AGENDA

Welcome & Introductory Comments

1. Commodities
2. China Commentary
3. Other Industry Stressors
4. Commentary
5. Questions
Are you ready to effect change?

since 1986

WHO WE ARE

30+ years in recycling and managing resources

40 employees in 3 countries

660 years combined field experience

1,000 projects across 9 markets

OUR SKILLS

- Recyclingsold waste planning
- Organics/compost
- Communications/education
- Engineering
- Policy/regulation
- Hazardous materials safety & compliance
- Project finance/economics
- Site operations & material flow studies
- Data analytics & design
- Corporate sustainability
- Collaboration facilitation
- Administrative
2019 CONFUSED SIGNALS: BEHIND THE BIGGEST DEVELOPMENTS IN ECONOMIC FUNDAMENTALS SHOWING WEAKNESS

1. Stock Market Gains 14% first 3 months
2. Chinese economy and spending slowing
   - GDP 4% in 2018, weakest expansion in 28 years
   - WSJ says slump may be over last week
3. N. American Housing starts down - lowest since 2016
4. Unemployment Up - U.S Up to 4%
5. World bank projects lower World GDP Oil price bottom out December 2018

HISTORICAL MARKET POSITION
Average Commodity Revenue Pricing at MRFs
Not adjusted for inflation, considering CPI—would appear much worse

Down 13% in February $42.18
Down 14.5% in March $38.18
HISTORICAL MARKET POSITION
AVERAGE COMMODITY REVENUE (ACR)

Value Share of ACR by Commodity

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

COMMODITIES DON’T HAVE A CPI

1.5% per year Discount vs. today’s market

- Lower than 2008 Great Recession
- Lower than 2001 Trade tower attack disruption
- Lower than 1998 market crash
- Lowest point since 1993 (discount)
- 2007 $’s- its in the $20’s
- Impact on MRFs- Labor and utility costs grow at or above CPI (later slides)
WHAT IS CAUSING THE MATERIAL MARKETS TO CONTINUE TO LOSE STEAM?

1. Accumulative Commodity Pressures
2. Recovered Paper Dynamics
3. Metal and HDPE slumps
4. China Ban impacts spread
5. Macro-economic influences—slowing China/U.S. indicators

COMODITY PRESSURES- ACCUMULATIVE

RECYCLABLE COMMODITIES 2017-2018
DYNAMICS IN A ROARING WORLD ECONOMY
RECOVERED PAPER DYNAMICS

1. OCC- Guardian of MRF paper- Compression, softening demand, relationship to mixed paper
2. SRPN- rider of the trends
3. Mixed Paper- Oversupply driving continued MRF-commodity slump

OCC- MP SUBSTITUTION DYNAMICS “COMPRESSION”

For most of 2018 MP pricing was at $0/T or lower
- OCC was over $75 net/T
- $75-90 spread allowed substitution of grade- MP consumption in U.S. up 4.4% (RISI)
- Trade off- lower yield, more contamination, higher cleaning cost
- Poster Company- Pratt (no PNW influence)
- Accelerated long-term decline of OCC beginning in Oct. 2017

Today’s compressed low price does not allow substitution

Hot 80% of OCC
Cold 20% of OCC
**EXPORT AND GRADE FRAGMENTATION FOR OCC - “COMPRESSION”**

- $85-130 | DS OCC (12) Export China FAS
- $85-100 | (11)/(12) China FAS
- $80-100 | “Premium 11, I/C/I, Hand Sort” - “Select” OCC Commercial MRF China
- $85-89 | FAS Export Index ISRI Spec S. Asia
- $28 | FOB MRF Non-Spec

Spread is still higher than $50 but was close to $90 which supported more MRF sorting in 2018.

**PREMIUM PRICING VS. INDICES - “COMPRESSION”**

- Many paper grades traditionally trade over index pricing sheets (i.e. Fastmarkets, CIF, Paper Stock, Recyclingmarkets.net)
- Competitive World Market. Trades well over the index, especially where local mills exist
- 2018 est. PNW premium was as much as $35 over, especially export
- Now lucky to have movement, let alone any premium
- Ramifications for MRF Contracts
LONG TERM DYNAMICS HAVE NOT CHANGED:

- Tariff threat still looming - China 25%
- Still a demand for clean news
- PNW market is limited
- U.S. and PNW has weak domestic capacity
- Lower long-term demand due to digitalization of media
- Best-in-class MRFs, dual stream and hand-sort can sell into Asia or domestic sources

Declining quality of SRPN bales in MRFs

Associated with Mixed Paper

Many MRFs give up on grade in this market as processing fees rise
SRPN/ONP (NEWSPAPER)- RIDING DOWN

Average across multiple Indice ranges, reported prices, no premiums

EXPORT AND GRADE FRAGMENTATION
MP LOST 100% VALUE FALLING FROM SPOT MARKET HIGH OF $100/T APRIL 2017 TO PROCESS FEE CHARGED BY BUYERS

Mixed Paper

Average across multiple index ranges, reported prices, no premiums

Mixed Paper - PNW

- Severe oversupply is growing - no currently supportable market
  - 2.2M went to China in 2017, 1.11 MM T in 2018, none going in 2019
  - +650K more tons went to other destinations in 2018

- Residential mixed paper - cultivated by new mills and China - direct result spread of modern curbside Single Stream and loss of ONP
  - Asian inventories, especially India, at high levels
  - Indonesia adopts .5% contamination standard
  - Recovered pulp market the exception

- Low demand growth from domestic carton board & boxboard mills where 20% is used

- Pulping for export? - ND Paper, Shinyang, PNW?
**NEW ANNOUNCED RECYCLED FIBER CAPACITY- PNW**

<table>
<thead>
<tr>
<th>Company</th>
<th>Project Type</th>
<th>Time Frame</th>
<th>Capacity (MT per year)</th>
<th>Recycled Inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio Pappel / McKinley Paper CO, Port Angeles</td>
<td>Re-open and Conversion to Containerboard</td>
<td>Q3 2019</td>
<td>250,000</td>
<td>OCC, RMP</td>
</tr>
<tr>
<td>Large Washington regional mill</td>
<td>Considering pulping line</td>
<td>12-16 Months</td>
<td>Unknown</td>
<td>RMP? Other Bulk and specialty</td>
</tr>
<tr>
<td>Berkeley International, Reno, NV</td>
<td>New Molded Fiber Plant</td>
<td>Q4 2019</td>
<td>Unknown</td>
<td>OCC</td>
</tr>
</tbody>
</table>

*Help may be coming but probably not 2019*

*PNW needs mill capacity to offset China loss for MP*

*Slow investment activity to start 2019 after red hat 2018*


*$9.1 billion (USD) Mill related M&A in 2018 > 2016 & 2017 combined*

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**GP JUNO PROJECT**

**TOLEDO, OREGON MILL**

**EARLY 2020**

- Targets IC paper–rich waste (MSW)
- Built from 3- year pilot
- Mission- extract fiber from MSW waste- input to mill’s existing pulper
- Removes coatings (polycoat) and food residues
- Counter intuitive- GP feels only way to get fiber in 10 years. P&W disappearing.
ALUMINUM UBC SCRAP
MARCH, 2019
$0.62 DOWN FROM $.84#*

Aluminum Cans/ST

<table>
<thead>
<tr>
<th>Date</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/2011</td>
<td>$2.150</td>
</tr>
<tr>
<td>12/2011</td>
<td>$1.950</td>
</tr>
<tr>
<td>4/2012</td>
<td>$1.750</td>
</tr>
<tr>
<td>1/2012</td>
<td>$1.550</td>
</tr>
<tr>
<td>6/2012</td>
<td>$1.350</td>
</tr>
<tr>
<td>11/2012</td>
<td>$1.150</td>
</tr>
<tr>
<td>4/2013</td>
<td>$0.950</td>
</tr>
<tr>
<td>9/2013</td>
<td>$0.750</td>
</tr>
<tr>
<td>2/2014</td>
<td>$0.50</td>
</tr>
<tr>
<td>7/2014</td>
<td>$0.25</td>
</tr>
<tr>
<td>12/2014</td>
<td>$0.00</td>
</tr>
</tbody>
</table>

No MRF receive $.62. Deposit material does. Deducts are taken at the published LME derivative for freight and quality. MRF pricing could be less than $1,000 ST.

West Coast MRF bales hurt by China dynamics
- Long freight to East Coast or off-spec capacity
- MRF-derived bales not welcome (“human consumed package”
- Tariffs. Some hope for deal, will not change China outcome
- Looming China ban 2020

12-Year highs for UBC and LME (UBC spot $1/Lb Set 2018 saved recycling
- P1020 Premium in N. America flattens from $340/T to $205 over LME
- Consumption of Chinese aluminum decreases with negative factory output, govt. market intervention on debt

MID-TERM- Aluminum finished goods in high demand 2018, ingot floats with the economy. Good warning signal.
STEEL CAN (TIN) BALE/BUNDLE

Outlook on Steel- Mixed Bag, Economy-related
Steel Scrap is down by 15% YOY
• Price slightly up in March- Spot $130MT
• Global steel demand growth 3.9%, NAFTA countries lower- 1.1%
• China Demand is slowing- makes 49% of total world output
• Uncertainty in trade

Steel Cans
• 70% recycled
• Index scrap price also down 21.2% YOY
• Canned goods continues to grow CAGR 3.8%

HDPE NOTES

• NHDPE pricing down 22% in last two months to $.31/#
• Colored HDPE hovers at $.15/#
• Capacity in PNW and domestically good
• Capacity exists in North America to absorb additional supply
• Increasing virgin PE supply (3.6+ mil tpy and growing) - natural gas as cheap input
• Demand highly seasonal for both virgin and recycled
• Virgin resin demand will increase with increased demand for scrap sub from China
• Long Term – Uncertainty related to Virgin PE Supply and Demand issues
• Increasing export demand for virgin resin will keep pace (5 million tons by 2020)
• CHDPE is more susceptible than NHDPE
PP TUBS AND LIDS

- Current price $.125
- Global supply of PP is growing (which is needed to stabilize market) – increasing collection & increasing sorting
  - Recognized grade
  - Steady pricing
- Strong domestic market interest (demand pull) driving stand-alone grade – driven by brands
- Low volume material per wasteshed is primary constraint
- Large MRFs or PRFs are the source – likely more sorting from mixed plastic
- Virgin PP very volatile and drives rPP volatility - Oil and gas leading indicators
- Investments in recovery technology (P&G)
- Confusion between #5PP grade and “tubs and lids”
- Increasing investment in processing technology

Estimates from Surveys and indices available. PP trades near these levels.
1. New Announcements - North American capacity for sorting #3-#7 plastics
   A. Merlin/Peninsula (California)
   B. EFS (West Coast)
   C. Revolve Recycling (Utah)
2. Most investments driven by demand for PE and PP
3. PP market pricing holding steady; demand strong

3-COLOR MIXED CONTAINER GLASS

- Market in PNW steady, glass is recycled
- Was not an issue until loss in other commodity revenue
- 3-mix pricing has decreased over time. As a average over four years pricing has moved from -$3 per ton to -$20 per ton.
- Good value chain but thin- SMI, Ol major players.
- There is little competition in beneficiating and capital scale efficiency requires dense urban demographics
- Renewed interest in deposits
- Fiberglass facilities increase use with economic expansion
- Any net expansion in glass bottle and fiberglass consumption is not expected and the furnace footprint in N. America is declining (Milford)
- There is an upper limit on cullet as a commodity, negative markets will continue
- Mindset of Beverage producers could change outcome
- Pozzolann cement regulatory structure could help smaller markets
Exports bound for China - Political/Environmental will trump economics

- China slow down due to economic demand affecting price of imported clean bulk grades
- Despite slowdown, domestic bulk grades through the roof - reports from $350-500 for Sino domestic MP & OCC
- Sino subsidiaries competing directly for #12 store-bought OCC, bypassing U.S. packers
- China plans to implements total import recovered material ban (2020). No reason to doubt intent
- Import finished paper from Canada, U.S. east Asia (will not help Chinese mills but will help converters and brands)
- Chinese building pulp units – cost for pulper and dryer $190M CAN for 400 MT/Day system (SERC 2019, Moore)
- U.S. - Announced Mills with increased pulp/board production- Nine Dragon pulpers in WI and ME; Shanying in KY- close to 1MM metric tons. ME in late Fall.
- East Asia- Still selling to China after re-sorting.
CHINA PAPER EXPORT COMMENTS

- Bulk represents MRF-mechanically separated paper
- June Graph- Through September, Old newspaper (“ONP” or “SRPN” (Column 4), and Mixed Paper (Column 5) were down 2.7 M TPY YOY through Sept.

EXPORT MARKETS REMAIN RESTRICTED, ESPECIALLY #3, 4, 6,7 PLASTICS

- Chinese imports down 99 percent
- Taiwan restricted to only post-industrial from company operations (October 2018)
- Vietnam import ban, set to sunset in October 2018, was extended indefinitely
- Basel Annex IX- non-treaty shippers banned from shipping plastics
**HISTORICAL MARKET POSITION**

Average Commodity Revenue Pricing at MRFs
Down 13% in February $42.18 • Down 14.5% in March $38.18

- Loss in Value from 2010 high - $148/T* on 22M curbside tons = $2.41B per year
- Per MRF Volume loss in Value $5M/Year (480 residential MRFs Avg. Size (EREF) or Municipal Customers)
- Per month shared deficit- $420K

*PNW pricing behavior historically slightly higher for fiber and slightly lower for other materials

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**INDUSTRIAL REVOLUTION COMMODITY INDEX TREND | IMF, CPI, USBOC**

Why
- Improved means of exploration
- Improved means of production
- Substitution - no overreliance
- Evolution of goods consumed
- Lower labor units

For Contracts
- Larger Risks with longer contracts
- Economic basis should not be over-reliant on commodities
- Substitution - no overreliance
- Evolution of goods consumed
**COMMODITIES GENERALLY HEAD DOWN IN PRICE**

![Graph showing commodity prices over time](image)

**MRF CONFUSION WITH SCRAP BUSINESS MODEL**

<table>
<thead>
<tr>
<th>SCRAP BUSINESS</th>
<th>MRF CLEANING SERVICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials Market</td>
<td>Convenience for residential customers</td>
</tr>
<tr>
<td>Buys source separated. Only sorts (upgrades) for price advantage; often receives premiums on the spot market in an arbitrage position</td>
<td>Accepts mixed materials &amp; sorts to clean materials to minimum standards</td>
</tr>
<tr>
<td></td>
<td>• Each contract defines its own standards</td>
</tr>
<tr>
<td></td>
<td>• Acceptable Materials</td>
</tr>
<tr>
<td></td>
<td>• Non-recyclables</td>
</tr>
<tr>
<td></td>
<td>• Measurements and formulas</td>
</tr>
<tr>
<td>Little residue</td>
<td>Expected residue (16-40%) increases with permissiveness</td>
</tr>
<tr>
<td></td>
<td>• Responsibility defined</td>
</tr>
<tr>
<td>Uses spot market purchases to regulate risk from contracts</td>
<td>Takes material regardless of ability to sell or price</td>
</tr>
<tr>
<td></td>
<td>• Lessen material risk by insuring services is paid for first</td>
</tr>
</tbody>
</table>
EQUILIBRIUM PROBLEM IN OVERSUPPLY MARKET DUE TO CHINA

Inelastic Supply @ MRFs and Scrap Buyer Elastic Demand

Demand and supply in U.S. Single Stream system is rarely in or above equilibrium

- Lacks power of price to control demand swings
- Fixed supply-generating contracts are multi-year
- No inventory control or storage system to restrict sales to bargain hunters
- MRF margins (generally under 20% and high OOP costs) require selling as much material as possible to support

Marginality high from MRF material

- Lower quality vs. source-separated
- Causes slower price booms & faster price drops
- Buyers learn to expect supply control weakness, i.e. export disconnect
HARD LESSONS TO LEARN ON COMMODITIES

- 1.3% loss in value per year (with few long-term exceptions)
- Volatility and marginality of MRF-derived scrap
- Position of MRFs: Need for constant cash flow due to high operating costs vs. revenue
- ...and municipalities: fixed budget blues
- In “current” bust, 20% of MRFs might fail

MRF COSTS CONTINUE TO RISE -

TRENDS
- Need to Slow Line down to meet export quality standards
- Low Labor Availability
- Increasingly complex MRF systems which are aging
- More & lighter materials at higher speeds
- Increasing contamination
- Freight (Not Included here)

<table>
<thead>
<tr>
<th>COST CATEGORY</th>
<th>2009</th>
<th>2015</th>
<th>2018</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed</td>
<td>$12.00</td>
<td>$20.00</td>
<td>$25.00</td>
<td>108%</td>
</tr>
<tr>
<td>O&amp;M</td>
<td>$46.00</td>
<td>$54.00</td>
<td>$60.00</td>
<td>30%</td>
</tr>
<tr>
<td>Residue</td>
<td>$4.00</td>
<td>$8.00</td>
<td>$9.80</td>
<td>145%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$62.00</td>
<td>$82.00</td>
<td>$94.80</td>
<td>53%</td>
</tr>
</tbody>
</table>
CURRENT MRF DEFICITS AND IMPACTS
MARCH 2019

SKETCH WELL RUN WEST COAST
MATERIAL RECOVERY FACILITY

<table>
<thead>
<tr>
<th>Category</th>
<th>March 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue from Commodities</td>
<td>$38.18</td>
</tr>
<tr>
<td>Midpoint Cost</td>
<td>$94.80</td>
</tr>
<tr>
<td>Loss Per Ton</td>
<td>($54.38)</td>
</tr>
<tr>
<td>ROI Requirements</td>
<td>$24.00</td>
</tr>
<tr>
<td>Tip Fee Required</td>
<td>$78.38</td>
</tr>
</tbody>
</table>

Not including market premiums or deposit

Processing Fees- Lower Speeds, higher sorting, lighter material
• Boston $115/T
• Fairfield, CT $75/T
• Houston 2018 - $87.05/FCC Environmental
• Friedman El Paso from $75 a ton to $115
• So. Florida >$100/T

Contracts Disputes
• Impact of China- tighter quality standards
• No Education in most programs which gives regular feedback = waste composition degradation
• Anti- “Wish” Cycling
• Move away from PAYT/Recycling Free

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

Single Stream Contamination
Public Reporting Range: 8-45%

- 22.50%
- 20%
- 18%
- 16%
- 16%
- 16%
- 12%
- 10%
- 10%
- 10%
- 8%
- 8%
- 7%

PREDICTIONS ON CURRENT SITUATION

- MRF Processing Fees must rise with rising costs as well (in addition to revenue increase)
- Megatrends of contamination and diverse, lighter materials
- Some MRFs will close - 15% in 2010, this downturn is singular

CHOICES POOR: FLEXIBILITY, HEAVY CONTINUOUS ENFORCEMENT, PAY MORE

SINGLE STREAM RECYCLING SERVICE IS POPULAR
MUNICIPAL RECYCLING
- Sold by The Haulers
- Meant to Be Flexible to Change with Changing Packaging Stream

<table>
<thead>
<tr>
<th>COLLECTION</th>
<th>SORTING</th>
<th>MARKET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evolved to Compete with Solid Waste Convenience</td>
<td>Designed to clean endless river of mixed, compacted materials into commodities</td>
<td>System still Recovers ~75% to 85% of inbound material with no means of controlling inventory</td>
</tr>
<tr>
<td>• One truck efficiency</td>
<td>• Deeper cleaning needed</td>
<td></td>
</tr>
<tr>
<td>• Fingertip accessible</td>
<td>• More Capital and scale</td>
<td></td>
</tr>
<tr>
<td>• Permissive (Too Much)</td>
<td>• More complicated layouts</td>
<td></td>
</tr>
<tr>
<td>• More items recycled</td>
<td>• Maintenance intense</td>
<td></td>
</tr>
<tr>
<td>• More Participation</td>
<td>• More technology</td>
<td></td>
</tr>
<tr>
<td>• More residue</td>
<td>• Constant retrofits required</td>
<td></td>
</tr>
<tr>
<td>• Less quality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• More diversion</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TAUTOLOGY

RESIDENTIAL RECYCLING SERVICE - Convenience & Cleaning To get To a Commodity State
SINGLE STREAM RECYCLING SERVICE REMAINS POPULAR AND INEXPENSIVE
NEEDS ANOTHER QUARTER TO FOUR BITS PER SERVICE

# of Programs tripled in 15 years
• MRF capacity more than doubled and over 3,000 munis offer service
• Fastest growing new municipal service
• Still growing despite severe commodity quality problems using current cleaning

Persistent Record
• < handful Single Stream programs ever rescinded

Convenience
• Huge popularity after initial roll out pains
• Surveys still uniformly show >85% approval with consistent service (falling recently from >90%)

Cheapest home-delivered service by far

SMALLEST PART OF SOLID WASTE SERVICE

• Understated due to reliance on commodities
• Needs to be funded and should be 15-20% of total avg. bill (somewhat less in the PNW given high LF Fees)
SORTING TECHNOLOGY - RELIABLE MANUFACTURERS GETTING BETTER

Flats from Rounds, lights from heavies, smalls or “fines” capture

- Advanced Air Knives: Nihat/WalAir/CP
- Optical Sorters: In-flight, TiTech, MSS
- Dimensional Trammels
- Robotics & Automation

- Dimensional layers and hole openings
- Air assisted
- Replaces high maintenance disk screens
- Captures organic sweet spot fraction (<-6”)

- Colors, Papers, individual containers
- Positive/Negative
- Lights from heavies
- X-ray fines separation
- Floating flats material from 3D smaller material

- Closed system
- Positive/Negative
- Lights from heavies, floating flat material from dimensional material (rounds)

SORTING TECHNOLOGIES - Next 5-Years

Promise of Robotics & AI
- IR Technology
- Data capture real time
- Automate horrible work, no human issues
- Robots are learning from fuzzy logic
- Newest generation 100x better than first for recycling
- “Hardest thing to teach is the unexpected”
NEW RECYCLING TECHNOLOGIES- NEXT 5-YEARS

AUTONOMOUS VEHICLES IN THE RECYCLING VALUE CHAIN

1. Driver shortages - collection, transfer, forklift, front-wheeled loader
2. Productivity - motion, electronic rhythm (systems integration)
3. Will be off-road first
   - Already heavily employed in bottle and aluminum industry
   - J. Fish experimenting at landfills
   - Without drivers will evolve - not drone-ready
   - Driver remains close by

REQUIREMENTS/LEARNING BY TRIANGULATION

1. capable of sensing their local environment
2. Classifying the types of objects that they detect
3. Reasoning about the evolution of the environment
4. Planning and executing complex motions that obey the relevant rules
5. Requires 3-D and Triangulation learning
6. Reacting to unexpected conditions

THE EVOLVING TON: CHALLENGES THE INDUSTRY

<table>
<thead>
<tr>
<th>Change from 1990 - 2015</th>
<th>DECREASING PREVALENCE</th>
<th>INCREASING PREVALENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDPE NATURAL BOTTLES</td>
<td>-0.7%</td>
<td>0.5%</td>
</tr>
<tr>
<td>OTHER PLASTIC CONTAINERS</td>
<td>-1.0%</td>
<td>0.1%</td>
</tr>
<tr>
<td>ALUMINUM FOIL, CLOSURES</td>
<td>-0.4%</td>
<td>2%</td>
</tr>
<tr>
<td>ALUMINUM CONTAINERS</td>
<td>-0.3%</td>
<td>3%</td>
</tr>
<tr>
<td>TOTAL CONSUMER WASTE</td>
<td>-4.1%</td>
<td>3%</td>
</tr>
<tr>
<td>OTHER CONSUMER WASTE</td>
<td>-4.4%</td>
<td>3%</td>
</tr>
<tr>
<td>HDPE NON-BOTTLES</td>
<td>-3%</td>
<td>7%</td>
</tr>
<tr>
<td>STEEL CONTAINERS</td>
<td>0.0%</td>
<td>1%</td>
</tr>
<tr>
<td>PLASTIC BAGS, SACKS, &amp; WRAPS</td>
<td>0.1%</td>
<td></td>
</tr>
<tr>
<td>PET BOTTLES &amp; JARS</td>
<td>0.2%</td>
<td></td>
</tr>
<tr>
<td>OTHER PLASTIC PACKAGING</td>
<td>0.5%</td>
<td></td>
</tr>
</tbody>
</table>

U.S. MONOPSONY MRF SERVICE
PNW ADVANTAGED WITH STRONG INDEPENDENT MRFs

Large Service Providers control over 60% of the MRF capacity
- WC, WCA, WCN, Republic, GLF
- Protect the Tons, anti-deposit, integrated plays
- Sophisticated arguments for limiting recycling

Overwhelming coordinated resources due to revenue crunch
- Local/State
- Legal
- Capital

No Supra-regional alternatives
- ReCommunity, Greenstar, etc.
- No private company investment
- Focus is integrated rather than MRF-centric

Policy-makers concerned with 1-MRF markets, express interest in renewed public/private facilities

CONTRACT DIFFICULTIES DUE TO MARKET CHAOS

Legacy high risk contracts
- All MRFs reporting higher costs
- Residue soaring from MRFs, at least 33% higher than 2016
- Freight lanes to cheap Ocean back hauls gone
- Both sides hurting due to risk sharing
## MIXED WASTE LANDSCAPE - 2019 UPDATE

<table>
<thead>
<tr>
<th>2019</th>
<th>Update</th>
<th>Remarks</th>
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<tbody>
<tr>
<td><strong>Fiberight - Delayed, no scheduled opening</strong></td>
<td>“schedule for completing the facility...revised three times...(delayed) a full year, ... town officials voiced their frustrations with mixed messages”, Rumors about what facility will take abode.</td>
<td>$69 Million. Operations were expected to start up in April 2018.</td>
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<td><strong>Fulcrum - now 2020</strong></td>
<td>Fulcrum BioEnergy promises $600M waste-to-fuel project in Gery, Indiana. Sierra BioFuels Plant, located outside of Reno, Nevada, will be closely watched to see if the technology can deliver. Said to be the first of its kind in the nation, the facility is currently projected to open in 2020. The Sierra plant will have annual capacity for approximately 175,000 tons of MSW, with an output of 10.5 million gallons of fuel. BP has signed a 10-year off-take agreement with Fulcrum for that fuel, including distribution through its partner Air BP, and agreed to invest $30 million.</td>
<td>Pick on poor cities. Promise jobs for garbage and bond commitment. Delays abound.</td>
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<td><strong>Entsorga</strong></td>
<td>“Bio-Hitech” appears as either spokesperson/new owner in Nov. 2018.</td>
<td>MBT system</td>
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<td><strong>Continuus</strong></td>
<td>Changed leadership. RDF. Not pelletizing for energy, just RDF, similar to Entsorga</td>
<td>Board business out of the energy business. Viable subsidiary, ReWall. Some potential here in high tip ee.</td>
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