

Continuous Improvement Fund

Ontario Fibre Capacity Study

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EXECUTIVE SUMMARY

In 2017, Ontario municipal recycling programs marketed a total of 610,856 tonnes of printed paper and other paper packaging. However, Ontario newsprint mills have closed, and China has imposed restrictions on the export of Ontario's fibre.

The Continuous Improvement Fund (CIF) requested the ReMM Group to conduct a study to determine if there is enough current and future capacity to consume the fibre marketed from Ontario's Blue Box program. The identification of challenges and opportunities to access current and future capacity were also requested as part of the study.

Molded fibre manufacturers, cellulose insulators and the containerboard industry were identified as the primary market segments that are consuming Ontario's fibre. The study findings indicate there is more than 8 million tonnes of current or future capacity within these market segments that may be able to consume the fibre collected from Ontario's curbside recycling program.

However, challenges exist for Ontario municipalities to access the current or future capacity, including: existing end market relationships, distance to end markets, end market quality specifications and pricing. Conversely, the following opportunities provide optimism for domestic end markets Ontario's fibre: future capacity announcements, fibre substitution, innovation and incentives.

Continuous Improvement Fund
Newsprint & Mixed Paper Capacity Project

The ReMM Group is pleased to submit this report to The Continuous Improvement Fund (CIF), which summarizes the printed paper, cardboard and mixed fibre capacity for Ontario municipal recycling programs.

This report includes the following sections:

- 1.0 Background
- 2.0 Changes in the Fibre Market
- 3.0 Study Objectives
- 4.0 Methodology
- 5.0 End Market Overview
- 6.0 Summary Findings

1.0 BACKGROUND

In order to define the challenges and opportunities related to the fibre collected in Ontario's Blue Box program, it is important to understand the following: quantity of fibre marketed from Ontario, fibre grade definitions and changes to Ontario's collection systems and newsprint end markets.

1.1 Fibre Quantity

In 2017, Ontario municipal recycling programs marketed a total of 610,856 tonnes of printed paper and other paper packaging, otherwise referred to as Fibre Materials (Resource Productivity & Resource Authority (RPRA)). This equated to 74% of the 822,979 total program tonnes marketed from 245 municipal programs across the province.

The Fibre Materials marketed through the Ontario Blue Box Program in 2017 consisted of:

- Printed Paper – 416,489 tonnes
- Old Corrugated Cardboard (OCC) and Old Boxboard (OBB) – 180,910 tonnes
- Mixed Paper – 7,005 tonnes
- Polycoat – 6,452 tonnes

The Polycoated paper packaging is generally sorted into other material categories (i.e. gable and aseptic) but, can also be found in mixed residential fibre grades. This study focuses on identifying capacity for the three largest fibre streams – printed paper, old corrugated cardboard and mixed paper.

1.2 RPRA Fibre Grade Definitions

RPRA provides the following definitions for Printed Paper, Old Corrugated Cardboard (OCC) and mixed paper.

Printed Paper: This refers to Newspaper, Household Fine Paper, Telephone Books, Magazines, Catalogues and Printed Paper

Old Corrugated Cardboard (OCC): This refers to Old Corrugated Cardboard (OCC), Old Boxboard (OBB), and Paper Based Packaging.

Mixed Paper: This refers to Residential Mixed Papers and Mixed Fibres.

In 2017, Printed Paper represented approximately 68% of all the Fibre marketed from Ontario's Blue Box Program. The printed paper portion of the fibre stream has realized some significant changes during the past fifteen years.

2.0 CHANGES IN THE ONTARIO PRINTED PAPER MARKET

In March 2017, the Ontario Paper Company newsprint mill in Thorold, Ontario was indefinitely idled. This mill started operating in 1913 and was a pioneer in the field of recycled furnish, having experimented with it briefly during World War II to extend its pulp supply. It had the first deinking plant in North America in 1981 and expanded to 100% recycled furnish in 2002.

Around that time, there were seven other newsprint mills running a 100% recycled furnish in North America. They were located in Coosa Pines (AL), Dublin (GA), Newberg (OR), Pomona (CA), Sheldon (TX), Snowflake (AZ), and Whitby (ON). At its peak, the Thorold mill's capacity consumed 450,000 tonnes per year of curbside news and the Whitby mill consumed more than 200,000 tonnes per year. This capacity provided a domestic market for all of Ontario's newsprint. None of the seven newsprint mills listed above consume newspaper today. What factors led to this rise and fall?

Due to supply and demand fluctuations, the cost of recovered paper swung between \$40 and \$140 per tonne, a huge variation when the selling price of newsprint was about \$500. In the late 1990s, newsprint production began to explode in Asia, almost all of it from 100% recycled furnish. Asian mills close to ocean ports started importing recovered paper from wherever they could get it, paying very little for marine transport, as the containers used to export merchandise such as televisions and computers abroad had to be returned anyway. This "China effect" was one of the driving forces that forced the closure of many 100% recycled newsprint mills in North America, because they could no longer afford the recovered paper from their own "back yards". The Whitby mill closed in March 2010, citing a combination of factors for the shutdown, including a drastic decline in North American newsprint demand, the rising value of the Canadian dollar, increased costs for raw material, and an overcapacity in the newsprint manufacturing sector.

On top of this was the decline in North American newsprint demand, which went down from a 1988 peak of 14 million tonnes to 4 million in 2015, about the same as in 1945. The Whitby and Thorold mills were not able to remain competitive with virgin newsprint mills and Asian 100% recycled newsprint mills and therefore subsequently closed in 2010 and 2017 respectively.

2.1 Changes to Curbside Collection Programs

During the past fifteen years, there has been a trend among North American municipalities to change their curbside recycling programs from dual stream (fibres in one collection container and all containers - plastics, metals, glass in another collection container) to single stream collection containers where all the fibre and containers are mixed together. The single stream programs were intended to reduce collection costs for municipalities and haulers. However, an unintended consequence of single stream recycling programs has been increased levels of contamination at recycling facilities as residents place a greater number of items in their recycling programs that they are uncertain about or wish could be recycled (sometimes referred to as "wish-cycling"). The mixing or commingling of fibres and containers in one collection truck then requires the MRF to separate the two material streams, before further sorting out

the various material categories. This results in a higher level of cross-contamination after processing and may increase the amount of combined or nested materials. Both of which add more labour to the process and can impact the quality of marketed materials.

As cited above, numerous North American newsprint mills closed during the past fifteen years. This caused Ontario municipalities to become increasingly dependent on exporting their Fibre Materials to China. The specifications in China were initially more accepting of lower quality material which contained higher levels of out-throws and contamination. North American mills were not willing or able to manage this same material quality.

During the past five years, the Chinese government began to realize the amount of contamination in mixed paper and plastics was causing significant environmental challenges within their country. In 2017 and 2018, the Chinese government imposed strict regulations (commonly referred to as the National Sword and Blue Sky) on the import of mixed paper grades in an effort to reduce the amount of contamination from other countries. The restrictions and stricter specifications continued throughout 2018 and are expected to remain in place for 2019 and beyond. Other countries (e.g. Taiwan, Indonesia) are also imposing tighter specifications and restrictions to prevent North American low-quality Fibre Materials from entering into their countries.

While Ontario municipalities continue to work on improving the quality of their Fibre Materials to meet the rigid specifications being imposed by other countries, some North American end markets have indicated they will begin using higher amounts of curbside fibre. Chinese owned companies are also actively investing in North American mill capacity to recycle domestic fibre to produce pulp and paper products to export to China. Based on these announcements and other changes at North American mills, it is a good time to assess if there is enough capacity at North American paper mills to consume the approximately 600,000 tonnes of Fibre Material marketed from Ontario's Blue Box Program.

3.0 STUDY OBJECTIVES

The main objectives of this project are to:

1. Determine how much total capacity exists at fibre end-users in freight efficient locations (i.e. around the Great Lakes -Ontario, Quebec, New York, Ohio, and Michigan) for Ontario's Fibre Materials (printed paper, old corrugated cardboard and mixed paper).
2. Identify challenges and opportunities for Ontario municipalities to access existing or new fibre capacity.

4.0 METHODOLOGY

Identification of Key Fibre End Markets

Given the closure of North American newsprint mills, ReMM identified the following three North American end market sectors that generally consume Ontario's curbside generated fibre:

- a. Molded Fibre Producers
- b. Cellulose Insulators
- c. Containerboard Mills

Research Methodology

The following methods were used to gather information for this project.

- Website searches
- Review industry publications
- Contact relevant organizations or associations
- Contact recycling and processing facilities
- Phone interviews
- Personal interviews

5.0 END MARKET OVERVIEW

A table for each end market sector (molded fibre producers, cellulose insulators, containerboard mills) is provided below, summarizing the following information:

- a. End market name
- b. Capacity by grade
- c. Total capacity
- d. Key notes

A map of these end markets can be viewed [here](#) and in Appendix A.

The fibre grade definitions provided by RPRA in section 1.2 differ from the specifications used by the end markets surveyed. These end markets generally use the Institute of Scrap Recycling Industries (ISRI) specifications or customized end market specifications. These end market grade definitions are summarized in Appendix B.

5.1 Molded Fibre Producers

Molded fibre, also named molded pulp is a collective term descriptive of the process for producing protective material and packaging solutions, typically made from recycled paperboard and/or newsprint. Molded fibre products, manufactured with waste paper or other natural fibres (which are essentially cellulose) and are recyclable along with other waste paper are biodegradable and compostable where facilities are available.

Both fibre & water are recycled and reused in manufacturing, resulting in almost zero waste. Inherently flexible, molded fibre offers substantial benefits to manufacturers of food related, horticultural, industrial parts and medical products.

The following flow chart provides an overview of the manufacturing process of a molded fibre egg carton. This manufacturing process is similar for other molded fibre products.

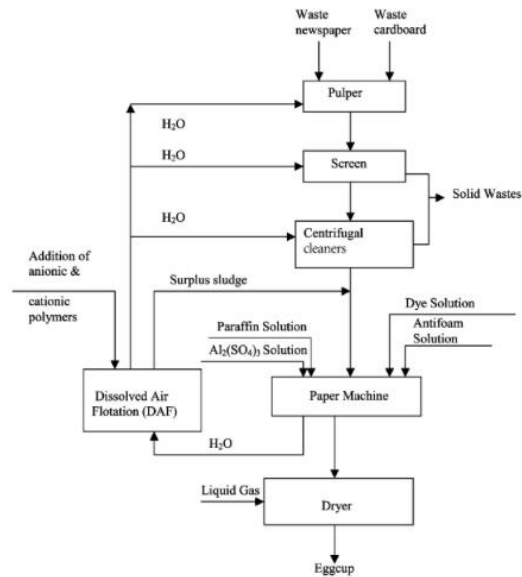


Figure 1: Process flowchart showing production of an egg carton from molded fibre

According to the International Molded Fiber Association (IMFA), a non-profit group promoting the use of natural and recycled fibres for packaging, there are four distinct markets for molded fibre packaging:

- Food related – Included are:
 - Clam-shell and carryout food containers
 - Cups, bowls, plates, food and serving trays
 - Egg, trays and cartons
 - Fruit, vegetables, berry, mushroom trays
 - Locator trays for bottled products, wine, jellies
 - Extended liquid retention
- Industrial or engineered packaging – Included are:
 - Electronics, cell phones, TV, modems, DVD etc.
 - Household items, toasters, coffee makers, furniture etc.
 - Vehicle parts, gears, panels, headlights, wheels etc.
 - Industrial products, electrical, plumbing, tools etc.
- Single Use Medical
 - Bedpans
 - Urine bottles
 - Kidney dishes
 - Bowls, etc
- Horticultural Trays & Pots

In response to ReMM questions for this study, the International Molded Fiber Association (IMFA) provided the following:

“The seven-point inquiry on statistics for the molded fibre industry is right on target for ReMM’s goals.”

“Unfortunately, the information requested is not tracked by IMFA, since they are not essential for the pursuit of our work. We can, however, offer some information that, we have experienced, and represents recent past conditions that could be useful in your study”

- **Locations of molded fibre mills:** There are about 40 molded fibre product manufacturers in North America (excluding Mexico), with five in Canada.
- **Mill Capacity:** Molded fibre product mills do not use volumes of recycled fibre found in paper mills and a reasonable estimate, would be from five tons per day to fifty tons per day depending the sizes of the manufacturers. Specifics are proprietary.
- **Products produced by each mill:** Molded fibre product manufacturing can be categorized into commodity types (egg packaging, drink carriers etc.) utilizing the higher volumes of recycled fibre, and protective (industrial) products), producing mainly customized molded fibre packaging items (Electronic, and household items, vehicle replacement parts, etc.).
- **Tonnes per year of OCC, news or mixed paper used at each mill:** Some molded fibre manufacturer’s use more OCC and some use, almost ONP exclusively.
- **Planned capacity increases to use more residentially generated fibres:** Many of our IMFA manufacturing members have, or are in the process of, adding capacity.
- **Is there an ability to enter into contracts** with any molded fibre companies for any of the current or future capacity requirements for residentially generated fibres? There is an excellent opportunity for contractual arrangements to supply local molded fibre product manufacturers with OCC, mixed and ONP, however, transportation costs could limit distribution. It has been suggested that a proposal could be submitted to some molded fibre manufacturers indicating the details of supplying recycled fibre, identifying or estimating the available volumes, types of material, and method of delivery. This would show interest from the Ontario municipal programs; and help determine reciprocal interest in additional tonnage into those manufacturing facilities.

Table 1 below summarizes responses from molded fibre markets that may be potential end markets for Ontario’s fibre.

Table 1: Molded Fibre Producers

COMPANY	LOCATION	STATE/ PROVINCE	END PRODUCT	OCC (MT/YR)	#56 (#8 ONP) NEWS (MT/YR)	#58 SCN (#9 NEWS) (MT/YR)	HARD MIX (MT/YR)	RESIDENTIAL MIX (MT/YR)	ANNUAL CAPACITY (MT)	NOTES
Cascades Forma-Pak	Kingsey Falls	QC	Molded Fibre		8,400				8,400	
CKF Industries	Handsport	NS	Molded Fibre		10,000				10,000	CKF does not have enough capacity for the local market. Local market exports as well.
Hartmann Canada	Brantford	ON	Molded Fibre Egg Cartons		25,000	2,500			27,500	Hartmann has a supply agreement with Recyclable Materials Marketing (ReMM).
Huhtamaki	Marion	IN	Molded Fibre Packaging		10,000				10,000	Limited ability to access capacity due to existing supply relationships.
Urban Fibre	Brook	IN	Molded Fibre (egg trays, other)		10,000	10,000			20,000	Limited ability to access capacity due to existing supply relationships.
Pactiv	Plattsburg	NY	Molded Fibre		4,000	8,000			12,000	One of the largest molded fibre manufacturers in North America. Multiple facilities- NY facility only one that is logistically suitable for Ontario's fibre.
Total					67,400	20,500			87,900	

5.2 Cellulose Insulation

Cellulose insulation is a market that has been growing during the past number of years as an alternative to fibreglass insulation.

The producers of cellulose insulation are generally smaller operations that use 5,000-20,000 tonnes per year of fibre. The majority of fibre used by this sector is #58 Sorted Clean News (SCN) or overissue news. However, certain cellulose insulators may use small quantities of residential fibre (#56).

The manufacturing system used by insulators generally involves shredding the fibre into small pieces that can be coated with fire retardants and blown into bags for sale to commercial insulators that blow the cellulose insulation into residential or commercial buildings. Therefore, the fibre required by insulators is generally newspaper that must be dry and clean, so it does not clog up the blowing systems within the manufacturing operation. The cellulose insulation manufacturing process is depicted below.

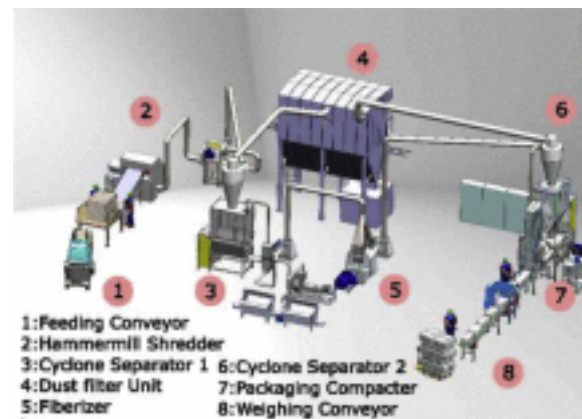


Figure 2: Cellulose Insulation Process

In some instances, cellulose insulation companies have installed sorting lines within their operation to accept curbside fibre. These sorting lines are typically used in the summer months when the curbside fibre tends to be drier. Newspaper is sorted from the curbside fibre and processed through the insulation process. The curbside news is used as an alternative lower cost fibre since the sorted clean news is currently 3-4 times the cost of the residential news. However, cellulose insulators must evaluate if the sorting costs, coupled with the lower yield of newspaper from the curbside programs are a better financial option compared to purchasing sorted clean news or overissue news.

Table 2 below summarizes cellulose insulation companies that may provide an end market for Ontario's fibre:

Table 2: Cellulose Insulation Manufacturers

COMPANY	LOCATION	STATE/ PROVINCE	END PRODUCT	OCC (MT/YR)	#56 (#8 ONP) NEWS (MT/YR)	#58 SCN (#9 NEWS) (MT/YR)	HARD MIX (MT/YR)	RESIDENTIAL MIX (MT/YR)	ANNUAL CAPACITY (MT)	NOTES
Applegate	Webberville	MI							40,000	Applegate is a large North American cellulose insulator. Current capacity unavailable – previous press release data used.
Canadian Comfort Insulation	Rodney	ON	Cellulose Insulation			4,800			4,800	
Climatizer	Toronto	ON	Cellulose Insulation							No information provided
Igloo Insulation	Montreal	QC	Cellulose Insulation			25,000			25,000	Currently only use overissue news. Supply agreement with Cascades.
Thermo-comfort	St. Thomas	ON	Cellulose Insulation		5,000	15,000			20,000	Ability to use clean, dry #56 in summer months as wet paper is not suitable in their operation.
US Greenfiber	Vars	ON	Cellulose Insulation							Plant recently idled. Mill was primarily consuming overissue news but also #58 and #56.
US Greenfiber	Wilkes-Barre	PA	Cellulose Insulation							Greenfiber is a large cellulose insulation manufacturer undergoing restructuring. No information provided.
Total					5,000	44,800			89,800	*Total exceeds grades as grades not always provided.

5.3 Containerboard Mills

Containerboard mills are the largest consumer of fibre marketed from Ontario's curbside recycling program. Cardboard boxes collected from curbside programs have traditionally been consumed by containerboard mills to make linerboard or medium board. Linerboard is the outer layers of boxes, whereas medium board mills use the fibre to make the middle or medium (wavy) layer of boxes. In some instances, mills use cardboard or mixed paper to make boxboard (cereal boxes) and/or cores (wrapping paper or other fibre cores). These mills have been working on using lower cost curbside fibre as an alternative to corrugated cardboard. However, cleaning technology or other production factors may limit the amount of lower grade curbside fibre that a mill is able to use.

The paper packaging flowchart in Figure 3 describes the circular journey of paper packaging from production to consumer to recycling back to production of new containerboard.

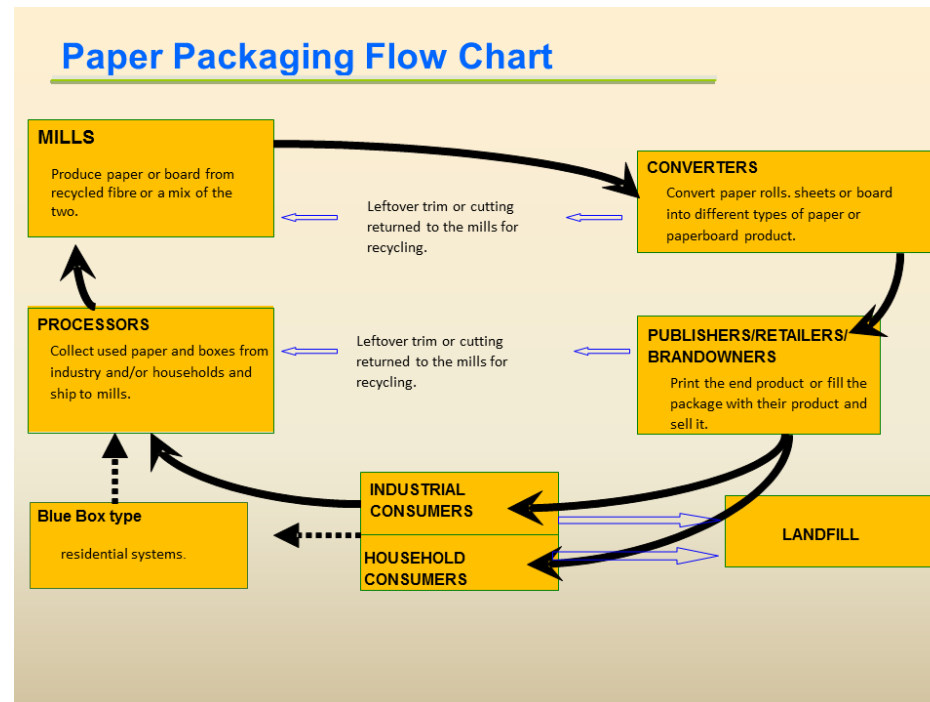


Figure 3: Paper Packaging Flowchart

Table 3 below summarizes the containerboard mills that may be potential consumers of fibre from Ontario's curbside recycling programs.

Table 3: Containerboard Mills

COMPANY	LOCATION	STATE/ PROVINCE	END PRODUCT	OCC (MT/YR)	#56 (#8 ONP) NEWS (MT/YR)	#58 SCN (#9 NEWS) (MT/YR)	HARD MIX (MT/YR)	RESIDENTIAL MIX (MT/YR)	ANNUAL CAPACITY (MT)	NOTES
Atlantic Packaging	Scarborough Whitby	ON	Linerboard, Medium	980,000				23,500	1,003,500	2 mills in Scarborough, 1 mill in Whitby. No additional mixed paper capacity for the time-being.
Cascades Containerboard Packaging - Cabano – CCP	Témiscouata -Sur-Le-Lac, Cabano	QC	Medium	77,237			3,941	3,941	85,119	
Cascades Containerboard Packaging - Greenpac (364-)	Niagara Falls	NY	Linerboard & Medium	296,105			30,481		326,586	
Cascades Containerboard Packaging - Kingsey Falls – CCP	Kingsey Falls	QC	Linerboard	9,515					9,515	
Cascades Containerboard Packaging - Lachute – CTG	Lachute	QC	Tissue	9,460					9,460	
Cascades Containerboard	Mississauga	ON	Linerboard	76,203	1,415				77,618	

COMPANY	LOCATION	STATE/ PROVINCE	END PRODUCT	OCC (MT/YR)	#56 (#8 ONP) NEWS (MT/YR)	#58 SCN (#9 NEWS) (MT/YR)	HARD MIX (MT/YR)	RESIDENTIAL MIX (MT/YR)	ANNUAL CAPACITY (MT)	NOTES
Cascades Containerboard Packaging - Niagara Falls – CCP	Niagara Falls	NY	Medium	188,114			15,992		204,106	
Cascades Containerboard Packaging - Papier Kingsey Falls – SPG	Kingsey Falls	QC	Chipboard	59,297	121,403		675	3,462	184,837	
Cascades Containerboard Packaging - Trenton - CCP	Trenton	ON	Medium		58,786				58,786	
Graphic Packaging	Battle Creek Kalamazoo Middletown East Angus	MI MI OH QC	Boxboard Boxboard Boxboard Boxboard						438,000 190,000 156,000 84,000	Accept OCC, ONP, mixed paper. Production numbers reported from annual report. Recycled tonnes not listed- assume more tonnes recycled than produced.
Greenpac	Niagara Falls	NY	Lightweight linerboard	544,311					544,311	
Kruger	Montréal	QC	White Top Linerboard, Saturating & Release Liner,	120,000			7,000	5,000	132,000	

COMPANY	LOCATION	STATE/ PROVINCE	END PRODUCT	OCC (MT/YR)	#56 (#8 ONP) NEWS (MT/YR)	#58 SCN (#9 NEWS) (MT/YR)	HARD MIX (MT/YR)	RESIDENTIAL MIX (MT/YR)	ANNUAL CAPACITY (MT)	NOTES
			Coloured Board, File Folder Board							
Kruger	Trois- Rivières	QC	100% recycled linerboard.	373,000				7,000	380,000	Capacity of 400,000 tonnes per year. Trial with residential fibre from a local municipality.
Pratt Industries	Staten Island	NY	100% recycled paper	260,000				100,000	360,000	
Pratt Industries	Valparaiso	IN	100% recycled paper	144,000				336,000	480,000	
Sonoco	Brantford	ON	Coreboard, Rexboard	35,000			42,000		77,000	60-65% contracted. No planned capacity expansions at any of the mills to use more residentially generated fibres
Sonoco	Trenton	ON	Linerboard, Ecotech, Canboard, Coreboard	70,000			30,000		100,000	60-65% / No planned capacity expansions at any of the mills to use more residentially generated fibres.
Strathcona Paper LP	Napanee	ON	Clay coated recycled	50,000	16,200				66,200	No planned expansions.

COMPANY	LOCATION	STATE/ PROVINCE	END PRODUCT	OCC (MT/YR)	#56 (#8 ONP) NEWS (MT/YR)	#58 SCN (#9 NEWS) (MT/YR)	HARD MIX (MT/YR)	RESIDENTIAL MIX (MT/YR)	ANNUAL CAPACITY (MT)	NOTES
			paperboard							However, as continuous improvement process facility, they increase capacity each year by a small percentage. With news being their lowest % in mix, do not foresee an increase in using more newspaper for food grade board.
WestRock Company	Battle Creek	MI	Paperboard							Accept OCC, mixed paper. Quantity unavailable.
WestRock Company	Stroudsburg	PA	Paperboard							Accept OCC, mixed paper. Quantity unavailable.
WestRock Company	Syracuse	NY	Linerboard and medium	725,000			25,000		775,000	Use OCC and accept some hard mix paper –estimated to be less than 5%
Total				4,017,242	197,804		155,089	478,903	5,742,038	*Total exceeds grades as grades not always provided.

5.3.1 Future Containerboard Capacity

There have been at least seventeen announcements (Waste Dive, November 2018) of additional capacity at current or new containerboard mills in North America. The capacity expansions that may impact Ontario are listed in Table 4 below. It is important to note that in some cases, the forecast capacity, fibre to be consumed and timelines are likely to change prior to the forecasted date.

Table 4: Forecasted Future Capacity

COMPANY	LOCATION	STATE/ PROVINCE	END PRODUCT	OCC (MT/YR)	#56 (#8 ONP) NEWS (MT/YR)	#58 SCN (#9 NEWS) (MT/YR)	HARD MIX (MT/YR)	RESIDENTIAL MIX (MT/YR)	ANNUAL CAPACITY (MT)	NOTES
Green Bay Packaging (GBP)	Green Bay	WI	Containerboard	TBD			TBD	TBD	620,000	620,000 tonnes per year, up from the existing mill's capacity of 220,000 tons per year. Planned completion 2021 Q2.
Kruger	Brompton	QC	Linerboard	120,000					120,000	Require clean OCC to create FDA approved linerboard.
ND Paper wholly-owned subsidiary of Nine Dragons Paper (Holdings)	Biron	WI	Convert existing equipment to produce corrugated medium and linerboard, new recycled pulp capacity.						690,000	Commission major projects at a cost of \$189 million at current site. Planned projects include conversion of paper machine to containerboard products. Planned completion by 2020 Q1.
ND Paper wholly-owned	Fairmont	WV	Current mill: recycled content						220,000	Currently producing 138,600 tonnes of

subsidiary of Nine Dragons Paper (Holdings)			pulp for packaging and tissue products Will likely be con					product. Feedstock is sourced from sorted office paper, newsprint and other grades, and some of the material comes from recycling programs in the region. Exact fibre grades undefined.
ND Paper wholly-owned subsidiary of Nine Dragons Paper Holdings	Rumford	ME	Coated one and two-sided paper, specialty papers and market pulp.	TBD		TBD	437,000	Produce recycled pulp to ship to China. Projected to be completed by 2020 Q1.
Pratt Industries	Wapakone ta	OH	Recycled linerboard and corrugated medium	120,000		280,000	400,000	The fibre will be sourced entirely from a separate Pratt subsidiary. Planned completion 2019 Q4.
Total				240,000		280,000	2,487,000	*Total exceeds grades as grades not always provided.

6.0 SUMMARY FINDINGS

The table below provides an overall summary of the reported capacity by the molded fibre manufacturers, insulators and containerboard mills as well as the forecasted future capacity at mills that may impact the Fibre collected in Ontario's Blue Box Program.

End Market	END PRODUCT	OCC (MT/YR)	#56 (#8 ONP) NEWS (MT/YR)	#58 SCN (#9 NEWS) (MT/YR)	HARD MIX (MT/YR)	RESIDENTIAL MIX (MT/YR)	ANNUAL CAPACITY (MT)
Molded Fibre	Fast food trays, egg cartons		67,400	20,500			87,900
Cellulose Insulation	Cellulose Insulation		5,000	44,800			89,800
Containerboard	Linerboard, medium, boxboard	4,017,242	197,804		155,089	478,903	5,742,038
Future Capacity		240,000				280,000	2,487,000
*Total		4,257,242	270,204	65,300	155,089	758,903	8,441,160

Note: The total of the Annual Capacity exceeds the detailed grade information, as specific grades were not always provided by sources.

The following sections provide responses to the key objectives of the study which were to:

1. Determine how much total capacity exists at fibre end-users in freight efficient locations (i.e. around the Great Lakes -Ontario, Quebec, New York, Ohio, and Michigan) for Ontario's Fibre Materials (printed paper, old corrugated cardboard and mixed paper).
2. Identify challenges and opportunities for Ontario municipalities to access existing or new fibre capacity.

6.1 Current capacity

The research findings suggest the following:

- There is approximately 8.4 million tonnes of existing or future capacity that could consume the 610,000 tonnes of fibre marketed from Ontario
- There is approximately 4.2 million tonnes of capacity for cardboard which is significant capacity to consume the 180,910 tonnes of OCC marketed from the Ontario Blue Box Program
- There is 1.1 million tonnes of capacity for newspaper (#56), hard mix and residential mixed paper which is enough capacity to consume the 423,494 tonnes of printed and mixed paper marketed from the Ontario Blue Box Program
- Approximately 2.5 million tonnes of additional capacity is forecasted to come online within the next three years for printed paper, cardboard and mixed paper

6.2 Challenges

While there appears to be sufficient capacity for Ontario's Blue Box Fibre Materials, there are challenges in accessing this capacity including: existing relationships, distance to end markets, end market quality specifications and pricing.

Existing Relationships

All end markets contacted indicated they have contracts and/or long-term relationships with suppliers for their fibre requirements. End markets willing to provide contract information, indicated they have contracts in place for between 50-75% of their overall requirements. The majority of end markets indicated that they are willing to consider new suppliers. One end market representative summarized it succinctly by stating, "we are always open to new opportunities – it depends on pricing".

Distance to end markets

The majority of current and additional capacity for printed paper is outside of Ontario. Cost to transport Ontario fibre to these end markets may cause a financial challenge as fibre end markets are very price sensitive to the "total landed cost", which includes the cost of fibre plus the transportation costs. Therefore, end markets generally prefer to purchase fibre located closest to their manufacturing facilities to minimize their overall cost.

End Market Quality Specifications

Fibre end markets require suppliers to comply with quality specifications that will allow the fibre to be processed with the current equipment at the mill. Most fibre end markets use the specifications published by the Institute of Scrap Recycling Industries (ISRI). However, the end market processing equipment may require alternative specifications to be met. For example, insulation manufacturers require very dry newspaper for their process while containerboard and molded fibre mills can tolerate a certain amount of moisture based on their production process.

Pricing

The price per tonne paid by end markets often determines where municipalities and processors sell their fibre. Domestic end markets generally use prices published in the Pulp & Paper week as market indicators to price their fibre. However, when the export market pays significantly higher prices for fibre, municipalities and processors may elect to sell their fibre to export markets.

6.3 Opportunities

The findings indicate there are significant opportunities to increase end market capacity to consume the fibre collected from Ontario's Blue Box Program. These opportunities include: future capacity announcements, fibre substitution, innovation and incentives.

Future Capacity Announcements

The research findings suggest there is 2.4 million tonnes of capacity scheduled to be implemented within the next two years. However, all of this capacity is outside of Ontario. The distance to these end markets may limit access based on the high transportation costs previously cited.

However, if these mills deliver their finished product e.g. rolls of linerboard, medium into Ontario, they may purchase fibre from Ontario if they can reduce their freight costs as part of a "back-haul" opportunity. A "back-haul" occurs when a trucking company delivers an item to a destination and then looks to pick up another load in the same vicinity of its initial delivery and haul the second load back to the vicinity of the original load.

Fibre Substitution

Some containerboard mills have been able to modify their processing systems to use a certain percentage of mixed paper as a lower cost option to OCC. Similarly, some cellulose insulation manufacturers have set up small sorting lines to use curbside fibre as a lower cost alternative to overissue news. Molded fibre manufacturers also have modified their equipment to accept more curbside news as an alternative to using overissue news.

As fibre prices increase, these end markets may also attempt to increase the amount of lower cost fibre in their systems. However, this may be limited by the equipment within their operation and the finished product specification requirements of their customers.

Innovation

Paper mills are also looking for opportunities to recycle additional fibre collected in curbside programs. In September 2018, WestRock Company announced it would begin accepting mixed paper bales that contain foodservice packaging at its eight 100% recycled paperboard mills across the United States. The mills located in Battle Creek, Michigan and Stroudsburg, Pennsylvania may have the greatest opportunity for Ontario's mixed residential fibre in addition to the WestRock paper mill in Syracuse, New York that primarily purchases OCC and a small quantity of hard mix.

WestRock's recycled paperboard mill in St. Paul, Minnesota, which produces 100 percent recycled content paperboard, conducted a trial in 2017 accepting poly-coated foodservice packaging during regular production. There was no disruption in the production process from this trial or at subsequent trials at other WestRock mills in Tennessee and Kentucky. The company has cited the evolution of the paper mill's pulping and cleaning systems to allow it to take alternative fibres.

The foodservice packaging that WestRock recycled paperboard mills will begin accepting include single-use cups, takeout cartons and pizza boxes. The addition of foodservice packaging is also beneficial to WestRock from a production perspective as the company's press release indicates that foodservice packaging is a source of high-quality virgin fibre that can add value to the residential mixed paper by improving fibre strength and yield. WestRock suggests that, "residential mixed paper averages about 65 percent fibre yield and foodservice packaging typically averages more than 90 percent yield."

The changes announced by WestRock will likely result in other paper mills accepting foodservice packaging in the residential mix in the future.

Incentives

Kruger's mill in Trois Rivières has been working on a pilot project with a local town to take unsorted curbside fibre as a lower cost option to OCC. However, the technological limitations at the mill have prevented Kruger from expanding this project.

A recent announcement by the Quebec government may stimulate incentives for Quebec mills to increase the use of curbside mixed paper into their manufacturing process. RECYC-QUÉBEC is a Crown corporation whose mission is to encourage Québec to reduce, reuse, recycle and recycle residual materials in a circular economy and climate change perspective.

In December 2018, RECYC-QUÉBEC announced it will support the implementation of promising projects to promote better sorting and packaging and recycling of different types of fibre in Québec with a new call for proposals for financial assistance up to \$500,000. This [financial assistance](#) will support projects aimed at resolving fibre-related market issues, particularly mixed papers and newspapers. The objective of this call for proposals is to financially support projects that aim to solve market problems affecting fibre from Quebec curbside recycling programs.

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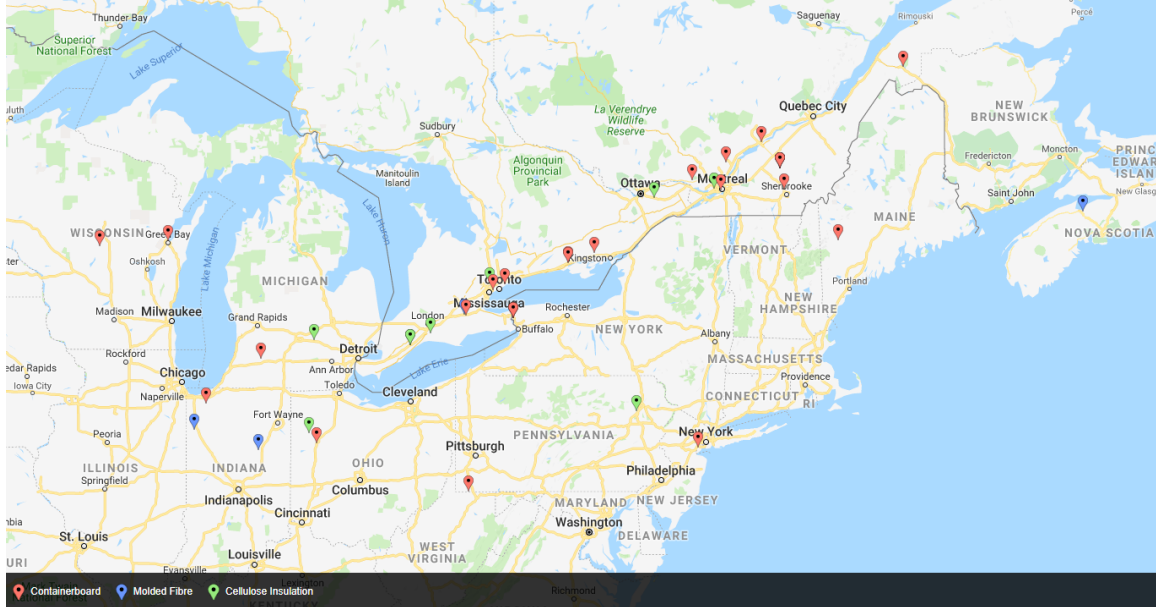
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APPENDIX A: MAP OF FIBRE END MARKETS



APPENDIX B: FIBRE GRADE DEFINITIONS

The table below provides an overview of the various fibre grades typically marketed from Ontario along with the definitions of the grade as defined by the Institute of Scrap Recycling Industries (ISRI) and/or the end markets:

Fibres		
Category	Description	Definition
Mixed Paper (MP) (ISRI #54)	Consists of all paper and paperboard of various qualities not limited to the type of fibre content, sorted and processed at a recycling facility.	Prohibitive Materials may not exceed 2% Outthrows may not exceed 3%
Old Corrugated Containers (OCC) (ISRI #11)	Consists of corrugated containers having liners of either test liner or Kraft.	Prohibitive Materials may not exceed 1% Outthrows plus prohibitives may not exceed 5%
Sorted Residential Papers & News (SRPN) (ISRI #56)	Consists of sorted newspapers, junk mail, magazines, printing and writing papers and other acceptable papers generated from residential programs (such as residential household and apartment collections and drop-off centers) sorted and processed at a recycling facility.	Material should be free of containerboard and brown grades (OCC, Kraft bags, boxboard and Kraft carrier board). Prohibitive Materials may not exceed 2% Outthrows may not exceed 3%
Sorted Clean News (SCN) (ISRI #58)	Consists of sorted newspapers from source separated collection programs, converters, drop-off centers and paper drives including the normal percentage of roto gravure, colored and coated sections. May contain inserts that would normally be included in the newspaper.	Grade must be free of excessive ink, brown grades and non-paper material. (Some mills may require pack to be free of flexographic inks.) Prohibitive Materials may not exceed 1 / 2 of 1% Outthrows plus prohibitives may not exceed 1% Other papers may not exceed 10%
Over-issue News (OI or OIN)	Consists of unused, overrun newspapers printed on newsprint, containing not more than the normal percentage of roto gravure and colored sections.	Prohibitive Materials: None permitted Outthrows plus prohibitives: None permitted
Hard-mix	Consists of cardboard and mixed paper processed at a recycling facility.	The percentage of cardboard in the mix is mutually agreed upon between the supplier and the buyer but generally the OCC must be greater than 50%