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# **A Report on the Status of the Markets for Post Consumer Plastic Packaging Recycling in the USA and Canada**

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## I) Preface:

In a report submitted to CIF by this author a year ago the state of post consumer plastic packaging recycling was examined for the four major categories: PET, HDPE, PP and Film packaging. While the data reviewed in that report showed adequate reclamation capacity and market demand for Ontario collection programs, a broader case was made questioning the long term sustainability of the industry. It framed the industry as a broken business model that is most evident when the value of post consumer recycle, as determined by the price of virgin resin, does not cover the cost of acquisition, transportation and processing. This is the situation that will most likely manifest itself, as a virtual tsunami of investments are being made by virgin resin producers to take advantage of cheap and abundant shale energy.

### Virgin Plastic versus Recycled Plastic Comparison

Fundamentals	Virgin	Recycled
Access to raw materials	Excellent; Increasing	Limited; decreasing
Quality of raw materials	Excellent; Improving	Fair; problematic
Contract security	Standard; Bankable	Very little available
Transportation cost	Improving	Increasing
Manufacturing/processing cost	Decreasing	Increasing
Market demand	Increasing	Must be less than virgin

This report will re-visit the impact of Chinese and other export markets, supply and demand, new virgin capacity and energy, as well as examining issues that had not surfaced a year ago namely:

- Calamitous weather events
- Bankruptcies
- Anti-dumping judgments and tariffs
- Trucking cost and availability

As in the previous report, the data and information is a distillation, except where direct attribution is given from a number of sources including resin and package manufacturers, Plastic Recovery Facilities (PRFs) and reclaimers, and, lastly, relevant US and Canadian Trade and Stewardship associations.

In some cases information was not available or could not be found and was noted accordingly.

## **II) Factors Affecting All Sectors of the Post Consumer Plastic Packaging Recycling Industry**

The factors that impact the plastic recycling markets irrespective of resin type include:

- A) Energy Pricing
- B) Chinese and other export demand
- C) Transportation cost
- D) State of collection

A) **Energy Pricing:** Almost all plastic production depends on either oil or natural gas for its source of chemical raw materials. The abundance of new energy sources resulting from the use of hydraulic fracking technologies and technologies that continue to improve their efficiency, has spurred an investment frenzy in not only new monomer and polymer capacity but the logistical support to efficiently get the product to market. PLG Consulting of Chicago forecasts that the North American Petro Chemical Industry will invest around 145 billion dollars in related industrial facilities by 2025, a result of low cost and abundant shale gas. But will energy prices remain low as the global economy expands, and will it matter if these facilities are owned by vertically integrated companies? Historically, the benchmark price of oil that allows for sustainable post consumer plastic recycling is around \$60 / barrel, but is that still a useful gauge in light of these new shale gas investments and relationships? Given the reality that the price of oil is influenced by geopolitical concerns as much as supply and demand, further speculation on the part of

this author would be presumptuous. That said most of the forecasts seem to predict stable to slightly increased oil pricing for 2018.

**B) Export Markets:** Chinese buyers have long had a strong, some might say pivotal position in the post consumer plastics market in the USA and to a lesser extent, Canada. That came to an end in 2017 with the announcement of National Sword, (Sword) an extension of the Chinese Law of Circular Economy. Originally Sword was two different initiatives, one to exert greater permitting control, the other to reduce contamination on materials entering the country. One was aimed at reducing smuggling, the other at increasing the quality of incoming materials. For all intents and purposes these initiatives have merged and Sword and is now synonymous with restricting the flow of all recyclables, not just plastics. Currently Sword is in full enforcement mode where no post consumer plastic can be brought into the country without a permit, and as of March 1, 2018 contamination levels cannot exceed .05%. This effectively eliminates access to the Chinese markets, the impact of which will be discussed in the individual resin sections. While various forms of enforcement by the Chinese government have been experienced over the last 25 years, only to lapse back to business as usual, most experts feel that this is a change that permanently reflects Chinese policy moving forward. Program operators and policy makers will be well served to keep this in mind as they try to weather the disruption Sword is having on global recycling markets.

Recently there have been some announcements by Chinese companies that are investing in new recycling facilities in the US, but these so far are targeted more for post industrial feedstock, not post consumer bottles. Investments in bottle recycling plants seem to be happening in countries like Vietnam and Malaysia where labor is still cheap and environmental regulations are lax. There have also been reports of Chinese buyers looking to acquire existing recycling assets in the US that would allow that shipment of pelletized recyclate back to China but the economics for these types of ventures have always been questionable at best. Clearly this is a very dynamic situation that

will continue to have major impacts on US and Canadian recycling markets moving forward.

C) **Transportation Costs:** Over the years transportation costs have been a relatively small but key component for the post consumer plastic recycling industry. Price fluctuations have been caused mostly by fuel prices, although availability and cost of sea containers have often determined how aggressive export buyers are. Historically when fuel price spikes have occurred, they have geographically restricted some bale purchases as well as limiting access to some end markets by reclaimers. These spikes were passed along in the form of fuel surcharges by the trucking companies and generally “eaten” by the reclaimers. This is all changing and changing rapidly.

**Factors affecting the cost of trucking**

Fuel	38%
Operator / labor	26%
Capital cost of equipment	17%
Repairs and maintenance	13%
Regulatory	6%

The vast majority of transactions for post consumer plastic involve over the road or long haul trucking carrying full loads. For this segment of the trucking industry the critical issue is driver availability. The American Trucking Association estimates that there is a current shortage in the USA of 30,000 to 35,000 drivers that will escalate to 80,000 by 2020. The Canadian Trucking Alliance (CTA) forecasts a shortage of 33,000 by 2020. In order to attract new drivers, compensation is increasing and that of course adds cost to whatever freight is being moved. However, the shortage has become so critical that trucking companies are reducing the lanes that they serve, impeding reclaimer’s access to some sources of supply and end markets. Further exacerbating the problem, at least short term, is the implementation of new regulations effective December 10, 2017 by the US Department of Transportation concerning the mandatory use of Electronic Logging Devices

(ELDs). These devices monitor hours of service and for some fleet operators limit top speed. Long term, most industry observers and regulators, as well as many fleet owners, believe the use of these devices will result in greater efficiency and lower costs, but for now it appears less freight is being moved with the available pool of drivers.

The CTA has just recently launched a letter writing campaign to elected officials urging them to support the harmonization of the use of ELDs with US law no later than the fourth quarter of 2018. Canada should then experience the short and long term impact of the use of these devices as well.

While all products being moved by long haul trucking will be impacted by these increased costs, virgin pellet will be substantially less affected. Much of this material already moves by rail and the investments mentioned in section A will only improve the efficiency of packaging and first product moves. In fact, PLG Consulting projects that by 2020, 81% of first moves of product by weight will be done by rail, up from 48% in 2017. Canadian Shipper forecasts a 10% increase in the cost of long haul rates, a projection that seems low in light of information shared by reclaimers. Of course if Trump pulls the US out of NAFTA it will cause major upheaval throughout the transportation industry, a possibility that few, if anyone, wants to think about.

**D) Current state of Collection:** While data for the post consumer plastics recycling industry can be perplexing, there is little doubt that the collection of PET and HDPE bottles has been declining in the USA over the last couple of years. This is based on the annual reports issued by NAPCOR and APR, but also on conversations with reclaimers and MRF operators who validate this assertion. These entities were asked if they saw more, less or the same volume from accounts they purchased from exclusively. No respondent said they saw more being collected and all continued to express their concern with respect to bale quality. One attributed an increase in paper contamination in PET bales to be the result of efforts by some MRFs to improve the quality of their paper bales.

According to the 2015 Report on Plastic Recycling in Canada (The 2016 Report still has not been released) it appears that collections in Canada have stagnated from 2013 – 2015. This may have changed in 2016 as it appears that PET collections may have increased recently as much as 9%. Whether this is the result of increases through deposit programs or more of all plastics being collected through curbside programs is unknown at this time. However, it does appear some additional volumes are currently being generated by single stream MRFs that are cleaning up their paper bales in an effort to meet the Chinese contamination levels or just to make them more marketable in general. Studies performed by NAPCOR in 2007 with Blue Heron and Southeast Paper uncovered PET contamination levels in fibre bales coming from single stream MRFs at levels of 2-5% by weight. So for every 25 loads or so of paper, an extra load of PET could be produced which is what some PET buyers are reporting. How much of an impact overall this will make remains to be seen, but any additional volumes will be well received by PET buyers.

### **III) Polyethylene Terephthalate (PET)**

To say that the PET resin and recycling industries are in a state of flux would be a gross understatement. The bankruptcy of M&G Polymers (M&G), a major North American virgin resin producer, implementation of National Sword and anti-dumping tariffs all have arguably created the most dynamic market ever witnessed.

For most of 2015, 2016 and into the fourth quarter of 2017, many US and Canadian PET reclaimers have been having a difficult time making profitable margins. This was due to the extremely low price of virgin materials that RPET prices had to compete against. The beverage companies in particular were aggressive in pushing RPET prices down to unsustainable levels. They were, however, doing that on the virgin side as well, and that eventually led to M&G closing its plants and filing for bankruptcy in October 2017. This effectively shuttered 25% of virgin PET resin capacity in North America and also halted the construction of the 2 billion pound resin plant in Corpus Christi. That resulted in the restoration of sustainable margins for both virgin and recycled producers as



converters scrambled to find sources to fill the void. This void was filled quickly by imports, which allowed the market to momentarily stabilize in December and January before prices started moving up again in March. However, anti-dumping tariffs imposed by the US on bottle grade resin coming from China, India, Canada and Oman effective April 1, 2018 have slowed the flow of imports and have once again spurred both virgin and RPET pricing. The judgment against Canada may have an impact on Canadian reclaimers as it does not distinguish recycled from virgin, so RPET pellet shipped from Canada to a US bottle converter would be subject to the additional duty.

Canada has in turn found China, India, Oman and Pakistan guilty of dumping bottle grade resin and have imposed additional duties of 26-76% accordingly.

Trying to track and make sense of all of these tariffs, anti-dumping judgments and import/export regulations, what is enforced and what is not, has been a daunting and somewhat fruitless task. There are according to USITC, 141 countries that have tariffs on PET resin, some that target the material with specificity, some not so much. As a result, the distinction between fiber chip and bottle resin (for example) often becomes blurred. This often explains retrospectively why markets that should be tight, aren't, or why prices that shouldn't be low, are. To complicate matters even further, the United States has a president that has the power and temperament to impose tariffs on a whim, often without warning, adding another layer of insecurity to an already chaotic market.

Interestingly, bale prices have until just recently remained fairly stable. This is in no small part due to Chinese buyers pulling out of the market. While some of the smaller export buyers increased their purchases to an annualized rate of about 45 kilotonne (kt) that still left about 135 kt for US and Canadian reclaimers over which to compete. That additional material combined with clean and dirty flake imports from Central and South America has at this point kept bale prices from spiraling upward. With more reclamation capacity being built and collections stagnating, it is unlikely that it will stay that way.

Currently there are 5 PET reclamation plants in Canada, although one has reportedly been in and out of the marketplace. Two are located in Quebec (i.e.,

Plastrec and Klockner); two in Ontario (i.e., Urban Polymers and Blue Mountain); and one in Alberta (i.e., Merlin Plastics). The total nameplate capacity for the five plants has now increased to around 170 kt with another 20 kt being installed. Even if Canadian reclaimers were able to purchase all of the post consumer PET packaging collected in Canada they would still have to import as much as 50 kt to achieve a reasonable utilization rate. To that end Canadian PET reclaimers bought 30.3 kt from US sources, down from 37.4 kt in 2015.

In the United States the picture is much the same, where many of the 10 most active reclaimers, most of which make active attempts to buy Canadian bales, are chronically short of supply.

**US PET Bale Demand (kt)**

	# of Plants	Capacity (Gross KT in)
Eastern	14	777
Western	7	210
Total	21	987

In addition, two more plants are about to open and there as many as four more in various stages of development.

While the Chinese pulling out of the market gave US and Canadian reclaimers the ability to source additional bales, it also eliminated a lot of the buyers for byproducts produced during the reclamation process including out throw bales, fines and kick-out from flake sorters. Reclaimers are having trouble moving some or all of these streams at any price and many report building large inventories. In an effort to minimize these yield losses, reclaimers are continuing to explore ways to use more colored PET bottles and thermoforms. These efforts will be more visible as prices nudge higher. There is also a major plant being considered in the US that could potentially use all of the colored bottles and thermoforms collected in both countries.

#### **IV) High Density Polyethylene (HDPE)**

Just when it looked like the first of the shale gas investments was going to impact the market, the gulf coast was hit by a number of calamitous weather events that resulted in numerous force majeure declarations by ethylene and polyethylene producers. This kept HDPE in tight supply and elevated price levels, particularly natural RHDPE. While margins have been good, there is no agreement on pricing moving forward other than ethylene prices probably losing up to \$.10 per lb over the rest of the year. How that is going to impact HDPE and film resin prices remains unclear and centers largely around how strong the export market will be. One thing that is clear is that new demand from an upscale outdoor furniture maker combined with brand owner demand for natural RHDPE to comply with the California content law is driving prices up to levels exceeding virgin.

As with PET, there is way more reclamation capacity than supply, particularly since the Entropex plant has been resurrected as ReVital Polymers and is actively purchasing HDPE bales. Also, the fact that residentially generated HDPE Bottles is a category that is shrinking will not help HDPE reclaimers fill their plants.

There is active import / export activity between the US and Canada of this commodity. However, the net result is just about zero, with roughly 30 kt being exported to Canada from the US, and an almost equal amount of bottles coming back from Canada to the US.

The APR 2016 United States National Post Consumer Plastic Bottle Recycling Report shows about 60 kt of HDPE bottles being exported to China, bottles that should now be available to US and Canadian reclaimers. However, conversations with four major buyers failed to uncover any additional HDPE bales being made available. Certainly if those bottles were no longer exported there would be some noticeable impact on the market.

## **V) Polypropylene (PP)**

Some of the 227 kt of new polypropylene capacity expected to come on line in 2017 from debottlenecking projects was delayed by the weather. As much as 2,200 kt of new propylene capacity is being added by 2019. This does not include a polypropylene plant proposed by the Canadian gas company Pembina in Alberta of 800 KT. More recently Exxon Mobil has announced that they are considering building a Polypropylene plant on the gulf coast with a production capacity of 400 kt.

Despite the new capacity, most analysts do not see prices destabilizing like PE short term. However, it must be noted that the PP market in general is known for wild price fluctuations, where movement of \$.10 / lb in either direction is not unheard of over the course of a month, as was seen again just recently.

Most of the PP containers that are not part of a HDPE bale, a tubs and lids bale or a dedicated PP bale find their way into a #3-7 bale or a mixed rigid bale. In many cases these bales consist of whatever plastic was left on the line after the PET and HDPE was sorted. Historically much of this material was exported. With the enforcement of Sword, export opportunities for these commodities, as well as for out throw bales produced by PET reclaimers, have been significantly curtailed to the point where this material is being landfilled in many locations, particularly on the west coast. Recently, a couple of the larger MRFs have been purchasing, accepting or even charging for mixed rigid bales to extract the PP. Irrespective of whatever stop gap measures surface, the days of indiscriminant bale composition are rapidly coming to an end for this category.

The few buyers of mixed rigids that exist in the US and Canada claim that the financial underpinning of their operations is the value of the PP. That may be so but the other components (particularly PVC, colored PET and PS) of the bale need to cover at least their respective handling, sorting and processing costs to allow the PP a chance to make the operation profitable. As previously mentioned, the most problematic issue for this industry segment is the lack of adherence to any recognized specification. With the bale quality for this material as erratic as it is, this business model is questionable. Nevertheless, there appears to be more than adequate markets for the PP once it is processed into clean flake and pellet. While

most of this recyclate ends up in relatively low end applications, that could change if a technology licensed by Proctor & Gamble is successful. The proposed plant is slated to have a capacity of 45 kt gross weight in, and will accept / purchase all forms of PP packaging while producing a homogenous, colorless, food grade material. However, the plant is not scheduled to be operational until 2020, assuming that the scale up is successful.

## **VI) Plastic Film**

The category that will probably be impacted the most by shale energy investments and Sword is PE film. While PE prices are likely to slide downward, the market options for much of the post consumer films collected will be limited with Chinese buyers out of the market. Post consumer film that requires little cleaning and that can be easily pelletized will continue to find markets, some going back into bags and other high end applications. Bags collected at supermarkets and other drop-off locations will most likely continue to find plastic lumber manufacturers willing buyers, but at much reduced pricing. Film bales generated by MRFs will have great difficulty in finding markets, and those markets that might emerge will more likely have no value especially as virgin prices slip.

With this in mind, and the fact that most MRFs are focused on producing paper bales that are marketable, it is unlikely that they will want to encourage more film in the stream. It is also unlikely that additional MRF investments will be made to sort and bale this material unless it is part of an effort to remove film contamination in paper bales.

## **VII) Other Resins**

There are a number of other resins that are use in packaging applications. Among the most common are PVC, PLA, PS (Rigid and foam) and PETG. None of these have any practical markets for bales produced at either MRFs or Plastic Recovery facilities (PRFs) but rather serve as contaminants in the recycling stream for the

other resins particularly PET. There are some limited markets for Expanded Polystyrene (Foam) but the material for the most part needs to be to be very clean and compressed into blocks and that generally restricts collection to bulk EPS packing materials. The financial impact of these materials as contaminants is not insignificant, adding cost to the system that can ill afford them. Among these are:

- The capital and operating cost of additional equipment necessary to remove them
- Yield losses incurred removing them
- Increased laboratory and quality control cost
- Negative impact on the quality of recyclate
- Increased system maintenance

Any serious effort to improving the economics of post consumer plastic packaging should start by evaluating the benefits of not having to deal with these contaminants.

## **VIII) Summary**

The cheap, abundant energy sources that have been the result of hydraulic fracking have precipitated unprecedented investment in monomer and polymer production and the logistic infrastructure to get these materials to market efficiently. These investments are often vertically integrated and are using the latest, most efficient technologies.

While the fundamentals for virgin resin production continue to improve, those for recycled resin are getting worse.

The implementation of National Sword by the Chinese has provided additional volume of bottles for North American PET and HDPE reclaimers but has eliminated markets for mixed rigids, film and reclamation plant byproducts that were often the only buyers for these materials.

The cost and availability of long haul trucking will continue to increase in the US and Canada, restricting access to some markets and suppliers.

PET pricing for both virgin and recycled should increase steadily if not spectacularly until such time as the shuttered M&G plant in Apple Grove, WV reopens. Depending on how effective the anti-dumping tariffs are, the market could remain tight until the Corpus Christi plants opens, but that won't happen until the 4<sup>th</sup> quarter of 2019, and that is probably optimistic.

HDPE virgin pricing on the other hand will stabilize then start to decrease as existing plants recover from weather events and new plants come online. Post consumer pigmented pricing should track virgin, while natural bales will maintain a delta commensurate with customer demand for high end bottle grade.

Polypropylene will continue to have a love hate relationship between suppliers and converters, resulting in price volatility, unlike most other resins. Despite this volatility, sustainable margins should continue to allow MRFs a range of market options for this material.

For all intents and purposes there are only niche markets for post consumer film generated by MRFs. If film / bags are to be collected through curbside programs, as many stakeholders are advocating, some serious reclamation plants with robust sorting and cleaning capacity, will need to be built and subsidized.

Other resins used in packaging have no real markets, but rather are contaminants to the PET, PE and PP recycling streams.

## **IX) Conclusions**

The full impact of shale energy investments will start to be felt in 2018 and carry forward to 2020 and beyond. As a results the price of virgin olefins, and therefore the value of recycle and subsequently bales, will steadily decrease. PET pricing will steadily increase until the impacts of the M&G Polymer bankruptcy are remedied. Without markets for mixed rigids, reclaimer out throw bales and byproducts, the economics of post consumer plastic recycling will be seriously impacted at both the MRF and reclaimer levels. Ontario will be much less impacted than most areas of the US given the investments made through EPR program to address these market deficiencies previously.

Given the above forecasts, combined with a downturn in US collections it would be a stretch to believe that any significant investment in traditional technologies will be made to address this market shortfall.

Significant new investments in post consumer plastic recycling at the MRF level will unlikely be seen until markets are revived for paper.

Eliminating PVC, PS, PLA and PETG from the plastic packaging stream would significantly improve the economics and quality of PET, PE and PP recyclate. There is no application that currently uses these resins that could not be replaced by a recyclable or recycling friendly alternative.

Factors, including energy pricing, calamitous weather tariff and trade regulations will continue to impact the markets in ways that are often unpredictable.

(Reprint from previous report)

Lastly, the issue of virgin pricing is what it is. Irrespective of whether the forecasts are correct, there will be times when post consumer recyclate cannot compete with virgin resin and those periods could be catastrophic for an industry like post consumer plastic recycling. A content program, either mandatory or incentivized, would go a long way toward imparting / creating some additional value in the recycled material that is not currently recognized. This goes to the heart of the matter; if public policy is going to create a supply of material, it should also address the issue of markets to consume it.