

# Van Dyk Recycling Solutions

## Presentation about Recycling



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06/03/2020



# Agenda

- Company Background
- Recycling Overview
  - Historical Overview
  - Explanation of current Single Stream Processing
  - Economics of recycling and Single Stream in particular
- The Future
  - Plastics and the circular economy
  - MSW Sorting

# Van Dyk Recycling Solutions

- We deliver recycling/waste processing solutions
- Design and build MRF's (Material Recycling Facility)
- European Suppliers:
  - Bollegraaf
  - Lubo
  - TOMRA
  - Walair
- Smart Collection
  - VConsyst



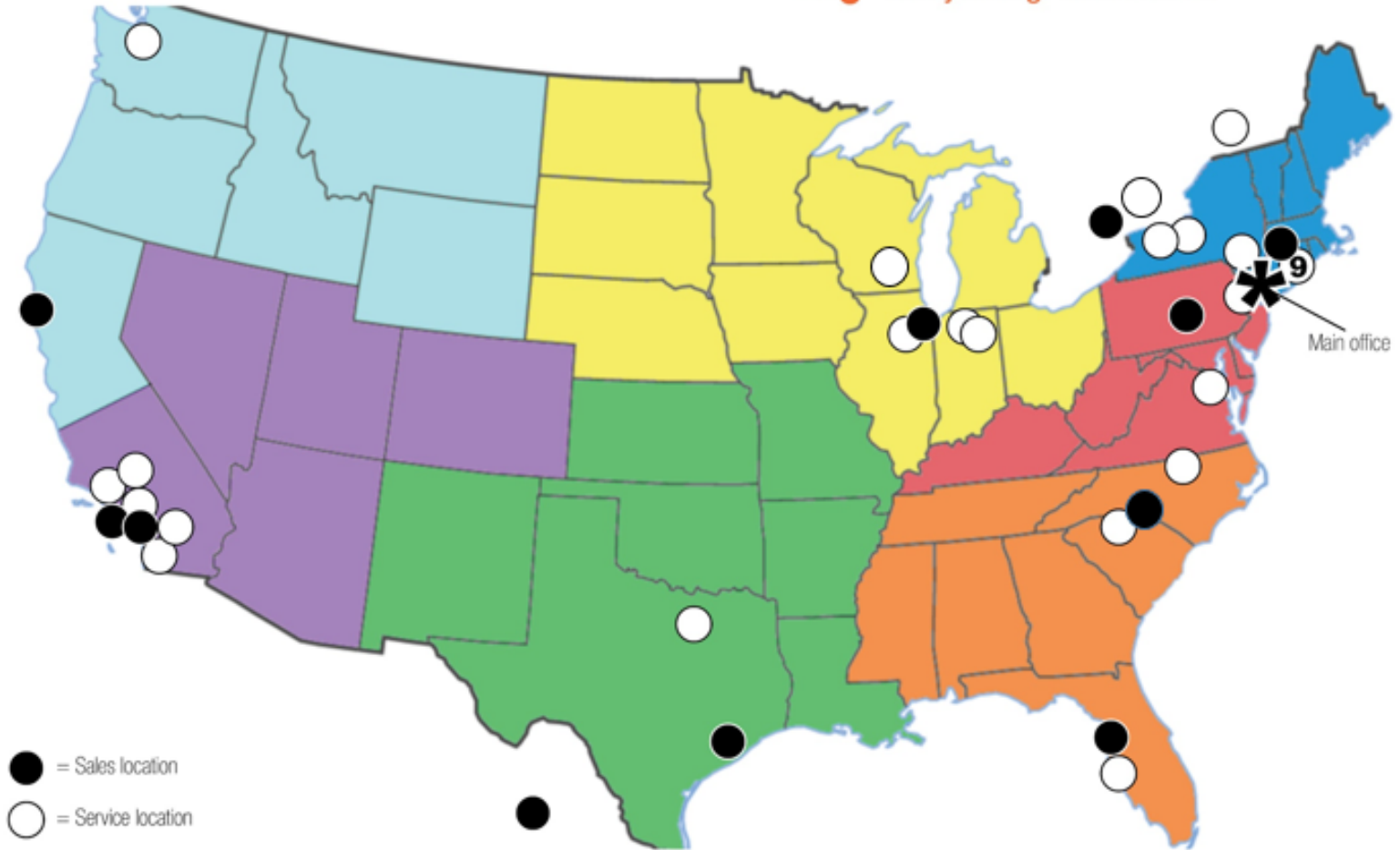
# Types of Recycling Streams

- Residential Recycling
  - Single Stream
  - Dual Stream
- Commercial Recycling
- C & D materials
- Plastics recycling
- Municipal Solid Waste (MSW)
- Organics
- E-Waste



# Company Background

North American Sales and Service Locations



# Visual Summary of Use VDB Campus



Section Dimensions						
	Name	Length	Width	Sq Ft	# Floors	Notes
1	FUTURE EXPANSION	265'	120'	31,800	1	40' Ceiling, 5 docks
2	FUTURE EXPANSION	128'	81'	10,368	3	
3	Machine Rebuild Facility	84'	44'	3,696	1	
4	TITECH Optical Sorting Test Center	148'	120'	17,760	1	
5	Warehouse 1st Floor and Training Center 2nd Floor	148'	83'	12,284	3	
6	FUTURE EXPANSION	140'	129'	18,060	1	
7	Warehouse - Shipping/Receiving	121'	166'	20,086	1	4 docks
8	Main Office	121'	86'	10,406	2	11' Ceilings
9	Baler Rebuild Facility	150'	63'	9,450	1	
10	FOR LEASE	104'	246'	25,584	1	24' Ceiling, 6 docks
11	Leased to Sky Zone Trampoline Park	164'	246'	40,344	1	40' Ceiling

# Parts Distribution Center

- \$19 million in Parts
- 2018 fill rate of 99.5%
- Parts warehouse open 7/365
- Same day (courier) and next day shipment
- Van Dyk Direct – (Amazon style)



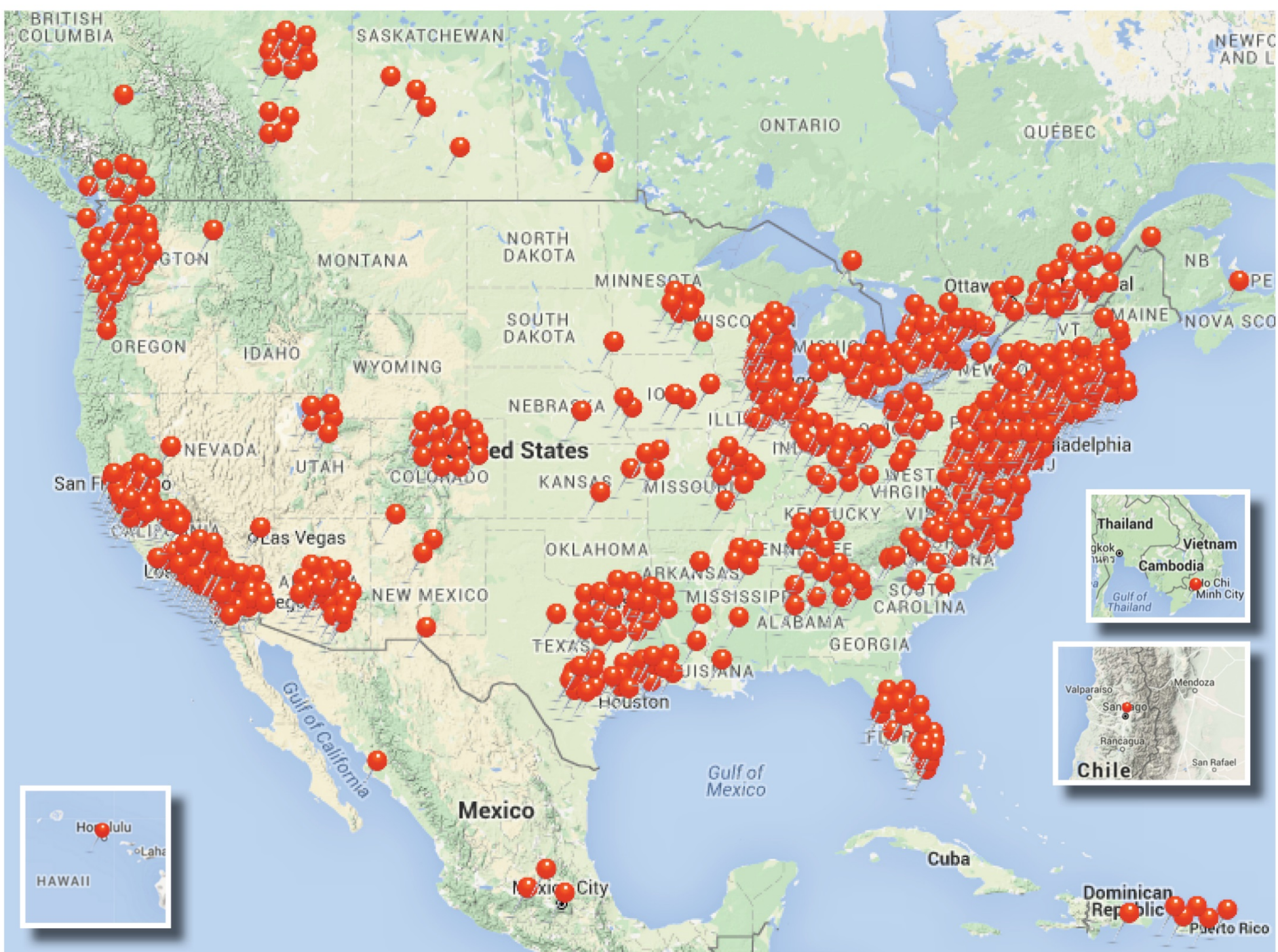
# Test Facility, Norwalk, CT

## Main Purposes

- Proof of concept for recycling processors
- Lab for packaging/brand companies
- Lab for packaging engineers and environmental studies







# Large 50+ TPH Facilities Supplied

- NYC
- City Toronto
- State of Rhode Island
- Baltimore
- Washington DC
- Minneapolis
- Los Angeles
- Chicago
- Philadelphia
- and more...





# SIMS largest container plant in the world - 70 tph New York City containers (1000 tons per day, only 8 sorters)



# Underground Waste Storage

- More Storage
  - Up to 44x more than regular garbage bins
- Hygienic
- Efficient Pick-up
- Aesthetically pleasing modern design





Installed in Norwalk, CT



# Recycling Overview

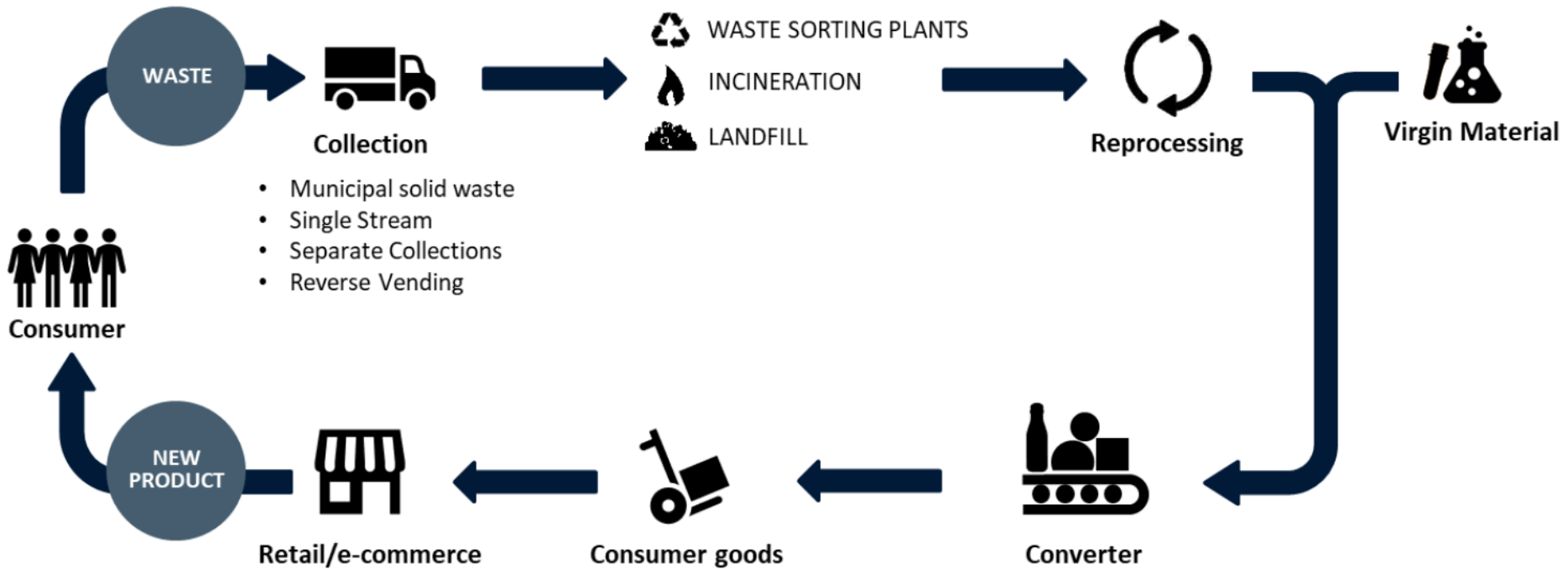


# Evolution of Recycling in the US





# Recycling



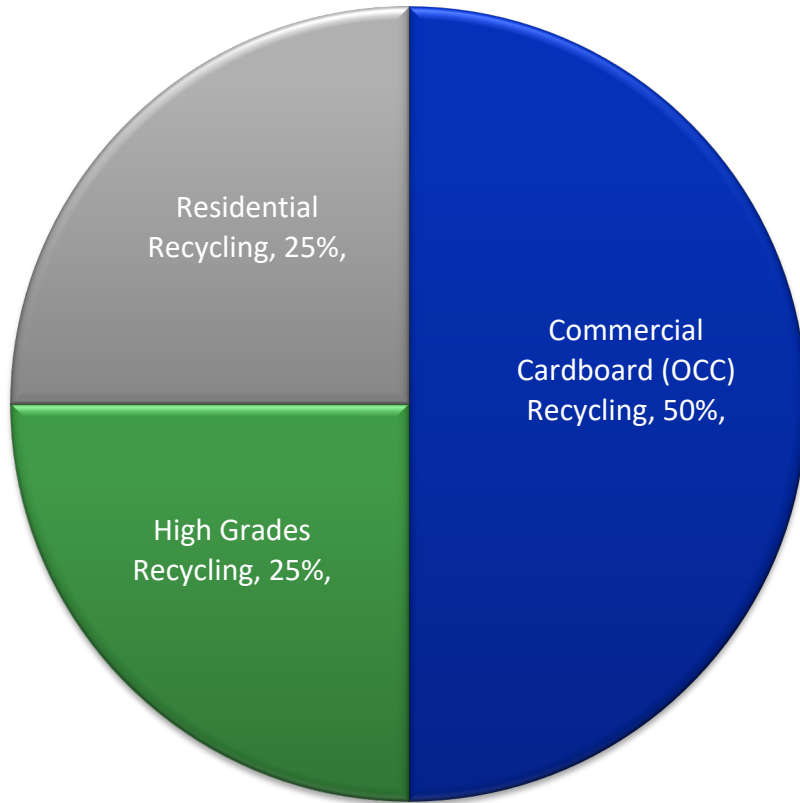
# Historical Overview - 80s

- 80's
  - All recycling private
  - Clean recyclables
  - Sorting systems for OCC and High grades



# Paper Recycling

# Metals Recycling



# Historical Overview - 90s

- 90's
  - Mandatory residential recycling
    - Dual stream systems
      - a) Bin for paper
      - b) Bin for plastic, glass, ferrous, and aluminum containers

# Processing with two separate mechanical systems

- Negative sorting of newspaper
  - News \$40/ton
  - OCC \$60/ton
- Bottle sorting with air, magnets, and eddy currents



# Historical Overview - 2000s

- 2000's
  - Single stream recycling
    - Big fight between paper mills and collection companies
      - Collection companies won because of lower cost of collection
    - All Recyclables in one bin
    - More participation because of ease of recycling

# Single Stream

## Single Stream Recycling



# Historical Overview – 2000s

- 2000's
  - China buys 30 million tons of paper per year
    - Biggest export article of the U.S. in volume!
    - Cheap freight: Containers coming with product going back with wastepaper
    - China has no natural resources
  - News \$100-140/ton
  - OCC \$150-200/ton



# Processing of Single Stream

- More Complicated sorting systems
- Separation and baling in one central location
  - Environmentally friendly
- USA leapfrogged Europe!



# The Plastic Bag Issue

- Film (plastic bags)
  - Biggest nightmare in a MRF
  - 2% Film in a 50 ton/hr system is 1.6 million bags per day
  - Most of labor spent in a MRF is taking film out of the stream (\$100-200/hr for a product that is worth \$0 to -\$80)
  - A lot of cleaning time needed to get bags out of screens (no production, extra labor cost)
  - Film contaminates the good products

# Historical Overview - 2000s

- +/- 2005's
  - Addition of optical sorting to
    - Single stream systems
    - Commercial systems
    - Dual stream systems



# Video of TOMRA Autosort



# Explanation of current Single Stream processing

- Materials to be separated
- Percentages of different materials
- Changes over time

# Materials to be separated

	2005
■ OCC (cardboard)	7.5%
■ Newspaper	50%
■ Mixed Paper	10%
■ Glass	17.5%
■ Plastics	
• PET (#1)	3%
• PE Natural (#2)	1.5%
• PE Colored (#2)	1.5%
• PP (#5)	0%
■ Ferrous	3%
■ Aluminum	1%
■ Residue	5%
■ Total	100%

# Video of Total Recycle



# Challenges

- Less and less Newspaper in the stream
- More OCC (Amazon effect)
- More Residue
  - Wish-cycling
  - One big bin gives more residue
  - Confusion in the marketplace
- Brands wanting their packaging to be recyclable
  - Really contaminates the good products



# Challenges

- China stops buying paper from single stream entirely
  - Government directive – not market driven
    - Mills in China going bankrupt
    - Very high recycling prices in China (\$400/ton for OCC and News)
    - Immediate very high recycling rate in China
  - China requires material that is 99.5% clean (0.5% prohibitives = non-paper)
- Why?
  - Afraid for pushback from their own people about polluters
  - Could not get local mills under control => starved them of material
- Ruined recycled paper prices in the U.S.

# Materials to be separated

	2005	2020
■ OCC (cardboard)	7.5%	25%
■ Newspaper	50%	0%
■ Mixed Paper	10%	32%
■ Glass	17.5%	17%
■ Plastics		
• PET (#1)	3%	3%
• PE Natural (#2)	1.5%	1.5%
• PE Colored (#2)	1.5%	1.5%
• PP (#5)	0%	1%
■ Ferrous	3%	3%
■ Aluminum	1%	1%
■ Residue	5%	15%
■ Total	100%	100%

	2005			2020		
	% in stream	Price	Contribution Margin to Avg. SS Price	% in stream	Price	Contribution Margin to Avg. SS Price
OCC	7.5%	\$ 175.00	\$ 13.13	25.0%	\$ 40.00	\$ 10.00
News	50.0%	\$ 120.00	\$ 60.00	0.0%	\$ (40.00)	\$ -
Mixed Paper	10.0%	\$ 70.00	\$ 7.00	32.0%	\$ (40.00)	\$ (12.80)
Glass	17.5%	\$ (20.00)	\$ (3.50)	17.0%	\$ (35.00)	\$ (5.95)
Steel	3.0%	\$ 150.00	\$ 4.50	3.0%	\$ 100.00	\$ 3.00
Aluminum	1.0%	\$ 1,200.00	\$ 12.00	1.0%	\$ 1,000.00	\$ 10.00
Plastics			\$ -			\$ -
PET	3.0%	\$ 230.00	\$ 6.90	3.0%	\$ 200.00	\$ 6.00
PE Natural	1.5%	\$ 500.00	\$ 7.50	1.5%	\$ 1,200.00	\$ 18.00
PE Colored	1.5%	\$ 350.00	\$ 5.25	1.5%	\$ 240.00	\$ 3.60
PP	0.0%	\$ 200.00	\$ -	1.0%	\$ 100.00	\$ 1.00
Residue	5.0%	\$ (60.00)	\$ (3.00)	15.0%	\$ (80.00)	\$ (12.00)
	=====		=====	=====		=====
Total	100.0%		\$ 109.78	100.0%		\$ 20.85

# Economics of Single Stream

## ■ 2005

- Average Price of recyclables after separation = \$110
- Minus the cost to run a MRF (with efficient VDRS system and two shift operation) = (\$40)
- Price paid to cities or haulers for recyclables = (\$25)
- Profit = \$45/ton

## ■ 2020

- Average Price of recyclables after separation = \$21
- Minus the cost to run a MRF (with efficient VDRS system and two shift operation) = (\$45)
- **Loss on operation** = (\$24/ton)
- **Result: necessary to charge for recyclables for the first time since we are in business**

# The Future

- +/- 2018 and onwards
  - Dirtier stream requires different approach
    - Size separation combined with positive sorting of paper



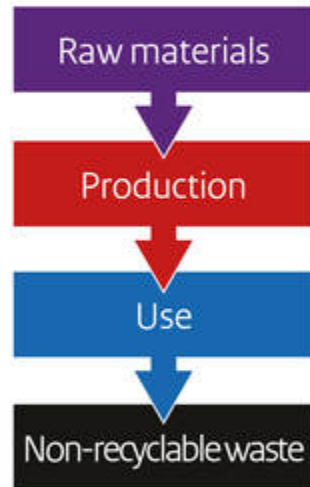
# Recycling – Plastic Problem



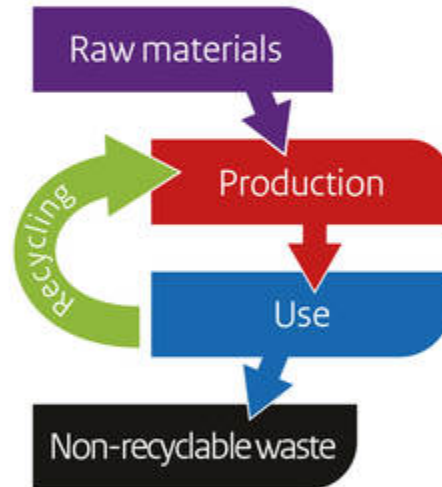
# Recycling – the Future

## From a linear to a circular economy

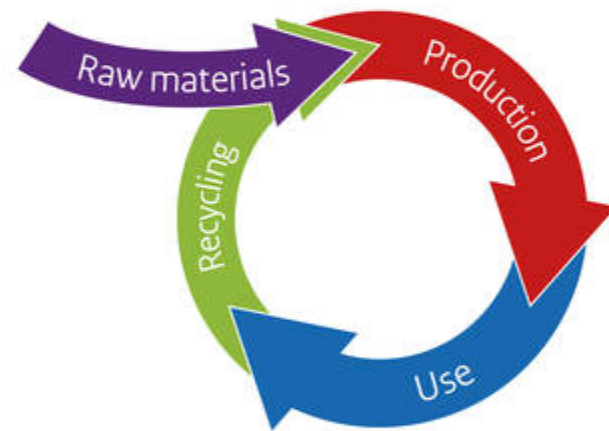
Linear economy



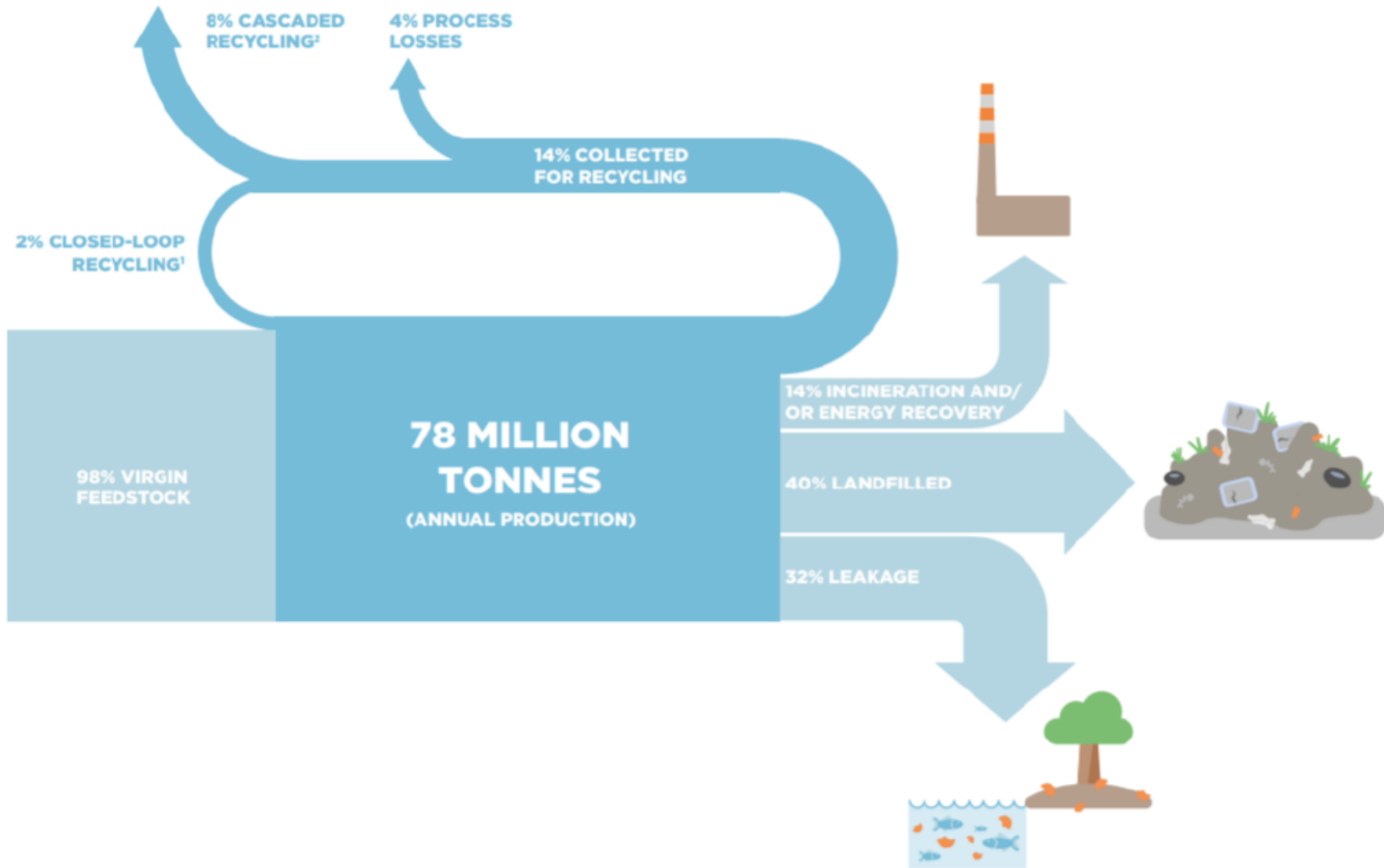
Reuse economy



Circular economy



# Recycling





# The Future – MSW Recycling

- MSW Processing in Puebla, Mexico
- Input: Straight MSW (Municipal Solid Waste)
- Results:
  - Organics 33%
  - Recyclables (Plastics/Aluminum/Ferrous) 10%
  - Process Engineered Fuel (PEF) 30%
  - Heavies (landfilled) 27%

# The Future – MSW Recycling

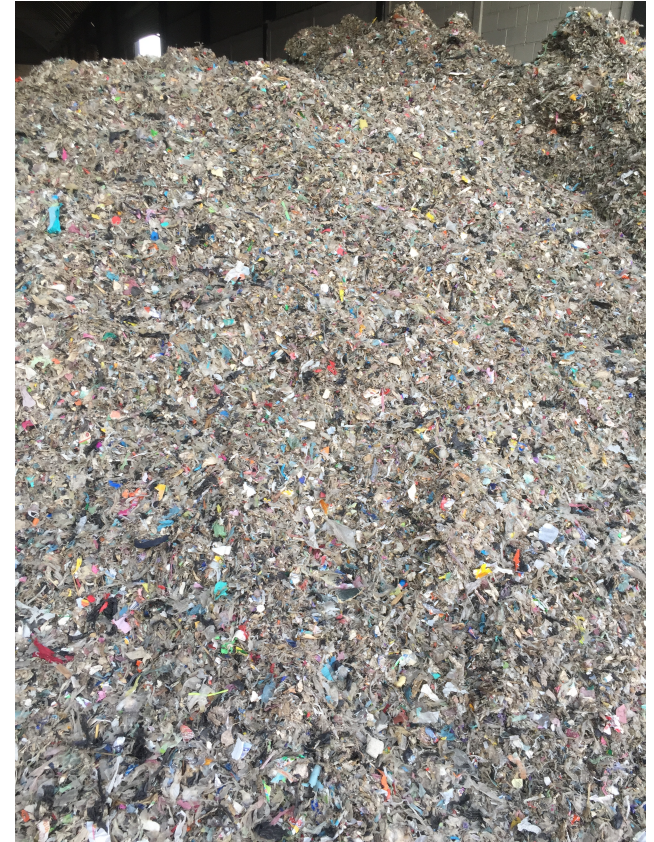


# The Future – MSW Recycling

Input:



Fuel (PEF):



Recyclables:



# The Future – MSW Recycling



# The Future – MSW Recycling

Time Lapse of Santa Barbara

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Thank you  
Questions?

