

*State and Future of
Northeast MRF's - 2018*

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Waste Management



88%

Increase in amount of
recyclables managed
since 2007

~ 15M



Tons of recyclables extracted
from the waste stream



102

Recovery facilities
owned/operated by Waste
Management

Top Ten U.S. Exports

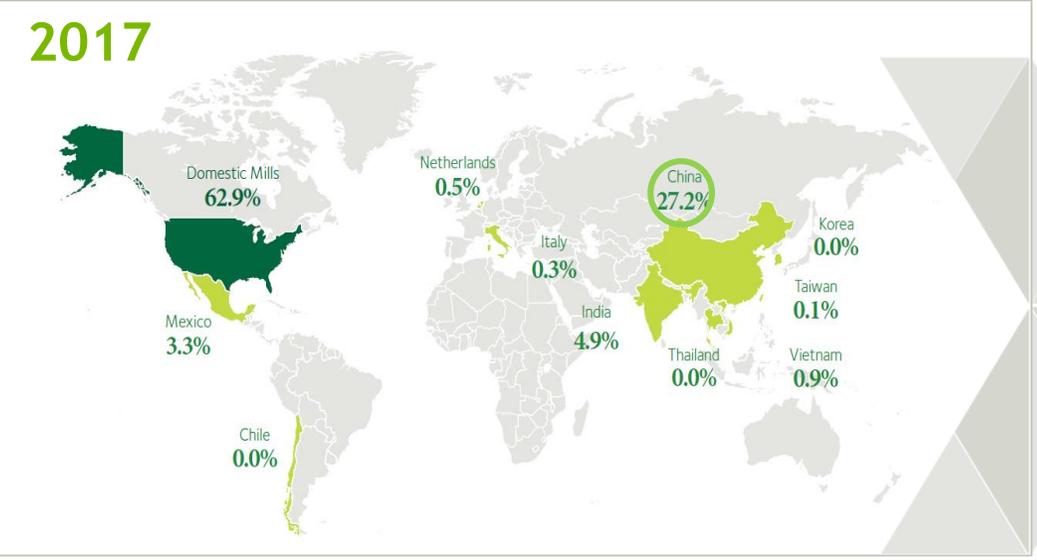
- Recyclables are the largest U.S export item by volume
- The U.S. is impacted by trade interruptions with its investment in the recycling industry and other products
- We continue to export large volumes, but the end markets are changing

2017 Top 100 Exports (in TEU)



Following the Path of Our Commodities

Destination of fiber recyclables 2017 vs 2018



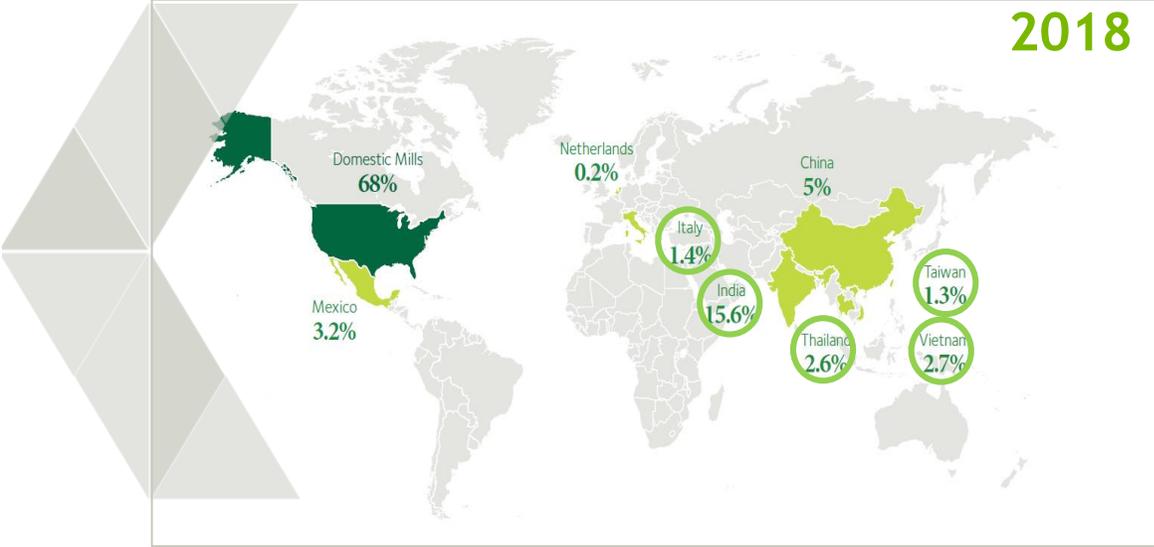
WM is the 7th largest exporter of all goods (by volume from the U.S. (2018))

27% of our fiber went into China in 2017

5% in Q1 2018

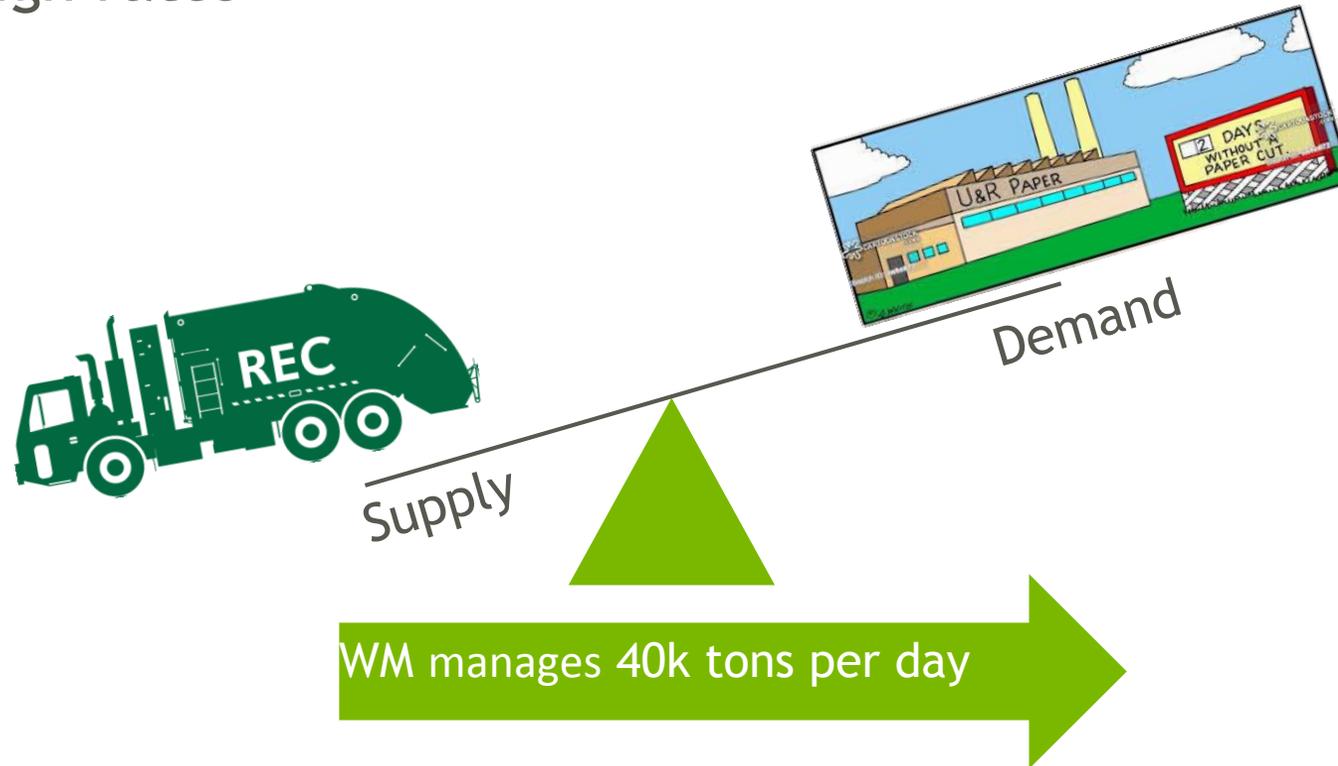
<3% in Q3 2018

Recyclers are continuing to build alternative markets to move material. India, SE Asia, Europe and domestic mills are all being used by WM's marketing team.



Recycling Supply and Demand Imbalance

- Recycling programs have a fundamental economic supply/demand problem
- Even though demand has significantly declined, inelastic supply continues to flow in at high rates



Reduced overall demand, supply surplus, increased quality requirements =
increased processing cost and low commodity values for paper

Impact of Excess Supply = Reduced Pricing

2018 YTD Mixed Paper Demand

US MIXED PAPER DEMAND DOWN 11%

(000 tons, year-to-date through July, numbers rounded.)

Mixed paper	2018	2017	% chg.
Domestic mill consumption	2,198	2,172	1.2%
Exports	1,747	2,267	-22.9
India	759	265	186.7
Indonesia	234	68	244.9
Canada	153	72	110.5
China	73	1,382	-94.7
TOTAL	3,945	4,439	-11.1%

Source: US Dept of Commerce, American Forest & Paper Association.

Moore
& Associates

US Average Mixed Paper Prices

(FOB Generator's Dock, Baled - \$/ton)

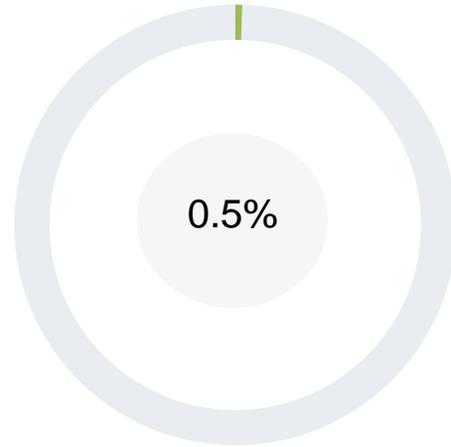


Moore
& Associates

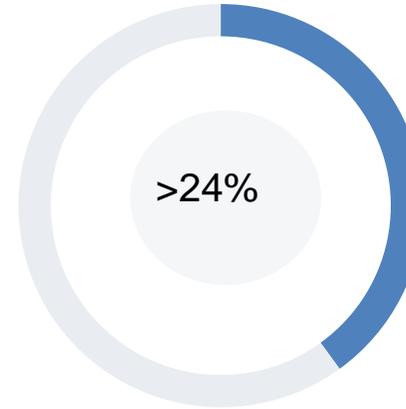
Oversupply means increased quality requirements for all markets



1 in 4 items placed in a recycling cart is not recyclable!



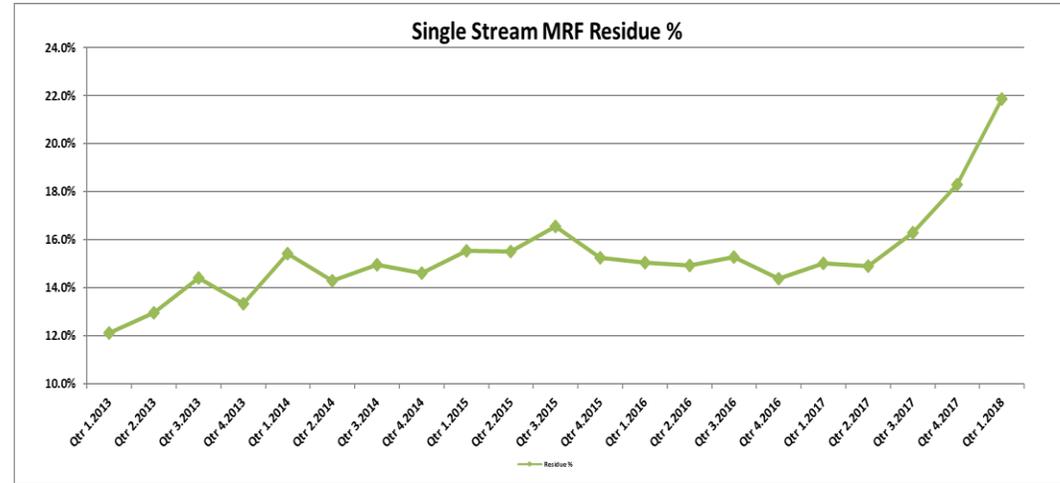
% Contamination enforced by China



Avg. contamination % in our MRFs

Every ton of material collected includes ~450 lbs of
contaminates; markets expect <10 lbs

What contamination looks like in the MRF stream



Single Stream residue rates ~24% due in part to cleaning outbound material to meet the new standards

- MRFs are adding equipment and labor, while slowing down their processing.
- The changing waste stream continues to stress MRFs
- Consumers expect whatever they put into their carts to be recycled
- There is little understanding of technical/economic limits of recycling
- Recyclables do not create an economic or environmental benefit until they are sold as commodities and manufactured into products.

MRFs in the Crossfire

Aspirational Recycling

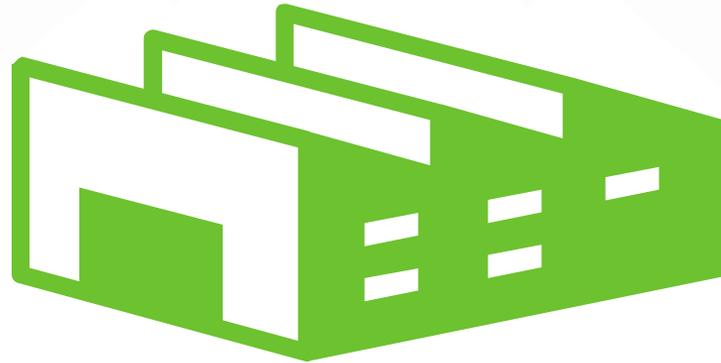
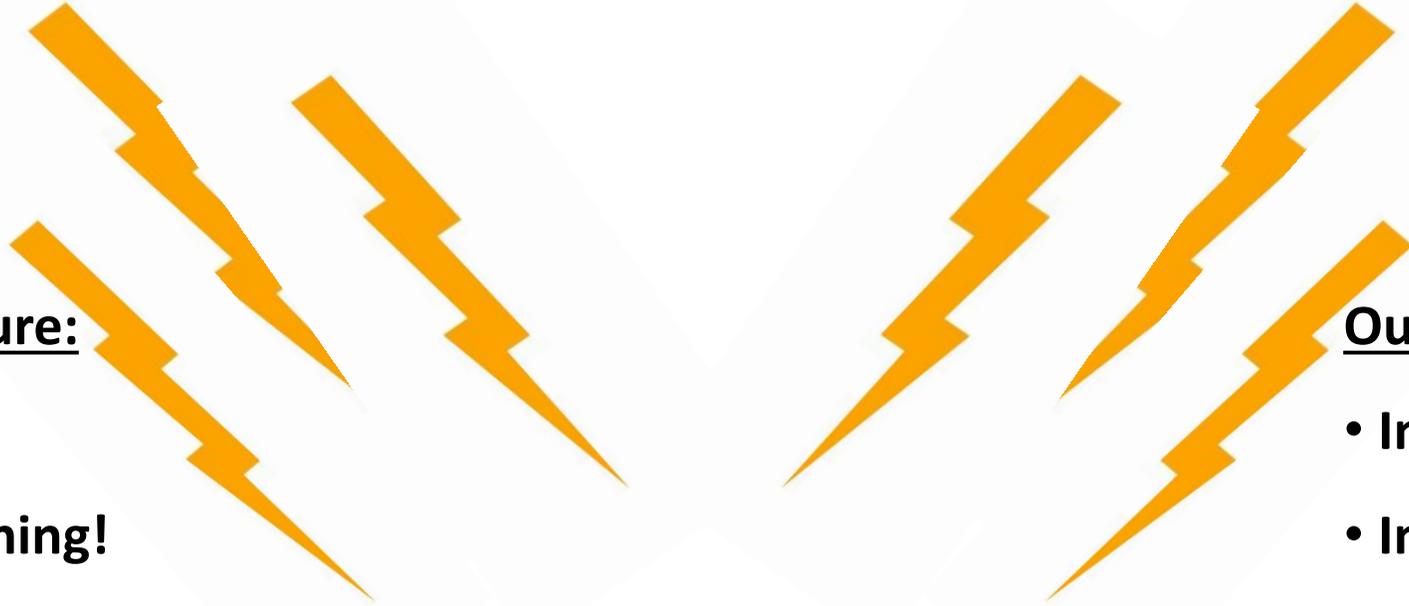
Inbound Pressure:

Recycle More!

Recycle Everything!

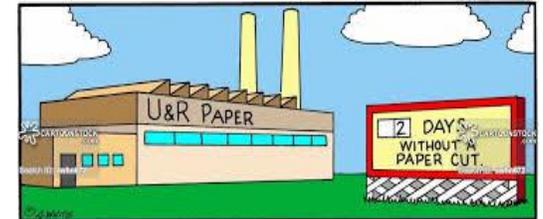
25% + Contamination

Keep costs Low!



Outbound Pressure:

- Improve quality
- Increasing cost
- Half the value
- Technology limits



End Markets

MRFs:

The magic box in the middle that is supposed to solve it all...

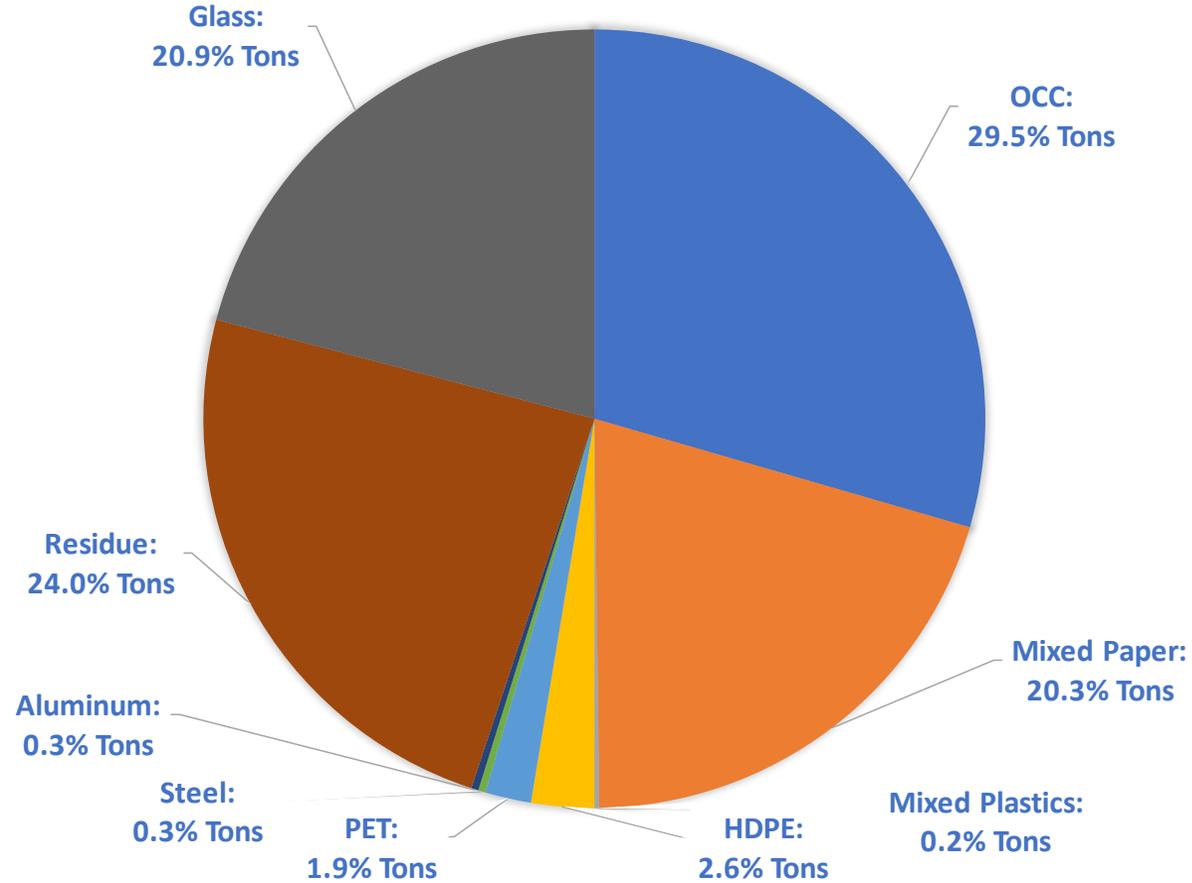
It's time to re-write the recycling playbook

- It is time to rethink/reset recycling programs.
- Which materials offer the best bang for the buck?
- As the cost of recycling increases, should we be looking more closely at the benefits of waste reduction?
- Environmental benefits are our goal

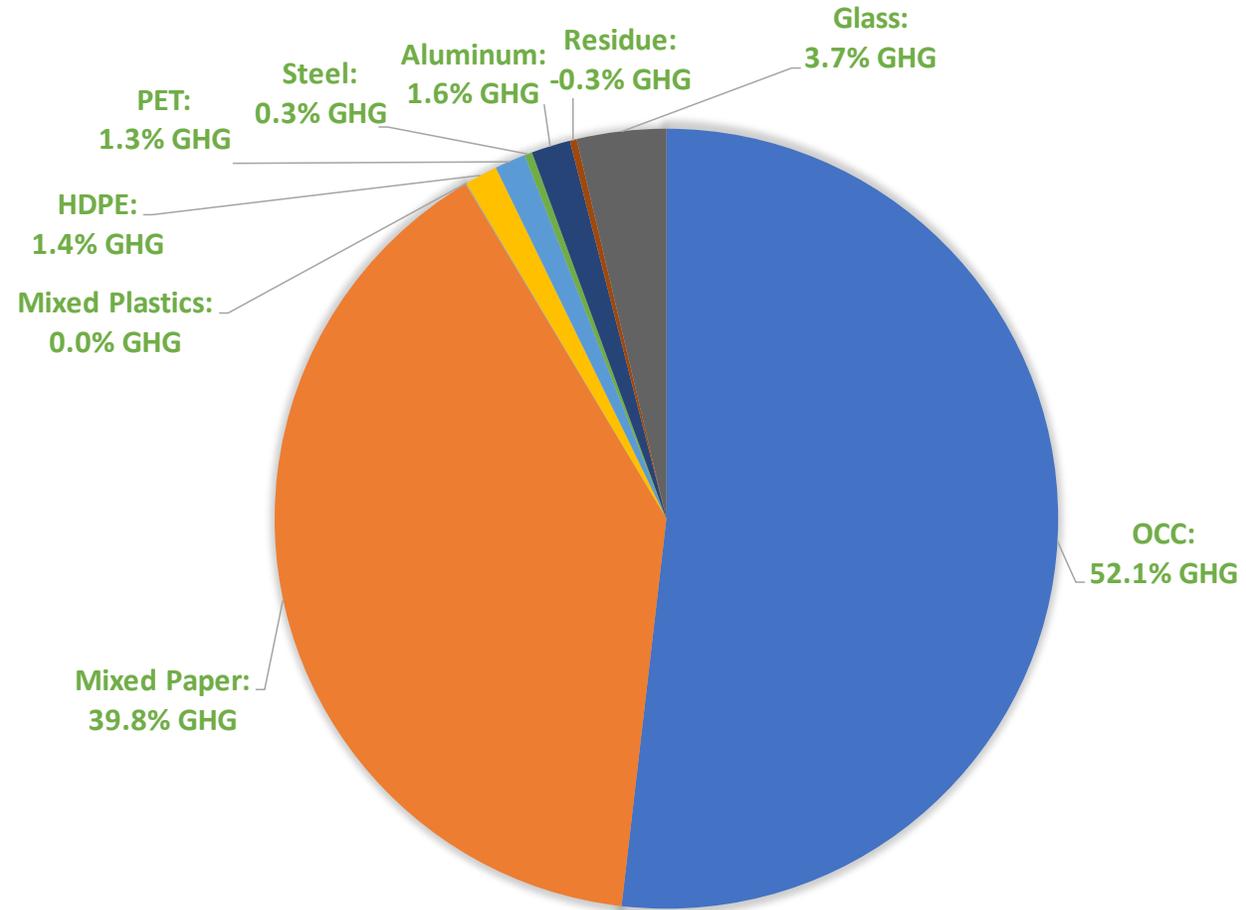


Residential Recyclables: Tons vs Emissions

TONS



GHG Emissions Reduction

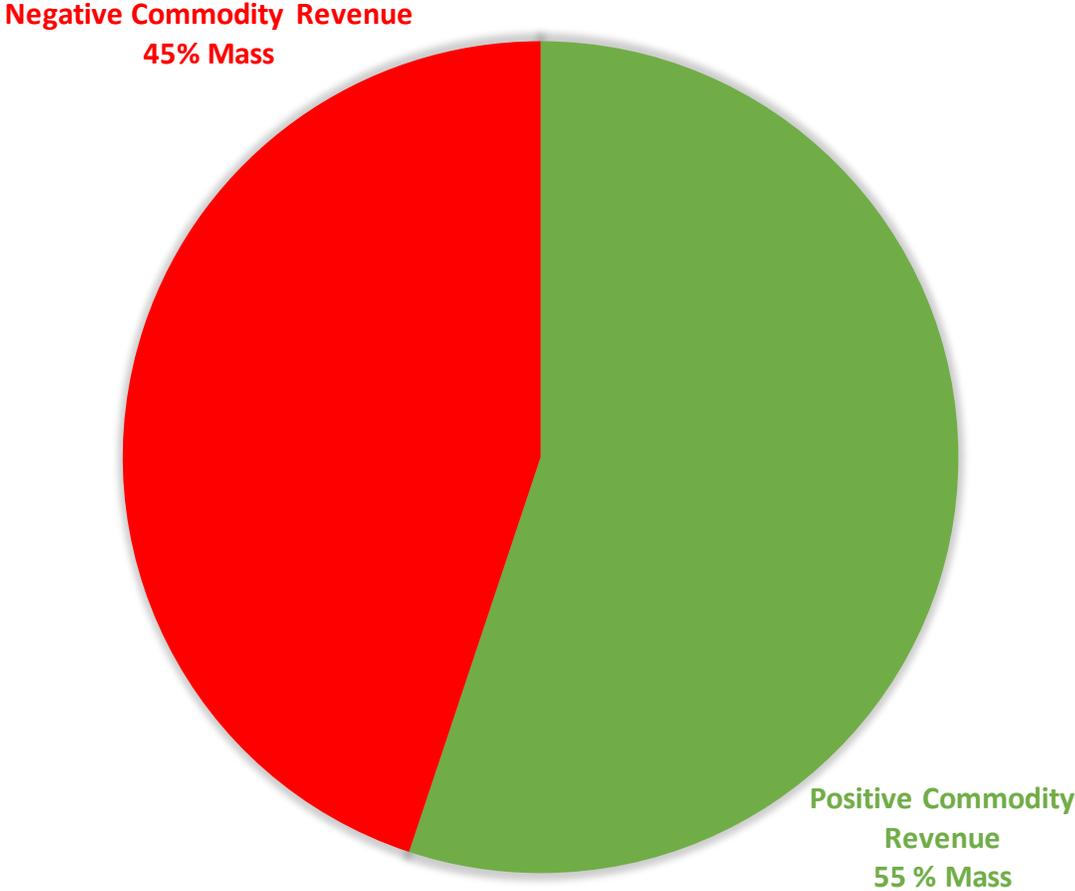


91% of CO2 benefits are from OCC and Mixed paper. Plastic is 4.5% & Glass is 3%.

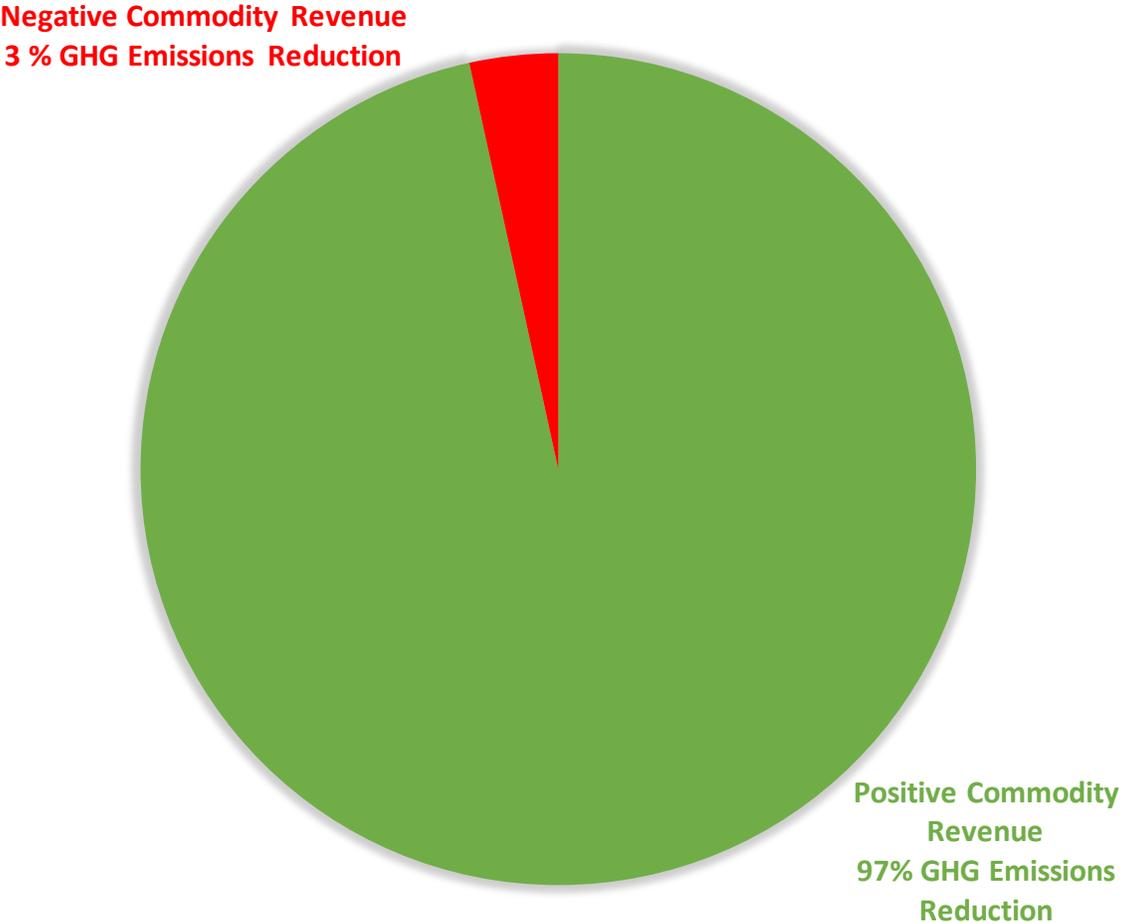


Value of recyclables: \$\$ vs GHG emission reduction

Mass Basis

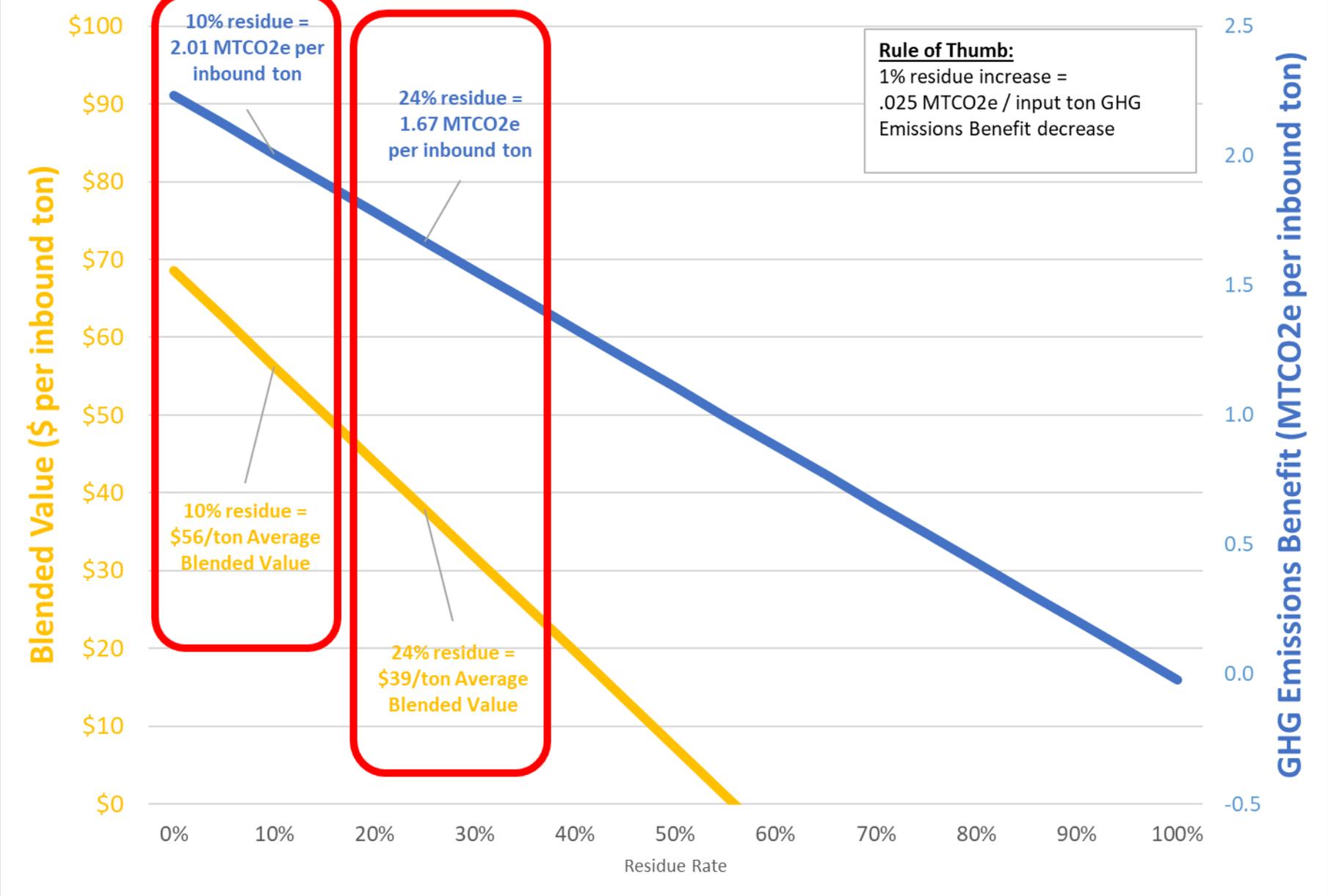


GHG Basis



- Blended Material value ~(-48.2%) from 2017 to 2018 creating a challenging economic environment for recyclers and their customers.
- The 55% of the stream with the positive commodity value contributes to 97% of the emissions reductions
- The 45% of recycling stream with a negative economic value contributes only 3% of the GHG emission reductions

Increasing residue hurts everyone!



State of MRFs: Summary

The bad news:

- **Recycling is likely to get harder before it gets better.** The cost of recycling is increasing and commodity values are expected to remain low, while quality requirements stay high.
- **Packaging continues to become more complex.** This makes recycling confusing and leads to increased contamination.
- **Innovation for alternative solutions for varied plastics are increasing - but they will take time.** We need to solve for the solutions first.

The good news:

- **Markets for paper will improve.** Recyclable paper is a feedstock for products that are in demand so new markets will develop. It will take 1-2 years to rebalance the markets.
- **Increased education efforts can help reduce contamination:** Collaborations to simplify messaging, increase funding, and expand public education and outreach are growing.
- **We have more knowledge to prioritize our efforts around recycling the right things, correctly.**