

King County Paper Recycling Report

6 June, 2018

Eric Elliott and Matt Morgano

Seattle University Albers School of Business and Economics

Table of Contents

Introduction	3
Background and Problem Statement.....	3
Background	3
Problem Statement.....	5
Approach.....	5
Strategy	7
Findings	9
Industry Analysis	9
Market Analysis.....	12
Catalog of Paper Mills	18
Recommendations	19
Change Implications.....	22
Next Steps	22
Conclusion.....	25
References	26
Appendix 1: Map of Operating Paper Mills.....	28
Appendix 2: Call Script.....	29

Introduction

As part of a collaboration between Seattle University Albers School of Business Masters of Business Administration program and King County, this report will take an in-depth look at the mixed fiber recycling industry, with special interest in the Pacific Northwest (PNW). The report is at the request of Lisa Sepanski of the King County Solid Waste Division under the supervision of Robert Spencer, professor of the Business Consulting course at Seattle University. The report includes research on the paper recycling industry that exists in the PNW and nationwide, a catalog of working paper mills in the PNW, a market analysis of the paper recycling industry, and market trends. The consulting project took place over a 10-week period from April 10th to June 6th, 2018.

Background and Problem Statement

Background

China, long the destination for most recyclables across the world, imported almost half of the world's recycled paper and plastic, much of it from the United States (Claugus 2018). Through the end of 2017, the United States exported about one-third of its total recyclable material, half of which went to China (Profita and Burns 2017). China's recent changes in recycling policy, however, have changed the global recycling landscape. In 2013 China started a national campaign called the Green Fence, which was an effort to enforce import regulations passed in 2006 (Resource Recycling 2018). Two years later, in 2015, China changed its approach to inspect importer practices instead of focusing on the imported goods themselves. In early 2017, the National Sword campaign was announced, focusing on low grade materials being imported into China, and in July 2017, a notice filed with the World Trade Organization laid out details to ban certain recyclables from Chinese import, including recovered mixed paper (Resource Recycling 2018).

The United States recycling market began to experience the effects of the National Sword campaign in September 2017. Material recovery and other sorting facilities began stockpiling post-consumer material as they were no longer able to send them to Chinese buyers, and there were no other convenient outlets to dispose of them. As a result of the change in policy, mixed fiber costs drastically decreased from \$146-\$156/ton on September 29 to \$5-\$40/ton in early 2018. The price has occasionally been negative throughout 2018 as well, meaning recyclers are paying to dispose of mixed paper bales (Gee, Moore & Associates 2018). When China finalized the limit of contamination to 0.5%, US companies were dealt a final blow. Over 100 million US residents use commingled, or single-stream, recycling programs. While convenient for customers, commingled recycling collection programs result in high contamination rates—multiple, or separated recycling streams average around 3-5% by weight in North America, while commingled collection streams in the same areas are typically well above 11% (Peek 2013). Even after sorting (typically done in high-tech Material Recovery Facilities, or MRFs), the average contamination rate for paper and plastics in the US is about 5%. Since the US rate of contamination is much higher than the allotted amount set by the Chinese government, US recyclers are being forced to find alternative options.

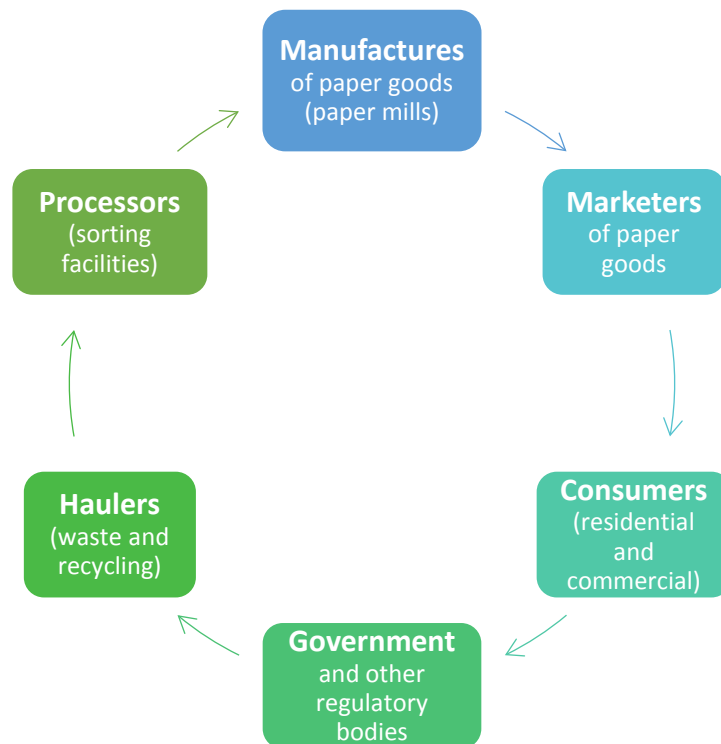
In 2018, China announced the Blue Sky 2018 campaign aimed at enforcing their import restrictions. This was widely seen as a development of both the Green Fence and National Sword campaigns (Resource Recycling 2018). In May of 2018 China instituted a one-month ban of all imports from the US. Details from Chinese import permits show that from Dec 26, 2017 to Jan 31, 2018, metric tons of waste paper fell by 81%. Permits decreased by 96% in that same time frame (Staub 2018). The future of mixed fiber recycling is unknown. However, it should be assumed that China will not lift the ban and resume taking US exports as it once did. According to many industry experts, the ban is “here to stay” (Clausus, 2018 Langdon, 2018 Burnstien, 2018).

Problem Statement

With the recent changes mentioned above, research is required to assess the capacity of paper recycling markets in Washington State and the Pacific Northwest to determine if there are any opportunities for expanding mill capacity to accept mixed fiber that was previously sent to China.

Approach

In order to fully assess the paper recycling market in the Pacific Northwest, research is needed on both large-scale industry changes across the country, and the changes made by local individual firms. Across the country, there are six main stakeholder groups within the paper recycling industry. These are Marketers of paper goods (including design companies), Consumers (residential and commercial), Municipalities and other regulatory bodies, waste and recycling Haulers, Processors (sorting facilities and similar reclamation facilities) and recycled paper Manufacturers. These stakeholders ideally move paper fiber material to each other in a closed loop, as detailed below:



The stakeholders first affected by China’s recent restrictions on paper imports, and resulting market shift, will be the Processors and Manufacturers—specifically sorting facilities who previously sent fiber to China, and paper mills that are either currently accepting or are able to accept post-consumer paper fiber. These sorting facilities worked in direct coordination with Chinese mills, thus the effect on their business model has been immediate. With the decrease of demand for paper fiber to China, there were also large quantities of post-consumer fiber available immediately at low cost to non-Chinese paper mills across the world. Marketers and Consumers will likely be the next to feel the effects of this market shift, as the price of goods made with recycled paper will fluctuate once available stock at pre-2018 prices runs out. Finally, depending on the local market structure, Haulers and Municipalities may have already felt some effects of the market shift, or they may be cushioned by multi-year contracts that lock them into current prices for the short-term future. So while the decrease in demand for post-consumer paper fiber will have impacts on every stakeholder within the entire paper recycling industry, sorting facilities, and the mills they send paper to, will be the first to deal with the change and may very well set the tone the entire industry will follow. Therefore the focus of this research was on this crucial part of the paper recycling industry—specifically on mill capacity, and finding what mills are currently accepting from recycling collectors.

The problem statement and industry analysis requirements were discussed in an initial meeting between King County and Seattle University. Also discussed were the details of the work arrangement and the scope of work to be undertaken during the 10-week project. This scope of work included limiting the “Pacific Northwest” to the states of Washington and Oregon and agreeing to research the following aspects of:

A. Market Structure in the Pacific Northwest

1. Which paper mills are currently operating and what is the current market size for post-consumer paper recycling?

2. How and from whom are these paper mills currently obtaining recycled paper fiber?
3. What standards are paper mills using when accepting post-consumer paper fiber for recycling?
4. How are industry participants setting prices for recyclables?
5. What recycled paper products are these paper mills currently producing and to whom are they selling these products?
6. Is there competition for recycled paper fiber within the market?

B. Recent Market Trends in the Pacific Northwest

1. What strategies have companies used to adapt to recent market constraints?
2. What are the projected prices for:
 - a. Mixed paper,
 - b. White ledger paper, and
 - c. Colored ledger paper for recycling?

These agreed-upon research topics were designed to set a narrow scope of work focused on local market responses to the industry change. This scope of work was intended to be specific enough to be covered in a 10-week timespan, but broad enough to be useful for decision-makers in the Pacific Northwest. These research topics are to be addressed in the “Findings” section of this report, and also shaped the formation of several items outlined in the following section covering “Strategy.”

Strategy

Over email and three phone conversations between King County and Seattle University, the project settled on the following assets, to be delivered to King County upon completion of the project:

1. An annotated list of experts for contact within the Pacific Northwest paper fiber recycling industry;
 - a. Using contact information discovered within market research, as well as contact information provided by King County, with scheduled interviews for at least 15 and no more than 20 industry experts, mill managers, and government officials
 - b. This list will be inspected and approved by King County
2. An interview script to be used when contacting industry experts via phone or email;

- a. Designed to collect information about the paper recycling market from an approved list of contacts within the Pacific Northwest paper fiber recycling industry
 - b. This script will be inspected and approved by King County
3. A catalog of working paper mills in Washington State including:
 - a. The ground shipping addresses and descriptions of the facility
 - b. The types of mixed fiber and other materials accepted
 - c. Required bale specifications for accepted materials
 - d. Whether the mill charges or pays for materials
 - e. Types of recycling processes used
 - f. Available capacity
 - g. End products made from recycled fiber
 - h. Existing markets for recycled materials
 - i. Other features of the paper mill and its recycling service
4. A report presenting this information in an agreed-upon format to be shared with the King County Responsible Recycling Taskforce;
5. A slide format presentation detailing the research methods used and findings to accompany the report.

Research started with the drafting of a contact list and script for quick approval by King County.

These were followed by literature research, beginning with multiple searches through online business databases provided through the Seattle University Library. These were followed by phone interviews with industry experts and journalists, along with subsequent database searches, primarily through the PARIS WA Department of Ecology permitting records and database. Finally, mill managers were contacted through information provided in earlier research, and further data was collected through webinars and in-person interviews, forums and discussions at the Washington State Recycling Alliance (WSRA) conference.

The goal of this research and outreach was primarily to find a way to better understand the perspectives of local paper mills. From the beginning of the project, it was assumed that most of the details about mill operations would not be widely available (see the industry analysis below) or would be guarded by confidentiality or non-disclosure agreements. Confidentiality concerns were paramount, since any information shared with the research team, and therefore with King County, is subject to

public disclosure as required by law. Database research and advice from industry experts was therefore preferred to reaching out directly to paper mill managers, as there are public regulatory or industry publications that contain useful data or contact information.

Weekly progress updates and a Call Log that included dates, times, call details and notes, were developed during the research phase of the project. These tools will allow each aspect of the research to be easily shared with any interested party.

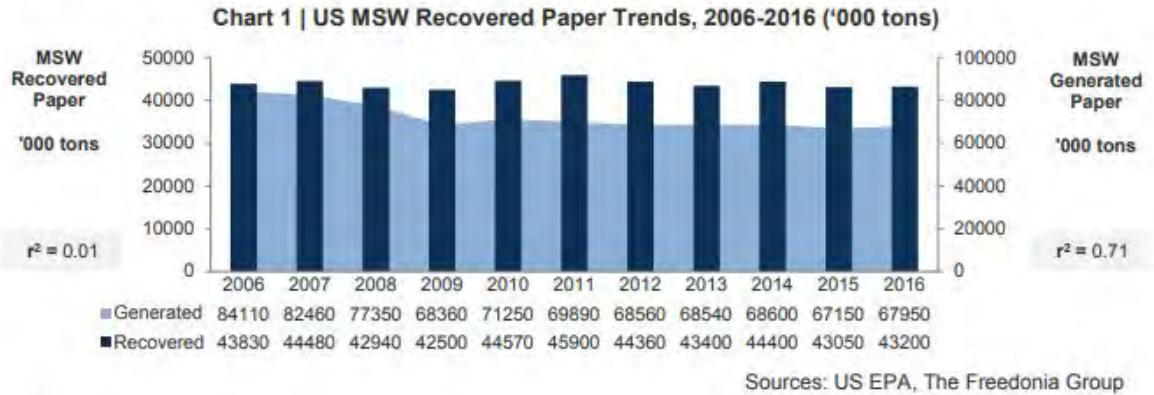
Findings

Industry Analysis

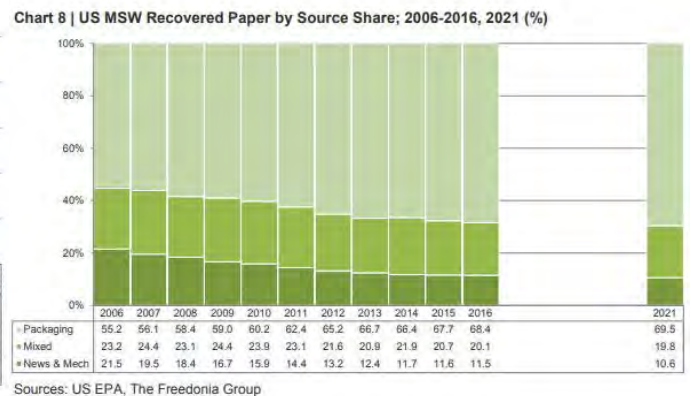
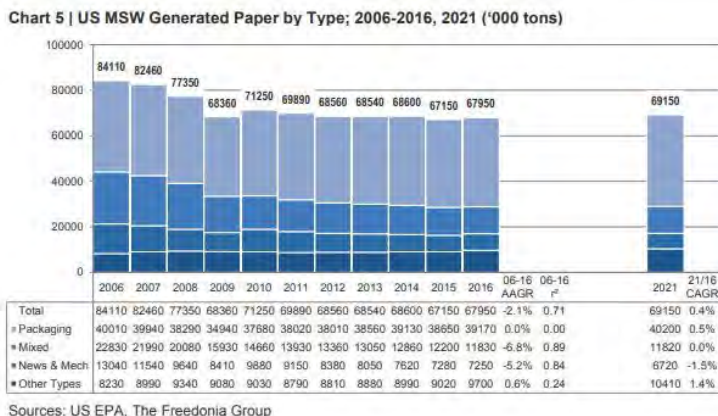
In general, waste management and recycling is a murky industry. While many large companies claim to support supply-side transparency—anti-sweatshop and responsibly sourced products can be found on shelves worldwide—waste disposal is left to customers, municipalities, and a collection of haulers who do not typically publish where they send material, and disposal-side transparency is rare, limited only to a few highly regulated or hazardous materials.

We have focused on the paper mill and paper processing industry in this report—with special attention on mills that accept post-consumer paper. The overall production of municipal solid waste (MSW) categorized as paper has decreased slightly over the last decade, and this decrease is forecasted to continue: recovery of newspapers and mechanical papers is forecast to reach 4.6 million tons in 2021, representing declines of 1.4% annually from 2016 volumes. This is due to decreases in domestic newsprint production that inhibit generation volumes, which in turn stunt recovery volumes (Recovered Paper Fredonia Report, 2016). Overall recycling and paper recovery rates, however, have increased steadily over the last decade: recovery of packaging paper, the largest and fastest-growing segment, is projected to rise 0.5% annually from 2016 volumes to 30.4 million tons in 2021. (Recovered Paper

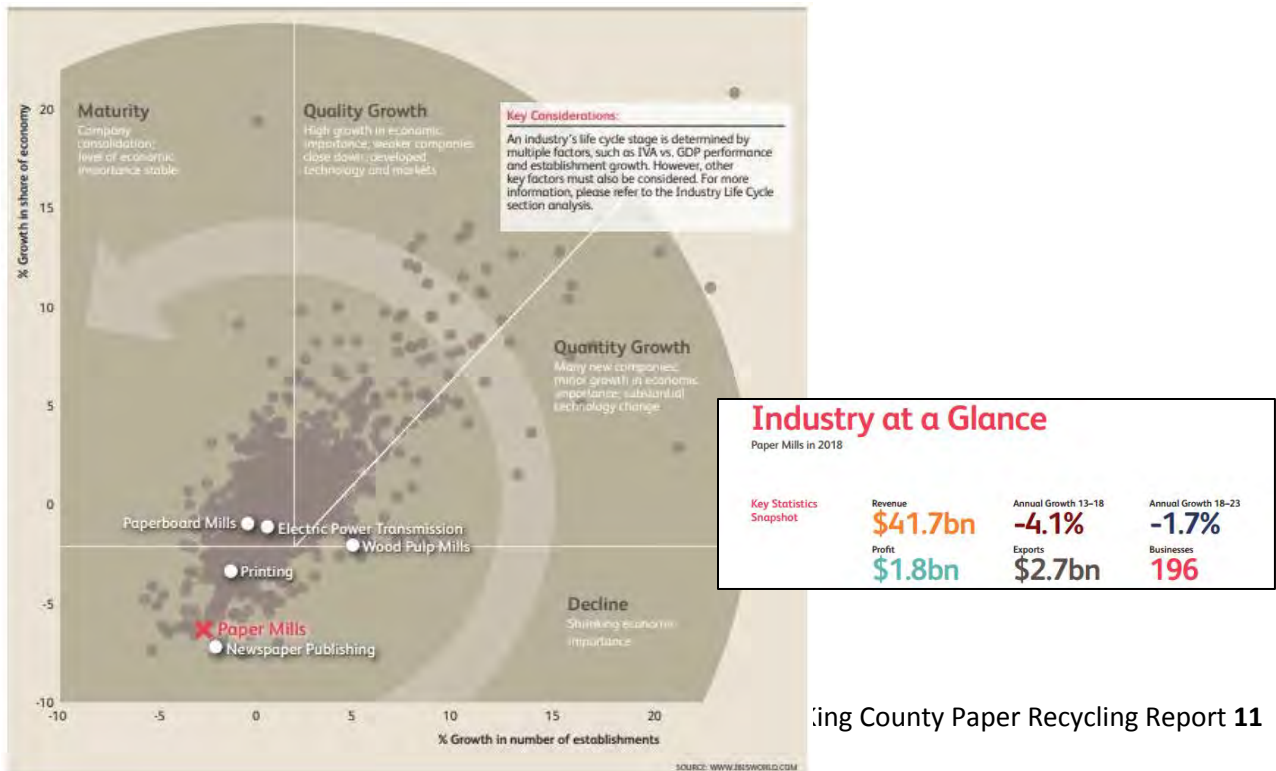
Fredonia Report, 2016). Due to these trends in the paper market, processors who deal with American reclaimed post-consumer paper have seen a steady supply of paper over the last decade, as seen in the following graph.



The majority of paper produced and recovered in America is packaging products such as cardboard and paperboard boxes. There has been a steady decrease in the production and recovery of other types of paper products such as newsprint and mechanical papers, as shown in the following graphs (Paper Recovery Fredonia Report, 2016). Therefore, while American recovered paper processors have seen steady levels of total recovered MSW paper, the specific content of this MSW paper has changed slightly.



Very little is currently being shared by recycled paper processors and manufacturers in the Pacific Northwest. This makes sense for two reasons: industry stakeholders who are involved in the processing and manufacture of recycled paper are a step removed from customers and the public, and have remained largely in the shadows of municipalities, haulers, and marketers of paper goods. They deal with a relatively small number of suppliers and buyers, do not need to market themselves to a wide audience, and therefore haven't invested in advertising outside of the industry (none of the paper mills in our research had advertising budgets over \$250,000, and most were below \$100,000). Second, the upfront cost of opening new mills or increasing production for large paper processing facilities is extremely high and there are only a handful of extremely large companies such as International Paper and Georgia Pacific with the ability to out-compete or buy-out smaller, weaker competitors (RISI, 2018). With high barriers to entry and recent market uncertainty, industry members must be hesitant to vocally commit to change in fear that they might be wrong and a competitor might gain a competitive advantage. There has been a long trend in the US of paper mills shutting down, decreasing production, or moving overseas, and in an industry with small profit margins, new investments have historically been measured, slow, and thought-out well in advance.



Growth in the American paper mill industry has been negative over the last decade (IBIS WORLD Paper Mills Report, 2018). This mirrors a decline in total USA manufacturing industry growth and is

Barriers to Entry checklist	
Competition	High
Concentration	Low
Life Cycle Stage	Decline
Capital Intensity	Medium
Technology Change	Medium
Regulation & Policy	Heavy
Industry Assistance	Medium

SOURCE: WWW.IBISWORLD.COM

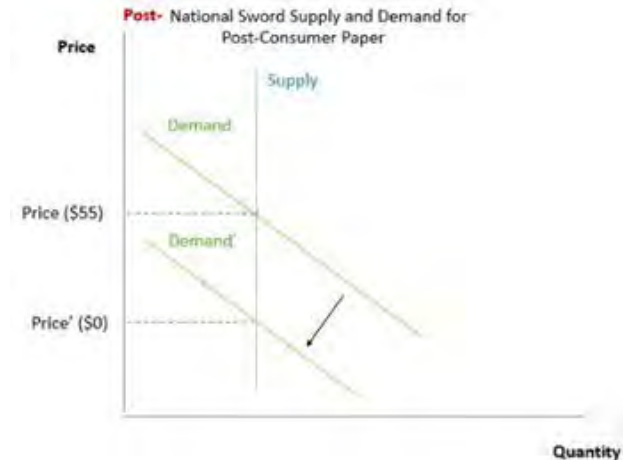
primarily due to competition from overseas firms. With paper processing and production, there has also been a decrease in domestic paper use and demand. However, there are other factors that have created challenges for the industry and barriers to entry (and barriers to increased production and growth

for that matter). One other factor includes high amounts of regulation—paper mills are often regulated due to intensive water and energy use, as well as greenhouse gas emissions. These barriers to entry and growth are important to any region with interest in fostering a local paper mill or paper processing industry, and would need to be taken into consideration when marketing a region to paper processing companies.

Market Analysis

Since the regulation of paper recycling has changed dramatically in the past year, the market has changed equally. The sudden changes have created a worldwide chaos. China, the leading importer of recycled products suddenly closes their doors. Cities, states, and countries are left wondering where their recycling goes. So far, the reactions of companies, municipalities, and government are varied. It seems the only certain thing is that there is no short-term solution. It will take years of businesses and governments to cooperate to fully address the market demand of paper recycling.

In economic terms, the decision for the Chinese to no longer receive paper from the United States represented a huge decrease in demand for post-consumer paper. Due to the relative inelasticity of the post-consumer paper supply in the United States (there is little fluctuation in the amount of MSW paper waste

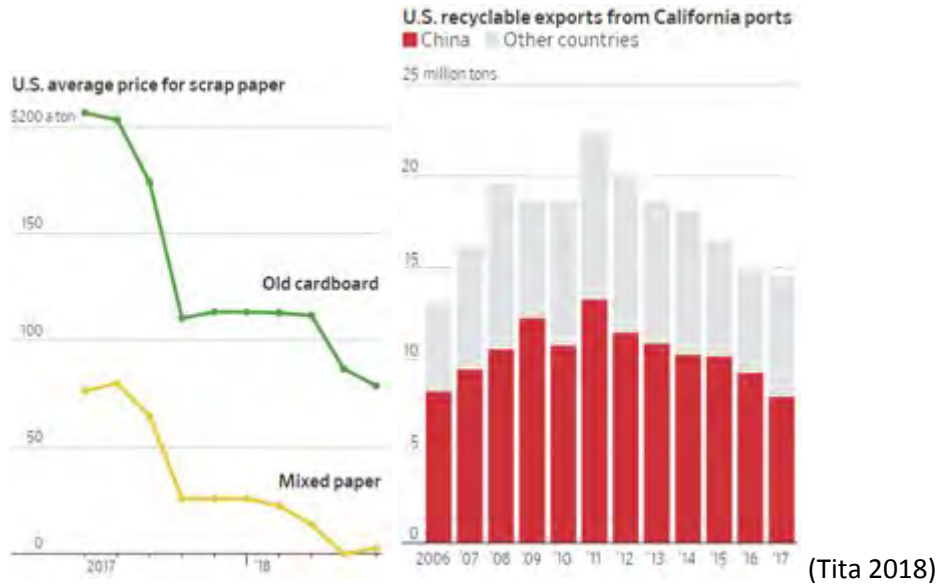


produced in the country, regardless of the price of paper, resulting in an almost-vertical supply line), this resulted in a sudden and drastic fall in the price of post-consumer paper. Because the supply of post-consumer paper is unlikely to shift in the future, an increase in the demand for post-consumer paper will be the only way to bring prices back up to pre-National Sword levels.

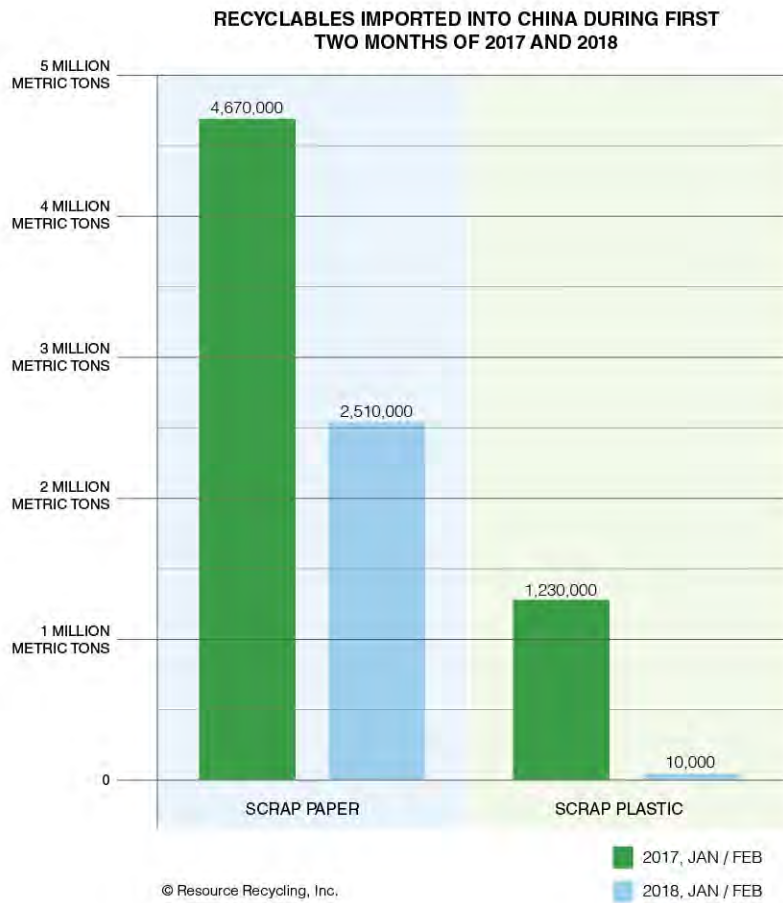
The pre-National Sword market was dominated by the Chinese. The Chinese economy relied on imports to fuel their growth. This came in all sorts of businesses, but one of the easiest for them was garbage and recycling. China imported a total of 21M tons of fiber last year. 11.5M from the US (Baxi 2018). Old Corrugated Cardboard (OCC) made up 75% of the total imports to China. Market experts such as Susan Robinson, director of public affairs for Waste Management and assistant vice president at the Institute of Scrap Recycling Industries, predict that in years to come, China will fully replace imports with domestic scrap (McEntee 2018).

For years companies in the world were being paid above market price for goods to ship to China. It was often much cheaper to ship across the Pacific than to recycle in your own neighborhood plant. China was buying paper by the ton for \$200. This created a competitive advantage for China. They were able to build up the processes and plants to allow them to process recycling at a low cost. In turn, because the advantage of Chinese recycling, it made no economic sense to build or improve mills to

process mixed fibers outside of China. China essentially held the market for recycling and no one wanted to challenge it.



This all changed when China stopped accepting mixed fibers above the 0.5% contamination rate. Immediately following the announcement, prices in mixed fibers dropped 36% from \$151/ton to \$97/ton in a week (Staub 2018). As seen in the charts above, over the course of the next six months the market has seen a further drop in prices of mixed fibers. The price, as of mid-May, is around \$5/ton. It has seen the price fall negative as well. These changes in price create some opportunities, however. While the low price does not help those who are trying to sell it, it greatly benefits those who want to process it. With the low prices, it now makes economic sense to start making improvements to paper mills domestically. For the time being, prices are low enough and demand is high enough to make money from the Chinese ban.



(Staub 2017)

However, that is a long-term solution and currently there is high demand not being met. As seen in the chart above, there is a drastic decrease in the volume of recyclables to China. Companies and municipalities have responded in various ways to keep up with the ever-changing price fluctuations of paper. Lancaster County, Pennsylvania, is increasing the collections cost of recycling for consumers by 3%. This is in direct response to the increase they have to pay to send their recycling to plants domestically instead of China. The cost increased 900% from \$4/ton going to China to \$40/ton staying domestic. The 3% increase to the consumer is to make up that difference (Tita 2018). Sacramento County, California, is also hurting. And while they haven't proposed any increases to their taxpayers yet, they are already feeling the pressures of the National Sword. Sacramento County was able to sell their recycling for \$1.2M last year. This year, because the price of recycling has declined radically, they are on

pace to owe \$1M (Tita 2018). That \$2.2M change is sure to trickle down to the taxpayers in one way or another. Municipalities elsewhere are responding like Friday Harbor, Washington, which stopped recycling pick-ups due to lack of a viable market (Staub 2017).

Private companies are in a state of flux as well. It is a sink or swim time for US recycling companies. While some are taking the opportunity of low prices to invest into new processes, others are cutting their losses. For example, when the National Sword campaign ramped up, Pacific Rim Recycling in California decided to slow down their processing in order to meet the stricter standards set forth by the Chinese. By slowing down the process, they had less volume go through and as prices dropped, it became less profitable. This went on to the point where they had to temporarily lay off workers. The plant is currently idle. As the President of Pacific Rim Recycling said, "The cost is impossible. We can't make money at it," Steve Moore said. "We quit accepting stuff" (Tita 2018).

Another California recycler is approaching the situation differently. Cal-Waste Recovery Systems is taking the opportunity of low priced mixed fibers to invest in infrastructure. They are investing more than \$6M in optical sorting equipment to increase processing. Still, the cost will be passed on to the public. Dave Vaccarezza, president of Cal-Waste Recovery Systems said, "It's going to cost the rate payer to recycle, they're going to demand we make our best effort to use those cans and bottles they put out" (Tita 2018). Pioneer Recycling in Portland, Oregon, has looked outside of China to take their recycling (Profita and Burns 2017). Countries such as India, Taiwan, Indonesia, Thailand, and Vietnam are taking more and more imports of recycling every day, though this still doesn't come close to the amount China imported (Gee 2018).

Still another approach is to stop single-stream recycling, which is the collection of recyclable materials (glass, paper, and plastics) in a single bin. While the single-stream approach gained popularity across municipalities in the late 1990s, it does not have the best results. While it is low cost, increases

public use rate, and the amount of recyclables increase, the contamination rate goes up as well. In essence, it's quantity over quality. Now, with new standards in place, there needs to be a focus of quality over quantity. This also has an effect of turning high-grade recycled paper to a lower quality by contamination. Waste Management's single stream recycling facilities have 2,000 tons come in and have to throw away 500 tons of that due to contamination (McEntee 2018). 25% of recyclables don't see the light of day post-consumer. Garry Penning, a spokesman for Rogue says, "If we don't get it clean, we're not going to be able to market it and if we can't market it unfortunately it's going to the landfill" (Albeck-Ripka 2018). More so, the higher the contamination rate, the more costs are passed on to those who process recyclables, such as MRFs and paper mills.

One final solution to their problems is companies are landfilling their recyclables. Rogue Waste, a recycler in Oregon, has so much extra recyclables they asked regulators to be able to send it to landfills. Laura Leebrick, an employee for Rogue Waste, says it best, "Right now, by definition, that material out there [bales of recyclables store in a parking lot] is garbage. It has no value. There is no demand for it in the marketplace. It's garbage" (Profita and Burns 2017). The state of Oregon lifted a ban on recyclables at landfills due to the excess supply of papers and plastics. Recology CleanScapes, in Seattle, Washington, stopped accepting glass, plastics, and mixed papers. This material went upstream to transfer stations in the San Juan islands, operated by Lautenbach Industries. Since there is no final destination for these materials, they de facto get landfilled (Staub 2017). Washington communities such as Skagit County, Walla Walla, Yakima, and College Place are landfilling certain recyclables, with College Place stopping curbside recycling temporarily (Rosengren 2018).

Another advantage of the change in markets is put best by Susan Robinson. We basically get to start anew on recycling; we get to emphasize its importance. As she puts it,

"We have the opportunity to help people understand why we're recycling. It's not because we have a landfill crisis. It's because recyclables create a valuable commodity in the manufacturing industry. That's what we need to be focusing on. It is not until we sell those materials for a value and not until they are made into a product offsetting virgin resources do we see any economic or environmental benefit at all. We have a great opportunity to re-educate the consumer about why we recycle, because we have completely lost sight of the reason why we do this" (McEntee 2018).

Perhaps this is another great opportunity for the industry.

Catalog of Paper Mills

In the Addendum to this report is a table and map of all paper mills operating in Washington and Oregon states (plus one mill on the Washington/Idaho border) as of May, 2018. This is meant to be a comprehensive snapshot of what mills exist in the PNW region. Noteworthy is that not every mill accepts post-consumer fiber, but the table includes details about each mill, with special attention paid to location and contact information for the mill, whether the mill accepts post-consumer paper fiber, and what specifications the mill has for accepting post-consumer material.

This catalog was compiled from several searches for businesses registered in the Reference USA database with North American Industry Classification System (NAICS) codes for paper or paperboard mills, cross-referenced with current wastewater and air quality permits on file with the Washington State Department of Ecology (WA DOE) and the Oregon Department of Environmental Quality (OR DEQ), and from resources provided through interviews with industry experts and the WA Office of Economic Development and Competitiveness. Each data value contains in parenthesis the most recent year for which its validity could be confirmed.

Recommendations

Based on this research, there are three immediate recommendations that King County could pursue in order to address problems in the current paper recycling market. The first would be the development of international markets. Another would be to educate consumers about the new state of recycling. A third would be to invest in domestic paper mills and implement a system that allows for increased local processing of recyclables. These are the best options given the current state of the market, under the assumption that China will not go back on their ban of imports.

While this is largely a recommendation aimed at private companies, King County could assist recyclers with information about international options. While China might be closing their doors, identifying other nations already equipped for an influx of recycling would help increase demand in the short run. This is a short-term solution that will help mitigate the excess supply of recyclables in the US market, and would reduce the amount of mixed paper being sent to landfills until a sustainable long-term solution is put into place. This can be done through a use of local, county, state, and federal government programs that deal with imports and exports of goods. Grants or tax breaks for exporting recyclables to certain countries could be put in place to ensure that the US is recycling as much as possible in the short-term.

Another strategy that King County could use to assist in this market transition is to consider a multi-stream recycling collection system. As stated before, multi-stream recycling collection typically has less than half the contamination rate of the cleanest commingled recycling program (Peek, 2013), and if King County were to cut its contamination rate, it would make it more financially viable for MRFs and other processors to send fiber to a wide variety of foreign or domestic mills. Within this time of market change, now would be a great opportunity to revisit commingled or single-stream recycling and move towards multiple stream recycling programs. According to paper mill contacts, glass is the least desirable

contaminant in bales of OCC or ONP, followed by plastic bags (Simmons, 2018). Simply removing glass or paper from the commingled stream and re-instating a multiple-stream collection system may vastly decrease contamination rates, reduce costs for MRFs and mills, while sending a message to residents and consumers that “not everything is recyclable” (Claugus, 2018). King County could lead the way in developing a new recycling program that cuts down on contamination of paper and plastics, and could potentially rally other neighboring counties and communities to adopt the same program. Educating consumer and the public would be necessary, and coinciding with the new recycling system would be a recycling education system that informs the public of why it is happening, what it means for them, what they can do, and how to do it. This might sound daunting to a region that has largely switched to a single-stream way of business, but if other counties and communities were to join, it could start a larger effort to clean up the entire region’s recycling stream. The Pacific Northwest has some of the highest recycling rates in the US, and if a successful transition from single to multi-stream recycling were to happen anywhere, it would be here.

Finally, the most direct way King County can help in the new recycling landscape is with grants and tax breaks. With the demand for paper recycling growing, now is the time to start investments in paper mills around the Pacific Northwest. That investment would come in the form of tax break and grants. It would cost \$10-40M to upgrade paper mills to process more recycling (Gee 2018). This would allow them to buy optical sorting machines, which would increase sorting capacity, and increase overall capacity. The price of paper is very low, which benefits investment; however, when the price of paper rises back to its more historic equilibrium, those companies will need reassurances of certain monetary value. Government can, and should, help to ensure that the mills are able increase their capacity.

There is a great need for standardization across the industry. Currently, every mill has different standards for minimum contamination rates and moisture contents, or they claim to follow the ISRI standards for paper bales. However, ISRI classifies certain materials as "outthrows," which are

"unsuitable" for a specific grade of paper, and others as "prohibited materials," which are described as "unusable" (USA Waste Paper Grades ISRI, 2016). Even within mills that claim to follow ISRI standards, there were still some discrepancies between paper mills as to what amount of outthrows and prohibited materials are allowed. The common phrase used to describe the preferred requirements for baled cardboard and paper was "as clean as possible" (Jay Simmons, NORPAC, 2018).

The ISRI Standards set in 2016 detail a wide variety of grades of paper waste and required specifications for each grade. These requirements appear to be reasonable and acceptable to both waste haulers and paper processors, and, if widely adopted, could remove some of the uncertainty about the quality of recycled paper. "As clean as possible" is a lofty, but unhelpful criterium, and encouraging local haulers, MRFs, and other paper processors to maintain ISRI standards will steady the moving target that many MRFs are currently chasing. If local governments and other contractors were to require that their recycling hauler bale paper into bales meeting ISRI requirements for contamination, there would be widespread adoption and enforcement of these standards.

Reaching out to paper mills who do not accept recycled mixed fibers would prove beneficial as a short-term solution. Right now, when the low price of reclaimed paper benefits those receiving and processing it, would be a good time to reach out and prospect these paper mills to allow them to take recyclables. Of course, the existing machinery and equipment may need to be re-fitted in order to handle recyclables, plus staff and crew would need to be trained to handle them as well. But if there were a low-price supply of paper that meets specific requirements for contamination and content, these mills would have a clearer target for re-fitting their equipment. However, reaching out to these mills could instantly increase capacity for recycled paper if the criteria are met.

Change Implications

If this recent market shift (some have called it a crisis) has taught us anything, it's that the patchwork industry of municipalities, haulers, and recycling processors cannot continue doing business as usual. They are not providing mills and manufacturers with adequately clean paper fiber, nor are they communicating effectively to consumers and marketers that a large percentage of what we place in our recycling bins is simply not recyclable in the current market. China's National Sword will affect every part of the paper recycling market, and adapting to this change will require action from every part of the market as well. While sorting facilities and mills may have been hit first by this change, the research seems to suggest that any stakeholder group, when working transparently and in conjunction with other stakeholders, can lead the way to a new method of doing things. Municipalities, haulers, and processors, however, since they work closely together, have similar interests, and are in direct contact with customers and manufacturers, have the best chance of leading a successful transition.

By considering the recommendations in this report, King County could lead the recycling industry towards a more collaborative, transparent, and system-based model. This would be a system in which the entire state or PNW region uses the same multi-stream collection process, and prices for recyclables (or possibly fees levied on marketers of non-recyclable or hard-to-recycle items) are consistent across all communities and are made transparent for all to see. With an initial investment in a new system guided by Extended Producer Responsibility principles and with tax or regulatory assistance for local paper mills, this change in the recycling market could eventually bring jobs and money to King County.

Next Steps

1. Keep track of what is going where.

Similar to what the State of Oregon is doing with their recycling program. They are allowing exceptions, in the forms of permits, that allow recyclers to dump at landfills. Part of that exception is to tell the state what materials they are seeking exceptions for and where it is being landfilled, as shown in the chart below. A running total of landfilled recyclables will be beneficial to have the data to improve arguments for potential programs and funding in the future.

To date, DEQ has concurred on the following:

Organization Name	Date	Materials Type	Frequency	Material Source Areas
Central Coast Disposal	9/27/2017	Residential commingled	One time	Florence
Hood River Recycle and Transfer Station	10/19/2017	Residential commingled	Ongoing	Hood River County
The Dalles Transfer Station	10/19/2017	Residential commingled	Ongoing	Wasco County, Sherman County, Gilliam County
Baker Sanitary Service	10/26/2017	Mixed Plastics	Ongoing	Baker City, Baker County
Southern Oregon Sanitation, Inc.	10/27/2017	Residential commingled	Ongoing	Grants Pass, Cave Junction, Rogue River, Gold Hill, Eagle Point, Shady Cove, Butte Falls, Jackson County, Josephine County
Pioneer Recycling Services	10/31/2017	Aseptic containers and cartons	Ongoing	Entire State of Oregon
Republic Services - Grants Pass	11/1/2017	Residential commingled	Not exercised	Grants Pass, Josephine County
Rogue Materials Recovery	11/2/2017	Residential commingled	Ongoing	Medford, Central Point, Jacksonville, Phoenix, Jackson County
Klamath County Solid Waste Division	11/3/2017	Door-to-door collected Comingled, scrap paper, corrugated cardboard, rigid plastic and #3-#7 plastic	One time	Klamath County
Waste Pro	11/7/2017	Residential commingled	Ongoing	La Grange, Island City

(Oregon.gov, 2018).

2. Educate the public

A common theme throughout the report is a lack of awareness from the public. Millions are unaware of the pain points of all facets of recycling, from the government, to the collectors, to the processors, to the mills. If certain products are hurting the quality and contamination rate of recyclables, which in turn hurts the bottom line of mills and MRFs, a ban of those certain products might be necessary in the short term. The public can help, especially those in the Pacific Northwest, who are typically more recycling savvy than the average American. A detailed look at examples mentioned in the Market Analysis can help guide. Also, an education

campaign, with the help of the Washington State Recycling Association (WRSA) and Washington Recycles Every Day (WRED) would further help to improve visibility into this matter.

3. Examine the effects of single-stream recycling

Another common theme throughout the report is a general disliking of single-stream recycling. MRFs and paper mills agree that the contamination from single-stream is too much. The costs that are saved by collectors (wages), municipalities (bins), and consumers (time), are simply passed down to those that are processing the material. With the help of the Department of Ecology and Department of Commerce, as well as representatives from collection and processing, King County should look at the societal cost of single-stream recycling. If there is no place for recyclables to go, cost savings up front won't matter.

4. Conduct research on regulations governing PCBs

PCBs are a leading concern in the processing of recyclables. Regulation, set forth at a federal level, limits the amount of PCBs in the byproducts of processing. The level is very strict, as PCBs are possible carcinogens and could be dangerous to the public and environment. However, this is not a product of current business practices. Mill and MRF operators are hurting because of past decisions made by manufacturers. Levels of PCBs are making the way through the eco-system from the 1970s. Mills are choosing virgin wood over recycled paper to ensure the PCBs meet the requirement. If Washington wants to increase paper recycling capacity, it needs to conduct the research into PCBs to see if the level is fair to businesses.

5. Enforce Universal Contamination Standards

In order to set clear targets for MRFs that would like to sell bales of paper locally, and for paper mills that would like to accept more post-consumer paper fiber, there need to be clear

and universal standards for each grade of reclaimed paper. These standards already exist in the form of the 2016 ISRI standards for baled scrap paper. King County could call on local recycling haulers, MRFs, and other paper processors to adopt these existing requirements for bales of reclaimed paper. Widespread adoption of the 2016 ISRI standards could quickly and easily reduce some of the confusion and ambiguity in the paper recycling market, thus encouraging stability and growth in the paper processing industry.

Conclusion

As one interviewee noted, this is “a profound opportunity to expand local markets and industry” (Claugus, 2018), and it would be a shame to miss out on it. If government entities like King County can work with haulers and processors, together they can create a system that sends more paper fiber to local mills and everyone can win. There are high up-front costs that are simply an inescapable part of the industry, but the change has come, and with it a need to invest in a new, more sustainable way of business. The existing patchwork method of local regulations and recycling requirements that change from county to county and from mill to mill will only get the region back into the crisis situation it’s in now, but if an investment is made towards a long-term sustainable industry model, there’s a chance that the industry will weather many market shifts to come without crisis.

References

Albeck-ripka, L. (2018, May 29). Your Recycling Gets Recycled, Right? Maybe, or Maybe Not. Retrieved from <https://www.nytimes.com/2018/05/29/climate/recycling-landfills-plastic-papers.html>

Baxi, R. (n.d.). National Reports. Retrieved from http://www.bir.org/?locale=en_US

Burnstien, T.[Telephone interview]. (2018, May 12).

Claugus, D. (2018, May 22). How Did We Get into this Mess & What Can We Do About it? Lecture presented at WSRA Conference in Blaine, WA.

Gee, D.[Telephone interview]. (2018, May 16).

Institute of Scrap Recycling Industries (ISRI). (2016) Guidelines for Paper Stock. Retrieved online from <http://www.ciparo.nl/wp-content/uploads/2014/06/USA-Waste-Paper-Grades-ISRI.pdf>

Langdon, A. (2018, May 23). Keynote Address. Lecture presented at WSRA Conference in Washington, Blaine.

McEntee, K. (2018, April 13). Market report: Mixed paper piling up. Retrieved from <http://paperstockreport.com/2018/04/13/market-report-mixed-paper-piling-up/>

Peek, K. (2013, August 28). How It Works: Inside The Machine That Separates Your Recyclables. Retrieved from <https://www.popsci.com/technology/article/2013-07/how-it-works-recycling-machines-separate-junk-type>

Profita, C., & Burns, J. (2017, December 09). Recycling Chaos In U.S. As China Bans 'Foreign Waste'. Retrieved from <https://www.npr.org/2017/12/09/568797388/recycling-chaos-in-u-s-as-china-bans-foreign-waste>

Pulp & Paper Mill Data and Costs | RISI. (2018, January 15). Retrieved from

<https://www.risiinfo.com/service/mill-data-costs/>

Rosengren, C. (2018, June 01). What Chinese import policies mean for all 50 states. Retrieved from

<https://www.wastedive.com/news/what-chinese-import-policies-mean-for-all-50-states/510751/#washington>

Staff, E. (2018, May 10). From Green Fence to red alert: A China timeline. Retrieved from

<https://resource-recycling.com/recycling/2018/02/13/green-fence-red-alert-china-timeline/>

Staub, C. (2017, October 24). China ban causes programs to cut collection. Retrieved from

<https://resource-recycling.com/recycling/2017/10/24/china-ban-causes-programs-cut-collection/>

Staub, C. (2018, April 17). Customs figures quantify falling Chinese imports. Retrieved from

<https://resource-recycling.com/recycling/2018/04/17/customs-figures-quantify-falling-chinese-imports/>

Tita, B. (2018, May 13). Recycling, Once Embraced by Businesses and Environmentalists, Now Under

Siege. Retrieved from [https://www.wsj.com/articles/recycling-once-embraced-by-businesses-and-environmentalists-now-under-siege-](https://www.wsj.com/articles/recycling-once-embraced-by-businesses-and-environmentalists-now-under-siege-1526209200?shareToken=std0172374a02848c188cc58d38f03798d&reflink=article_email_share)

[1526209200?shareToken=std0172374a02848c188cc58d38f03798d&reflink=article_email_share](https://www.wsj.com/articles/recycling-once-embraced-by-businesses-and-environmentalists-now-under-siege-1526209200?shareToken=std0172374a02848c188cc58d38f03798d&reflink=article_email_share)

United States, State of Oregon, State of Oregon Department of Environmental Quality. (2018, May 31).

[Www.oregon.gov](http://www.oregon.gov). Retrieved from State of Oregon Department of Environmental Quality

Appendix 1: Map of Operating Paper Mills

Map of Paper Mills in WA and OR State (2018)



- ◆ Mills that currently accept post-consumer fiber
- ◆ Mills that do not currently accept post-consumer fiber

Appendix 2: Call Script

Hi <<Contact Name>>,

Good <<morning/afternoon>>! I am contacting you on behalf of the King County Solid Waste Division. I am a MBA student at SeattleU currently enrolled in a Business Consulting course. My partner and I were assigned to work with the King County Solid Waste Division, under the guidance of our King County contact, Lisa Sepanski (cc'd on this email).

Our research is in response to the National Sword campaign implemented by China that discontinued the imports of mixed fibers.

Our goal is to assess the capacity of the paper recycling market in Washington State and the Pacific Northwest to determine if there are any opportunities for expanding mill capacity to accept the mixed fiber that was previously sent to China.

I was hoping we could schedule a brief interview to discuss your mill operations. We can conduct the interview by phone or email, whichever is your preferred method. I would be more than happy to send you a list of questions beforehand, as well.

*****Since our project is with King County, all matters discussed are subject to public disclosure.*****

Thanks for your time and I look forward to hearing from you.

* Scan for potential speakers for China Sword Task Force.

Best,

<<Name>>

<<Contact Info>>