Recycling: The Past, Present and Future

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What we’ll look at today

- A review of recycling’s progress, based mainly on U.S. data
- An assessment of where we stand now
- An analysis of key trends that may determine recycling’s future in North America
Recycling’s progress

After two decades of important growth, recycling’s rate of increase has declined. We are capturing the easiest tons, thus making growth harder and more expensive than in the past.
Total MSW generation (by material), 251 million tons (before recycling)

- Paper/Paperboard: 28.2%
- Glass: 4.6%
- Metals: 8.9%
- Plastics: 12.3%
- Rubber, leather, and textiles: 8.7%
- Yard trimmings: 13.5%
- Food scraps: 14.5%
- Other: 3.4%
- Wood: 6.3%
- Paper/Paperboard: 28.2%
MSW management in the United States, 2012

- Discarded: 53.8%
- Recovery: 34.5%
- Combustion with Energy Recovery: 11.7%
Recycling’s progress

In Canada, we saw waste volumes of about 28 million tons in 2010, mainly being paper (40 percent), organics (27 percent) and metals (15 percent). About 1.3 million tons were generated in Saskatchewan.
Recycling’s progress

The national recycling level in 2010 was similar to that in the U.S. at about 32 percent, with approximately nine million tons being recovered annually (156,000 tons from Saskatchewan). The province’s recycling rate was about 13 percent.
MSW recycling volumes and rate

Total MSW recycling (million tons)

Percent of generation recycled

- 1960: 5.6%
- 1970: 6.4%
- 1980: 9.3%
- 1990: 16.7%
- 2000: 84.2%
- 2008: 82.9%
- 2010: 85.0%
- 2011: 86.9%
- 2012: 86.6%

Percent recycling:
- 1960: 6.4%
- 1970: 6.2%
- 1980: 6.6%
- 1990: 7.3%
- 2000: 10.1%
- 2008: 33.2%
- 2010: 33.2%
- 2011: 34.0%
- 2012: 34.7%
- 2013: 34.5%
- 2014: 34.0%
- 2015: 33.2%
- 2016: 33.2%
- 2017: 33.2%
- 2018: 33.2%
- 2019: 33.2%
- 2020: 33.2%
- 2021: 33.2%
- 2022: 33.2%
- 2023: 33.2%
- 2024: 33.2%
- 2025: 33.2%
- 2026: 33.2%
- 2027: 33.2%
- 2028: 33.2%
- 2029: 33.2%
- 2030: 33.2%
- 2031: 33.2%
- 2032: 33.2%
- 2033: 33.2%
- 2034: 33.2%
- 2035: 33.2%
- 2036: 33.2%
- 2037: 33.2%
- 2038: 33.2%
- 2039: 33.2%
- 2040: 33.2%
Recycling rates for selected products, 2011-2012

- Auto Batt.: 96.2%
- Newsprint: 72.5%
- Yard Scraps: 57.3%
- Steel Cans: 70.6%
- UBC: 67%
- Tires: 44.6%
- HDPE: 28.6%
- Glass: 34.2%
- PET: 29.1%
- Food Scraps: 2.5%
We have seen growth in collections
We have seen growth in processing
We continue to grow
Recycling’s progress

Yes, more than 10,000 communities, with 70 percent of U.S. single-family homes, now collect recyclables curbside, using 15,000 recycling trucks. Yes, 193 million Americans can set out recyclables weekly.

But our progress has slowed.

Recycling rates have flattened out or even dipped slightly.
Aluminum can recycling rate

![Graph showing the aluminum can recycling rate from 1997 to 2012. The rate generally decreases from around 65% in 1997 to approximately 50% in 2002, then fluctuates between 50% and 60% until 2012. The graph is labeled with years from 1997 to 2012 on the x-axis and percent on the y-axis.]
Steel recycling rate
Recycling’s progress

We were able to survive the Great Recession of 2008-2010. While recycling rates were not severely affected, recovery economics became ugly.
Impact on exports in the first quarter of 2009

<table>
<thead>
<tr>
<th>Material</th>
<th>Volume</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper</td>
<td>- 14%</td>
<td>- 22%</td>
</tr>
<tr>
<td>Plastics</td>
<td>+ 15%</td>
<td>- 32%</td>
</tr>
<tr>
<td>Aluminum</td>
<td>- 40%</td>
<td>- 31%</td>
</tr>
<tr>
<td>Ferrous Scrap</td>
<td>+ 12%</td>
<td>- 26%</td>
</tr>
</tbody>
</table>
HDPE milk jug bale prices
Aluminum can prices
Recovered paper prices
(18 grades; weighted average)
Old newspaper price
Ferrous scrap prices
(No. 1 heavy melting steel)
Recycling’s progress

And we have seen a fundamental shift in critical recycling markets. The continuing rise in Chinese demand resulted in systemic changes in the American recycling market.
Recycling’s progress

The crunch created by high export demand, changing consumer practices and a crushing recession has been toughest on the domestic paper industry.
Paper collections continue

![Bar chart showing paper collections from 1993 to 2013]

- 1993: 30 Million Tons
- 1995: 40 Million Tons
- 1997: 50 Million Tons
- 2001: 60 Million Tons
- 2003: 50 Million Tons
- 2005: 50 Million Tons
- 2007: 50 Million Tons
- 2009: 50 Million Tons
- 2010: 50 Million Tons
- 2011: 50 Million Tons
- 2012: 50 Million Tons
- 2013: 50 Million Tons
Use of recovered fiber by U.S. paper industry sector

- Tissue: 55%
- Paperboard: 48%
- Containerboard: 42%
- Newsprint: 30%
- Printing & Writing: 4.8%
Recovered paper exports

- Metric Tons
- 1997 to 2013
- Graph showing an increase in recovered paper exports from 1997 to 2005, with a peak in 2008, followed by a decline in 2011.
### 2013 recovered paper market

<table>
<thead>
<tr>
<th></th>
<th>Million Tons</th>
<th>Versus 2011</th>
<th>2012 Marketplace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic</td>
<td>30.1</td>
<td>+0.1%</td>
<td>58%</td>
</tr>
<tr>
<td>Exports</td>
<td>22.1</td>
<td>-6.3%</td>
<td>42%</td>
</tr>
<tr>
<td>Total</td>
<td>52.2</td>
<td>-2.2%</td>
<td></td>
</tr>
</tbody>
</table>
Newsprint: a serious problem

North American shipments in million metric tons:

2000: 15.8
2005: 12.7
2010: 7.8
2011: 7.3
2012: 6.7
2013: 6.4

This is a loss of 50 percent over eight years.
### Paper recycling markets: Bankruptcies

<table>
<thead>
<tr>
<th>Company</th>
<th>Product Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>AbitibiBowater</td>
<td>Newsprint</td>
</tr>
<tr>
<td>Caraustar</td>
<td>Paperboard</td>
</tr>
<tr>
<td>Newark Group</td>
<td>Paperboard</td>
</tr>
<tr>
<td>Smurfit-Stone</td>
<td>Paperboard</td>
</tr>
<tr>
<td>SP Newsprint</td>
<td>Newsprint</td>
</tr>
</tbody>
</table>
# Paper mill closures

<table>
<thead>
<tr>
<th>Company</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue Heron</td>
<td>Oregon City, OR</td>
</tr>
<tr>
<td>Caraustar</td>
<td>Chattanooga, TN</td>
</tr>
<tr>
<td>Caraustar</td>
<td>Richmond, VA</td>
</tr>
<tr>
<td>Caraustar</td>
<td>Charlotte, NC</td>
</tr>
<tr>
<td>Franklin Boxboard</td>
<td>Franklin, OH</td>
</tr>
<tr>
<td>International Paper</td>
<td>Albany, OR</td>
</tr>
<tr>
<td>Smurfit-Stone</td>
<td>Missoula, MT</td>
</tr>
<tr>
<td>Sonoco</td>
<td>Rockton, IL</td>
</tr>
<tr>
<td>Sonoco</td>
<td>Lancaster, OH</td>
</tr>
</tbody>
</table>
Recycling’s future

A dozen issues or trends will help form where recycling is headed in the next decade.
1: The evolving ton

Per capita waste generation is down eight percent since 2000, thus affecting recycling, landfilling and waste incineration. We are seeing:

-- less paper
-- more plastics (up 25 percent)
-- no growth for metals
2: More programs and materials

During the recession, more than 100 North American communities launched or expanded local recycling efforts. This trend has continued, as more communities drive deeper into the waste stream to attain recycling goals and also given the “evolving ton.”
2: More programs and materials

As well, a slow return to high recycling prices will again result in added investment. Recycling will return to improved profitability for many firms.
2: More programs and materials

With less waste being generated, programs have collection and processing capacity available. More materials are being added to many programs, such as aseptic packaging and mixed rigid plastics packaging (tubs, buckets, pails, etc.).
3: More aggressive program actions

As communities strive harder to attain higher recovery levels, we’ll see more adoption across the U.S. of sterner measures:

-- landfill bans
-- product bans
-- pay-as-you-throw garbage pricing
-- enforced mandatory participation laws
3: More aggressive program actions

At the same time, communities will try new approaches, especially mixed-waste sortation (Cleveland, Houston, Montgomery, San Jose) and possibly mixed-waste composting.
4: Rising focus on toxics

Local and state initiatives targeting the management of toxics in solid waste will grow in number and effect.
5: More stewardship programs

Extended product stewardship will become the prevailing waste management model in the coming years, except for paper and packaging. However, current EPR initiatives require remodeling if they are to become truly sustainable.
5: Stewardship’s flaws

1. These are often 1R programs
2. They often lack market development elements
3. They often provide no local preference
4. Some have no downstream auditing
5. Some contain goals that discourage additional recycling
6: Food discards

Look for more and more North American communities to add food discards – both commercial and residential – to organics collection and composting systems. As a result, we’ll see more programs picking up trash every other week.
7: Larger is better

More and more large, regional, hub-and-spoke MRFs will come on-line. Thus, you’ll see smaller and smaller communities moving to single-stream recycling collection and a number of smaller, old MRFs will close.
8: Continued consolidation

More and more recyclables will be collected and processed by fewer and fewer players. Too, the number of end users will decline but the size of these firms will rise. Mergers and acquisitions will continue.
The impact

<table>
<thead>
<tr>
<th>Big supplier</th>
<th>Million tons/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>ReCommunity</td>
<td>1.8</td>
</tr>
<tr>
<td>Republic/Allied Waste</td>
<td>3.3</td>
</tr>
<tr>
<td>Waste Connections</td>
<td>1.0</td>
</tr>
<tr>
<td>Waste Management</td>
<td>12.9</td>
</tr>
</tbody>
</table>
The impact in 2013

<table>
<thead>
<tr>
<th>Big consumer</th>
<th>Million tons/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pratt Industries</td>
<td>1.2</td>
</tr>
<tr>
<td>Sonoco</td>
<td>1.2</td>
</tr>
<tr>
<td>Cascades</td>
<td>3.0</td>
</tr>
<tr>
<td>Georgia-Pacific</td>
<td>2.4</td>
</tr>
<tr>
<td>International Paper</td>
<td>5.1</td>
</tr>
<tr>
<td>Rock-Tenn/Smurfit</td>
<td>4.0</td>
</tr>
</tbody>
</table>
The impact

<table>
<thead>
<tr>
<th>Steel company</th>
<th>Processing plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Metals</td>
<td>36</td>
</tr>
<tr>
<td>Nucor</td>
<td>58</td>
</tr>
<tr>
<td>Schnitzer Steel</td>
<td>42</td>
</tr>
<tr>
<td>Steel Dynamics</td>
<td>27</td>
</tr>
</tbody>
</table>
The impact

<table>
<thead>
<tr>
<th>Paper company</th>
<th>Processing plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>International Paper</td>
<td>23</td>
</tr>
<tr>
<td>Newark Group</td>
<td>11</td>
</tr>
<tr>
<td>Rock-Tenn/Smurfit</td>
<td>37</td>
</tr>
<tr>
<td>Sonoco</td>
<td>17</td>
</tr>
<tr>
<td>SP Fibertech</td>
<td>21</td>
</tr>
</tbody>
</table>
8: Continued consolidation

Top four metal processors handle 23 million metric tons per year
- Sims: 7.2 million metric tons
- OmniSource: 5.8 million metric tons
- Schnitzer Steel: 5.2 million metric tons
- David J. Joseph: 5.0 million metric tons
9: Continuing deindustrialization

The lack of attention in the U.S. toward an industrial policy will hurt recycling. As volumes of recyclables climb while Chinese demand slows, states will be urged to, once again, launch recycling market development programs.
9: Continuing deindustrialization

Only 9.3 percent of American work force is in manufacturing. At one time, 30 percent of the work force was in manufacturing.

The U.S. added 937,000 jobs in 2010, while Foxconn, China’s largest employer, added 300,000. The company now employs 1.4 million, on par with America’s largest employer (Walmart).
10: The green fence is real

This past year saw recycling quality and the cost of recycling both rise, but for a good reason. China no longer wants to be the world’s dumping ground. Recycling practices of the past no longer suffice.
Chinese CRT glass processing
11: Reframing

We will move towards better metrics. Less attention will be focused on recycling rates, and more governments and industries will consider toxicity, global warming and life-cycle issues when making decisions. The U.S. EPA is already rethinking how it addresses wastes, as are some states, such as Oregon.
12: Sustainability

We are far from being a sustainable practice, and more effort is required for us to move forward. That is recycling’s greatest challenge in the coming decade.
12: Sustainability

That said, we have seen substantial corporate efforts in voluntary producer responsibility (Closed Loop Fund, SERDC 120, etc.). You should expect more such efforts.
Conclusion

We are ready once again to move forward in Saskatchewan and throughout North America. And we must.
## Energy consequences of not recycling

<table>
<thead>
<tr>
<th>Material</th>
<th>Annual lbs per Household</th>
<th>Barrels Saved per Ton</th>
<th>Barrels Lost Annually</th>
<th>Energy Value Lost (@$75/bbl in billion dollars)</th>
<th>Value per Household</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiber</td>
<td>1,821.6</td>
<td>1.70</td>
<td>85,425,000</td>
<td>$6.407</td>
<td>$116.14</td>
</tr>
<tr>
<td>Aluminum Cans</td>
<td>27.0</td>
<td>40.00</td>
<td>28,936,875</td>
<td>$2.170</td>
<td>$40.47</td>
</tr>
<tr>
<td>PET Bottles</td>
<td>39.0</td>
<td>16.30</td>
<td>28,115,870</td>
<td>$2.108</td>
<td>$23.87</td>
</tr>
<tr>
<td>HDPE Bottles</td>
<td>30.1</td>
<td>16.30</td>
<td>20,454,870</td>
<td>$1.534</td>
<td>$18.41</td>
</tr>
<tr>
<td>Glass Bottles</td>
<td>883.4</td>
<td>0.12</td>
<td>4,543,855</td>
<td>$0.341</td>
<td>$3.98</td>
</tr>
<tr>
<td>Steel Cans</td>
<td>19.2</td>
<td>1.80</td>
<td>1,141,756</td>
<td>$0.085</td>
<td>$1.30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,820.4</strong></td>
<td><strong>1.93</strong></td>
<td><strong>168,618,226</strong></td>
<td><strong>$12.645</strong></td>
<td><strong>$204.16</strong></td>
</tr>
</tbody>
</table>

Source: SWANA/SRI

168,600,000 barrels or 3.5%
We are sending money
to the landfill

<table>
<thead>
<tr>
<th>Material</th>
<th>Recycling Rate</th>
<th>Value of Unrecovered Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper</td>
<td>61%</td>
<td>$3.1 Billion</td>
</tr>
<tr>
<td>Aluminum Cans</td>
<td>65%</td>
<td>$1.3 Billion</td>
</tr>
<tr>
<td>Plastic Bottles</td>
<td>31% HDPE, 30% PET</td>
<td>$1.6 Billion</td>
</tr>
<tr>
<td>Steel Cans</td>
<td>65%</td>
<td>$0.4 Billion</td>
</tr>
<tr>
<td>Glass Bottles</td>
<td>28%</td>
<td>$0.1 Billion</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>$6.5 Billion</strong></td>
</tr>
</tbody>
</table>
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