



MRF CHALLENGES AND HOPES



Are you ready to
effect change?



ORGANICS
MANAGEMENT



WASTE
RECOVERY



GLOBAL CORPORATE
SUSTAINABILITY

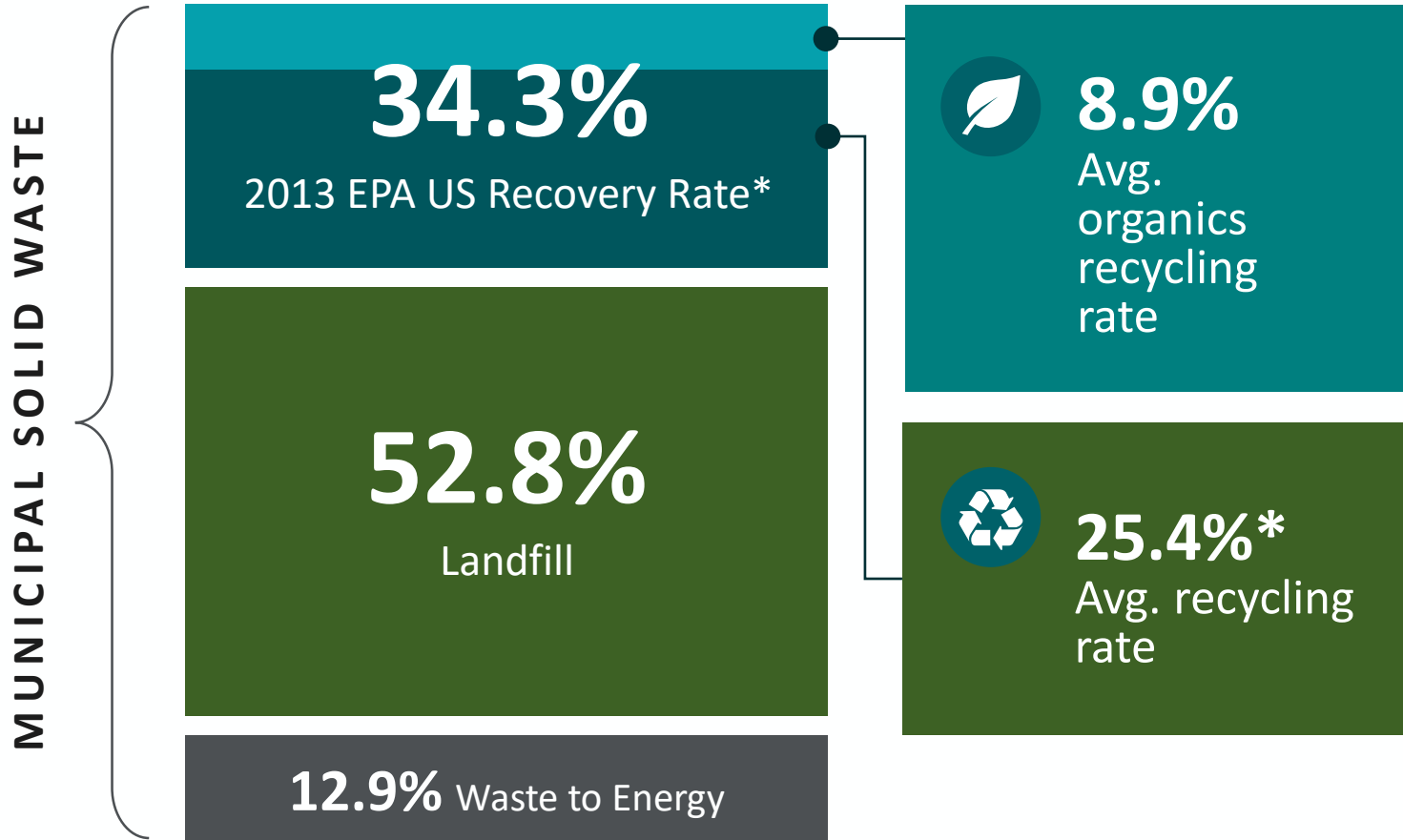
since 1986



What is a Materials Recovery Facility, Really?

A facility that takes mixed targeted recyclables, fractionates them by size, positively or negatively target sorts by characteristic, to make a freight-ready package to go to market.

THE U.S. WASTE AND RECOVERY SYSTEM



*US EPA defines Recovery Rate as Recycling and Composting. 65% of US population has curbside access. C&D is accounted for separately.



THE CHALLENGES AND HOPES

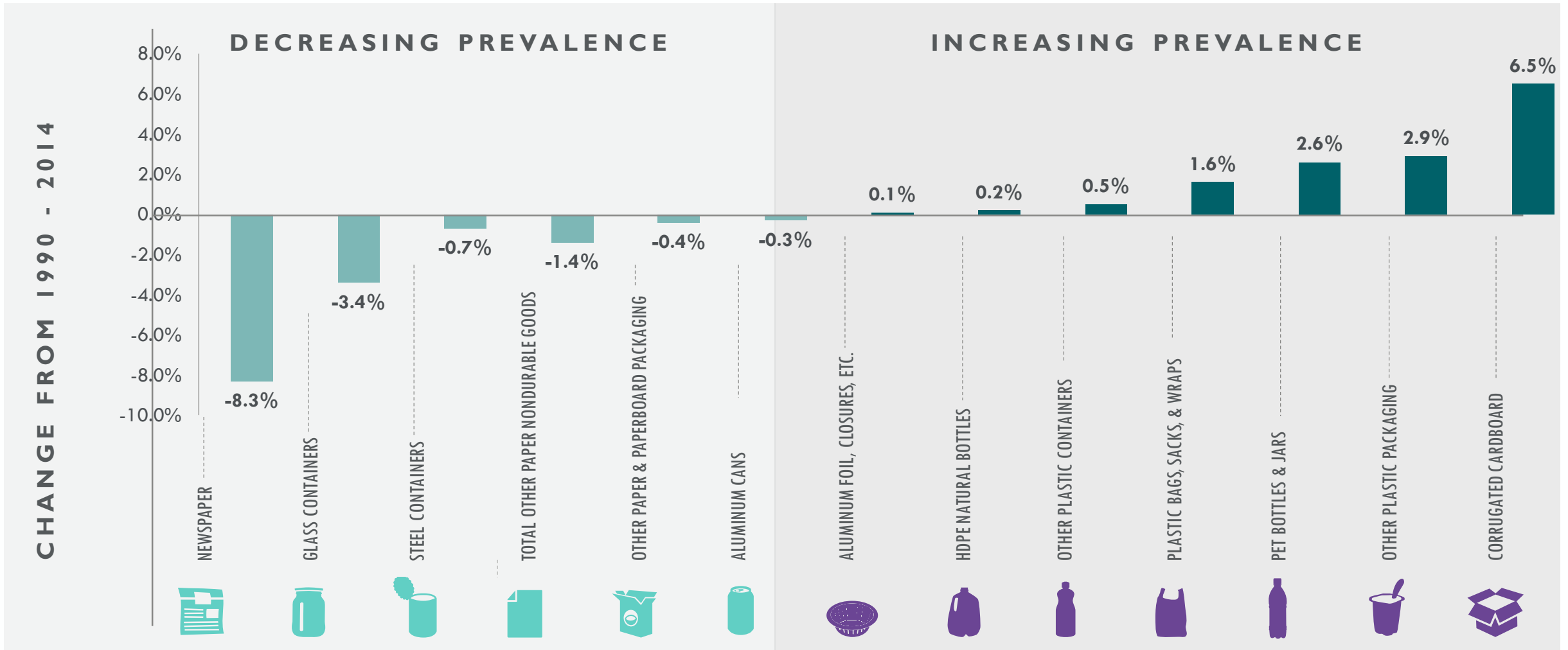
CHALLENGES

- The history of the composition of a ton of recyclables
- The historic value of a ton of recyclables
- Outside economic influences
- MRF operational costs and trends
- Municipal Contracts with lopsided risk
- Municipal contract disruptions

HOPES

- End market development in the U.S.
- Public-Private Partnerships
- Emerging technologies
- Packaging studies and pilot solutions

THE EVOLVING TON





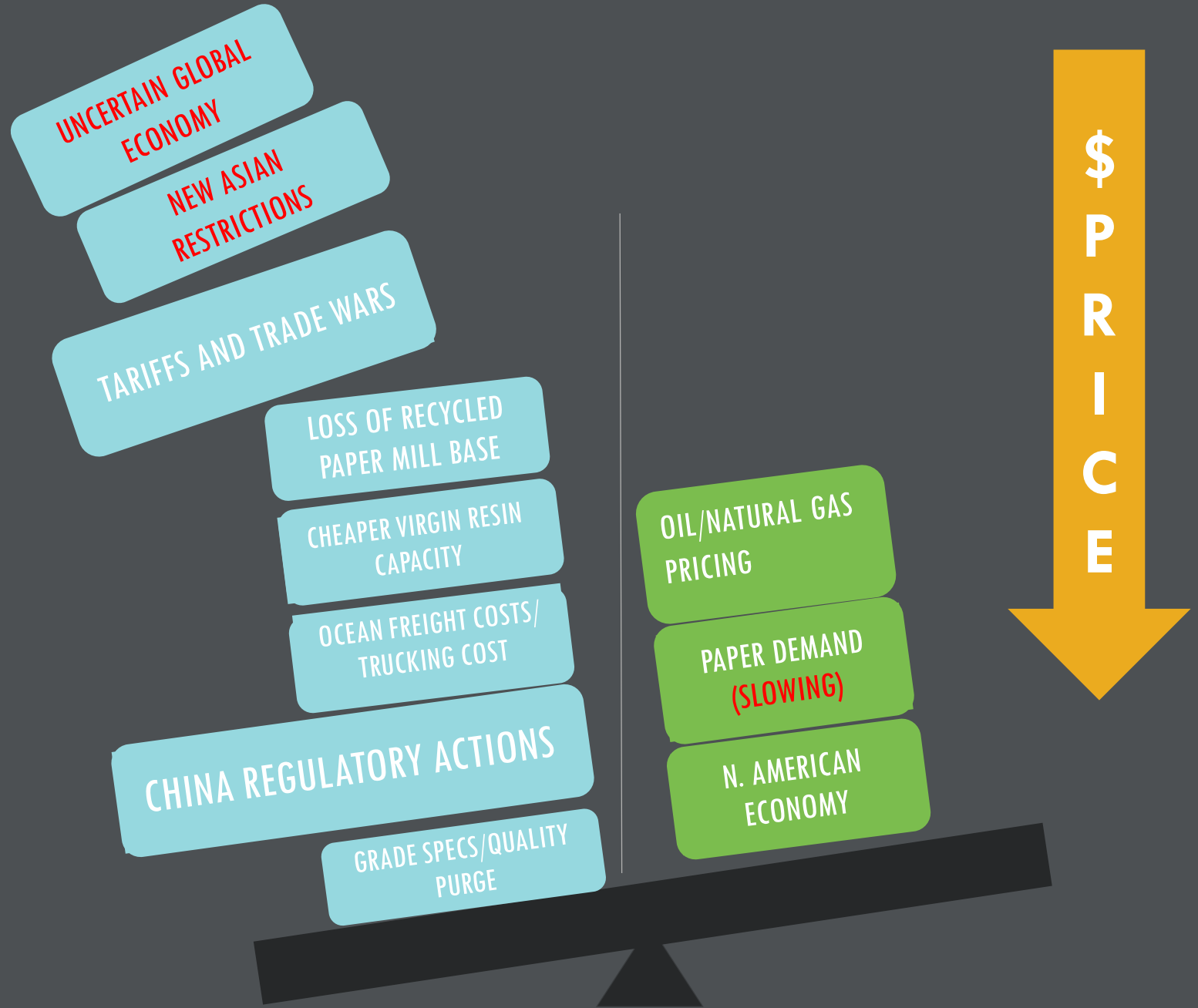
MRF MARKETS- 25-YR. LOW IN GOOD ECONOMY-

- Value of a ton of MRF recyclables is 53% lower than 5-Year average
- Dropped in value every month 2019
- OCC/Aluminum decreases in 2019
- Metals and Plastic make up 75% of Current Value, but only 7.5% of the stream by weight

PREDICTION: CONTINUED NEGATIVE PRESSURE

NOT MANY POSITIVE
INDICATORS EXCEPT
U.S. ECONOMY

RETURN TO \$75-100
AVERAGE
COMMODITY VALUE
UNLIKELY

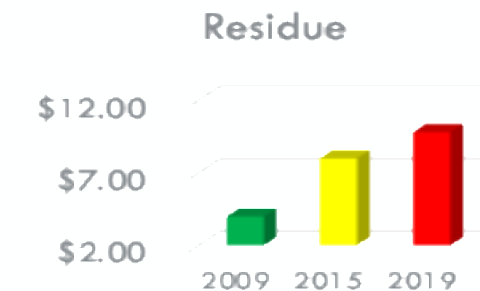
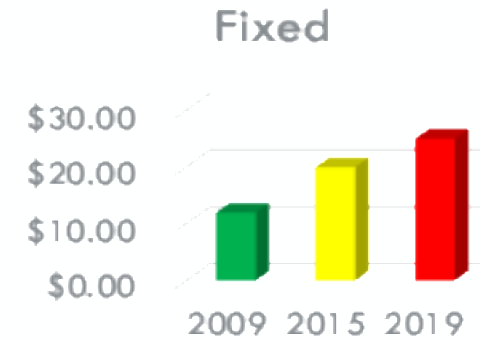
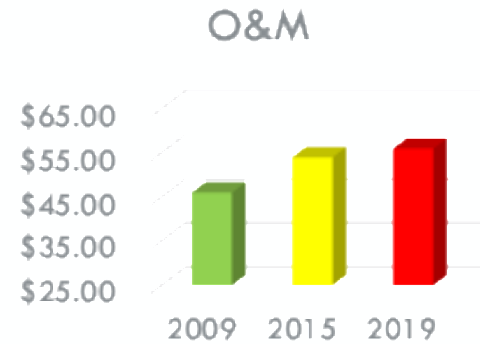


AFTER RISING FOR A DECADE- MRF COSTS BEGIN STABILIZE SLIGHTLY LOWER IN 2019 AS REPORTED PUBLICLY

MATERIAL RECOVERY FACILITY COST CATEGORIES

Inbound Processing \$/Ton

COST CATEGORY	2009	2015	2019	Change
Fixed	\$12.00	\$20.00	\$25.00	108%
O&M	\$46.00	\$54.00	\$56.00	22%
Residue	\$4.00	\$8.00	\$10.00	150%
TOTAL	\$62.00	\$82.00	\$91.00	46%



O&M

- Impacts of China- Slowing down the line
- Rise of film and clamshells
- More units per ton = less throughput
- Labor shortage

Fixed Cost

- Trend towards automation
- Larger regional footprint
- More technology

Residue

- Aggressive MRF interpretation
- Impact of China- tighter quality standards
- Enforcement
- "Wish" Cycling

2019 FACTORS LEADING TO SLIGHTLY LOWER MRF COST

- Higher cost, higher contamination contracts
 - Reject, Abandon/no renewal, no bid
 - Automation
 - Operations focus to reduce losses
- Active Rejections and charge backs
- Closures/consolidations of old or poorly-operated facilities
- Reduced materials accepted- contract changes



CONTRACT DIFFICULTIES DUE TO MARKET CHAOS

Legacy High Risk Contracts Lead to Disruptions

- All MRFs reporting higher costs
- Residue percentages are soaring from MRFs - at least 33% higher than 2016
- Both sides hurting due to risk sharing

IMPACTS- NET PROCESSING FEES UP 40% IN 2 YEARS JUNE 2019

City	St.	Date	Processing Fee	Parties to Agreement
Sunrise	FL	7/20/18	\$100/ton	Sunrise, WM
North Lauderdale	FL	6/26/18	\$96/ton	North Lauderdale, WM
St. Petersburg	FL	6/9/2019	\$90/ton	WCX/St. Petersburg
DeBary	FL	8/1/18	\$80-120/ton	DeBary, Waste Pro
DeLand	FL	Sept. 2018	\$80/ton	DeLand, Gel Recycling
Deltona	FL	1/8/19	\$77.50/ton	Deltona, Waste Pro
Ormond Beach	FL	Sept. 2018	\$77.50/ton	Ormond Beach, Waste Pro
Sunrise	FL	7/20/18	\$100/ton	Sunrise, WM
Volusia County	FL	Sept. 2018	\$80/ton	Volusia County, Gel Recycling
Baltimore	MD	6/20/18	\$82.93/ton	Baltimore, WM
Gouldsboro	ME	7/31/18	\$140/ton	Gouldsboro, Casella
Kennebunkport	ME	3/13/19	\$211-276/ton	Unknown
Westland	MI	3/4/19	\$80/ton	Westland, ReCommunity
Kirkwood	MO	9/7/18	\$115/ton	Kirkwood, Republic Services
Harrisburg	PA	12/6/18	\$35/ton	Harrisburg, Penn Waste
Philadelphia	PA	11/28/18	\$170/ton	Philadelphia, Republic Services
Milwaukee	WI	5/15/19	\$53.89/ton, 80-20 Rev. Share	Milwaukee, ReCommunity

CURRENT MRF DEFICITS AND IMPACTS- DISRUPTIONS

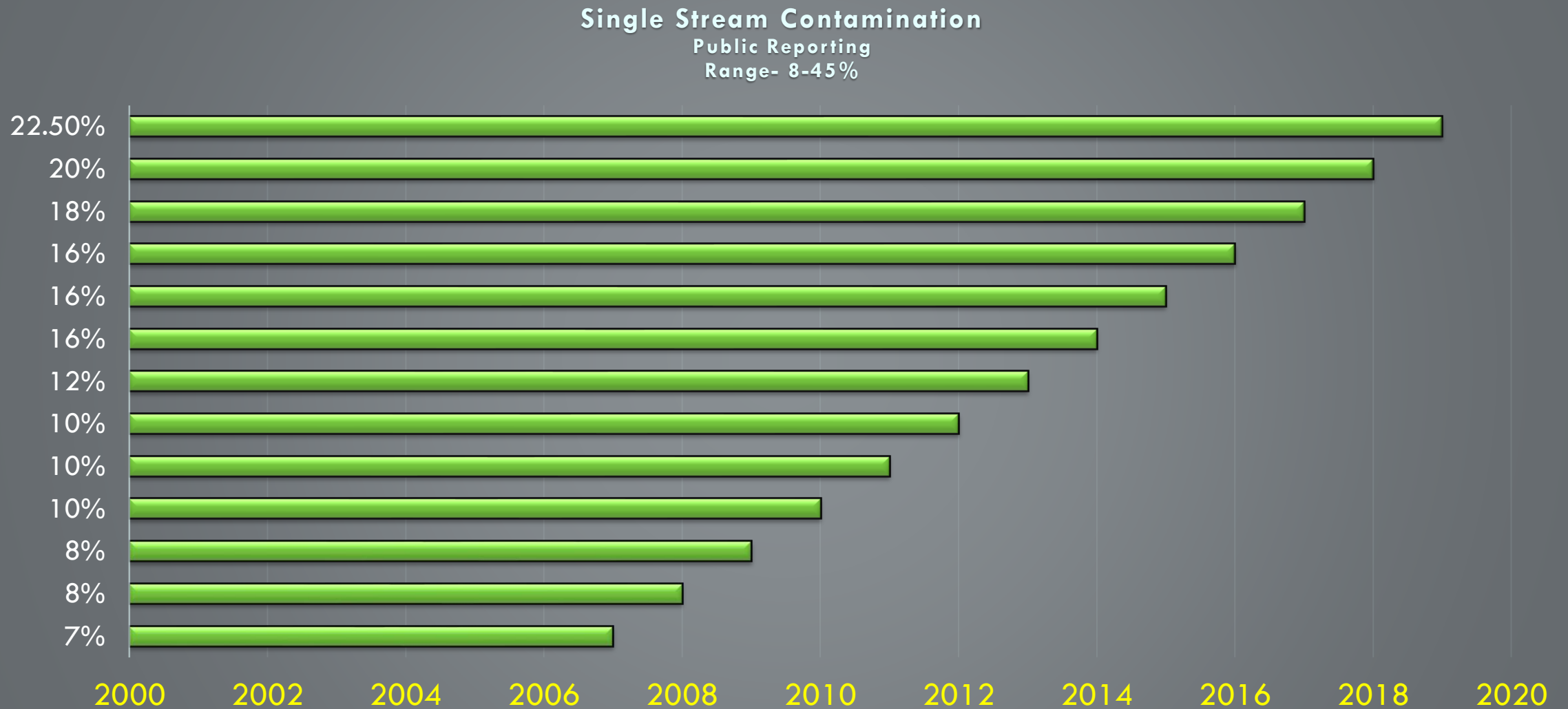
JUNE 2019

DISRUPTIONS- Southeast US		
Enterprise	AL	Closure
DeBary	FL	Closure
Deerfield Beach	FL	Closure
Deltona	FL	Closure
Iberia Parish	LA	Closure
St. Martins, Wardsville and Taos	MO	Closure
Scott City	MO	Closure
Lincolnton	NC	Closure
Harris County (partial)	TX	Closure
Fort Smith	AR	Disruption
Pensacola	FL	Disruption
Savannah	GA	Disruption
DeKalb County	GA	Disruption
Greenville	SC	Disruption
Chattanooga	TN	Disruption
Memphis (partial)	TN	Disruption
Ormond Beach	FL	Disruption/Material Removal
Lafayette	LA	Disruption/Material Removal
South Central SWMD	AR	Future Closure
Little Rock, North Little Rock	AR	Material Removal
Gulf Breeze	FL	Material Removal
Polk County	FL	Material Removal
Gwinnett County	GA	Material Removal
New Orleans	LA	Material Removal
Wildwood	MO	Material Removal
Wentzville	MO	Material Removal
O'Fallon	MO	Material Removal
Gulfport	MS	Material Removal
Rock Hill	SC	Material Removal
Tega Cay City, Chester and Lancaster Co.	SC	Material Removal
Sherman	TX	Material Removal

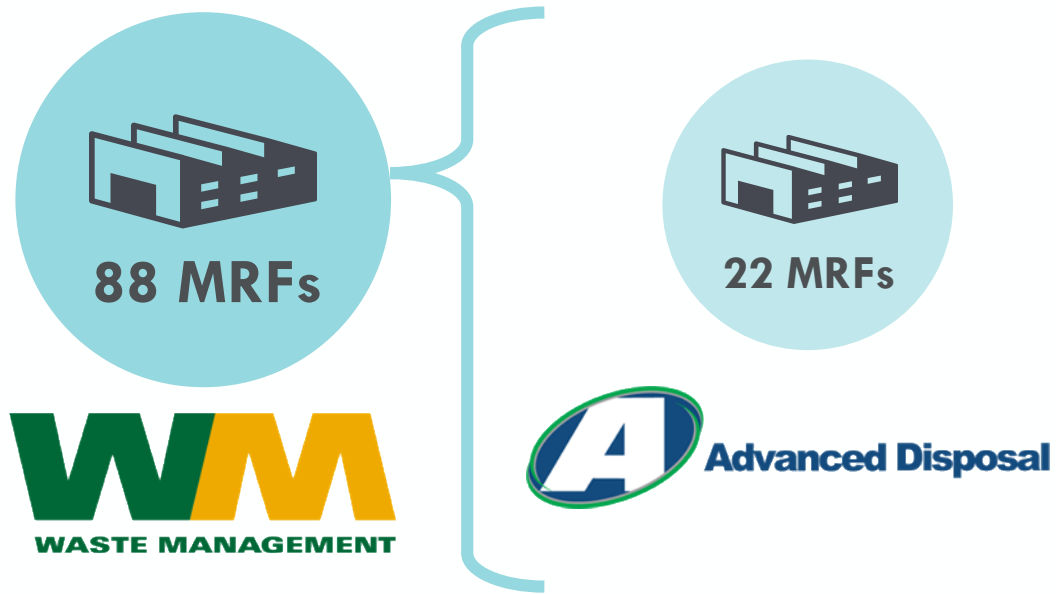
- Reported Southeast material recycling disruptions in media sampling
- Large concessions on less valuable materials- especially glass (about 30 programs per quarter)
- Less than 5% of programs affected so far- estimate 15-20% as contracts cycle

CONTAMINATION INCREASES- PUBLIC RANGE AVERAGES

MUNICIPAL PROGRAMS, WM, BILL MOORE, GAA, RRS, KESSLER

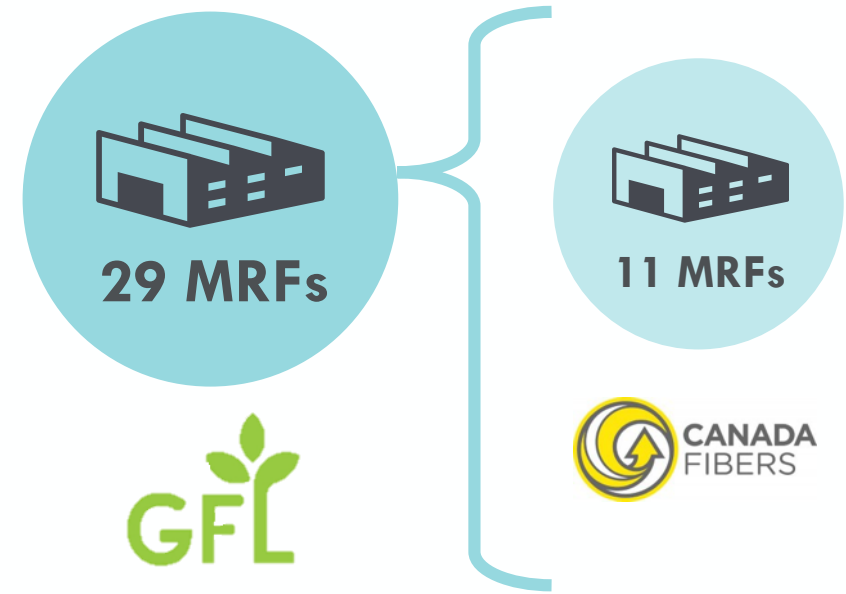


CONSOLIDATION- TREND OF ACQUISITIONS



PAPER COMPANIES- 64

WestRock- 22
Pratt- 18
Cascades- 18
GP-6



PUBLIC WASTE COMPANIES- 307

Waste Management — 88
Republic Services — 91
Waste Connections — 64
Advanced Disposal Services — 22
Casella Waste Systems — 18



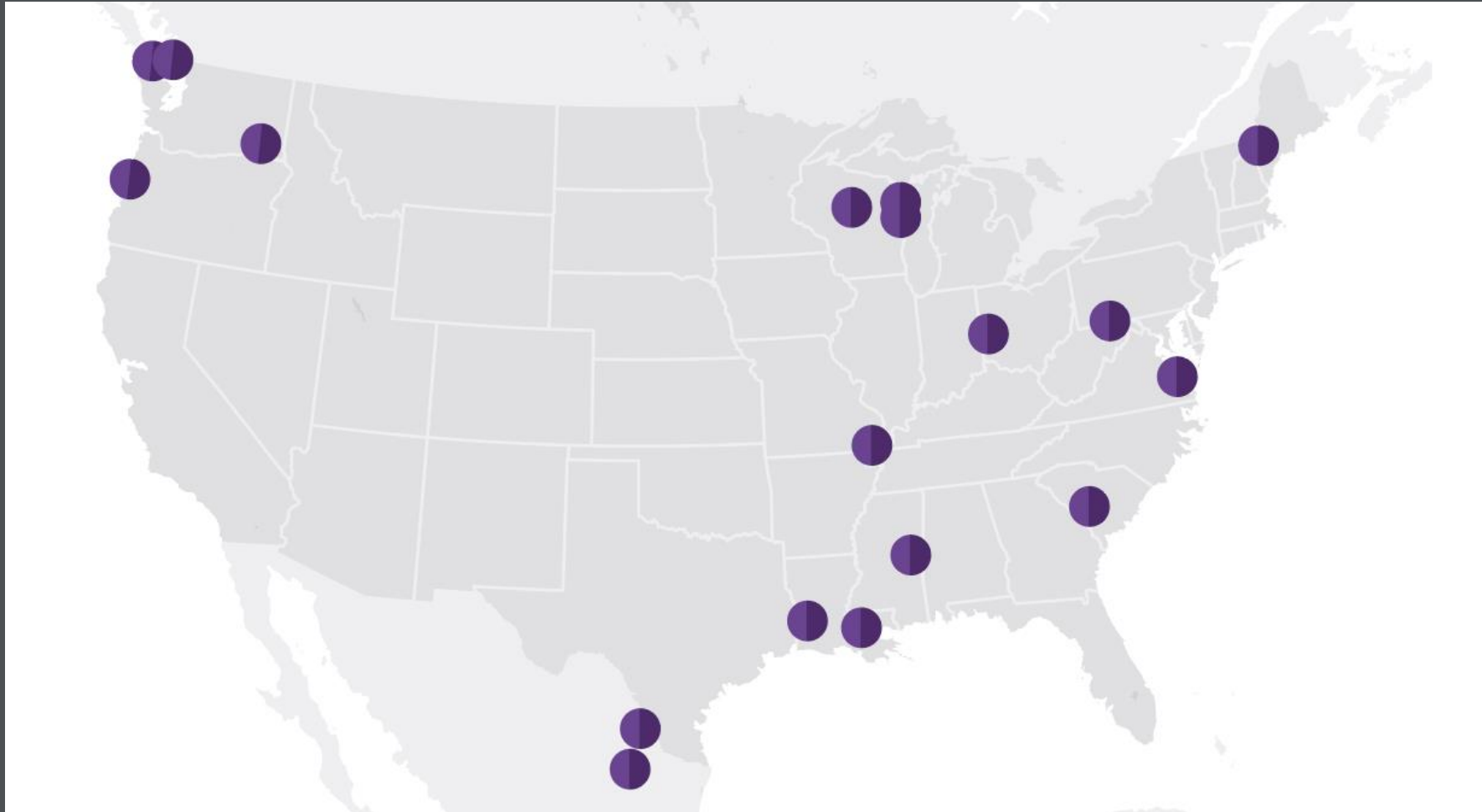
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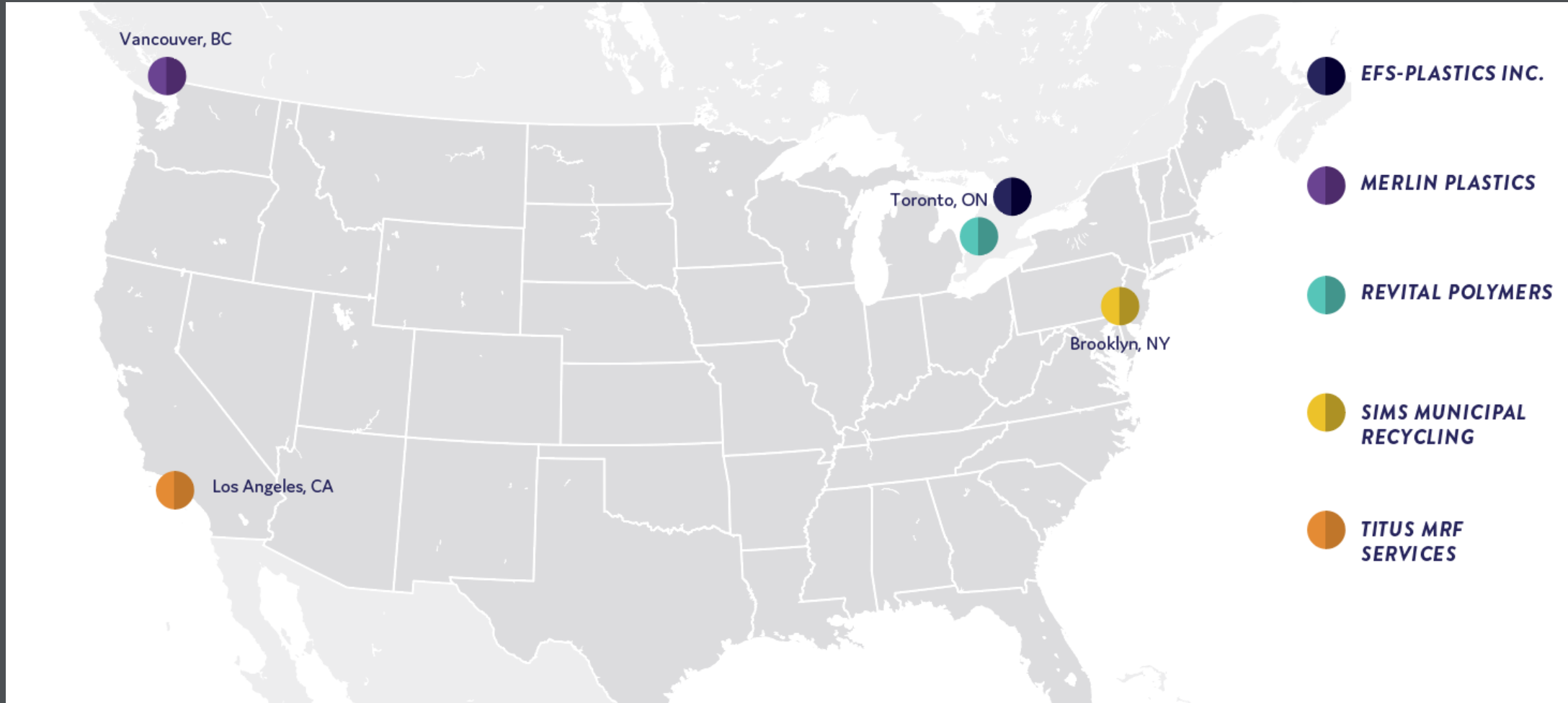


END MARKETS

NEW PAPER MILLS ARE IN DEVELOPMENT



MIXED PLASTICS MARKETS ARE NOT DEAD!





EMERGING TECHNOLOGIES

- Robotic Sorting Using AI Image Recognition
- High Level MRF Automation
- Evolution of Screens and Optical Sorters
- Higher Capital
- Higher Quality Material

PUBLIC/PRIVATE COORDINATION



Invoice

Company: [Name]
Address: [Address]
Phone No: [Phone]
Customer ID: [ID]

Quantity: []
Amount: []

Year	2015	2016	% Growth
Product A01	108,287	119,114	+11%
Product A02	81,938	87,812	+7%
Product A03	125,819	132,145	+5%
Product A04	278,161	295,123	+6%
Product A05	11,827	12,543	+6%

Region	2015	2016	% Growth
North America	135	145	+7%
Asia	100	110	+10%
Europe	20,309	21,500	+6%
Latin America	47,716	50,000	+5%
Africa	13,890	14,500	+4%
Oceania	456	480	+5%
Total	25,359	26,738	+5%



CURRENT STATE OF
CARTON RECYCLING IN
U.S.



EXPECTED GRADE 52 INFRASTRUCTURE IN NA BY Q3 2019

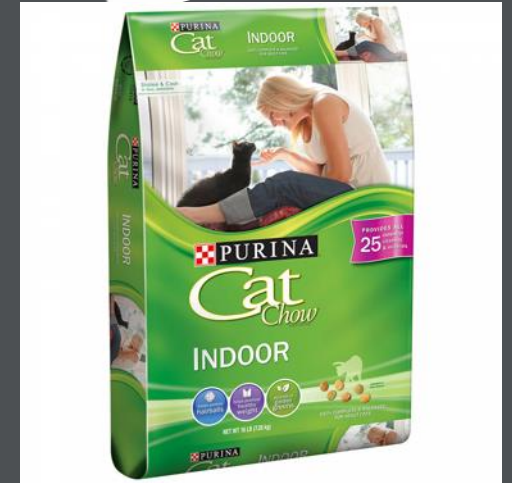


UNDERSTANDING CONTAMINATION



- Contamination affects recovery and commodity value.
- “Wishcycling” is not recycling.

THE ADDITION OF MODERN PACKAGING IS BEING STUDIED



CORPORATIONS NEED RECYCLED CONTENT TO MEET GOALS





RECYCLING IS EVOLVING EVERY DAY

- **Trade organizations** are voluntarily expanding the recycling opportunities of the materials they produce
 - Carton Council (CCNA)
 - Foodservice Packaging Institute (FPI)
 - They are funding, technical assistance, outreach support, and best practices support municipalities
- **Partnerships and Collaborations** are exploring how to recover materials that are becoming more prevalent in the stream
 - Materials Recovery for the Future (MRFF)

WRAP-UP



Recycling
is not
dead



It's time to
take stock,
evaluate
and
improve



Landfilling
everything
is not the
answer



Recycling is
constantly
evolving



Collaboration
results in
innovation



THANK YOU

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MRF FIBRE COMMODITY INFLUENCERS

- Oversupply-- Indonesia .5%; 1.25MMT MRF fibre.
- “contamination” limit restricts MRF paper grades
- Market Pulp off record high pricing by C\$400 (36%)- RISI; profoundly “weak, inventories up 60%”
- US paper production down 4.7% in worst showing since 2009
- Amazon affect vs. Frustration Free Flex
- Still quality OCC is moving and price stabilizes



Residential Single Stream Price Ticker Behavior May 2019

UBC, OCC,
and PET now
account for
+69% of
Single Stream
value



OCC stabilized in last 3-months; only commodity to see an increase in September. High quality #12 (DS) is coveted by China. OCC increases for first time in nine months. MRF grades report still tough to get orders



SRPN- Surprising price stability \$0-15 CDN. RISI- "...as MRFs close, (stop producing higher sort-cost SRPN, price stable



All Resin pricing falling during quarter, Saudi Arabia bombing might change that



Steel slide increases acceleration, Steel CDN bales decreased by 15% continuing 6-month trend since start of 2019



TO PUT IT SIMPLY

- Values are Decreasing
- Processing Costs are Increasing
- End Markets are Harder to Find

CURRENT MRF DEFICITS AND IMPACTS TO PROCESSORS AND PUBLIC SECTOR

JUNE 2019

U.S. MATERIAL RECOVERY FACILITY AVERAGE

Bottom Line Impact Avg. Size MRF

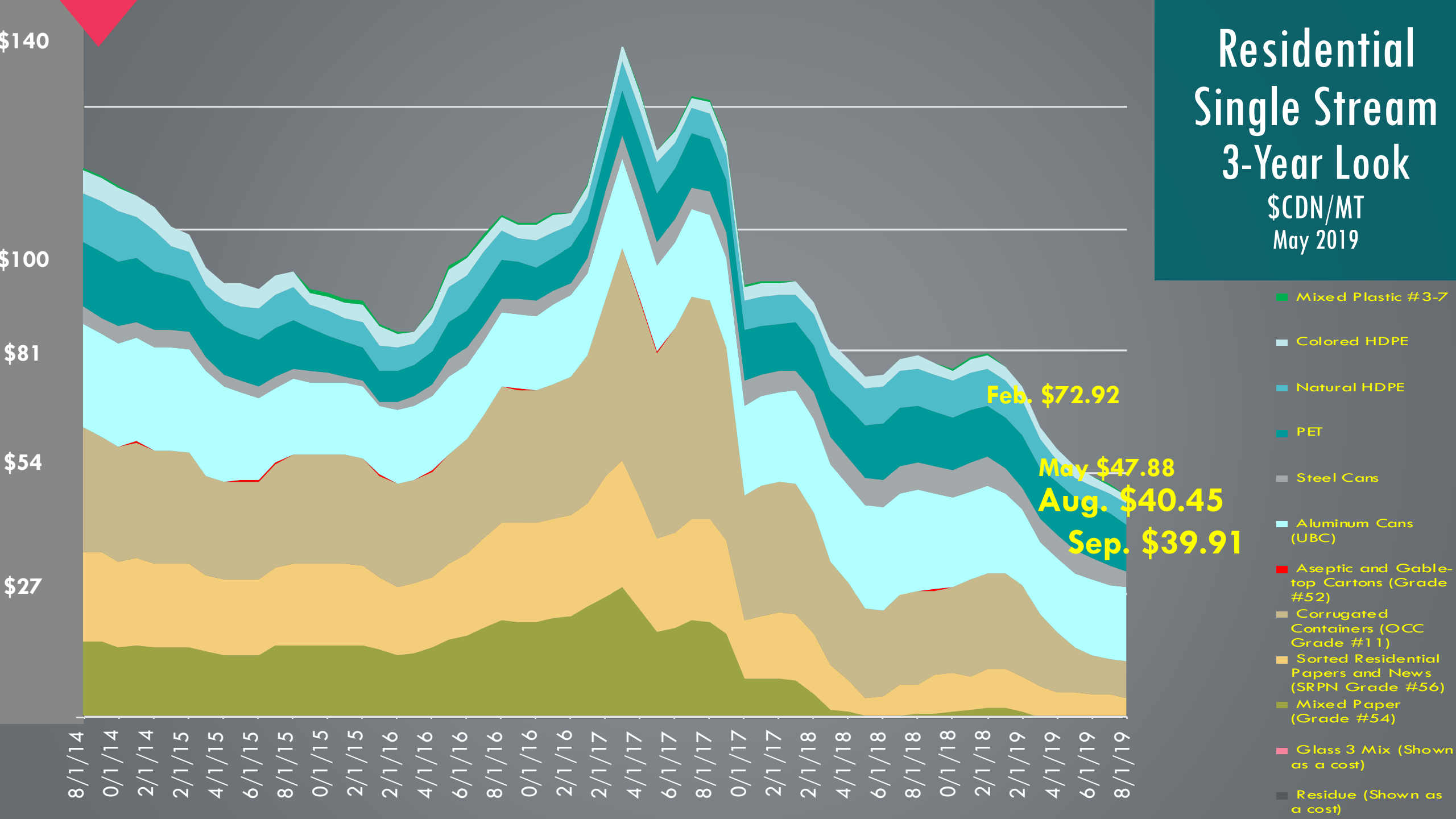
Category	June 2019
Revenue (from graph for June 2019 Avg. Indices)	\$30.57
MRF Single Stream Total Cost	\$91.00
Loss Per Ton	(\$60.03)
Average Sized MRF (Tons/Mo)	7,800
Loss Per Month based on Revenue	(\$468K)
Loss Per Year	(\$5.6M)

Addressing the Gap

- Made up by processing fees
- Since China ban 2 years ago- \$30/T/year
 - Existing Contracts obsolete for both sides and do not address:
 - Today's losses if risk is part of contract
 - Higher residue costs
 - No easy ways to adjust agreements incrementally

Residential Single Stream 3-Year Look

\$CDN/MT
May 2019



- Mixed Plastic #3-7
- Colored HDPE
- Natural HDPE
- PET
- Steel Cans
- Aluminum Cans (UBC)
- Aseptic and Gable-top Cartons (Grade #52)
- Corrugated Containers (OCC Grade #11)
- Sorted Residential Papers and News (SRPN Grade #56)
- Mixed Paper (Grade #54)
- Glass 3 Mix (Shown as a cost)
- Residue (Shown as a cost)