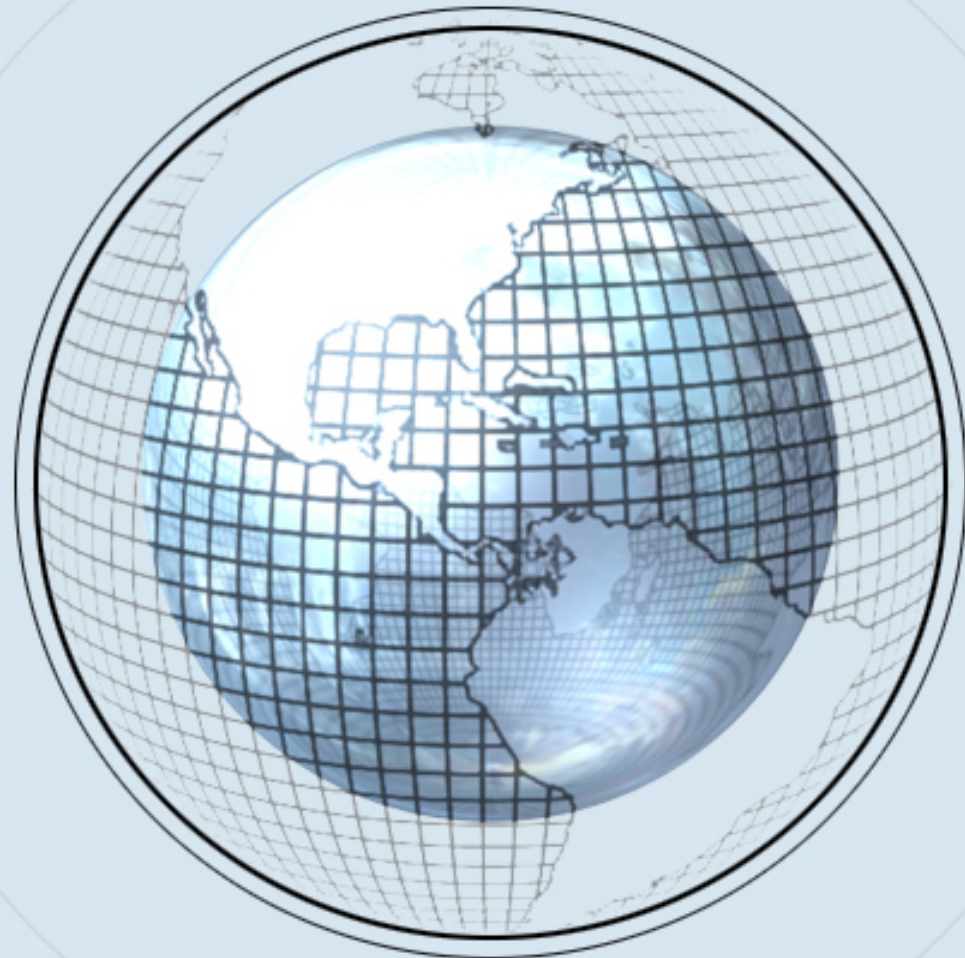


**Carolina Recycling Association
Wilmington, NC - March 2016**

Recycling Megatrends

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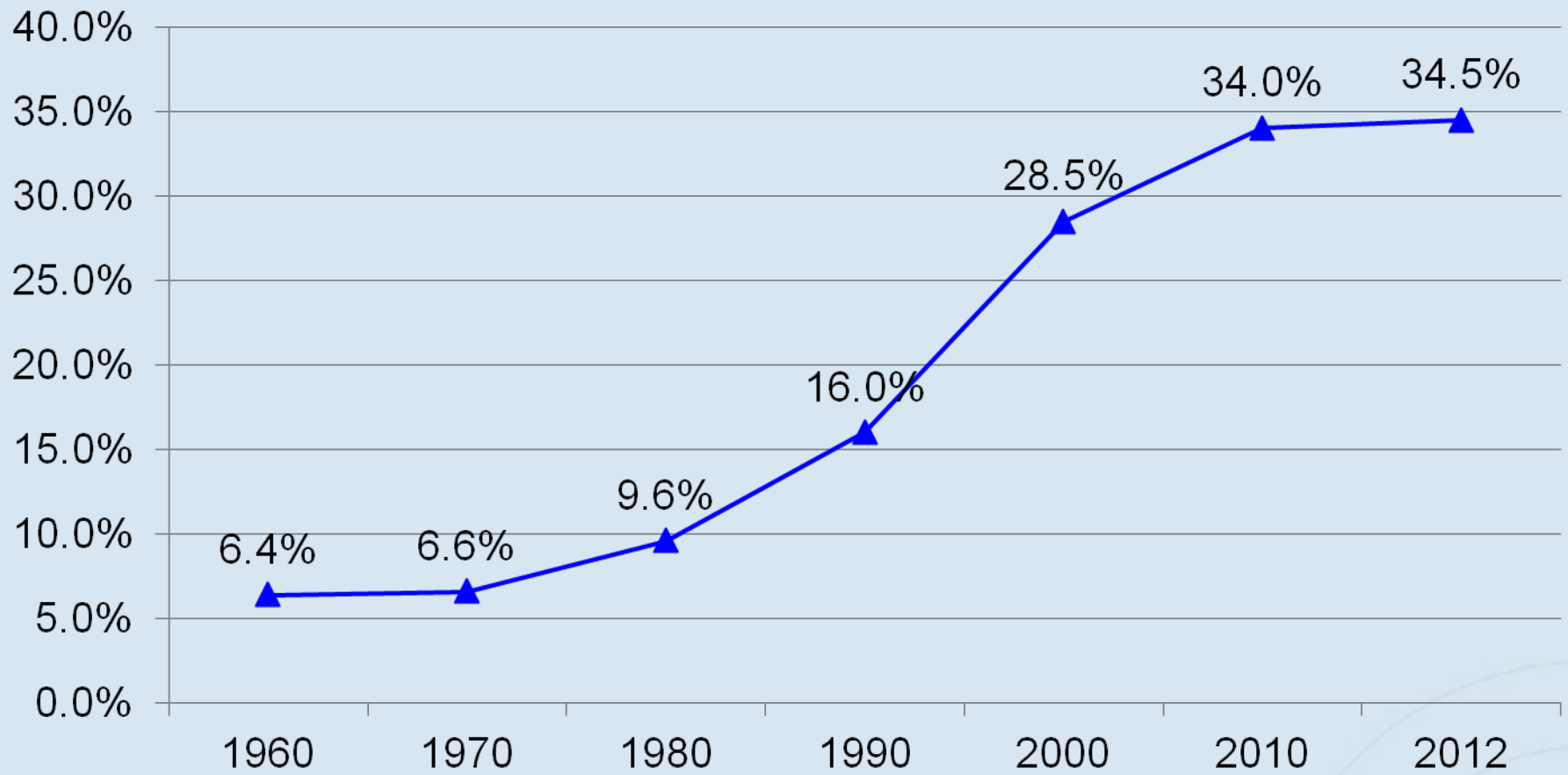


Moore & Associates – Paper Recycling Market Consultants

- **Recovered Paper Market Experts**
- **Based in Atlanta, Global Practice**
- **Market Research**
- **Strategic and Tactical Business Assistance**
- **Pricing Analysis**
- **Recovered Paper Sales & Procurement Assistance**



US MSW Recovery Rate 1960 - 2012



Legislation that Moved Recycling Forward – 1970s

- **1970 – The Big Year!**
 - Earth Day
 - National Environmental Policy Act (NEPA) - established a US national policy promoting the enhancement of the environment
 - EPA formed
- **NEPA led to the Resource Conservation and Recovery Act (RCRA) to regulate solid and hazardous waste**
- **While RCRA applies to solid waste, the early years focused on hazardous waste regulation**
- **While not solid waste, the Love Canal issue (hazardous waste induced groundwater contamination in western NY in the mid-1970s) added fuel to the disposal/groundwater**
- **Led to the 1980 passage of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA – commonly known as Superfund)**



Resource Conservation and Recovery Act (RCRA)

- **While RCRA regulates solid waste, it has very little direct attention to recycling**
- **It did address recycling commodities markets and required the Federal government to purchase recycled content products – paper, motor oil, etc.**
- **This approach to “end market” stimulus became a model for many states to follow and even businesses**
- **The most important effect of RCRA on recycling: set the environmental standards for the disposal of MSW, thereby forcing closure of substandard landfills – it caused disposal costs to steadily increase for thirty years, the most important driver of recycling**



“Modern” Recycling Collection History – 1970s

- **Up until the 1980s, recycling primarily took place through scrap yards (focused on metals) and paperstock plants: not residentially oriented - buy backs, newspaper drives, etc.**
- **Commercial/industrial recycling always happened on an economic, avoided disposal, & market supply/demand basis**
- **There were a few ONP only household collections in early/mid 1970s and even some activity in the 1960s as the first recycle fiber based newsprint mills emerged in New Jersey and Illinois.**
- **First real multi-material residential recycling programs started in the US in Somerville & Marblehead, MA (1976)**



Residential Curbside Comes of Age – the Middle 1980s

- **Almost at the same time, three areas of residential curbside collection emerged, with pretty different approaches:**
 - **New England/New Jersey – dual stream collection: one household bin, two compartments on the truck: paper (usually only ONP) and containers (only steel & Al cans and glass). Materials were sorted/processed at the first generation true MRFs**
 - **Ontario, Canada – the blue bin system which featured collection vehicles with three or four bins and the materials were sorted at the truck-side**
 - **Northern California – three bins in the household and the truck: ONP, metal containers, & glass containers – processed at simple MRFs**



Curbside Recycling Turning Point

- **1986/87 – When San Jose, CA decided to implement a city wide residential curbside recycling program after piloting it in a small area**
- **Pilot programs in parts of cities were the approach in the late 1980s as city official wanted to determine “would it work” (would people participate!)**
- **First very large city (about 750,000 population) to have full curbside recycling program**
- **Three bin program popular at the time in California, modeled after the Santa Rosa, CA program run by local company – Empire Waste Management**
- **Mississauga, ON was Canada’s first large curbside program – 1986 (population 375,000)**



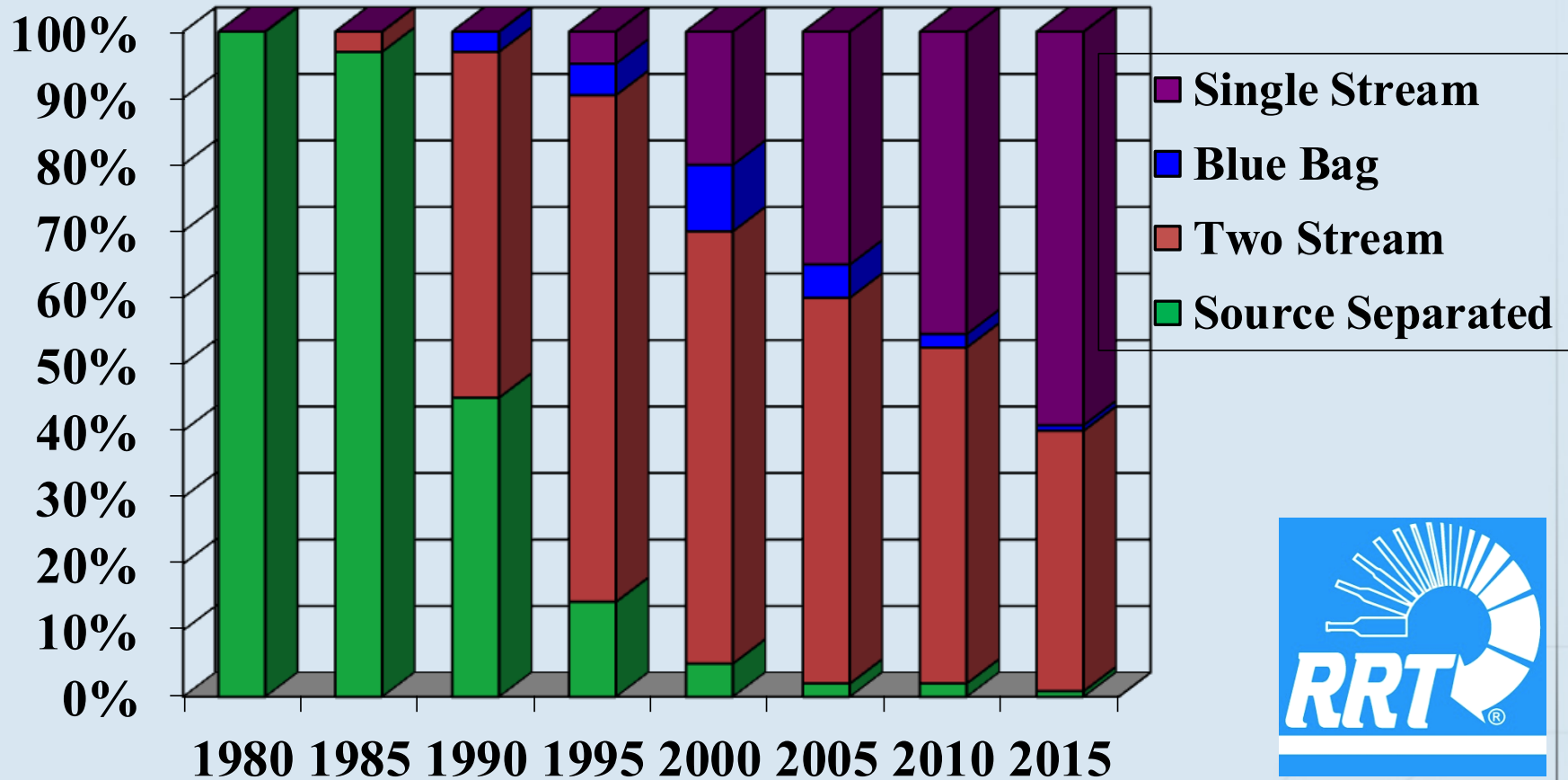
Multi-Material Processing Facilities – the Early Years

- **As mentioned earlier, paperstock plants and scrap yards were the earliest processing facilities**
- **Some of these emerged as the first MRFs**
 - **Peter Carter – Resource Recycling Systems (CT) – the godfather of the modern multi-material processing facility**
- **His facilities in the northeast US were the first real MRFs**
 - **Several operations in Connecticut (Hamden?)**
 - **Camden, NJ – the first real MRF to process dual stream material (at a scrap yard)**
 - **RRS assets were acquired/rolled up over the years into today's ReCommunity**



MRF Style History

(courtesy of Nat Egosi, RRT)

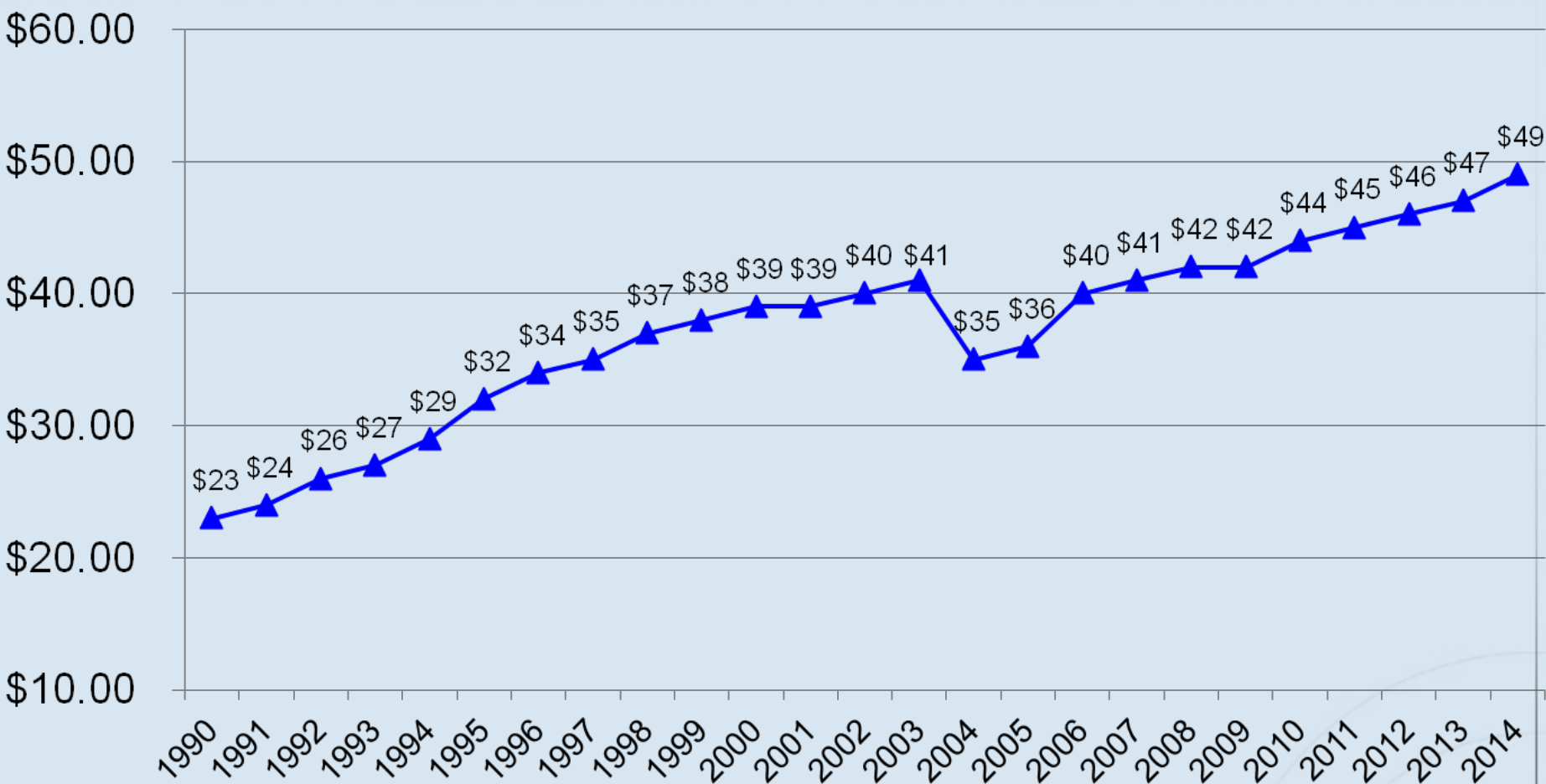


Late 1980s

- **Mobro – the garbage barge – “the Flying Dutchman” of solid waste – a barge of MSW from Long Island that “wandered “ the Atlantic for months in 1987 going as far as Belize seeking to dispose of it’ s cargo: ultimately going back to NY where it was incinerated**
- **Significant number of “old”, environmentally unsound “dumps” closed as a result of the implementation of Subtitle D of RCRA**
- **Perceived shortage of disposal capacity throughout the US**
- **Skyrocketing landfill costs, a number of costly waste-to-energy plants built**
- **Higher disposal costs/perceived landfill capacity shortage accelerates move to recycle**
- **A number of states enact recycling legislation**



US Average Annual MSW Gate Rates 1990 to 2014 - \$/Ton



Residential Recycling Grows – 1990s

- **All three types of earlier collection/processing operations grew in the first half of the decade: truck-side sort, two (dual stream) and three compartment trucks**
- **New materials are added:**
 - **Plastic containers: usually only PET & HDPE**
 - **Additional paper grades added, Mixed Paper & OCC**
- **The first single stream programs emerge**
- **Toward the middle to later 1990s, truck side sort and three bin trucks start to fade because of high collection costs**
- **By the end of the 1990s dual stream collection still leads with single stream gaining**

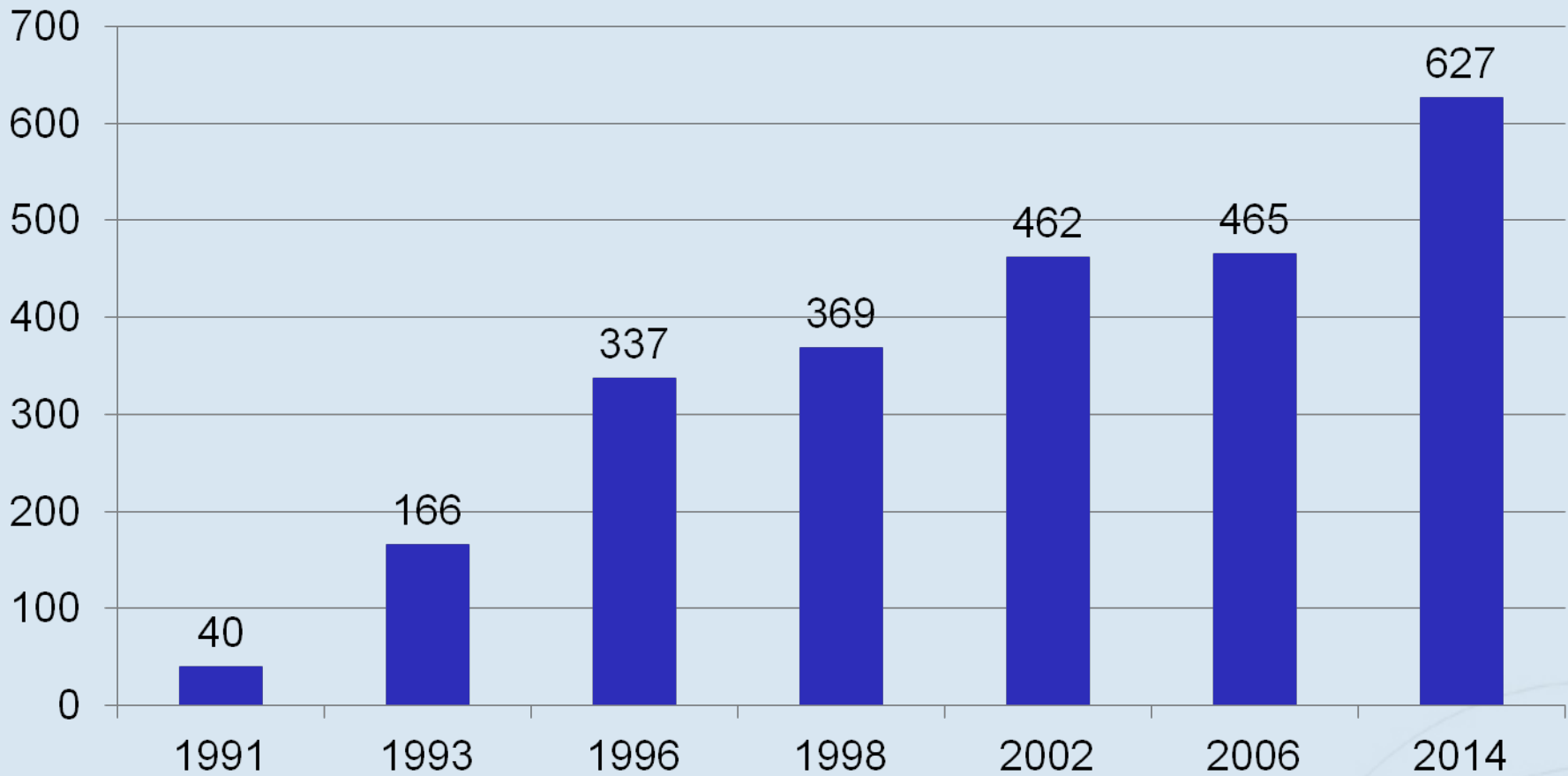


Recycling in the 2000s

- **Residential**
 - Single stream collection gains market share
 - Dual stream programs decline
 - Mixed Waste Processing starting to emerge
 - Organics at the curb
 - Many new materials added, poly-coated packaging and others
- **Commercial/Institutional/Industrial**
 - Has remained fairly similar over the last thirty years, with efficiency improvements
 - Single stream commercial emerges and gains momentum
- **Recyclable commodity quality continues to deteriorate as collection systems change and recovery rates go higher**



Number of Operating MRFs and Mixed Waste Facilities in the United States



Source: Governmental Advisory Associates, Inc. Database of Materials Processing Facilities in the United States. Westport CT., 2015.



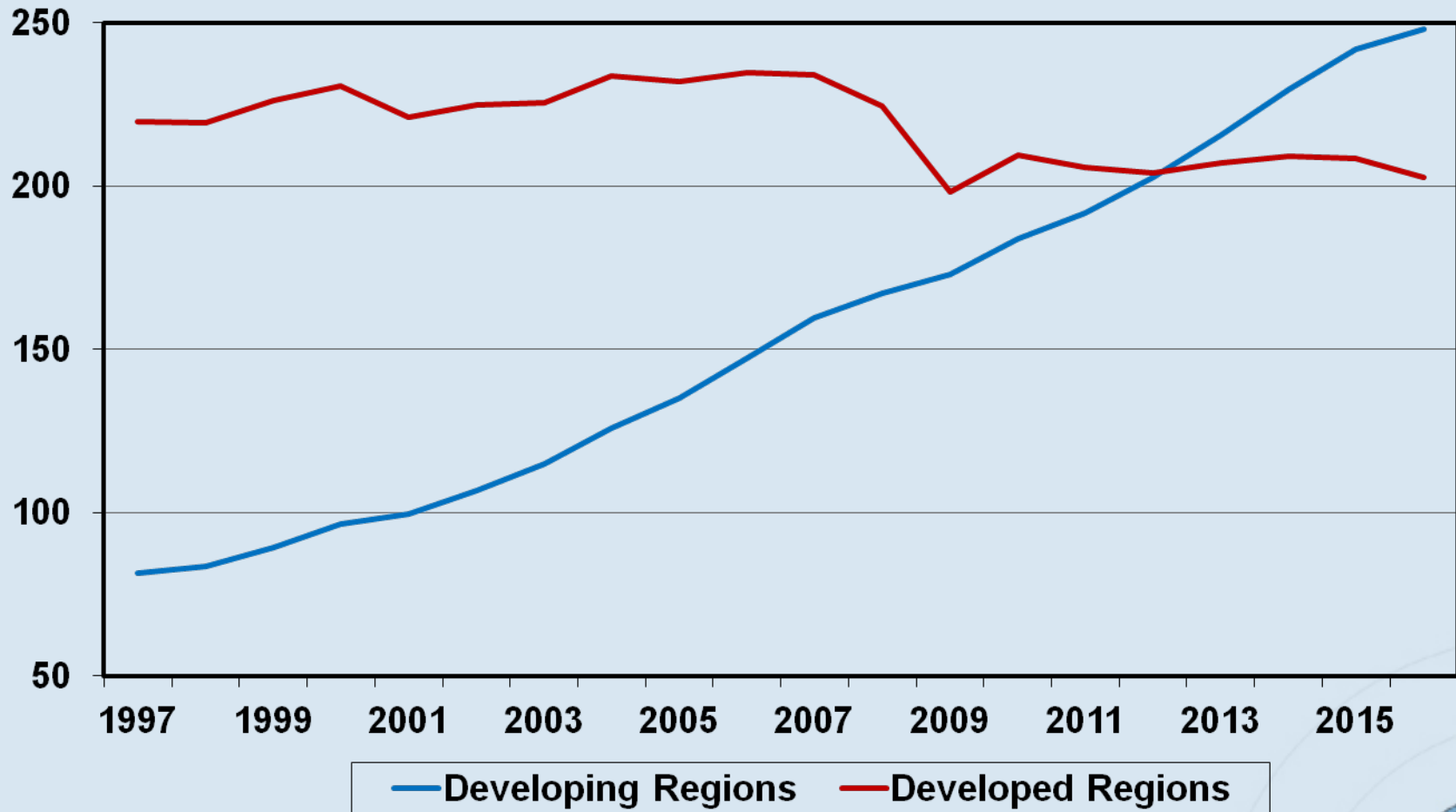
The Current Decade

- **Greening and sustainability movement takes hold in both the general public and businesses/government follow suit – spurs recycling even further**
- **Sustainability becomes an important factor in source reduction, material/packaging choices – changes the attitude of the “generators” of MSW**
- **Extended Producer Responsibility increasing?**
- **Partly because of recycling, the amount of MSW disposed of begins to decline. Disposal costs moderate, disposal capacity not an issue**
- **Recycling becomes mainstream**
- **Quality of recyclables bottoms out**
- **Interest in Mixed Waste Processing increases – see next slide**



Global Paper and Board Production

(Million Tonnes)



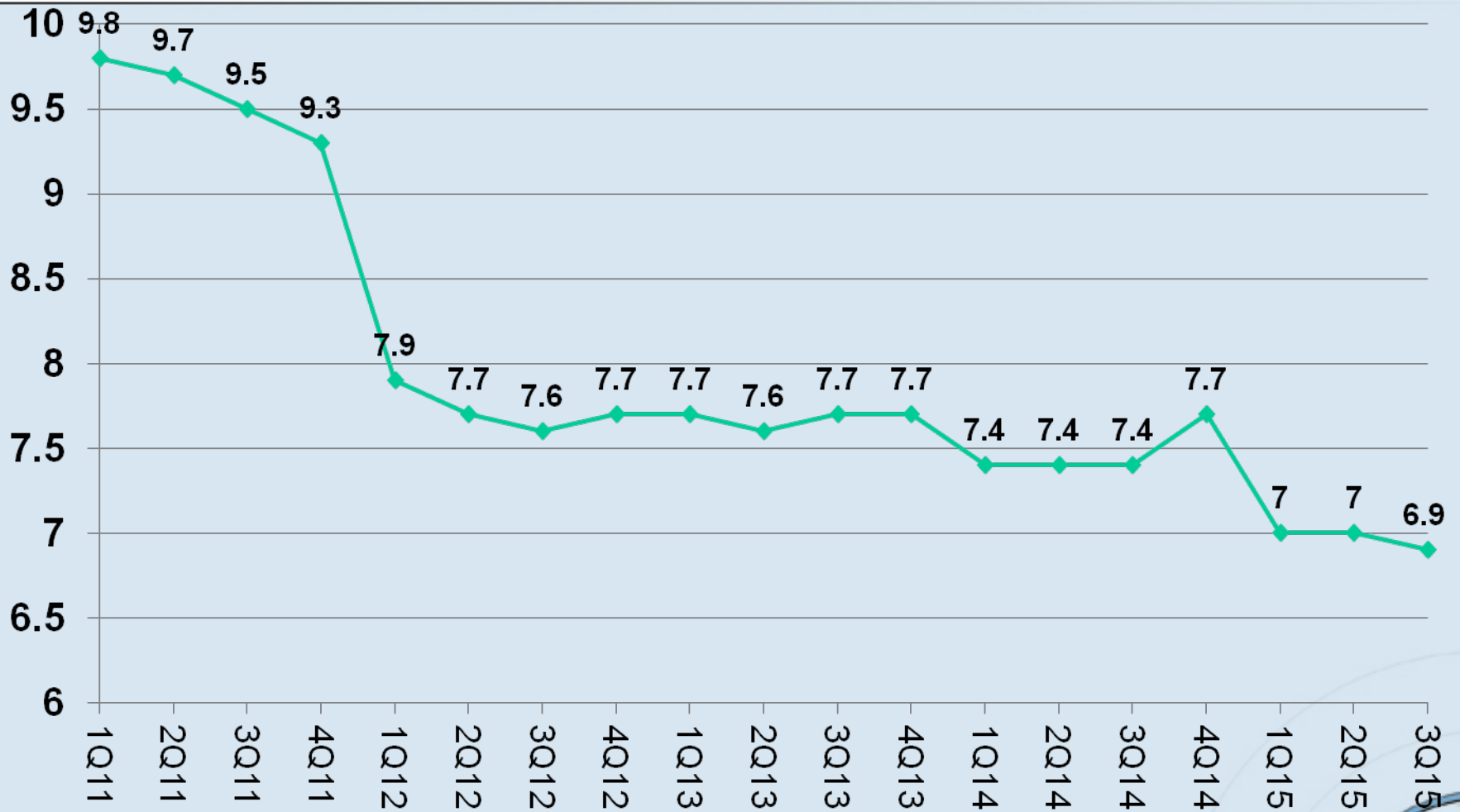
Chinese Production by Major Paper Grade

Million Tonnes

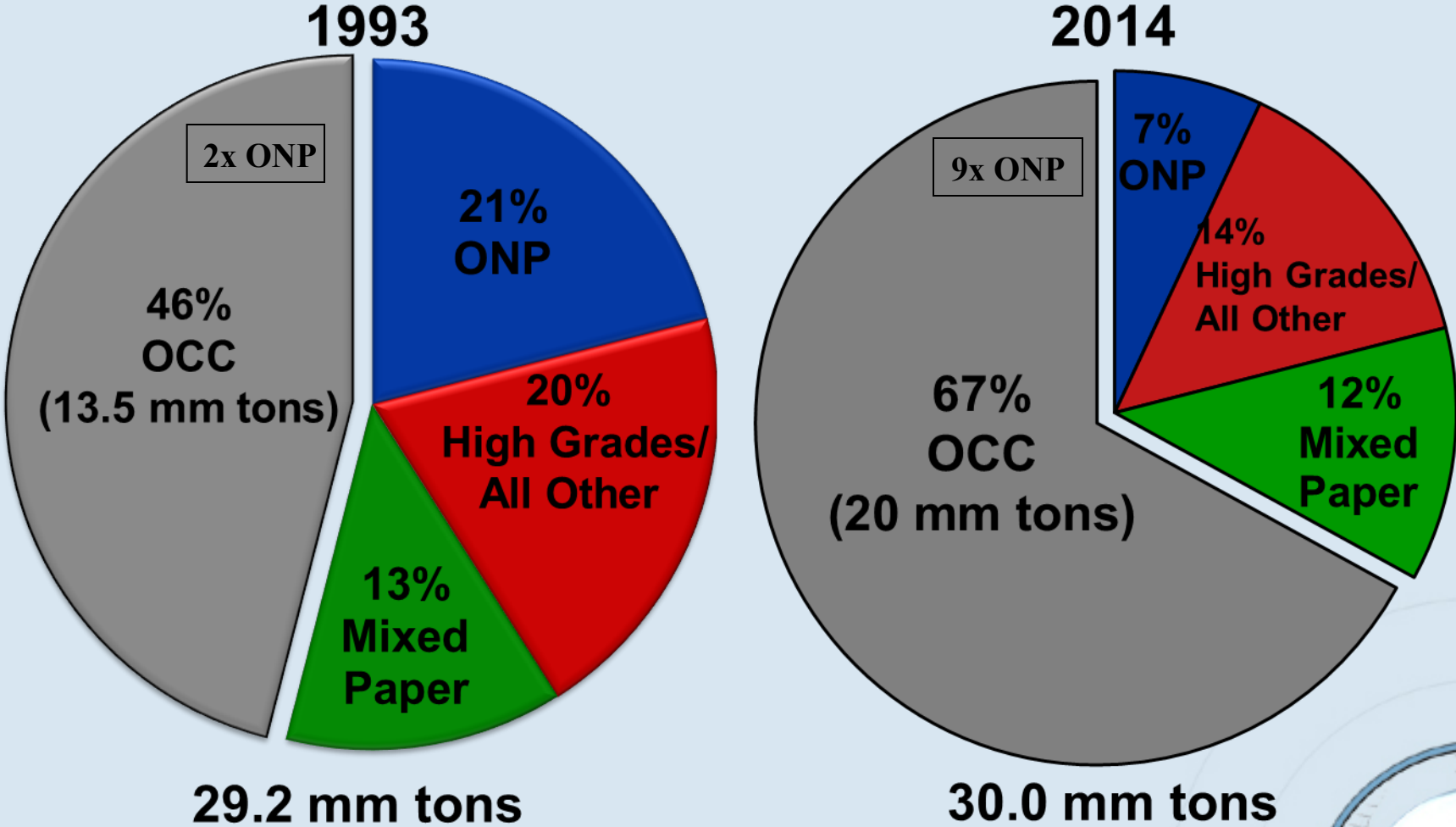
Grade	2002	2010	2016
Newsprint	1.85	4.30	3.97
Mechanical P&W	0.15	2.05	3.53
Woodfree P&W	10.85	20.52	27.18
Containerboard	10.85	37.50	57.20
Tissue Paper	2.73	5.25	8.54
Other P&B	11.41	23.49	30.80
Total P&B	37.83	93.10	131.22



China's GDP Growth in 2011-2015



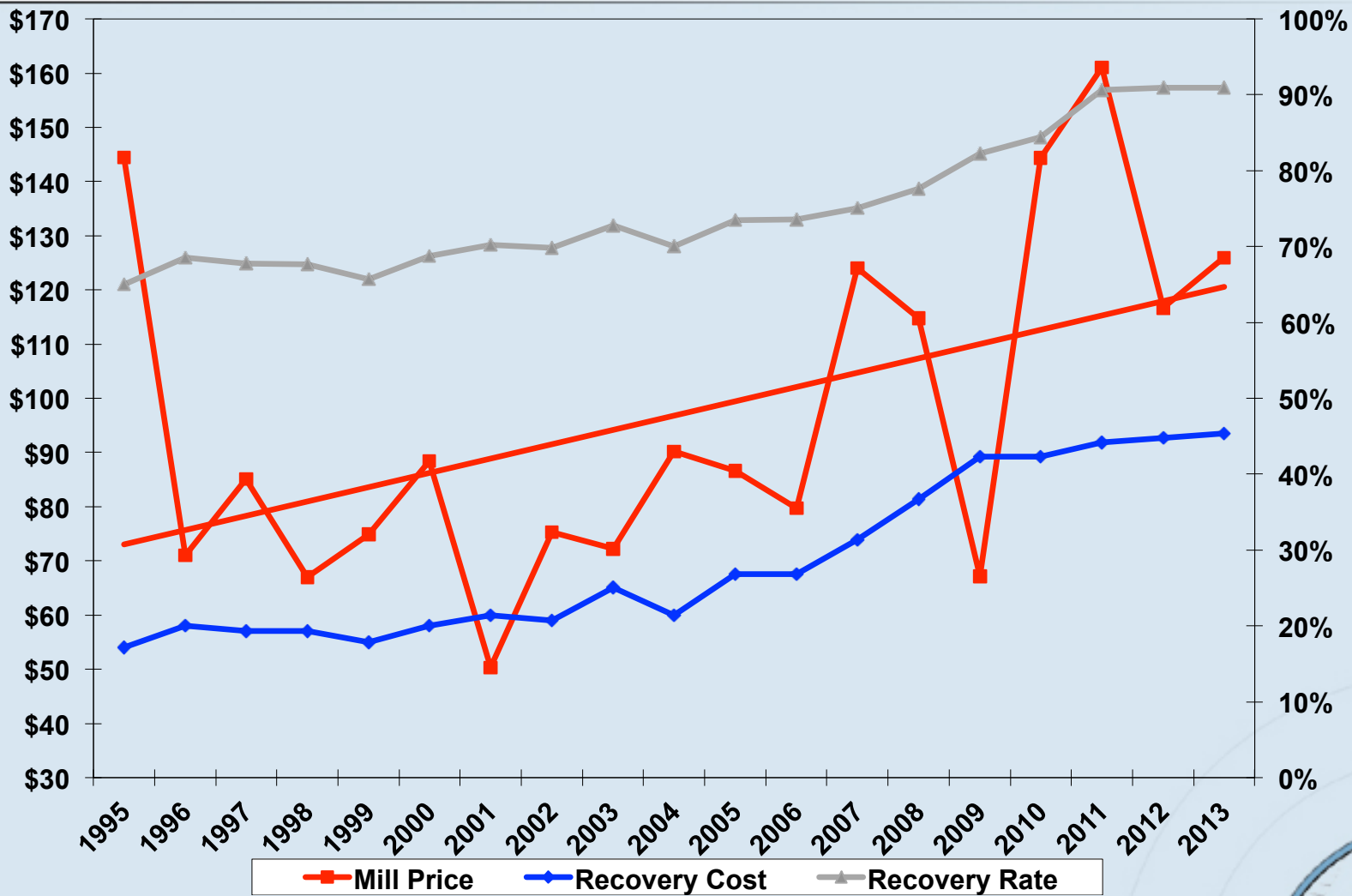
The Change in North American RCP Consumption Over Time



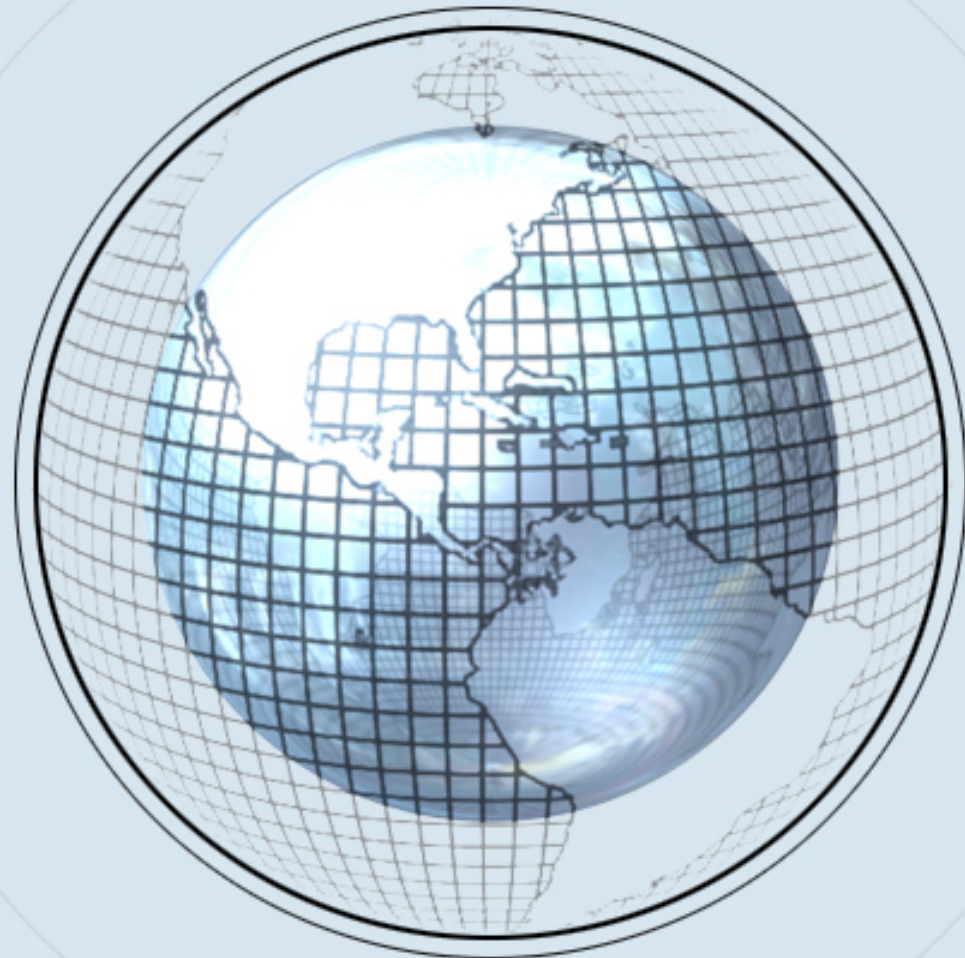
Source: Numera Analytics



OCC Recovery Cost vs Price vs % Recovered



Future Trends



Overall and the “Drivers”

- **US MSW recovery rates are expected to grow only slowly: no return to the fast gains of the mid 1980' s through early 2000' s**
- **Legislative initiatives will only occur at the state level and be limited, focused on special materials/situations**
- **Disposal costs, much like recovery rates are expected to increase only modestly**
- **Global end use markets for recyclables will expand slowly and adjust to accommodate to the available supply**



Disposal

- **Waste to Energy growth will be limited as it has been for almost twenty years now**
- **Pay As You Throw/volume based disposal approaches will grow slowly**
- **We will continue to rely on landfills as the primary means of disposal after recovery of recyclable materials**
- **Mixed Waste Processing and conversion of major parts of MSW to fuel substances or other useful materials after removal of some recyclables may play a role.**



Processing Facilities

- **They will continue to increase in size, feature more sophisticated equipment, and continue the positive trend of operating more like manufacturing facilities**
- **Single stream facilities are here to stay**
- **Increased emphasis on incoming material quality and decreasing MRF residue (the current level at many programs is unacceptable)**
- **The jury is out on Mixed Waste Processing Facilities: if they can't produce usable recycled commodities, they won't happen**




Producing Paper & Board Using Recycled Fibers

- **For the last several decades, recycled fiber has had a distinct cost advantage over virgin fibers for the production of newsprint, away from home tissue products, containerboard, and recycle paperboard. But not for printing/writing grades and high end packaging.**
- **Increasing recovered paper costs over the next ten years may change the cost advantage dynamic:**
 - **Higher commodity cycle costs**
 - **Lower quality, shorter fibers and non-fiber contaminants - lower yields, higher processing costs**



Quality

- **By 2010, recyclables quality had fallen to the lowest acceptable level – inevitable outcome of higher recovery rates**
 - **The inverse relationship of quality and price of recyclable commodities**
 - **Domestic manufacturers have had trouble using the lowest quality material for quite some time – new overseas capacity provided demand (especially China)**
 - **China's Green Fence – set the “new” bottom: largest impact – mixed plastics and Mixed Paper**
 - **Quality initiatives by a number of organizations – Recycling Partnership, NW&RA, AF&PA, Waste Mgt, etc.**
 - **Generator education and incoming quality to the processing facility**
- 

End Markets

- **Global**
 - Demand for recyclable raw materials will grow to meet slowing growth in supply. Emerging/developing countries will increase their recovery
 - **US**
 - Manufacturing industry doing OK, slow but steady increase in the use of recyclables: but varies by material
 - **India and Southeast Asia**
 - On a percentage basis, strong growth in recyclable demand
 - But starting from a low base and will the country be able to sustain growth as China has?
 - **China**
 - Overcapacity/low operating rates in recyclables end user capacity
 - Will domestic packaging demand increase to absorb capacity?
History tells us it will!
- 

Latest Breaking Trends

- **US domestic mills**

- Highest use of recovered paper in 2015 (almost 31 million tons) since 2010. Up 0.9% from 2014
- Overall US paper & board production declined 1% in 2015 vs 2014 to 79 million tons, about where it was at the end of 2009 recession
- Graphic papers (newsprint & printing/writing) production: about 30 million tons in 2015 compared to almost 34 million tons in 2009
- New containerboard mill startups from converted graphic paper machines

- **Export**

- As of end of Nov. 2015, US RCP exports were up 2.9% over the same period in 2014



Late Breaking Items (continued)

- **China**
 - Recovered paper buy in the first few weeks after Lunar New Year is up – restocking
 - The currency and stock market turmoil continues, but some depreciation movement of the yuan
- **Transportation**
 - Ocean shipping costs are down, overcapacity in mega ships, weak global demand
 - Trucking costs remain stubbornly high, even with lower diesels costs: driving rules and lack of qualified drivers
- **Quality**
 - PSI Specs Summit approved changes to Mixed Paper and ONP, but rejected an OCC grade B proposal – “off shore” corrugated content



Thank You for Your Attention

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