

# Disposable Coffee Cup Waste Reduction Study

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## Abstract

One million paper coffee cups are sent to a landfill from Toronto each day (Entec, 2009). This amount of waste from a single-use disposable item is not sustainable. This study reviews the recyclability of the industry standard polyethylene lined paper coffee cup by studying various Solid Waste Management Systems in Ontario, including jurisdictions where coffee cups are accepted in blue bin and green bin organics collection systems. In both these cases coffee cups are treated as contaminants of the collection stream and are discarded during the recycling process.

Biodegradable cups, styrofoam cups and reusable mugs are evaluated, using life cycle assessment methods, to determine alternatives to current industry standard disposable cup.

The target population of the proposed waste reduction strategy is frequent coffee buyers, understood to mean those who buy their coffee in disposable cups as part of their routine. This target population was identified through the use of IPSOS Reid survey data collected in 2008 for 700 representative residents from Toronto.

The recommended policy option and accompanying implementation considerations were developed in conjunction with a series of eleven interviews conducted in October of 2009 with independent coffee shop owners in Toronto. The policy consists of three behaviour change tools; a prompt, a sign and an available alternative. These tools are described as policy recommendations.

## Introduction

The City of Toronto estimates that more than one million single-use coffee cups are disposed of per day in the City. These single-use coffee cups are not recyclable and are being sent to landfill (Entec Consulting, 2009). Sending this amount of disposable product to a landfill per day is not an environmentally sustainable practice. Coffee cups are not only a Toronto problem; it is estimated that in the USA, 16 billion paper coffee cups are sent to landfills every year (Fusso, 2009). Dunkin' Donuts alone claims to serve one billion cups of coffee a year, or about 2.7 million cups a day. If all these cups were strung together in a straight line, Dunkin' Donuts could create two rings around planet Earth (Dineen, 2005). However, this study focuses on reducing waste in the City of Toronto.

One of the many challenges in reducing the use of disposable products is that the true social cost of using these disposable products, the externalities, are not incorporated into the price we pay for them.

The cost of coffee cups is not obvious to consumers because the cost of the cup is embedded in the price consumers pay for their coffee, and individuals use multiple cups in a day without any obvious environmental repercussions. The environmental cost of using disposable coffee cups is in the energy and resources used for the production, the shipping and particularly the disposal of each cup. Coffee cups in the City of Toronto can not be recycled (City of Toronto, 2009) and are therefore sent to a landfill for final disposal. Landfills have many environmental impacts that can mainly be classified in air, water and solid waste (Sojo Benítez, 2003) aside from these direct environmental impacts there are also indirect social, economic and health impacts that result from landfills. The price of a coffee cup to the consumer is perceived to be free, therefore these social impacts are not obvious.

“Disposable cups represent the essence of an over consumptive society: an obsession with convenience (Alsop, 2004)”.

The issue of the widespread use of disposable coffee cups is uniquely North American. Take-out coffee is not nearly as popular in other cultures. In Europe for example, coffee is most often made at home or bought and consumed at coffee shops where china not paper cups are used (Verma, 2005). Therefore North American policy makers cannot learn from how their European counterparts have tackled this issue.

The City of Toronto has clearly stated that paper coffee cups are not recyclable in Toronto (Solid Waste Management Services, 2008). However in the first step of policy development, the inter-jurisdictional scan, it is revealed that some jurisdictions are accepting paper cups in their recycling systems. Existing paper coffee cup policies focus on recycling, not on source reduction. Toronto is faced with strong lobbyists that advise increased spending on recycling disposable materials (CFRA, 2008) - rather than on source reduction of materials.

The combination of a lack of existing coffee cup source reduction policies from other jurisdictions and the strong lobbyist presence has caused the coffee cup issue to be

postponed by Toronto City Council since 2008 (Shupac, 2009). The current City of Toronto position is described in the *Current Coffee Cup Approaches* section of this study.

## Recycling Coffee Cups

A common reaction to the excessive use of disposable coffee cups is: “Why don’t we just recycle them all?” The IPSOS Focus Groups in 2009 indicated that almost all participants believed coffee cups are recyclable in Toronto.

Even if coffee cups were recyclable it would not be an effective use of our resources to use disposable products daily. In some cases it is unavoidable to use a disposable cup, however 70 percent of coffee cups are used as part of a daily routine (Source Data: IPSOS 2008). As part of a daily routine it is feasible to replace the disposable cup with a reusable cup.

Yet consumers feel that placing a disposable cup into the recycling bin is green enough. According to Shana Weber, the manager of sustainability at Princeton University, many people think recycling is equal to sustainability, if people think they are living sustainably just because they are recycling, they need to think again (Lemonick, 2009). Because recycling generates a ‘feel good’ effect that consumers don’t feel the need to change their habits to reduce waste by using a reusable cup. Therefore the recyclability of paper cups is explored to accompany the waste reduction initiative.

There are several causes for the perpetuation of the coffee cup recycling myth. Certain jurisdictions accept the polyethelene lined paper cup in their recycling or green bin programs and several retailers label their recycling bins as the appropriate disposal bin for the paper cup.

### **Blue Bin Compatibility**

A study of the treatment of coffee cups in paper recycling was conducted under the direction of the City of Toronto by Entec Consulting in 2009. Several jurisdictions were examined including Essex Windsor, York, and Owen Sound. In these jurisdictions, the cups are included in the recycling and end up in a mixed paper output. The cups are included in this product but are ‘contaminants’ of that stream. Meaning that if the level of ‘contaminants’ is low enough they can be discarded in the processing stage, because coffee cups are a small percent of the overall paper recycling stream the product can still be sold as a low contaminated batch. This was further researched through a phone interview with Entec Consulting in October 2009, where paper cups were confirmed to be a contaminant in the recycling process and should therefore be kept in the waste stream in Toronto’s processing rather than included in a recycle stream.

A further report by Amec confirms these findings: “In the case of mixed paper, if the purchased grade is meeting the mill specifications and cups are in the pack then it will be accepted. This does not mean the cups are being processed; they may be coming out of the pulper as refuse (Amec, 2009)”.

Therefore, while cups are accepted in some blue bin programs, they get processed with other paper but they are not recycled. Instead they are considered contaminants that will be removed from the mixed paper batch before being recycled. The reports do not use the term 'landfill' –however, as a contaminant of the process, cups are considered a waste product and would be sent to landfill from the paper-processing site.

In summary, in the blue bin treatment of coffee cups there is evidence that cups are considered contaminants in the processing stage and end up in a landfill rather than being recycled.

### **Green Bin Compatibility**

Several jurisdictions, Hamilton, Durham Region, Halton Region and Ottawa Valley allow coffee cups to be collected in their organics green bin systems. The industry standard cup is a polyethylene (thermoplastic) lined cup (Starbucks, 2009). Figure 1 is a photo of an industry standard paper cup to illustrate the difficulty in achieving degradation of thermoplastics.



Figure 1: An industry standard 'poly lined' paper cup retrieved from over a year in a residential compost.

The photo is of a cup that was placed in a Toronto home compost for over a year. Clearly the paper layer has degraded but not the plastic coating.

There are no available studies on how coffee cups are processed in the municipal organics systems. However, Joel McCormick, the Manager of the Central Composting Facility in Hamilton agreed to an interview on coffee cups processing in the Hamilton system. He stated that the paper layer may degrade under the right conditions of the organics treatment. The plastic layer will not degrade in the treatment. Instead it will be sorted out at the 'hurricane system' stage of the organic waste processing. As the name implies this stage blows air into the pile of organics and plastics such as plastic bags or the coffee cup plastic lining are removed and sent to a landfill.

In some cases the paper layer does not decompose in the organic waste collection, for example if there is not enough air or moisture around the cup. In these cases the cup flows through the entire process and ends up in the residuals pile which is collected through a screener that collects pieces that are too big, so called 'overs'. In many cases the residual pile is re-processed and according to Mr. McCormick the paper layer of the cup may degrade when it's passed through the second time. In other cases though the paper layer of the cup may not degrade and the entire cup is screened into the overs pile as a contaminant and is sent to landfill.

Mr. McCormick stated that the volume of cups that are found in their process was combined in their audit with paper tissues and box boards. The preliminary results of the draft audit cite the combined volume of these materials to be under 2.1% of the total waste stream.

In the interview Mr. McCormick stated that Hamilton's Central Composting Facility is able to accept plastic lined paper cups because the volume of cups arriving at the organics facility is low compared to the overall volume of organics. Coffee Cups are considered contaminants at the composting facility, like plastic bags, they do not biodegrade and are pulled out of the stream at various stages, such as the hurricane and the screener stages, and sent to landfill.

## Evaluation of Alternatives: Styrofoam cups, Biodegradable Cups and Reusable Mugs

Several alternatives to the industry standard polyethylene lined paper cup exist. This paper compares the use of disposable Styrofoam cups, widely used before the public outcry in the 1980's and disposable 'biodegradable' plastic lined paper cups, which are commonly perceived as a more environmentally friendly choice than the standard paper cup (Lee, 2009). Finally reusable cups are evaluated as an alternative to all disposable cups.

### **Styrofoam cups**

In the 1980's styrofoam manufacturing created chlorofluorocarbons, or CFC emissions (Brower, 1999). Public awareness drove businesses to shift away from Styrofoam cups (Brower, 1999). Since 1980 Styrofoam cups no longer create CFC emissions in their manufacturing process, but consumer opinion on Styrofoam cups has not been restored, "a significant share of the environmentally concerned public is unaware that foam cups are no longer responsible for ozone destruction" (Brower, 1999).

Furthermore, to the disfavor of the Styrofoam cup image, they are significantly cheaper than plastic lined paper cups. They are estimated to be on average a third of the cost of paper cups (Papa, 2009). Coffee shops concerned about the impact of their cup choice on their business are advised “Styrofoam has a cheap perceived value, which in turn will devalue your coffee product. Paper cups send a more sophisticated and exclusive message” (Papa, 2009).

Ironically, Styrofoam cups are the only cups that are recyclable in the City of Toronto. In the Life Cycle Assessment, further discussed under *reusable cups* below, Styrofoam cups are shown to have the lowest production energy requirement (Hocking, 1994).

Despite Styrofoam cups having the lowest production energy equivalent and them being recyclable it is unlikely that they will replace the current industry standard poly-lined paper cup due to the historic poor public perception of the Styrofoam cup.

### **Biodegradable cups**

One of the alternatives to the current industry standard of the polyethylene lined paper cup is the polylactic acid cup, the so-called ‘biodegradable’ cup. These look and feel exactly the same as the standard paper cup but the plastic layer is made from corn based plastic, polylactic acid, generally referred to as PLA (AMEC, 2009).

At first glance corn based plastic lined cups are an improvement over petroleum based plastic lined cups, but upon closer inspection there are concerns over the potential for more widespread use of biodegradable plastic food packaging, the most common concerns are summarized below.

Specific biodegradation conditions are required for plant based plastics to degrade (Ecotainer, 2009). PLA only biodegrades if it is in a facility that reaches 140 degrees for ten consecutive days and has a humidity of 90% (Roytle, 2006). Municipal organics treatment facilities do not process organics under those conditions. For example the Toronto Dufferin Organics Treatment facility processes organics for 15 days at a temperature of 98.6 degrees Fahrenheit (Luxmore, 2008). Biodegradable cups are therefore not accepted in the Toronto Green bin system (311 Toronto, 2009). The City requests that biodegradable plastics be placed in the garbage bin. Biodegradable cups therefore also end up in landfills. These landfills are dry environments designed not to produce leachates, therefore biodegradable plastics do not degrade in landfills (Gross, 2002). There is no evidence that PLA will break down any faster than PET or any other kind of plastic in a landfill (Roytle, 2006).

Research shows that biodegradable cups do not degrade in home composting facilities: “Will Brinton, president of Woods End, a compost research laboratory in Mt. Vernon, Maine, who has done extensive testing of PLA, says such containers are “unchanged” after six months in a home composting operation. For that reason, he considers the signage touting PLA’s compostability, to be false advertising” (Roytle, 2006).

Recycling systems have also expressed concerns over PLA. If consumers place PLA in with PET products destined for recycling plants, this will become a key concern for municipal recycling (Bogetich, 2007). The City of Toronto has already banned biodegradable plastic bags from being sold (in December 2008) due to their compatibility

difficulties with other plastics in the recycling stream (Solid Waste Management Services, 2009). The City stated that recyclers cannot use post-consumer plastic that contains biodegradable plastics. Therefore any biodegradable plastics ending up in the recycling stream will seriously damage the ability to maintain an end user market for recyclable plastic (Solid Waste Management Services, 2009).

The world has recently experienced significant increases in corn and basic food staple prices as a result of the increased demand for ethanol products; this is predicted to lead to malnutrition and hunger (Runge, 2007). The use of corn for ethanol purposes has pushed the price of food to increase at twice the rate of inflation in the US, forcing some lower-income families to go hungry (Skaug, 2009). PLA is another form of using a food product for a non-food item, for this reason PLA has been criticized since the increased demand is predicted to further drive up the price of basic food (Bogetich, 2007).

The leading producer of the PLA resin, NatureWorks, is owned by the corn giant Cargill. Their crops, genetically modified to resist pests, are blamed for disrupting the ecosystem and causing erosion (Roytle, 2006).

Furthermore, “a lifecycle analysis conducted by the Athena Sustainable Materials Institute, an independent research group concluded that PLA offered no significant advantages over conventional plastics in terms of energy demand or CO2 emissions. The total energy demand for PLA is lower, but the difference is less than 10%. Although PLA does utilize fewer fossil fuels, over 50% of the cradle-to-grave energy used for PLA nonetheless comes from fossil fuels, compared to about 89% for petroleum polymers” (Bogetich, 2007).

In Roytle’s 2006 article in the Smithsonian magazine, Martin Bourque the executive director of the Berkeley Ecology Center is quoted “My worry is that PLA legitimizes single-serving, over-packaged products”.

The danger with using so called “biodegradable plastics” is that they do not address the overuse of disposable products. In Toronto, from the perspective of volume of waste sent to landfill, PLA is no better than the polyethelene lined paper cup because PLA can’t be recycled or biodegraded in Toronto’s waste management system.

There is a movement in the coffee shop industry towards using biodegradable cups, despite the fact that they are three to five times more expensive than the industry standard cup (Cullen, 2009). Many coffee shops market themselves as being environmentally responsible by selling their coffee in biodegradable cups, one coffee shop owner who was interviewed stated that “there is pressure to buy into biodegradable cups because everyone is going in that direction”.

### **Reusable Cups**

Many reusable cups are available to transport hot drinks. These keep coffee hot for longer and would reduce the volume and weight of waste sent to landfill if they replaced habitual use of disposable coffee cups.

In order to compare the alternatives described in this report; Styrofoam, Biodegradable, Reusable and the current industry standard Paper Cup, several published life cycle

assessments (LCA) are summarized. It is worth noting, before reviewing the analysis, that the studies generally reach similar conclusions, but do not agree on specific values, for example, for exact values of energy use over a life time. The life cycle analysis studies summarized below cannot be used as exact measures of the Life Cycle Impacts in Toronto as manufacturing, transportation and disposal differ from place to place. For example, impacts from disposal of Styrofoam cups in Toronto, where Styrofoam is recycled, would vary from a municipality where Styrofoam is incinerated.

The first study, by Hocking from the University of Victoria, compiled in 1994, compares the energy requirements of hot drinks cups. The cups studied are: Ceramic, Plastic and Glass re-usable cups and non-coated paper and polystyrene cups (Hocking, 1994).

The study calculates the break even point for energy use of a disposable cup compared to a reusable mug that is washed in a dishwasher between uses. A critical variable in the study was the amount of energy a dishwasher used to clean the reusable cup after each use. Hocking used a conservative energy value of 184kJ per wash per cup, the values used by Hocking in 1994 are cited to be from studies in 1992 and 1993. Appliances have become more efficient over the last 17 years. The current average energy use for an Energy Star household dishwasher is estimated at 1.23kWh per wash (Dunn, 2009). Converted into KJ and divided by 50 cups that fit into a household dishwasher, the current average energy use for a cup wash is 88.5kJ.

Criticisms of the Hocking study also include that it does not compare the industry standard cup to reusable cups, it compares a non-poly-coated paper cup. Some of the values used in the energy calculation of the paper cup date as far back as 1974!

Energy use values for the following cups were calculated in the Hocking study:

Cup Type	Energy Use (MM Btu/10,000 units)
Re-usable Ceramic	133.53
Re-usable Plastic	59.71
Re-usable Glass	52.14
Non-coated Paper	5.20
Polystyrene	1.87

Table 1: Energy required to make common hot drink cups (Source Data: Hocking, 1994)

The second study was conducted by Franklin Ltd. in 2006, their values for energy use of PE-coated paper cups and Polystyrene cups are calculated to be approximately 30% higher than in the Hocking study. The Franklin study compared only disposable products; Polystyrene, Poly-coated Paperboard with and without a sleeve. The study used traditional Life Cycle Inventory methodologies and found polystyrene cups to be meaningfully lower in energy use than polyethelene coated paper cups with sleeves and wax-coated paperboard cold cups.

The results of the Franklin study are as follows:

	<b>Energy</b>		<b>Solid Waste-Weight</b>		<b>Solid Waste-Volume</b>		<b>GHG</b>	
	Range of Total Results (MM Btu/ 10,000 units)		Range of Total Results (lb/ 10,000 units)		Range of Total Results (cu ft/ 10,000 units)		Range of Total Results (lb CO2 equiv/ 10,000 units)	
Expanded Polystyrene Foam	6.13	6.97	1.29	146.00	9.75	11.08	500	569
PE-coated Paperboard	7.29	8.89	358.00	437.00	10.75	13.10	483	588
PE-coated Paperboard + Sleeve	8.54	11.17	553.00	793.00	16.95	24.47	689	699

Table 2: Results for 16-ounce Hot Drink Cup (Franklin Ltd. 2006)

The following formula was developed by Hocking in 1994 to calculate the break even energy use of a disposable cup used once and a reusable cup washed in a dishwasher between uses:

$$\text{Break even number of uses} = (\text{Energy of Reusable cup}) / (\text{Energy of Disposable cup} - \text{Energy of wash})$$

This formula was used with Hocking's energy values for reusable mugs, the values calculated by Franklin Ltd in 2006 for disposable cups, and current values for household dishwasher energy consumption. Table 3 displays the results of this analysis:

	Polystyrene	PE-coated Paperboard	PE-coated Paperboard + Sleeve
Re-usable Ceramic	127	18	15
Re-usable Plastic	57	8	7
Re-usable Glass	50	7	6

Table 3: Results of Hocking's, 1994, methodology for calculating break even uses of cup types using current values, as calculated by Franklin Ltd and current energy star appliance energy use values.

Another life cycle assessment is conducted in Belgium by Vercauteren and presented at the Life Cycle Engineering Conference in 2006. Four cups are compared: a reusable Polycarbonate cup (PC), three single use cups; polypropylene (PP), polyethylene (PE) coated cardboard and polylactide (PLA) also known as 'biodegradable' cups. The study plotted environmental profiles for each of the four types of cups over their life cycle, the life cycle of the reusable cup was studied at 20 and 45 uses, disposable cups were studied at a single use. All four cups varied in their environmental impacts. PP cups consumed the most Fossil fuels, LC cups consumed the most Minerals, PLA cups created the most Acidification, LC cups rated the worst on Exotoxicity, the Ozone layer was the most impacted by PC cups, the climate change rating was the best for LC cups. The study found that none of the cups had consistently the lowest or the highest

environmental score. The study then used the Eco-indicator 99 method (Goedkoop, 2000) to create one indicator for all the environmental impacts. The study concludes that in the single indicator the re-usable PC cup system has the most favourable score, even at the lower boundary of 20 uses.

Broca, conducted a life cycle assessment in 2008 to compare the use of ceramic plates with PLA plates. The study found that the break even energy use is at 50 uses of the ceramic plate when it breaks even with the PLA plate. The study therefore recommended the use of ceramics over PLA plates in a cafeteria application (Broca, 2008).

Therefore in the case of reusable cups, the exact break-even point for energy use and environmental preference is not universally agreed upon. However, values of break-even uses are in the same degree of magnitude.

It is clear that over a lifetime of frequent disposable paper cup use, a reusable mug is environmentally preferable, for waste sent to landfill, greenhouse gasses and energy consumption. This study addresses coffee purchasing patterns and recommends a waste reduction initiative to encourage the increased use of reusable cups.

## **Current Coffee Cup Approaches**

### **The Province of Ontario**

The province is in the process of developing and consulting on changes to the Waste Diversion Act (Solid Waste Management Services, 2009). These changes are likely to include 100% Extended Producer Responsibility, that means retailers will in the future be completely responsible for the packaging throughout their life cycle (Shupac, 2009). In Toronto, taxpayers fund \$20 million per year of the blue box program. Extended producer responsibility will mean retailers will cover this cost (Shupac, 2009).

The Minister of the Environment's letter to Waste Diversion Ontario dated August 14, 2009 includes instructions to develop mechanisms for the identification and management of problematic materials for the Blue Box program (Minister Gerretsen, 2009). The Province consulted with the City of Toronto to develop the new act, and during these consultations, the City included coffee cups in the Problematic Materials section. The reports prepared by consultants, ENTEC and AMEC, engaged by the City to determine if there is any potential for recycling cups in Toronto, was presented to the Province as a model for identifying problematic materials (Solid Waste Management Services, 2009).

The subsequent position paper, released in November 2009 by Waste Diversion Ontario, included a proposal for a levy for manufacturers on non-recyclables (Hendra, 2009). In regards to the proposed levy for products destined for landfills, the Minister stated: "If we do that, it may become more economically viable for companies to start, in effect, recycling, reducing and reusing materials rather than purely disposing of them (Hendra, 2009)".

The proposed changes to the Waste Diversion Act would increase cost to the manufacturer for disposal of the current industry standard coffee cup. In other words, the externality is being internalized into the costs of the producing company. How retailers

will react to their increased operating costs is not certain. Potential retailer reactions include:

- absorbing the additional cost as profit reduction, and maintaining the status-quo;
- pursuing a disposable cup that is recyclable (For example: switch to a Styrofoam cup);
- continuing to lobby that recycling technology be developed for the industry standard paper cup; or
- pursuing source reduction.

Pursuing source reduction policies at the city level is therefore not in conflict with the new direction of the Waste Diversion Act as proposed in November 2009.

### **The City of Toronto**

The Solid Waste Management department has explored various options since 2007 to reduce the amount of disposable food and beverage containers that are used (Welsh, 2008). Toronto City Staff recommended a mandatory 20 cent discount on reusable mugs in December, 2008 in the report to Council (Public Works and Infrastructure Committee, 2008). The Canadian Foodservices and Restaurant Association (CFRA) Lobbyists attended the Council meeting with strong opposition to the recommended fees (CFRA, 2008). They argued that developing recycling capacity for coffee cups was “a more reasonable and responsible solution than bans and taxes” (CFRA, 2008). Their arguments include that other municipalities accept coffee cups in their recycling program (CFRA, 2009). In developing any policy to deal with the million cups created from the coffee industry daily in Toronto CFRA is a force to be reckoned with. They proclaim that they will continue to lobby for the expansion of the city’s recycling program (CFRA, 2008).

Toronto City Council decided to establish a Hot Drink Taskforce to review the recommendations put forth by Solid Waste Management Services (Hanes, 2008). The Hot Drink Cup Taskforce, established through City Staff in January 2009, included hot drink retailers/brand owners, material suppliers, material converters, distributors/wholesalers, and trade organizations (Kelleher Environmental, 2009). Since the Hot Drink Cup Taskforce was assembled, their recommendations have continually focused on expanding the blue bin program to accept coffee cups (Hanes, 2009). The taskforce funded research of coffee cup recycling in other jurisdictions as well as a summary report on behavior change research (City of Toronto, 2009).

The taskforce deadline of June 2009 was not met. The taskforce was unable to reach a resolution with hot drink cup retail stakeholders (Solid Waste Management Services, 2009). The Waste Diversion Act changes were announced shortly after this deadline. City Councilors were advised by Solid Waste Management not to proceed with policy or by-law development related to hot drink cups until the changes to Waste Diversion Act have been finalized (expected in early 2010) and the impacts thereof have been studied (Solid Waste Management Services, 2009).

Councilor Mr. De Baeremaeker stated: "We're very, very pleased that the provincial government is stepping in. The reason Toronto was taking action was because nobody

else was. If the province's recommendations fall short, then we'll take action (Shupac, 2009).”

While the City waits for the new diversion act to be completed they have been tasked “to continue to conduct research and pilot studies into effective means of promoting source reduction of hot drink cups at the retail level, consistent with City policies” (Solid Waste Management, 2009).

## Existing Source Reduction Policies: Plastic bags

Changing the way consumers think of and use products can occur, but requires significant effort from the City, retailers and from the consumers themselves. Toronto has seen an encouraging shift in the use of plastic bags. The City of Toronto Act allowed the city to order businesses in Toronto to charge the 5 cent fee for all plastic bags (Office of the Mayor, 2009).

The bylaw demands that plastic bags be dispensed “at the request of the customer” therefore the customer is now asked “Do you need a bag?”

In an interview with a bookstore manager she stated: “I have wanted to reduce plastic bags in our store for a long time, but when I used to ask people if they needed a bag for their books they would not understand how to take their books home without using a plastic bag. Since the fees hardly anyone wants a bag to take their books home. Everyone carries their own bag” (Interview with Titia Donker, October 2009).

In the City of Toronto one major grocery retailer, Metro, has seen a 70% decline in the use of plastic bags between the introduction of the fees on June 1, 2009, and June 25, 2009 (National Post, 2009). City evaluations of the bi-law will occur in May 2010 to determine the city wide rate of reduction (Interview with City Staff, 2009).

## Usage Statistics, Plastic bags vs. Coffee cups

Further encouragement to tackle the disposable cup issue in Toronto is that usage patterns are similar between single use plastic bags and disposable coffee cups. The Ipsos Public Affairs survey shows that before the plastic bag fees were implemented 56% of Toronto Residents used plastic bags often (More than twice a week) and 51% of Toronto Residents used disposable cups often (Ipsos Public Affairs, 2008). Age and gender are similar between frequent coffee cup and plastic bag users (Ipsos Public Affairs, 2008). It is encouraging that the same target demographic has already learned to bring re-usable bags with them when they go shopping. With the right policy it is foreseeable that these individuals could learn to bring reusable cups with them on their commute to the office.

## Reduction Target

The Ipsos Public Affairs survey of 700 statistically representative residents of Toronto shows that 21% of Toronto Residents use disposable cups every day (Ipsos Public Affairs, 2008). The Ipsos Survey showed that 20% of people who buy coffee in the City of Toronto do so more than twice a week (Ipsos Public Affairs, 2008). These buyers, not the buyers who purchase coffee once a month, are targeted in this initiative.

The purchasing pattern from the IPSOS Public Affairs Study indicates that if only individuals who purchase coffee every day as part of a routine can modify their behaviour to bring a reusable mug with them, then disposable coffee cups can be reduced by 70%.

Using the same IPSOS survey figures: if all frequent (daily and more than twice a week) users who purchase coffee use reusable mugs then disposable coffee cups can be reduced by 90%.

One million coffee cups are sent to landfill per day from Toronto, the estimated weight of this material being sent to landfill is 5006 tonnes/yr (Entec, 2009).

Daily coffee buyers account for an estimated 3504 tones of coffee cups per year, or 700,000 cups per day that are sent to landfill per year in Toronto. Frequent coffee buyers account for 4505 tones per year or 900,000 cups per day.

As a comparative statistic, waste generated by plastic bags in Toronto is estimated through an audit at just over half of the coffee cup waste, at 2745.6 tones per year by Stewardship Ontario (Solid Waste Management Services, 2008).

## Greening Trends

Across all consumer sectors there is an increasing trend for buying green. In 2008, thirty percent of customers were buying green (Willard, 2009). Another identified barrier to the reduction of disposable coffee cups is the bulkiness of a reusable mug. Compared to carrying a reusable bag the mug is much heavier and bigger. Focus groups showed that bulkiness is a barrier to consumers bringing reusable cups with them on their daily routine (Ipsos Reid, 2009). However, a telephone survey of 700 Torontonians found that 70% of those who use disposable beverage cups would be likely to use a reusable cup instead (Ipsos Public Affairs, 2008). The willingness to change does not appear to be discouraged by the size of reusable cups.

A coffee shop in Toronto, Caffiends, has recently become disposable cup free (Howell, 2009). Customers are asked to bring their own mug or to drink coffee in a ceramic mug at the coffee shop. The co-manager, Emily Gilbert, stated: "customers haven't balked at the ban, though a few were caught mug-less at the beginning. Initially, some people were like, 'Oh, I won't get anything then,' but that has quickly faded" (Howell, 2009).

## Source Reduction of Disposable cups: Policy Recommendation

Based on the trend of buying green and the success of the plastic bag source reduction campaign the following behaviour change tools are recommended at the retail level to drive a reduction from daily and frequent coffee drinkers. Along with providing mugs for in-store coffee drinkers, the following three tools are recommended as part of the “do you need a cup?” initiative to reduce the use of disposable coffee cups:

1. Educational signage stating cups are not recyclable must be displayed at the point of sale
2. Mandate a prompt: “Do you need a cup?”
3. Provide alternatives at the point of sale

### Educational Sign

An example of an educational sign for coffee cups was developed with the help of Doug McKenzie-Mohr’s book: “Fostering Sustainable Behaviour, An Introduction to Community-Based Social Marketing”. The approach taken by McKenzie-Mohr 1999, encourages individuals from whom a behaviour change is required, to be educated of the environmental impacts of their actions. Educational signage should frame impacts around local landmarks, as seen in the use of the CN tower in Figure 2. The sign states most obviously that coffee cups are not recyclable, and states that they are sent to landfill. Almost all focus group participants thought single use disposable containers are currently recyclable in the City of Toronto (Ipsos Reid, 2009). Recycling is vastly popular in Toronto, with participation rates of approximately 90% of all households (Kelleher Environmental, 2009). Learning that disposable coffee cups are not recyclable is shocking to most Torontonians and they instantly feel guilty about the amount they use. Figure 2 includes that the City uses 1 million cups every day that are being sent to landfill. More than just being educated that cups are not recyclable, the sign also points to the desired action: “Bring your mug”.

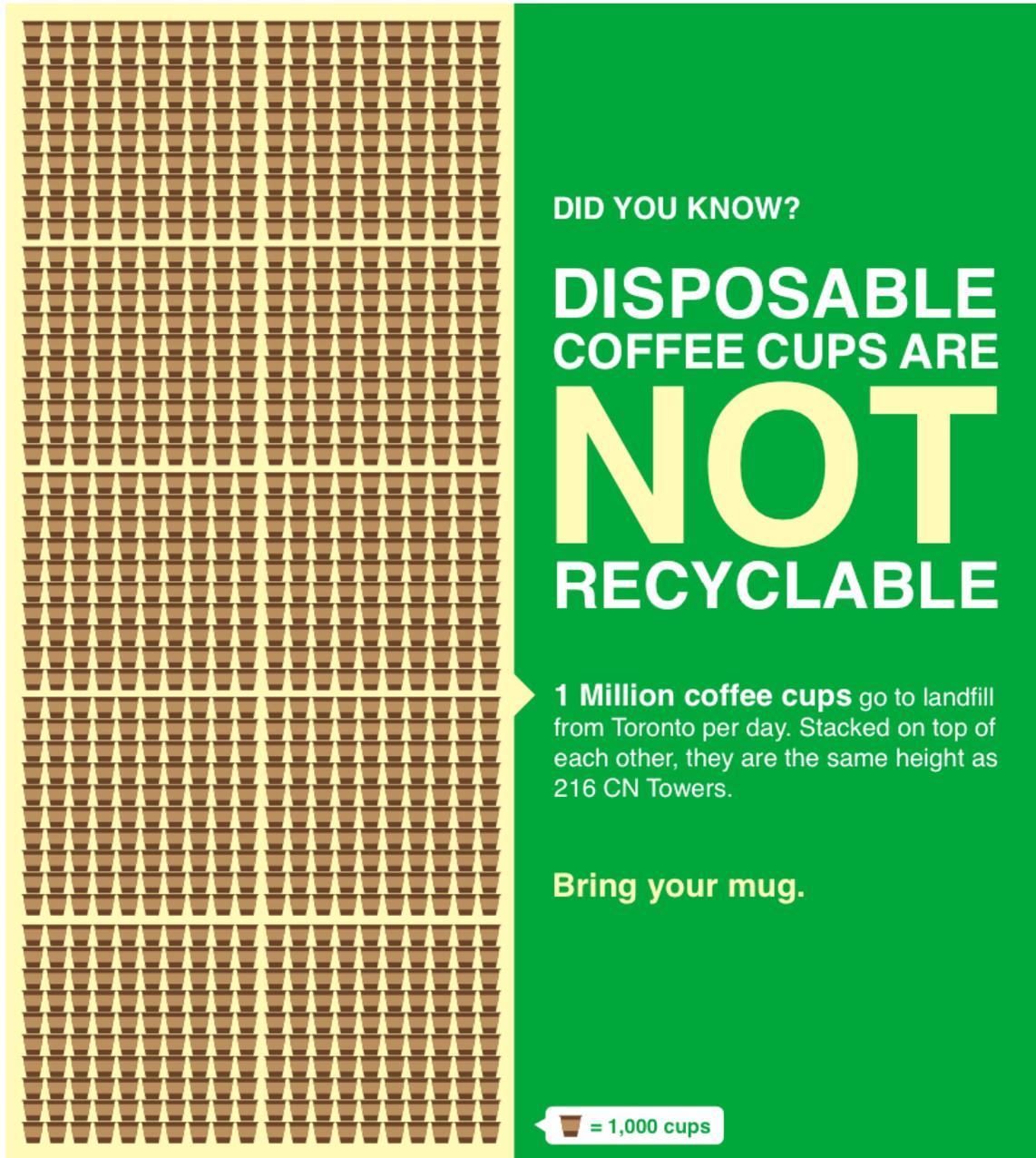


Figure 2: Example of an educational sign for coffee shops

Once the Irish plastic levy was implemented and people learned that their use of plastic bags was not environmentally friendly “Plastic bags became socially unacceptable- on a par with wearing a fur coat or not cleaning up after your dog” (Rosenthal, 2008). This type of social stigma is required for behaviour change. The Kelleher Environmental report states that for a successful behaviour change campaign the required behaviour change must have community buy-in and become the social norm. Since most Torontonians believe coffee cups are recyclable, learning that they are not will make them less socially acceptable.

Equally as important as educating consumers that disposable coffee cups end up in landfills is to tell consumers what it is that they can do to solve the problem. The message needs to be clear and simple (Doug McKenzie-Mohr, 1999). The education campaign must convey the message that consumers need to bring a reusable mug with them to buy coffee.

Studies have shown “that the most important factor in whether individuals actually behaved in an environmentally friendly way was ‘personal control’ which was defined as ‘the extent to which participants felt their actions could benefit the environment’” (New Economic Foundation, 2005). A campaign encouraging people to bring a reusable mug to save another cup from being sent to a landfill could be an effective way to show people that each time they bring their mug it makes a difference to the environment.

The sign alone however will not drive behaviour change. Behaviour change requires a combination of tools, not just education (Doug McKenzie-Mohr, 1999). Consistent with literature, when the sign was placed at the cash register of two independent coffee shops, Broadview Espresso and Three Peppers in Toronto, for over a month, there was no resulting reduction to the volume of reusable cups filled. At Broadview Espresso, an increase in awareness was noticed, and a few comments such as ‘I should really get a mug to bring in’ were triggered at the sight of the sign.

To drive source reduction the education campaign needs to be combined with another tool: the verbal prompt.

## The Verbal Prompt

The implementation of the plastic bag fees changed the pattern of receiving bags at stores. Retailers were no longer able to pile purchases in plastic bags without asking the customers if they wanted plastic bags. Clerks now ask customers “Do you need a bag?” at every purchase. This constant reminder is called ‘a verbal prompt’ in behaviour economics and is credited with having a significant effect on driving behaviour change (New Economic Foundation, 2005).

Behavioural Economics indicates the cue from the plastic bag fee to remember to bring a bag every time the customer is asked if they want one is the most significant behaviour change tool. The customer could easily save 5 cents by choosing their grocery brands more carefully (New Economic Foundation, 2005). Behaviour economics suggests that consumers are more aware of the extra amount they are spending because they are prompted to spend it each time. Arguably if they received a prompt each time they were about to add a brand costing 5 cents more to their purchases they would be likely to change their behaviour (New Economic Foundation, 2005).

The first principle described by the New Economics Foundation for policy-makers is that “Other people’s behaviour matters” (New Economic Foundation, 2005). If a customer is asked each time they purchase a cup of coffee if they brought a mug they would assume that many other people must be bringing their mugs to be filled since they are being asked each time they buy coffee. The increased awareness for refillable mugs would lead them to notice that most coffee shops provide discounts for reusable mugs and they

would be more likely to notice other individuals use their own mugs. A coffee shop wanting to boost their green image could also post their reusable cup results, for example: "This week our customers saved 200 disposable cups". This would encourage customers to follow suit.

The Ipsos Survey showed that 51% of people who buy coffee in the City of Toronto do so more than twice a week (Ipsos Public Affairs, 2008). Coffee shops pride themselves on building relationships with their customers and remembering people's orders. The relationship between people and the individuals who serve and make their coffee (the barista) is a unique relationship that coffee shop retailers foster and encourage. The relationship customers have with their baristas can be used for reinforcement of doing the right thing. A customer who wants to demonstrate his or her commitment to reducing their ecological footprint would like to have this effort acknowledged by their barista. A customer will feel a sense of satisfaction if they brought a mug and their barista asks them if they brought one.

As discussed above, education alone is not enough to drive consumer behaviour. A simple "Do you need a cup?" at each coffee purchase would be the ideal complement to educational signage. This must occur at every purchase so that the habitual coffee buyer, the daily or more than twice a week buyer will anticipate the question before being asked. For frequent coffee buyers the change to the routine, by bringing a reusable mug with them is not a difficult change, and as the IPSOS Reid Survey showed 70% of residents are already prepared to bring a mug with them without knowing that disposable cups are not recyclable. The survey also showed that these frequent coffee customers are in the same demographical group that has in recent months learned to bring a reusable bag to go shopping.

Asking if consumers need a cup and not giving them one without it being requested will change the way people perceive cups. They will no longer be 'invisible' and their environmental impacts will be more obvious. Customers will be involved in the waste reduction effort because they will have to ask for a disposable cup instead of the use of a disposable cup being the accepted status-quo.

## The Alternative

When customers are asked if they need a mug they must be able to purchase a reusable mug at the cash register - this is especially important in the early implementation phase of the reduction initiative. When a customer is asked for the first time if they need a cup for their coffee, if there is no alternative offered, the prompt could seem absurd. The behaviour change must be easy for people to adopt, ensuring reusable mugs are widely available at coffee shops will make this feasible.

According to a chain market share study Tim Horton's and Starbucks owned a combined 75.2% of the chain shares market in 2005 (Kelleher, 2009). Both Tim Hortons and Starbucks offer a discount for bringing a reusable mug.

## Applying Social Marketing for Behaviour Change

Social Marketing Rules, 1 through 7 for Behaviour Change are described in the Kelleher Environmental report, prepared for the Coffee Cup Taskforce (City of Toronto, 2009). The rules are applied to the recommended policy option and their implementation is described below:

<b>Social Marketing Rules</b>	<b>Implementation</b>
1 Action is Clear and Unambiguous	Action is clear in the sign and prompt: "Bring your mug"
2 The Required Action is Convenient and Easy to Do	The initiative is focused on individuals who buy coffee daily or more than twice a week. Alternatives must be available at the point of purchase.
3 The Required Behaviour Change Makes Sense	Reducing the use of disposable products and material sent to a landfill is an easy to understand 'green' thing to do.
4 The Required Behaviour Change Involves Public Participation has Community Buy-in	Being asked if the customer brought a cup will make it seem like it's more common to bring a cup than not, this will induce the 'bandwagon' effect. There is appetite among coffee shop owners to encourage reusable cup use, both for the environmental benefit and for expense reductions from disposable cups.
5 The Required Behaviour Change Involves A Reward or An Avoidance of Penalty	"Feel Good" effect when Barista asks if you brought a cup- and you did! Discounts are offered at 79% of the market share of chain coffee shops.
6 Residents Are Provided with Education and Means to Act	Point of sale signage is an education tool, increased awareness through the prompt at the point of sale and through the available alternative at the point of sale.
7 Residents Must be Motivated to Change Behaviour	All focus group participants were unaware that coffee cups are not recyclable. 70% of Ipsos Survey respondents answered that they were likely to use a reusable cup. Same target demographics that have reduced plastic bag use.

## Coffee Cup bylaw for Retailers

This source reduction policy option can be enforced as a City of Toronto bylaw that would fall under the City of Toronto Act. Wording below is modeled on the impacts of the bylaw on plastic bag retailers that became effective June 1, 2009. Here's how the coffee cup bylaw would affect Toronto retailers:

- Retailers can only provide a disposable cup for a purchase at the request of the customer.
- Retailers must provide an alternative to disposable cups (i.e., reusable mugs).
- Prominent signs must be posted at the checkout to let customers know that disposable cups are not recyclable.

- Retailers must accept the use of any reusable containers (i.e., stainless steel, plastic or ceramic reusable cups) brought in by customers to transport their purchases, in lieu of disposable cups.
- Reusable in-store coffee cups must be available.

## Implementation Study Methodology

The implementation study methodology consisted of developing a sample educational sign, Figure 2, to be used for coffee shop interviews.

Eleven Coffee shop owners were interviewed in October of 2009. Owners were approached with the sign and asked if they would be willing to display the sign. After seeing the sign it was mentioned in the interview that the success of plastic bag fees reductions are largely attributed to the prompt at the cash register. The 70% plastic bag reduction within three weeks at Metro supermarkets statistic was shared with the owners.

Responses were similar amongst owners. Because multiple individuals in the same group of stakeholders were interviewed, their responses were considered to be validated and therefore representative of the views of independent coffee shops in the City of Toronto. Further implementation concerns were cross-checked with a smaller group of owners who agreed to a more lengthy interview and several follow-ups.

## Implementation Study

Results of the study are divided into the three initiatives that were discussed with the retailers: signage, verbal prompt and providing reusable mugs.

### ***Retailer Response to Signage***

As independent Toronto coffee shops were interviewed as part of this implementation study several interesting patterns emerged. The majority of the shops had already tried to green their business. Many shops have switched to biodegradable cups without knowing that these are not accepted in the waste management system and, as explained above, will not biodegrade in a landfill. Many shops already provide discounts for customers bringing in their reusable mugs. Even though these shops are independently aiming to reduce the amount of waste sent to landfill their reuse mug percentages ranged only from 5 to 6 percent of sales.

Retailers understand the issue of waste reduction and realize that coffee cup waste needs to be reduced. In general, response to the sign was positive. A couple of retailers offered to display the sign and did so for all of October.

One of the shop owners approached did not want to post the sign voluntarily, specifically because his shop is using biodegradable cups. He did not want to advertise that biodegradable cups are not recyclable since they cost more than other cups and are currently providing the shop with a green image.

Several retailers stated that they would be more comfortable advertising that cups are not recyclable if they had an available alternative, i.e. reusable mugs in their stores.

### ***Retailer Response to the Verbal Prompt***

Retailers who were approached are hesitant to ask the customer if they need a mug. Reasons for being hesitant were cited to be because they do not sell reusable mugs and therefore would be encouraging their customers to be purchasing mugs from their competitors. Several business owners also mentioned that they think their employees are already asked to complete many tasks when they make a sale. Retailers are hesitant to add another step to making a purchase.

Of 11 interviewed coffee shops, 6 volunteered the fact that they felt bad about the amount of waste they create.

All retailers interviewed are supportive of source reduction and could see that a prompt would encourage their customers to bring a mug, however, none of the business owners volunteered to do so without it being mandated. There is no current incentive, aside from a business owner's personal desire to run a green business, to pursuing source reduction strategies. The public is unaware that coffee cups are being sent to landfills, so there is no social pressure to change the way coffee shops run their business.

One coffee shop owner stated in regards to a prompt: "If the City asks me to do it, I will, but I won't do that on my own".

Therefore based on the results of the implementation study it must be a City mandated and top down approach to get businesses to act.

Educating consumers that coffee cups are not recyclable will help to create an incentive for businesses to pursue source reduction.

### ***Retailer Response to offering Reusable Mugs***

None of the coffee shops approached currently sell reusable mugs in their stores but 8 out of 11 mentioned, in response to seeing the sign, that they had considered selling their own reusable mugs. In the extended interviews with coffee shop owners they stated that they would prefer not to fill reusable mugs that had logos from other shops on them. One of the barriers identified by the store owners is that reusable mugs do not have standardized sizes, this creates an implementation difficulty in deciding what size each mug is when it is being filled.

A retailer suggested a city wide standard mug (for example with the City Live Green Campaign Logo) that would solve concerns over what size a mug is and would address hesitancy to fill mugs that have other coffee shops logo's on them.

A long term-vision of a reusable mug would be modeled on the Ontario beer system, which is glass based and has a 95% recapture rate (Hendra, 2009).

Implementation of the reusable mug alternative should consider public private partnerships. It may be possible to have (non-coffee-industry) sponsors for providing a standard city wide reusable mug at a reduced cost.

## Next Steps

The city has been tasked to continue to conduct research and pilot studies into effective means of promoting source reduction of hot drink cups at the retail level, consistent with City policies (Solid Waste Management, 2009).

This recommended source reduction strategy will be most effective if implemented on a city wide scale. Limitations of a pilot study include that the prompt will not be effective if a consumer habitually buys coffee from several locations. It may not be possible to reach desired reduction targets for a pilot because the benefits of a city-wide media campaign are missing, even media criticisms help because they raises awareness. Behaviour change can only occur if the item becomes social taboo, this will not be easy to create if only a few coffee shops are aiming to reduce their disposable cup use.

An alternative to a pilot study could be to create incentives for early adopters. Media impacts can still be present, but implementation concerns can be addressed before the initiative is rolled out citywide.

Most important to the implementation of this recommendation is that it must be clear to the public that the city is discouraging the use of disposable cups, because they are a single use disposable product that is not recyclable and therefore is not a sustainable use of our resources.

## Notes on Monitoring and Evaluation

Evaluation of the bylaw should take place at the same time as plastic bag fees bylaw is evaluated, which is June 1<sup>st</sup> 2010. At this stage, it would be possible to compare reduction rates of bags and cups and evaluate success of policies based on reduction achievements. At the time of evaluation, adding consumer fees to achieve coffee cup reduction targets should be considered.

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