Van Dyk Recycling Solutions
Presentation about Recycling

Presenter – Pieter Eenkema Van Dijk

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

<table>
<thead>
<tr>
<th>Section Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>1 FUTURE EXPANSION</td>
</tr>
<tr>
<td>2 FUTURE EXPANSION</td>
</tr>
<tr>
<td>3 Machine Rebuild Facility</td>
</tr>
<tr>
<td>4 TITECH Optical Sorting Test Center</td>
</tr>
<tr>
<td>5 Warehouse 1st Floor and Training Center 2nd Floor</td>
</tr>
<tr>
<td>6 FUTURE EXPANSION</td>
</tr>
<tr>
<td>7 Warehouse - Shipping/Receiving</td>
</tr>
<tr>
<td>8 Main Office</td>
</tr>
<tr>
<td>9 Baler Rebuild Facility</td>
</tr>
<tr>
<td>10 FOR LEASE</td>
</tr>
<tr>
<td>11 Leased to Sky Zone Trampoline Park</td>
</tr>
</tbody>
</table>

**VAN DYK recycling solutions**

**DMA**
Darien Men’s Association
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)
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…

VAN DYK recycling solutions

DMA Darlen Men's Association
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

VAN DYK recycling solutions

DMA Darlen Men’s Association
Recycling Overview
Evolution of Recycling in the US
Recycling

WASTE
Collection
- Municipal solid waste
- Single Stream
- Separate Collections
- Reverse Vending

WASTE SORTING PLANTS
INCINERATION
LANDFILL
Reprocessing
Virgin Material

NEW PRODUCT
Retail/e-commerce
Consumer goods
Converter

Consumer

VAN DYK
recycling solutions

DMA
Darlen Men's Association
Historical Overview - 80s

- 80’s
  - All recycling private
  - Clean recyclables
  - Sorting systems for OCC and High grades
Paper Recycling

- Residential Recycling, 25%
- Commercial Cardboard (OCC) Recycling, 50%
- High Grades Recycling, 25%

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 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

<table>
<thead>
<tr>
<th>Material</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCC (cardboard)</td>
<td>7.5%</td>
</tr>
<tr>
<td>Newspaper</td>
<td>50%</td>
</tr>
<tr>
<td>Mixed Paper</td>
<td>10%</td>
</tr>
<tr>
<td>Glass</td>
<td>17.5%</td>
</tr>
<tr>
<td>Plastics</td>
<td></td>
</tr>
<tr>
<td>- PET (#1)</td>
<td>3%</td>
</tr>
<tr>
<td>- PE Natural (#2)</td>
<td>1.5%</td>
</tr>
<tr>
<td>- PE Colored (#2)</td>
<td>1.5%</td>
</tr>
<tr>
<td>- PP (#5)</td>
<td>0%</td>
</tr>
<tr>
<td>Ferrous</td>
<td>3%</td>
</tr>
<tr>
<td>Aluminum</td>
<td>1%</td>
</tr>
<tr>
<td>Residue</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

2005
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.
  - 30 Million tons per year had to find another home overnight
## Materials to be separated

<table>
<thead>
<tr>
<th>Material</th>
<th>2005</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCC (cardboard)</td>
<td>7.5%</td>
<td>25%</td>
</tr>
<tr>
<td>Newspaper</td>
<td>50%</td>
<td>0%</td>
</tr>
<tr>
<td>Mixed Paper</td>
<td>10%</td>
<td>32%</td>
</tr>
<tr>
<td>Glass</td>
<td>17.5%</td>
<td>17%</td>
</tr>
<tr>
<td>Plastics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• PET (#1)</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>• PE Natural (#2)</td>
<td>1.5%</td>
<td>1.5%</td>
</tr>
<tr>
<td>• PE Colored (#2)</td>
<td>1.5%</td>
<td>1.5%</td>
</tr>
<tr>
<td>• PP (#5)</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>Ferrous</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Aluminum</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Residue</td>
<td>5%</td>
<td>15%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------</td>
<td>------------------</td>
</tr>
<tr>
<td></td>
<td>% in stream</td>
<td>Price</td>
</tr>
<tr>
<td>OCC</td>
<td>7.5%</td>
<td>$175.00</td>
</tr>
<tr>
<td>News</td>
<td>50.0%</td>
<td>$120.00</td>
</tr>
<tr>
<td>Mixed Paper</td>
<td>10.0%</td>
<td>$70.00</td>
</tr>
<tr>
<td>Glass</td>
<td>17.5%</td>
<td>$(20.00)</td>
</tr>
<tr>
<td>Steel</td>
<td>3.0%</td>
<td>$150.00</td>
</tr>
<tr>
<td>Aluminum</td>
<td>1.0%</td>
<td>$1,200.00</td>
</tr>
<tr>
<td>Plastics</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>PET</td>
<td>3.0%</td>
<td>$230.00</td>
</tr>
<tr>
<td>PE Natural</td>
<td>1.5%</td>
<td>$500.00</td>
</tr>
<tr>
<td>PE Colored</td>
<td>1.5%</td>
<td>$350.00</td>
</tr>
<tr>
<td>PP</td>
<td>0.0%</td>
<td>$200.00</td>
</tr>
<tr>
<td>Residue</td>
<td>5.0%</td>
<td>$(60.00)</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>$109.78</td>
</tr>
</tbody>
</table>
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
  \[ = \frac{110 - 40 - 25}{\text{ton}} = 45/\text{ton} \]

**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**
- Result: necessary to charge for recyclables for the first time since we are in business
  \[ = \frac{21 - 45}{\text{ton}} = 24/\text{ton} \]
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
- Raw materials
- Production
- Use
- Non-recyclable waste

Reuse economy
- Raw materials
- Production
- Use
- Recycling
- Non-recyclable waste

Circular economy
- Raw materials
- Production
- Recycling
- Use
- Non-recyclable waste
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: Recyclables:

Fuel (PEF):

Recyclables:
The Future – MSW Recycling
The Future – MSW Recycling

Time Lapse of Santa Barbara

https://app.truelook.com/?m=15415865174200833613469&l=1575453094893427&u=dt1545079603#tl_shared
Thank you
Questions?