Molded Fiber & Recyclability: The Road Ahead

Susan Cornish, Associate
Moore & Associates
www.MARecycle.com

- Recovered paper market experts
- Based in Atlanta, global practice
  - Market Research/Analysis
  - Recycling Business Strategy
  - Pricing Analysis
  - Recovered Paper Purchasing/Selling Optimization Assistance
- Sustainability Research & Communications
Residential curbside recycling is at a crossroads:

- Result of China's restrictions, limiting imports of recovered paper and plastic
- Prices are down for most materials
- 3 components have no value at all: Mixed Paper, most plastics, glass

Charges to cities/residents for recycling services are increasing dramatically

Materials are being removed, not added to programs, based on volume of the material and market value

- Good news is MF is one material, not multi-layered, and paper

Positive: New quality standards are being introduced and Material Recovery Facilities (MRFs) are working to meet them.

US paperboard mills are upgrading stock preparation systems to use more Mixed Paper for the first time in decades
Introduction to Molded Fiber

- Molded fiber / molded pulp: invented in 1903 in Maine, originally for egg cartons
- Definition: Packaging made from molded pulp formed into 3-dimensional shapes

**US Molded Fiber Product Volume**
- 40%
- Eggs, fruit, vegetable, packaging (gray)
- 20%
- Protective packaging (brown kraft)
- 20%
- Foodservice packaging (white/chemical fibers)

**US Molded Fiber Product $ Demand 2017**
- 50%
- Eggs, fruit, vegetable, packaging (gray)
- 26%
- Protective packaging (brown kraft)
- 23%
- Foodservice packaging (white/chemical fibers)

*Source: Anecdotal 2018
**Source: Freedonia Custom Research 2017
Molded fiber (MF) producers could benefit from 'recycling/recyclability' on both sides of the value chain:

- Material inputs on the supply side, and
- On the market side, from new directions in packaging, largely driven by sustainability.
Supply Side Challenges

- A key raw material for most MF producers *recovered paper (RCP)*:
  - Currently many higher quality grades of RCP are expensive because supply volumes are declining -- yet MF production is growing.
  - MF plants are often smaller, difficult to invest in extensive stock prep systems that would allow use of lower priced, lower quality RCP grades.
- Cost and declining supply are especially acute for mechanical fiber-based products:
  - Supplies of *#9 Over-Issue News* and *#58 Sorted Clean News* (primary source of RCP for MF) have been declining for years and still heading lower.
  - Prices for these clean *Old Newspaper* grades are very high.
- For brown MF products, raw material situation is less of a problem:
  - Mostly use DLK (*#13 Kraft Corrugated Cuttings*) and OCC (*#11 or #12 Old Corrugated Containers*)
  - Box production is growing -- but demand for OCC is also increasing
In response to China’s ban on imports of Mixed Paper, US companies are examining *Recycled Fiber (RCF) market pulp* to find a material that can be exported profitably.

RCF pulp typically produced from *OCC* and *Mixed Paper*:
- Could be an alternative *raw material* for both mechanical fiber and brown MF products.

Two versions of RCF market pulp being considered:
- *High Mixed Paper* – some of the ONP/short fiber content needed by many MF products
- *Low Mixed Paper/High OCC* – potential for protective packaging MF

US companies have not committed to building pulp mills for market sale yet…

*Chinese company* Nine Dragons recently purchased multiple US mills and converted them to produce RCF pulp, most of which will be shipped to China to feed the company’s mills.
Innovation: MF Comes of Age

- **Market side**: what is new, driving growth for commercial/industrial customers (manufacturers/packaging buyers) and consumers?

- **Manufacturing technology** for MF has improved in recent years leading to:
  - Improved appearance: smoother surface, color, more sophisticated look and feel, tighter production tolerances
  - Range of applications is expanding beyond protective packaging to primary packaging; especially in CPG, food & beverage, technology

- For **packaging buyers and consumers**, growing importance of **sustainability**:
  - MF well positioned: made from recycled materials; easily recycled.
  - Fiber products are biodegradable, compostable, unlike plastic and Styrofoam
  - MF can be made from a variety of fibers such as recovered paper, bagasse, bamboo, or wheat straw. Some recent products based on green grass.
How important is Sustainability? Very important.

**Consumer awareness** of sustainability has grown exponentially in the past few years. The visibility of plastics in the ocean is driving change among brand owners.

**Brands** are making serious commitments:

- *Sustainability leads* surveyed in 153 companies*, 2016, mix of sectors, revenue of $250 million+: most expected a budget increase, 1/3 double-digit increases.
- *Collectively gained* about $800 million from increased sales and $800 million in manufacturing cost savings, with additional earnings in risk reduction, productivity gains, and enhanced growth opportunities adding up to billions in value.
- Companies earning the most from sustainability planned to further increase budgets, suggesting a strong *link between* sustainability investment and business results.

**Sustainable Packaging Coalition** (SPC): What is sustainable packaging?

- Beneficial, safe, healthy throughout life cycle. Meets market performance and cost criteria. Optimizes use of renewable or recycled materials... Effectively recovered and used in closed loop system.

**Recycled materials** and the *ability to recycle* are key components of sustainability.

* Source: Pure Strategies Sustainability Consulting
Sustainable Packaging a Key Driver

**Neilsen 2015:**
- 30,000 consumers in 60 countries. 'Environmentally friendly packaging' one of top 8 key drivers of purchasing.

**EcoFocus Tracking 2018:**
- 68% "I try to buy products in packaging that is recyclable", *up 5% since 2014*.
- 51% "I have changed what I buy because of the type or amount of packaging", *up 5% since 2014*.

**Asia Pulp & Paper (in US) 2018:**
- "52% of Americans willing to pay more than 10% more for products with sustainable packaging". Especially millennials.
Recycling in the US
• Recycled materials important on the supply side for MF; there are alternatives.
• As a sustainable and recyclable material, MF has a huge opportunity.
• In the US, fast growth in share of municipal solid waste (MSW) recycled after 1970, then little change after 2010.
Origins of Recycling in the US

• Prior to 1960s: Recycling was primarily metal scrap yards and paperstock plants
  – Commercial/industrial recycling driven by simple economics: if a recycled material is less expensive than virgin, that material will be recycled
• 1960s: First recycled fiber-based newsprint mills emerged in NJ and IL
• 1970, The Big Year!
  – Problems with litter led to the first beverage container deposit programs
  – Green movement, Earth Day, growing public awareness of conservation
  – National Environmental Policy Act (NEPA) – first US national policy promoting enhancement of the environment
  – Environmental Protection Agency (EPA) formed
• 1976: First EPA recycling grants given to 2 cities in Massachusetts for first multi-material curbside collection
By mid 1980s: 10% of US households participated in recycling

3 quite different approaches to residential curbside collection in 3 locations:

- New England/New Jersey: Collected paper (usually newspapers) and containers (steel/aluminum cans and glass). Materials were sorted/processed at the first generation of MRFs.
- Northern California: Three bins in the household and in the truck collected newspaper, metal containers, glass containers. Materials were sorted and processed at simple MRFs.
- Ontario, Canada: Blue Box system was developed which featured collection vehicles with 3-4 bins and the materials were sorted at truck-side.

1987: Mobro Garbage Barge from NYC wandered the Atlantic for months seeking to dispose of cargo, ultimately going back to NYC to be incinerated

The perceived shortage of landfill capacity led to higher disposal costs and accelerated the move to recycling

States began to enact recycling legislation with the goal of reducing landfill, and increasing diversion to recycling

- NJ was first state to enact a mandatory recycling law
Maturity: 1990s through 2000s

• Rapid growth of recycling programs and recession of 1990-91 led to oversupply and lower prices for recovered materials.
• In order to save recycling, States responded with more policies including:
  – Mandatory recycled content
  – Mid 90s: Items banned from landfill included yard waste, tires, aluminum containers, corrugated boxes, foam polystyrene, plastic containers, and newspapers
• New materials are added to recycling programs:
  – Plastic containers, usually only PET & HDPE
  – Additional paper grades added, Mixed Paper & OCC
• As MRF processing capabilities expanded, more new materials were added, such as poly-coated packaging and others.
• Early 2000s: Expansion of programs led to pressure to simplify and reduce cost of collection, many programs went single stream, and the quality of recyclables dropped.
• The volume of waste going to landfills also began to decline, disposal costs moderated, and disposal capacity was no longer an issue.
Recycling Then, Sustainability Now

• Early 2000s, the EPA introduced *Waste Reduction Model* (WARM), a tool to help solid waste planners and organizations track and report greenhouse gas (GHG) emissions.

• Substantial impact on awareness of *GHG emissions* and related issues:
  – Recycling is no longer just an issue of litter and disposal costs
  – Recycling saves energy, as well as materials, and reduces GHG
  – Recycling now driven by broader environmental goals

• *States like CA and OR* were the first to use GHG emissions approach to guide recycling policies and programs.

• Many large corporations have followed suit with Corporate Sustainability Plans.

• New framework: *Sustainable Materials Management* aims to systematically reduce environmental harm by managing materials across the life cycle.

• *Packaging is 10% of carbon footprint.* For packaging, sustainability means:
  – Source reduction, lightweighting, renewable energy, recycled content, recyclability, reusable packaging, biodegradable, compostable, and the like.
94% of US population has some form of recycling available; 7 of 10 have curbside available.
Currently 20%+ of recycling programs include MF

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>% OF US POPULATION WITH RECYCLING PROGRAMS AVAILABLE FOR MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Less than 20%</td>
</tr>
<tr>
<td>PET, HDPE, PP, LDPE/LLDPE bottles, jugs, jars</td>
<td>x</td>
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<tr>
<td>PET – all, cups, containers, etc.</td>
<td>x</td>
</tr>
<tr>
<td>Cans, bottles, aerosol containers</td>
<td>x</td>
</tr>
<tr>
<td>PVC non-bottle rigid, clamshells</td>
<td>x</td>
</tr>
<tr>
<td>PS cups, containers, all but cutlery</td>
<td>x</td>
</tr>
<tr>
<td>Bulky plastic</td>
<td>x</td>
</tr>
<tr>
<td>Cartons</td>
<td>x</td>
</tr>
<tr>
<td><strong>Molded fiber food packaging</strong></td>
<td>x</td>
</tr>
<tr>
<td>Aluminum foil food packaging</td>
<td>x</td>
</tr>
<tr>
<td>Foam PS cups, trays, clamshells</td>
<td>x</td>
</tr>
<tr>
<td>Paper cups, take-out trays</td>
<td>x</td>
</tr>
<tr>
<td>Paper ice cream tubs</td>
<td>x</td>
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</tbody>
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* Source: 2015-16 Centralized Study on Availability of Recycling Sustainable Packaging Coalition. Availability of recycling for 47 materials; based on 2,000 communities/50% of US population.
Residential Recovery vs.
Industrial/Commercial/Institutional

- In the US, ICI accounts for 60% of municipal solid waste (MSW) while residential accounts for 40%.

- Important to note that for recovered materials, over 3/4 are generated by ICI and less than 1/4 by residential recycling.
Recycling in Canada & Europe
Recycling in Canada

• 1969 - Toronto students create *Pollution Probe* to build awareness of waste generation and environmental issues

• 1970 – Ottawa creates *Environment Canada*
  – Ontario government passes Waste Management Act for air; waste disposal permit systems; and introduces the Environmental Protection Act (EPA).

• 1973 – A recycling effort that covers 80,000 households is organized by *citizens* on the east side or Toronto and picks up glass, cans and newspapers.

• 1981 -- First *residential curbside recycling program* was tested in Kitchener, ON. Designed by Laidlaw, a waste hauler and consultant Resource Integration Systems (RIS). Started by providing the Blue Box to with 1,500 homes and went citywide by 1984.

• 1989 – *Blue Box programs* served 1 million homes in Canada and had attracted international attention, receiving a number of awards.
• **Provincial governments** have responsibility for recycling policies while **municipalities implement** programs. Municipalities may initiate specific policies such as landfill bans independently of provincial requirements.
  – Industry groups and associations, NGOs, and citizens have also lobbied various levels of government for specific results.

• Each province currently has a *stewardship agency* that is funded heavily by industry. Generally governments want as much in the recycling bin as possible since they pay 100% the cost of disposal, but industry supports a percentage of the cost of recycling.

• **MF is generally included** with other paper products in the recycling stream. Accepted in all Blue Box programs and also in many Green Box programs which are intended for composting.

• With full EPR in BC, all recycling programs across the province are consistent and the **acceptance of MF is stated**. Elsewhere:
  – "Check with your municipality to see what items are accepted in your curbside Blue Box" – Stewardship Ontario
Municipal waste recycling includes material recycling, composting and digestion of bio-wastes.

EU (28 countries) averaged 44% recycling, up from 31% in 2004. By 2016, 46%.

Germany, Austria, Belgium, Switzerland, the Netherlands and Sweden recycled over half of MSW.

Highest increases from Lithuania, Poland, Italy, UK, Czech Republic.

7 countries – no change and in 2 countries recycling decreased slightly.

Population: In 2018, US population was 327.2 million; EU was 511.5. The US is approximately 64% the size of the EU with almost twice as many 'states'.

Half of EU population is accounted for by Germany, France, UK (13%), Italy, Spain.

* Source: European Environment Agency 2016
Europe does better than rest-of-world, followed by North America.

In 2014, 71.7% of paper used in Europe was recycled.

Decline of newsprint; increase in corrugated.

15 countries exceeded the average paper recycling rate.

9 countries still below 60% paper recycling.

Recycling rate in world regions in 2013

* EU-28 + 2 = EU-28 + Norway and Switzerland

Source: CEPI, RISI – 2014 figures will be available in October 2015
Recycling MF in Europe

• Most programs in Europe accept MF and have done so from the start.
• Considerable variation in programs as recycling is managed locally
  – Usually MF goes in the paper bin but, in some parts of the UK, all 'light packaging' goes together, so MF goes with bottles and cans which can cause contamination.
• MRFs separate the different paper grades. Egg cartons go to deinking newsprint grades. Brown molded fiber usually goes to OCC bales.
• To be included in recycling programs, materials go through a technical test. Paper products must pass a re-pulping and screening test.

  • Consultant XYZ "is a trusted leader in third-party environmental, sustainability and food quality certification, auditing, testing and standards development".
  • "We partner with companies, government agencies, and stakeholders worldwide to identify and drive practices…that advance the goals of sustainable development…Audits, test results, and certifications conducted by a neutral third-party provide the independent perspective needed…"

• EU Ecolabel, since 1992, awarded to 40,000 products and services meeting high environmental standards throughout life-cycle. Qualify by being recyclable and minimizing emissions to air and water.
Europe – Packaging

• In May 2018, the European Council passed the **Circular Economy Package**
  – 70% of all packaging waste and 100% of all plastic packaging should be recycled by 2030
  – Likely to discourage the use of foam for food and foodservice packaging

• **Packaging & Packaging Waste Directive** sets material-specific recycling targets for packaging until 2030
  – Paper and cardboard are expected to reach 75% recycled by 2025 and 85% by 2030

• By 2035 the amount of **municipal waste** landfilled must be reduced to 10% or less of the total amount of municipal waste generated.
  – In 2016, landfilling of household waste in the EU as a whole dropped to 24%.
  – Yet big differences among EU countries remain.
  – In 2016 ten countries still landfilled over 50% of their household waste and six of them incinerated 40% or more.

• Directive calls for the **establishment of EPR** schemes in all member states by December 2024.
US, Canada, Europe

• **Similarities:**
  – Legislation is the key driver behind residential recycling.
  – Industrial/Commercial recycling is greater volume in all locations and driven by market forces.

• **Differences:**
  – Europe: technical testing first, prove that it will re-pulp.
  – Canada and Europe are more 'inclusive' in their approach, if it's paper-based, throw it in the paper bin.
  – Europe by country/Canada by province: Consistent structure and a mix of public/private funding that supports decision-making.
  – Europe: In some countries, cultural coherence can make communications easier.
3  Marketing Recyclability
For recycling programs to work, a large, stable supply of recyclable material is needed in order to ensure demand. Many legislative options have been used in the US:

• **Supply side:**
  - Container deposit legislation: Shift cost to industry and consumers
  - Mandatory recycling collection: Recycling targets for communities with % of specific materials to be diverted from waste stream
  - Refuse bans: Disposal plans need to be in place or result can be illegal dumping

• **Demand side:**
  - Procurement policies require a certain % of spending on recycled products:
    - Resource Conservation and Recovery Act (RCRA): required the Federal government to purchase products with recycled content
    - 'End market' stimulus is a model many states (and businesses) have followed
  - Minimum recycled content: Force manufacturers to include recycled content
  - **Recycled product labeling:** Give consumers more information to help them make better choices.
In the US, the Federal Trade Commission (FTC) governs the appropriate use of environmental marketing claims – 'Green Guides' to help marketers avoid consumer deception.

If a package says "made using recycled content" or "recyclable" that is an environmental marketing claim.

- Applies to on-package claims, press releases, websites, sales collateral, etc.
- False claims can be reported to the FTC; action may be taken against offenders

**Green Guides indicate:**

- "Product or package should not be marketed as recyclable unless it can be *collected and separated from the waste stream* through an established recycling program".
- "Where recycling programs are *available to less than 60% of consumers*, marketers should qualify recyclable claims by stating the percentage of consumers or communities that have access to facilities that recycle the item".
SPC's "How2Recycle" Label

- Initiated in 2008, goal is to **reduce confusion** by providing a clear, understandable, nationally consistent label that tells consumers how to recycle a package.
  - *Increase* the availability and quality of **recycled material**.
  - Improve the reliability, completeness, and transparency of recyclability claims with labeling that supports the FTC Green Guides.

- Online platform provides members with **packaging recyclability insights**.

- Member examples:
  - **March 2019:** *Walmart* will label 100% of its food and consumable private brand packaging with the How2Recycle label by 2022
  - **Nov. 2018:** *Johnson & Johnson Consumer* Inc. will use How2Recycle labeling on many of its baby products, including baby lotion, baby shampoo, and baby wash.
  - **Feb. 2018:** *Lego* announced that by end of 2018, over 60% of new toy boxes will have the How2Recycle label.
Challenges at the MRF

Next step would be to work with MRFs to ensure operations keep MF in:

• In a typical single stream MRF, most MF products function as 3 dimensional objects.
  – MF would typically be sorted into the container line and not with paper. Then becomes a contaminant among recovered containers and must be pulled out, discarded.

• Egg cartons and rough MF products, printed/unprinted mechanical fiber grades, would ideally go into ONP bales.
  – Except that with the decline of newspapers, many MRFs are not making ONP any more, making Mixed Paper instead.

• Most protective packaging is brown Kraft MF based on OCC and DLK -- which should go into OCC bales.

• White, high quality, foodservice MF based on chemical fibers (SBS) would be a positive addition to Office Paper.

• MRFs are upgrading equipment and adding more screens, more sorting equipment, optical scanning, and artificial intelligence robotic systems.
  – Can identify items on the belt and be programmed to pick up specific shapes/ materials.
  – Increasingly feasible to pick out MF products and sort with the appropriate paper grades.
The Association of Plastic Recyclers created the **Rigids Committee in 2008** with the objective of increasing the recycling rate of rigid plastics beyond bottles.

- Committee oversees **94%+ of the processing capacity** of postconsumer plastic recycling in North America
- Works to enhance quality and supply through technical resources, testing programs, design solutions, corporate training, regulatory leadership, education
- Many reports and studies impacting the industry, technological advances, and new trends in the recycling marketplace, and their impact on plastic recycling.
- Membership includes independent recycling companies, processors of resins, CPG companies, equipment manufacturers, testing laboratories, associations, and others committed to the success of plastics recycling.
2011 - Paper Recovery Alliance (PRA) & Plastics Recovery Group (PRG)

Membership includes full value chain from:
- Raw material suppliers,
- Packaging converters
- Foodservice operators and retailers
- Collection and processing service providers
- End users, such as mills.

Started with recovery pilot projects in 2 cities

Examples of PRA / PRG initiatives on Foodservice Packaging (FSP):
- Building end markets for paper FSP (work with AF&PA, brokers, mills, etc.)
- Building end markets for plastic FSP (associations; plastic recovery facilities)
- Sharing info with MRFs
- Toolkit to encourage paper and plastic recycling/composting in restaurants
- Working with cities to get paper and plastic FSP into curbside recycling programs; add compostable paper and bioplastic to composting programs

Recent Success: 2 million have access to paper cup recycling!
The Carton Council Story

- Carton Council, founding member Tetra Pak plus Evergreen Packaging, SIG Combibloc, and Elopak.
  - From April 2009 to 2011, doubled the number of US households with access to carton recycling from 18% to 36%
  - Communities in 39 states began to include cartons in recycling programs
  - Increased the number of MRFs accepting cartons to 37
  - Grew the number of mills accepting cartons from 1 to 9 in <2 years
- Substantial funding from members. 2008 study that examined
  - Manage gable-top and aseptic separately or together?
  - Included in Mixed Paper or on their own?
  - What is highest and best use of the recycled material?
- Worked closely with industry experts/consultants
- Worked across the supply chain: recycling programs, haulers, MRFs, mills
- Started with building substantial end markets; building processing infrastructure; bringing communities online; then building consumer awareness
- New PSI spec grade #52; Accepted in 60% of recycling programs
- Now being challenged because of high cost of recovery/contaminant in Mixed Paper
Strengths & Opportunities

• Supply Side – Raw Materials:
  – The current high level of interest in RCF market pulp could provide alternative raw material inputs for MF producers when needed.

• Demand Side -- Product Markets:
  – Sustainability and sustainable packaging goals are with us to stay
  – MF is made from recycled material and it can be recycled.
  – Easy for consumers to recognize that it is a paper product.
  – In a strong position to be marketed as sustainable packaging.
  – Also light weight, even biodegradable and compostable in the right situation.
Challenges: To Dos

- No technical certifications in the US; it requires buy-in from the whole value chain: inclusion in collection programs, correct processing at MRFs, demand from mills.
- Labeling the package as 'recyclable' with good directions makes a big difference – "Check locally, not recycled in all communities" is a start.
- How2Recycle is used primarily by brand owners on product containers and boxes, not protective or foodservice packaging. Not clear this specific label would work for all MF products.
- How to ensure appropriate processing at MRFs and expand acceptance in recycling programs? Sales: make contacts, share benefits of including MF, follow-up. Associations have provided considerable support.
- Creating demand for the recycled material is most critical. Where are the population centers where MF is generated and the existing programs? Talk to cities, MRFs, mills in those locations first, followed by next best opportunities.
Thank You for Your Attention