



Win-Finity

Recycling Windows Everyday!

Post-Consumer Viny Window Recycling Pilot Program

Information and Educational Kit Introduction

The Government of Canada is taking steps toward eliminating plastic pollution in Canada. **Over 3 million tonnes of plastics were discarded as waste in Canada in 2016, and only 9% was recycled.** Under Canada's G7 presidency in 2018, the Government of Canada championed the development of the Ocean Plastics Charter which commits to a more resource-efficient and lifecycle approach to plastics stewardship, on land and at sea.

In November 2018, through the Canadian Council of Ministers of the Environment (CCME), **the federal, provincial and territorial governments approved in principle a Canada-wide Strategy on Zero Plastic Waste, building on the Ocean Plastics Charter**, the strategy takes a circular economy approach to plastics and provides a framework for action in Canada. Federal, provincial and territorial governments are collaborating on implementing the Strategy via action plans focused on:

- Guidance to facilitate consistent extended producer responsibility (EPR) policies for plastics.
- National performance requirements and standards for plastics, including targets and timelines for increasing recycled content; and
- Assessing infrastructure needs for improved plastic lifecycle management.

As part of the integrated management approach to plastics, the Government of Canada is Tackling technological and logistical barriers and challenges for reuse and recycle plastics

- **Raising collection, repair and recycling rates.**
- **Minimizing** the amount of **plastic sent to landfill.**
- Bringing more product categories under **management frameworks across the country**
- Establishing the conditions for **innovation and greater capacity throughout Canada** to create a circular economy for plastics and stimulate investments in critical collection and recovery infrastructure.



In Canada, **17 per cent of the country's greenhouse gas (GHG) emissions come from the building sector and 35% heat loss from windows.** As a result, the Canada's Pan-Canadian Framework on Clean Growth and Climate Change 2030 led to the Energy and Mines Minister's identification of residential windows as one of the technology areas for improving energy efficiency and GHG targets.

National Research Council Canada has identified the aspirational thermal and energy performance goals for windows to be achieved by 2030. Natural Resources Canada also conducted research on the barriers to achieving this aspirational goal. The research showed that PVC window frames would be a necessary material to meet the demand to supply the Canadian market with windows that meet the aspirational goal and the building code by 2030. PVC windows are needed to reduce home heating and cooling loads subsequently necessary to reducing GHG in Canada.

Vinyl windows currently make up much of the residential window market share with **74 % US window sales at 39 million units and will continue to grow to 50 million units in North America by 2028. By 2028, over 26.7 million vinyl window units to be replaced in North America. This equates to 406.4 million lbs. of vinyl (approx. 1.6 billion lbs. of glass).**



Vinyl is recycled and vinyl products can be made with recycled content. **Post industrial PVC recycling is robust in North America with more than 1 billion lbs. recycled annually.** PVC window profiles are very rich compounds, highly stabilized and UV enhanced. In the PVC recycling industry reprocessed PVC window profile is in demand. The ability to collect post consumer PVC windows, segregating the PVC and reincorporating it into a new PVC window profile or other PVC product will not only provide landfill diversion and reduce virgin PVC resin consumption, but will capture a valuable resource capable of being **recycled more than 7 times, reducing PVC window profiles carbon footprint** and the need to use more fossil-based materials.

Currently post-consumer vinyl windows are not being recycled, they are sent to landfills. The infrastructure within North America is not developed enough for contractors to bring these windows to recycling facilities. Vinyl windows within construction, renovation & demolition (CRD) sites become part of a comingled waste stream limiting the desire for Vinyl Recyclers to accept them (In Canada 9 million tonnes of CRD waste are landfilled annually).



To retrieve Vinyl from CRD sites, it must be done before the waste is comingled at the worksite. Voluntary Industry Programs are currently the only routes. Europe has established many recycling plants for post-consumer vinyl window and door profiles. **In 2022, 408,151 tonnes were recycled. This program was implemented over the past 25 years.** Production and recycling sites keep the vinyl material in a traceable loop from vinyl profile to vinyl profile. Recycling PVC in a closed loop has proven to be the most sustainable management of the material.



To support the **Canadian Government Strategy on Zero Plastic Waste programs for Extended Producer Responsibility (EPR)** and promoting innovation for plastic life cycle management. We would like to co-ordinate a pilot project demonstrating the feasibility for end-of-life management of post-consumer vinyl windows. That includes the collection, deconstruction and the recycling options for materials recaptured. More importantly we need to demonstrate that we are recovering materials that are of value and are economically viable to reuse.

The **objectives** of this pilot program are to:

- **Identify the existing logistical and technological gaps.**
 - Identify the technological capabilities and needs to further the deconstruction, sortation and recycling of post-consumer PVC waste stream.
- **Validate the quantity of materials collected.**
 - Validate the actual PVC available from this waste stream to determine if this concept can be scalable (i.e. size of collection area) so it is self-sustainable and to justify capital investments in collection, deconstruction, recycling or recycled content end use.
- **Evaluate the quality and ability to reuse captured materials.**
 - Determine the required purity threshold for use of recycled PVC from post-consumer PVC windows and properties of products that contain this recycled material.
 - Based on these evaluations, collection, deconstructions and sortation methods may need to be adjusted to improve quality and consistency. This may involve modifying Window Installer Training & Certification programs.
 - Identify the need to improve initial design of PVC window compounds and window systems to improve the ability to recycle post-consumer PVC windows (i.e. additive technology in formula, best practices or design windows with more compatible materials).
 - Evaluate long-term performance and durability characteristics of window profiles made with post-consumer recycled PVC to ensure if recycled product is going to fulfill the intended service life.



- **Determine real cost of recycling vs Landfill and potential revenue opportunities.**

- Highlight the reality that PVC window profile recyclate is a material of value and economically viable to reuse.
- Any program needs to be self-sustainable like post-industrial PVC recycling.
- To encourage capital investment throughout the value chain towards improving capabilities and expanding EPR programs for post-consumer PVC windows, the economic viability needs to be supported.
- In addition, the value to end markets for incorporating recycled content also needs justified to promote further demand.

This pilot program will:

- **Set up of collection sites** at Distributor's location for Installers to return of post-consumer vinyl windows.
- **Establish receiving, separation & sorting protocols** for Deconstruction facilities and tracking mechanism to record/document material volumes and yield.
- **Establish receiving & processing protocol for Recycling facilities** and tracking mechanism to record/document material volumes and yield.
- **Generate report** documenting evaluations (trials & properties) from incorporating the captured vinyl into existing window profiles or other building product vinyl profiles.
- Create a **database tracking** overall mass balance for the pilot program.
- Provide an **economic assessment** outlining the viability of this program.





The plan is to **recycle post-consumer vinyl windows** from residential replacement and renovation locations by using existing infrastructure. Starting with:

- Installer picking up new windows from Distributor.
- Goes to renovation project to install new windows.
- Takes out old windows, places in truck/trailer.
- Drives back to Distributor disposes of old windows in a bin and picks up new windows for next job.
- Distributors collect old windows in bins provided.
- When a certain number of windows are collected, the Distributor calls to have them picked up and delivered to Deconstruction site.
- Deconstruction facility separates glass, metal and vinyl into separate bins.
- Deconstruction facilities call Recyclers (Vinyl, Glass, Metal) to pick up material.
- Recycler processes material into feed stream for new products.
- Converter incorporates captured material into finished product.



Benefits of the Program include the following:

Energy Savings	Creating a long-lasting Recycling program allows less new product being introduced to the industry. It takes less energy to reuse and recycle material than it does to produce the same material from scratch
Global Warming Benefits	Less overall carbon Waste
Waste Control	Diverts waste from the landfill, as per EPA, 18% is plastics
Community and Workplace Spirit	We are creating a positive program the both the community and workplaces will be proud to participate in. this creates a moral increase knowing we are all contributing to a cleaner industry.
Marketing and Sales tool	This program will create a tool for all participating member to use in marketing and customer acquisition.
Financial Saving	This program will create direct financial saving by avoiding waste and dumping fees at landfills and garbage pickups. This program will also create clean product that will be reintroduced into the manufacturing process that will translate into revenue.



Collection requirements and expectations for the recycling program are as follows:

1. Windows removed at job Site (new windows installed)
2. Old windows to be taken back to Dealer site and disposed of in designated MARKED bins
3. Bin to be picked up when full and delivered to Deconstruction site.
4. Windows to be broken down and separated into material categories (Vinyl, glass, waste)
5. Recyclable material to be prepared for shipping to partnering manufactures to test the quality of materiel.

Fenestration product deconstruction for recycling

Fenestration products contain glass and sharp components requiring attention to safety, **always wear appropriate Personal Protective Equipment (PPE)** when handling and deconstructing fenestration products. Glass can be very brittle and may break unexpectedly into large shards that can be very dangerous, always use extreme caution when handling glass.



Use Caution When Handle Large Products.

Combination (multi pane) designs of windows can be heavy, use caution when handling larger products utilizing assistance when moving and carrying.



Handling glass and deconstructing fenestration products requires the correct tools:

- Small pry bar
- Olfa style knife with new blades
- Assorted screwdrivers
- Saw appropriate for cutting frame and metal reinforcing components
- Glass suction cup(s) for handling larger glass units
- Tools for scraping/removing contamination from frames and glass



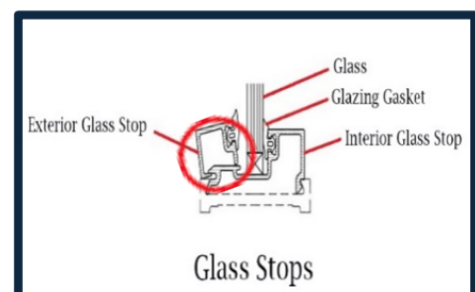
Basic deconstruction steps, depending on the type of the product, are as follows:

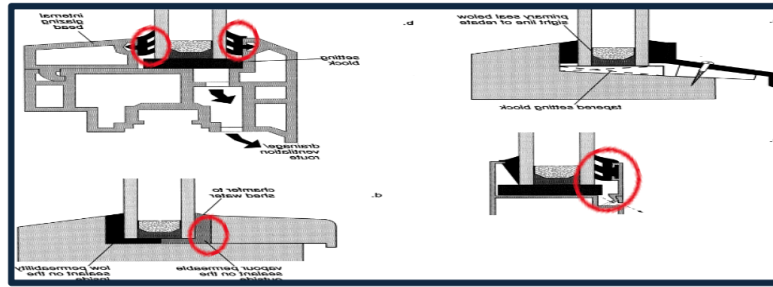
Windows

- Ensure adequate space is available to move and rotate products as required
- Determine if the glass is dry or wet-glazed in the frame/sash.
- Glass will be seated on gaskets (dry glazed) or held in place with tapes or sealants (wet glazed).

Glass

- Remove glass stops/bead that hold the glass in place. Insert a pry bar into the seam between the stop and frame/sash at the end, once the end is loose, it will pull out easily. Glass stops can be either on the interior or exterior of the frame.

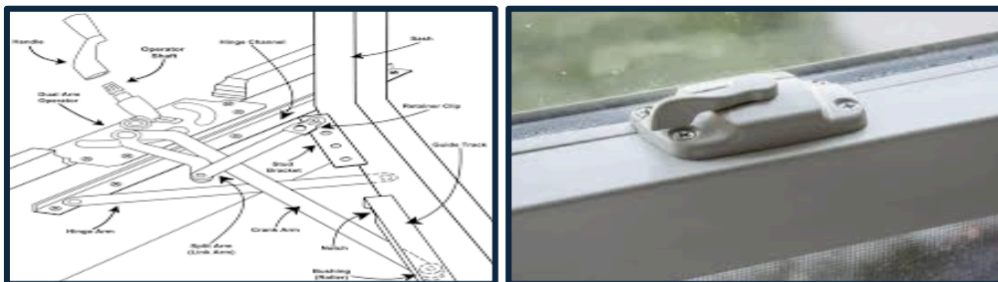




- Wet-glazed products are held in place with either tapes or sealants.
- For tapes or sealants use an Olfa style knife to cut around the perimeter of the glass where it contacts the frame/sash. While cutting the tape apply light pressure to the glass to help remove from the frame/sash surface.
- Once the bond is separated remove the glass unit from the frame or sash.
- Dispose of the glass unit appropriately for recycling.

Deconstruction of the assembly

- Remove all external hardware components typically held in place with screws. Dispose of hardware in appropriate recycling processes.
- Watch for hardware components that may be internal or inside frame/sash tracks.



Mullions/Mulls

- Mullions are typically held in place with screws at either end on the frame edge, or along the inside edge of the frame for mulled products.

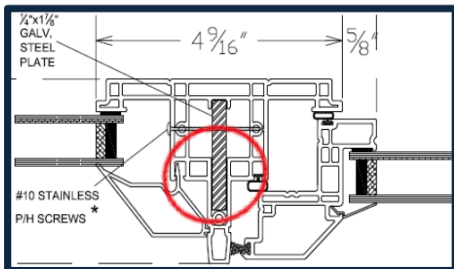


Figure 8

Mullion

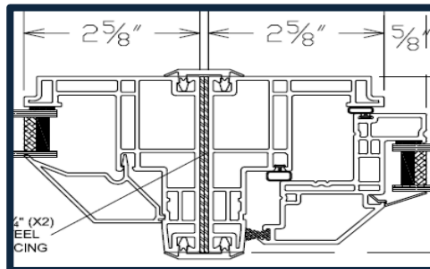


Figure 9

Mulled

- Unscrew and twist to break any sealant bonds and remove.
- Many mullions/mulls will contain reinforcements such as steel or aluminum, these may be fixed into the mullion/mull with screws. Remove reinforcing and dispose of it in the appropriate recycling process.
- Some frame systems may also contain reinforcing materials such as steel or aluminum. Break the frame down and remove and recycle any reinforcing materials. Reinforcing may be fixed to the frame with screws.
- Remove weatherstripping materials that may be inserted into channels in the frame, sash, or mullions. Some gasket systems are extruded in the frame and may need to be cut out

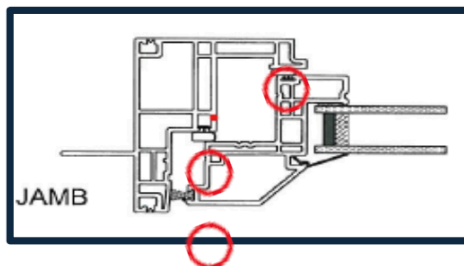


Figure 10

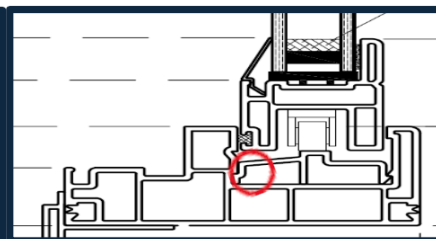


Figure 11

- PVC windows often have a wood jamb liner attached to them with staples and or screw anchors. Remove the liner and anchors and dispose of them in appropriate recycling processes.



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- Remove any contamination of the frame, sash, or mullion/mull such as glazing tapes, sealants, gaskets, metal anchors, and weatherstrips before the recycling process.





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