



NATIONAL ZERO WASTE COUNCIL | PLASTICS ADVISORY PANEL

Regulatory Approaches for Priority Plastic Wastes

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About the National Zero Waste Council

The National Zero Waste Council, an initiative of Metro Vancouver, is a leadership initiative bringing together governments, businesses and non-government organizations to advance waste prevention in Canada and the transition to a circular economy.

For more information, please visit www.nzwc.ca.



I. OBJECTIVES

Plastics serve useful purposes and can be part of more efficient packaging and products, saving energy, preventing other types of wastes, and protecting human health. That said, some uses of (or mismanagement of) plastic can be problematic, and could be addressed through the application of the 5Rs hierarchy – that is, focusing on materials and product redesign for source reduction and reuse, then improved collection and recycling, and finally disposal in a responsible manner.

The objectives of this document are to:

- Identify a selection of ‘priority’ plastic wastes
- Suggest specific regulatory measures to prevent, and better manage, those plastic wastes

This document has been compiled and reviewed by the National Zero Waste Council’s Plastics Advisory Panel; a Panel co-chaired by representatives of Metro Vancouver and the Communauté métropolitaine de Montréal who are members of the Council. Informing this analysis is the work of the Circular Economy Leadership Coalition (of which the Council is a founding member), the CCME Plastics Strategy and the G7 Oceans Plastics Charter as well as relevant research, analysis and actions by local governments across Canada.

Due to time constraints, not all members of the Plastics Advisory Panel were able to review the recommendations in full detail. Therefore, while the Panel was in general agreement with the overall recommendations made, it should be noted that the opinions expressed in this document are not necessarily those of all the Panel members or their respective organizations.

II. GUIDING PRINCIPLES & SELECTION CRITERIA

The guiding principles and criteria used to select priority plastics, and the suggested regulatory measures, include:

- **SOURCE REDUCTION/PREVENTION:** the 5Rs hierarchy and the preferred order of reduction, reuse, recycling, recovery and residual management. Historically, most regulatory measures have provided drivers for increased recycling while reuse or source reduction have been overlooked. In implementing the regulatory measures recommended in this document, regulators should include requirements for waste prevention by reducing plastic use at the source. In order to meet the targets of the G7 Ocean Plastics Charter, mandatory and incrementally increased recycled plastic content would need to be imposed on all plastics marketed in Canada;
- **MUNICIPAL IMPACT:** the impact of the plastic items on municipal operations, particularly municipal litter and illegal dumping, or on municipal wastewater treatment;
- **ENVIRONMENTAL IMPACT:** impact on the receiving environments, particularly as a contributor to ocean plastics and impact on marine life;
- **ALTERNATIVES:** the practical availability of alternatives to the plastic material used in the item, or alternatives to the item itself; and
- **BENEFITS:** economic, environmental or social benefits of the plastic item.

Other considerations are listed below.

- ***One size does not fit all***
No single regulatory method is universally applicable. Measures may include:
 - Outright prohibition of the use/sale of a product or material.
 - ‘Traditional’ Extended Producer Responsibility (EPR) making the manufacturer/ brand owner of a product financially and legally responsible to collect and dispose/recycle their product after its use. A deposit/refund system may be used, and the EPR program may include requirements to drive waste prevention through product redesign, as opposed to simply increased recycling.
 - Other product stewardship models in which governments take on a portion of the funding and/or operation of collection and disposal/recycling of a product after use.
 - Taxation or other incentives for product collection & recycling, or waste prevention.
 - Voluntary industry programs for waste prevention/waste recycling, with possible backdrop regulations, if voluntary efforts are unsuccessful in a given timeframe.

II. Guiding Principles and Selection Criteria

- ***Unintended consequences must be considered***

For example, replacing a plastic item with an alternative material may have an even greater negative environmental impacts over its lifecycle.

There can also be unintended socio-economic impacts which may necessitate some exemptions when implementing bans and other regulations. For instance, there are people for whom straws are necessary not optional and for whom straws of alternative materials are not ideal.

- ***Biodegradable/ compostable plastics are not a complete solution***

- Certification standards for biodegradable/ compostable plastics are currently set out only as a single-level 'pass-fail' system. Those certifications (e.g. those established by American Society for Testing and Materials and by the Biodegradable Products Institute) allows a plastic to be called biodegradable/ compostable if it breaks down to a specified degree, over a minimum period of time, when exposed to a certain minimum temperature and other physical conditions. However, that required period of time is usually longer than the normal residence time of most commercial composting and digestion facilities, and the minimum required temperatures are far below that of say, a marine environment.

The result is that many 'certified biodegradable' plastics will not sufficiently biodegrade in existing commercial composting or digestion facilities, let alone in the natural environment of land or oceans. Some advocate regulations to require organics processing facilities to modify their design and operations to accommodate the longer processing requirements of some biodegradable plastics. However, it would be more realistic to expect new products to be designed to fit the capabilities of existing infrastructure. This could be done through requirements by senior governments.

- The widespread use of biodegradable plastics could have the unintended consequence of increasing littering and marine plastics, if the public mistakenly thinks such materials will always biodegrade in the natural environment.

- ***Compromises may be necessary***

- In some cases, a reduction of plastic waste may be preferable, even if it results in other environmental impacts. For example, it may be preferable and more practical to offset GHGs, than to try to compensate for ocean plastics pollution.
- Some regulatory measures may need partial interim funding from governments in order for timely implementation.

II. Guiding Principles and Selection Criteria

- **Regulatory measures need supporting programs**

Supporting programs for regulatory measures include but are not limited to:

- Institutionalizing **source reduction/waste prevention** through:
 - Public and private sector procurement policies,
 - Legislated targets for source reduction/waste prevention
 - Coordinated, harmonized regulations including EPR (including requirements for source reduction), and restrictions on the use of unnecessary single-use items. Many Canadian municipalities including Victoria, Vancouver, Montreal and Toronto have begun implementing restrictions on the use, distribution and sale of certain single-use items. However, such restrictions are problematic for retailers and industries operating across many different locations with different requirements. Wherever possible, these should be coordinated or harmonized at a Provincial or even Federal level
- Institutionalizing **recycling** through:
 - Legislated minimum recycled content requirements in individual items or within an industry overall (note that minimum recycled content should also be considered in implementing EPR programs),
 - Legislated requirements for labelling/disclosing of recycled content
- Suitable enforcement to drive compliance
- Community-based social marketing and other methods to encourage voluntary behaviour change
- Public education programs to increase awareness
- Guidelines by/for local governments to ban, restrict, or manage a particular plastic

III. PRIORITY PLASTIC TYPES (in *alphabetical order*)

All of the plastics in this section are priorities. Ranking them based on tonnage and other criteria is not feasible given the time available to complete this document, and because credible tonnage data on many of these items is simply not available. As a result, the plastics have been listed in alphabetical order, and no ranking is implied:

Bags (single use)

- Recommended methods of management:
 - a. Controlled usage (e.g. bans/restrictions on use) [*Local governments*]
 - b. Economic incentives (e.g. mandatory fees at point of sale) [*Local governments*]
 - c. Increased littering fines [*Local governments*]
 - d. Expansion of/inclusion in existing/new EPR for packaging, preferably with a deposit-refund requirement [*Senior governments*]
- Plastic bags are easily windblown, frequently littered, and readily mistaken for food by many marine animals. Alternatives to single-use plastic bags are widely-known and practical, although depending on the material used, a sufficiently high number of reuses must be made in order to offset impacts of production. Plastic bags are currently somewhat covered by existing packaging EPR programs. Although logistically more difficult to administer, a deposit-refund system could ensure higher recovery rates and less littering. Specific collection or drop off points are used somewhat successfully in some provinces already. Similarly, studies (Australian State of Victoria, State Environment and Climate Change Minister) have shown that charging a sufficient fee for such single-use items is more effective than offering a discount for bringing a reusable alternative. Increased requirements for minimum recyclable content should be considered wherever possible. A country-wide ban (as per France) could be considered.

Balloons

- Recommended methods of management:
 - a. Consumer education/guides on alternatives to balloons [*Local governments*]
 - b. Controlled usage (e.g. bans/restrictions on use) [*Local governments*]
 - c. Increased littering fines [*Local governments*]
 - d. EPR through deposits on helium-filled balloons [*Senior governments*]
- Although not a large contributor to marine plastics or municipal litter in terms of weight, balloons have a notable and disproportionate impact on the environment. Released balloons have the potential to travel long distances, particularly helium-filled balloons. They have been cited by organizations such as Ocean Conservancy and the Marine Conservation

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Society as one of the deadliest ocean plastic items as they are mistaken for food by marine animals such as sea turtles, dolphins, and birds.

While it may be challenging to place deposits on such a low-value item, they should still be considered, as traditional EPR makes it unlikely that low-value items like balloons would be returned for recycling, and deposits have worked well on other low-value items such as beverage containers.

Bottles and Caps

- Recommended methods of management:
 - a. Source reduction through the promotion of reusable bottles and the consumption of tap water [*Local governments*]
 - b. Expansion of/inclusion in existing/new EPR for packaging [*Senior governments*]
- Where beverage container EPR programs exist, recovery rates are high - particularly in those locales with deposit refund systems. Deposit systems have a proven track record of very high recovery rates over the last 5 decades. Plastic caps are somewhat covered by those EPR programs, though consistent EPR requirements across Canada, and education to encourage the inclusion of caps in the recycling of bottles is needed. Recyclers and manufacturers should also work to encourage that plastic caps and bottles are made of the same plastic, whenever possible. We recommend national harmonization of EPR for beverage containers and caps. Increased requirements for minimum recyclable content should be considered wherever possible.

Cigarette filters

- Recommended method of management: A national prohibition on the use of cellulose acetate (or any non-biodegradable material) as a filter for cigarette manufacturing. This prohibition would necessitate source reduction of plastic waste through the substitution of alternative biodegradable non-plastic filters and/or innovation in the physical design of cigarettes. [*Senior governments*].

An alternative approach would be for a nationally harmonized EPR program making the manufacturers legally and financially responsible for the associated costs of collecting cigarette filters littered on land and in the oceans. While this would not necessarily eliminate plastic cigarette filters entirely, it could provide an incentive for redesign of cigarettes. It could possibly also include responsibility for environmental impacts related to the disposal of the associated tobacco components littered in the environment.

- Most cigarette filters are made from cellulose acetate which is not biodegradable. Worldwide, an estimated 4.5 trillion cigarette butts are littered each year, making them the single most littered item. Similarly, Ocean Conservancy lists cigarette butts as the single

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most common item in beach litter entering oceans. According to the WHO, Stanford University and San Diego State University, cigarette filters do not serve any actual function in making cigarettes safer, and are essentially a marketing tool. Traditional EPR is not a good option, as effective collection of, and accounting for cigarette butts would be logistically impractical. Previous attempts by the cigarette industry to promote portable ashtrays and educate the public against littering butts were very limited in scope and almost completely ineffective.

Clothing and Other Textiles (made with synthetic fibers)

- Recommended method of management: Modified EPR making synthetic fiber clothing manufacturers contribute to the cost of plastic microfiber mitigation, and/or research toward new technologies [*Senior governments*].
- It is now well-known that the laundering of clothing made of synthetic fibers such as polyester, acrylic, and nylon results in the release of huge numbers of plastic microfibers. Much of this can be captured at sewage treatment plants, but the uncaptured microfibers are still plentiful and are now detected in our municipal drinking waters around the world. While the science regarding the impact of plastic microfibers on humans is not yet certain, plastics are known to preferentially absorb certain toxins and may release them in the body. It is not realistic to think that synthetic clothing fibers could be banned or replaced at this time. Similarly, a traditional EPR program (where industry collects and recycles/disposes of the product after it becomes a waste) would not address the release of microfibers which occurs mostly during the use of textiles rather than after the textiles become a waste.

However, EPR programs could take another form where textile manufacturers make a mandatory contribution to a fund that would

- a. upgrade municipal sewage treatment to further reduce the release of microfibers
- b. incentivize homeowners to install filters for microfibers on washing machines (until such time as these filters are made a standard feature on new washing machines)
- c. go towards research into new and emerging methods to redesign/treat/recover synthetic fibers

Fishing Gear (especially nets)

- Recommended method of management: Industry EPR delivered in conjunction with government [*Senior governments*]
- Though not a municipal litter issue in any way, fishing nets are included in this document given its very high ranking as a problematic ocean plastic. According to some studies such as those by World Animal Protection, abandoned fishing nets comprise almost half of the weight of ocean plastics, and organizations such as Ocean Conservancy list abandoned fishing nets as the deadliest of all plastic items in the marine environment. International prohibitions against abandonment of fishing gear has existed since 1973, but is largely unenforceable and ineffective.

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Given the urgent need to address abandoned nets, and the lack of enforced regulation, our recommendation is to regulate the fishing gear manufacturers under a product stewardship program immediately. However, while traditional EPR is usually funded entirely by the manufacturers and brand owners of the product, the high cost, low turnover, and the small number of manufacturers of fishing nets will likely require a different model in order to allow for quick implementation. In this case, it will likely require partial funding from the federal government, and strict enforcement of minimum recovery rates. Discussions between the federal government and the fishing industry should be initiated immediately. Incentives such as deposits or ‘bounties’ on fishing nets should be considered, recognizing that the amount of a suitably incentivizing deposit may need to be high because of the relatively large initial purchase cost.

Foam Cushions (especially mattresses and furniture)

- Recommended method of management: EPR for mattresses and furniture [*Senior governments*]
- The cushioning materials used in mattress and upholstered furniture are mostly composed of polyurethane foam rubber materials. These items are not commonly littered on beaches or found in the marine environment. However, illegal dumping of mattresses and furniture is a very costly problem for municipal governments. In the Metro Vancouver area alone, there are tens of thousands of illegal dumping incidents each year, with clean-up costs representing several million dollars. Similarly, in Quebec, following July 1st “Official Moving Day” (when the vast majority of leases are renewed), significant resources need to be deployed by municipalities to collect mattresses and furniture. Mattress and bulky furniture are well suited for traditional EPR, which is being considered in a number of provinces.

Foodware for Takeout

Containers (Rigid and Foam Plastic)

Cups and lids (single use plastic)

Straws (single-use, plastic)

Utensils (single use plastic)

- Recommended methods of management:
 - i. Controlled usage (e.g. bans/restrictions on use) [*Local governments*]
 - ii. Support for reusable alternatives where practical [*Local governments*]
 - iii. Economic incentives (e.g. mandatory fees at point of sale) [*Local governments*]
 - iv. Increased littering fines [*Local governments*]
 - v. Inclusion under EPR, preferably harmonized nationwide [*Senior governments*]
- A popular belief is that conventional plastics, especially foodware, can be widely replaced with certified biodegradable plastics, but this is not yet a complete solution. As discussed in the ‘considerations’ section of the Guiding Principles and Selection Criteria, not all ‘certified biodegradable’ plastics can be sufficiently biodegraded in existing commercial composting

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or digestion facilities, let alone in the natural environment (i.e. on land or in oceans). Senior governments could regulate that the timeframe and physical conditions under which a 'certified' plastic must biodegrade should be (a) comparable to those found in the natural environment, or (b) comparable to those found in typical existing commercial composting/digestion facilities.

- **Containers (single use rigid and foam plastic):** Both rigid plastic and expanded polystyrene takeout containers are found as beach litter, and as part of municipal litter. Although they are not as significant a contributor as other plastics (e.g. cigarette butts, fishing nets, bottles, or bags), they are still in the top 10 of beach littered plastic items. Foam plastics in particular have a low density and tendency to break apart easily into small fragments, which make them problematic as windblown plastics in the environment. Recognizing the range of different measures being used by different locales, we recommend supporting projects that switch from single use items to reusable containers, national harmonization of bans, fee/incentives, and/or EPR for plastic take-out containers. Where possible, and not in conflict with other regulations or performance standards, requirements for local production and minimum recycled content (whether through conventional plastics recycling, or through emerging recycling technologies such as depolymerization) may also be considered.
- **Cups and Lids:** Plastic and plastic-coated cups and lids are another category that is not necessarily the largest contributor to litter, but still in the top ten of beach littered items. They are already somewhat covered by EPR programs in those provinces in which EPR for packaging has been implemented, and could be readily added to programs where coverage does not already exist. For locales relying on economic incentives, behavioral economics studies have shown that charging a fee for such single-use items is more effective than offering a discount for bringing a reusable alternative. Voluntary reduction of single-use cups and lids is already occurring in some locales. Recognizing the range of different measures being used by different locales, we recommend supporting projects such as cup share programs that switch from single use to reusable cups, national harmonization of bans, fee/incentives, and/or EPR for plastic cups and lids. Increased requirements for minimum recyclable content should be considered wherever possible.
- **Straws:** As a high-profile single-use item, the plastic straw has received much attention, though other plastic items are arguably more concerning in terms of weight, number of occurrences, and direct impact on marine life. Nonetheless, the impact of the plastic straw is significant, alternatives are reasonably practical, and they can be covered under existing and future EPR programs. There is anecdotal evidence that several businesses (e.g., restaurants) have already voluntarily moved to supply straws only upon request from the customer. Best practices to reduce the use of straws could be formalized within a voluntary agreement with industry to avoid the use of straws. That said, many communities are also using prohibitions, and/or economic incentives to reduce plastic straw use. Similarly, behavioral economics studies have shown that charging a fee for such single-use items is more effective than offering a discount for bringing a reusable alternative. Recognizing the range of different measures being used by different locales, we recommend supporting projects that switch from single use straws to reusable straws or other alternatives, national harmonization of bans, fee/incentives, and/or EPR for plastic straws.
- **Utensils (single use plastic):** In terms of weight, plastic utensils are not a large contributor to beach litter/ocean plastics, and not a particularly large component of municipal litter.

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However, according to Ocean Conservancy, the small particles that result from the micro-fracturing of these items is particularly harmful to marine animals that mistake them for food. The same methods of managing other food-related single-use plastics could apply to utensils. For locales relying on economic incentives, behavioral economics studies have shown that charging a fee for such single-use items is more effective than offering a discount for bringing a reusable alternative. As is the case with straws, voluntary reduction of plastic utensils is also occurring in some locales. Recognizing the range of different measures being used by different locales, we recommend supporting projects that switch from single use to reusable utensils or other alternatives, and national harmonization of bans, fee/incentives, and/or EPR for plastic utensils. Increased requirements for minimum recyclable content should be considered wherever possible.

Food Wrappers (single use, flexible/film plastic)

- Recommended methods of management:
 - a. Voluntarily or through government directive, the packaging industry should formalize a new effort towards reducing packaging at the source (e.g. a new program similar to that of the former National Packaging Protocol led by the CCME in the 1990s). [*Senior governments*]
 - b. Expansion of/inclusion in existing/new EPR for packaging [*Senior governments*]
- By weight, food wrappers (e.g. candy wrappers) are a relatively small contributor to municipal litter, although some shoreline cleanup events (e.g. International Coastal Cleanup Day 2017) found food wrappers to be the second most prevalent item of beach litter (after cigarette butts). Food wrappers are already somewhat covered by EPR programs in those provinces in which EPR for packaging has been implemented, and could be readily added to programs where coverage does not already exist.

Tires

- Recommended method of management: Mandatory requirement for research and development by the tire manufacturing industry and other stakeholders (e.g. Canadian Association of Tire Recycling Agencies), complemented by public education to improve public awareness [*Senior governments*]
- This has been included in this document, as microparticles from tires are a significant contributor to ocean plastics, but they have not been categorized as a priority per se, as no immediate apparent solutions can be recommended yet, regulatory or otherwise. Automotive tires include a mixture of natural and synthetic rubbers. In their normal use, the wear and tear of being driven over their lifetime causes up to 20% of the original weight of tires to be lost as microscopic rubber dust (mostly under 100 nanometers in size), deposited onto roads, parking lots, driveways, etc. Many, if not most of those microscopic particles can enter surface water systems or other watercourses and eventually reach lakes and oceans without going through municipal sewage treatment.

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Like microbeads from personal care products, the particles from tires are already microplastics when they reach the ocean – no period of fracturing from UV, salt water, or wave action is needed. The IUCN in 2017 estimated that 28% of the microplastics in our oceans come from car tires.

With about 20 million tires replaced each year in Canada this represents tens of thousands of tonnes of rubber microparticles. In many provinces, tires are already collected and recycled under regulated EPR programs. However, just as is the case with textiles, this occurs after the tires are worn, and the microparticles have already been released. But unlike textiles, there are no potential in-situ filters, or treatment plants that could intercept all stormwater. Furthermore, there is no realistic commercially developed alternative to the automotive tire, and no biodegradable rubber material that could be realistically substituted. Because of these reasons, a regulation or additional EPR requirement for tires would not appear to be viable.

We recommend that directed research is needed – into mechanical alternatives to the tire itself (such as longer-lasting non-pneumatic designs), alternatives to the synthetic rubber materials used (such as natural Guayule or Taraxacum rubbers), new methods to capture of rubber microparticles from surface/stormwater, increasing adhesion of worn rubber particles to roads, etc.

Wet wipes (single use)

- Recommended methods of management:
 - a. Controlled usage through bans/restrictions on use of plastics in manufacturing [Senior governments]
 - b. Controlled usage through restrictions on sales [Local and/or Senior governments]
 - c. Economic incentives (e.g. mandatory fees at point of sale) [Local governments]
Concurrent with this, explore upstream approaches such as federally-mandated requirements for implementation by provinces and municipalities [Senior governments]
 - d. Inclusion in Extended Producer Responsibility programs [Senior governments]
 - e. Prohibition from being labelled or advertised as “flushable” [Senior governments]
- Wet wipes are a group of single-use items generally used for cleaning purposes. Some wipes such as those used for automotive detailing and household cleaning are predominantly disposed in garbage. Wet wipes used for cleaning toilets and bathrooms as well as for personal hygiene purposes (baby/adult) are most often flushed down toilets.
- While a minority of wet wipes are made from natural fibres, most are composed of polyester, polyethylene or other plastic materials.
- Wet wipes flushed down toilets accumulate in sewer systems and are a major cause of blockages and clogging, amounting to an estimated \$250M per year in direct cleanup and maintenance costs for municipal wastewater systems in Canada. This does not include any indirect costs (e.g. flooding damage, microplastics in receiving waters) of disposal.
- An International Water Services Flushability Group (IWSFG) has developed criteria for ‘flushable’ products. Only products that meet their proposed criteria would be deemed to

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be compatible with municipal sewer systems and would be allowed to use the term “flushable”. A study by Ryerson University (March 2019) tested at least 64 different wet wipe products sold in Canada, and demonstrated that none of them, whether using natural or synthetic materials, currently meet the criteria.

- Controlled usage through bans on the use of plastics in manufacturing of wet wipes would require action by the Senior (likely Federal) government. There are wet wipe products available for sale that use only natural materials. Restrictions on sales could be done at the local level (in the same way that sale of cosmetic pesticides is banned by some municipalities), but a harmonized restriction at the Provincial, or preferably Federal level would be much more effective and efficient.
- EPR for wet wipes could be implemented provincially, but would be more effective and efficient at the Federal level. EPR makes the manufacturers responsible for recovering their waste products for recycling and/or disposal. Because recovery of flushed wipes is impractical, in practice the manufacturers of wet wipes could be (a) made financially responsible for annual compensation to municipal wastewater systems for their incremental maintenance costs, and (b) required to conduct substantial public education to redirect wipes from toilets to the garbage. Manufacturers might thereby be significantly motivated to propose product redesign as an alternative.
- The recommendation to prohibit plastic wet wipes from being labelled “flushable” is analogous to California’s plastics labeling law that prohibits the sale of any plastic product or packaging with a "biodegradable" or other unproven claim implying that the item will break down, fragment or decompose in a landfill or other environment.

IV. OTHER PLASTIC TYPES

The following plastics are not large contributors to ocean plastics, or to problems with municipal litter, or sewage treatment. Nonetheless, they are listed here for consideration:

Agricultural Plastics

- Recommended method of management: Traditional EPR through new or existing programs [*Senior governments*]
- Agricultural plastics (such as baler twine, grain bags, bale wrap, silage plastic and feed bags) contribute very little to the problem of ocean plastics or to urban litter/illegal dumping, although impacts in rural communities are of greater concern due to issues such as open burning on farms. Agricultural plastics do contribute to landfill plastic wastes, and have been identified as a Level 1 EPR priority in Quebec and are the target of some voluntary programs and pilots (e.g. Alberta, Saskatchewan, Nova Scotia, etc.)

Vinyl Siding from Construction and Demolition

- Recommended method of management: Traditional EPR [*Senior governments*]
- Significant tonnages of plastics can be found in Construction and Demolition (C&D) wastes going to landfills.
However, C&D plastics waste is not a significant issue for ocean plastics, nor is it a large issue for municipal litter (illegal dumping of demolition materials from small contractors is a municipal litter issue, but such incidents generally do not include large amounts of plastics). Significant logistical challenges for recovery of most C&D plastics would need to be worked out.

The predominant plastics will be PVC in the form of vinyl siding and PVC, PE and PP in plastic plumbing. Other minor contributors include window and door frames, blinds and shutters, film plastics from packaging of building materials, etc.

C&D materials have been on the CCME plan for EPR, but no generally-accepted models have been developed to date. From a logistical standpoint, and focusing on the two largest contributors to plastics, which are siding and piping, only siding lends itself to a potential EPR solution.

Siding is easily accessible on the exterior of building and does not require high levels of physical deconstruction or excavation. Piping, on the other hand, exists inside of cabinets and walls, or is buried on the building property, so removal for recycling is considerably more onerous, and more work would need to be done to develop a realistic regulatory method of management. Some locales have used deposits on demolitions which are

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refunded in whole or in part after materials have been recovered for recycling, but these are done by individual municipalities through their local building permitting systems, and tend to focus on more easily recovered materials.

Miscellaneous

As described at the outset, priority plastics were selected based on criteria that included negative impact on municipal operations (particularly litter and sewage treatment) and on the environment (particularly oceans).

There are a number of other plastic items not discussed in this document due in part to time constraints, but also because they have no significant impact on municipal operations or ocean environments (per the selection criteria). These include but are not limited to plastic toys, plastics from electronics, plastic materials in automobiles, and in child car seats.

As the regulatory measures recommended for the higher priority plastics are implemented, some of these other plastics should also be affected. For example,

- EPR for electronics naturally captures plastics from e-waste and electronic toys.
- Minimum requirements for industry source reduction and recycled content should affect many of these plastic items

Nonetheless, as time and resources permit, these other plastic items should be addressed as they do represent opportunities for solid waste diversion from disposal.

V. ACKNOWLEDGEMENT

We give our sincere thanks to the members of the Plastics Advisory Panel. The Panel members are:

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