PLASTIC RECYCLING: IS IT WORTH IT?

STRATEGIC ANALYSIS OF A PLASTIC RECYCLING START-UP COMPANY IN BRITISH COLUMBIA

APPLIED PROJECT SUPERVISOR: ANN GREGORY

STUDENT: JENNIFER R. BIKA W
# TABLE OF CONTENTS

ABSTRACT .......................................................................................................................... 4

1.0 INTRODUCTION ........................................................................................................... 5

2.0 RESEARCH .................................................................................................................. 5

2.1 RESEARCH QUESTIONS ............................................................................................... 5

2.2 BACKGROUND ............................................................................................................. 6

2.3 LITERATURE REVIEW ................................................................................................ 7

2.4 ENVIRONMENTAL ISSUES ........................................................................................ 11

  2.4.1 Environmental Concerns of Plastic and Biodegradable Products ....................... 11

  2.4.2 Recycled Plastic in the Construction Industry ....................................................... 12

  2.4.3 The Human Relation to the Environment ............................................................... 12

3.0 PLASTICS RECYCLING INDUSTRY ........................................................................ 14

3.1 INDUSTRY ANALYSIS ................................................................................................ 14

3.2 MARKET ANALYSIS .................................................................................................... 18

3.3 REGULATORY ENVIRONMENT IN BRITISH COLUMBIA ....................................... 20

4.0 PLASTICS RECYCLING COMPANY START UP: DELTA POLYGREEN RECYCLING LTD. .......................................................................................................... 22

4.1 BUSINESS STRATEGY ................................................................................................. 22

  4.1.1 Mission and Objectives ......................................................................................... 22

  4.1.2 Target Market Segment Strategy ......................................................................... 23

4.2 COMPETITION ANALYSIS ......................................................................................... 23

  4.2.1 Westcoast Plastic Recycling Inc. .......................................................................... 24

  4.2.2 Silverdale Recycling Ltd. .................................................................................... 25

  4.2.3 Target Recycling Services Inc. .......................................................................... 26

4.3 PORTERS FIVE FORCES ANALYSIS ....................................................................... 27
ABSTRACT

In November 2008, the general manager of one of the few recycling companies in British Columbia (BC) lamented that “the whole market has crashed on everything across the board” (Glave, 2008). It was one of the unexpected consequences of the economic downturn that started at the end of 2007 and turned into a global recession one year later.

What seemed like a good business opportunity only two years ago, when demand for post consumer plastics was continuously growing, may currently not be profitable? This research project critically analyzes whether recycling plastic – economically, environmentally and socially – is truly worth it. If indeed, we could turn an obvious good practice – that of recycling plastic packaging and waste – into a profitable business.

The project explores the recycling concept and its economics, and the theory assessing our (humans) relationship with the environment. An analysis of the recycling industry in North America and BC is made, including the strengths, weaknesses, and threats of industry competitors. A business plan for a start-up recycling company, Delta Polygreen Recycling Inc., in Metro Vancouver is crafted. Even though the company may not be economically viable in the early stages of its life, an example should be set of balancing the significance of the environment with the significance of profit. By receiving external support for financial start-up from the government, the company will have a greater chance to survive and be profitable over time. It is crucial to convince business leaders and citizens that there is more than just profitability, when creating a business. Over time, the economic downturn will diminish and the company will have an even greater chance at succeeding. Delta Polygreen Recycling will become a trend setter and be a main leader in the plastic recycling industry balancing profits with environmental sustainability objectives.
1.0 INTRODUCTION

Companies that just few months before, all recyclers were still competing for recycled materials (mostly paper, plastic and glass) due to high demand in China during the record-high oil prices, are now seeing a negative-priced\(^1\) material piling up their warehouses. The recycling industry is just a domino piece in the global economy. The stagnation or the danger of collapse of the industry could have two causes. First, it is the demand. Most of the recycled materials are shipped to China for processing, but as demand for consumer goods collapsed due to the worst recession in developed countries since 1929-1933, there is no need for corrugated boxes used for packaging or plastic used in production of cheap toys. Second, the oil price has seen one of the steepest declines in price over a short period of time, from $150 per barrel in the summer to less than $40 per barrel four months later.

The research objective for this project is focused on describing the recycling industry, identifying current challenges created by the economic downturn of 2007-2008, and gathering information and data that will help understand the competitive environment within the industry.

The research will produce a business plan that would help an entrepreneur who is deciding whether or not to enter the market for recyclable products and when this market should be entered.

2.0 RESEARCH

2.1 RESEARCH QUESTIONS

The research objectives will be achieved by answering the following questions:

- Will recycling become a necessity? Is it economically profitable? If not, is it worth subsidizing it?

\(^1\) Negative-pricing – The industry parlance for paying someone to take the recycled materials
• What would be the political and regulatory environment in BC to facilitate government subsidization of the industry?

• What is the industry’s impact on community, local economy and global economy? Why setup recycling re-processing locally vs. China?

• Would it take more energy to recycle than to use new materials?

• What is the environmental impact of landfills vs. recycling? Is it more expensive to re-process plastic vs. benefit for the environment? What is the short-term and long-term impact?

2.2 BACKGROUND

Plastics are significant and make a positive contribution with regards to packaging in various ways. By sorting and processing plastic packaging that is found in predominantly homogeneous streams, the value and market availability is maximized for the collected plastic packaging industry. Plastic bottles, plastic tubs, and plastic bags all have the potential to be recycled; however, what can or cannot be recycled depends on the municipalities. There are people, who are of the belief that recycling uses more energy than it saves. This was highlighted by a columnist, John Tierney, who had posited in a New York Times Magazine an article stating that “recycling is garbage.” “Mandatory recycling programs,” he wrote, “…offer mainly short-term benefits to a few groups - politicians, public relations consultants, environmental organizations and waste handling corporations - while diverting money from genuine social and environmental problems. Recycling may be the most wasteful activity in modern America…”

The environmental groups were quick to point out the benefits of recycling, especially on the assertions that recycling was doubling energy consumption and pollution, while costing taxpayers more money than disposing of plain old garbage. Municipal recycling programs they asserted do reduce pollution and the use of virgin resources, while decreasing the sheer amount of garbage and the need for landfill space -- all for less,
not more, than the cost of regular garbage pick-up and disposal. This assertion was confirmed, as New York City acted on lessons learned from their early curbside programs with high bureaucratic overhead and duplicate trash pickups to refine their recycling programs as the city gained experience and their landfill costs increased. New York City began collecting their recycling at the same time as garbage collections and used a more efficient recycling system and with more reputable service providers than used previously. Other cities took note and followed New York City’s lead for their own recycle programs. Recycling programs should cost cities (and taxpayers) less than garbage disposal for any given equivalent amount of material.

Landfill operators are also changing methods of operations as well because in the past landfills were compacted tightly, and thus did allow much air into the landfill. As such, any biodegradation that does take place does so very slowly. Some landfills are now being designed to promote biodegradation through the injection of water, oxygen, and even microbes. But these kinds of facilities are costly to create and, as a result, have not caught on. Another recent development involves landfills that have separate sections for compostable materials, such as food scraps and yard waste. Some analysts believe that as much as 65 percent of the waste currently sent to landfills in North America consists of such “biomass” that biodegrades rapidly and could generate a new income stream for landfills: marketable soil. With landfills around the world reaching capacity, technological fixes are not likely to make our waste disposal problems go away.

2.3 LITERATURE REVIEW

A variety of strategy books provide useful information needed to develop a business plan strategy for an entrant in a mature market. Robert Grant, in his book published in 2005, “Contemporary Strategy Analysis”, believes that “strategy is about winning”. Creating a strategy is a key factor to a business’ success. His book, through a theoretical and practical approach, offers tools for identifying factors that determine the success of a business. It provides a useful framework for an industry analysis and
competitive advantage analysis. Grant also offers a valuable insight into diversification strategies and organizational models.

Besanko, Dranove, Shanley and Shaefer, in their book “Economics of Strategy”, published in 2007, provide useful framework to perform an industry analysis. The five-force framework will be used to do the industry analysis. Each of the five forces will pose major threats to the business profits.

In 2005, Canada stood out as an exemplary nation in the recycling industry in comparison to the US. It was focused on having a foundation of a producer responsibility model that forces packagers to pay for a fair amount of municipal recycling programs, which displayed much innovation in the sector. By assessing Ontario’s steps in the recycling industry, we can determine the necessary means that can be taken in BC. Ontario’s government has been building more of recycling costs “into the product and requires packaging companies to pay 50 percent of the price tag to support recycling programs in 2005” (Toloken, 2005). From a 16 percent recycling rate in 2003, five years later, Ontario has managed to raise the rate to 38 percent (Gillespie, 2008). However, the province’s goal three years ago was to reach 60 percent (Toloken, 2005). This has proven to be more difficult than it seemed. Despite Ontario’s inability to reach its desired goal, more than doubling the recycling rate over a short time period is still impressive and is helpful in the pattern that the BC Provincial government could utilize to improve its recycling sector. However, it is significant to analyze the cost imposed on the industry due to recycling and whether this has not affected their revenues. “In 2005, $118 million was spent by the industry towards recycling with $31 million coming from plastic packaging firms alone” (Toloken, 2005).

**Findings Concerning Plastic Recycling**

The history of plastic for consumer use begins with Bakelite Corporation, one of the first major plastic companies, which first targeted women (jewellery). Life Magazine described the new era of plastic in the middle of the twentieth century in the West as “throwaway living” (Morrison & Ellenwood, 2008). “More than 100 billion BIC pens have
gone to landfills” (Morrison & Ellenwood, 2008). They are designed to have a short lifespan but last forever, which is quite ironic.

Plastic is one of the main concerns of the health of ecosystems. An example is the ocean; it is to be noted that pollution in the ocean will have dangerous repercussions on the surrounding ecosystems on land. “Over 18,000 pieces of plastic are floating on every square kilometre of the ocean” – UNEP 2006 (Morrison & Ellenwood, 2008).

The following discusses some of the experiences of communities in terms of plastic recycling, the interest in recycling, and the effect of the slowdown upon individual companies. The decreasing global demand for plastic recycling products has started to affect smaller communities in BC. Bowen Island is one of those communities, where the situation has gotten so bad that the recycling company has had to ask the locals to keep their recyclable material until further notice. Recycling companies must think of innovative ways to do business in order to maintain profitability. A market needs to be established for certain materials that currently have no market, so waste will decrease in size (“BC’s recycling industry”, 2008). “Some goods are fetching only a third of the price they did in September; some recycling companies are laying off workers and others have stopped collecting certain types of plastics altogether” (“BC’s recycling industry”, 2008). The Environment Ministry, along with other parts of the government, plans to contribute to helping open new markets for the recycling industry. Another option is to promote the importance of landfill bans or “changing their tipping fees at the landfill” (“BC’s recycling industry”, 2008). This way, an incentive for recycling is generated and the demand could increase once again.

There is an increased awareness and public interest in recycling. The following are numerous examples of difficulties in utilizing material that sometimes cannot be recycled or is not convenient to be recycled. For example, a documentary by F.M. Morrison (written, produced and directed) and Lisa Ellenwood (produced) – Forever Plastic - presents Interplast egg cartons, which is a company that manufactures environmentally friendly plastic because the plastic they use comes from “mostly” recycled bottles, such as used pop bottles. The trim from the egg cartons also gets
grinded into flakes and turned back into plastic sheets and reused once again. This type of egg carton is the more expensive than moulded fibre and is the most expensive packaging for eggs. Each carton costs 25 cents to make and it is generally made for higher priced eggs. Recycled plastic can be even used in art. Stewart Hagarth, a contemporary artist uses plastic that has been washed up on the English Channel beaches for art – he calls it “upcycling” (Morrison & Ellenwood, 2008). Hagarth creates elaborate pieces such as chandeliers that are sold for high prices. This could possibly lead to a new market for recycled plastic in the art industry. The Urban Source in Vancouver is an example for sources of interesting recycled plastic art supplies for sale (Urban Source, 2009).

One realistic concern is the cost of recycling. An example is a plastic recycling company where the conveyor belt moved too quickly for workers to do a good job at sorting out through the plastic and not mixing up non-plastic products (paper) along with the plastic products. Problems later arose when they stack bottles together into massive cubes and find non-plastic bits into it. Companies need to overcome coordination failures. Another example are the Interplast egg cartons, even though potentially recyclable have NO market value, thus cannot be recycled. Growing public concern about the potential dangers of plastic poses a risk to companies like Interplast.

Recycling logo does not really mean the product is recyclable it just denotes what type of plastic it is based on the number in the center – plastic industry refuses to change the misunderstood symbol. “67 percent of people believe that the recycling symbol guaranteed recyclability” – stated the David Sadiki study in California (Morrison & Ellenwood, 2008).

Even though the benefits of recycling over disposal are manifold, individuals should keep in mind that it better serves the environment to “reduce and reuse” before “recycling” even becomes an option. Plastic bottles (soft drinks, water bottles and other beverages) are often recycled into fibre for carpets, fibrefill pillows, fleece shirts, upholstery and stuffing for ski jackets, cushions, mattresses and even sleeping bags. Plastic bottles can also be recycled into new bottles, crates, tote boxes, fencing and
plastic lumber. There is a great opportunity into increasing the recycled plastics industry in Canada. 80 percent of all Canadians have access to plastic bottle recycling and out of this percentage, only 36 percent of the bottles end up in the recycling stream. “The Environment and Plastics Industry Council (EPIC) is a promoter for plastic bottle collection in municipal curb side recycling programs and has designed tools to assist municipalities with their curb side plastic bottle recycling” (CPIA, 2009).

2.4 ENVIRONMENTAL ISSUES

2.4.1 Environmental Concerns of Plastic and Biodegradable Products

The effect of plastic on landfills is problematic, as it takes a long time to disintegrate. It is important to note that despite it being a man made, chemical product it takes just as long to decompose as any food or paper wastes. Given this, the recycling of plastic is still vital, as the carrying capacity of landfills is limited. Even though earlier studies stated that plastic wastes do not create difficulties in landfill operations and do not add to the toxicity of leachate from the landfills (EPA, 1991; Office of Solid Waste and Office of Water, 1990), over time these have been discredited. The new concepts of biodegradation (where starch additives are incorporated to plastic) and photo degradation (where photo sensitive additives are integrated in the manufacturing of plastic products) have been controversial towards commercial applications. Light and air must be available in order for the biodegradable and photodegradable materials to decompose, along with sufficient moisture and nutrients to sustain microbial action (Alter, 2003; Boettcher, 1992). Thus, the deeper these plastics are buried in the landfill, the less likely they are to decompose. “Moreover, making plastics degradable would lower the quality and performance of the material and therefore would mitigate some of its major desirable features in various applications” (Siddique et al., 2008, p.1839). Therefore, it is reasonable to conclude that the market for plastic recycling is not threatened by biodegradable and photo degradable plastic products. Due to the higher manufacturing costs of these products compared to regular plastics, and the lack of environmental benefits, firms will not replace conventional plastic products.
2.4.2 Recycled Plastic in the Construction Industry

Substantial progress has been made regarding the use of waste and by-products such as plastics because of the rise in awareness of waste management and environmental problems. Recycled plastic plays a vital role in the future of the concrete market. Siddique et al.’s studies concluded that up to 50 percent of recycled plastic can be utilized in concrete manufacturing and found that the use of recycled plastic in the concrete reduced the overall concrete bulk density. Also, concrete containing plastic aggregates manifested more ductile behaviour, which is of significant advantage in reducing the amount of crack formation and propagation, despite the decrease in splitting tensile strength. “Polymer concrete using an unsaturated polyester resin based on recycled PET is a feasible and effective material and can achieve more than 80 percent of its ultimate strength in 1 day, a very significant advantage in many structural applications” (Siddique et al., 2008, p.1850). Recycled plastic could also be utilized in the repair and overlay of damaged cement concrete surfaces in a variety of surfaces made out of concrete, such as pavements, bridges, floors and dams. Other applications in which concrete could be used are drains for acid wastes, underground vaults and junction boxes, sewer pipes and power line transmission poles. Lastly, different recycled plastics can be used to manufacture marine construction materials that are economically competitive and environmentally superior to conventional marine construction products (Siddique et al., 2008).

2.4.3 The Human Relation to the Environment

There is a significant difference between economic and natural systems, in the way that goals are perceived for both parties. Humans have a will to produce and maximize their production abilities, whereas there is no such ultimate goal in nature. However, all of its elements are driven by a set of three factors (Kronenberg, 2007):

1. self-maintenance, development and self-realization;
2. replication and renewal; and
3. service to other organisms, to other species or to the whole of nature.
By having all of these factors realized, stability, evolution, diversity, interconnectedness and sustainability of the ecosystems is achieved. We have been the ones that have disrupted the natural world order. As industrial organisms, we tend to feel superior to nature and not one with it, thus exploiting it without much sympathy (Schumacher, 1973). We must take responsibility for the wastes that we accumulate on a daily basis on the planet, and finding a way to minimize the damage we are doing to our ecosystems. Schumacher states that one of our greatest flaws is that we believe that we have solved the problem of production, where we find that resources are finite. However, another problem is the way that we handle our commodities after production and usage. Therefore, recycling, especially of plastics, needs to become a prominent activity in our lives. This goes beyond social responsibility, and reflects the human-nature relationship, and our realization that we cannot take the natural world for granted forever, because it will not be able to sustain our lifestyles. Landfills will not be endless, and we must find a solution to the man-made products (comprised largely of different types of plastics) that we no longer have a use for.

Industrial ecologists and neoclassical economists are on opposing sides, in relation to the issue of commodity production and the environment regarding the concept of waste. “Industrial ecology advocates the most efficient possible use of resources through its emphasis on prevention, from imitating natural patterns of resource and energy use” (Kronenberg, 2007, p.100). Therefore, industrial ecology supports prevention rather than end of the product life solutions to environmental problems, where waste prevention can be achieved with strategies such as cleaner production, dematerialization (using less material in product manufacturing) or eco-design (making products with environmentally friendly ingredients). On the other hand, neoclassical economists object to this way of thinking as they would fear the macroeconomic costs related to the potential decrease of global demand caused by source reduction. A drastic decrease in source reduction of environmental problem risks would be the cause of loss of demand.
Since businesses still rely on profit maximization as the top priority, insufficient demand that concerns neo classical economists (Krugman, 1999), is just as important to businesses. So until we have a paradigm shift towards a more sustainable industrial system of production, we need to deal with the waste that we are exerting at the present. “If we start perceiving wastes as yet unfilled niches, we may see the space and need for new species (or companies) to increase the resilience of industrial ecosystems” (Kronenberg, 2007, p.100). Like in natural systems, overall efficiency is found in their ability to recycle, which is greater than that of man-made ecosystems.

One way to perceive a firm is as “an organization which transforms inputs into outputs”, which plays an important role from the environmental aspect (Coase, 1988, p.5). Like organisms in nature, companies consume energy and natural resources, and eject heat and wastes into the environment. However, the inputs and outputs of a firm are in disequilibrium from those of the natural system. Thus, a different type of company needs to be created to reestablish balance and reduce waste. This specific company can be a plastic recycling company, which can be the link between the natural world systems and the industrial ecosystems. It will help create a symbiotic relationship between the two differing systems.

Although the current economic crisis is a downfall for any start up business, a plastic recycling company has great potential to succeed. There will always be an excuse towards placing the environment on the bottom of priorities. However, new markets can be created for plastic products, and recycled plastics, as we have created many markets so far.

3.0 PLASTICS RECYCLING INDUSTRY

3.1 INDUSTRY ANALYSIS

The plastics recycling industry is a mature industry. Its main problems are developing technologies, high costs and limited supply of raw materials. The recycled plastics
industry is based on a strong demand for the use of recycled plastics in plastics packaging. It is the packaging industry’s response to consumers’ requests to see some recycled content in the packaging of the products they purchase as part of their own zero waste principals. Until early 2008, before the global recession affected the entire economic activity, markets and uses for recycled plastics expanded rapidly.

What are recycled plastics? They are the result of the process of recovering scrap or waste plastics and reprocessing the material into useful products. For example, polyester soft drink bottles could be melted down then the polymer spun into fibres. Before recycling, plastics are sorted according to their resin identification code. The table below summarizes the existing resin categories and their use in packaging and plastics products found on the Canadian Plastics Industry Association (CPIA) website.

**Recycled Plastics Table**

<table>
<thead>
<tr>
<th>#1 PETE</th>
<th>Polyethylene Terephthalate (clear and tough with the ability to contain carbon dioxide – most recycled plastic in North America)</th>
<th>Plastic soft drink, water, sports drink, beer, mouthwash, ketchup and salad dressing bottles. Peanut butter, pickle, jellies &amp; jam jars.</th>
</tr>
</thead>
<tbody>
<tr>
<td>#2 HDPE</td>
<td>High Density Polyethylene (very strong with excellent protective qualities – second most recycled plastic in North America)</td>
<td>Frosted milk, juice, cosmetics, shampoo, dish &amp; laundry detergent bottles, yogurt and margarine tubs.</td>
</tr>
<tr>
<td>#3 VINYL or PVC</td>
<td>PVC, PVB, EVA (clear plastics with extensive use in construction industry)</td>
<td>Water bottles, medical tubing, wire and cable insulation, film and sheet, construction products such as pipes, fittings, siding, floor tiles, carpet backing and window frames. PVC is also used extensively in automobiles and is being recycled in ever greater amounts as auto recycles now strip it out of the automobiles before crushing for a higher value product. This in turn is sold to plastics recyclers.</td>
</tr>
<tr>
<td>#4 LDPE</td>
<td>Bread bags, milk pouches, grocery bags, squeezable bottles such as honey and mustard bottles.</td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Low Density Polyethylene (flexible and strong – most commonly used in flexible plastic film)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#5 PP</td>
<td>Ketchup bottles, yogurt containers and margarine tubs, medicine bottles, appliance parts, luggage.</td>
<td></td>
</tr>
<tr>
<td>Polypropylene (strong with high melting point – good for packaging “hot-filled” products)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#6 PS</td>
<td>Compact disc jackets, food service applications, grocery store meat trays, foam egg cartons, cups, plates &amp; cutlery</td>
<td></td>
</tr>
<tr>
<td>Polystyrene GPPS, HIPS, EPS Foam (clear – can be foamed to provide excellent insulation and protection)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#7 OTHER</td>
<td>Three and five gallon reusable water bottles, some citrus juice and ketchup bottles, safety glasses, automotive tail lights.</td>
<td></td>
</tr>
<tr>
<td>Polycarbonate, Acrylic, ABS, Mixed Plastics</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

After recycling, the recycled resins are reprocessed into marketable plastics products. The table below summarizes the use of post consumer re-cycled plastics.

### Post Consumer Recycled Plastic Products

<table>
<thead>
<tr>
<th>Recycled products</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 PETE  Pullover sweatshirts, pillow stuffing, carpet backing</td>
</tr>
<tr>
<td>#2 HDPE  Plastic lumber, blue boxes and compost bins, consumer bottles</td>
</tr>
<tr>
<td>#3 VINYL or PVC Drainage pipes, cable insulation</td>
</tr>
<tr>
<td>#4 LDPE  Plastic lumber and compost bins</td>
</tr>
<tr>
<td>#5 PP  Ice scrapers, industrial packing cases, automotive battery cases</td>
</tr>
<tr>
<td>#6 PS  Cassette and CD cases, office accessories</td>
</tr>
<tr>
<td>#7 OTHER Picnic tables, outdoor signs</td>
</tr>
</tbody>
</table>

(CPIA, 2009)
Plastic tubs and lids that have a wide mouth are being recycled into flowerpots, shipping pallets, protective corner-edge (single-trip export model that utilizes 100 percent recycled tub and lid material; other models contribute 60 to 90 percent of recyclable material). They can also be used by being transformed into plastic spacers during the shipment of a product.

It is important to note that plastic bags and lumber are the two main products which are made from recycled plastic. Polystyrene is another type of plastic that is manufactured into “trays, foam cups, egg cartons, cutlery and clear take-out food containers is recycled into office accessories, backing for reverse vending machines and horticultural products” (CPIA, 2009). The Canadian Polystyrene Recycling Association (is established in central Canada, and is in close proximity to the Ontario and Quebec municipalities that have access to this type of recycling. Polystyrene recycling is still in the development progress as only two provinces have implemented it in their plastic recycling program. It is a market that needs to be further explored. Also, markets still need to be developed for plastic bags and film, in other areas of Canada such as Alberta, where sometimes the local markets may be too contaminated to justify recycling.

Polyethylene film is another important type of plastic that contributes towards one of the most popular recycled plastic products: plastic lumber. Large amounts of plastic film can be utilized in the fast developing plastic lumber market. EPIC has taken part to promote this market by introducing the “Stretch Wrap Recycling Guide”, which helps companies to initiate their own plastic film collection programs.

Another significant recycling program entails agricultural products such as hay bale wrap and greenhouse film. Ontario is actively collecting, baling and selling used greenhouse film from local farms. Also, Waterloo is engaged in a similar program where a “processor is utilized for gathering and recycling the hay bale wrap from municipalities and organizations located within a 200 kilometre radius” (CPIA, 2009). A Prince Edward Island business is recycling hay bale wrap to manufacture it into plastic lumber. Similar pilot projects have been introduced to the Prairie Provinces by EPIC that could
also produce composite roofing shingles and poly-fibre reinforcing agents for concrete and cold mix asphalt.

Besides plastic lumber, vinyl products can be used for construction purposes. Municipal sewer pipe, underground ducts, electrical conduit, and electrical and sewer fittings are some products that are made from postindustrial vinyl. Vinyl is treated in a similar manner as other plastics are, when being recycled. Raw materials dependence decreases when recycled vinyl is used in construction, and it also reduces costs. “EPIC and the Vinyl Council of Canada are pioneering the collection and reprocessing of vinyl siding from residential demolition and new construction products” (CPIA, 2009). The recycled vinyl is by far one of the fastest growing markets.

Plastic boat wrap is another market that was introduced as a result of large amounts of plastic found “shrink wrapped” to boats at the beginning of every new boating season. Since this is a cost effective and easy way to protect boats during the winter, we have to find ways that the disposed plastic will be recycled and not end up in a landfill (CPIA, 2009). Plastic pail recycling should be exercised where facilities are available. Kitty litter, birdseed, laundry soap, pool chemicals, washable paints, dishwashing soap, cooking oil and pet food are all types of household pails that can be recycled as long as they are rinsed and cleaned properly.

3.2 MARKET ANALYSIS

The North America supply of PET (the number one recycled resin in volume) is estimated at 800 million ponds with an expected growth to reach 1 billion pounds over the next few years. It was the plastics industry’s effort to develop new markets for recycled resins from post industrial and post consumer sources that drove the growth of the recycled plastics. In 1997, just 16 percent of total PET consumed (3.7 billion pounds) was from recycled plastics and of the total plastics produced annually (90 billion pounds), only 5 percent comes from recycled sources. Plastics is the second highest value material in waste after aluminium. Packaging plastics is expected to be the largest market segment for recycled plastics (the other two significant segments being sheet and lumber). As indicated above, North Americans are more and more
willing to recycle and to forgo the convenience of dumping everything to the landfill, with the result that in recent years households increased the recycled rate of PET by 30 percent.

Demographics play an important role in the evolution of recycling in Canada. Household size in Canada has decreased over the last 40 years from 4 persons per household in 1961 to 2.6 in 2001. The population increased 165 percent during the same period and the number of households increased by 250 percent.

<table>
<thead>
<tr>
<th></th>
<th>1961</th>
<th>1981</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>18,238,247</td>
<td>24,343,181</td>
<td>30,007,095</td>
</tr>
<tr>
<td>Households</td>
<td>4,554,736</td>
<td>8,281,531</td>
<td>11,562,975</td>
</tr>
<tr>
<td>Average Persons per household</td>
<td>4.0</td>
<td>2.9</td>
<td>2.6</td>
</tr>
</tbody>
</table>

(Cirko, 2006)

Smaller households generate more packaging per person than larger households. For example, in the United Kingdom, one or two person households generate on average 50 percent more packaging than a three or more persons household. The reason for more packaging generated by smaller households is that they have different shopping patterns, buying smaller quantities of products that require more packaging per unit of weight. One third of Canada’s population leaves in one or two person households and generates almost 50 percent of packaging.

<table>
<thead>
<tr>
<th></th>
<th>2001 households %</th>
<th>No. of Households</th>
<th>Total population</th>
<th>Packaging generation (kg/capita/year)</th>
<th>Total packaging (tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2 persons</td>
<td>58%</td>
<td>6,749,305</td>
<td>10,521,735</td>
<td>105</td>
<td>1,104,782</td>
</tr>
<tr>
<td>&gt;3 persons</td>
<td>42%</td>
<td>4,813,675</td>
<td>19,005,565</td>
<td>70</td>
<td>1,330,040</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td><strong>11,562,980</strong></td>
<td><strong>29,527,300</strong></td>
<td><strong>70</strong></td>
<td><strong>2,434,822</strong></td>
</tr>
</tbody>
</table>

(Cirko, 2006)
As a result, the plastics available for recycling increased greatly. The alternative to recycling is the incineration of the waste. Communities are reluctant to incinerate before all efforts are made to recycle. Diverting plastics packaging from the landfill is a priority of many communities with the support of the public. As a result, in recent years, recycling rate of PET bottles increased to 30 percent of all PET bottles sold (plastic soft drink bottles represent 2 percent of the total solid waste in North America). The recycling industry’s commitment to develop solutions to plastic waste intends to accelerate the rate of recycling. More plastics can be recycled than other recyclable material and it could be a practical and profitable answer to America’s waste management problem.

3.3 REGULATORY ENVIRONMENT IN BRITISH COLUMBIA

The economic impact of the BC recycling regulation was reviewed by Gardner Pinfold Consulting. The company assessed their performance based on the Extended Producer Responsibility or the product stewardship, which is an environmental policy approach used in BC and other areas. The product stewardship implements the entire life cycle of a product, from the selection of the materials and design to its end life, to the recycling, post consumer stage. Specifically for the BC Ministry of Environment’s stewardship policy, producers and consumers assume the cost of industry product stewardship programs rather than general taxpayers or local government (Gardner Pinfold Consulting, 2008). It aims at altering the responsibility from the municipalities to the plastic manufacturing producer. The product stewardship is providing of incentives to producers to take environmental considerations into the design of the product (such as the eco design concept). The Organization for Economic Cooperation and Development (OECD) has become involved in product stewardship, giving their guidance and expertise to this specific sector. They have provided different types of guidance packages for jurisdictions to consider in planning and monitoring stewardship programs. BC has been considered as one of the leading jurisdictions in Canada regarding its implementation of the product stewardship programs.
The BC Ministry of Environment has been responsible for establishing new product stewardship programs, and monitoring their results and making sure that they have enough enforcement to be successful. In 2004, under the Environmental Management Act, the Recycling Regulation was created to provide a single, results-based regulation. This regulation requires the producers of plastic (and other recyclable) materials to acquire complete responsibility for the management of their products at the end life, where a stewardship plan is submitted and approved by the BC Ministry of Environment director (Gardner Pinfold Consulting, 2008). Thus, the funding and management of the producer’s programs are their own responsibility. Although the Ministry only includes beverage containers under plastic, new categories must be established for plastic in order to promote the long-term operations of plastic recycling companies.

The product stewardship is divided into different categories for the different types of recycling products. In 2007 the Beverage Container Stewardship (BCS) collected and handled 11,000 tonnes of plastics out of a total of 76,000 tonnes of materials (the other materials being class and aluminium. The revenue of $60 million came largely from unclaimed deposits, container recycling fees and sales of recyclable materials. Handling fees to depots, transportation and processing, and depot operations expenses exceeded revenue by about $4 million. Also, another $6 million was collected from administration and consumer awareness spending. The year ran on a budget deficit, but it was covered by the accumulated surpluses from operations from previous years. The BCS also employs 775 full time equivalents, increasing job creation in the province. The total employment generated by the recycling industry in BC is 1,600 direct full time equivalents and 500 indirect workers, creating a total of 2,100 jobs (Gardner Pinfold Consulting, 2008).
4.0 PLASTICS RECYCLING COMPANY START UP: DELTA POLYGREEN RECYCLING LTD.

4.1 BUSINESS STRATEGY

4.1.1 Mission and Objectives

The company’s business vision is based on the following core values, which are:

- social responsibility
- integrity
- environmental awareness
- sustainable development

The main purpose of the company is to create profit for owner by recycling plastic products in an environmentally supportive manner and to reduce a usable commodity (plastics) from becoming a component of land fill and to prevent pollution of both on land and water.

The visionary goal is to become the largest successful plastics recycler in Canada and be the standard that all other plastics recyclers can measure themselves against Delta Polygreen Recycling Ltd.

The mission statement of the proposed plastics recycling start up company, named “Delta Polygreen Recycling Ltd.” shall be:

*To successfully develop, operate and grow as a plastics products and recycling company, while creating value with integrity through a sustainable business, observing environmental and social responsibility in all our business transactions.*

The strategy will be based on business unit level to develop and sustain the Delta Polygreen Recycling Ltd. using a combination of Michael Porters three generic strategies: cost leadership, differentiation and focus (Quick MBA, 2007).
A combination of strategies was chosen as the most likely successful means to build on the company’s strengths on a narrow segment of a mature market for plastic pellets. The company will focus on a low cost strategy to allow it to maintain a profit and also focus on a differentiation strategy to build a loyal supplier and customer base that will perceive our company as having honest communications and follow up actions, where our word is never broken, once we make a promise to the suppliers and customers. We will use our resources in a never-ending quest to develop ways to mechanize to recycling process to gain competitive advantage over our competition.

4.1.2 Target Market Segment Strategy

The proposed company will have to target the market for the recycled PET for two reasons: 1) PET plastics are the most common plastics being recycled, therefore there is a greater supply of raw materials, and 2) recycled PET (flakes, pellets and sheets) are in greater demand by the plastics converters (manufacturers). The market segment niche has been identified as the recycled PET flakes as a start-up strategy.

The demand for PET flakes is estimated at 600-800 million tonnes per year with only 70 percent processed in North America. The difference is sourced from other countries such as India, Central and South America or from virgin resins, more expensive and environmentally damaging. Appendix 1 shows the commodity prices for Recycled PET in Canada in April 2009.

4.2 COMPETITION ANALYSIS

In the lower mainland of British Columbia there are a large number of recyclers that include plastics collection and sorting in their recycling businesses; however for the majority of these recyclers, they are not focused only on plastics recycling as their core business and most just sell their plastics to the larger plastics only recycling companies. There are a few large plastics recyclers that focus only on the plastics recycling business solely, however in the greater Vancouver area and area, they are the main competition for any start up plastics recyclers. They are West Cost Plastics Recycling
Ltl., Target Recycling, and Silverdale Recycling Ltd. and are stated in order of terms of strength and competitiveness to an upstart new plastics recycling company that is being proposed. The plastics’ only competition in some cases has alliances with a number of local government districts for plastics supplies.

4.2.1 Westcoast Plastic Recycling Inc.

Westcoast Plastic Recycling (WPR) was established in January 2008 and is based in Richmond, BC. The company’s main objective is to provide a collection and recycling service for film and rigid plastics from Western Canada. Once collected, the plastic is processed and shipped to North American and Overseas re-manufacturers. WPR is currently servicing a large number of customers, in the Richmond, Vancouver, Burnaby, New Westminster, Abbotsford, Chilliwack, Surrey, Coquitlam and Langley areas. The company claims that it is committed to becoming a plastics recycling industry leader. Their philosophy is that through plastics recycling one can save money, help the environment and create employment while conserving valuable non-renewable resources. WPR offers a free pick up and recycling of plastics service and even offers payment on “premium” plastics. This is the largest sized “plastic only” recycling company in Western Canada (Westcoast Plastic Recycling, 2009).

The strengths of Westcoast Plastic Recycling

- the company has bank credit line for capital funding for expansions
- it offers published free pick ups for recycling of plastics to larger customers such as non-profit organizations and neighbourhoods that recycle plastic
- it is the strongest competitor found in BC for recycled plastic sources

The weaknesses of Westcoast Plastic Recycling

- the company is a new start-up plastic only recycling company
- it is still at the beginning stages of building its supplier and customer relationships
- the company has few (one or two) contracts with plastics remanufactures
• their main client base, overseas remanufactures, are not very profitable and may not honour existing contracts

The threats from Westcoast Plastic Recycling
• the company adds to the competitive rivalry for low cost plastic recycling sources
• the company is well known for picking up gathered plastics and has an increased presence in BC
• it can pay for larger supplies of plastics such as industrial plastic

4.2.2 Silverdale Recycling Ltd.

Silverdale Recycling is a privately owned company operating in BC that has been established in 2007. It is the only plastic recycling plant in North America that is geared to process agricultural waste plastic, post-consumer plastic and industrial plastic. Silverdale Recycling is the second largest sized “plastic only” recycling company in BC (Silverdale Recycling, 2009).

The strengths of Silverdale Recycling
• the company has adequate bank credit secured for capital funding for expansions
• the company produces three major plastic products for sale
• it is capable of processing very dirty and contaminated plastics that none of the other major competitive recycling companies will accept, such as agricultural plastic
• this competitor has the potential to grow faster than any of the other competitors because of its competitive advantage for processing dirty and contaminated plastic

The weaknesses of Silverdale Recycling
• the company is a new start up plastic recycling company
• it is still in the process of establishing a supplier and strengthening customer relationships
• the company has only one or two contracts with remanufacturers

The threats of Silverdale Recycling

• the company adds to competitive rivalry for plastic recycling supplies
• the company has a competitive advantage in being able to produce a marketable product from contaminated plastic sources such as agricultural plastic recycling
• it can pay for larger supplies of plastics such as industrial plastic

4.2.3 Target Recycling Services Inc.

Target Recycling (TR) is a privately owned company operating in BC, which has been in business since 1995 and has worked closely with industry as well as with the Provincial and Federal Ministries of Environment. TR was founded, structured, and nurtured through its 18-year evolution. The company creates and implements processes and technologies that provide sustainable solutions for waste material feedstocks that it utilizes.

TR started its recycling product development by launching into the Tire Derived Product (TDP) market and recently has expanded its waste stream processing and product development into plastic recycling. It earns $500,000 in revenues, exports $100,000 and has 10 employees. This is the third largest sized “plastic only” recycling company in BC (Target Recycling, 2009).

The strengths of Target Recycling

• the company has strong supplier and customer relationships
• it has established relationships with Provincial Federal Ministries
• the company knows the ropes of the businesses and has longevity
• this company is the next strongest competitor in BC for industrial waste plastic
  feed stock

The weaknesses of Target Recycling
• the company is a privately owned company by one individual
• it is not an information technical savvy company
• the company has limited capital for expansion in an already tight credit market
• the company’s activity is limited to industrial waste material feed stocks for
  suppliers
• it has small opportunities for employment

The threats of Target Recycling
• it is well established and a competitive rivalry for plastic recycle supplies
  especially government organizations that run blue box recycling programs
• the company can pay for larger supplies of plastics such as industrial plastics

4.3 PORTERS FIVE FORCES ANALYSIS

Using the framework to perform an industry analysis developed by Besanko, Dranove,
Shanley and Shaefer, in their book “Economics of Strategy” published in 2007 and
based on Porter’s five-forces approach we will analyse how each of the five forces will
pose major threats to a proposed company’s business profits.

4.3.1 Barriers to Entry
A company will require having the ability to access the post-consumer bottle stock,
industrial waste plastic sources and to design an integrated process of collecting,
cleaning and refining. The source – raw materials – for the recycled plastics comes from
a variety of plastics. Existing plastics recyclers have relationships with governments
that run blue box recycling programs and it is difficult for new companies to obtain
access to these sources of plastics supplies. Any decrease to existing competitors
recycling plastics supplies will result in their retaliations by increasing efforts to take the
new businesses customers away by reducing prices on plastic pellets or flakes.
4.3.2 Supplier Power

Only approximately 25 percent of plastic containers manufactured in North America enter the recycling stream. Large scale recycling can be done (as some major cities, such as New York and San Francisco, have demonstrated in the past few years), but many municipalities were not able to achieve their recycling targets. This has a big impact on the supply available for the industry, which may have to rely on consumer choice and change in lifestyle. Some of the challenges facing the industry are technological difficulties, financial struggles and competition for raw materials (Tullo, 2007).

The first report on the trends in recycling and the way they affect the plastics industry in North America has been released in early 2009 by the American Chemistry Council and the Association of Postconsumer Plastics Recycling. The report estimates that the total plastic containers recycled in 2007 in North America was 325.4 million pounds with two thirds being exported in China (Tullo, 2007). Municipal governments running the blue box recycle collection programs are now beginning to expect to be paid for recyclable plastic products as more companies enter the market as competition for recyclable plastics is increasing.

Recycled Resins Compete with Virgin Resins

Single recycled resins which come from separated waste plastic are a substitute product for virgin resin. The demand for recycled single resin is therefore linked to the demand and the commodity pricing for virgin resin. As the price for oil falls, so do the prices for virgin and recycled resins. Where there is little effect to the margins of resin manufacturers, when oil prices drop, there is however, a dramatic effect to the margins of waste plastic processors, since their collection, transport and processing costs are fixed.

There are no established thresholds as to where the price for recycled resin should be in comparison to virgin resin. Much depends upon the recycled resin's purity, the
contractual conditions that have been set between processors and suppliers, and the fixed costs associated with collecting, processing and transporting the resin feedstock.

Currently, the pricing for virgin resins are running twice that of the recycled resins. Some industry experts suggest that viability can only occur if the price paid for recycled plastic resin is no less than 60 percent of the price paid for virgin resin. Most local product manufacturers use virgin resins, and those that use recycled resins are more apt to accept post-industrial feed stocks as opposed to post-consumer (“Alberta Post-Consumer Plastics”, 1997).

### 4.3.3 Buyer Power

In the past, local manufacturers have made arrangements with local collectors and brokers to accept post-consumer resins in baled or re-grind forms. However, these arrangements have been unsuccessful over the long term for a number of reasons, including inconsistent supply, contamination problems, high brokering costs, and low demand for finished products. As a result, many Western provinces area manufacturers use only post-industrial and/or virgin resins in their products. Many manufacturers also perceive post-consumer plastic as being substandard to virgin resin. This is where quality of the recycled pellets and flakes needs to be kept up by washing to remove contaminates as a value added process. There is a need to better market the recycled resins to local manufactures and to work closer with them to ensure a reliable supply of quality feedstock. Long-term contractual arrangements are in place with end markets outside of the region thus any changes aimed at providing local feedstock will take time (“ Alberta Post-Consumer Plastics”, 1997).

**Buyer Power for Customers Waste Plastics Exported from Alberta & BC on Long Term Contracts**

Local brokers and processors have established long-term purchasing contracts with end markets outside the region, province or country (“Alberta Post-Consumer Plastics”,
This precludes opportunities to enter into provincial or local closed loop contracts, and affects the broader scope of sustainability. Collectors need to know the acceptance specifications for recycled plastics ("Alberta Post-Consumer Plastics", 1997).

This is where the marketing and sales opportunities arise especially during the current economic crisis to work on developing a plastics recycled program in Western Canada that will create jobs instead of exporting them elsewhere. Politicians are looking out for their respective areas are even more so looking at job creations and local business development than the past and the global solutions are not as cost effective any more.

4.3.4 Substitute Products and Acceptance Specifications

Synthetic resin is the main input to the plastics processing industry and costs typically 30 to 50 percent of the total final value of a plastics product. The demand for recycled resin is growing, mainly because the rise in prices for two major products, PET and HDPE. Plastic production equipment is sensitive and has a low tolerance for contaminants in feedstocks. As a result, the requirements of end users and recyclers in terms of feedstock quality and contamination levels are very stringent.

Unfortunately, there appears to have been no efforts by local end users (or recyclers) to develop written recycled resin feedstock specifications to pass on to collectors. ("Alberta Post-Consumer Plastics", 1997). The plastics recycler has to determine what standards his customers requires and then process the plastics to the customers standards in order to develop a customer loyalty focus.

4.3.5 Rivalry amongst Competitors

The recycling industry in BC is mature and well established with few competitors and some new entrants in recent years. These recent entrants into the market were due to the increased demand in plastics by the foreign plastics producers over the last years of
the economic boom that preceded the downturn of 2007-2008. Strong demand attracted new entrants in a market that has a limited supply of raw material and high processing costs.

4.4 SWOT ANALYSIS – Delta Polygreen Recycling Ltd.

Delta Polygreen Recycling Ltd. is a privately owned Corporation that will began operating in BC in business in June 01, 2009. Situated in an industrial park on 2 areas, the plastics processing facilities have covered and heated buildings suitable for inventory holding of tubs for pellets and flakes sorting, baling and grinding of plastics into pellets or flakes. The area has security fencing surrounding the perimeter, where the baled plastic is stored in cubes and where several transport trucks can be loaded and offloaded. The buildings are large enough for future plastics remanufacturing equipment to be added. This plant is set up for processes post-consumer plastic and industrial plastics into pellets and flakes. The company has secured a large evergreen contract with BC plastics remanufacture.

The Owner and General Plant Manager has established political contacts in the regional districts responsible for recycling programs and has been introduced to the BC provincial MLA for the Environment. Regular contact with these government officials is a priority in marketing the services and products of Delta Polygreen Recycling. This will be the 4th largest sized plastics only recycling company found in BC.

There will be a website found on the internet for this company that emphasises the pick-up of plastics, environmental and social benefits, sustainable business practices, and support for community functions such as sick children’s hospital support. The recycled plastics products and benefits are scheduled to be advertised on the internet with links to government and industry plastics recycling programs.

4.4.1 The strengths of Delta Polygreen Recycling

- the company has strong customer relationships with existing customers and secured recycled bottle suppliers to sell plastics to company exclusively
- it has established relationships with Regional and Provincial Ministries
it has established a bank credit line sufficient to for operations and to purchase capital equipment as its plant expands
the company has a large contract with a local plastics remanufacturer for purchase of plastics pellets feedstock that can carry the operating and overhead costs that is in place for two years and can be extended.

4.4.2 The weaknesses of Delta Polygreen Recycling

- it is not a very well known company
- Government small business support and grants have not been secured
- sources of plastic for recycling still need more development in order to help the company grow
- recycled bottle suppliers will be reluctant to sign long term contracts and enter into commitments to exclusively supply plastic bottles
- limited to industrial waste material feed stocks for suppliers
- the company will have to pay for industrial and bottle recycled plastic

4.4.3 The threats of Delta Polygreen Recycling

- there is a well established and a competitive rivalry for plastic recycling supplies especially with government organizations that run blue box recycling programs and their supply of recyclable plastics, where in some cases there are supplies free to recyclers which gives a competitive advantage to the successful plastic recycler
- increased prices paid by existing plastics recycling competitors for industrial recycle plastics suppliers and to bottle recyclers
- Delta Polygreen Recycling is new to the business and during the learning process may be out manoeuvred in securing a greater part of the Municipal Blue Box Recycling plastics supplies by established competitors
- transportation costs can increase with rise in price of oil making picking up from smaller organizations prohibitive and could damage customer service reputation
4.4.4 The opportunities of Delta Polygreen Recycling

- by marketing the services and benefits of working with Delta Polygreen Recycling, there are opportunities for substantial growth for over $1 million in revenues
- the company needs to establish partnerships with Regional Blue Box Recycling Government programs for larger sources of plastics supplies as these are low cost suppliers
- the company could take advantage of government grants available for new businesses that create jobs and subsidized wages for hiring persons with disabilities as sorting workers

4.5 MANAGEMENT PLAN

4.5.1 Ownership Structure
The company will be incorporated under the BC Corporations Act, with 51 percent owned by Jennifer Bikaw and 49 percent by a silent venture investor.

4.5.2 Management Structure
The company's organizational structure is based on the recycling process flow and is divided into main components, operations, administration and sales and marketing.

In addition, the company will use a variety of external management resources, such as: accountants, payroll services, lawyers, IT consultant and advisory business professionals. The organization chart shows the start up human resources requirements for the new company.
Delta Polygreen Recycling Ltd. Operations
Flowchart

Owner & General Manager

Office Manager
(Reception, Information, Scheduler, Web Site, Office supplies, Invoice processing, Data entry, Interface with External Mgmt Resources)

Operations Technician
(Equipment Maintenance & Back-up Machine Operator)

Sales / Marketing Representative
(Sales / Marketing & Contract Administration)

3 Inspectors
(Material Sorters, Quality Inspections)

2 Machine Operators
(Forklifts, Washers, Balers, Flaking Machines, Grinders, Extruders, Cutters and Plastics pick-up services)

External Mgmt Resources
(Accountant, Payroll Services, Lawyer, IT Consultant, Advisory Consultants)
4.5.3 Operating Plan

The processing plant and warehouse will be located in Delta, British Columbia.

The chart below depicts the following process of recycling plastics.

(Demand Side Management, 2004)
Sourcing of Recycled Plastics

Plastic bottles have the strongest demand. They are collected in municipal programs (through curbside recycling), big grocery stores such as Superstore, Save on Foods and Safeway, or bottle depots.

We have identified the following sources of recycled plastic:

- Returnable containers
- Curbside collection programs offered by municipalities
- Drop-off recycling
- Buy-back centres (bottle recyclers)
- Municipal partnerships in their blue box recycling collections
- Pick-up service for plastics recyclers (non-profit organizations and environmentally aware groups and individuals) in metropolitan centers
- Industrial plastic waste sources

Through these methods, collected PET plastic containers are picked up or delivered to the plastics recovery facility or to an intermediate processing plant. It is very important to ensure a high quality material that passes through the system to obtain the best value of post consumer recycling products.

Sorting Process

Sorting can be performed manually by trained inspectors to visually identify and sort plastics into designated categories. The bottles and containers pass through a conveyor. We recommend a negative sorting system where PET bottles and containers are left on the conveyor and contaminated or unwanted plastics are removed by the inspectors. Positive systems where PET bottles and containers are removed from the stream of plastics flowing through the conveyor are considered to provide materials of
the highest quality but they are not the most efficient sorting system as they are significantly costlier. The efficiency of a negative system can be improved through the use of the UV light, which will help identify PET faster. PET is fluorescent and appears blue when exposed to UV light as opposed to PVC which appears yellow or green when exposed. The addition of UV light can improve efficiency by 90 percent. A pre-sorting step is necessary when using the UV light to sort out the PVC from the PET stream. A shield and viewing window will be installed to reduce the workers’ exposure to UV light which is thought to be linked to skin cancer and cataract.

**Baling Process**

Baling is the technique used to convert loose plastic containers into blocks by compaction. The choice of the baling equipment was made within the budget constraints. The company chose for the start up phase the vertical baling system, which is cheaper than the horizontal one. To apply best practices in baling, the following rules will be enforced (Hurd, n.d.):

- baling wire (non-corrosive galvanized metal) will be wrapped in one direction only, just once
- no headers will be used so the bale will be uncontaminated

**Grinding and Flaking Process**

Delta Polygreen Recycling researched obtaining an advanced / state of the art grinding / flaking process machine that will optimize material quality and production efficiency from Europe, where plastics recycling is in a more advanced state. “Tariff eliminations came into force on a range of imported machinery and equipment on January 28, 2009” (Department of Finance Canada, 2009). Therefore, less tax will be paid for Capital Equipment purchases, giving the company a competitive and financial advantage.
Washing Facilities

The company will have sufficient water available and equipment to wash contaminated flakes to ensure highest quality and value is added to obtain premium prices.

4.6 FINANCIAL PLAN

The company will have a start up budget of $275,000, representing the capital invested by Jennifer Bikaw ($200,000) and a line of credit of $75,000. Over the next three years, the company is expected to break even as detailed in the table below:

<table>
<thead>
<tr>
<th></th>
<th>6 months 2009</th>
<th>Yr 1</th>
<th>Yr 2</th>
<th>Yr 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue Growth Year Over Year Revenue</td>
<td>$152,000</td>
<td>$477,000</td>
<td>$786,000</td>
<td>$1,237,200</td>
</tr>
<tr>
<td>Expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs of Goods Sold</td>
<td>40,950</td>
<td>111,800</td>
<td>95,300</td>
<td>133,950</td>
</tr>
<tr>
<td>Sales, General &amp; Administrative</td>
<td>220,005</td>
<td>419,545</td>
<td>647,080</td>
<td>890,980</td>
</tr>
<tr>
<td>Total Operating Expense</td>
<td>260,955</td>
<td>531,345</td>
<td>742,380</td>
<td>1,024,930</td>
</tr>
<tr>
<td>Operating Income (Loss)</td>
<td>($108,955)</td>
<td>($54,345)</td>
<td>$43,620</td>
<td>$212,270</td>
</tr>
</tbody>
</table>

The company will actively look for opportunities to benefit from the increased interest in climate change initiatives. The federal government in Canada and the BC government will most likely initiate innovative programs to help businesses reduce waste or recycle. We will participate in lobby groups to pursue various levels of government to enact legislation that would encourage recycling. The governments can provide programs for recycling for individuals and business and they are responsible to offer incentives for recycling or impose penalties for waste if needed. This can be done through tax incentives, tax rebates, sales of their collected commodities at less than current commodity pricing to recyclers and through new legislation that will regulate certain industries. The governments can also offer research and development tax rebates for businesses that will be willing to re-engineer their production process to accommodate recycling. This will be beneficial for Delta Polygreen Recycling as it will increase the supply available for plastics recyclers.
4.7 MARKETING AND SALES

Marketing and sales are critical to the success of a plastics recycling business and be able to adapt and stand out from competitors. The customer service and environmental benefits of doing business with Delta Polygreen Recycling are to be advertised in all major searched Canadian websites, such as the Recycling Council of British Columbia (RCBC, 2009). Local community newsletters, newspapers and billboards to gain a competitive advantage for the services offered and to make the company name well known to the politicians, business and to the public. By making the company known to such a large target population, there can be leads to existing and potential new suppliers of recycling plastic be made available to Delta Polygreen Recycling. There are to be measures taken after each marketing and sales campaign to determine their effectiveness and to determine their reach to target markets. Sales will focus on obtaining long-term contracts for sales of the recycled plastic flakes and pellets in local markets preferably.

4.8 GROWTH AND RISK MITIGATION

Delta Polygreen Recycling Ltd. can investigate future growth possibilities with the ability to partner with several bottling manufacturer/organization, such as Pepsi, Coca Cola and Nestle that can include the disposal of plastic bottles in their product life cycle. These partner companies can use Delta Polygreen for customers and communities to drop off their bottles as part of the bottle’s life cycle for disposal. This type of partnership will serve two purposes:

1. It is good for the environment as implementing this method of disposal of plastics bottles sends the right message to the consumers that these large organizations are balancing profit with the environment.
2. It will increase sales and brand strength and recognition. In today’s environment, consumers have become more conscientious and will tend to purchase products from organizations who have adopted environmental sustainable policies and practices. Consumers have choices and they will demonstrate their support by their decisions they make.

Delta Polygreen Recycling Ltd. also must be prepared to mitigate any risks that could impact the business from continuing to operate, such as the potential for their grinding and flaking equipment breaking down so when choosing equipment there must be parts and service available on short notice. An equipment maintenance contract could be considered. If the equipment chosen is so new to the country, than the equipment manufacturer could be partnered with Delta Polygreen to use the company site as a demonstration site for their equipment, so they would have to ensure it was operational at all times to be able to demonstrate its durability and their ability to keep it functioning.

Delta Polygreen Recycling Ltd. is a non union company that deals with unionized suppliers of plastics for recycling such as The City of Surrey. In the case of a strike by the City's union workers, there must be alternatives to pick up the plastics stored at their collection facilities. This could be done through the use of courier companies who could supply trucks to pick-up the materials on short notice. The couriers could also pick up the blue boxes if the citizens would gather them in one area of the streets and call Delta Polygreen for pickup of the plastics they have gathered. A partnership or contract with a courier company should be investigated and implemented to mitigate this risk.

4.9 EVALUATION AND CONTROL

Evaluation and Control is performed by measuring and comparing the following:

- the company is doing better or worse than last year or last month
- over or under budget measured monthly
- above or below the industry average – compare with trade association statistics, bank managers’ expectations, accountants’ projections
- better or worse than another company or one product against another
• make adjustments for fair comparisons
• receivables status: are they on time or greater than 30 days, 60 days or 90 days and how do they compare with competitors and what are bad debts and are they increasing
• receivables status: are they on time for discounts or paid at 30 days, 60 days or 90 days if allowed without interest penalties and how much follow up is required to collect debts
• analyse profit versus service costs
• gross profit margins monitoring
• inventory turnover
• customer complaints
• staff turnover or absenteeism
• safety status – accidents measurements to avoid increases to WCB premiums
• lost business
• overhead to sales and marketing
• cash flows reviewed monthly
• how is the company doing against its one year and three year plans

4.10 CRITICAL SUCCESS FACTORS

The critical success factors for plastics recycle companies are based on sufficient sources of recyclable plastics controls on inventory, sources of markets to purchase the commodity and sound financial controls and all working towards the mission of the company. The business plan and business strategies are to be followed and communicated to partner, banker and staff. Any deviations or market changes will require review and changes to strategies and to the business one and three year plans. Marketing and sales will play a large part of the success as effective information is critical to the business to succeed and to be able to adjust to the changes in market and economic conditions. The customer service and environmental benefits of doing
business with Delta Polygreen Recycling are marketed and advertised with the results being measured for effectiveness.

4.11 VERTICAL SCOPE ANALYSIS

We have performed a brief analysis of the vertical integration of suppliers and buyers. Using the value supply chain map (Appendix 2) it has been determined that vertical integration is not very attractive to a start up plastics recycling company as the product from plastics recycling is a commodity and its production cost decreases as the cumulative quantity increases. To remanufacture products from the recycled resins requires much more sophisticated equipment and current customers may see the new facilities as a threat and discontinue buying product from the new company.

The alternative is to develop long-term contract and possible joint venture to remanufacture plastic products for a market that is not well developed, so it does not become a threat to your customers for their commodity purchase of recycled plastic. Government Incentive programs are to be researched and if Delta Polygreen Recycling qualifies, they are to be taken advantage of, especially the Government of Canada’s Department of Finance, Government of Canada Economic Action plan support for small business (Department of Finance Canada, 2009).

5.0 RECOMMENDATION

Recycling will become a necessity in the future due to the increase in plastic manufacturing and the ever-decreasing landfill space. The limited available landfill space has increased in cost, pushing Governments and industry by the ever growing environmental and sustainability conscious public towards the recycling alternative to deal with our waste problem. Thus, finding out how to use different wastes is significant to our future sustainability. One way of using recycled plastic is in construction materials (Rafat et al., 2008). This way, the construction and plastic recycling industries will develop new business relationships, which will increase economic profitability. The recycling sector will expand by increasing the benefits of recycled products in other,
bigger sectors that will further add value to the recycling industry. This new company (Delta Polygreen Recycling Ltd) strategy for future growth possibilities would include the ability to partner with actual a bottling manufacturer/organizations, such as Pepsi, Coca Cola and Nestle to include the disposal of the plastic bottles in their product life cycle. This would be a win-win solution for the partners, and a method of achieving sustainable business practices that could be a differentiator strategy for both the bottler and Delta Polygreen Recycling.

The downturn in the market has led to a decline in plastic recycling. For example, it has greatly impacted the Bowen Island community in BC, where the Bowen Island Recycling Society has asked citizens to store their recycling at home until they find a solution for dealing with the problem (“BC’s recycling industry”, 2008). The decrease in China’s import of recycled plastic in the last few months has been one of the major causes affecting the recycling sector as they import 70 percent of global plastic waste (Sun, 2008). "It would seem that the global economy has impacted Bowen Island now," said Carr (“BC’s recycling industry”, 2008). The recession has displayed the vulnerability of the recycling industry.

In order for the BC economy to break loose from the unpredictable fluctuations of the global market, it needs to increase its own plastics recycling and remanufacturing industry. China has the monopoly for processing plastics, so it is important to move away from a single country source for recycled plastic, baled, pellets and flakes. China has recently improved their labour standards, which will eventually lead to higher wages. Along with labour changes, Lam stated that “the ban of imported post-consumer plastic bag will increase prices” (Sun, 2008). These factors may lead to a decrease in world plastic imports to China, as companies may no longer find it economically feasible to export their plastic.

Another important reason for the plastics recycling and re-processing to occur locally rather than internationally is creating local jobs. This will increase Delta Polygreen Recycling sales and recognition by businesses and consumers. Consumers will tend
to purchase products from organizations who have adopted environmental sustainable policies and practices. Thus, they will demonstrate their empowerment and support for environmentally friendly priorities through their decisions. Since the consumption of plastic will likely keep increasing in North America and in the world, the recycling industry will not go through enormous boom and bust cycles. A local established plastics recycling and remanufacturing industry will benefit even small community economies, like Bowen Island. Such a community will be able to recycle their collected plastics with established plastic recyclers on the BC mainland, not solely the companies functioning out of urban centers.

6. CONCLUSION

From the information gathered, I would recommend that the new company, named Delta Polygreen Recycling, should proceed to enter the plastic recycling market, first and foremost by securing a long-term contract for its output. The contracted products that this company will sell will enable it to have a steady and secure beginning for its growth process. By marketing their customer service and environmental benefits, the anticipated number of customers will rapidly increase. Delta Polygreen Recycling has a sound business plan that, if managed based on their strategy plan, will successfully develop the company and provide profit for its owners. We cannot ignore the risks that start up companies are burdened with. Delta Polygreen Recycling is at higher risk for bankruptcy, especially during the current economic crisis and the first two years of business. However, Delta Polygreen Recycling has sound financing and silent venture partner and a line of credit established through a bank, which facilitates its entrance in the market at even such a tumultuous time for the market system; in fact, it would be an opportune time for a start up. Skilled and unskilled labour is readily available and competitors may not be in a financially stable position to raise barriers to entry to Delta Polygreen Recycling that they could otherwise mount in a better economy.
Furthermore, it is important to acknowledge the two main objectives of Delta Polygreen Recycling: making a profit and being environmentally responsible. These objectives stand on equal levels, deviating away from the conventional business model that usually incorporates profit as the most important goal of a company. Thus, the concept of maximizing profit as the sole purpose of a company must change.

Based on Delta Polygreen Recycling Ltd future growth strategy, would be win-win solutions for all involved (consumers and bottling partners) and would be a way of achieving sustainable business practices into the life cycle of the manufacture's plastic bottles and leave consumers feeling less guilty about polluting the environment during purchasing and consumption of these products.

This paradigm shift begins within the industry, since businesses have the power to alter our way of life by becoming responsible for the life cycle of their products. By being conscious of our environment and its limitations, (that we may be reaching them at a faster rate than expected) is crucial for new plastic recycling markets to exist and be successful.
REFERENCE LIST


Appendix 1

Commodity Prices for Recycled PET in Canada (April 2, 2009):

<table>
<thead>
<tr>
<th>Type</th>
<th>LTL</th>
<th>TL</th>
<th>Units/lbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loose Mixed PET Scrap</td>
<td>$0.06</td>
<td>$0.12</td>
<td>lbs</td>
</tr>
<tr>
<td>Loose Coloured PET Scrap</td>
<td>$0.09</td>
<td>$0.16</td>
<td>lbs</td>
</tr>
<tr>
<td>Loose Clear PET Scrap</td>
<td>$0.09</td>
<td>$0.19</td>
<td>lbs</td>
</tr>
<tr>
<td>Baled Mixed PET Scrap</td>
<td>$0.12</td>
<td>$0.21</td>
<td>lbs</td>
</tr>
<tr>
<td>Baled Coloured PET Scrap</td>
<td>$0.14</td>
<td>$0.24</td>
<td>lbs</td>
</tr>
<tr>
<td>Baled Clear PET Scrap</td>
<td>$0.16</td>
<td>$0.26</td>
<td>lbs</td>
</tr>
<tr>
<td>Coloured PET Regrind</td>
<td>$0.20</td>
<td>$0.33</td>
<td>lbs</td>
</tr>
<tr>
<td>Clear PET Regrind</td>
<td>$0.24</td>
<td>$0.40</td>
<td>lbs</td>
</tr>
<tr>
<td>Preconsumer Clear PET Scrap</td>
<td>$0.21</td>
<td>$0.41</td>
<td>lbs</td>
</tr>
<tr>
<td>Preconsumer Coloured PET Scrap</td>
<td>$0.15</td>
<td>$0.31</td>
<td>lbs</td>
</tr>
<tr>
<td>Preconsumer Clear PET Regrind</td>
<td>$0.36</td>
<td>$0.47</td>
<td>lbs</td>
</tr>
<tr>
<td>Preconsumer Coloured PET Regrind</td>
<td>$0.27</td>
<td>$0.36</td>
<td>lbs</td>
</tr>
<tr>
<td>Clear PET Repro</td>
<td>$0.40</td>
<td>$0.52</td>
<td>lbs</td>
</tr>
<tr>
<td>Coloured PET Repro</td>
<td>$0.32</td>
<td>$0.42</td>
<td>lbs</td>
</tr>
</tbody>
</table>

(PET Recycling Exchange, 2009)

**LTL** – The LTL prices refer to the over the scale value of miscellaneous quantities of materials. Less than Truck Load quantity refers to weights of less than 40,000 lbs unless otherwise stated.

**TL** – TL prices refer to sorted and prepared materials, packaged and ready for shipment in typical Truck Load quantity weights of 40,000 lbs, unless otherwise stipulated.

(RecycleNet, 2009)
## Delta Polygreen Recycling Ltd

### Business Plan - Value Analysis - Supply Chain Map

#### RAW MATERIAL
- Local Voluntary Donations by citizens dropped off & from call in collections.
- Non-profit environmental group collections.
- Retailer Plastic Collections from boxes set up in parking lots and stores.
- Industrial plastic waste collections.
- Automotive recycled PVC plastic from auto recyclers.
- Government blue box recycling collections and Plastic bottle recyclers.

#### REGULATORY AND OVERHEAD COSTS
- Landfill Disposal for Non-Sellable Items
- Warehousing, Transportation, Processing & Shipping Costs
- Licenses & Taxes – Business & Federal Utilities – Electrical & Water

#### INFORMATION SYSTEMS
- Customized Website, Web based Products Inventory Management & Internet Sales Support.
- PC Based Accounting System and Cash Register and Credit Card System

#### LOW VOLUMES CUSTOMERS
- One time purchases
- Local Plastics Manufactures
- Walk-Ins or Phone call purchasers

#### HIGH VOLUME CONTRACT CUSTOMERS
- Baled Plastics purchased for packaging processing overseas.
- Value added plastic pellets and flakes for feedstock for domestic and international customers.
- Manufactured Plastic Products (Future Planned Value Added Products for Resale)

### OUTGOING - MONEY FLOWS - INCOMING

- Tier 1 & 2 requires pick up of materials
- Delivery Only
- Tier 1 & 2 Pick up & delivery of materials

### MATERIAL MOVEMENT

### INFORMATION FLOW