THE PAPER & PAPERBOARD PACKAGING ENVIRONMENTAL COUNCIL

2022 PPEC RECYCLED CONTENT SURVEY

Average Recycled Content of Major Paper Packaging Grades made by Canadian Mills in 2022

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EXECUTIVE SUMMARY

About PPEC

The Paper and Paperboard Packaging Environmental Council (PPEC) is the national association representing the environmental interests of the Canadian paper packaging industry.

PPEC members include mills and packaging converters operating across Canada who produce the three major packaging grades: containerboard (used to make corrugated cardboard boxes), boxboard (used to make boxboard cartons), and kraft paper (used to make paper bags and sacs).

About the Recycled Content Survey

PPEC's Recycled Content Survey was launched in 1990 and is conducted every two years to determine the average recycled content contained in the three major paper-packaging grades.

- The purpose of the survey is to track the average use of recycled content in 2022.
- The survey was conducted between April and June 2023.
- The scope is limited to Canadian containerboard mills only.
- PPEC received 11 survey responses, representing a 92% survey response rate.
- Together, the 11 companies operate 17 containerboard mills, with the majority located in Eastern Canada.

2022 Survey Results

The Canadian paper packaging industry is committed to environmental sustainability and waste minimization.

PPEC's 2022 Recycled Content Survey results continues to confirm that the feedstock used for the production of boxboard and containerboard made in Canada is primarily recycled content fibres.

- **Total Canadian mill packaging shipments:** 2.97 million tonnes
- **Total domestic packaging shipments:** 1.79 million tonnes
- **Total domestic recycled content of shipments:** 1.43 million tonnes
- **Average recycled content of domestic shipments for the top two major packaging grades:** 80.2%
- **Average recycled content for domestic shipments of boxboard:** 86.2%
- **Average recycled content for domestic shipments of containerboard:** 81%

Paper packaging represents a true circular economy in Canada, as paper packaging products are continually collected and recycled through residential and business recycling programs, allowing them to be remade into new paper packaging products again and again.

For more information about the survey, including information about survey data or methodology, please contact PPEC at ppec@ppec-paper.com or (905) 458-0087.

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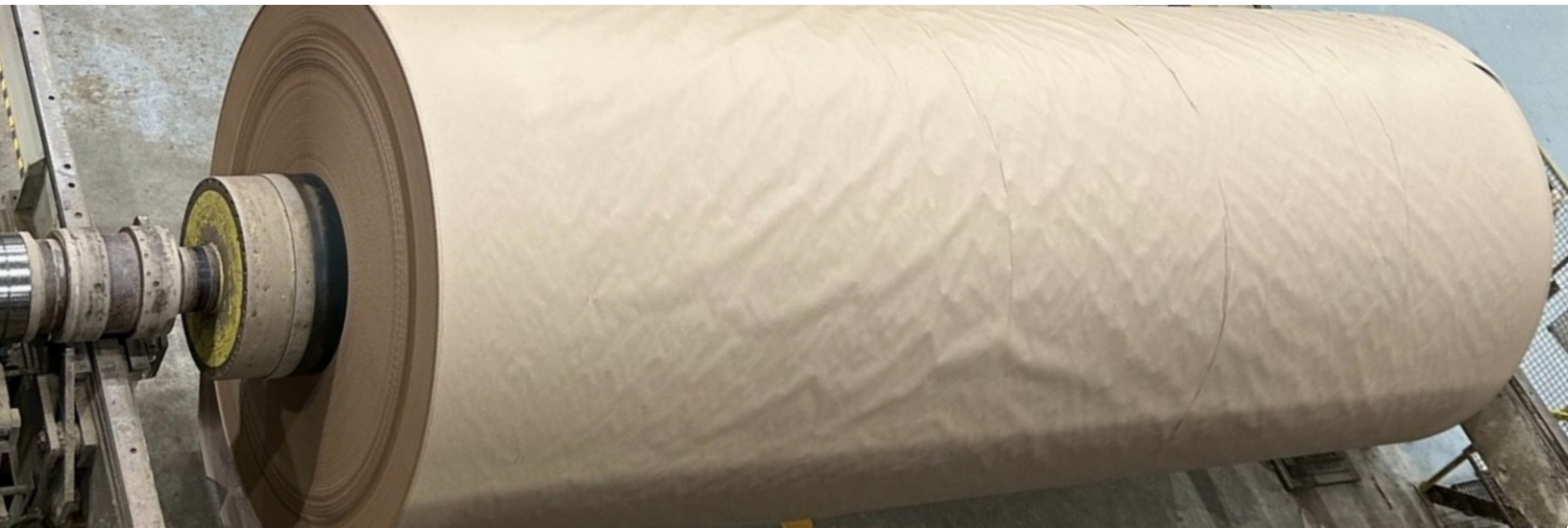


INTRODUCTION

About PPEC

PPEC is the national association representing the environmental interests of the Canadian paper packaging industry. PPEC is the environmental voice of the industry, promoting its sustainability achievements through communications and advocacy activities on behalf of its member companies.

PPEC members include mills and packaging converters operating across Canada who produce the three major packaging grades: containerboard (used to make corrugated cardboard boxes), boxboard (used to make boxboard cartons), and kraft paper (used to make paper bags and sacs).

PPEC's membership represents several different components of our industry's recycling supply chain and circular economy, not just as providers of recyclable paper-based packaging, but also as processors of collected paper materials, and as mills who recycle and reuse the collected materials as their primary feedstock. Paper packaging represents a true circular economy in Canada, as paper packaging products are continually collected and recycled through residential and business recycling programs, allowing them to be remade into new paper packaging products again and again.

About the Survey

The Canadian paper packaging industry is committed to environmental sustainability and waste minimization. Using recycled content as its primary feedstock has been an inherent part of our industry's business operations for decades. As the national association representing the environmental interests of the Canadian paper packaging industry, PPEC tracks and monitors our industry's environmental progress.

PPEC's Recycled Content Survey was launched in 1990 and is conducted every two years to determine the average recycled content contained in the three major paper-packaging grades manufactured in Canada, as represented by PPEC's membership: containerboard, boxboard, and kraft paper. For this latest survey report, PPEC has introduced a new report format, along with additional information on the purpose of the survey, its methodology, survey participants, and insights on the use of recycled content in Canada.

Survey Purpose and Scope

The purpose of PPEC's Recycled Content Survey is to track the use of recycled content of the major paper packaging grades made in Canada. PPEC uses the aggregate survey results in its advocacy and communications activities to promote the sustainability of Canada's paper packaging industry to its members, government, public, and other stakeholders.

PPEC surveys both its PPEC member mills, as well as non-member mills, who make boxboard, containerboard (linerboard and corrugating medium), and kraft paper in Canada. PPEC only surveys containerboard mills in Canada. We do not survey other types of mills such as pulp, newspaper, or tissue mills. While PPEC's survey collects data for both domestic and export shipments, our primary focus is on domestic recycled content shipments. As a national industry association, PPEC's advocacy and communications activities are focused on the Canadian marketplace and so we focus on the domestic recycled content percentage survey findings.

SURVEY METHODOLOGY

Information Collected

This survey was conducted and completed between April and June 2023. It was sent to 12 Canadian containerboard mills to be completed with their company data for January through December 2022.

The requested data is for the shipments (not production) of boxboard, linerboard, corrugating medium, and kraft paper, reported by weight and rounded to the nearest metric tonne, for both domestic shipments (ie. to a Canadian destination, including transfers from a mill to an integrated or related domestic corrugator or converting plant) and export shipments (ie. to the U.S. and overseas).

Companies submit their actual shipment data, including the recycled content tonnage, which is kept confidential by PPEC. PPEC inputs the individual survey responses into a master spreadsheet that calculates totals for each material type. Only aggregate data is shared and reported on.

The raw data entry is reviewed for accuracy and validated internally by PPEC.

PPEC received 11 completed survey responses, representing a 92% survey response rate.

Data Limitations

There are data limitations concerning the recycled content of kraft paper made in Canada.

Recycled content data is unavailable for this grade as the containerboard mills surveyed that manufacture kraft paper in Canada use virgin fibres by way of sawmill residues and trees in their production.[1]

That doesn't mean that paper bags don't contain recycled content, as many do, but for the purposes of this survey and the containerboard mills surveyed, recycled content data is not available at this time for kraft paper. Additional information can be found in the kraft paper section of this report.

Clarification to 2020 Recycled Content Survey

In PPEC's 2020 Recycled Content Survey communications, PPEC stated that "The average recycled content of domestic Canadian shipments of the three major packaging grades – containerboard (used to make corrugated boxes), boxboard (used to make boxboard cartons), and kraft paper (used to make paper bags) – is 81.7% according to the 2020 survey, up from 73.5% in 2018."

While these percentages are correct, as written it suggests that recycled content is contained in kraft paper based on the survey results. However, as there was no recycled content used for kraft paper by those surveyed, PPEC offers this clarification and will be clearer in future communications.

[1] While most paper packaging made in Canada is produced with recycled content, the paper fibres it was originally made from came from a tree. However, the Canadian paper packaging industry doesn't use much in the way of freshly cut trees, and the little that is harvested must be reforested by Canadian law, either by tree replanting or through natural regeneration (ie. when new seedlings or sprouts are produced by fallen trees). In 2020, the total forest harvest (for lumber and all paper grades, including packaging) represented 0.2% of Canada's forest land (Source: Natural Resources Canada's State of Canada's Forests Annual Report, https://natural-resources.canada.ca/our-natural-resources/forests/state-canadas-forests-report/16496).

Profile of Survey Participants

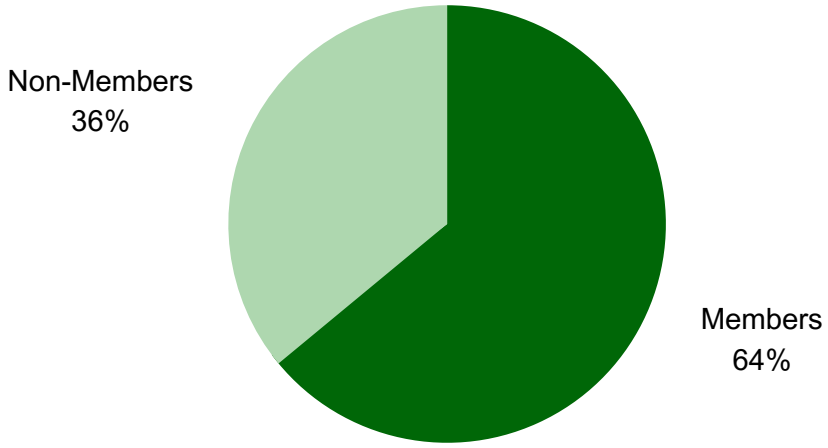
Out of the 11 companies that responded to the survey, seven are members of PPEC and four are not members. Together, the 11 companies operate 17 containerboard mills.

Geographically, the majority of the mills are located in Eastern Canada with eight mills located in Québec, seven located in Ontario, and the other two mills located in Manitoba and New Brunswick.

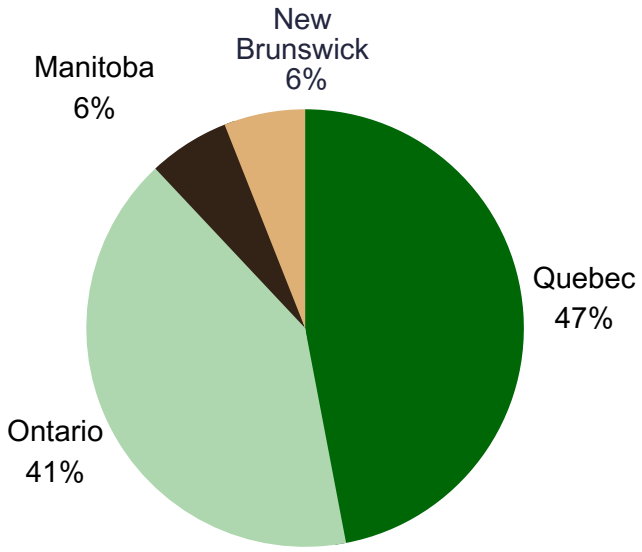
The 11 companies surveyed represent the majority of the containerboard mills in Canada.

Additional information on the survey respondents is contained in Appendix I of this report.

Companies Surveyed



Location of Mills



SURVEY FINDINGS

2022 Recycled Content Survey Key Findings

The key findings of the 2022 PPEC Recycled Content Survey:

2.97 million tonnes

Total Canadian mill packaging shipments

2.1 million tonnes

Total recycled content shipments to domestic and export markets

80.2%

Average recycled content of domestic shipments for the top two major packaging grades

86.2%

Average recycled content for domestic shipments of boxboard, which is used to make cereal or shoe boxes

81%

Average recycled content for domestic shipments of containerboard, which is used to make corrugated shipping boxes

PPEC Commentary

Total domestic packaging shipments in 2022 for the three major paper packaging grades totalled 1,787,850 tonnes, and of that, over 1.4 million tonnes constituted recycled content, which represents an average domestic recycled content rate of 80.2 per cent.

Compared to PPEC's 2020 survey results, this represents a slight decline in the average recycled content, though it continues to confirm that the feedstock used for the production of boxboard and containerboard made in Canada is primarily recycled content fibres.

In 2022, Canadian mill packaging shipments totalled close to 2.97 million tonnes, which is down from 3.37 million tonnes in 2020. While fluctuations in production are normal, it should be noted that mill activity is closely connected to the economy and consumer and business spending. In 2020, the impact of the COVID-19 pandemic saw a significant increase in online shopping and deliveries due to stay-at-home orders, which increased demand for containerboard, increasing overall packaging shipments.

While the average recycled content for containerboard and boxboard are both over 80%, there has been a slight decline in domestic recycled content shipments in 2022 compared to 2020, most notably for corrugating medium, which is the type of paperboard used to form the fluted portion of corrugated board to provide strength and cushioning. In 2020, corrugating medium had an average recycled content of 76%, and, in 2022, it decreased to about 63%.

"It continues to confirm that the feedstock used for the production of boxboard and containerboard made in Canada is primarily recycled content fibres."

Some mills may have needed to use virgin material for their corrugated medium as there was not enough supply of high-quality recycled content. Supply of recycled paper is impacted by the quality of available materials and price. Mills need clean used paper packaging because they use it as their primary feedstock, and in many cases, PPEC members have their own recycling divisions to make sure they have a good supply of recycled paper fibres coming in for production. When there is not enough supply of high-quality Old Corrugated Cardboard (OCC), Old Boxboard (OBB), and other types of used paper packaging available, mills have to buy and import it from other sources or use virgin material.

Some recycled paper packaging collected from commercial and residential recycling programs may not meet quality standards because they may be contaminated with other materials or residue. A recent federal government study revealed that paper packaging mill facilities are receiving lower quality feedstock, often as a result of higher contamination levels, especially from residential bales, where consumers may be placing unrecyclable materials in their recycling bins.[2]

Supply of materials is also impacted by the current prices of recycled paper fibres, such as OCC and OBB, which are commodities whose prices fluctuate month-to-month, province-to-province, depending on supply and demand. Other factors that may have contributed to a decline in recycled content tonnage for 2022, and a reduction of domestically produced corrugating medium, include mill closures. In June 2020, Sonoco announced that it would shut down its Trent Valley paper mill, located in Quinte West, Ontario, which produced recycled uncoated paperboard and recycled linerboard, announcing that the company would no longer be in the corrugated medium market by the end of 2021.[3]

[2] Giroux Environmental Consulting, Kelleher Environmental, and Isabelle Faucher Consultancy. The State of Paper Recycling Including Paper Waste Regulations in Canada (April 14, 2023).
[3]"Sonoco to shutter Trent Valley, Ont. paper mill," Pulp & Paper Canada (April 15, 2020). https://www.pulpandpapercanada.com/sonoco-to-shutter-trent-valley-ont-paper-mill/

Background

Understanding Recycled Content

PPEC previously published the following information as a backgrounder entitled "*Understanding Recycled Content*." This section provides information on:

- How is recycled content defined?
- How is recycled content measured?
- What is the average recycled content of paper packaging made in Canada?
- What is the average recycled content of the various packaging grades?
- Does using recycled content mean that less virgin material will be consumed?
- How is paper-based packaging made?

Defining Recycled Content

Recycled content is generally defined in two ways: pre-consumer and post-consumer. Both are recognized by the International Standards Organisation (ISO) and by the Competition Bureau's now archived Environmental claims: A guide for industry and advertisers Canada's "Guidelines" for environmental labelling.

PPEC does not distinguish between the two in its survey results because both divert used paper material for further recycling:

- "Pre-consumer" recycled content includes the corrugated clippings or boxboard trim that is left over when converting board or paper into a box, bag, or carton. This leftover trim is sent from the converting facility (box plant) back to the mill for recycling.
- "Post-consumer" material is the formed box, bag, or carton that is sent for recycling after use by residential or business consumers.

Some argue that post-consumer material is environmentally superior to pre-consumer material. PPEC (and ISO) do not support this argument. The amount of trim or cuttings (pre-consumer material) at a box plant, for example, is relatively small, as maximizing the use of the whole board, which has already been paid for, is in the best interests of the plant and its customer.

The next customer will get some of this trim in the next piece of board purchased, and so on, in a continuous recycling loop. It should also be noted that to produce 100 tonnes of recycled product, a mill needs 110 tonnes of used paper or board. This is because paper fibres shrink in the pulping process. Even though a mill has paid a municipality, a processor, or a broker for 110 tonnes, and technically re-pulped 110 tonnes, it makes no claim for recycling more than 100 tonnes for recycled content purposes.

Measuring Recycled Content

Recycled content is usually expressed as an average. This could be an average of a mill's particular production run so that customer can label the recycled content of its packaging, or an average over a longer period, normally 12 months. National average recycled content percentages are determined by dividing the number of tonnes shipped, by the number of tonnes of recycled paper or board used in those shipments.

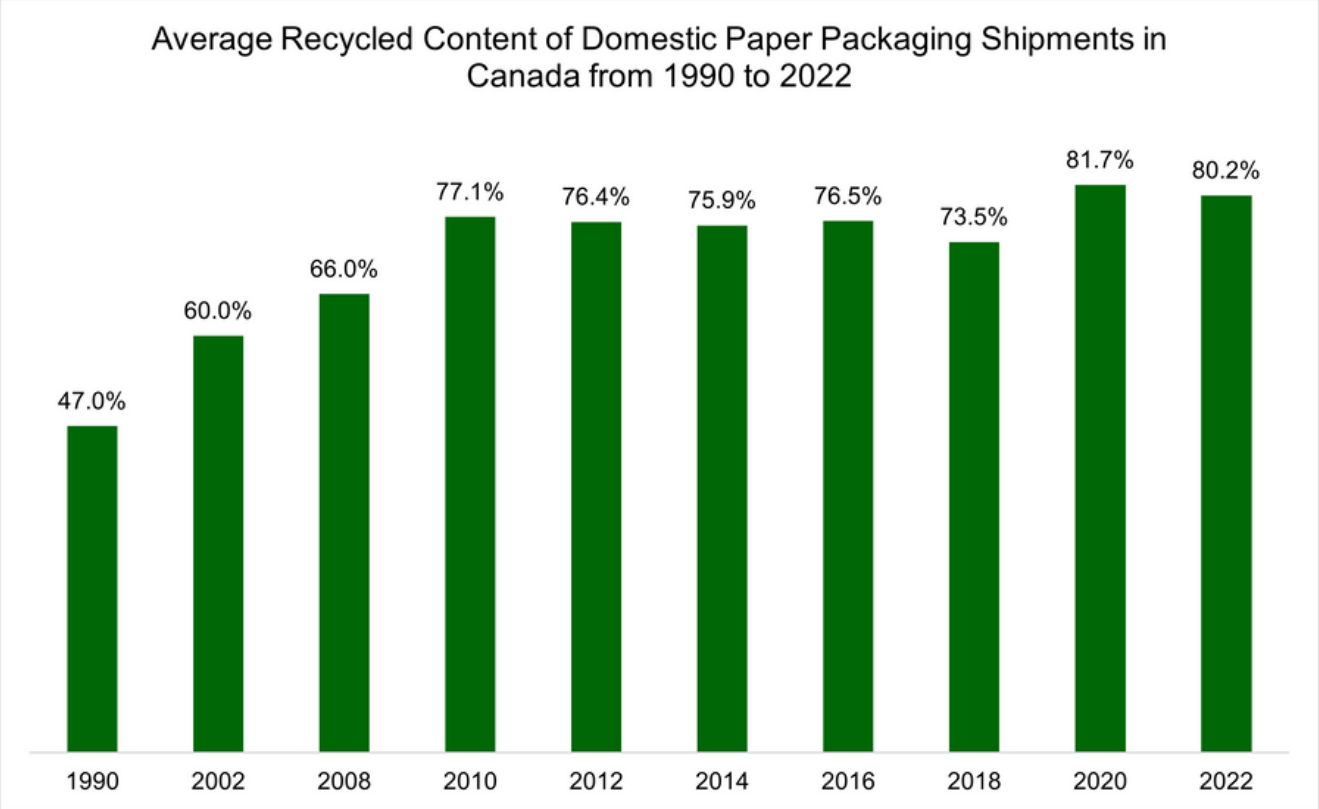
For example, in 2022, of the 2.97 million tonnes of paper packaging material shipped in Canada, some 2.11 million tonnes were comprised of recycled paper or board, giving an average recycled content of just over 71 per cent.

Average Recycled Content of Paper Packaging Made in Canada

The average recycled content of paper packaging made in Canada depends on how paper packaging is defined, and if all shipments (or just domestic or export shipments) are included.

There are three major packaging grades: containerboard (used to make corrugated boxes); boxboard (used to make boxboard cartons); and kraft paper (used to make paper bags). Each of them has different technical requirements, such as paper fibre length and strength, which can have a bearing on whether recycled content is favoured or not.

The overall recycled content produced by Canadian mills was just over 80% in 2022. The average has steadily increased from 47% back in 1990.



Source: PPEC Recycled Content Surveys

Average Recycled Content of Major Paper Packaging Grades

Kraft Paper

Kraft paper is used for many industrial and commercial applications, including packaging products with high demands for strength and durability, such as multi-wall sacks and grocery bags, which require strong paper fibres, typically requiring more virgin fibre. “Kraft” is the German word for strong.

Paper bags in Canada are made from woodchips and sawmill residues left over from lumber operations. Nothing is wasted. Even rotten, bent, or twisted saw logs are salvaged and used.

Paper bags collected from household Blue Box recycling programs are typically recycled back into new corrugated boxes, rather than separated out and shipped back thousands of kilometres to the nearest kraft paper mill for recycling.

Paper bags can be virgin material or 100% recycled content, or anywhere in between. However, recycled content data is unavailable for this grade as the mills that manufacture kraft paper in Canada use virgin fibres in their production. That said, paper bags are made from a renewable material and are highly recyclable. Many paper bags found in Canada are not only marked “recyclable” given wide access to residential recycling programs across Canada, but many also contain information on the source of the fibres, which are often recycled content.

Source: Examples taken from publicly available paper bags in Canada.

Boxboard

Boxboard, which is used to make cereal or shoe boxes, does not require the strong paper fibres that kraft paper bags do, and are mostly 100% recycled content when it leaves the mill. It is made from a mixture of old corrugated boxes, old newspapers, used printing and writing paper and old boxboard itself, the residential collection of which PPEC pioneered back in the early 1990s.

Overall, the average recycled content for domestic shipments of boxboard is over 86%, based on the 2022 Recycled Content Survey.

Containerboard

Containerboard is the major packaging grade in Canada and is used to make the corrugated boxes commonly used to ship heavier products. Its component parts (linerboard and corrugating medium) are mostly 100% recycled content.

Overall, the average recycled content for domestic shipments of containerboard is 81%, based on the 2022 Recycled Content Survey

The Role of Virgin Material

It should be noted that in general the paper packaging industry cannot exist without the introduction of some virgin fibre at some point in the paper packaging life cycle. It needs longer virgin fibres to replenish the shorter and thinner fibres that gradually wear out due to repeated recycling.

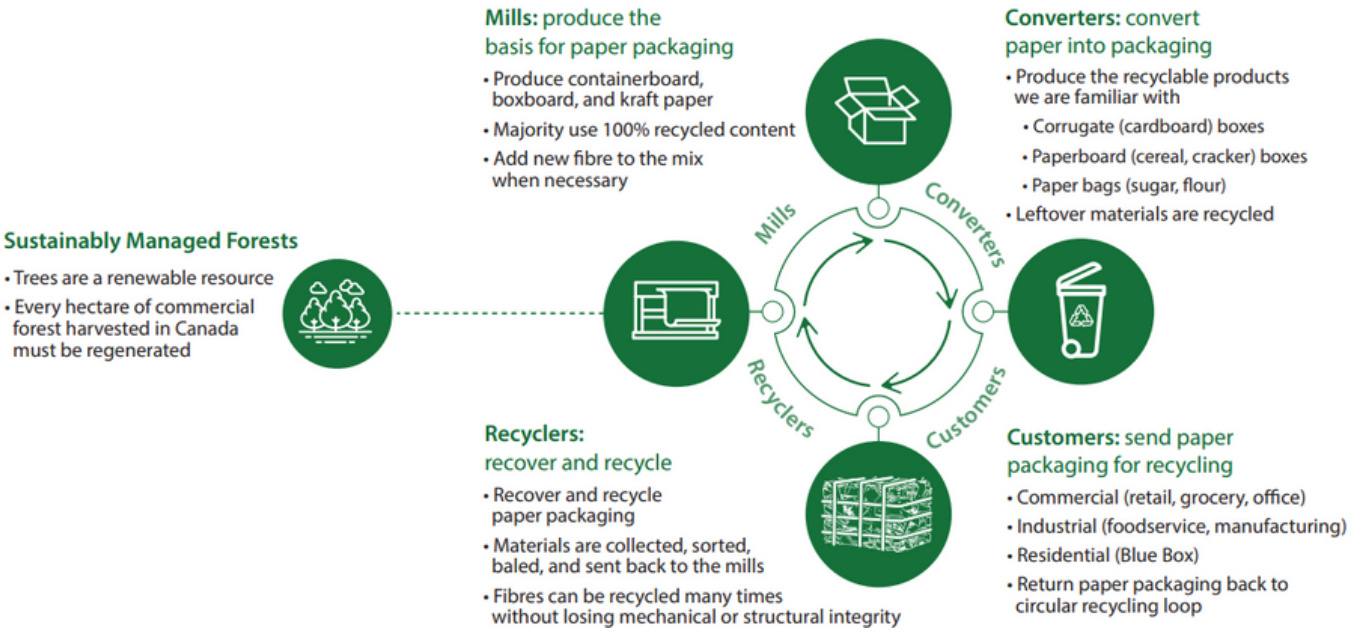
It is generally understood that paper fibres can be recycled between 5-7 times, with corrugated containerboard up to 10 times.

As the overall recycled content produced by Canadian mills was just over 80% in 2022, which means that approximately 20% of paper packaging would be made up of sawmill residues (wood chips) and fresh trees. The Canadian paper packaging industry doesn't use much in the way of freshly cut trees, and the little that is harvested must be regenerated by Canadian law; the most recent data shows that the total forest harvest for lumber and all paper grades, including packaging, represented 0.2% of Canada's forest land.[4]

[4] Natural Resources Canada's State of Canada's Forests Annual Report, https://natural-resources.canada.ca/our-natural-resources/forests/state-canadas-forests-report/16496

How Paper Packaging is Made in Canada

PPEC's infographic illustrates how paper packaging is made, and continuously remade into new paper packaging, through the action of recycling.



While most paper packaging made in Canada is produced with recycled content, the paper fibres it was originally made from came from a tree. However, the Canadian paper packaging industry doesn't use much in the way of freshly cut trees, and the little that is harvested must be successfully regenerated by Canadian law, either by tree replanting or through natural regeneration (which occurs when new seedlings or sprouts are produced by fallen trees). Less than half of one per cent of Canadian commercial forests are harvested for paper packaging.

In addition, paper fibres used by PPEC member mills are verified to be responsibly sourced by independent, third-party forest certification organizations such as the Sustainable Forestry Initiative (SFI), Forest Stewardship Council (FSC), and the Canadian Standards Association (CSA Z809).

A mill produces the raw material used to make packaging, using mostly recycled content, and responsibly sourced wood chips and sawmill residues. It is then formed into big rolls of paper and sent to a converter, where it is made into packaging products. Once used by the customer, it is recycled, making its way back to the mill to start the process over again, as it is remade into new paper packaging products.

Appendix I: Survey Participants

Company	Mill	Location
Atlantic Packaging	New Forest Paper Mill	Scarborough, Ontario
	Atlantic Packaging Whitby Mill	Whitby, Ontario
	Atlantic Packaging Scarborough Linermill	Scarborough, Ontario
Canadian Kraft Paper	Canadian Kraft Paper mill	The Pas, Manitoba
Cascades Canada	Cascades Papier Kingsey Falls	Kingsey Falls, Québec
	Cascades Containerboard Packaging – Mississauga	Mississauga, Ontario
	Cascades Containerboard Packaging – Trenton	Trenton, Ontario
	Cascades Containerboard Packaging - Cabano	Témiscouata-sur-le-Lac, Québec
Graphic Packaging International	GPI East Angus Mill	East Angus, Québec
J.D. Irving*	Lake Utopia Paper	St. George, New Brunswick
Kruger Packaging	Place Turcot Containerboard Mill	Montréal, Québec
	Trois Rivieres Mill	Trois-Rivières, Québec
One PaperWorks*	Strathcona Paper	Napanee, Ontario
Papiers White Birch	Stadacona Mill	Québec City, Québec
Rayonier Advanced Materials (RYAM)*	Temiscaming Paperboard Mill	Temiscaming, Québec
Sonoco Canada*	Brantford Mill	Brantford, Ontario
WestRock Canada	La Tuque Mill	La Tuque, Québec

*Company is not a member of the Paper and Paperboard Packaging Environmental Council

Appendix II: Definitions

Most of these definitions have been adapted from the Fibre Box Association's 75th Anniversary edition of the Fibre Box Handbook (https://www.fibrebox.org/fibre-box-handbook)

Boxboard: Type of paperboard used to manufacture folding cartons.

Carton: A folding box made from boxboard, used for consumer quantities of product. A carton is not recognized as a shipping container. Also known as a Folding Carton.

Chipboard: A paperboard generally made from recycled paper stock, used where specified strength or quality is not necessary.

Containerboard: The paperboard components (linerboard, corrugating medium, and chipboard) used to make corrugated board. Raw materials used to make containerboard include virgin cellulose fibre, recycled fibre, or a combination of both.

Converter: A processor or manufacturer who uses one form of material to fabricate a more advanced form of material for packaging; specifically, one who fabricates from purchased stock rather than from raw materials, e.g., converting a large roll of kraft paper into custom-specified paper packaging products.

Corrugated Board: The structure formed on a corrugator by gluing one or more sheets of fluted containerboard (medium) to one or more sheets of containerboard (linerboard).

Corrugating Medium: The type of paperboard used in forming the fluted portion of corrugated board. A sheet of corrugating material (paperboard) pressed into the shape of a wave, known as flutes.

Flute: Wave shapes pressed into corrugating medium.

Kraft Paper: Word of German origin meaning strength; designates pulp, paper, or paperboard produced from wood fibres by the sulfate process. Natural kraft paper has a characteristic light brown appearance.

Linerboard: Paperboard used for the flat outer facings of combined corrugated fibreboard.

Paperboard: One of the two major product categories of the paper industry. Includes the broad classification of materials made of cellulose fibres, primarily wood pulp and recycled paper stock. The major types are containerboard and boxboard.

Recyclable: Packaging materials that may be processed through a number of treatments or changes in order to be reused.

Recycled Content: The fibres in corrugated, paper board, or paper that happened used in prior materials, recovered through recycling, and processed into a fresh product. The level of recycled content is the fraction of those types of fibres that make up a given product.

Virgin Fibre: Also called harvested fibre or first use fiber, fibre that is derived directly from wood sources bracket chips, logs, sawdust bracket; as distinct from recycled fibre.

OUR MEMBERS

Founding Associations

AICC Canada — The Independent Packaging Association

CCCA — Canadian Corrugated and Containerboard Association / L'Association canadienne du cartonnage ondulé et du carton-caisse

Mills

Atlantic Beyond the box

Canadian Kraft Paper

CANFOR

Cascades

Graphic Packaging International

Kruger

Papiers White Birch S.E.C. Stadacona WB

Packaging Converters

astro box corporation

Atlantic Beyond the box

Bag to Earth / Sac au Sol

Cascades

Coleman Containers Limited

Crown Packaging

Emballages Mitchel-Lincoln Packaging

FibreCorr Ltd.

Graphic Packaging International

Independent Corrugated Converters

Kruger

Maritime Paper Packaging Forward

Master Packaging Inc.

montcorr

Moore Packaging Corporation

Niagara Sheets LLC

Royal Containers Ltd.

Shipmaster Containers Limited

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huber group

Ingredion

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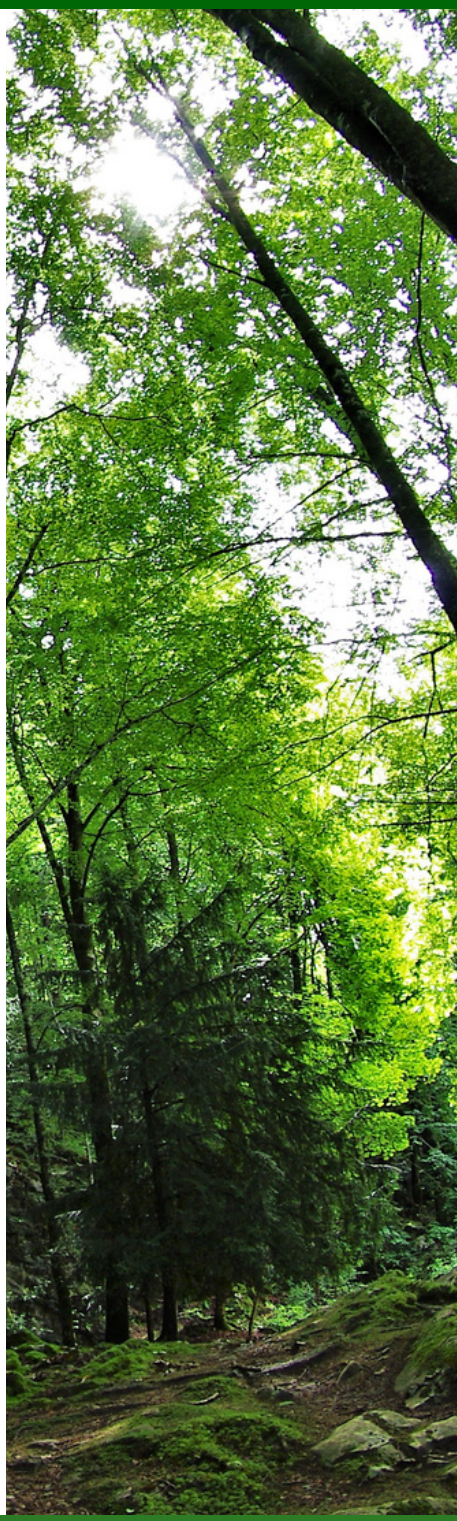

PPEC represents the Canadian paper packaging industry on environmental issues

PPEC members include paper packaging mills and converters operating across Canada manufacturing:

- Containerboard (used to make corrugated boxes)
- Boxboard (used to make boxboard cartons)
- Kraft paper (used to make paper bags)

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Learn more about the paper packaging industry's circular economy.

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