are “short-lived” disposables such as pens, toothbrushes, and more.

To manage the waste caused by these products, the federal government proposes a three-pronged approach to guide regulatory and voluntary instruments:

1. Managing SUPs: restrictions or bans on harmful SUPs, as supported by science;
2. Establishing performance standards: setting minimum recycled content requirements and rules for evaluating whether products conform; and
3. End of life responsibility: working with provinces and territories to improve and expand Extended Producer Responsibility (EPR) across Canada, making companies pay for product collection and recycling.

To determine the need for single-use plastics management, the *Approach* proposes this three-step process:

⁴⁷ A version of this report was submitted to the federal government as part of that consultation.

1. Categorizing SUPs as problematic from an environment or recovery/collection standpoint (to be considered “harmful”, necessitating a ban/restriction, a SUP must meet both categories).
2. Deciding whether to reduce/eliminate the item from the domestic market or increase the recycling/recovery rate; and
3. Choosing the appropriate instrument to achieve the goal informed by the Instrument Choice Framework for Risk Management under the Canadian Environmental Protection Act (CEPA).

Only six SUPs made the ban list announced in October: plastic checkout bags; stir sticks, six-pack rings, cutlery, straws, and certain types of food service ware. The plan noted that further consultations could indicate whether other products warrant management.

On the surface, the plan ticks the box on the Liberal Party’s election promise to ban certain SUPs and hold polluters accountable — broad goals that were reiterated in the September *Speech from the Throne*.⁴⁸ In reality, **both industry stakeholders (many of whom oppose the ban) and the federal government have commented on the ban’s tiny scope.** Environment Minister Jonathan Wilkinson told the *Canadian Broadcasting Corporation* that “the ban is a very small part of the plastics industry in Canada and the utilization of plastic in Canada.”⁴⁹ While the chief plastic lobby group in Canada estimates that items to be banned

account for less than one percent of plastic demand.⁵⁰

Given the admittedly minuscule scope of the ban, we infer that the bulk of single-use plastics and packaging will be addressed through the second and third parts of the government’s three-pronged approach: by increasing recycled content, improving waste diversion and recycling rates and increasing producer responsibility for their products. As such, Greenpeace Canada’s view is that, despite lofty aspirations and political rhetoric, the plan is built on the global plastic industry’s self-interested, false promise of recycling.⁵¹

1.2 The Infamous R: Unpacking what we already know about the recycling myth

Waste collection systems are not standardized across Canada. While municipalities bear the largest part of collection recycling and disposal, provinces/territories establish policies and monitoring standards, and the federal government is responsible for interprovincial and international movement of hazardous materials as well as identifying best practices to reduce toxic pollution.⁵²

Provincial and territorial governments have the jurisdiction to implement extended producer responsibility programs (EPRs), which put varying degrees of onus and cost back on producers for managing the materials and products they produce. Certain plastic items are collected under

⁴⁸ Governor General Julie Payette delivered the federal throne speech on 23 September 2020: [A Stronger and More Resilient Canada: Speech from the Throne to open the Second Session of the Forty-Third Parliament of Canada](#). Government of Canada.

⁴⁹ See, for example, Environment Minister Wilkinson’s comments in: Wallis, Snowdon, “[Ban on single-use plastic won’t trash Alberta’s recycling hub plans, Ottawa insists](#),” CBC, 7 October 2020.

⁵⁰ See comment attributed to Bob Masterson of CIAC in Joannou, Ashley, “[Single-use plastic ban could impact Alberta’s ability to attract investment, industry group warns](#),” *Edmonton Journal*, 8 October 2020.

⁵¹ See investigation in the U.S. by NPR and PBS into how industry continued to promote recycling despite knowing its limitations: Sullivan, Laura, “[Plastic Wars: Industry Spent Millions Selling Recycling — To Sell More Plastic](#),” *NPR*, 31 March 2020.

⁵² Government of Canada, “[Municipal solid waste: A shared responsibility](#)”

EPRs (managed at the provincial/territorial level) to divert waste from landfills. Items collected under municipally-run recycling programs do the same, but are paid for by taxpayers. The federal government's new *Approach* commits to working with provinces and territories on EPRs.⁵³

Regardless of who runs recycling programs, **the first step is collection and sorting**. This process is reliant on consumers at the household level, such as through Blue Bin programs that collect and truck waste to sorting and pre-processing facilities. The plastic waste amassed at such facilities becomes the feedstock for plastic recycling. But, as discussed in the next chapter, plastics are lost in each step of the process.

The plastic recycling technology Canada relies on most is called **mechanical recycling, a type of plastic-to-plastic recycling**.⁵⁴ This is a well-established industrial process that is used for 97 percent of recycled content.⁵⁵ Mechanical recycling involves sorting, washing, shredding/grinding, melting and pelletizing plastic waste into secondary raw material. This process, however, cannot remove additives such as flame retardants or colourants.⁵⁶ Mechanical recycling does not change the chemical structure of the plastic, and so cannot repair degradation caused by wear and tear of use or the physical effects of the recycling process itself.⁵⁷ As such, plastics cannot be mechanically recycled endlessly without a reduction in quality. For these reasons, **it is common practice to need to mix mechanically**

recycled resin with virgin resin when producing recycled plastic products.

Plastic resins suitable for mechanical recycling include polyethylene (PE), polyethylene terephthalate (PET), polypropylene (PP), and polystyrene (PS). Given deteriorating quality, mechanically obtained secondary plastic resins are frequently used in end-of-life applications: downcycled into products which will ultimately end up in landfills or being incinerated.⁵⁸

Chemical recycling (sometimes called “advanced recycling”) is an umbrella term used by industry and government to cover a variety of technologies that convert plastic to plastic, plastic to fuel, or plastic/waste to energy. However, **the only form of chemical recycling that meets an actual definition of recycling is technology that converts plastic to plastic.**

This type of recycling is being eyed in part because of its potential ability to address degradation and contamination in the recycling process. **But plastic-to-plastic chemical recycling has not been commercially scaled in Canada.**⁵⁹ Still, “advanced recycling” technology has been touted as a solution to plastic pollution by industry-affiliated groups.⁶⁰ As we will discuss in our findings (Chapter 2), this is a simplistic assumption.

For collected plastic that makes it through the recycling sorting process, the two chemical

⁵³ ECCC, the *Approach*, pg. 14, 2020.

⁵⁴ Deloitte and Cheminfo Services Inc, 2019.

⁵⁵ Immell, Tara et al., *A Roadmap to Support the Circularity and Recycling of Plastics in Canada – Technical Standards, Regulations and Research*, pg. 21, 2020.

⁵⁶ Zero Waste Europe, *El Dorado of Chemical Recycling: State of play and policy challenges*, August 2019.

⁵⁷ Zero Waste Europe, *El Dorado of Chemical Recycling: State of play and policy challenges*, August 2019.

⁵⁸ O.Berk, “[What is Downcycling](#),” 30 May 2018.

⁵⁹ *Accelerating Circular Supply Chains for Plastics*, Closed Loop Partners, 2019.

⁶⁰ See, for example Seidel, Christina, “[Opinion: Smart solutions needed to create circular economy for plastics](#),” *Edmonton Journal*, 25 September 2020. (Seidel is the co-chair for the [Plastics Alliance of Alberta](#), a collaboration between government, industry, and academia [linked to Alberta's new plan](#) to grow natural gas and related products, including plastics).

processes most likely to be used for plastic-to-plastic recycling applications are:

- **Solvent-based purification (solvolysis):** This process extracts impurities (waste) and the polymers must then be processed again to form new products (and thus are subject to degradation). This process is suitable for polyvinyl chloride (PVC), PS, PP and PE; and
- **Chemical depolymerization:** Suitable for a wide range of plastic types, this transforms used plastics into the equivalent of virgin polymers (no degradation or contamination), ready to be put back together (re-polymerized) into new plastic. However, this process can require significant thermal energy, and has unknown safety and sustainability questions due to the use of catalysts, and resultant waste contaminants.

A third type of chemical process, thermal depolymerization, cannot be considered recycling, according to Greenpeace Canada, because it is not currently used for creating plastic from plastic. It uses heat to convert mixed feedstocks into fuel. In the process, it creates greenhouse gas (GHG) emissions and other harmful pollutants.⁶¹ Plastic that ends up in the waste stream may be treated this way. Instead of being reconstituted into new plastic, waste treated this way simply ends its life as burned emissions fuelling the climate crisis. Like incineration, burning garbage and plastic waste to capture energy is a linear, not circular, process.

1.3 Defining a truly circular economy

⁶¹ Global Alliance for Incinerator Alternatives, [False Solutions to the Plastic Pollution Crisis](#), 2020.

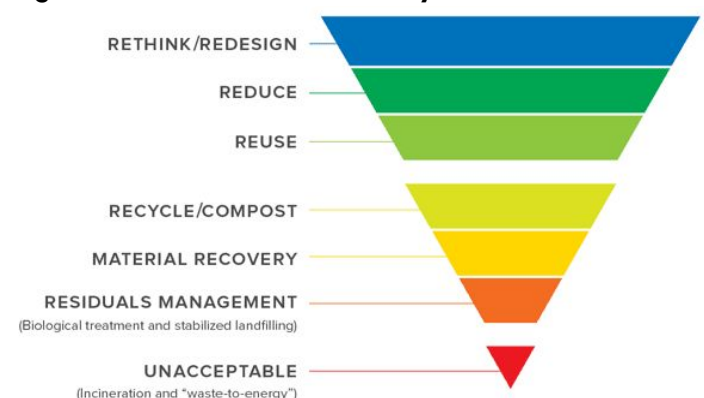
As illustrated by the great volume of plastic waste Canada generates, **our current economic system is linear: it is based on a take-make-waste model** of using up and consuming resources.

In contrast, **a circular economy seeks to end waste and use resources sustainably in a closed loop.** Rejecting industrial growth models, a circular economy decouples economic activity from the relentless use of finite resources. Greenpeace Canada believes that a true circular economy:

- is regenerative;
- uses renewable sources of energy;
- designs waste and pollution out of the system;
- prioritizes the reuse, refurbishment, remanufacturing, sharing, leasing, and repairing of materials and products;
- builds social and natural capital;
- respects natural systems and seeks to maintain biodiversity; and
- has social justice and equity at its core.

A circular economy means, for example, moving from take-make-waste to rethink-reuse-return. (See Chapter 3 for ways could be harnessed as part of COVID-19 recovery efforts.)

Figure 1: The Zero Waste Hierarchy



Source: Zero Waste International Alliance (Zero Waste Hierarchy Version 7.0 at zwia.org/zwih).

1.4 Environmental justice and a green, equitable recovery

In Chemical Valley, Sarnia, Ontario, toxic chemicals have been linked to negative health impacts, including cancer in Indigenous and frontline communities like the **Aamjiwnaang First Nation**.⁶² It is well documented that the continued environmental and public health impacts of petrochemical facilities, fossil fuel extraction and plastics disposal from incinerators to landfills hits certain groups harder.



Credit: Beze Gray, facility in Aamjiwnaang

For example, a 2020 report by Călin Georgescu, the United Nations Special Rapporteur on human rights and hazardous waste found that “in

⁶² See work done by the Aamjiwnaang First Nation and Ecojustice, for example, by: MacDonald, Elaine, [Return to Chemical Valley 2019](#), Ecojustice, 2019.

examining toxic exposures in Canada, the question of discrimination becomes simply unavoidable”.⁶³

Citing a 2018 Health Canada analysis,⁶⁴ the report goes on to state that health inequities persist across a range of socioeconomic indicators and recommends “consideration of intersectional discrimination manifesting in impacts of toxic exposures”.⁶⁵

Coined by American Black civil right leader Benjamin Chavis, **environmental racism** refers to racial discrimination in policy- and law-making, regulation enforcement, and the targeting of racialized communities for locations of toxic operations or waste facilities, as well as the history of excluding racialized people from environmental leadership.⁶⁶

The **UN Special Rapporteur’s report** should serve as a wakeup call to Environment Minister Wilkinson, Health Minister Patty Hajdu, and Indigenous Services Minister Marc Miller, as well as Canadian policymakers on plastics, as it **underscores that “the only way to minimize externalized impacts on people and peoples throughout the lifecycle of plastics is by reducing their consumption and production.”**⁶⁷

The time of plastics and fossil fuel industries being allowed to push toxic, throwaway plastics that harm communities and the planet must come to an end. In doing so, we can make space for a new model that puts people and the planet first.

One way in which groups are advocating for a society that is more economically, racially and

⁶³ Georgescu, pg. 7, 4 September 2020.

⁶⁴ Health Canada, [“Key Health Inequalities in Canada,”](#) 2018.

⁶⁵ Georgescu, pg. 7, 4 September 2020.

⁶⁶ Macdonald, Elaine, Dr., “Environmental racism in Canada: What is it, what are the impacts, and what can we do about it?” Ecojustice, 1 September 2020.

⁶⁷ Georgescu, pg. 19, 4 September 2020.

environmentally equitable is a **green and just recovery**. Politicians, academics and civil society advocates have observed that governments could approach their recovery policies in a way that addresses systemic inequalities while shifting social and economic systems toward better environmental outcomes.

For example, hundreds of organizations — including Climate Action Network, Greenpeace Canada, the Canadian Federation of Students, the Canadian Labour Congress, Indigenous Climate Action, Black Lives Matter-Vancouver, and Registered Nurses' Association of Ontario — have endorsed six principles of a Just Recovery for All.⁶⁸ Those principles include:

1. Put people's health and wellbeing first, no exceptions.
2. Strengthen the social safety net and provide relief directly to people.
3. Prioritize the needs of workers and communities.
4. Build resilience to prevent future crises.
5. Build solidarity and equity across communities, generations, and borders.
6. Uphold Indigenous rights and work in partnership with Indigenous peoples.

In May, a University of Oxford economic study comparing “traditional” tax relief measures to environmentally oriented ones identified “five policies with high potential on both economic multiplier and climate impact metrics: clean physical infrastructure, building efficiency retrofits, investment in education and training, natural capital investment, and clean R&D.”⁶⁹ It also noted

that “green fiscal recovery packages can act to decouple economic growth from GHG emissions and reduce existing welfare inequalities that will be exacerbated by the pandemic in the short-term and climate change in the long-term.”

After months of campaigning by civil society, in September, the federal government promised that the economic recovery from the pandemic would be “green” and “equitable”.⁷⁰ As we will demonstrate in the coming chapters, however, the federal government has missed opportunities to make a truly circular economy part of those plans.



Gredit: Greenpeace Toronto local group

⁶⁸ Climate Action Network Canada, [Just Recovery for All](#), 2020. See endorsers section for complete list of signatory groups.

⁶⁹ Hepburn, C. et al, “[Will COVID-19 fiscal recovery packages accelerate or retard progress on climate change?](#)”, 2020, Smith

School Working Paper 20-02, pg. 13, Oxford Smith School of Enterprise and the Environment.

⁷⁰ “[Freeland says restart of economy needs to be green, equitable](#)”, *Global News*, 18 August 2020.

2. THE MYTH OF PLASTIC RECYCLING

2.1 Understanding Canada's existing plastics landscape

In 2019, Environment and Climate Change Canada (ECCC) funded the *Economic Study of the Canadian Plastic Industry, Market and Waste*, a survey of plastic waste and recycling in Canada conducted by Deloitte and Cheminfo Services.⁷¹ The report is informed by a range of public, academic, and industry sources (including information by key plastics lobby groups)⁷² and provides a comprehensive assessment of the plastic value chain in Canada. It also is meant to inform the federal government's policy making — recommending, for example, an “integrated approach to plastic management,” the first tenet of which is the creation of markets for recycled plastic (such as content quotas for plastic products).⁷³

Greenpeace Canada does not agree with the report's recommendations, which focus on unrealistic, market-based waste management instead of reducing plastic production. We utilize and analyze Deloitte/Cheminfo's data, noting crucial, but overlooked, shortcomings in the federal government's information gathering. For example, Deloitte/Cheminfo recognizes waste-to-fuel as chemical recycling,⁷⁴ whereas Greenpeace Canada does not consider this to be zero-waste or “recycling” (as explained in Chapter 1). The Deloitte/Cheminfo Services report says that Canada's economy is “designed to be linear”.⁷⁵ What it doesn't say, and what we will argue in this chapter, is that cannot become circular while it relies so heavily on the plastics industry.

The Deloitte/Cheminfo report revealed the conditions of plastics recycling in the country to be bleak: in 2016, **2.795 million tonnes (t)** – or 86 percent – of plastic waste ended up in landfills, another **137,000 t** were incinerated with energy recovery, and another **29,000 t** were lost to unmanaged dumps or leaks, ending up in the environment.⁷⁶ Only **305,000 t**, around 9%, were “recycled”.⁷⁷ However, the report notes that of that, **40,000 t** was “chemical recycling from disposed waste”;⁷⁸ this was most likely plastic recovered from the waste stream made into fuel (not recycling, in our opinion). Deloitte/Cheminfo also identified that another **9,000 t** was “chemical recycling from diverted waste”⁷⁹ (in the recycling stream). This represents a tiny 0.3 percent of the total plastic reported as “recycled”. But, as discussed in the following subsection, only a very small portion could have been plastic-to-plastic recycling. **Even being overly cautious and including the full 9,000 t, discounting the 40,000 t we estimate to be burned as fuel brings the total recycled plastic down to 8 percent (roughly 265,000 t).**⁸⁰



⁷¹ Deloitte and Cheminfo Services, 2019.

⁷² Deloitte and Cheminfo Services, 2019. See Disclaimer section.

⁷³ Deloitte and Cheminfo Services, 2019, pg 22.

⁷⁴ Deloitte and Cheminfo Services, 2019, pg x.

⁷⁵ Deloitte and Cheminfo Services, 2019, pg 3.

⁷⁶ Deloitte and Cheminfo Services, 2019, pg ii.

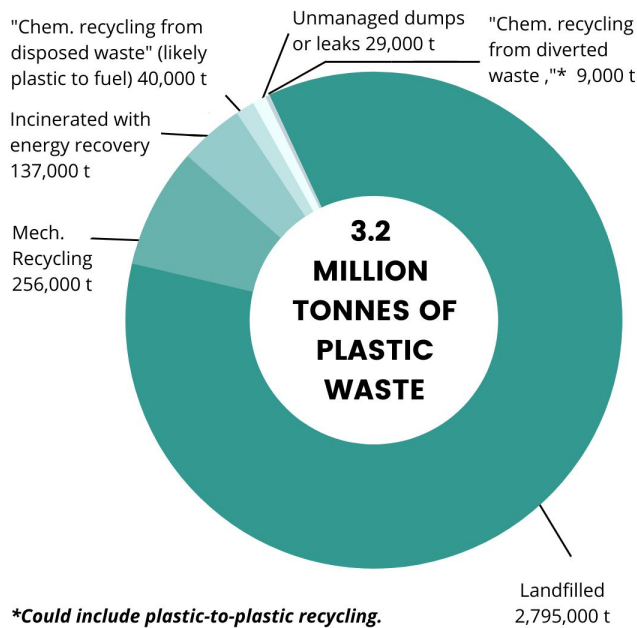
⁷⁷ Deloitte and Cheminfo Services, 2019, pg ii.

⁷⁸ Deloitte and Cheminfo Services, 2019, pg ii.

⁷⁹ Deloitte and Cheminfo Services, 2019, pg ii.

⁸⁰ Deloitte and Cheminfo Services, 2019, pg ii.

Figure 2: Plastic waste processing in tonnes, 2016

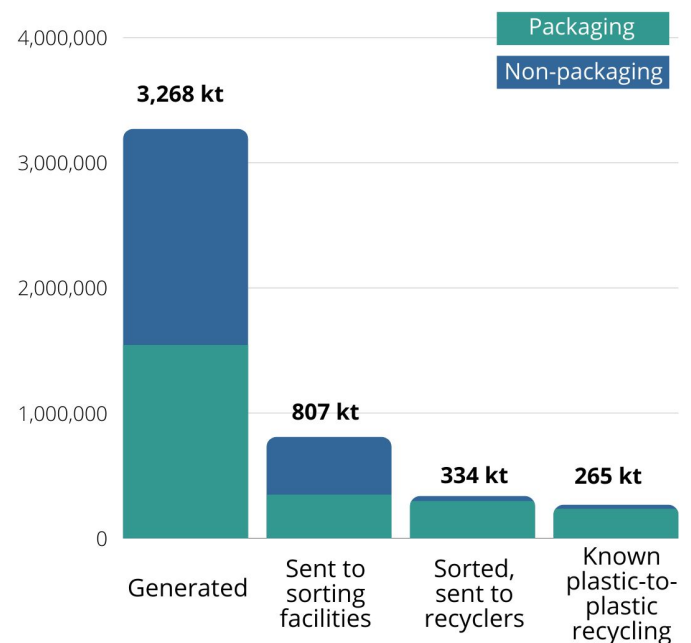


Source: Deloitte/Cheminfo, 2019; adapted with Greenpeace analysis 2020

It is further noted that **1.59 million t** of the plastic circulating in 2016 was non-durable,⁸¹ the vast majority of which is packaging, so it most likely went straight to waste.⁸² In total, non-durable plastic made up nearly half of all the plastic waste in the country, and packaging accounted for **33 percent** of the total plastic circulated that year.⁸³

Much of the plastic waste that is put into the recycling stream, particularly food packaging, can't be recycled — where these plastics end up, inevitably, is in landfills, incinerated, plastic-to-fuel, or in the environment. Deloitte/Cheminfo found that while more than **3.2 million t** of plastic waste were produced in 2016, only **807,000 t** were actually sent to sorting facilities, and **334,000 t** to processing facilities. Between those sorting and reprocessing stages, **542,000 t** were discarded (see Figure 3).

Figure 3: Loss of plastics along the waste management process, 2016



Source: Deloitte/Cheminfo, 2019 (adapted from pg. 12); Greenpeace analysis 2020.

The federal ban on single-use plastics (SUPs) has a negligible scope despite the government's observation that approximately one-third of annual plastic use in Canada is single-use or "short-lived".⁸⁴ Addressing the problem of SUPs is essential. But beyond that, Canada's plastic waste problem clearly requires comprehensive solutions. The crisis is systemic: these numbers indicate that existing recycling infrastructure in Canada is buckling under the burden of massive virgin plastic waste production, which in turn continues to grow in part thanks to federal and provincial governments' funding and industry partnerships, illustrating the priorities of the public officials involved (see section 2.3, page 22). Virgin plastic resin demand sits at **3.8 million t** annually.⁸⁵

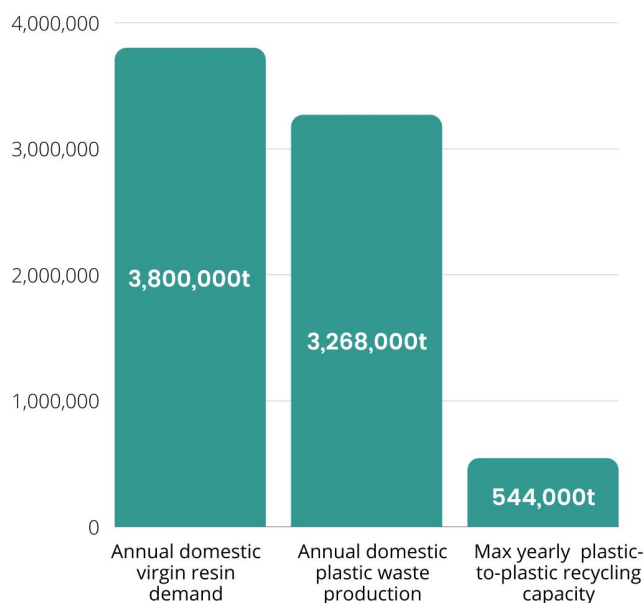
⁸⁴ ["Canada to ban harmful single-use plastics and hold companies responsible for plastic waste"](#), Prime Minister's Office, 10 June 2019.

⁸⁵ Deloitte and Cheminfo Services Inc, 2019, pg. 4. Based on 2016.

2.2 Investigating recycling capacity in Canada

Greenpeace Canada has investigated the recycling capacities of the top 32 largest recycling plants in the country⁸⁶, 10–11 of which conduct the vast majority of the country’s recycling.⁸⁷ We found that **plastic-to-plastic recycling capacity (mechanical and chemical) in the country is currently between about 514,895–544,400 t, less than 17 percent of the total waste produced annually.**⁸⁸

Figure 4: Annual plastic demand, production and recycling capacity in Canada, 2016



Source: Deloitte/Cheminfo, 2019 (for annual domestic virgin resin demand and annual domestic plastic waste production); Greenpeace analysis 2020 (for capacity). Rounded to the nearest thousand.

⁸⁶ Greenpeace Canada looked into 50 recycling facilities across the country, of which only 32 provided concrete information regarding their capacities. See Appendix 1 for details about the methodology and key desktop literature consulted.

⁸⁷ Deloitte and Cheminfo Services Inc, 2019, pg. 10.

⁸⁸ See Appendix 2.

FOOD GRADE PACKAGING IN CANADA



The gaps in the system grow even more apparent when considering the need for food-grade packaging.

Packaging makes up about half of the plastic waste produced annually in Canada.⁸⁹ While we don’t know precisely how much of the packaging is for food products, we know it is a significant proportion of the total. Current regulations disallow recycled plastic from being used in applications where it will come into direct contact with food unless minimum standards have been met.⁹⁰

Currently **only 10 of the 32 facilities with data confirmed being able to produce food-grade recycled plastic, of which 3 were recycled water bottle producers.**⁹¹

This illustrates a significant and sizable shortcoming in Canada’s recycling industry’s ability to meet specific needs which equate to a significant draw on virgin plastics.

⁸⁹ Deloitte and Cheminfo Services Inc, 2019, pg. 7.

⁹⁰ Government of Canada, “[Guidelines for Determining the Acceptability and Use of Recycled Plastics in Food Packaging Applications](#),” webpage updated 7 October, 2011.

⁹¹ See Appendix 2.

Each form of recycling in the country presents its own set of problems.

Mechanical recycling makes up roughly **513,495 to 543,000 t** of recycling capacity in Canada, according to our research.⁹² While this infrastructure has existed for many decades, the system is riddled with holes; starting from the collection stage, plastic waste is miscategorised, contaminated, or lost to the non-recyclable waste stream (see Figure 3). We argue that too much of the burden and blame is placed on consumers and municipalities to handle the plastic waste flooding the market. Furthermore, most plastic waste is lost somewhere on the path to being recycled.⁹³ For the plastic that is recycled in Canada, most is downcycled, meaning it is made into a product with less recoverable value. Plus, the stream of virgin resin required to supplement mechanically recycled plastic demands more plastic production (as explained in Chapter 1).

A closed loop model requires that, at a minimum, that there is not a constant input of virgin material, that materials maintain integrity for reuse over time and that waste is not continuously generated. Even though the recycled resin produced by some recycling facilities is used by some producers to make 100% recycled content products, which do not require input of virgin content,⁹⁴ the recycling facilities still fail to meet other circularity criteria set out on page 14.

Plastic-to-plastic chemical recycling is in its infancy in Canada, with only a handful of existing and developing plants across the country. **There are currently no industry-scale plastic-to-plastic chemical recycling facilities in**

the country.⁹⁵ As noted in Appendix 2, several facilities are in development but are not yet operational. One plastic-to-plastic chemical recycling facility which promises no material degradation over time is PyroWave, which received \$4.2 million in public funding and recently signed a joint development agreement with Michelin to fast track Pyrowaves's PS recycling technology to production scale.⁹⁶

Awareness about the status of chemical recycling in Canada is crucial to being able to make judgements about its viability as part of federal plans. Yet it is challenging to understand the full capacity of plastic-to-plastic facilities because other processes are often conducted as well. **Our best estimate for plastic-to-plastic chemical recycling capacity is 1,400 t.**⁹⁷ It is also important to note that plastic-to-plastic processes are reliant on the faulty collection and sorting process described on page 18 and in Figure 3.

While Greenpeace does not consider **plastic-to-fuel**⁹⁸ a form of recycling, it is often grouped under chemical or advanced recycling. Ultimately we believe it is a misleading characterization of a clearly linear model, and that it misrepresents the universally accepted definition of recycling, which is to take waste

⁹⁵ [Accelerating Circular Supply Chains for Plastics](#), Closed Loop Partners, 2019. See Appendix II of the report, "Profiles of Technology Providers", pg 48.

⁹⁶ Michelin, "[Michelin and Pyrowave join forces to industrialize an innovative plastic waste recycling technology](#)," 18 November 2020.

⁹⁷ See Appendix 2. 1,400 t is the combined production capacity of the only two facilities that Greenpeace confirmed are converting plastic to plastic via chemical processes; however, true capacity data could not be obtained for all facilities in Canada that *could* employ their technologies to do plastic to plastic recycling in the future.

⁹⁸ For the purposes of this report plastic-to-chemical products have been lumped with plastic-to-fuel. Both applications are end of life (eg., waxes, asphalt additives) and in cases where both fuel and chemicals are produced it's impossible to determine quantities of either; fuel is the more common application.

⁹² See Appendix 2.

⁹³ Deloitte and Cheminfo Services, 2019, pg. 12.

⁹⁴ See, for example, [Ice River's marketing](#).

products and turn them into new materials or products.⁹⁹ When plastic-to-fuel is lumped under the chemical recycling category, the so-called chemical recycling capacity goes up to roughly 174,600 t, showing where much of the focus by industry has been to date.¹⁰⁰ One company, Enkema, one of the best-funded and highest-capacity so-called chemical recycling facilities in the country, which converts waste to ethanol, received \$3.5 million in government funding from the Western Innovation initiative in 2017, illustrating that public support for chemical “recycling” doesn’t always support the circular solutions consumers might expect (see section 2.3).¹⁰¹ Because plastic-to-fuel technologies convert plastic into fuel, it is ultimately an end-of-life process where the material value of the plastic is lost and that contributes to emissions.

A report by Closed Loop Partners titled, *Accelerating Circular Supply Chains for Plastics*, stated that across North America, there are roughly 60 facilities using chemical processes that have taken an average of 17 years to reach growth scale.¹⁰² This falls far outside the 10 year window the federal government is working with to reach its 2030 zero plastic waste goal. Given how early in development most plastic-to-plastic chemical recycling facilities in Canada are, we judge that expecting to wait more than a decade for industry-scale chemical recycling is untenable with the expected growth of virgin plastics production in that time (not to mention the waste accumulating until such time that technology

⁹⁹ See definition by United States Environmental Protection Agency, “[Recycling Basics](#).”

¹⁰⁰ This includes capacities for Enkema, Sustane, GreenMantra, and Klean Industries, as well as chemical plastic-to-plastic companies Pyrowave and Polystyvert, for an estimated 174,618 tonnes.

¹⁰¹ “Enkema gets \$3.5M boost for final phase of Edmonton facility”, Canadian Biomass Magazine, 17 November 2017.

¹⁰² “[Accelerating Circular Supply Chains for Plastics](#)”, Closed Loop Partners.

might available). **Greenpeace’s research found that there are just three facilities using cracking, gasification or pyrolysis to create hydrocarbons or syngas from mixed plastic waste or garbage.**

Waste-to-energy (incineration with energy recovery) is sometimes included under the chemical recycling umbrella; however, similar to plastic-to-fuel, it does not meet the definition of recycling. Waste-to-energy processes can use mixed streams of plastic waste, such as what would be obtained from garbage, or what is rejected from diverted plastic waste. As noted above, it accounts for **137,000 t** or 4 percent of waste disposal. There are various environmental and human health concerns associated with incineration. It requires a constant stream of waste to be efficient, thereby creating a dependency on plastic waste production.

An in-depth review by GAIA found that plastic-to-plastic, plastic-to-fuel, and waste-to-energy chemical processes present unique technological, economic and environmental challenges.¹⁰³ Even if certain plastic-to-plastic technologies and facilities could meet more rigorous environmental standards, scaling within a reasonable timeframe seems highly unlikely given the current pace of advancement, the array and quantity of plastic types on the Canadian market and the collection problems also associated with the current recycling recyclables management.

The amount of plastic resin in Canada is expected to rise to **6 million t**, generating waste of about 4.5 million t by 2030 — significantly more than today.¹⁰⁴ Virgin resin producers are increasingly exploring or committing to plastic-to-plastic production or plastic-to-fuel production as part of expansion

¹⁰³ “[Chemical Recycling: Distraction, Not Solution](#)”, GAIA, 2020.

¹⁰⁴ Deloitte and Cheminfo Services, pg. iv, 2019.

plans¹⁰⁵ but we were not able to obtain data to confirm timelines and details on the estimated contribution to plastic recycling capacity. Further, without virgin plastic reduction alongside post-consumer production, the result is more plastic items being produced overall.

Greenpeace believes this scenario is, first of all, highly unlikely to be achieved by 2030: more than 160 facilities in 10 years is, to our knowledge, unprecedented in Canada. But, more crucially, it's obvious these investments will not – and in the case of incineration, should not – take place, because government funding is being funneled into virgin plastics production to a far greater degree than to recycling or circular solutions.

Our investigation of government funding since 2017 found that federal and provincial sources including the Ontario Ministry of Economic Development, Alberta Petrochemical Diversification Program and the Federal Strategic Investment Fund have provided at least **\$334 million in public funding to plastics manufacturing companies producing virgin plastics in the last three years.**¹⁰⁸ Because some of these projects are in such early stages, (with announcements stating vague intentions), it's quite difficult to reliably determine their capacity for future plastic production.

These projects include the following:

- **Nautical Energy** was given **\$80 million**¹⁰⁹ in royalty credits by the Alberta government for the building of a methanol plant – methanol being a key part of plastics production.
- **Nova Chemicals** received up to **\$100 million**¹¹⁰ from the Ontario government's Jobs and Prosperity Fund and **\$35 million**¹¹¹ from the federal government's Strategic Investment fund for a new polyethylene facility.

¹⁰⁸ See Appendix 3, Table A.

¹⁰⁹ [“Alberta government helping new methanol plant with \\$80M in royalty credits”](#), Canadian Press, 20 Feb 2019.

¹¹⁰ [“Creating New Jobs in Ontario's Chemical Manufacturing Sector”](#), Ontario Government, 8 Dec 2017.

¹¹¹ [“Feds gave Nova Chemicals \\$35-million grant before urging G7 to reduce plastics”](#), Canadian Press, 15 Feb 2018.

2.3 Public money flows to plastic producers

Deloitte/Cheminfo outlined in their 2019 report what they called an “ambitious scenario”¹⁰⁶ projecting the investments it would take to successfully divert 90 percent of plastic waste away from landfill by 2030. This included building 67 more mechanical and so-called chemical recycling facilities, at a cost of between \$1.5-3.6 billion; 22 more waste-to-energy facilities requiring \$0.6-0.8 billion; 70 more sorting facilities, at a cost of \$1.8-2.9 billion; and building 8 more incinerators, at a cost of between \$1.2-1.7 billion.¹⁰⁷

¹⁰⁵ See, for example, Nova Chemicals Corporation and Merlin Plastics Supply Inc., [“NOVA Chemicals and Merlin Plastics Join Forces to Use Curbside Recycling for Consumer Packaging.”](#) 1 September 2020.

¹⁰⁶ Deloitte and Cheminfo Services, pg. 16, 2019.

¹⁰⁷ Deloitte and Cheminfo Services, pg. 19, 2019.

- **Inter Pipeline** was awarded **\$70 million**¹¹² through Alberta's Petrochemical Diversification Program in 2019, alongside **\$49 million**¹¹³ by the Strategic Investment Fund. The project will turn propane into polypropylene.¹¹⁴

It's worth noting that the, **Canada Kuwait Petrochemical Corp's (CKPC)** propane-to-polypropylene project received **\$300 million**¹¹⁵ in royalty credits from the Alberta Government Petrochemical Diversification Program, and **\$49 million**¹¹⁶ from the Strategic Investment Fund. The project was a collaboration between the Pembina Pipeline Corporation and Kuwait's Petrochemical Industries Company K.S.C. However, in March, after the outbreak of COVID-19, Pembina announced that they would be deferring their \$2.7 billion investment into the project¹¹⁷ and the project was suspended indefinitely in December.¹¹⁸ Still, evidenced in federal and provincial governments intentions and priorities is an apparent willingness to provide hundreds of millions in royalty credits and funding. (This figure is not included in our overall calculations, given that it's been shelved.)

Greenpeace Canada's investigation further found that federal and provincial sources have provided

¹¹² "[Alberta commits \\$70 million to new petrochemical concept by Inter Pipeline](#)", JW Energy, 11 March 2019.

¹¹³ "[Government of Canada invests in green production of highly recyclable plastics](#)", Gov. of Canada, 7 March 2019.

¹¹⁴ It's worth noting that Enkern was also [awarded \\$200 million](#) in Royalty Credits in 2016, via Alberta's Petrochemical Diversification Program.

¹¹⁵ "[CKPC reaches FID for PDH-PP complex in Alberta](#)", Oil and Gas Journal, 5 Feb 2019.

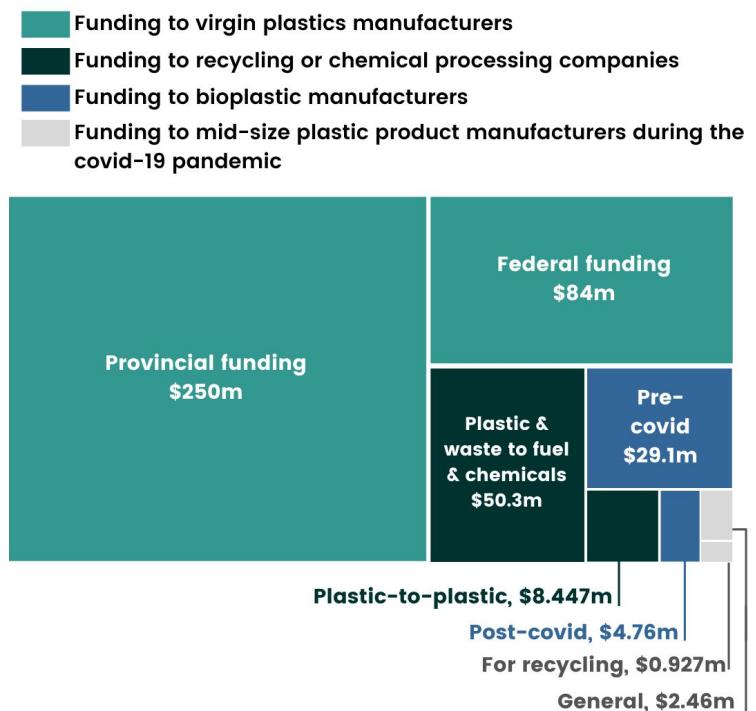
¹¹⁶ "[Government of Canada helps to attract new investment in production of highly recyclable plastics](#)", Government of Canada, 26 April 2019.

¹¹⁷ "[Plug pulled on CKPC's \\$4.5B PDH project](#)", Sherwood Park news, 27 March 2020.

¹¹⁸ Bloomberg, "[Pembina suspending \\$4.5B Alberta petrochemical project indefinitely](#)", BNN Bloomberg, 14 December 2020.

roughly **\$8.45 million** to support, fund and expand plastic-to-plastic recycling companies, though much more went into plastic/waste-to-fuel/chemical facilities (see Figure 5).¹¹⁹ Roughly **\$33.9 million** more was awarded to bioplastics companies since 2017, of which roughly **\$4.76 million** was awarded after the COVID-19 pandemic was declared (post-covid).¹²⁰ We estimate that, post-covid, governments have given roughly **\$3.39 million** in support to mid-sized plastics product companies (**\$2.46 million** for plastics products and **\$927,000** related to recycling).¹²¹

Figure 5: Comparing public-sector funding for the plastic sector since 2017



Source: Greenpeace Canada analysis, from publicly available sources detailed in Appendix 3. "Pre-covid" refers to funding announced prior to the start of the pandemic. "Post-covid" refers to funding announced following or explicitly related to the pandemic.

¹¹⁹ See Appendix 3, Table B.

¹²⁰ See Appendix 3, Table C.

¹²¹ See Appendix 3, Table D.

2.4 CASE STUDY: The Metro Vancouver and BC Extended Producer Responsibility program



Greenpeace' and community beach clean-up and plastic polluter brand audit in Vancouver in 2018.

British Columbia (BC) is considered a better case scenario when it comes to recycling and extended producer responsibility in Canada. According to a 2019 report by Recycle BC, the industry-funded, non-profit organization created to manage BC's packaging and paper product (PPP) recycling Extended Producer Responsibility (EPR) program, 73 percent of BC residents report going out of their way to recycle, and 97 percent are aware of the recycling program in their community.¹²²

Yet all is not well in BC's recycled plastic waste stream — despite having community participation and EPR programs which are more comprehensive than in many other provinces or territories, a majority of the plastic waste circulated under the EPR fails to be collected and ultimately recycled.¹²³

Under the PPP EPR program in BC, producers are responsible for collecting and managing consumer paper and packaging products from when they are discarded to end-of-life. What this

means for plastic in the province is that Recycle BC is responsible for the collection of paper and packaging waste resulting from the products of the more than 1,200 businesses that fund the organisation.¹²⁴ The program doesn't cover industry, commercial and institution recyclables, — an issue still being debated by the provincial government and circular economy advocates.¹²⁵

According to Recycle BC's 2019 annual report,¹²⁶ **64,120 t** of PPP EPR eligible plastic packaging was put on the market. In an ideal world, the entirety of those plastics would have been collected. **But Recycle BC reports a collection rate of only 46 percent, or 29,199 t. The majority of the plastic waste under Recycle BC's EPR was lost to landfill, incineration, or as litter; that's nearly 35,000 t.**

Of the **29,199 t** collected, more than **8,762 t** were sent to plastic-to-fuel processing — which is, as we've previously described, far outside the realm of the circular economy. By Greenpeace Canada's analysis, that leaves just over **20,000 t** to be recycled, of which it's unclear how much was recycled and how much went to landfill.¹²⁷ Recycle BC does not report or record how much of the material collected under the EPR ends up in landfills (see Figure 6, next page). Such significant losses within a relatively comprehensive program, in a province where consumers display an active interest in the integrity of their recycling systems, does not bode well for the rest of Canada.

Zero waste expert Sue Maxwell, says that the provincial government hasn't been requiring companies to respect the zero waste hierarchy, such as designing reusable and easy to repair products.¹²⁸

¹²⁴ "EPR Programs Summary", Recycle BC.

¹²⁵ "Business owners forced to throw recycling into landfill, or face fine", The Nelson Daily, 10 July 2020.

¹²⁶ [2019 Annual Report](#), Recycle BC, pg. 28, 2019.

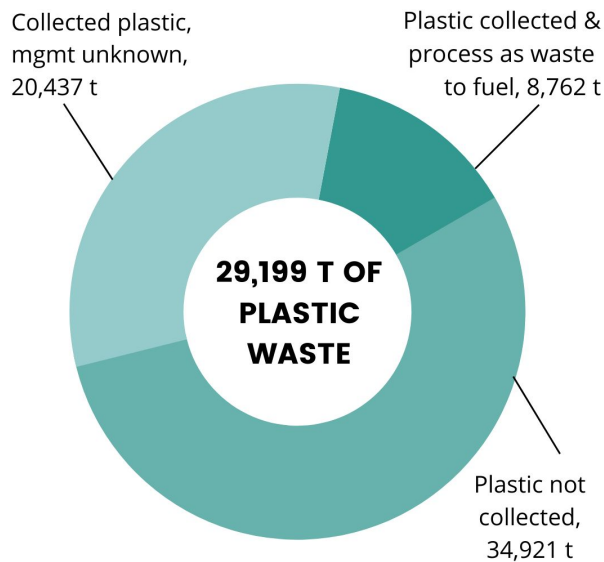
¹²⁷ [2019 Annual Report](#), Recycle BC, 2019.

¹²⁸ Tele-interview with Greenpeace Canada, 27 November 2020. [More about Sue Maxwell.](#)

¹²² [2019 Annual Report](#), Recycle BC, pg. 13, 2019.

¹²³ [2019 Annual Report](#), Recycle BC, pg. 3, 2019.

Figure 6: Recycle BC collection rates



Source: Recycle BC Annual Report, 2019.

Maxwell also laments the lack of supportive policies for plastic reduction and reuse/refill models in the federal *Approach*. If the federal government really wants to respect the do-no-harm precautionary principle it references in the plan, “then the first thing we do is stop making as much plastic,” she says, adding that chemical recycling is only useful if you’re planning on maintaining or increasing plastic use.

Even plastic-to-plastic recycling isn’t a home-run option. As Maxwell told us, “[W]e need to take a look at what is the cost of that, how much energy does it take, how much chemicals or materials, what’s the effluent that comes out of those plants?”

In 2018, Metro Vancouver did a single-use plastics audit of its municipal solid waste (MSW), examining how much SUP was found in both residential and commercial waste that year.¹²⁹ The findings revealed millions of SUP items in the waste stream, which could have been recycled. In total,

¹²⁹ “2018 Single-use items waste composition study Metro Vancouver”, TRI Environmental Consulting, 2018.

the city found **674 million** single use items in the municipal waste stream, totalling **12,300 t**. They also retrieved an additional **243 million** plastic-lined items, like cups and takeout containers, which came to more than **6,500 t**. In total, SUPs made up nearly **18,900 t** of Vancouver’s municipal waste that year. While it can’t be said for certain how many tonnes of this were covered under the PPP EPR, the number is likely significant – residential waste made up at least half the sample size for the study. It costs Vancouver taxpayers a total of **\$2.5 million annually** for the City to manage single use plastics that end up in public waste bins, or become litter.¹³⁰

Vancouver and BC as a whole prove to be particularly insightful case studies because they illustrate a core crisis in recycling. In Vancouver, single-use plastics are a burden on the waste management system because they are put into the waste stream instead of being diverted back into the EPR program that circulated them; and Recycle BC more broadly reports being unable to collect even half the plastics they circulate in a year, and 30 percent of what is collected is converted to fuel instead of being meaningfully re-entered into the plastics economy.¹³¹ Recycle BC’s current lack of information on how much of their plastic waste – be it collected or lost – ends up in landfill suggests the possibility that the crisis is even more dire than we currently understand.

Vancouver City Councillor Michael Wiebe, also interviewed to help inform this report, said, “[T]he **actual percentage of material that’s being utilized as recycled goods, is not a lot. And I think we need to really give that to the public because I think the public just thinks, I recycle the bottle, it’s coming back, but recognizing how much waste is in that recycling process, how much energy is used to do it, what the other alternatives are, needs to be better explained.**

¹³⁰ “Re: CleanBC Plastics Action Plan Consultation”, 30 Sept 2019.

¹³¹ [2019 Annual Report](#), Recycle BC, 2019.

Because just putting in recycling policies is not going to get us to where we want to go.¹³²

2.5 The Takeaway: A free pass for Industry?

It's clear from both recent federally-commissioned research, and Greenpeace's investigation into top recycling facilities, that Canada's recycling technology and infrastructure are vastly inadequate to manage the national plastic waste.

While private and public investments have been made in mechanical and chemical recycling recently, there is a lack of publicly-available information about the capacities of these new or expanded operations.¹³³ Chemical recycling facilities are highly unlikely to be the cure-all advancements they are touted to be,¹³⁴ given that much of what is alleged to be "recycled" ends up as fuel (as we discussed in sections 2.1 and 2.2) — emitting carbon into the atmosphere — and given the fact that commercial scaling could take nearly double the time to scale than is left to meet the federal government's 2030 zero-waste goal. Meanwhile, mechanical recycling will continue to require virgin inputs for the foreseeable future.

This means that we're locked in to years of polluting plastic production. The system's capacity to contend with this added waste is even more untenable. What's more, public funding is only deepening the problem, with millions of public dollars being spent on the companies producing the waste-generating products the government is trying to address. **Massive reductions to plastic production are needed.**

Meanwhile, the federal government is working with the provinces and territories on ensuring EPRs are rolled out nation-wide; but even in BC, where EPR is well-established, most plastic waste is not recycled. This revelation is not unique to single-use plastics, or to British Columbia. While diversion rates may improve with the implementation of EPR programs (eg., 100 percent diversion for automotive waste), only 1.8 percent of plastic waste that is not packaging makes it past the sorting stage in the recycling process in Canada, despite a multitude of EPR and Product Stewardship programs across the provinces and territories.¹³⁵ It remains unclear whether stewardship and EPRs can have significant and lasting effect on achieving zero waste goals without a complete overhaul of programs to go beyond a post-consumer focus.

Furthermore, while EPRs are meant to put responsibility on producers, consumers continue to do the heavy lifting. It's not consumers' responsibility to clean up industry's mess. While the federal government's *Approach* says "all Canadians can do their part by reducing the amount of plastic waste they create," it's clear that the solution is not so easy. Industry has attempted to deflect scrutiny with vague references to innovation,¹³⁶ while long-standing public education campaigns have kept the onus on individuals and households.¹³⁷ **Despite using the language of "circular economy" the federal *Approach* does not include requirements for a shift to the models and materials that would enable one.** It's time, therefore, for the federal government to

¹³² Tele-interview with Greenpeace Canada on November 30, 2020

¹³³ See Appendix 2.

¹³⁴ See for example, Valiante, Usman, [A Vision For A Circular Economy For Plastics In Canada The Benefits Of Plastics Without The Waste And How We Get It Right](#), 2019, Smart Prosperity Institute.

¹³⁵ Deloitte and Cheminfo Services Inc, pg. 12, 2019 (32,000 t of waste not considered "packaging" was recycled, this equates to 1.8% of the 1,726, 000 t of non-packaging waste generated).

¹³⁶ See, for example, Timbers, Jon and Ricardo Cuetos, "[Industry Solutions Exist for Plastic Waste, Government Should Support Them](#)" *National Newswatch*, 16 November 2020.

¹³⁷ See, for example, the prominence of household education and access to recycling in Stewardship Ontario's [History of Ontario's Blue Box](#), nd.

rethink the false solutions that form the backbone of its *Approach*, with an eye toward prioritizing long-term, environmentally preferable solutions.

In recent years, major consumer goods companies, retailers and food chains representing significant (Canadian and global) shares of disposable plastic waste have committed to packaging ‘improvements.’ The focus has largely been to improve recyclability¹³⁸ and recycled content¹³⁹ with little to no commitment to reduction or transitioning to zero waste models – despite the seeming impossibility of managing waste volumes. Reliance on other false solutions including bioplastics and other bio-based disposables (eg., paper) creates new waste problems and slows consumer transition to zero waste solutions. Lack of government leadership to move us beyond recycling, combined with the bare minimum effort invested by industry to ‘keep the plastic but make it better’ is a reconfirmation that industry will not change voluntarily.

With the proposed *Approach*, the federal government has given license to enthusiastically embrace the status quo. This status quo, however, fuels a massive contribution to the plastic pollution crisis perpetuated by SUP product and packaging producing companies. Until the government requires that companies actually design products for the environment as part of comprehensive EPRs in which they are responsible for the full lifecycle of their products, and not simply for waste management, **there is little incentive for**

companies to reduce their dependence on all disposables and non-essential plastics, or to work cross-sectorally to scale truly circular, zero waste solutions.

As our research demonstrates, the promise of a circular economy for plastic is built on false hope and it should no longer be prioritized by the government. Far from revealing the promise of a thriving market for secondary plastics, the only gem hidden in the recycling geode is that the majority of the recycling processes currently employed are, ultimately, linear. While disheartening, this knowledge is ultimately key to being able to start to change the system. Abysmal plastic recycling rates reveal that improvements to recycling, where possible, may be required as an interim step to address plastic currently in the market, but **ongoing substantive investment in plastic recycling as a strategy to combat the current scale of the waste and pollution crisis will only delay the necessary transition to new, truly circular, low carbon systems.**

Of note, Greenpeace did not address the complexities and problems associated with bioplastic waste management and recycling in the scope of this report. We believe a replacement of fossil-fuel derived single-use plastic with bio-based disposable alternatives of any type is a false solution that creates other potential environmental impacts, further entrenches us in a linear system, perpetuates throwaway culture and fails to promote a transition to a truly circular, zero waste economy.¹⁴⁰

In the following chapter, we present a number of viable solutions for strengthening the *Approach* while addressing the economic challenges presented by the recession caused by the COVID-19 pandemic.

¹³⁸ See for example, The Consumer Goods Forum (CGF) Plastic Waste Coalition of Action, “[Canada’s biggest retailers and consumer packaged goods brands support “Golden Design Rules” to reduce plastic waste](#)”, [Press Release] Newswire.ca, 9 December 2020

¹³⁹ See for example: Partnership commitments between Loop Industries’ and companies including [Danone](#) and [Pepsico](#); and general commitments made by companies such as [Walmart](#) and [Dove](#).

¹⁴⁰ See, for example, Greenpeace USA [Throwing Away our Future](#).

3. SOLUTIONS: A TRULY CIRCULAR COVID-19 RECOVERY

To implement effective solutions for a green and just recovery from COVID-19, the federal government must stop relying on the myth of recycling. As we work to emerge from the COVID-19 pandemic while not losing ground on action to address the climate emergency, sectors that promote and benefit from throwaway culture must rethink the way they deliver their products. At the same time, governments must use regulation and incentives to move us to a zero waste economy, while ensuring a just transition for workers.

According to the Ellen MacArthur Foundation, replacing just 20% of single-use plastic packaging with reusable alternatives offers an opportunity worth at least USD\$10 billion, globally.¹⁴¹ Embracing this necessary transition could help position Canada as a knowledge leader in cross-sector zero-waste technologies. This could catalyze circular economy innovation and build systems to help us achieve conservation and climate goals.

3.1 Getting back to basics: The Zero Waste Hierarchy

If recycling isn't the answer to how to build a circular economy, then what is? To answer this question, we need to look back at the Zero Waste Hierarchy (ZWH) introduced in Chapter 1. The ZWH describes a number of broad approaches that can be taken to prevent and manage waste, and places them in a hierarchy with the best (prioritized) options at the top, and the least desirable 'last resort' options at the bottom. The elements of the hierarchy from top to bottom are: Rethink/Redesign → Reduce → Reuse →

Recycle/Compost → Recover → Residuals Management.¹⁴²

Rethink/Redesign refers to taking a step back and looking at the overall design of a product or system, and thinking about how it could be reorganized to better support zero-waste objectives. It also means ensuring that companies Design for the Environment.¹⁴³ For example, a product could be redesigned to make it easier to repair and reuse. Product delivery supply chains and infrastructure could be evaluated across a sector to identify intervention opportunities that would reduce waste and resource use. Or, if a system is incentivized to use SUPs even when viable zero-packaging or refill-based alternatives exist, then rethinking the system to incentivize the reusables can reduce SUPs and prevent plastic products from being produced in the first place.

Reduce, Reuse and Recycle are the three familiar "Rs", often learned as children. What people often forget, however — and what the ZWH emphasizes — is that these Rs are listed in order of importance and priority. First we do our best to reduce the use of new materials; then we do our best to reuse products; and only after we've achieved what we can with the first two Rs (and Rethink/Redesign) do we resort to recycling.

As described in Chapter 2, both mechanical and chemical recycling present challenges that hinder

¹⁴² There are a number of different versions of the ZWH, each with slightly different elements. While the details and emphasis differ, they all share the same basic principles. See [Zero Waste Canada](#) for details.

¹⁴³ Design for the Environment is an approach to product and systems design that seeks to reduce human health and environmental life cycle impacts by incorporating concern for these factors throughout the design process, including the very earliest stages. It was [studied by the federal government](#) in 2009.

¹⁴¹ Ellen MacArthur Foundation, [Reuse: Rethinking Packaging](#), 2019.

the achievement of truly closed loop systems. This, combined with the numerous types and sheer quantity of plastic products, means that recycling compares especially unfavourably to simply reducing or reusing products. In the ZWH, **Recover** refers to the recovery of useful materials from waste products, such as extracting valuable metals from electronics. **Residuals Management**, the least desirable option, is about handling materials leftover after the other approaches have been applied (e.g., by sending them to landfill).

With the ZWH in mind, the problem with any approach to plastic waste elimination, reduction or management that puts the emphasis on recycling is obvious: it focuses on the middle of the hierarchy, instead of the top. As described above, the federal *Approach* adopts plastic recycling as its ‘first resort’ solution to our plastic waste and pollution problem; only where recycling is very challenging is there serious consideration of simply reducing the production of plastic in the first place. **The federal plan, therefore, goes against agreed best practices in zero-waste management by not prioritizing the most effective options and best solutions.** Those solutions are rooted in rethinking/redesigning our systems and products so that we don’t need so much plastic in the first place, reducing production and use of problematic materials, and choosing products and materials with the longest lifespan for continuous reuse. Only the residual plastic waste we cannot eliminate through these efforts should be candidates for recycling.

The plastics crisis is also part of a much larger environmental crisis which includes the climate and biodiversity crises.¹⁴⁴ Part of addressing these

wider crises requires us to respect and operate within nature’s limits, including the energy and materials we take for human use and the overall waste we produce. In tackling plastic waste and pollution, we must take a holistic approach that recognizes these wider crises and does not perpetuate destructive, extractive and high-consumption patterns that created them.

3.2 COVID-19 recovery policies that support a zero plastic waste objective

Recognizing the fundamental mismatch between the ZWH and the federal government’s approach, it’s clear that changes must be made to build a truly circular system. Despite promises made on plastics in the federal government’s September 2020 Throne Speech,¹⁴⁵ the November Fall Economic Statement did not prioritize or allocate funds to make significant strides forward on this.¹⁴⁶ It was a missed opportunity to make a rethink of the plastic industry and a move toward a circular economy part of Prime Minister Trudeau’s plans to “build back better”¹⁴⁷ from COVID-19.

Measures taken by the Canadian government, such as those listed below, could create jobs and stimulate a new kind of post-pandemic economy — one that could help achieve zero plastic waste, champion local and sustainable small businesses,

Environmental Law et al. [Plastic & Climate: The Hidden Costs of a Plastic Planet](#) (2019).

¹⁴⁵ Governor General Julie Payette delivered the federal throne speech on 23 September 2020: [A Stronger and More Resilient Canada: Speech from the Throne to open the Second Session of the Forty-Third Parliament of Canada](#). See pg. 24.

¹⁴⁶ Deputy Prime Minister and Minister of Finance Chrystia Freeland Delivered the Fall Economic Statement on 30 November 2020. [“Fall Economic Statement 2020: Supporting Canadians and Fighting COVID-19.”](#) Government of Canada.

¹⁴⁷ See Prime Minister Trudeau’s statement, as quoted in: Leavitt, Kieran, [“Justin Trudeau promises to ‘build back better’ and Erin O’Toole scoffs saying there is no plan to reduce the pandemic debt.”](#) *Toronto Star*, 26 October 2020.

¹⁴⁴ In 2017, United Nations officials [called](#) ocean plastics a “planetary crisis” and [declared](#) a “war on plastic”, owing to its impact on marine life. The Centre for International Environmental Law has also [exposed](#) its climate impact in Hamilton, Lisa Anne at the Center for International

and support the communities in which they are located. Such measures include:

- Providing financial support to provinces/territories and municipalities for the development and scaling-up of reuse/return, refill and package-free delivery models and supply chains for food and other goods.
- Creating innovation funds to expedite the scaling of zero waste, reuse and refill models and infrastructure, repair and remanufacturing infrastructure, 'libraries of things', and regenerative systems (systems which restore, renew and revitalize their own inputs).
- Incentivize community-driven zero waste programs, practices and initiatives.
- Support communities to make an equitable transition to more diversified and sustainable job opportunities, prioritizing BIPOC (Black, Indigenous, and People of Colour) and low income groups as well as communities impacted by petrochemical/plastic production, disposal and pollution.
- Ensure plans proceed in a rights-based way, including by ensuring respect for Indigenous rights and law, consulting with communities on their needs, and increasing support to Indigenous-led zero-waste technological and feasibility advisory committees¹⁴⁸ or other bodies.
- Support public education campaigns to promote a successful transition to new systems for the public and businesses.

¹⁴⁸ See, for example, the [Indigenous Zero Waste Technical Advisory Group](#).

- Invest in a just transition for petrochemical and plastic workers (eg., re-training and income support programs).

"Right now we need to help fund circular economies," said Vancouver City Councillor Michael Wiebe, underscoring the appetite for green policies that address plastics. ¹⁴⁹ "[A] lot of this work is labor intensive, which can be a good thing. I mean, when you're talking about labor, low barrier jobs that are greening the planet ... But

it does need federal infrastructure funding to help some of these opportunities. So in Vancouver, we have a lot of one story industrial spaces. On city owned property, it would be amazing to get federal infrastructure funding to create six storey industrial areas that have reuse/repair centers, to have reuse malls, textile recoveries."



3.3 Toward zero plastic waste by 2030 in Canada: Greenpeace recommendations

There is no silver bullet that will achieve zero plastic waste by 2030. The Canadian government is right in proposing an integrated management approach; however, for the plan to achieve its goals, the scope and direction of the plan must immediately be reconsidered. While improving

¹⁴⁹ Tele-interview with Greenpeace Canada on November 30, 2020.

recycling rates, coordination and technologies should be part of a transition strategy for contending with the existing plastic in circulation, it cannot be *the* main strategy for eliminating plastic waste. To prompt zero-waste and closed-loop innovation and adoption, bold measures must be taken immediately to prevent further harm to human and environmental health.

Greenpeace Canada is urging the Canadian government to strengthen the *Proposed Integrated Management Approach To Plastic Products to Prevent Waste and Pollution* by taking the following actions:

- Commit to a complete phase out of all non-essential plastics by 2030, starting by cutting the production of common single-use plastics in 2021.¹⁵⁰
 - Set time-bound targets for the reduction of virgin plastic production.
 - Set time bound reduction targets on the distribution, sale and consumption of plastic packaging across sectors. This should include measurable key performance indicators, based on the number of units produced and distributed.
 - Set time bound reuse/reusables targets across sectors.
 - Invest in reuse and refill models, and incentivize zero-waste initiatives.
- Ban the export of plastic waste and recycling to the Global South.¹⁵¹
 - Cease subsidies to, and investment in, petrochemical and plastic production.
 - Establish targets that promote *full* Extended Producer Responsibility, including pollution cleanup and the requirement to Design for the Environment.
 - Work with relevant health and safety authorities to amend and modernize existing packaging and food distribution regulations to accelerate a transition to reuse and refill models that meet necessary standards.
 - Cease incentivizing the sale and use of alternative disposable products and packaging that perpetuate linear, waste-generating product models.

By applying the Zero Waste Hierarchy and adopting these solutions, we can take a major step towards a truly circular, resilient economy.



¹⁵⁰ This list of banned SUPs should be broadened to include plastic bags (all weights and formats); cups and lids; bottles and caps; straws; plates (including paper plates with plastic lining); cutlery (forks, knives, spoons and chopsticks); cotton swabs; take-out containers; balloon sticks; oxo-degradable plastics; plastics labelled as biodegradable or compostable; all forms of polystyrene and polyvinyl chloride (PVC); black and dark coloured plastics; and, plastic packaging made of mixed materials (i.e., multi-layered packaging); cigarette filters.

¹⁵¹ Canada accepted amendments to the Basel Convention, (set to take effect next year) which limits countries' ability to ship plastic waste overseas. However, CBC reported that a bilateral treaty signed with the U.S. could create a loophole that could allow waste to be shipped in non-compliant ways. See Dyer, Evan, "[Government quietly made 'back door' agreement with U.S. that could undermine treaty on plastic waste](#)," CBC News, 3 December 2020.

CONCLUSION AND RECOMMENDATIONS

With the majority of Canada's collected plastic waste going to landfill, and Greenpeace's findings revealing that the top recycling facilities are equipped to handle less than a fifth of plastic waste, **it's time to admit that plastics recycling ... is not a thing.** The increasing production of cheap virgin plastic, inadequate plastic waste collection, and technical hurdles to scaling chemical and mechanical recycling, mean that recycling is unlikely to solve the problem.

These ongoing recycling failures are perpetuating a plastic production to pollution cycle that harms Indigenous and frontline communities, who suffer the health impacts of petrochemical production.¹⁵² It also harms communities on the receiving end of Canada's plastic trash exports.¹⁵³ It threatens our natural environment, where, for example, 12.7 million tonnes of plastic entered the ocean in 2010 alone,¹⁵⁴ impacting marine life and aquatic ecosystems.¹⁵⁵ Plus, it blasts greenhouse gas emissions into our atmosphere — emissions that researchers say could reach 56 gigatonnes by 2050; that's 10-13 percent of the remaining carbon budget.¹⁵⁶ The international uptick in plastic use

driven by the COVID-19 pandemic¹⁵⁷ brings a fresh urgency to the need for action.

It's a disservice to people across Canada for the federal government's *Proposed Integrated Management Approach To Plastic Products to Prevent Waste and Pollution* to set stock on recycling when such aspirations have limited technical feasibility to scale before the 2030 deadline, especially considering that they reinforce a linear economy. With new plastic production and waste set to increase by 2030, it's time for the federal government to stop funding the problem and begin looking at real solutions. Canada can achieve a zero-waste future and build a truly circular economy, but only by facing the issue with clear eyes.

Despite federal promises about the post-pandemic economic recovery, information about specifics remain scarce. As evidenced by this report, Greenpeace is calling for this recovery to address the harm caused by plastic production and recycling. **Greenpeace Canada recommends the following actions to build a zero-waste circular economy that works within nature's limits and builds healthier communities in the wake of COVID-19:**

1. Strengthen *A Proposed Integrated Management Approach To Plastic Products To Prevent Waste And Pollution*, as described in the previous chapter.
2. Recognize that there is no circular economy for plastics. Make building a zero waste, reuse-centred economy part of COVID-19 green recovery plans, starting

¹⁵² See, for example, [Aamjiwnaang Solidarity against Chemical Valley](#) and ["New study in Aamjiwnaang finds residents may face higher health risks caused by toxic substances in air"](#), in Anishinabek News, 13 January 2020.

¹⁵³ See the CBC Marketplace investigation by Szeto, Eric et al., ["We don't want to be the next cancer village': Canada's plastic recycling dumped and burned overseas,"](#) *CBC Marketplace*, 27 September 2019.

¹⁵⁴ Jambeck, Jenn, et al., ["Plastic waste inputs from land into the ocean,"](#) *Science*, Vol. 347, Issue 6223 (2015), pp. 768-771, DOI: 10.1126/science.1260352.

¹⁵⁵ Gall, S.C., and R.C. Thompson. ["The Impact of Debris on Marine Life,"](#) *Marine Pollution Bulletin*, vol. 92, no. 1-2 (2015), pp. 170-179.

¹⁵⁶ Hamilton, Lisa Anne at the Center for International Environmental Law et al. ["Plastic & Climate: The Hidden Costs of a Plastic Planet"](#) (2019).

¹⁵⁷ See, for example: Adyel, Tanveer M., ["Accumulation of plastic waste during COVID-19,"](#) *Science*, Vol. 369, Issue 650 (2020), pp. 1314-1315 DOI: 10.1126/science.abd9925

with investments in the 2021 budget and ensuring a just transition for plastics/petrochemical workers, as outlined in the previous chapter.

3. Consult with Indigenous, BIPOC and frontline communities impacted by plastic production, recycling, incineration and disposal about federal plans — including by ensuring opportunities to design and benefit from a circular economy, and by increasing funding for Indigenous-led and community-led solutions.
4. Ministers Freeland and Wilkinson should be transparent about and end subsidies and investments for petrochemical and plastics production,¹⁵⁸ as well as waste-to-fuel and waste-to-energy disposal.
5. Ensure that governments and private companies are transparent with the public about current and planned plastic production, recycling capacity, public funding and harmful emissions, including those contributing to planetary heating.

While the federal government has studied the science of plastic pollution¹⁵⁹ and the economic opportunities of production recycling,¹⁶⁰ the true feasibility of recycling as a pathway to meeting the 2030 zero-waste goal has been left sorely unexamined. This report has attempted to expose this gap clearly. Putting all of our eggs in the recycling basket is a recipe for polluting our health, trashing our planet and cooking our climate.

¹⁵⁸ Identifying and ending subsidies was [recommended](#) by the federal Standing Committee on Environment and Sustainable Development last year (see recommendation 13). As noted in Appendix 2, we have tried to compile subsidies based on publicly available information, but the federal government has the access to information and means to do this more fulsomely.

¹⁵⁹ Government of Canada. [Draft Science Assessment of Plastic Pollution](#). 2020.

¹⁶⁰ Deloitte and Cheminfo Services Inc, 2019.

Greenpeace Canada has collected nearly 250,000 signatures from people joining us in calling on producers and retailers to end the plastic pollution crisis created by their products.¹⁶¹ Thousands more people have called on the federal government to make "Reduce" and "Reuse" pillars of the 2030 zero waste strategy.¹⁶² It's time for the federal government to take action, instead of allowing the plastic industry to offload the economic, social and environmental costs onto consumers and communities.

Our economy must operate within environmental boundaries and, in the near term must be able to withstand probable increases in health risks due to increasing extreme weather¹⁶³ and the destruction of nature.¹⁶⁴ To do this, we must avoid fueling additional waste and pollution, which ultimately leave the ecosystems we rely on less resilient.

By putting people and the environment at the centre of decision-making, we can reorient our economy toward community-based solutions, the zero-waste hierarchy, and a just way out of the current planetary emergency we're up against.

¹⁶¹ Greenpeace Canada supporters have [asked Starbucks to go plastic-free](#), [asked Canada's supermarkets to ditch throwaway plastic packaging](#), and [publicly called out Canada's top 5 plastic polluters](#).

¹⁶² For reference, see Greenpeace Canada's active email-to-target petition to Environment Minister Jonathan Wilkinson: ["Tell the federal government Reduce and Reuse are key for Canada's zero plastic waste strategy"](#).

¹⁶³ Bush, E. and Flato, G., [Canada's Changing Climate, Government of Canada](#), 2019.

¹⁶⁴ Tollefson, Jeff. ["Why deforestation and extinctions make pandemics more likely," Nature](#), 7 August 2020.

APPENDIX 1: METHODOLOGY

Recycling facilities

In order to try and understand the current recycling capacity in Canada, we established a foundational list of all the recycling facilities in the country using a few key resources. The most valuable were the Recycling Council of Ontario's '[Canadian Plastic Recyclers](#)' database and the Closed Loop Partners report [Accelerating Circular Supply Chains for Plastics](#),¹⁶⁵ the latter of which provided a list of current chemical recycling companies across the US and Canada. We supplemented this list with a number of additional recycling facilities listed in ENF Recycling's '[Plastic Recycling Plants in Canada](#)' database, and Canadian Plastics Magazine's [2019 list of recycled plastic providers](#)¹⁶⁶. We also knew from the [Deloitte/Cheminfo Services Report](#) that the vast majority of mechanical recycling (the main type of recycling in Canada) happens at 10-11 facilities, which we included in our analysis. After compiling a complete list, we gathered information about each facility through a review of their website, any media content written about them, and any government releases in which they were mentioned. All found content has been hyperlinked in Appendix 2. For those facilities which did not list their capacities on their websites, we endeavoured to call them and find out – 10 small-scale facilities we reached out to declined to comment. In total, we reviewed 53 recycling facilities, of which 32 provided usable data. We additionally did not include 8 facilities still in development within our capacity count because of uncertainties regarding their operational status and viability. All capacity is rounded and approximated, with some being converted from tons, lbs or kg to metric tonnes.

Funding for plastics providers, plastics product manufacturers, and bioplastics

Funding for plastics providers, product manufacturers and bioplastics were gleaned through keyword search of multiple provincial and federal funding databases, most importantly the federal government's '[Current Investments](#)' database and '[Grants and Contributions](#)' database. Keywords included 'plastic', 'virgin plastic', 'plastic recycling', 'recycling', 'bioplastics', 'oil', 'liquid natural gas', 'ethane', 'methanol', 'propane', 'polypropylene', and some other long-form plastics names. We also conducted a search of provincial governments' websites for funding information and announcements related to the plastics sector. We supplemented this research with a review of media coverage of provincial and federal funding for oil, gas and petrochemical companies, after which we assessed the direct connection of those projects to plastics production. We undertook this assessment because of the lack of information on plastic industry subsidies in the public domain.

British Columbia Case Study Statistics

We based our understanding of Recycle BC's rates from 2019 on their own 2019 [Annual Report](#), from which we pulled all reported statistics and proceeded to calculate the rate of collected plastic, lost plastic, and waste-to-fuel processing. Our assessment of Vancouver's single-use-plastics crisis was based on numbers provided by their [2018 Single Use Items Waste Composition Study](#), from which we processed the amount of items they recovered and their weight to understand the total tonnage of SUP in 2018.

¹⁶⁵ Closed Loop Partners, [Accelerating Circular Supply Chains for Plastics](#), 2019, pg. 46.

¹⁶⁶ "[2019 list of recycled plastic providers](#)," Canadian Plastics Magazine, 2019, pg. 27.

APPENDIX 2: RECYCLING CENTRES IN CANADA AND THEIR CAPACITY

#	Recycler name and location	Technology	Applications	Feedstock	Products	Producers food-grade plastic (Y/N)	Viability	Capacity (low-range) in tonnes*	Capacity (high-range) in tonnes*
1	Pyrowave (Montreal, QC)	Thermo catalytic depolymerization (Uses microwaves to break down PS into styrene)	Plastic-to-plastic	Post-consumer and post-industrial PS	100% recycled polystyrene monomer to be used to make PS & chemicals	No (under certification)	Early commercial (p.76)	800	800
2	Merlin Plastics (Est. Delta, BC)	Mechanical	Plastic-to-plastic forthcoming engineered fuel	PP, PE, LDPE, PET	Engineered fuel / HDPE, LDPE, PP, PB, PET	Yes	Operational	136,078	136,078
3	Enerkem (Edmonton, AB)	Gasification	Waste-to-fuel, and plastics to chemicals	Municipal solid waste	Syngas (ethanol/ methanol)	No (n/a)	Operational	90,718	90,718
4	Sustane Technologies (Chester, NS)	Pyrolysis	waste to fuel	HDPE, LDPE, PP, PS	kerosene, jet fuel, diesel	N/A	Operational	70,000	70,000
5	Nexcycle Plastics (ON)	Mechanical	plastic-plastic	LLDPE, LDPE, HDPE, PP	HDPE, LLDPE, LDPE, PP	No	Operational	45,359	45,359
6	Nam Polymers (ON)	Mechanical	Plastic-plastic	HDPE, LDPE, PS	PET, PP, PVC, more	Yes	Operational	36,287	36,287
7	Norwich Plastics	Mechanical	Plastic-plastic	PVC	PVC	Not stated (no)	Operational	36,287	45,359
8	Sani-Eco inc.	Mechanical	Plastic-plastic	HDPE, PVC, PP, PET, LDPE		Not stated (no)	Operational	30,000	30,000
9	Ice River Springs/ Blue Mountain Plastics	Mechanical	Plastic-plastic	PET	Bottles	Yes (water)	Operational	22,680	22,680
10	Green Processing Company Inc.	Mechanical	Plastic-plastic	*PP, PPTF (talc-filled), PPMF (mineral filled), PPGE (glass-filled), Painted TPO, Unpainted TPO, TEO, TPE, HDPE, HDPE S/E (structural foam),	HDPE	Not stated (no)	Operational	22,670	22,670

				HDPE-HMW, ABS, PC/ABS, PC, PC/PBT, ASA, PBT, Acrylic, POM, Nylon 6, Nylon 66, Nylon 6 GF (glass-filled), Nylon 66 GF (glass-filled), Nylon 6 GF+ME (glass and mineral-filled), Nylon 66 GF+ME (glass and mineral-filled)."					
11	Canada Risheng Plastic Co	Mechanical	Plastic-plastic	"PET, PP, PA, PS, PC, PE, HDPE, MDPE, LDPE, LLDPE, ABS, EPS, HIPS, POM, PMMA, PBT, SAN, TPE" according to ENE Recycling	ABS, HIPS		Operational	24,000	24,000
12	Enviroplast/TC Trans-continental Recycling	Mechanical	Plastic-plastic	LLDPE, LDPE, HDPE	Packaging plastics	Yes	Operational	10,000	20,000
13	Plastrec	Mechanical	Plastic-plastic	PET	PET	yes	Operational	18,144	18,144
14	EFS Recycling	Mechanical	Plastic-plastic	HDPE, LDPE, PP - mixed bales	PP, PE, LDPE, HDPE	Not stated (no)	operational	27,216	27,216
15	Urban Polymers	Mechanical	Plastic-plastic	PET, PE, PP	PET, PE, PP	No	Operational	16,329	16,329
16	Exxel Polymers, Inc. (QC)	Mechanical	Plastic-plastic	HDPE, PP, PS, PC, PA	LDPE, HDPE, ABS, PC	Yes (water)	Operational	11,340	11,340
17	Kal-Polymers	Mechanical	Plastic-to-plastic	PET, HDPE, PVC, LDPE, PP, PS	PP, PS, PET, LDPE, PVC	No (industrial)	Operational	9,072	18,144
18	Polykar, Inc.	Mechanical	Plastic-plastic	HDPE, LDPE, LLDPE	PE	Yes	Operational	10,000	10,000
19	Lavergne	Mechanical	Plastic-plastic	PET, PP, PC, ABS, HIPS	PET, ABS, HIPS, PC	Not stated (no)	Operational	10,000	10,000
20	JDB Plastic Recycling Inc.	Mechanical	Plastic-plastic	PP, HDPE, LDPE, HIPS	PP, HDPE, LDPE, HIPS	Not stated (no)	Operational	6,967	6,967
21	Modix Plastique (QC)	Mechanical	Plastic-plastic	PCR, LDPE	LDPE	Not stated (no)	Operational	7,200	7,200
22	GreenMantra	depolymerization	Plastic-to-petroc	Post consumer	Synthetic	Not stated	Operational	7,500	7,500

	(Brantford, ON)	and solvent-based purification https://patents.justia.com/assignee/greenmantra-recycling-technologies-ltd	chemicals and polymers	and post industrial PE, PP and PS	waxes, pigments, additives, coatings	(no)	(Not doing plastic to plastic, yet. May end up doing styrene to styrene products via INEOS.)		
23	Green Solutions	Mechanical	Plastic-plastic	PA, HDPE, LDPE, PP, LLDPE, PS, PET, ABS, PC		Not stated (no)	Operational	5,443	5,443
24	Klean Industries	Pyrolysis, gasification	Plastic to fuel	PVC, PET	ASTM spec diesel	N/a	Operational	5,000	5,000
25	EPL Plastics	Mechanical	Plastic-plastic	PS, PP, PE, TPE, ABS	PP, PE, PET, PS	No	Operational	1,678	1,678
26	Fraser Plastics	Mechanical	Plastic-plastic	HDPE	HDPE	No	Operational	700	700
27	Polystyvert (Montreal, QC)	Chemical depolymerization (Purification)	Plastic-to-plastic (Unsure: Plastic-to-fuel)	PS from municipalities and companies	100% recycled polystyrene monomer to be used to make PS, chemicals and fuels, is being sold to an insulation company, is seeking approval for certification for food packaging	Pending	Pilot/ potentially likely in early 2019 it was about the begin commercial deployment in Europe and North America	600	600
28	Mel Tech Plastics (ON)	Mechanical	Plastic-plastic	PP, PET, HIPS, HDPE	HDPE	Yes	Operational	3,674	3,674
29	Paradise Distribution & Recycling	Mechanical	Plastic-plastic	PP, HDPE, LDPE		Not stated (no)	Operational	1,588	1,588
30	Polymer Recycle Inc.	Mechanical	Plastic-plastic		HDPE, PVC, LDPE, PP, PS	Not stated (no)	Operational	4,000	4,000
31	Post Plastics Inc.	Mechanical	Plastic-plastic	PET, PP, PC, PE, ABS	ABS, PE, PP, PC, PET	Yes	Operational	5,443	6,804
32	Stayana International Trading	Mechanical	Plastic-plastic	LDPE, HDPE, LLDPE, PP	PP, HDPE		Operational	11,340	11,340
All plastic-to-plastic								514,895	544,400
Mechanical (plastic-to-plastic)								513,495	543,000
Chemical plastic-to-plastic								1,400	1,400

Total	688,113	717,618
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*In metric tonnes. Where tonnage was unclear (Imperial vs. Metric), we were overly cautious and assumed Metric. See more information in linked sources. For capacity entries where there is no hyper-linked source, the capacity is based on phone calls with the company. All links accessed in November and December 2020.

Small recyclers we attempted to reach by phone but whom did not provide information for where we had no publicly available quantities include: [Solen Recycling \(QC\)](#), [Sol Recycling \(ON\)](#), [Reclaim Plastics \(BC\)](#), [Re-plast](#), [A & B Plastics](#), [Dacol Plastics Limited](#), [PVC Enterprise](#), and [Repro Plastics Canada](#).

Other facilities we did not include because they were not yet operational (the majority of those below) or we could not confidently ascertain their capacities: [Energem \(Varenes, QC\)](#), [Loop Industries](#), [Pyrovac \(Quebec\)](#), [GreenMantra/Ineos Styrolution](#), [GreenMantra/Ineos Styrolution](#), [Nova Chemicals & Energem](#), [NOVA Chemicals/Merlin Plastics](#), [Polystyvert/TOTAL S.A.](#), [ReVital Polymers](#), [Pyrowave & Ineos Styrolution \(Sarnia, ON\)](#).

APPENDIX 3: PUBLIC FUNDING FOR PLASTICS & RECYCLING

The following tables document public funding for plastics since 2017, as cited in publicly available sources. While we were able to ascertain many details, it was not possible to determine what specific applications the funding was for. Known details are noted and linked in the table. We have organized the tables into the following categories:

- Funding for virgin plastics manufacturers since 2017;
- Funding for recycling or chemical processing facilities since 2017;
- Funding for bioplastics since 2017 and during covid-19; and
- Funding for mid-sized plastics product manufacturers (inc. for recycling) during COVID-19.

A) Funding for virgin plastics manufacturers since 2017: \$334 million*

Funding recipient	Location	Feedstock	Provincial funding amount	Provincial funding source	Federal funding amount	Federal funding source	Details
NOVA Chemicals	Joffre, Alberta; Sarnia, Ontario	Ethane/ natural gas liquids to plastic	\$100,000,000	ON, Ministry of Economic Development, Job Creation and Trade	\$35,000,000	Strategic investment fund	SOURCE - "leading multinational producer of plastics and chemicals. Recently, invested approximately \$250 million to convert its Corunna, Ontario ethylene cracker to handle up to 100% natural gas liquids – and became the first company to use ethane derived from the Marcellus shale deposit. NOVA Chemicals also announced a further \$300 million in investments to increase production and source additional Marcellus and Utica shale gas-based feedstock supply for its Ontario facilities."
Inter Pipeline	Fort Saskatchewan, Alberta	Propane to polypropylene	\$70,000,000	Alberta, Petrochemical Diversification program (credits)	\$49,000,000	Strategic investment fund	SOURCE - Building a C\$3.5 billion petrochemical facility near Edmonton that would turn propane, a common gas and oil-refining byproduct, into 525,000 tons a year of polypropylene, a plastic polymer used in packaging and labeling. The plant is scheduled to enter service in 2021. The company is also considering a C\$600 million facility that would further refine the above products.
Nauticol Energy	Grand Prairie, AB	Methanol feedstock ; formaldehyde, which is further treated to	\$80,000,000	Alberta, Petrochemical Diversification program (credits)			Methanol has been one of the world's most widely used industrial chemicals since the 1800s. SOURCE - Nauticol Energy is building a C\$2 billion (\$1.5 billion) facility in

		form resins, glues and various plastics, and for the production of acetic acid which is used for the production of polyester fibers and PET plastics.					Grande Prairie, a town in the heart of Alberta's gas fields, that will use about 300 million cubic feet of gas a day to produce methanol, starting up in 2022.
Subtotals			\$250,000,000		\$84,000,000		

Total public funding for virgin plastic manufacturers is \$334,000,000

*It's also worth noting that the Pembina Pipeline Corp and Kuwait Petrochemical Industries Company received public funding to build a \$4.5 billion petrochemical upgrading facility. The project, however, has been [shelved](#) so we did not include the \$49 million from the federal government's Strategic Innovation Funding or the \$300 million in royalty credits from the Province of Alberta through its Petrochemical Diversification Program.

**Inter Pipeline also received [\\$200 million](#) in 2016, making the total 270 million over two years.

B) Funding for recycling or chemical processing facilities since 2017: \$58.7 million**

Recipient	Technology	Applications	Funding	Details
Pyrowave (Montreal, QC)	Thermo catalytic depolymerization (Uses microwaves to break down PS into styrene)	Plastic-to-plastic	\$4,200,000	\$1,000,000.00: Export Development Canada \$3,200,000.00: Federal Sustainable Technology Development Fund
Enerkem (Edmonton, AB)	Gasification	Waste-to-fuel and plastics to chemicals	\$3,500,000	Western Innovation (WINN) Initiative
Enerkem (Varennes)	Gasification	Waste-to-fuel and plastics to chemicals	\$38,000,000	Investissement Québec: \$20 million Subsidy of \$18 million granted by the Ministry of the Economy, Science and Innovation
Sustane Technologies (Chester, NS)	Pyrolysis	waste to fuel	\$2,600,000	Sustainable Development Technology Canada (SDTC).
Enviroplast/TC Transcontinental Recycling	Mechanical	Plastic-plastic	\$3,000,000	FedDev Ontario.
Polykar, Inc.	Mechanical	Plastic-plastic	\$1,000,000	From Canada Economic Development for Quebec Regions.
Modix Plastique (QC)	Mechanical	Plastic-plastic	\$247,448	Canada Economic Development for Quebec Regions.

GreenMantra (Brantford, ON)	Depolymerization and solvent-based purification See also patents.	Plastic-to-petrochemicals and polymers	\$3,200,000	Public: \$2.2 million Sustainable Development Technology Canada SDTC (2019) \$1 m - federal plastics innovation challenge (2020). See also Bioindustrial Innovation Canada (2018)
Pyrovac	Pyrolysis	Waste-to-chemical	\$3,000,000	Sustainable Development Technology Canada (SDTC).
Total since 2017				\$58,747,448

**Based on the information in linked sources. See Appendix 1 for methodology.

C) Funding for bioplastics since 2017 and during covid-19: \$33.9 million

Name	Details and application/s	Funding (\$)	Of which, Post-COVID (\$)
Origin Materials	Innovation, Science and Economic Development Canada funding support a project aiming to implement the demonstration of disruptive biorefinery technology based on the use of forestry biomass feedstock to produce two commercial-grade intermediate bio-product chemicals. Funding awarded on Sep. 23, 2020, by the Atlantic Canada Opportunities Agency is to hire engineering consultants to complete site assessments for a manufacturing facility.	\$23,050,000	\$50,000
TerraVerdae Bioworks Inc.	National Research Council Canada funding (Jul. 1, 2019): TerraVerdae Bioworks (TVB) is an advanced biomaterials company whose technology is based on the use of biobased and biodegradable polyhydroxyalkanoates (PHA). See related details outlining contributions from the Clean Growth Program as well. Agriculture and Agri-Food Canada funding contributed (Apr. 1, 2020): The objective of this project aims to work with their current agri-based PHA's to enhance its properties and create a biobased bioplastic prototype that would meet the needs of the agricultural industry and provide benefits to the environment by reducing the plastic waste.	~\$2,060,000	\$1,060,000
CERT Systems Inc.	Using only water, electricity, and a catalyst, CO2 can be transformed into building blocks like ethylene. When powered by renewable energy sources, the process provides net-neutral production of precursors for fuels and consumer plastic. Funding by the Energy Innovation Program, Natural resources Canada.	\$1,400,000	
Titan Clean Energy Projects Corp.	Agriculture and Agri-Food Canada (Jul. 15, 2019): \$150,000 awarded for The objective of this project is to test the formulation and produce a bioplastic masterbatch (an additive or binder for imparting other properties to plastics), which is hypothesized to increase the biodegradability of bioplastics. Additional funding posted Sep. 1, 2020 (\$1,000,000).	\$1,150,000	\$1,000,000
Ecoenviro Labs Inc.	Agriculture and Agri-Food Canada ((ISC-02-PHI GA) (Jul. 15, 2019 - Jan. 15, 2020)): The objective of this project is to test the formulation and properties (such as strength and decomposition rate) of a biodegradable and compostable bioplastic mulch, in order to adapt for agricultural applications. Turning Feathers into Organic Bioplastic Mulch for Agricultural Industry. (ISC-02-PH2) (Sep. 1, 2020 - Aug. 31, 2022)	\$1,150,000	\$1,00,000

Polymateria (Canada) Products Limited	Canada Economic Development for Quebec Regions (2018): Business start-up: The project aims to acquire manufacturing equipment to begin production of an additive that makes plastic biodegradable.	\$1,000,000	
B.C. RESEARCH INC.	National Research Council Canada (Industrial Research Assistance Program): BCRI has developed a process to modify purified LignoForce™ lignin properties for higher-value uses such as blending with certain plastics to manipulate their mechanical properties and impart biodegradability.	\$139,295	
Kwi Kunststoffwerk industrie inc.	National Research Council Canada (2019): Funding for the innovation project aims to manufacture nanomaterials by sequestering carbon from plastic waste destined for landfill (estimated minimum amount). Transport Canada Funding (2019): Grant to develop a proof of concept for innovative solutions under the Plastic Recycling of Glass Fiber Reinforced Plastic challenge Transport Canada (Mar. 30, 2020): \$1,000,000 awarded to provide funding for the development, testing and demonstrations of prototype technologies, as part of an agreement for the Recovery of Post-Consumer Glass Fiber Reinforced Plastics Project.	\$1,357,000	\$1,000,000
Plantee Bioplastics Inc	Fisheries and Oceans Canada (Mar. 30, 2020): \$286,000 for the purpose of the Program is to enable Participating Departments/Agencies to support the scale up of Canadian small businesses through early-stage, pre-commercial R&D. Previously, \$138,000.00 was awarded by the department (Jun. 1, 2019). National Research Council Canada: \$20,000 (Sep. 1, 2020) from Youth Employment Program for conducting a market research, develop a Go-To-Market strategy and creating an investor pitch deck. Another \$20,328 (Apr. 1, 2020) was awarded to assist innovative, early-stage small- and medium-sized enterprises that are unable to access existing COVID-19 business support. Natural Resources Canada (Aug. 31, 2020): \$146,750 related to technology research and development.	\$611,078.00	\$473,078
Singular Solutions Inc.	National Research Council Canada (Jun. 1, 2020): Development of a proprietary BioSustainable Additive which will cause food packaging and agricultural film products made of PE or PP to naturally biodegrade within 6 - months, if discarded or landfilled, without creating harmful microplastic. The project includes development of the equipment and process for 200kg/h pilot-scale production for BioSustainable Additive.	\$149,999	\$149,999
BOSK BIOPRODUITS INC.	National Research Council Canada (Apr. 1, 2020): \$30,492.00 provided from the IAP program is to assist innovative, early-stage small- and medium-sized enterprises that are unable to access existing COVID-19 business support. Natural Resources Canada (Mar. 27, 2020): \$1,000,000 for technology demonstration related to the production of compostable bioplastic from pha base derived from forest biomass, with the main expected results being advanced technologies or tools that can lead to energy savings, reduced environmental impacts and enhanced competitiveness	\$1,030,492	\$1,030,492

good natured Products Inc.	Western Economic Diversification Canada awarded this in 2018 to develop non-toxic high-heat microwave and dishwasher-safe bioplastic food containers.	\$850,000	
Totals		\$33,947,864	\$4,763,569

D) Funding for mid-sized plastics product companies and recycling awarded during the COVID-19: \$3.39 million***

Recipient	Funding Amount	Funding Source	Details	Awarded or allocated for recycling Y/N
Novo Plastics Inc.	\$500,000	Federal Economic Development Agency for Southern Ontario	RRRF funding will be used to support Recipients to address the impacts of the COVID-19 pandemic (Mar. 16, 2020).	No
Ritz Plastics Inc.	\$490,000	Federal Economic Development Agency for Southern Ontario	RRRF funding will be used to support Recipients to address the impacts of the COVID-19 pandemic (Mar. 16, 2020).	No
Hawk Plastics Ltd.	\$472,775	Federal Economic Development Agency for Southern Ontario	RRRF funding will be used to support Recipients to address the impacts of the COVID-19 pandemic (Mar. 16, 2020).	No
Stratus Plastics International Inc.	\$167,476	Federal Economic Development Agency for Southern Ontario	RRRF funding will be used to support Recipients to address the impacts of the COVID-19 pandemic (Mar. 16, 2020).	No
Plastiques Moore inc.	\$831,000	Canada Economic Development for Quebec Regions	Acquisition of equipment: The project aims to increase the production capacity of the company, which specializes in the injection molding of plastic parts (Aug. 19, 2020).	No
Modix Plastique inc.	\$247,448	Canada Economic Development for Quebec Regions	Working capital : In the context of the crisis caused by the pandemic at COVID-19, the project aims to ensure the continuity of the activities of ModixPlastiqueInc., which specializes in manufacturing resin from recycled plastic (Sep. 1, 2020).	Yes
Green Solutions Industries International Ltd.	\$287,594	Federal Economic Development Agency for Southern Ontario (\$137,594.00) National Research Council Canada (\$150,000)	RRRF funding will be used to support Recipients to address the impacts of the COVID-19 pandemic (Mar. 16, 2020). The purpose of this project is to develop new solutions to use low end PE, PP and Mixed Auto plastic materials to make different plastic lumbers. The purpose of the Industrial Research Assistance Program Contributions to Firms is to support research, development, adoption and/or adaptation of innovative or technology-driven new or improved products, services or processes in Canada up to their commercialization (Jun. 1, 2020).	Yes

Plastics Redeemed Inc. (recycling)	\$40,656	National Research Council Canada	The funding provided from the Innovation Assistance Program is to assist innovative, early-stage small- and medium-sized enterprises that are unable to access existing COVID-19 business support (Apr. 1, 2020).	Yes
Goodwood Plastic Products	\$286,000	Fisheries and Oceans Canada	The purpose of the Program is to enable Participating Departments/Agencies to support the scale up of Canadian small businesses through early-stage, pre-commercial R&D. Stated expected impact is avoiding/minimizing negative impacts on Canada's oceans and other aquatic ecosystems (Mar. 30, 2020).	Yes
ClairEco S.E.N.C.	\$65,650	Canada Economic Development for Quebec Regions	Working capital : In the context of the pandemic crisis COVID-19, the project aims to ensure the continuity of operations of a company specializing in plastics recycling (Jul. 8, 2020).	Yes
Total for recycling				\$927,348.00
Total for plastics COVID-19				\$2,461,251.00
TOTAL				\$3,388,599.00

***Source: [NRCan Current Investments](#); and [Canada Open Data portal on Grants and Funding](#).