

# Behind the Scenes at MSW& Manufacturing MRFs



# - BURNS & McDONNELL PROPRIETARY INFORMATION -

# Topics of Discussion

01

Introduction

Composition

**Audits** 

Equipment

**Processing** 

02

05

MRF Contracts

03

Challenging Materials

06

Manufacturing Facilities

# INTRODUCTION



#### Background















#### Live Safer Commitment

#### Our Mindset:

Live safer isn't just a goal—it's who we are.

#### Our Foundation:

We build strong relationships to achieve exceptional results while prioritizing safety and well-being.

#### **Our Actions:**

- Embrace feedback and continuous learning
- Speak up and treat at-risk observations as opportunities
- Welcome coaching at all levels
- Share knowledge from successes and failures

#### Our Commitment:

We empower everyone—employees, clients, subcontractors, and families—to build a safer future together.

WHAT DRIVES US



ENVIRONMENTAL PROFESSIONALS

75+

OFFICE LOCATIONS 50+

YEARS OF EXPERIENCE

#11

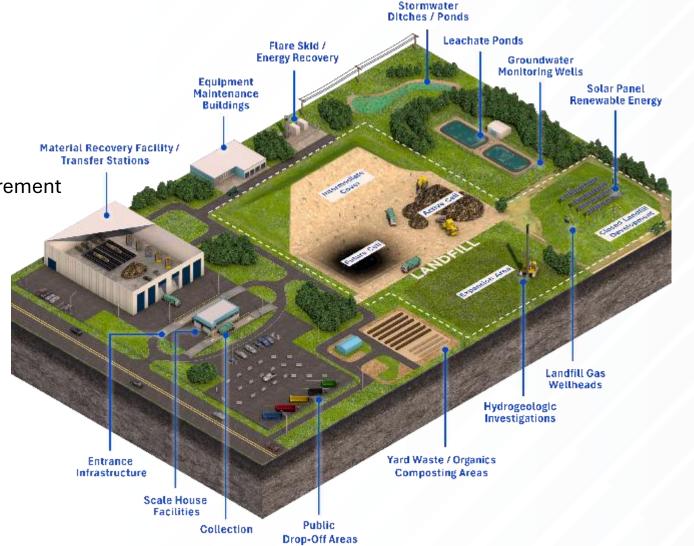
IN ENVIRONMENTAL BY *ENR* 



#### Solid Waste & Resource Recovery Services

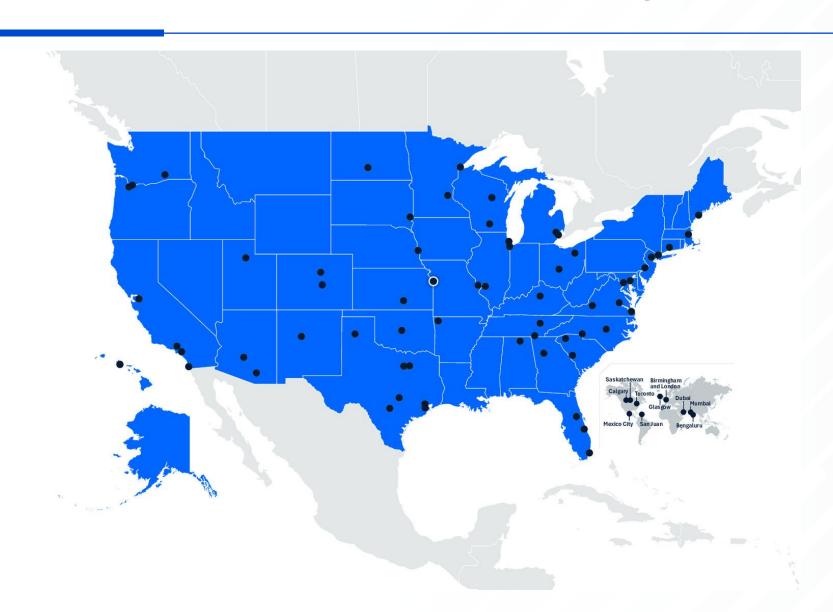
- Operations optimization
- Collection evaluation
- Cost of service studies
- Comprehensive planning
- → Collection and processing/disposal procurement
- Recycling and diversion
- Material recovery facilities
- Transfer stations
- Landfill disposal
- → Leachate management
- Landfill gas management
- Yard waste and organics
- Energy from waste

ENVIRONMENTAL ENGINEERING





#### Solid Waste & Resource Recovery Services



# MSW MRFS



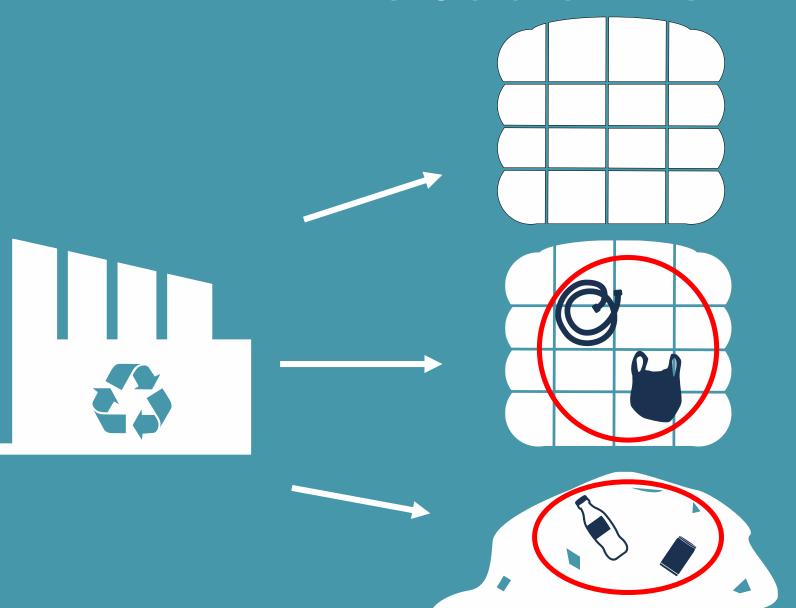


#### **Problem Statement**

Local governments may not be MRF operations experts.

- Processing equipment capabilities
- Accepted materials
- → Contamination
- Commodity markets
- Commodity rebates
- → MRF audits

#### The Job of the MRF



Converting inbound commodities to outbound commodities

High Bale Quality

Keeping Commodities out of Residue





# MSW MRF PROCESSING EQUIPMENT



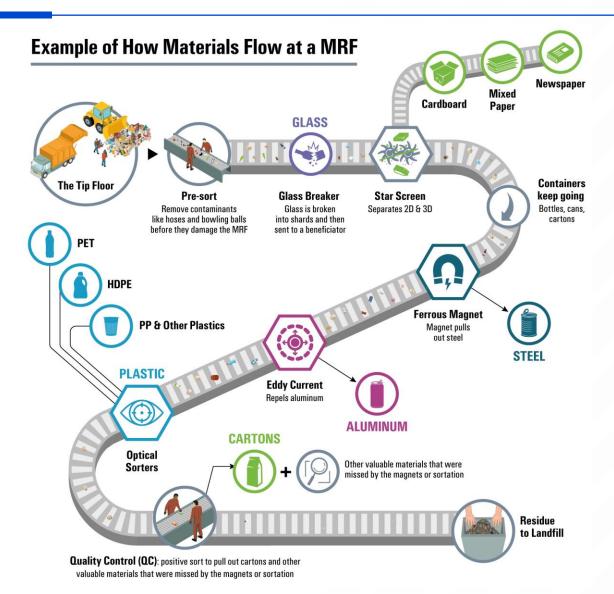
#### **Processing Equipment**

Reducing labor reliance, increasing throughput, improving material quality & recovery

- → Auger screens
- → Optical sorters
- → Robotics
- → Last chance retrofits



#### **Processing Equipment**



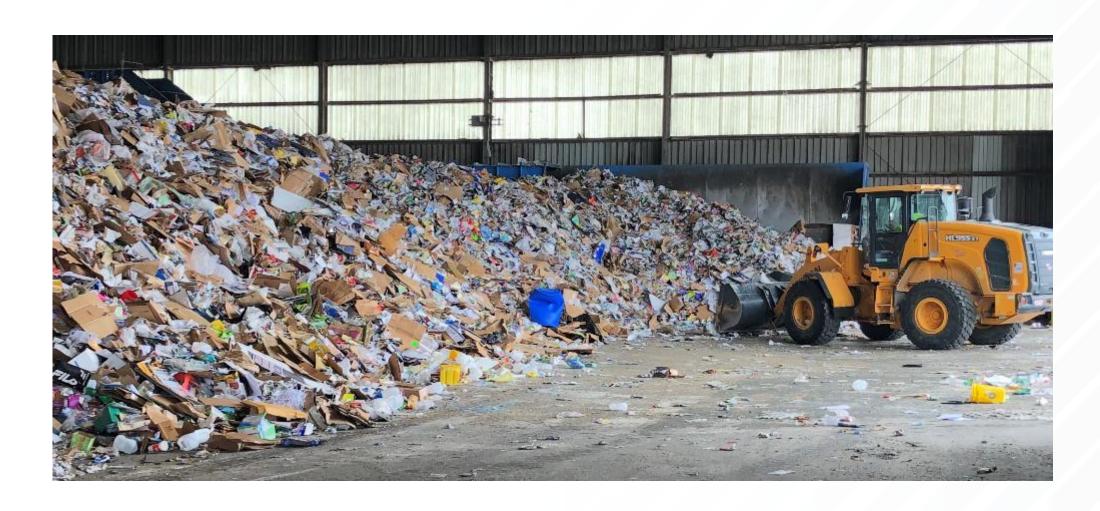


#### Truck Scale



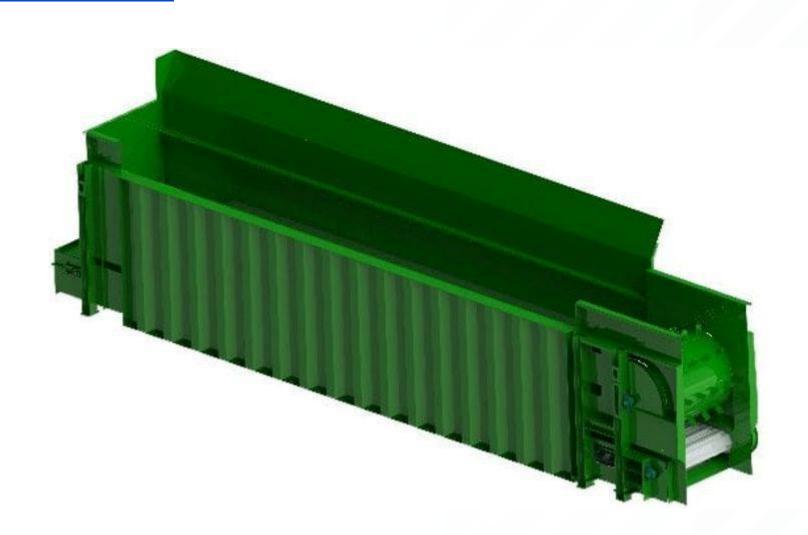


# Tip Floor





# Metering Bin

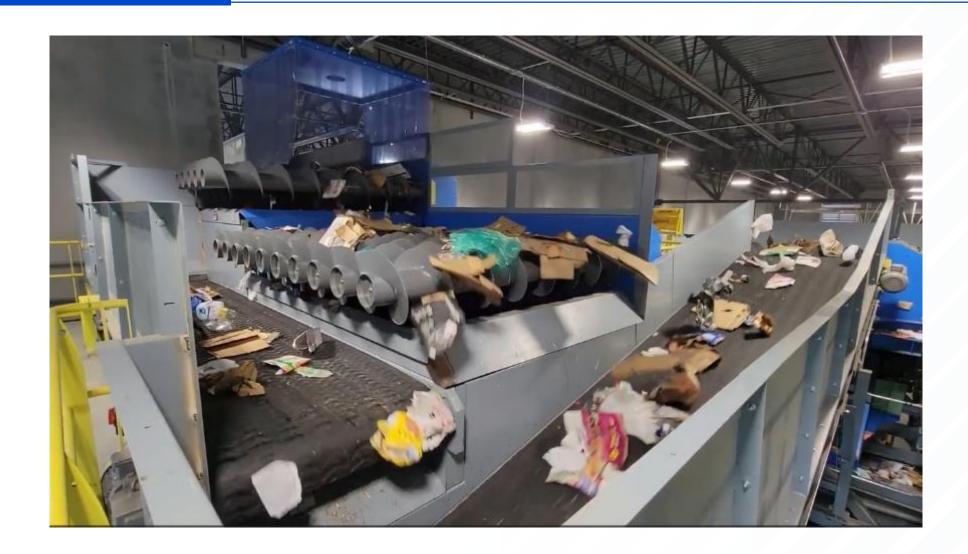


#### Pre-Sort



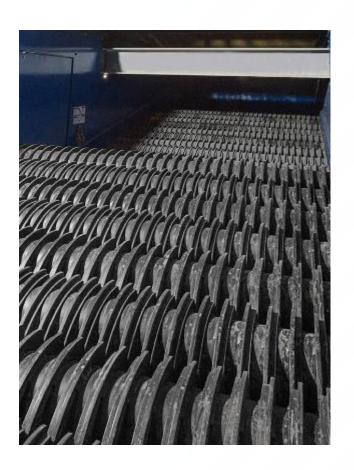


#### Auger Screen





#### Glass Screen



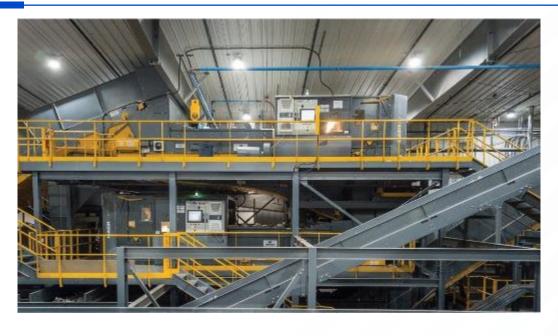


#### Paper Screens



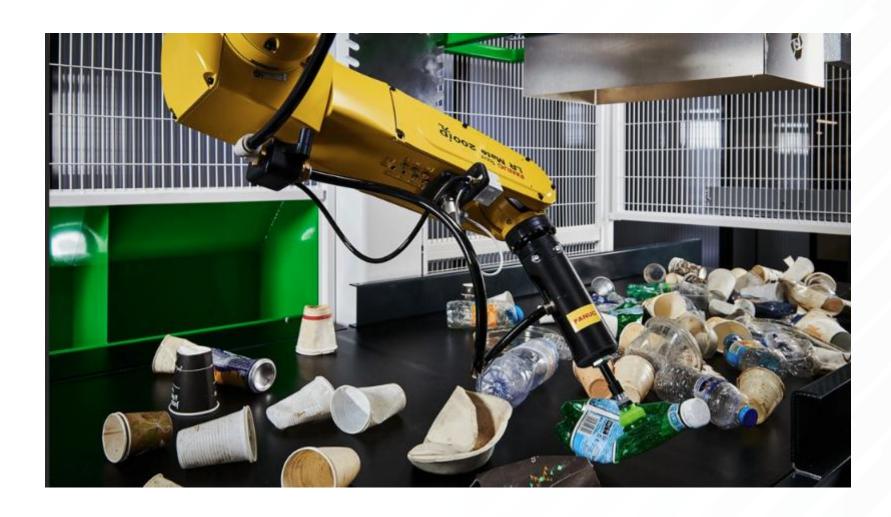


#### **Optical Sorter**





#### Robotics





# Magnet Belt



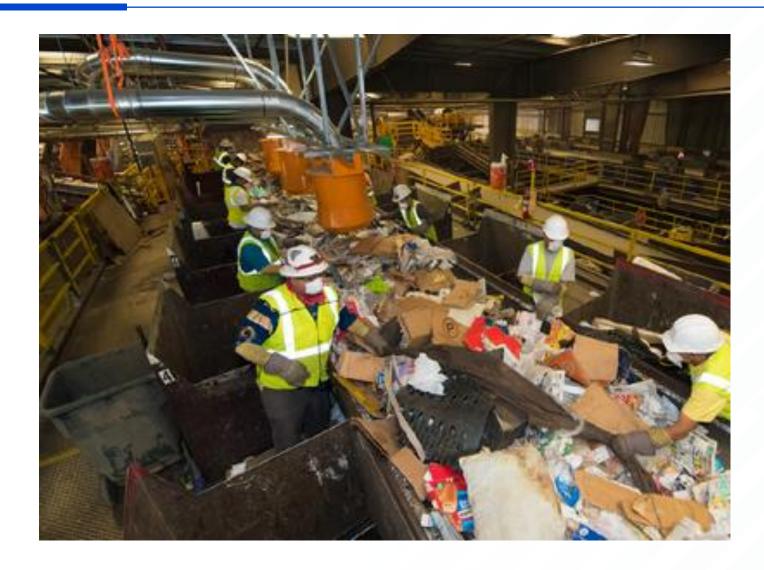


### **Eddy Current**





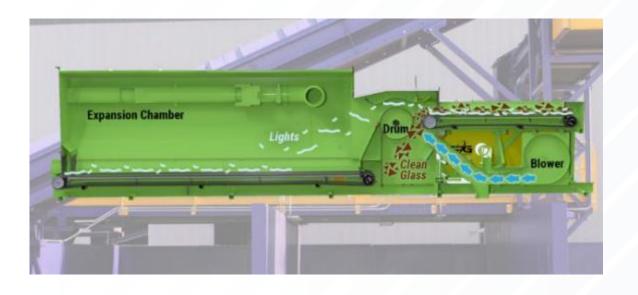
# QC Stations





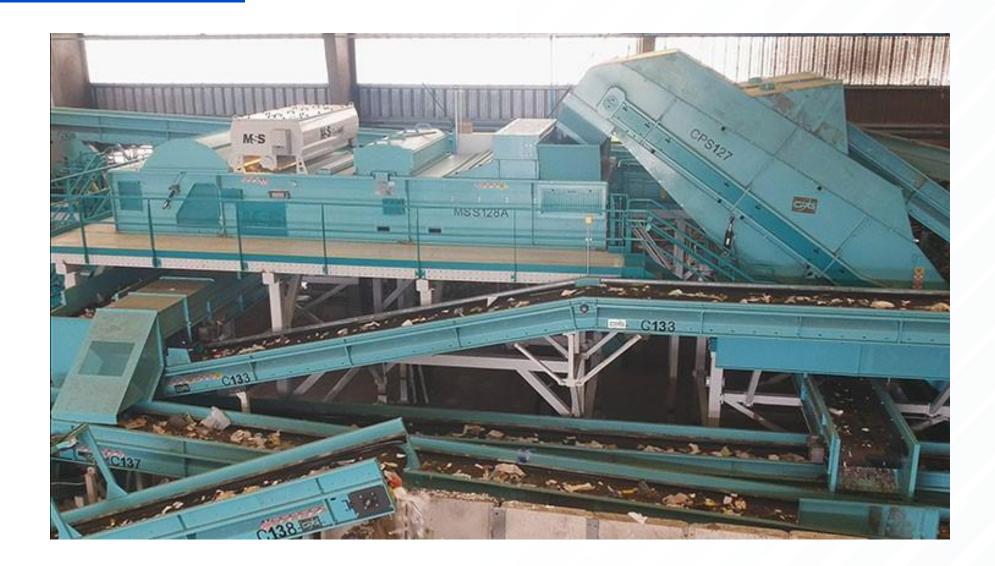
#### Glass Cleanup



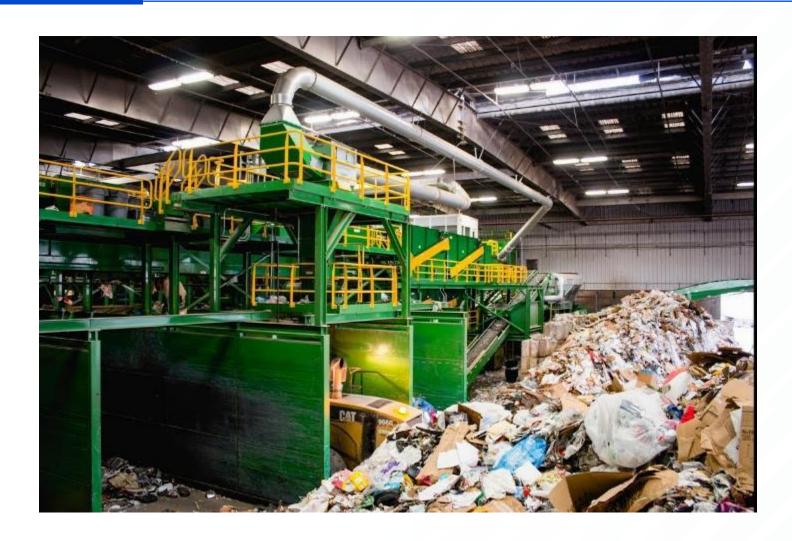




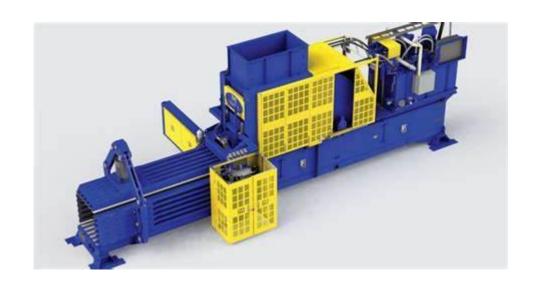
#### **Last Chance**



#### Bunkers



#### Balers







#### Bale Storage & Shipping







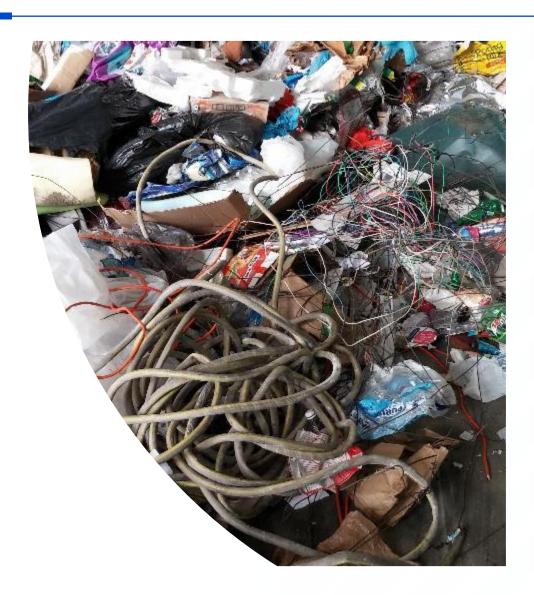
#### Challenging Materials

# Contamination decreases single-stream recycling value

- → Tanglers
- Glass cleanup systems
- → Small materials
- → Flexible packaging
- Compostable plastics
- Mixed materials
- Batteries



# Tanglers



#### Glass Cleanup Systems





### **Small Materials**













## Flexible Packaging

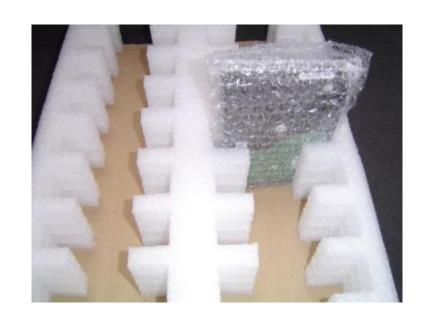




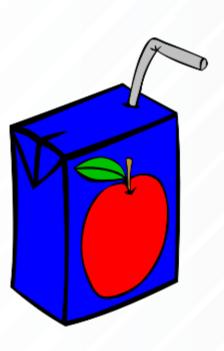


### Mixed Materials











## Compostable Packaging





### **Batteries**











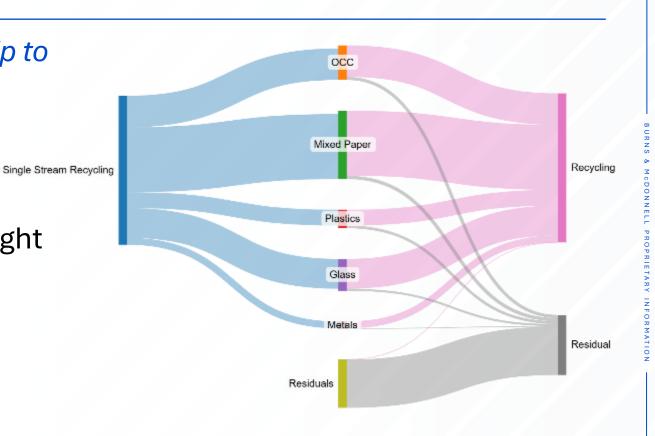
# **COMPOSITION AUDITS**



### **Composition Audits**

Municipal and MRF operators' partnership to maximize value

- Optical sorter maintenance
- Container loss in fiber streams
- Aluminum can eddy current bar height
- Cardboard bales bunker
- Avoid wet material



# MRF CONTRACTS



### MRF Contracts

## Municipal and MRF operators' partnership to maximize value

- → 95% recovery of program recyclables materials per equipment manufacturer specification
- → Rebate calculation order of operation



### MRF Contracts

Line Item	Formula A	Line Item	Formula B
Annual Tons	15,000	Annual Tons	15,000
Weighted Commodity Sales Price	\$100	Weighted Commodity Sales Price	\$100
Revenue from Sale of Recyclables	\$1,500,000	Revenue from Sale of Recyclables	\$1,500,000
Percent of Revenue Share	80%	Processing Costs	\$1,000,000
Revenue Share	\$1,200,000	Net Recyclable Revenue	\$500,000
Processing Costs	\$1,000,000	Percent of Revenue Share	80%
Net Revenue Share	\$200,000	Net Revenue Share	\$400,000

# **KEY TAKEAWAYS**



### **Key Takeaways**

# BMcD your trusted solid waste management partner

- Range of solid waste management services
- MRF procurement, audit, operations optimization, and design-build services
- → Design for automation
- Conduct regular audits
- Carefully structure contracts



# MANUFACTURING MRFS





### **Problem Statement**

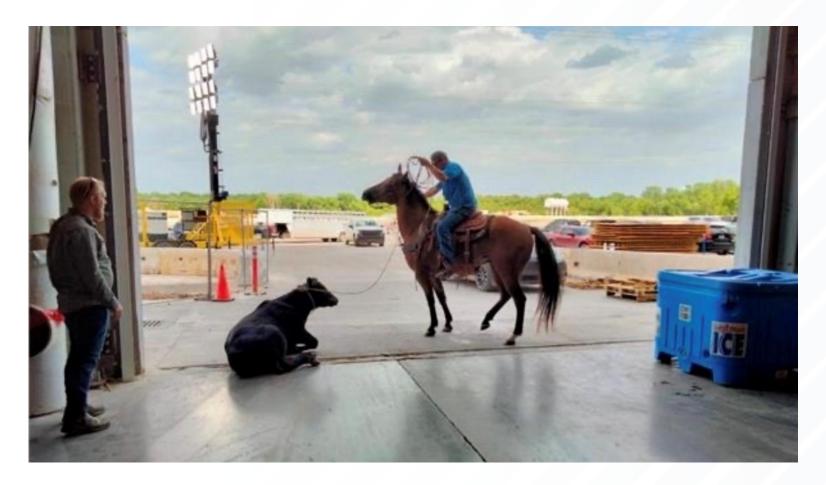
Public and private sectors aren't aware of and/or capturing manufacturing recycling.

- Facility design
- Facility layout, material flow, equipment
- Commodity markets
- Commodity values



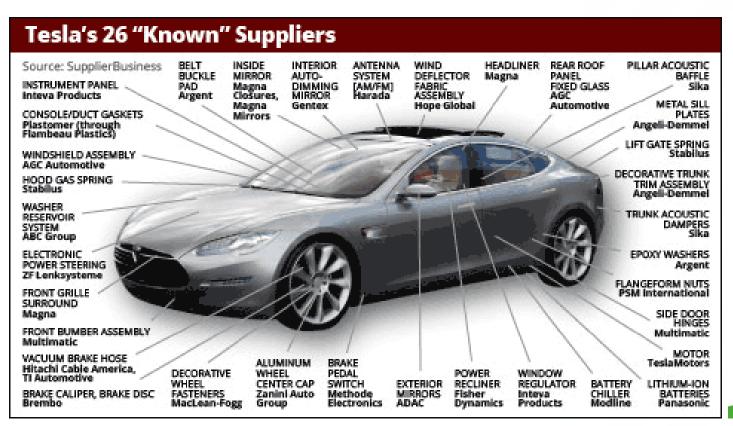
### Opportunity for source-separated materials

- → Production
- Packaging
- → People





#### Supplier Parts







#### **Production Process**







Supplier

Warehousing

### Manufacturing Facilities

#### **Production Process**





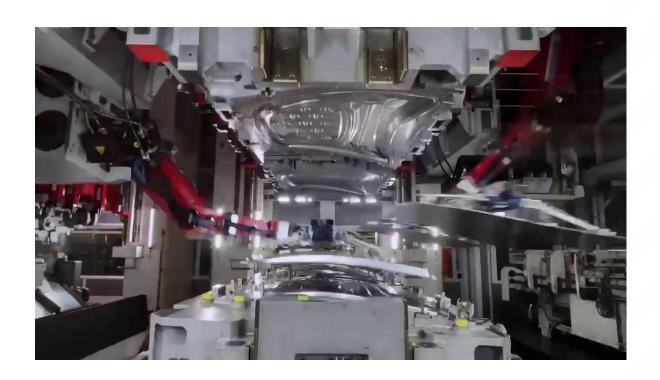


**Production Line** 

Finished Product



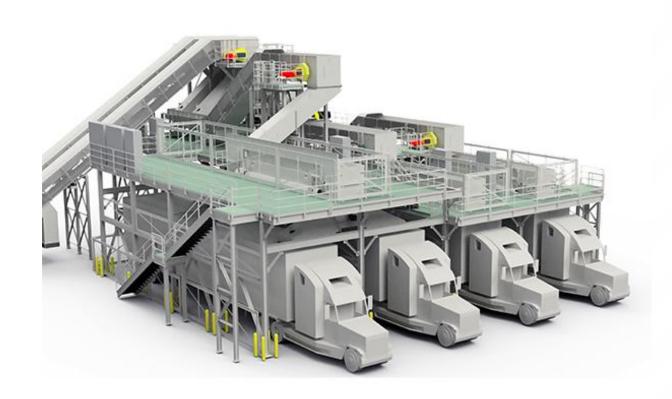
### Stamping Line Scrap







### Stamping Line Scrap





## Manufacturing Facilities

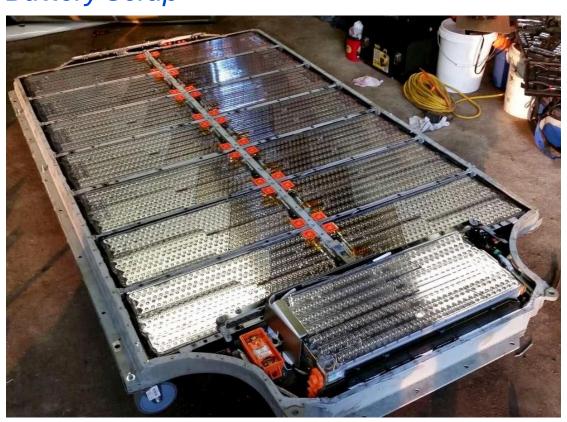
### Casting Line Scrap





## Manufacturing Facilities

### Battery Scrap





## Manufacturing Facilities

### **Exterior Operations**

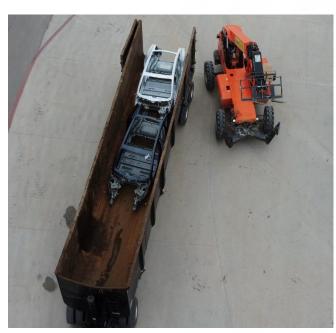






### **Exterior Operations**









### **Exterior Operations**







#### Two Ram Baler Install





## Manufacturing Facilities

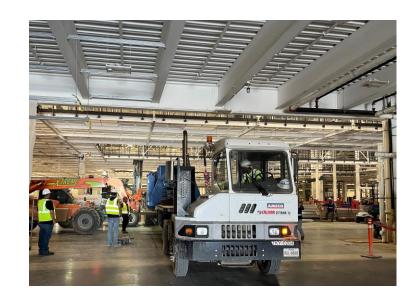
#### Horizontal Baler Install





## Manufacturing Facilities

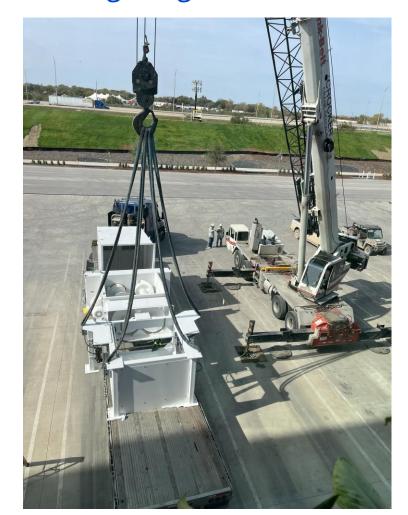
#### Horizontal Baler Install















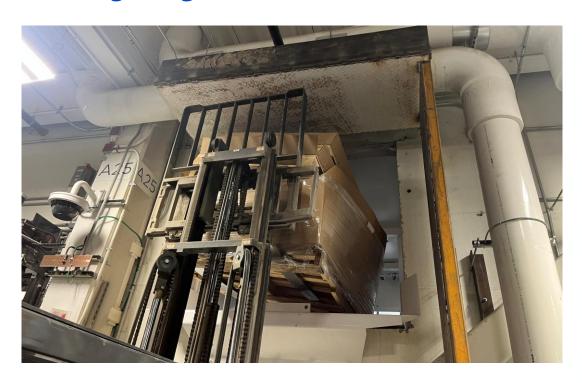














### Manufacturing Facilities

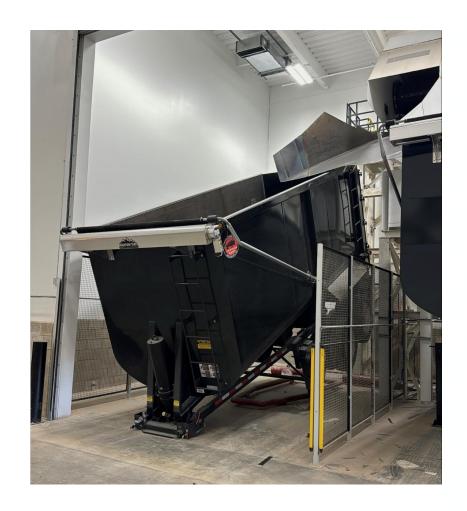








### Safety Risks







## Manufacturing Facilities







### Exterior Processing Yard







Exterior Processing Yard





## Manufacturing Facilities

#### **Dunnage Processing**





## Manufacturing Facilities

#### Dunnage Auger





## Manufacturing Facilities

#### **Commodity Bales**







# **KEY TAKEAWAYS**



## Key Takeaways

## Manufacturing facilities are significant recycling generators

- Over 10,000 tons monthly
- → \$30MM annual revenue
- → ~280 employees, 24/7 shifts
- 2 interior primary processing and 6 satellite processing areas
- 2 horizonal balers
- 6 vertical balers
- → 2 auger compactors
- → 1 exterior processing area
- → 3 self-contained compactors
- Fleet of yard hostlers, trailers, forklifts, and tuggers



# ZERO WASTE FACILITY PROJECT APPROACH





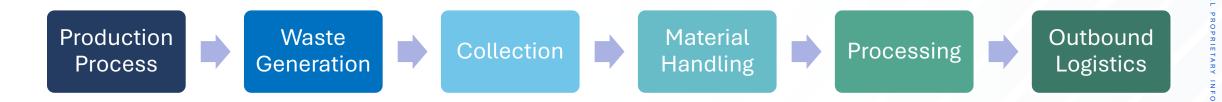
#### Project Process Flow

Waste Evaluation

Process Improvements Zero Waste Program Zero Waste Certification



#### Generic Waste Process Flow



#### Financial (Cost) / Benefit

Material	Current Annual Revenue or (Cost)/Ton	Potential Annual Revenue or (Cost)/Ton	Annual (Cost)/Benefit	
Cardboard	\$2,520	\$5,760	\$3,240	

#### Landfill Diversion (Cost)/Benefit

Material	Current Landfill Diversion Percent	Potential Landfill Diversion Percent	Variance		
Recycling	50%	95%	45%		

## 1

## Zero Waste Facility Project Approach

#### 5S Approach



**SORT** 



SET IN ORDER



SHINE



**STANDARDIZE** 



SUSTAIN

When in doubt, move it out

A place for everything and everything in its place

Clean and inspect or inspect through cleaning

Make up the rules, follow and enforce them

Part of daily work and it becomes a habit

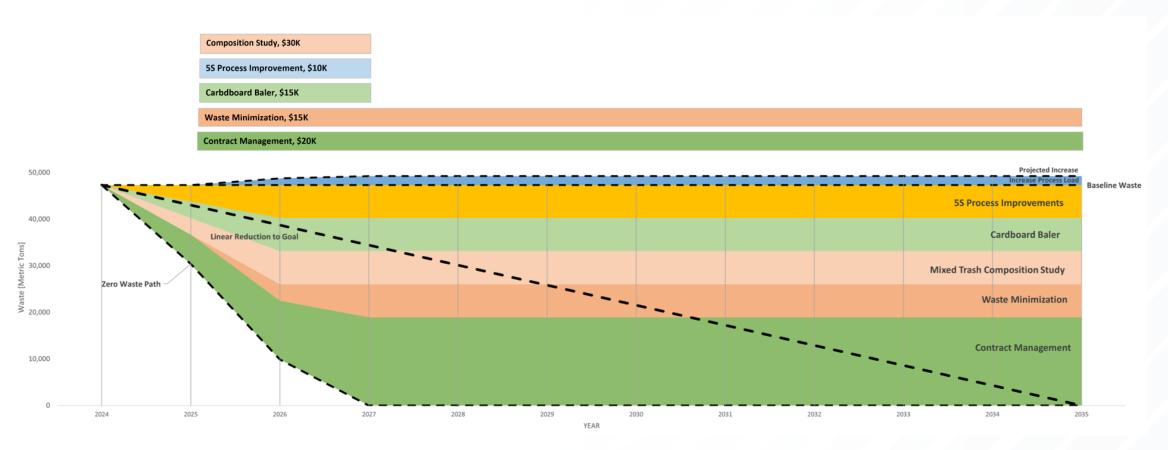


#### Implementation Matrix

NA : -1 - (0/)	<u> </u>	1	400/	2007	F0/	F0/	100/	100/	400/	1000/
Weight (%)			40%	20%	5%	5%	10%	10%	10%	100%
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Process Improvement		$\overline{}$	$\overline{}$	/ <b>\</b> *	/ 5	<del>/ •</del>	/ W		<b>( *</b>	
Standardize Collection Containers										
5S Layout Processing Area										
Vertical Baler for Cardboard										
Foam Denisifer										
Sort Electronics										
New Recycling Contract										
Improved Electronics Pricing										
1	Least Pref	erred								
2										
3										
4										
5	Most Prefe	erred								



#### Zero Waste Roadmap





CASE STUDY

### Net Zero Roadmap

**Project:** Net Zero Roadmap

**Client:** Confidential

**Services Provided:** Consulting

Size: Four facilities, 2.65M square feet

Status: Completed

**Duration:** 6 Months

#### Highlights:

- Developed a Net Zero Roadmap for a multinational corporation to reduce carbon emissions, water consumption, and waste to zero.
- Site visit for field observations
- Identification of sustainability opportunities, including 5S process improvements
- Collaboration with client to develop sustainability criteria prioritization matrix
- Incorporation of criteria to map actions to achieve Net Zero

Q&A





## **Contact Information**

## Thank you!

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