Market and Technology Report

2020-2023

August 29, 2023

This report submitted pursuant to NYSDEC Permit Number 7-3142-00028/000011, Certificate to Operate the Onondaga County Resource Recovery Facility; NYSDEC Permit Number 7-3156-00047/00001 Permit to Construct and Operate the OCRRA Landfill; NYSDEC Permit Number 7-3148-00048/00001-0 Solid Waste Transfer Station-Ley Creek and NYSDEC Permit Number 7-3142-00036/00001-0 Solid Waste Transfer Station-Rock Cut Road. Prepared in accordance with NYCRR Part 360-1.9(f).

Submitted To:
New York State Department of Environmental Conservation

Submitted By:
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Introduction

The following report includes an analysis of what markets exist for materials that are currently accepted in Onondaga County's curbside recycling program. The report also includes a review of developing technologies that result in the creation or enhancement of economic markets for materials that are not currently required to be separated from the waste stream.

Current Recycling Program in Onondaga County

Onondaga County currently has a population of approximately 473,000, with over 197,000 occupied households. The solid waste management system is managed by the Onondaga County Resource Recovery Agency (OCRRA) on behalf of the Planning Unit, Onondaga County. OCRRA serves 33 of the 35 municipalities of Onondaga County with quality programs and sound waste solutions. OCRRA's award-winning, integrated solid waste program continues to exceed established recycling goals and provide safe and environmentally appropriate waste management. OCRRA funds the recycling program and other operations through disposal tip fees supplemented with revenues from the sale of electricity, and grant funding from the New York State Department of Environmental Conservation.

OCRRA has a strong recycling program due to its commitment to fund the processing and marketing of recyclables, its ability to maintain long-term contracts for services, including a contract with Waste Management-Recycle America (WM-RA) for services at the Liverpool material recovery facility (MRF) and its comprehensive and innovative public education campaign.

The following materials are currently collected in Onondaga County's curbside recycling program.

- Office Paper and Discarded Mail
- Newspapers and Magazines
- Corrugated Cardboard, Brown Paper Bags, Paperboard, Pizza Boxes
- Glass Food and Beverage Containers
- Metal Food and Beverage Containers
- Aluminum Foil
- Aerosol Cans
- Plastic Bottles, Jugs and Jars
- Plastic Dairy Tubs

Market Analysis for Non-Hazardous Solid Waste:

OCRRA does not collect, process or market the materials that are collected from the curbside recycling program. OCRRA has a contract agreement with Waste Management-Recycle America (WM-RA) to process and market curbside recycling at the WM owned and operated material recovery facility in Liverpool, NY. The contract agreements from 2020 to 2022 included agreed upon adjustments to Mixed Paper and Aluminum commodity values. These adjustments were eliminated in the 2023 contract. The recycling market information, by commodity type from 2020-June 2023 is described below, incorporating the adjustments for Mixed Paper and Aluminum for 2020-2022. Figures showing the market value of each commodity per ton are in Appendix A.

Old Corrugated Cardboard (OCC)

OCC collected from Onondaga County's curbside residential recycling program is marketed to pulp and packaging manufacturers in New York State. In 2020, the average value per ton of OCC was $64/ton. In 2021, this value nearly doubled, with an average value per ton of OCC reaching $132. In 2022, the average value decreased to $109 per ton of OCC. As of June 2023, the average value of a ton of OCC is $43/ton.

Mixed Paper

Mixed Paper includes items like newspapers, magazines, catalogs, paper and mail collected from Onondaga County's curbside residential recycling program. Mixed Paper is marketed to paper mills in Ohio and Canada. In 2020, the average value per ton of Mixed Paper was -$12 with nine months of negative market value. In 2021, the market value per month was a positive dollar value with an average value per ton of $41. In 2022, the market value was positive until September 2022, where it dipped into the negative, giving a yearly average of $25/ton. As of June 2023, the average value of a ton of Mixed Paper is $8/ton.

Aluminum Cans

Aluminum cans collected from Onondaga County's curbside residential recycling program are marketed to aluminum can manufacturers in the southern United States. In 2020, the yearly average value per ton of aluminum was $427. In 2021, this value more than doubled, with a yearly average value per ton of aluminum reaching $938. In 2022, the market value continued to increase, with a yearly average value of $1,293 per ton. As of June 2023, the average market value of a ton of aluminum is $1,367.

Steel/Tin Cans

Steel cans collected from Onondaga County's curbside residential recycling program are marketed to steel mills in various domestic locations, depending on demand. Densified steel is repurposed into low grade products like appliances and rebar. From 2020 to 2023, the yearly averaged value per ton of steel has remained stagnant at $15.

Natural High-Density Polyethylene (Natural HDPE)

Plastic jugs that contain items like milk, juice, detergent, water can be made of Natural HDPE. Natural HDPE collected from Onondaga County's curbside residential recycling program is marketed to plastic mills in the southeastern United States and is used to make new bottles and jugs. In 2020, the average value per ton of Natural HDPE was $1,050/ton. In 2021, this yearly average increased with an average market value per ton of HDPE reaching $1,846. In 2022, the average value decreased to $1,081 per ton of Natural HPDE. As of June 2023, the average value of a ton of Natural HDPE is $1,457.

Colored High-Density Polyethylene (HDPE)

Plastic jugs that contain items like milk, juice, detergent, water can be made of Colored HDPE. Colored HDPE collected from Onondaga County's curbside residential recycling program is marketed to plastic mills in the southeast United States and is used to make construction pipe. In 2020, the average market value of colored HDPE was $198/ton. In 2021, from June to October the market value of Colored HDPE was over $1,000 a ton, bringing the average yearly market value to $865. In 2022, the average value decreased to $430 per ton of colored HDPE. As of June 2023, the average value of a ton of colored HDPE is $305.

Polyethylene terephthalate (PET)

Plastic bottles that contain items like beverages, soap, and shampoo are made of PET. PET collected from Onondaga County's curbside residential recycling program is marketed to plastic mills in the southeast United States to be used to make new beverage containers or spun into thread to manufacture textiles and carpeting. In 2020, the average value per ton of PET was $188. In 2021, this value more than doubled, with an average value per ton of OCC reaching $401. In 2022, the market value was higher in the first half of 2022, bringing the yearly average to $543/ton. As of June 2023, the average value of a ton of PET is $297.

Rigid Plastics

Rigid Plastics like old recycling containers, plastic buckets and laundry baskets are not accepted in the curbside recycling in Onondaga County. However, there is currently a market for rigid plastics that incidentally end up in recycling. Currently, Rigid Plastics collected from Onondaga County's curbside residential recycling program is marketed to plastic mills in the southeast United States to be used in creating new plastics. In 2020, rigid plastics collected at the material recovery facility were not separated as marketable material. In February of 2021, rigid plastics began to be marketed at $80/ton, Since April 2021, the value per ton of rigid plastic has remained stagnant at $100.

Polypropylene

Stackable Tubs that contain dairy or dairy alternatives items are made of polypropylene. Polypropylene collected from Onondaga County's curbside residential recycling program is marketed to plastic mills in the southeast United States and is used in personal care, automotive, agriculture, paint & coatings, recreation, and flexible packaging/sheet applications

industries. In 2020, polypropylene collected at the material recovery facility were not separated as a marketable material. In February of 2021, polypropylene was separated to be marketed. In 2021, the average market value of polypropylene was $685/ton. In 2022, this value decreased with an average value per ton of polypropylene at $453. As of June 2023, the average value of a ton of polypropylene is $194.

Glass

Glass bottles and jars that are collected in the curbside recycling program are crushed and dirty from the collection process and are not able to be turned into new glass items. Collected glass then becomes a cullet material that is used as Alternate Daily Cover at New York State Landfills. There is no market for this material, and this material is moved to the landfill at cost to OCRRA. In 2020, the average cost to manage a ton of glass was $28.21. In 2021, the average cost to manage a ton of glass was $26.05. In 2022, the average cost manage a ton of glass was $29.31. As of June 2023, the average cost to manage a ton of glass is $27.62.

The material recovery facility installed a glass breaker at the front of the conveyer belt system, in an effort to produce a cleaner cullet material. This material may be able to be used in construction and asphalt projects, depending on market demand.

Review of Developing Technologies and Markets

The decision concerning what materials to recycle involves a number of factors. They include the ease with which people can sort and prepare the items for recycling; the cost and feasibility to collect the materials at the curb and sort at the MRFs; and, most importantly, the long-term stability of the market for the sale of the material. Below is a discussion of various materials that are not currently included in OCRRA's curbside recycling program or are included on a limited basis.

Expanded Polystyrene (Styrofoam)

According to the 2019 Waste Quantification and Characterization Study of OCRRA's curbside recycling waste stream, 0.1% of the annual tonnage of curbside recycling is polystyrene, about 56 tons.

There are currently companies (e.g., GREENMAX) who have developed Styrofoam (expanded polystyrene) densifiers. These densifying machines break down pieces of packaging Styrofoam into "EPS beads." These beads are separated by the machine into reusable and non-reusable material, and the reusable beads are mixed to manufacture new Styrofoam products (EPS Recycling System- GREENMAX). Machines like this can cost $20,000 to purchase, not including operating and energy costs.

Recycling expanded polystyrene (EPS) is not economically nor organizationally feasible, when considering the low volume (56 tons) that is found in the county's solid waste. EPS is not sorted and separated at the material recovery facility, so it would have to be separated at a transfer

facility. EPS recyclers can only accept material that is clean and has no contamination, making food containers and coffee cups unacceptable. EPS material is also mostly air and would take up a large footprint of any facility while being stored to ship or densify. The EPS material, densified or not, is very light, unstable and expensive to haul, making transportation difficult (Styrofoam).New York State also passed the Expanded Polystyrene Foam Container and Polystyrene Loose Fill Packaging Ban effective in 2022, which will reduce the amount of EPS in the waste stream by eliminating it from the source (Go Foam Free). While recycling is not a feasible option for EPS, OCRRA encourages residents, businesses and institutions to examine ways in which they can use less of this material by eliminating it altogether, reusing it, or finding a recyclable alternative.

Polyvinyl Chloride, Polystyrene, Polycarbonate and Other Plastics (#3, #6 and #7 Plastics)
Plastic resins #3, #4, #6 and #7 are not currently collected in OCRRA's curbside residential recycling program. According to the 2019 Waste Quantification and Characterization Study of OCRRA's curbside recycling waste stream, 0.3% (124 tons) of the annual tonnage of curbside recycling is plastics #3, #6, #7. Collecting this relatively small amount of material would increase the cost of recycling by requiring more sorting and storage at the material recovery facility.

The demand for these plastics is not currently stable in the long term and there are few processing facilities for these materials. These plastic types contain many different shapes and sizes, which would require sorting items into several different categories. Storage at the material recovery facility is limited, and it would take several months to have a full truckload of material to ship, even if there was a market for this material.

Polyvinyl Chloride (PVC) is difficult to recycle and must be separated from other types of plastics during a typical mechanical recycling process, to avoid cross contamination from PVC's harmful additives and by-products (Fagnani). While chemical recycling processes allow for the separation of the plastics into their individual monomers or polymers, these processes are still being studied and developed in New York State.

While recycling is currently not a feasible option for these types of plastics, OCRRA encourages residents, businesses and institutions to examine ways in which they can use less of this material by eliminating it altogether, reusing it, or finding a recyclable alternative.

Low-Density Polyethylene (LDPE) and Linear Low-Density Polyethylene (LLDPE) Plastics
Low-Density Polyethylene (LDPE) and Linear Low-Density Polyethylene (LLDPE) plastics are commonly used in the manufacturing of film plastics, including plastic bags, shrink wrap, pallet wrapping, and frozen food and produce bags. This material is not currently accepted in OCRRA's curbside recycling program. OCRRA currently educates residents to bring acceptable film plastics to big-box grocery or retail stores, like Wegman's and Tops. These locations have drop off programs through companies such as Trex, that recycle acceptable film plastics into plastic lumber that can be used in decks and outdoor furniture. These programs help to keep plastic bags and other film plastics out of the trash and provide an outlet for recycling separate from the curbside program.

These plastics pose problems that hinder them from currently being included in OCRRA's residential recycling program. They come in a variety of shapes and sizes, and flat plastics typically are sorted as paper in material recovery facilities (contaminating finished paper bales) due to their light, two-dimensional shapes. In addition, plastic bags mixed with other curbside recyclables cause problems with sorting machinery, which cost time and money to remedy. Markets for the majority of LDPE materials are for plastic film wrap, which is required to be uniform, clean, dry and uncontaminated. This is difficult to achieve in any sort of residential collection, as this film is collected from multiple sources and has many opportunities to become contaminated with food or other unwanted materials.

In 2023 the consulting firm Resource Recycling Systems (RRS) published a report summarizing their findings from a Pennsylvania TotalRecycle material recovery facility (MRF) pilot program to accept flexible plastic packaging (FPP) from their curbside collection program. This program involved funding from the American Chemistry Council and United States Department of Energy and several equipment upgrades to the TotalRecycle MRF in Pennsylvania. Three high-end optical sorters used to eject FPP from fiber lines and a fourth optical sorter cleaned up the resulting FPP stream by ejecting any remaining fiber after the three lines joined. A flex/ rigid separator was also installed to separate rigid items, such as containers, from the FPP stream. Since the program began the MRF has generated 1,559 bales of FPP, which are then sold under the commodity title "rFlex" to end markets including roof cover board manufacturers such as "Kelly Green Products." RRS's lifecycle assessment found that "manufacturing one piece of roof cover board using 100% of the rFlex bale produces about 3.54 kg of CO_2e emissions. Compared to its market comparator, gypsum drywall, rFlex roof cover board can reduce carbon footprints by 53% per board." The RRS team concludes that "flexible packaging manufacturers have a significant opportunity to work with MRFs and the paper industry to justify the equipment upgrades that will increase the quantity and quality of post-consumer recyclables supply for post-consumer recycled content products." (Graff, 2023)

Textiles

Textiles are not accepted in OCRRA's curbside recycling program. Textile recycling requires the material to be clean and dry, which would not be feasible when textiles are included with mixed recycling. The current material recovery facility is also not able to process and separate clothing for recycling, and it would tangle and wind up around the sorting equipment and cause unsafe conditions for the machinery and employees.

Separate from OCRRA's curbside program there are programs for community members to drop off textiles for recycling. Rescue Mission and Salvation Army, along with other smaller charitable donation centers, collect old clothes and textiles at drop-off locations throughout Onondaga County. Rescue Mission locations accept any textiles, regardless of condition, and market unwearable/sellable clothes to textile buyers to be turned into new materials like pillow stuffing and rags. OCRRA informs the public of these donation centers and helps support the mission of these charities by providing credit towards their trash fees based on the amount of donations they collect.

Food Waste

The 2019 Waste Quantification and Characterization Study reported that annually there is over 60,000 tons of food waste in the municipal solid waste stream. This is over 20% of the material found in the trash.

OCRRA currently operates an extended aerated static pile system at our Amboy Compost Site. This facility is permitted by the New York State Department of Environmental Conservation to accept up to 10,000 tons of food waste annually. OCRRA accepts food scraps from local institutions, restaurants, and food processors. The Amboy Compost Site generates a high-quality finished compost product to be added back to the community's gardens and soil. OCRRA's Amboy Compost Facility processes between 2,000-4,000 tons of food scraps each year. The volume of food scrap material collected at the compost site could potentially be increased by purchasing a depakaging machine. Depakaging machines allow compost sites to accept food scraps in original, non-compostable containers and plastics. These machines would depackage the material and separate the food scraps from the non-compostable materials. This would allow more potential commercial customers who have food items in containers to bring their items to the compost site for composting.

A depakager machine would cost between $400,000 and $600,000 and require at least two people to operate. The machine would also require valuable land space at the facility (Cooker Composting and Consulting). Depakagers work more effectively in anaerobic digestion systems, which OCRRA does not currently operate. The byproduct of machine operated depakaging, a thick slurry is not currently able be managed at the compost facility.

Currently, OCRRA accepts a few loads of packaged material a week and has an ARC of Onondaga employee hand separate compostable materials from trash and packaging. This provides OCRRA a higher quality organic material to add to our compost equation. Hand depackaging allows for comprehensive removal of potential plastic contaminants (which must be disposed as trash).

Municipal Solid Waste (MSW) Combustor Ash

Municipal solid waste (MSW) combustor ash is the by-product that is produced during the combustion of municipal solid waste in solid waste combustor facilities, including the Onondaga County Resource Recovery Facility (OCRRF). Modern municipal combustor ash facilities have improved and complex furnace designs, which help to achieve better burnout and reduced organic content in the combined ash product, generally achieve better burnout and have reduced organic content in the ash product (FHWA). The ash by-product at the OCRRF is currently landfilled at New York State landfills. In 2022, 78,043 tons of MSW combustor ash was brought to landfills from OCRRF, after valuable ferrous and nonferrous metal was removed.

MSW combustor ash has been used in highway construction, with specific processing requirements. Municipal waste combustor ash has been tested for use as an aggregate substitute in asphalt paving mixes, to replace a sand-size or fine aggregate material. It has also been used as a granular base in road construction, fill material and as embankment material in

European countries for several decades (FHWA). These practices have not yet been implemented in New York.

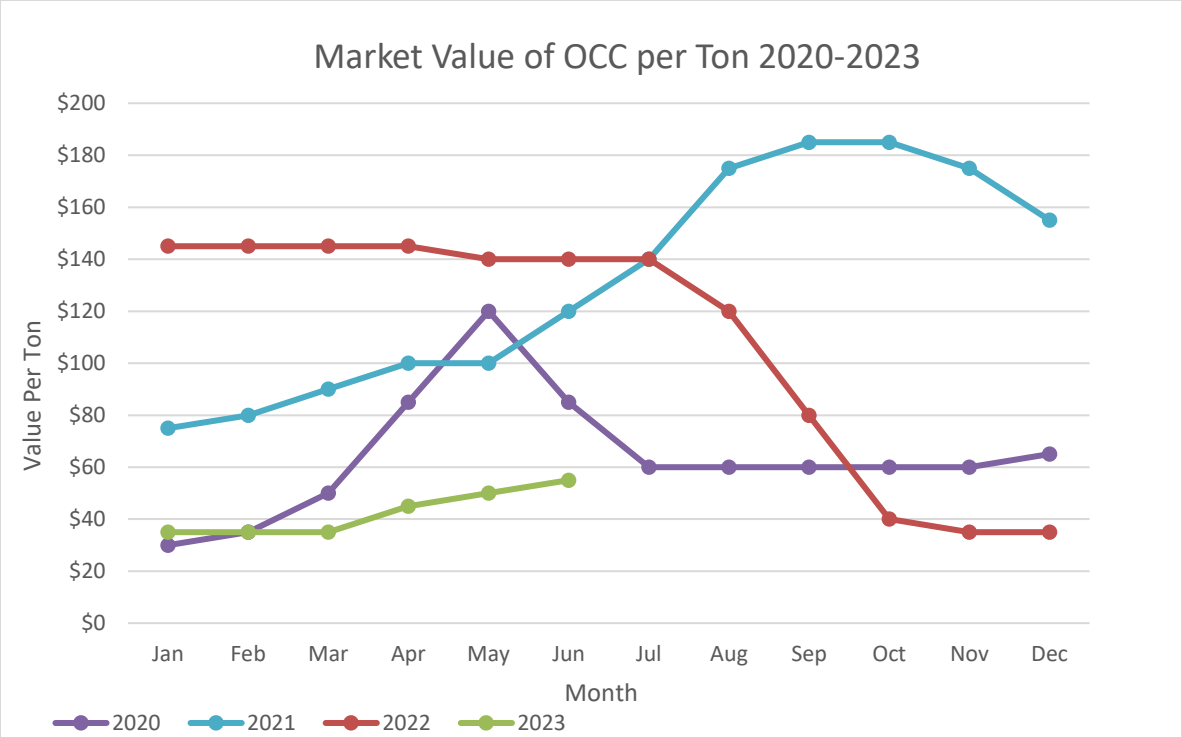
Conclusion

OCRRA's recycling program continues to evolve each year as the waste stream changes, as markets fluctuate, and as new technology emerges. OCRRA continually evaluates materials to determine the most environmentally sound and economically feasible methods of keeping valuable materials out of the trash and put back into circulation.

Appendix A

Market Value by
Commodity Type

January 2020- July 2023


Market Value of OCC per Ton 2020-2023
$200
$180
$160
$140
$120
$100
$80
$60
$40
$20
$0
Value Per Ton
Jan
Feb
Mar
Apr
May
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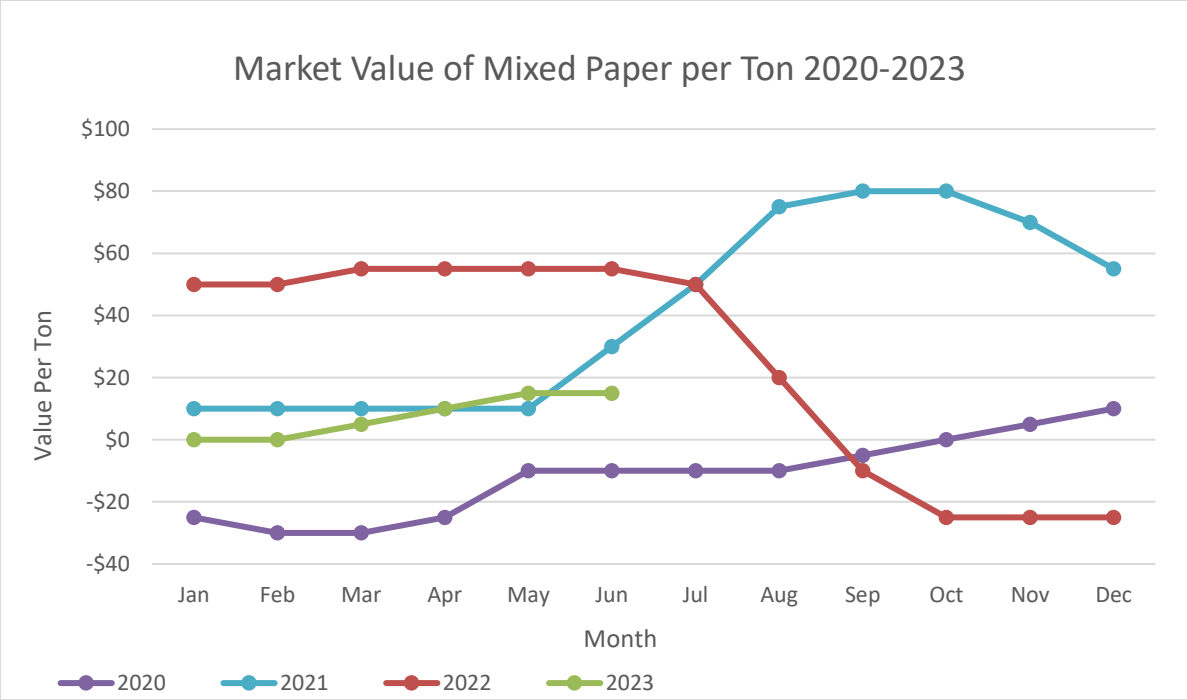
Sep
Oct
Nov
Dec
Month
2020
2021
2022
2023


Market Value of Mixed Paper per Ton 2020-2023
$100
$80
$60
$40
$20
$0
-$20
-$40
Value Per Ton
Jan
Feb
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Apr
May
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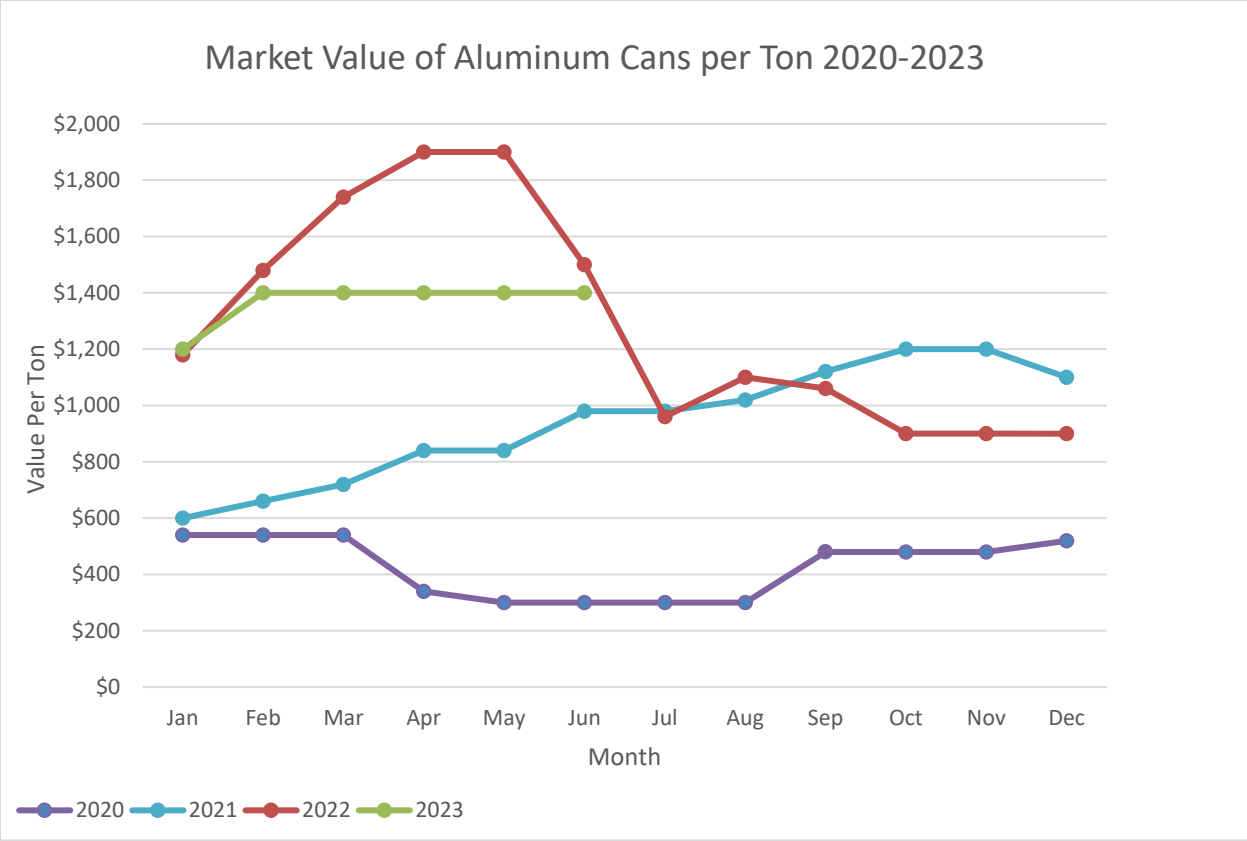
2020
2021
2022
2023


Market Value of Aluminum Cans per Ton 2020-2023
$2,000
$1,800
$1,600
$1,400
$1,200
$1,000
$800
$600
$400
$200
$0
Value Per Ton
Jan
Feb
Mar
Apr
May
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Jul
Aug
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Nov
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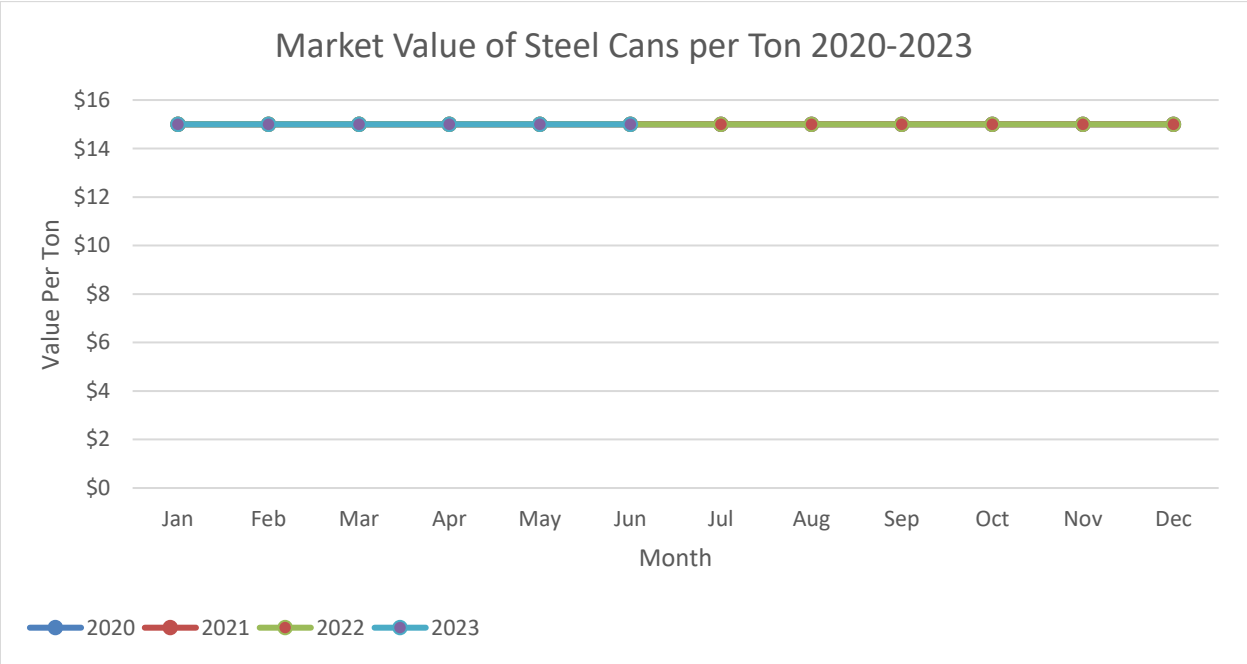
Month
2020
2021
2022
2023


Market Value of Steel Cans per Ton 2020-2023
$16
$14
$12
$10
$8
$6
$4
$2
$0
Value Per Ton
Jan
Feb
Mar
Apr
May
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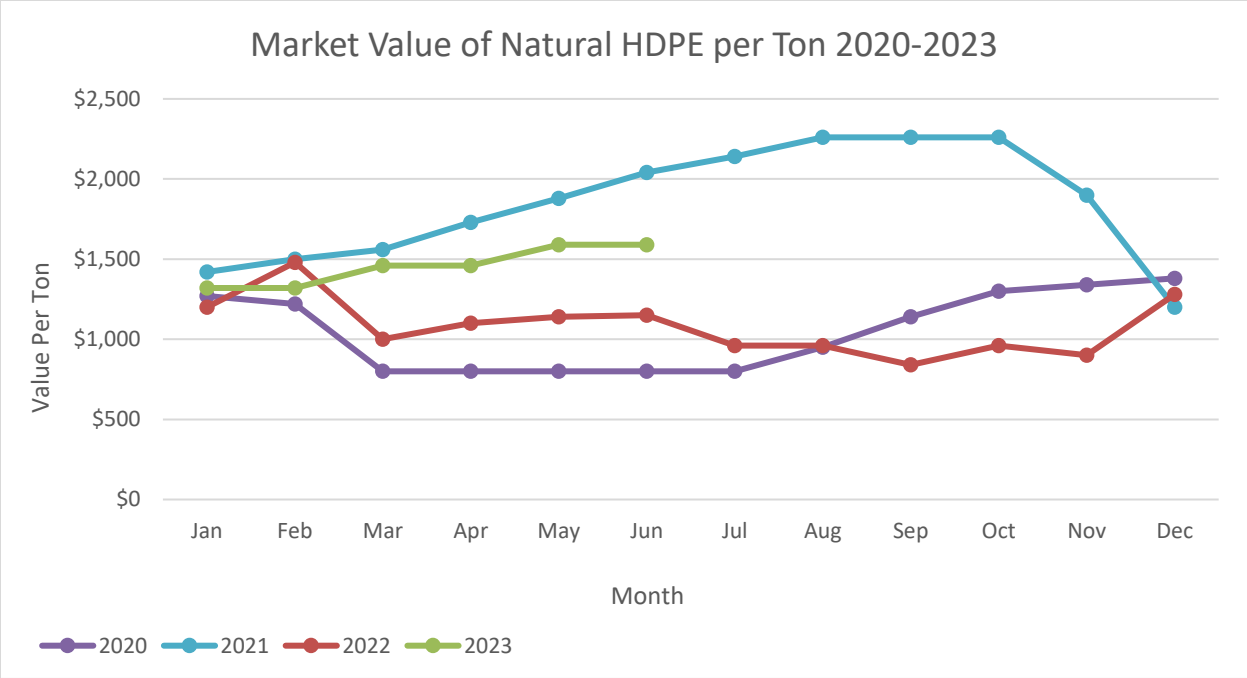
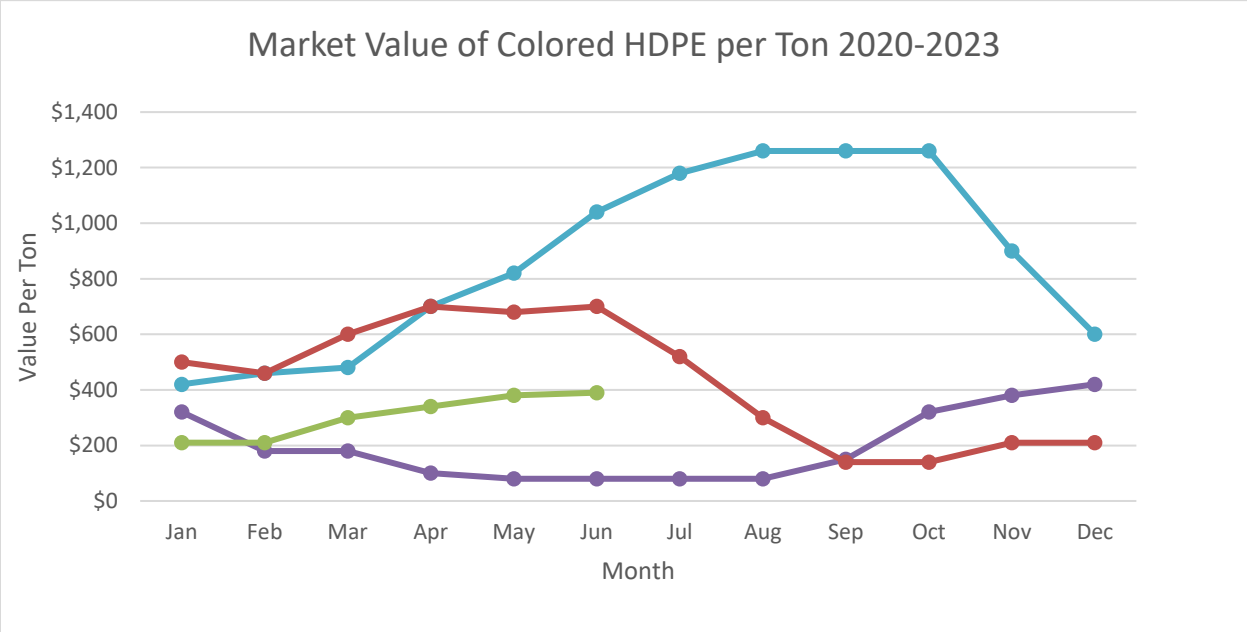
Jul
Aug
Sep
Oct
Nov
Dec
Month
2020
2021
2022
2023


Market Value of Natural HDPE per Ton 2020-2023
$2,500
$2,000
$1,500
$1,000
$500
$0
Value Per Ton
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month
2020
2021
2022
2023


Market Value of Colored HDPE per Ton 2020-2023
$1,400
$1,200
$1,000
$800
$600
$400
$200
$0
Value Per Ton
Jan
Feb
Mar
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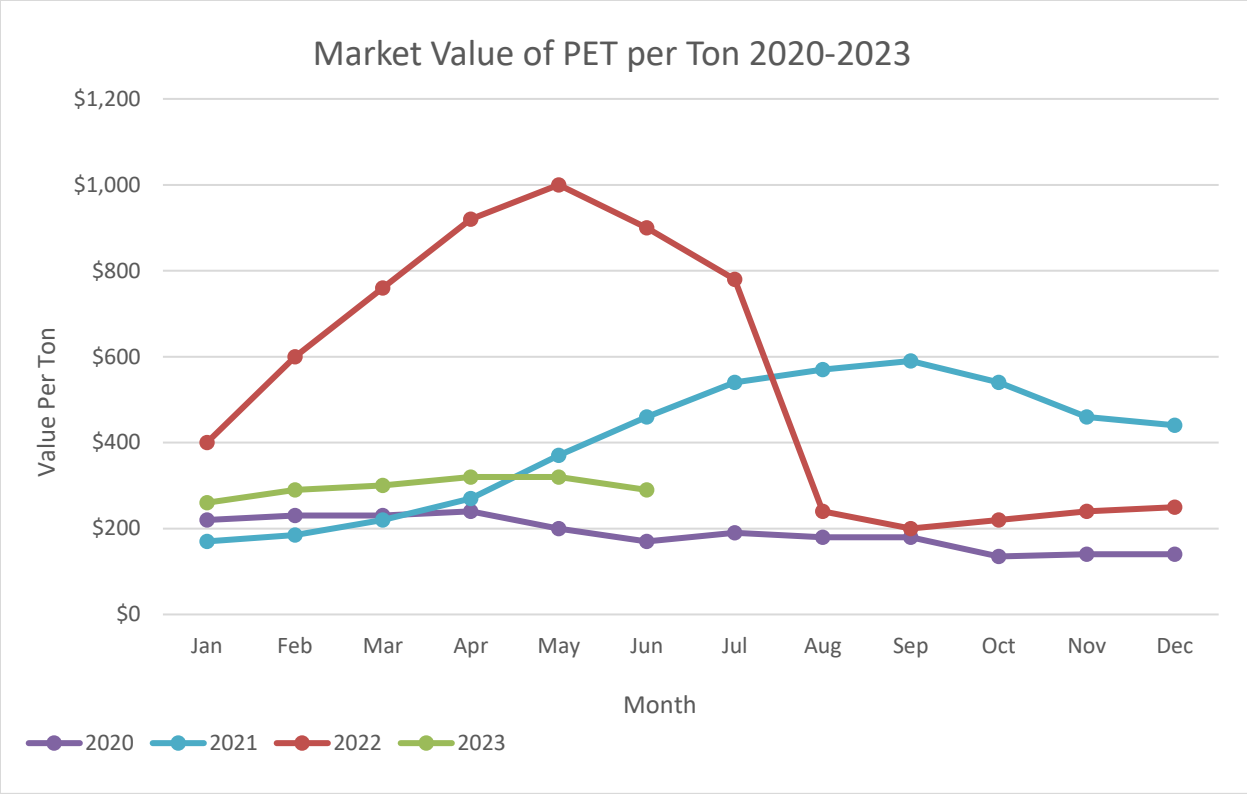
Oct
Nov
Dec
Month


Market Value of PET per Ton 2020-2023
$1,200
$1,000
$800
$600
$400
$200
$0
Value Per Ton
Jan
Feb
Mar
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May
Jun
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Sep
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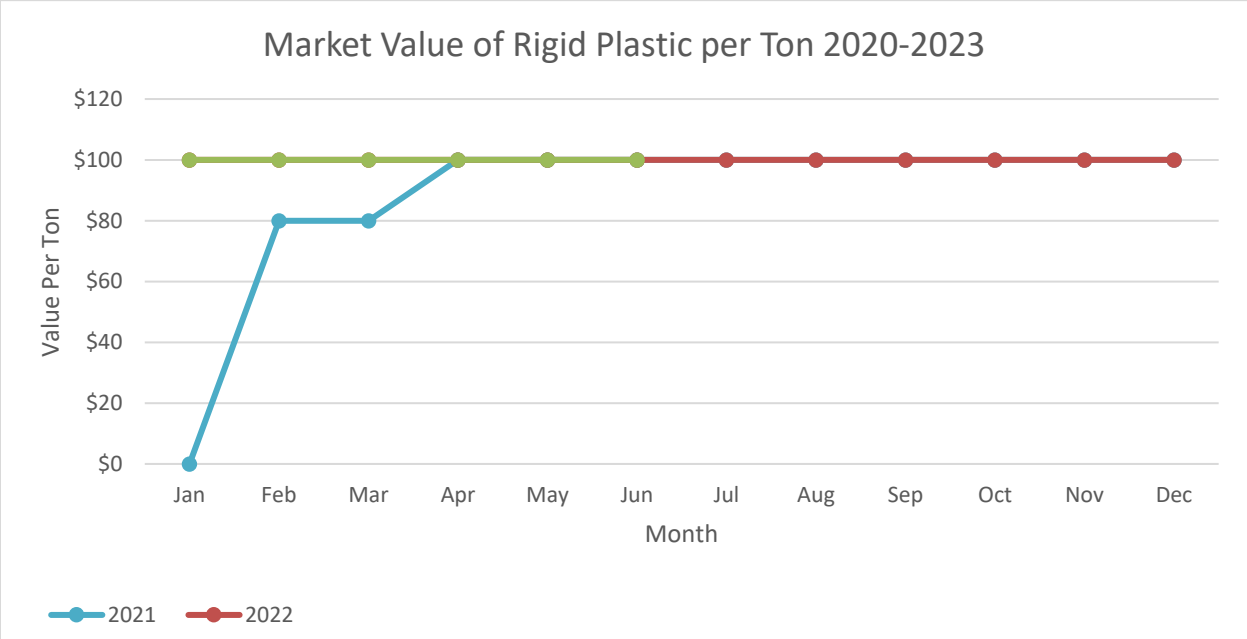
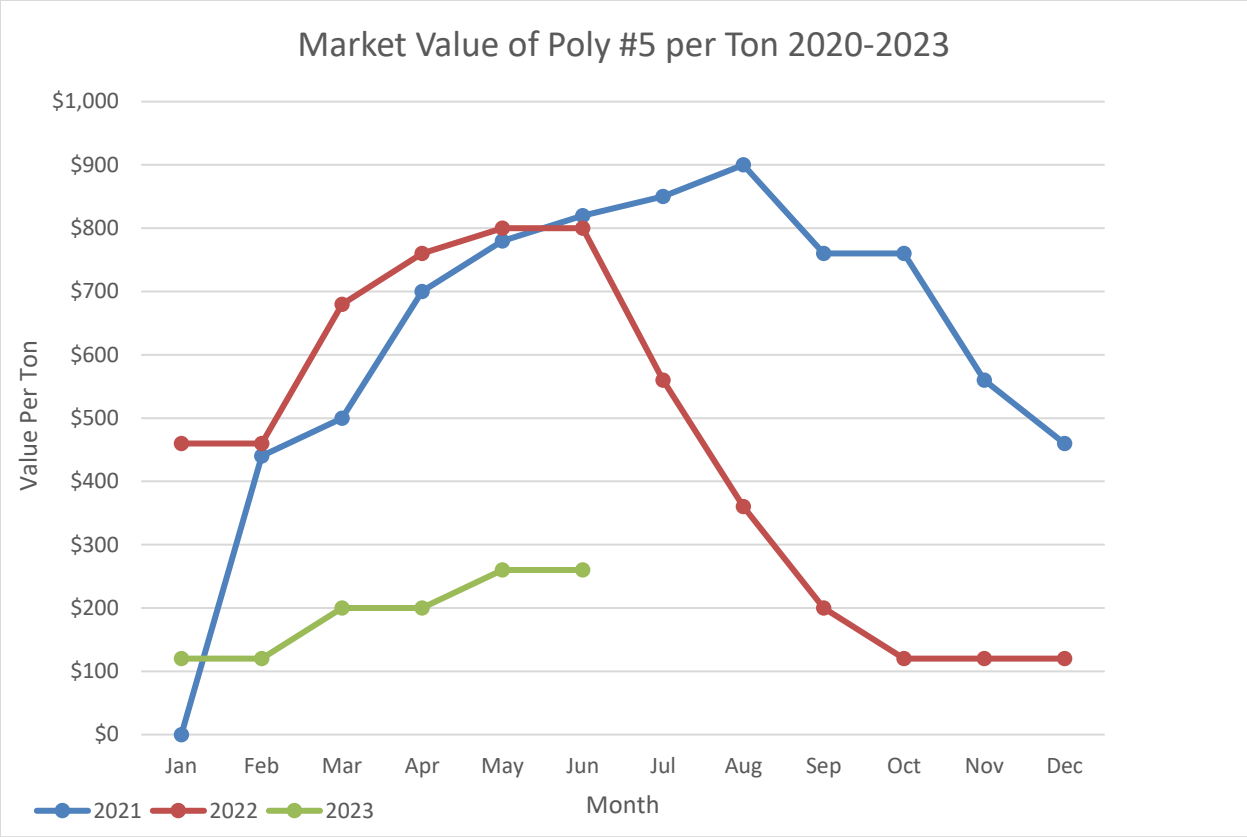
Dec
Month
2020
2021
2022
2023


Market Value of Rigid Plastic per Ton 2020-2023
$120
$100
$80
$60
$40
$20
$0
Value Per Ton
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month
2021
2022


Market Value of Poly #5 per Ton 2020-2023
$1,000
$900
$800
$700
$600
$500
$400
$300
$200
$100
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Value Per Ton
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Apr
May
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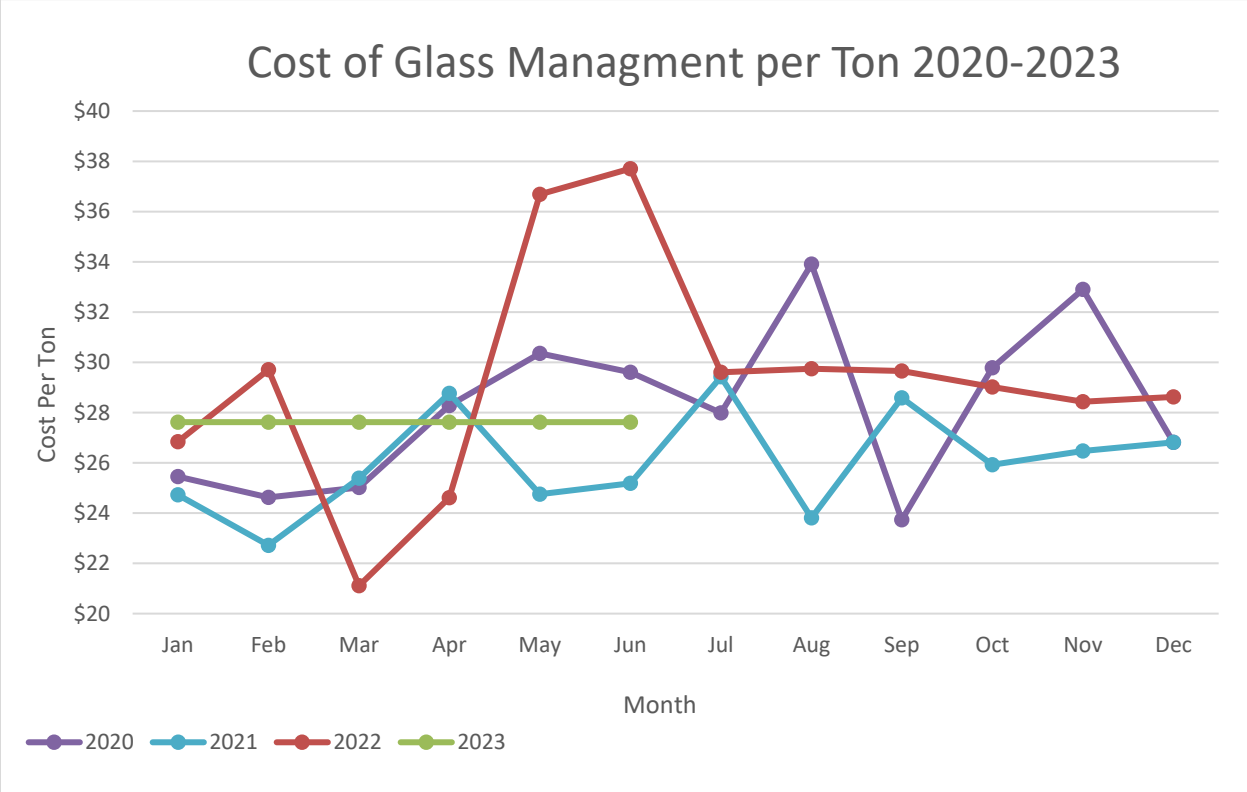
Month
2021
2022
2023


Cost of Glass Managment per Ton 2020-2023
$40
$38
$36
$34
$32
$30
$28
$26
$24
$22
$20
Cost Per Ton
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month
2020
2021
2022
2023

Appendix B

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Works Cited

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