

2021 NY Federation Virtual Conference

# The Importance of Recycling End Markets: Impact of China's National Sword program on Plastic Secondary Markets

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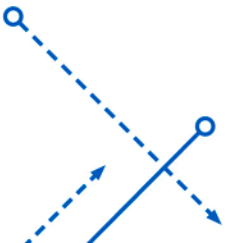
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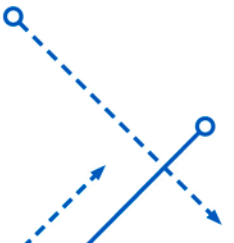


Source: <https://www.governor.ny.gov/news/governor-announces-new-partnerships-suny-schools-reduce-waste-and-improve-recycling-across-new>

## University at Buffalo to receive \$1.9 million from New York State DEC to research recycling programs

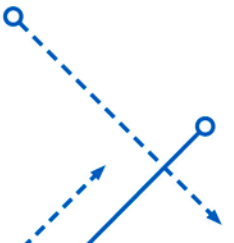
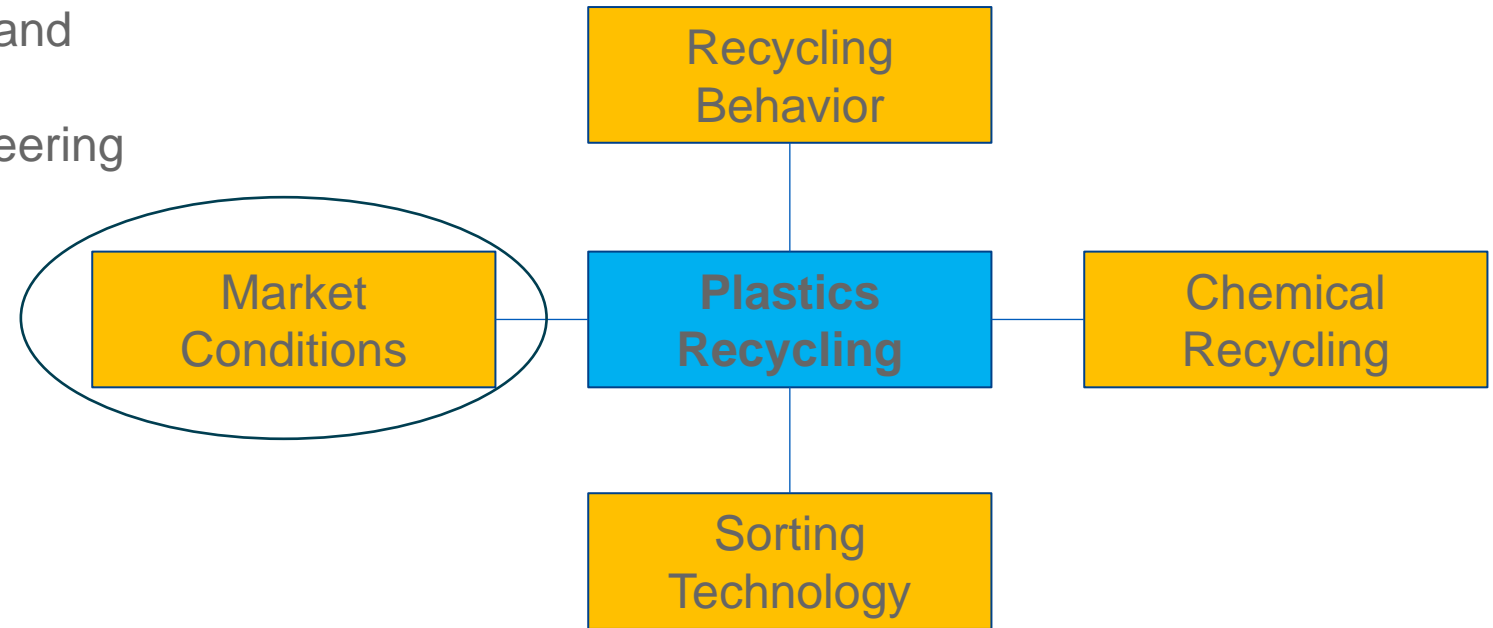


Source: <https://www.wkbw.com/news/state-news/university-at-buffalo-to-receive-1-9-million-from-new-york-state-dec-to-research-recycling-programs>



A multidisciplinary team consisting of faculty and students from:

- Civil, Structural, and Environmental Engineering
- Chemical and Biological Engineering
- Computer Science and Engineering
- Chemistry
- Environment and Sustainability
- Communications
- School of Management
- RENEW Institute
- Sustainability Office



## Key questions

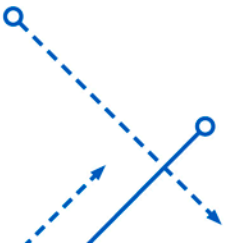
1. *How has China's National Sword policy impacted plastic secondary material markets?*
2. *Is there sufficient processing capacity in NYS for all types of recyclable plastics (#1-#7)? Is additional capacity available if needed?*
3. *Are there any limitations in accessing that additional capacity for NYS sourced material? Does it vary for different plastic types? Is there a need or benefit to develop capacity in NYS to enhance additional recovery of these plastics?*



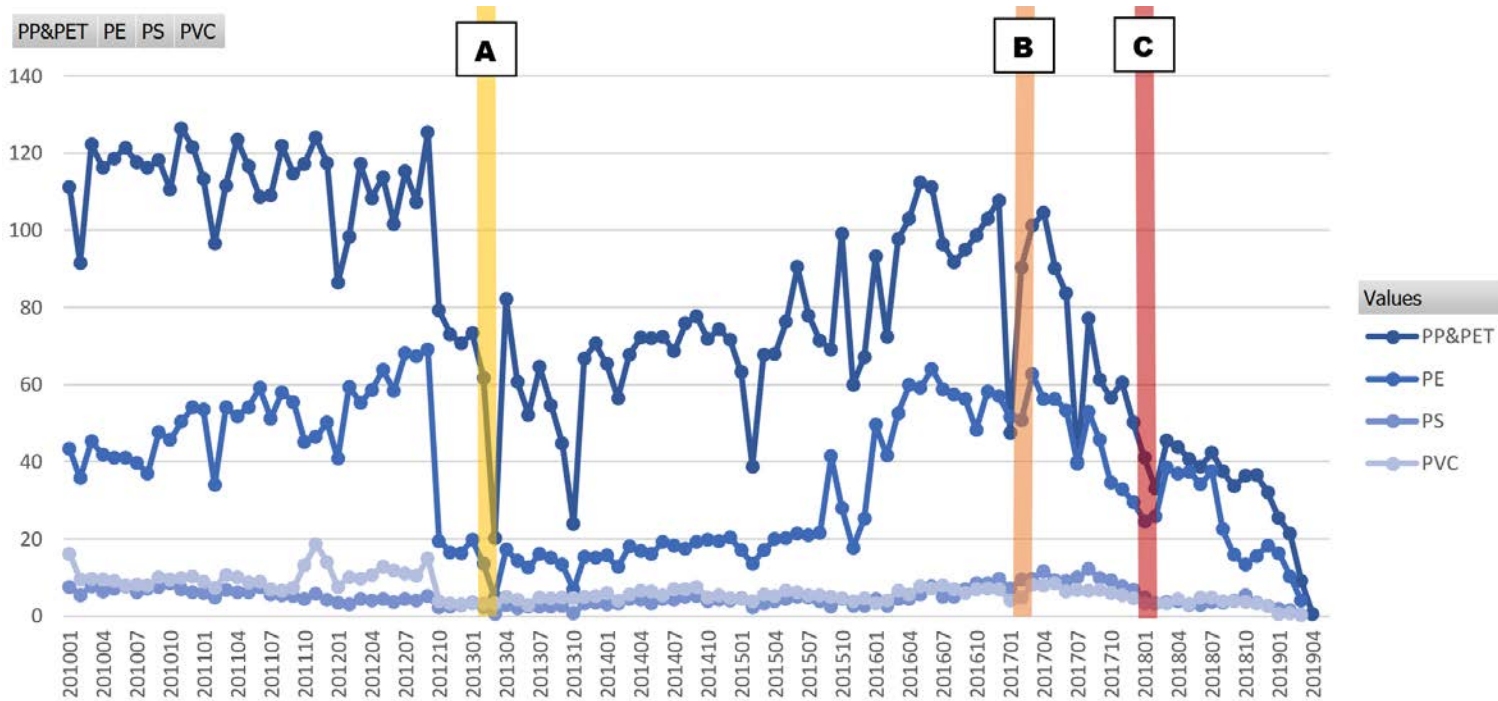
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## Total U.S. Plastic Waste Exports (2010-April 2019), thousands of tons



February 2017: National Sword announced

This Chinese action has [a specific focus on halting smuggling operations](#) meaning those groups using illegal permits to import materials. Inspection scrutiny is directed toward bales of low grade plastics as well as paper with high moisture content.

March 1, 2018: Contaminant crackdown takes effect

The 0.5 percent contamination limit in imported loads takes effect for most recyclables that are not banned outright. Since 2005, this has officially been the limit for plastic imports, and it's a relatively modest reduction from the previous official 1.5 percent contaminant limit for paper imports. But the previous standard was not tightly enforced, and it's widely acknowledged that actual contamination in imports ran much higher. This time, Chinese authorities say they will strictly enforce contamination limits.

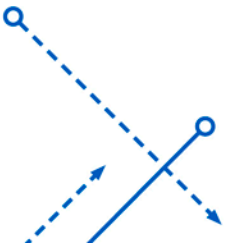
- (A) "Green Fence" Policy (February 2013)
- (B) "National Sword" Policy announcement (February 2017)
- (C) "National Sword" Policy enforcement (March 2018)

## Focusing on landfill and restriction: ANOVA and Post-hoc tests

	Contrast	Std. Err.	Tukey		Tukey	
			t	P> t	[95% Conf. Interval]	
restriction						
1 vs 0	-1.664754	20.87738	-0.08	0.997	-51.2258	47.89629
2 vs 0	94.38525	39.07754	2.42	0.045	1.618623	187.1519
2 vs 1	96.05	39.62636	2.42	0.044	1.980541	190.1195

We see that as China's restrictions get stricter, the mean amount of plastic landfilled increases.

Comparing the mean of amount landfilled during restriction 2 (National Sword) as compared to the amount during restriction 0 (Green Fence), the mean is 94.385 thousand tons higher.



# NYS DEC's Annual Recyclable Handling and Recovery Facilities (RHRF) forms between 2016 and 2019

Key variables:

- Total quantity of plastic received, sorted and baled at MRFs (Section 2)
- Material sent downstream to brokers and reclaimers. (Section 5)
- Residuals
- Export information

Sample size (n) = 102 facilities



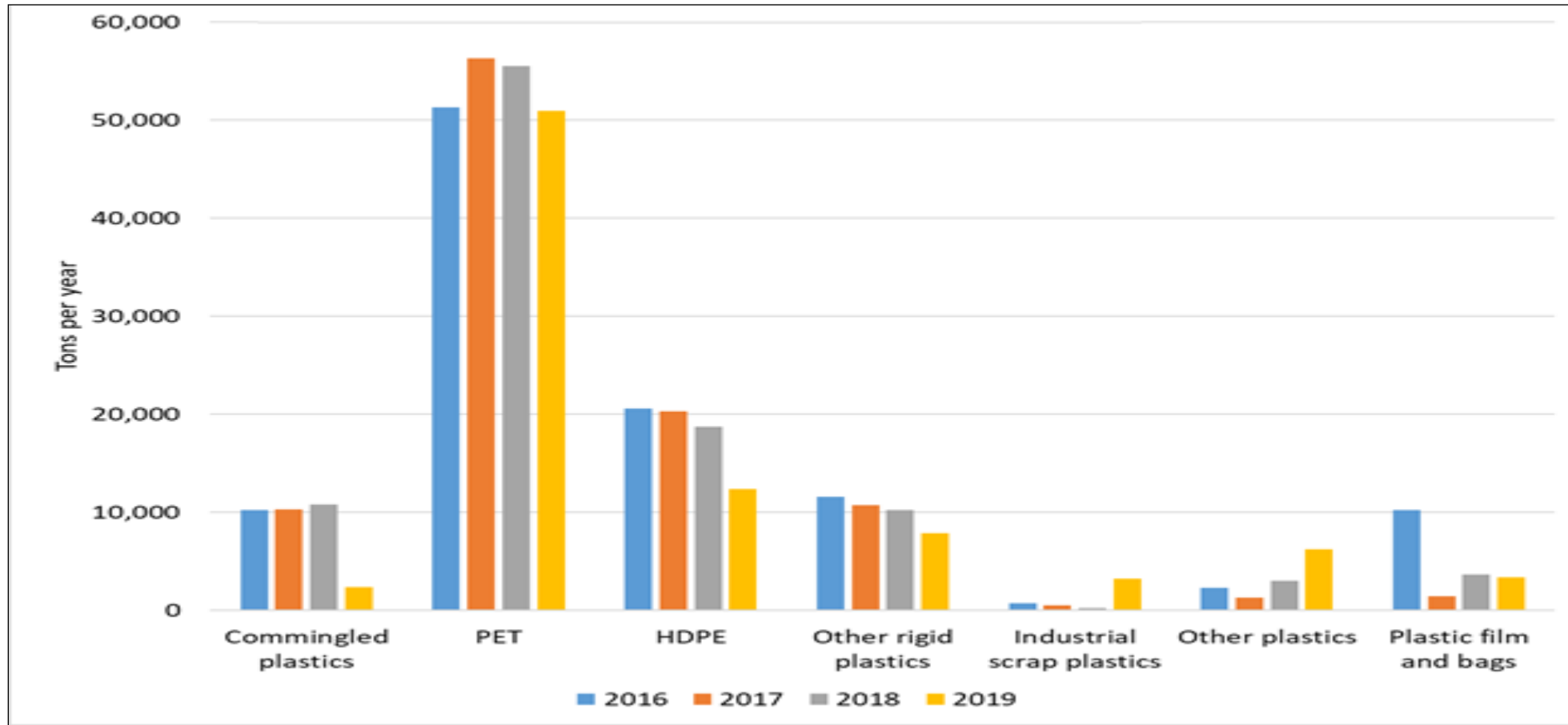
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**Tons of plastic recovered by NYS MRFs by plastic type and year**

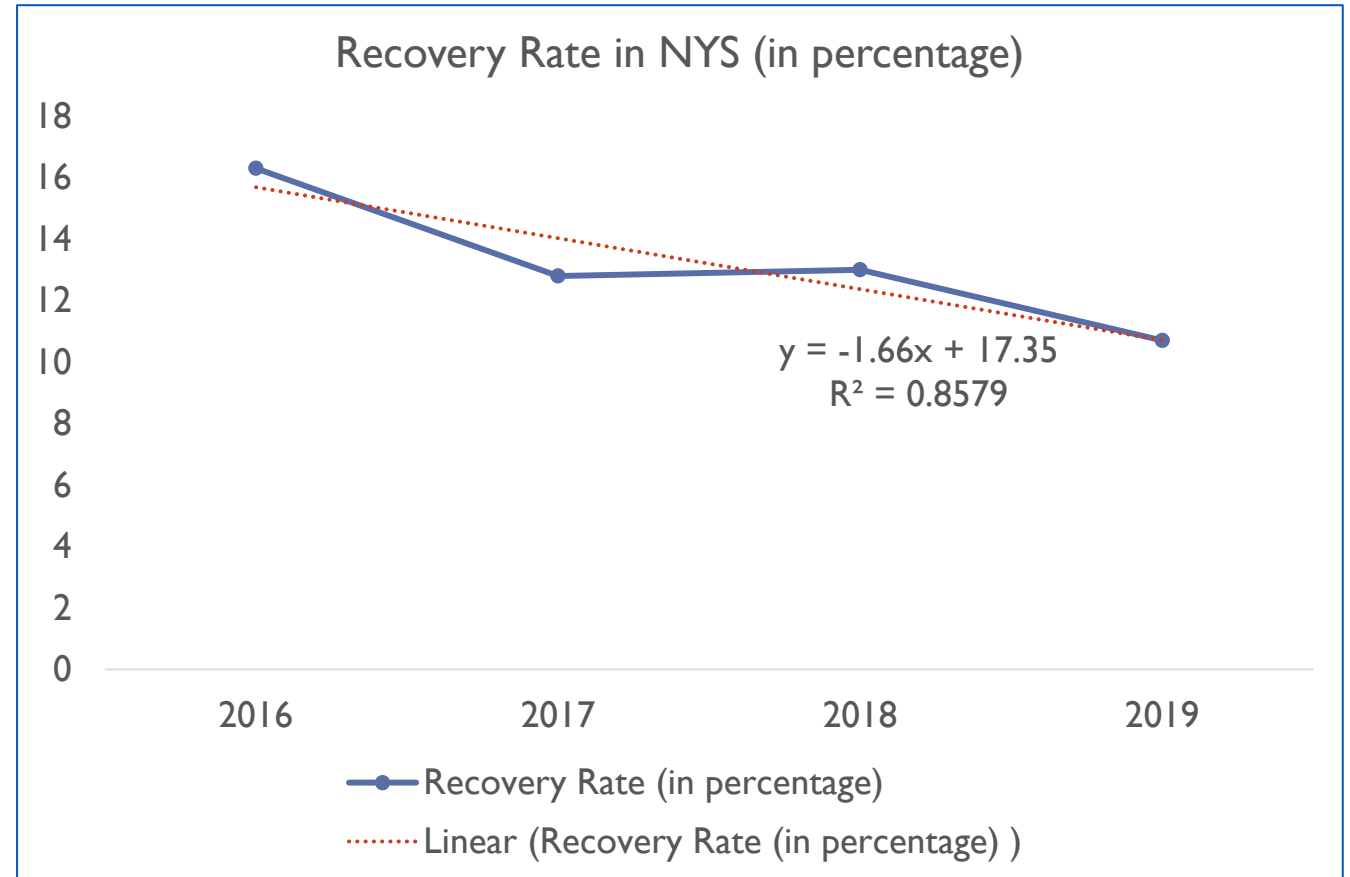
Source: NYS DEC's Annual Recyclable Handling and Recovery Facilities (RHRF) forms



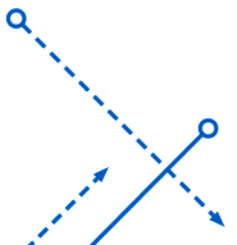
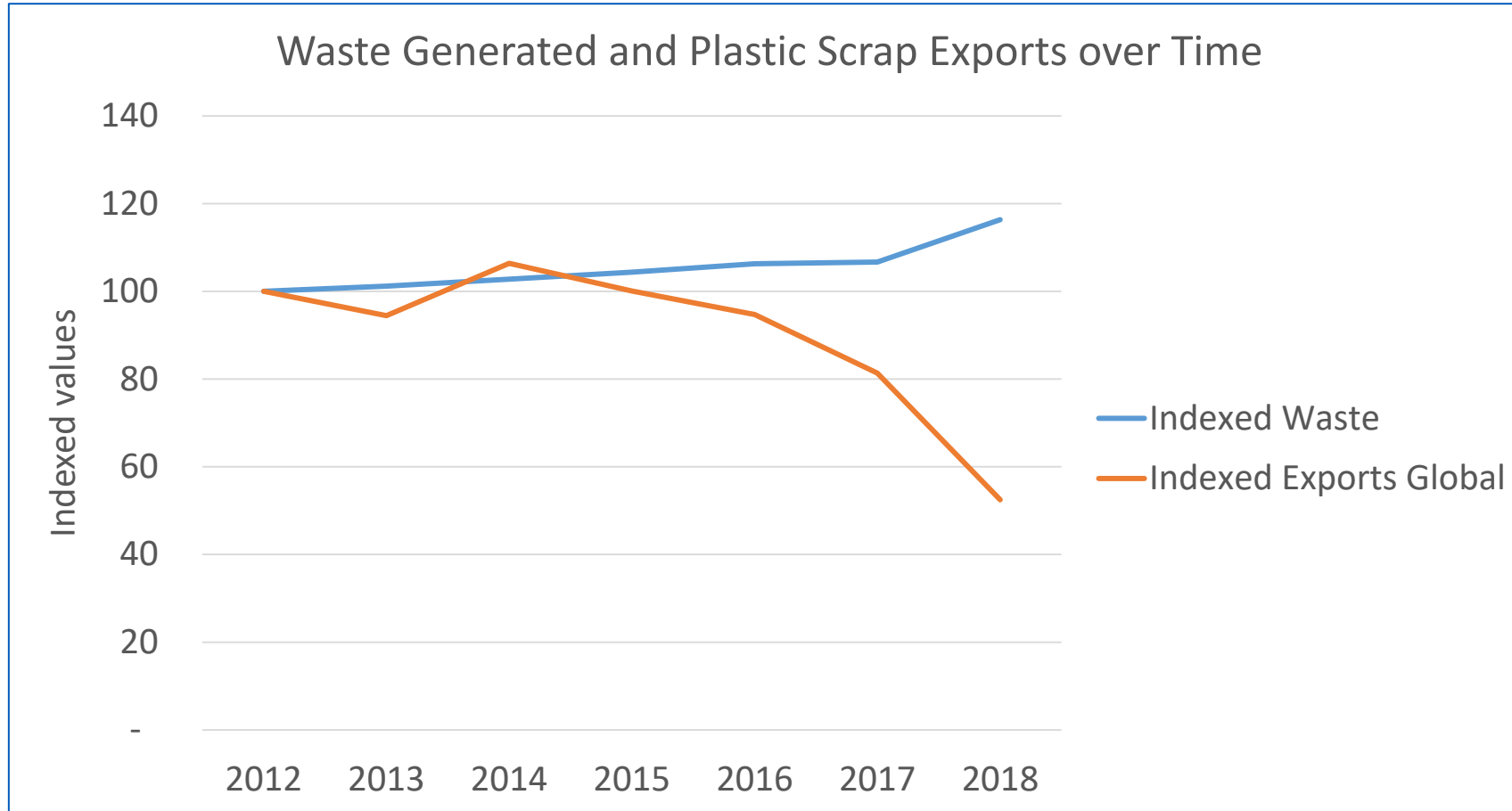


Year	Incoming Material (tons)	Plastics Out (tons)	Recovery Rate	# of facilities
2016	638,254	104,085	16.3%	30
2017	769,397	98,364	12.8%	33
2018	728,231	94,619	13.0%	31
2019	775,054	83,162	10.7%	34

Amount not recovered is mostly landfilled or incinerated.



Source: NYS DEC's Annual Recyclable Handling and Recovery Facilities (RHRF) forms



## Industry Survey

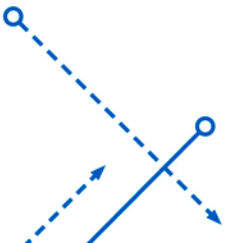
- A survey was distributed to MRFs, Brokers and Reclaimers/Reprocessors in the U.S.
- A total of 113 companies were contacted in waves via phone calls, emails and voicemails.
- The earliest response was received in July, 2020 and the latest response was received in February, 2021.
- The activity resulted in a total of 23 survey responses as the final sample indicating a 20% response rate.



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# Industry Survey

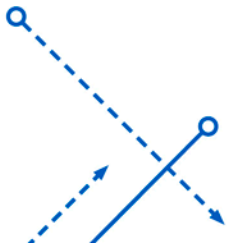
## Respondent profile

Please select which region(s) of the United States your company currently is operating in.	
Canada	2
Midwest	3
Midwest,Southeast,West	1
Midwest,West	1
Northeast	9
Northeast,Midwest,Southeast,West	1
Southeast	2
West	3

Please indicate how you would classify your facility? N=23	
Reclaimer	12
Broker	3
MRF	7
No response to question	1

What is the end-product of your reclaiming system? N= 12	
Flakes (small pieces of plastics)	3
Flakes (small pieces of plastics), Pellets or granulated plastics	2
New plastic products	1
Pellets or granulated plastics	2
Pellets or granulated plastics, New plastic products	4

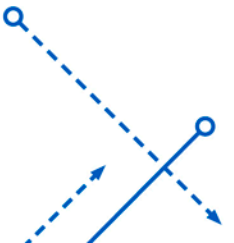
Source: Industry survey distributed to MRFs, Brokers and Reclaimers/Reprocessors in the U.S.



# Industry Survey

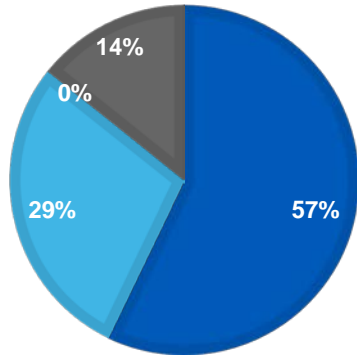
At present, what type of plastic does your facility process for recycling? (i.e., it is sorted and sold to a downstream buyer?)	MRFs	Brokers	Reclaimers
PET	8	2	8
Natural HDPE	7	2	2
Colored HDPE	7	3	2
PS	3	2	1
LDPE	4	3	4
PP	5	3	5
MRP	5	3	1
Plastic film & bags	3	3	1
Others (Nylon 6, Nylon 66, Post-industrial PP/PE caps)	2	1	2

Source: Industry survey distributed to MRFs, Brokers and Reclaimers/Reprocessors in the U.S.



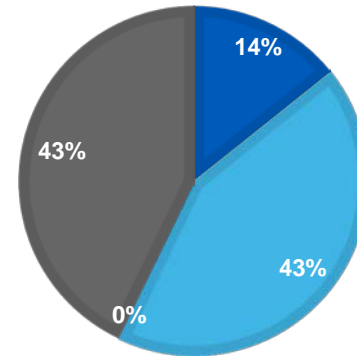
### PET: WHERE PLASTIC IS PROCESSED AFTER IT LEAVES MRF FACILITIES

■ Both ■ Out of state ■ Within NYS ■ Does not process this plastic



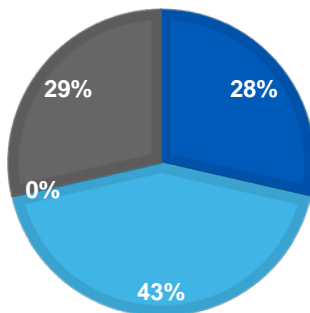
### PP: WHERE PLASTIC IS PROCESSED AFTER IT LEAVES MRF FACILITIES

■ Both ■ Out of state ■ Within NYS ■ Does not process this plastic

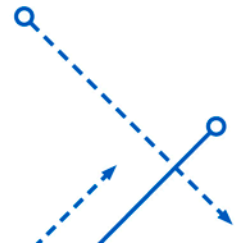


### HDPE: WHERE PLASTIC IS PROCESSED AFTER IT LEAVES MRF FACILITIES

■ Both ■ Out of state ■ Within NYS ■ Does not process this plastic



	Out of state	Within NYS	Both	Does not process this plastic
PVC	0%	0%	14%	86%
LDPE & PS	43%	0%	14%	43%
Industrial Scrap	29%	0%	0%	71%
MRP	43%	0%	0%	57%
Other	14%	0%	0%	86%

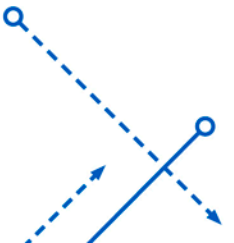


# Survey Results: Impact of China's National Sword Program

**Q. On a scale of one to five, please rate how much your business has been impacted by the National Sword Program.**

("1" being little or no impact, "3" being moderately impacted, and "5" being significantly impacted)

	MRFs	Brokers	Reclaimers
1	14%	0%	8%
2	14%	33%	0%
3	<b>14%</b>	<b>33%</b>	<b>25%</b>
4	<b>14%</b>	<b>0%</b>	<b>25%</b>
5	<b>29%</b>	<b>33%</b>	<b>8%</b>
No response given	14%	0%	33%
Sample size (N)	7	3	12





## Survey Results: Impact of China's National Sword Program

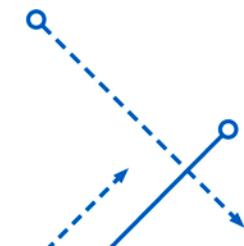
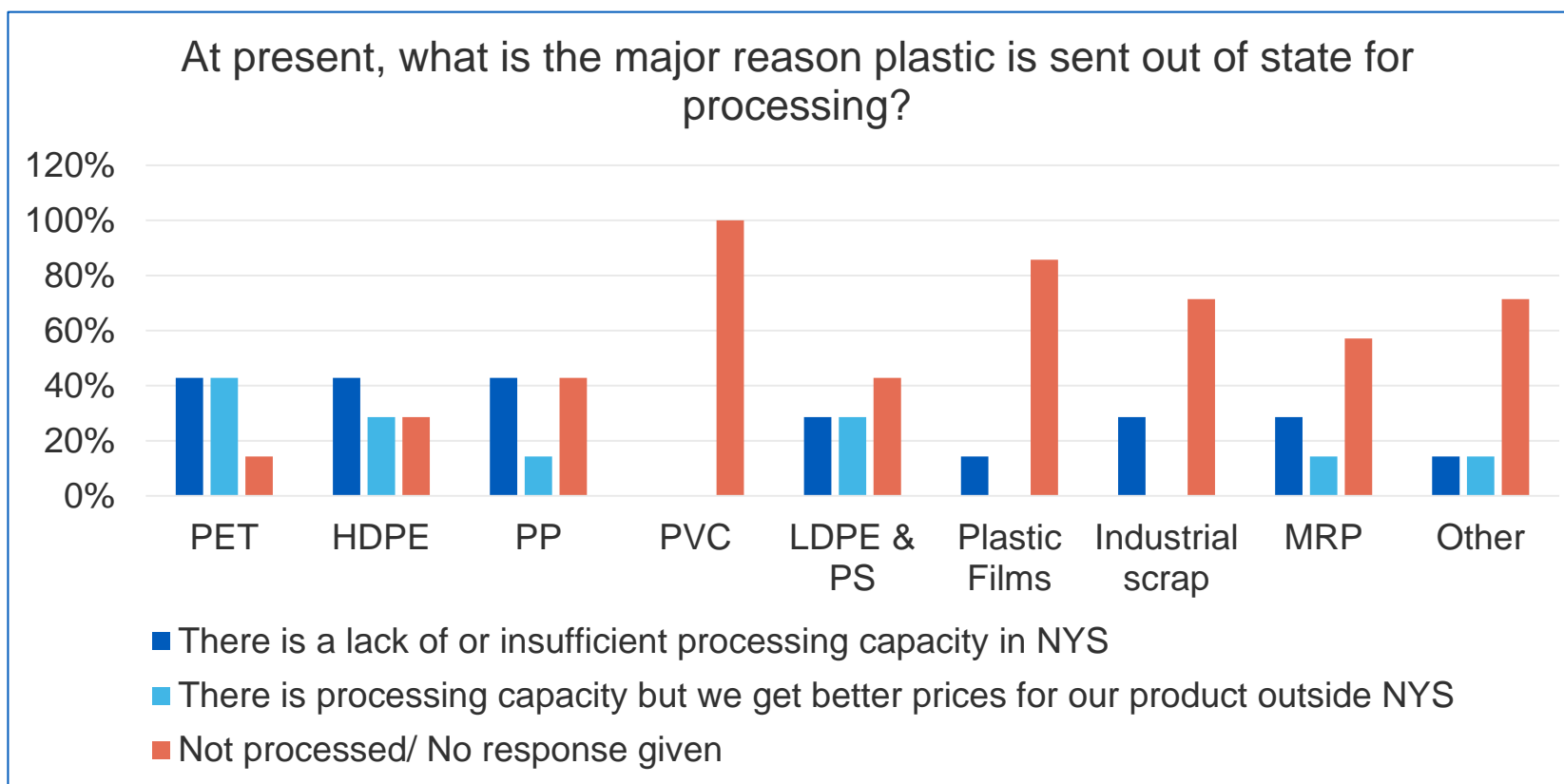
Market factors	Decreased Compared to Pre-National Sword	Increased Compared to Pre-National Sword	Same as Before	No response
Market price	47%	0%	0%	53%
Domestic demand	0%	<b>40%</b>	27%	33%
Quality of plastic supply	20%	27%	20%	33%
Processing cost	0%	<b>27%</b>	40%	33%
Landfill amount	13%	<b>33%</b>	13%	40%
Incinerated amount	13%	7%	27%	53%

*Prior to National Sword, we shipped little to no plastics to China. National Sword still affected our plastic markets because west coast plastic flooded plastic mills east of the Mississippi that we supplied.*

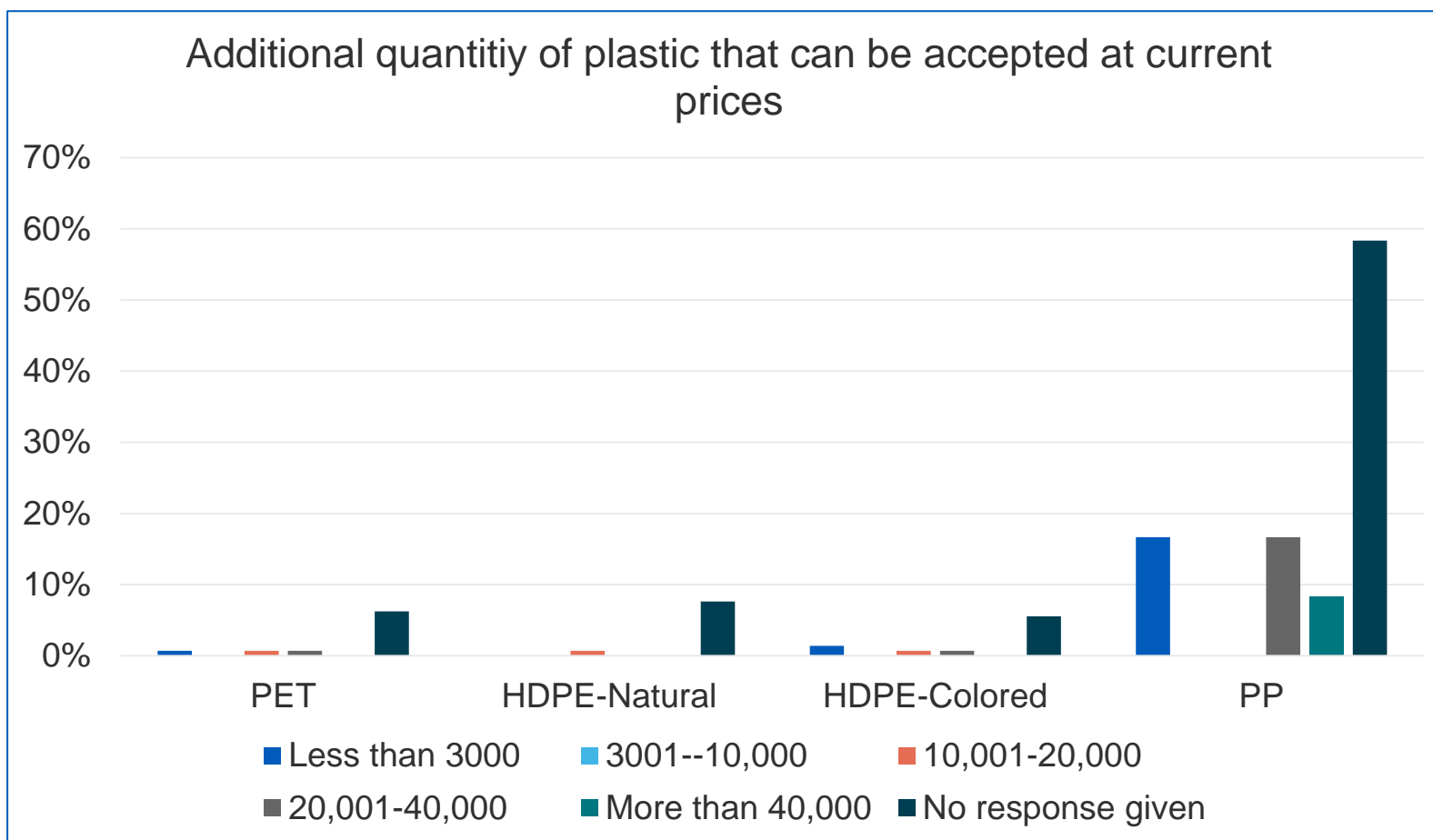
*Source: Comment made in survey*



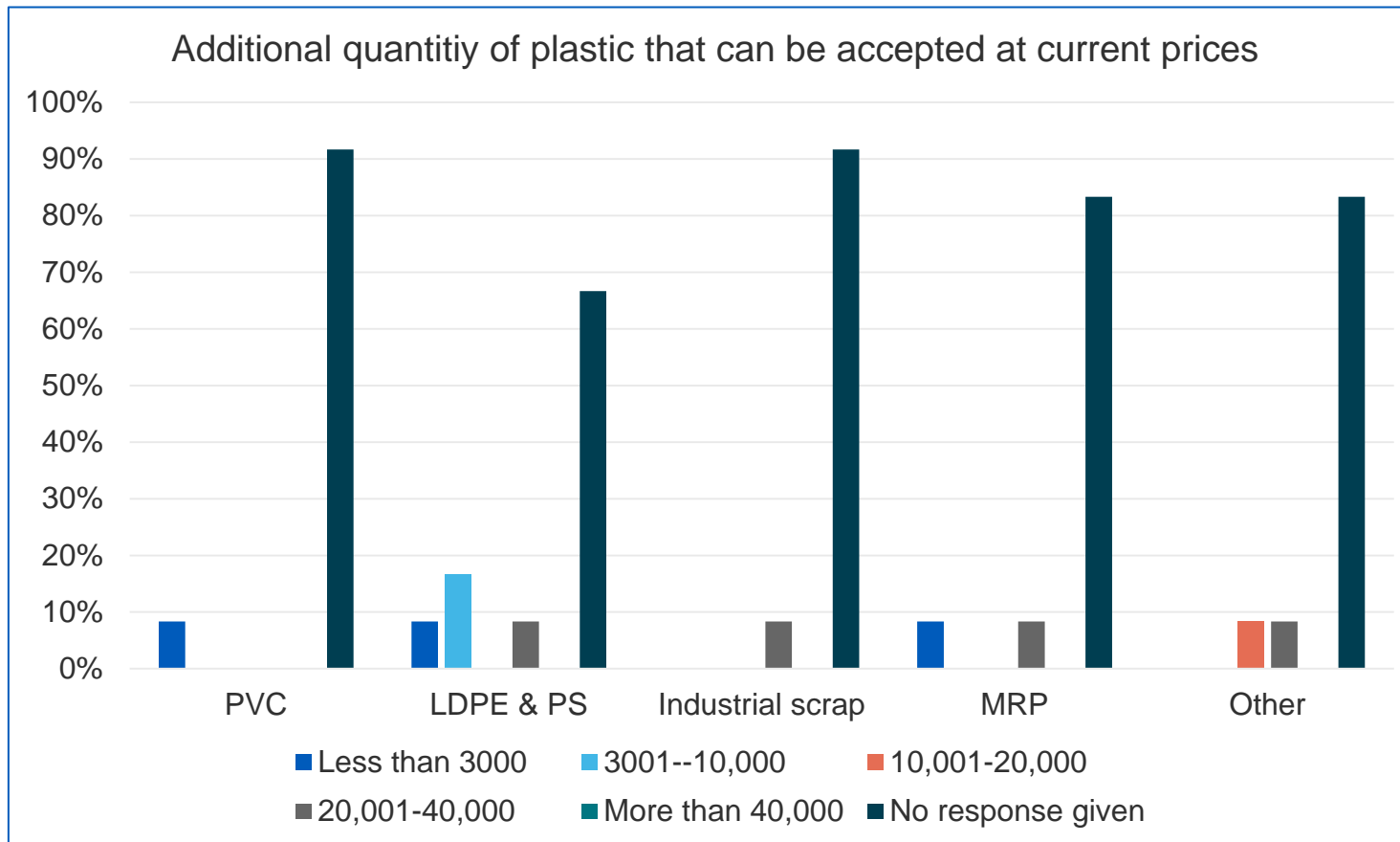
## Is there sufficient processing capacity in NYS for all types of recyclable plastics (#1-#7)?



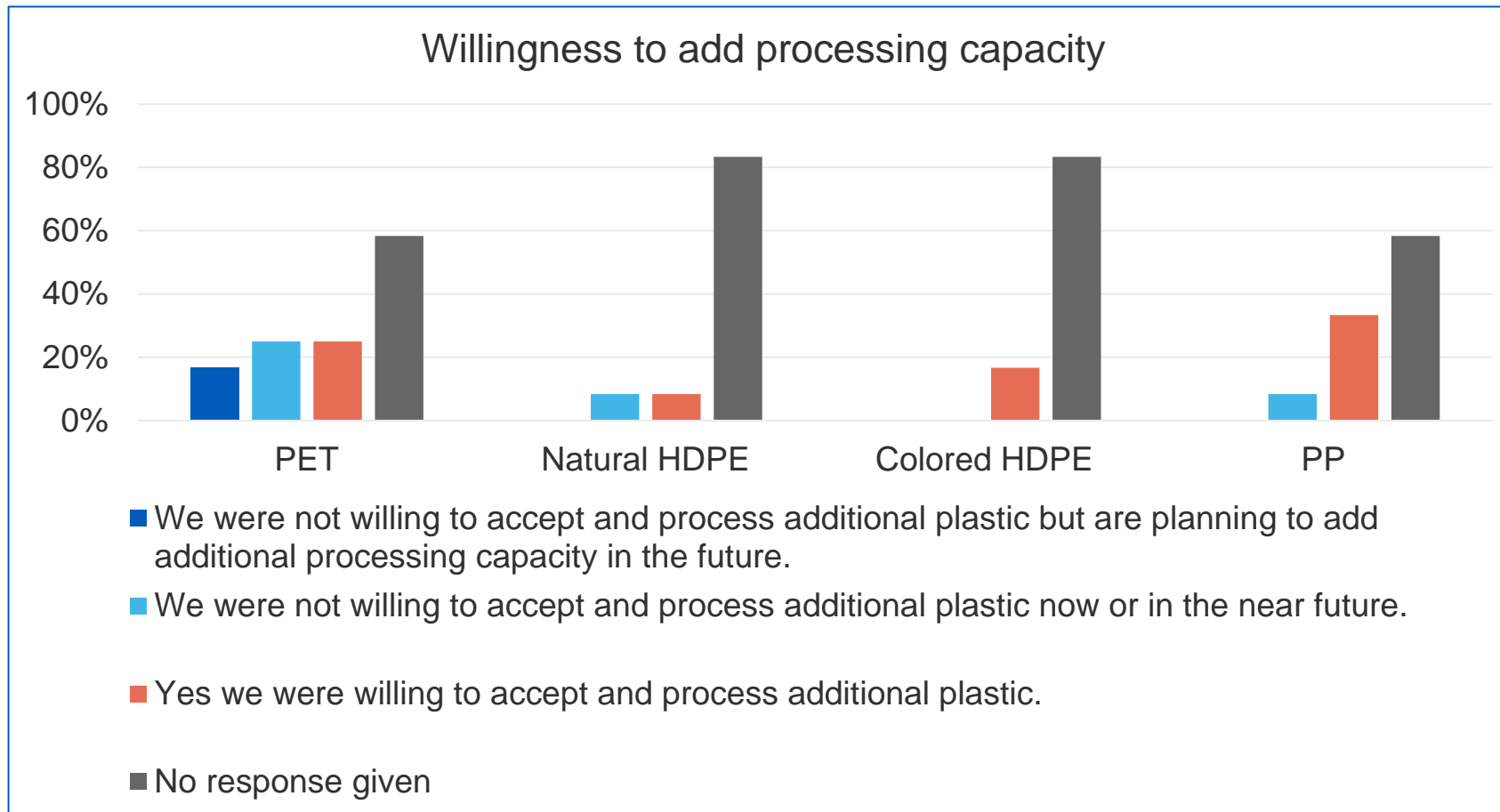
## *Is additional capacity available if needed? Does it vary for different plastic types?*



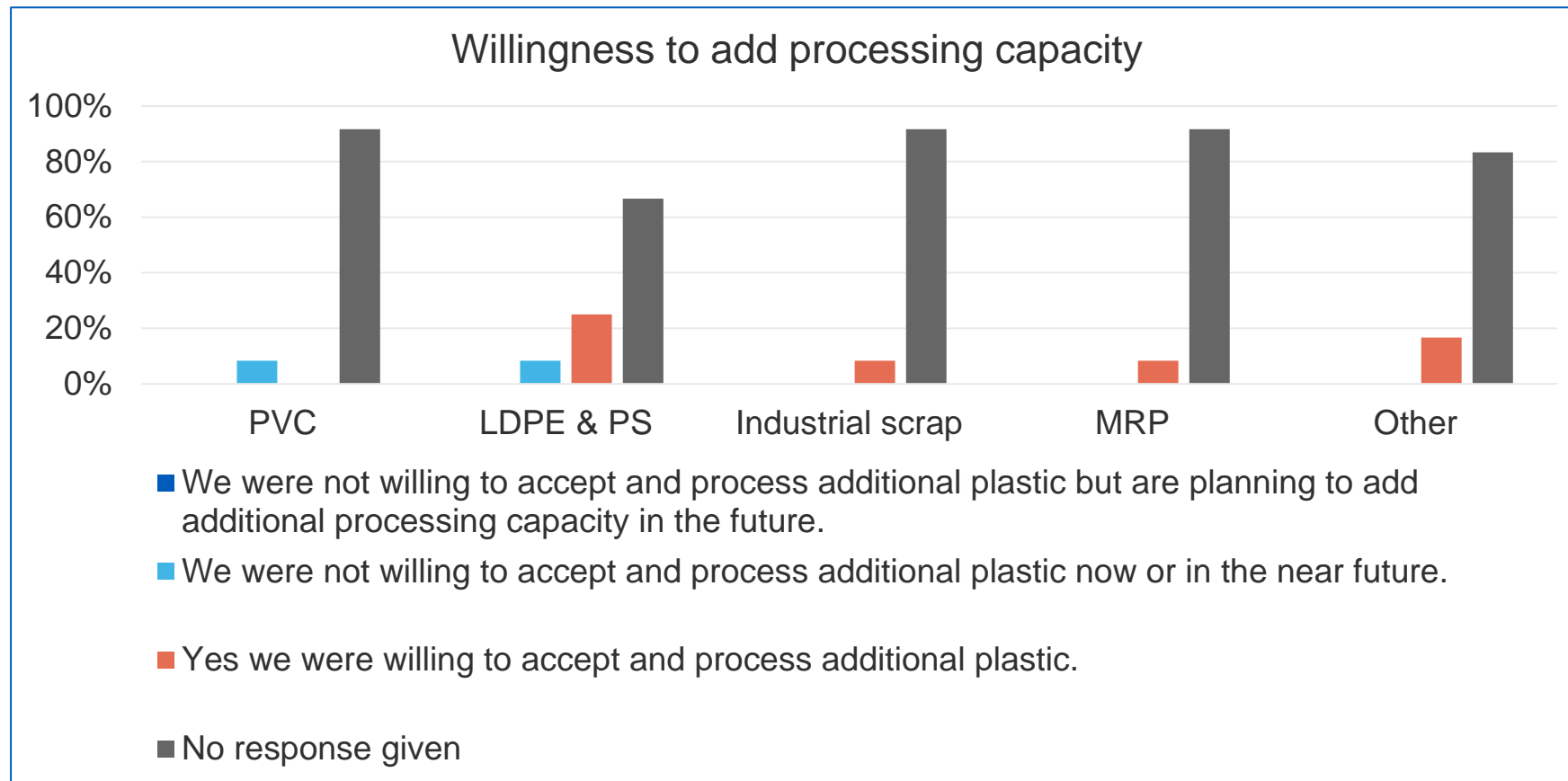
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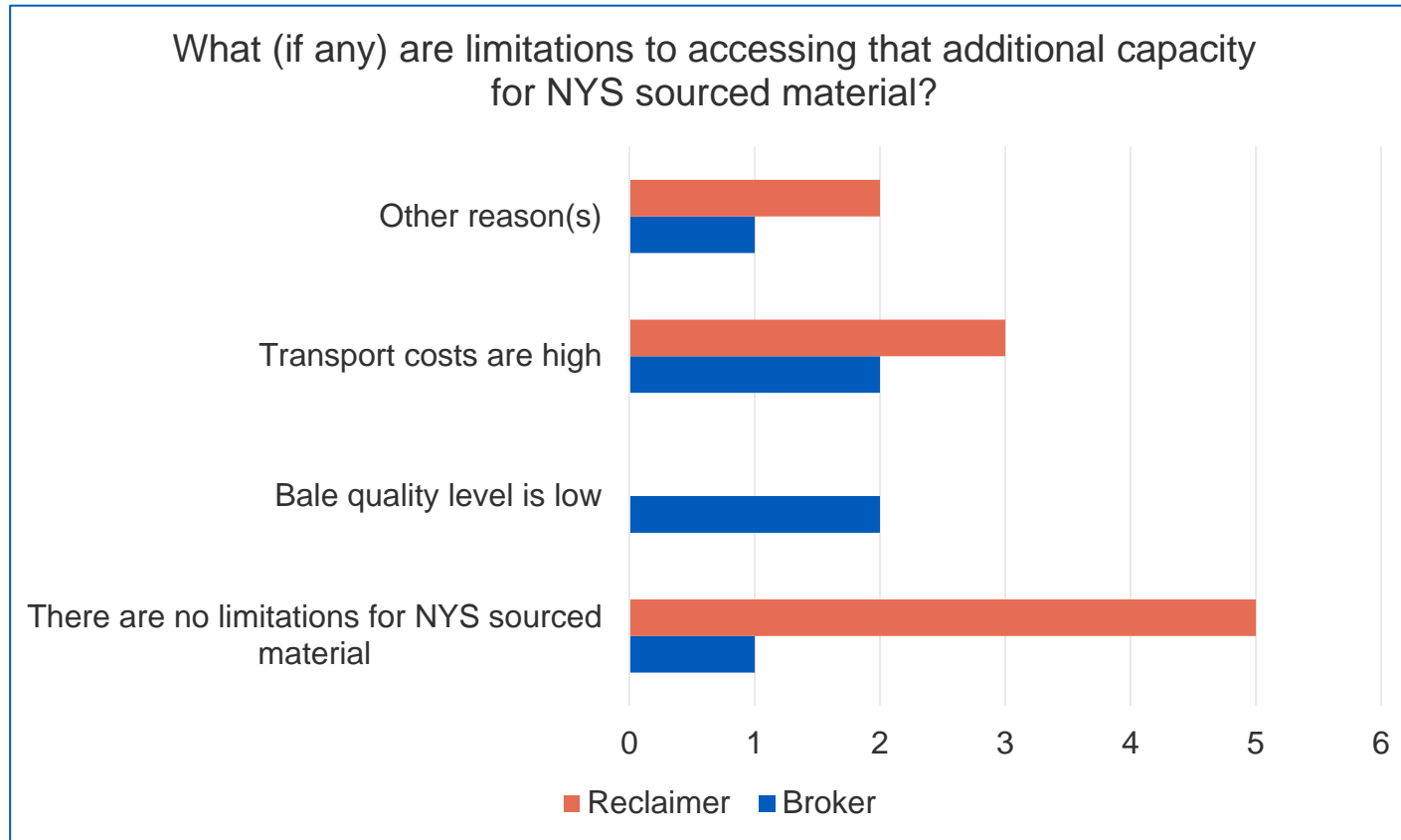
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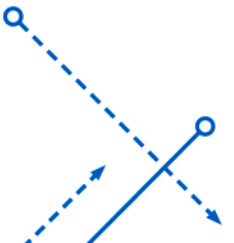
## *Are there any limitations in accessing that additional capacity for NYS sourced material?*





## Overview

- We see a statistically significant (99% confidence level) impact of China's Green fence and **National Sword polices** on the amount of plastic landfilled with increase in restrictions leading to a statistically significant increase in **amount of plastic landfilled**.
- Analysis of **annually reported data from MRFs in New York State** suggest a sizable decline in the amount of total plastics recovered between 2018 and 2019 despite increased generation of plastic.
- **Survey of MRFs, broker and reclaimers** suggest directions on processing capacity investment in NYS and the need to create end markets and processing capacity for mixed plastics (#3- #7).



## **Acknowledgements:**

New York State Department of Environmental Conservation...Amy, Terri, Jaime, Jerry, Gerard, and many more!)

All the industry professionals that have so graciously spent time on the phone, replying to emails, and/or providing helpful information to our team

