Recycling at the MRF

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Waste Management Recycling Service

January 2011

Agenda

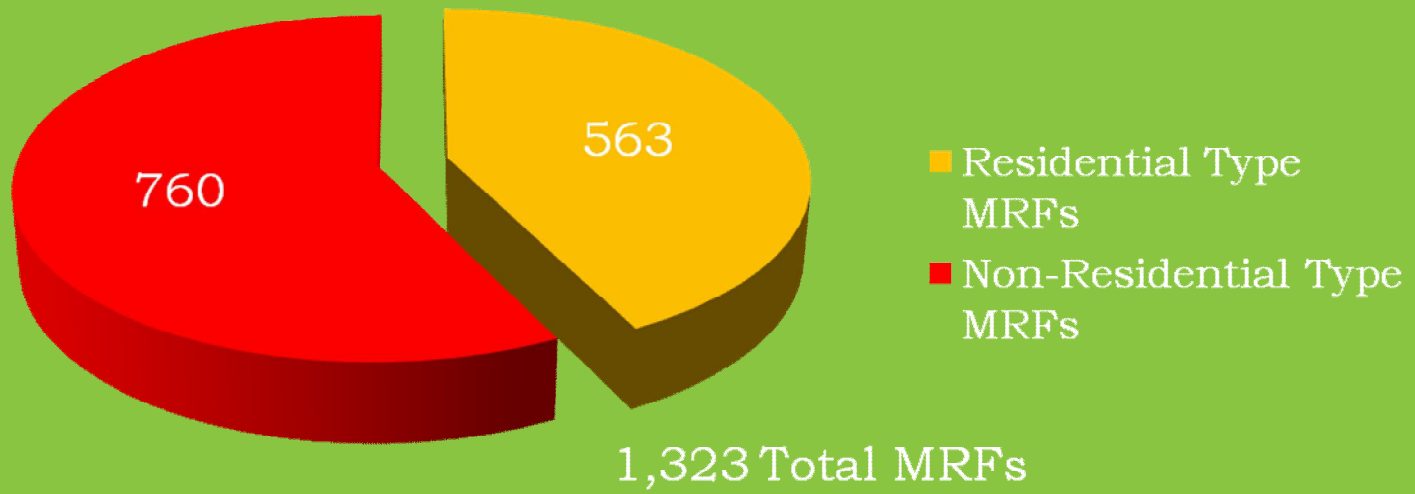
- Current State of MRFs
  - How Many?
    - Who Owns Them?
    - Service Areas Covered?
  - What is being Collected / Separated?
    - Plastics – Bottles Only vs All
    - Glass – Included or not
    - Newspaper only vs All paper, etc.
    - Current Technology Spread (Hand, automated, Optical)
- What is on the Technology Horizon?
    - Currently available, but not widely used and why?
    - How improve use of technology
- Summary
    - Opportunities currently missing
    - Barriers to recycling more packaging
    - Additional issues

Acknowledgements

"Berenyi, Eileen Brettler. Materials Recycling And Processing In The United States: 2007-2008
Yearbook And Directory (Westport, CT: Governmental Advisory Associates, Inc.) ©2007.

How Many MRFs are There and Who Owns Them?

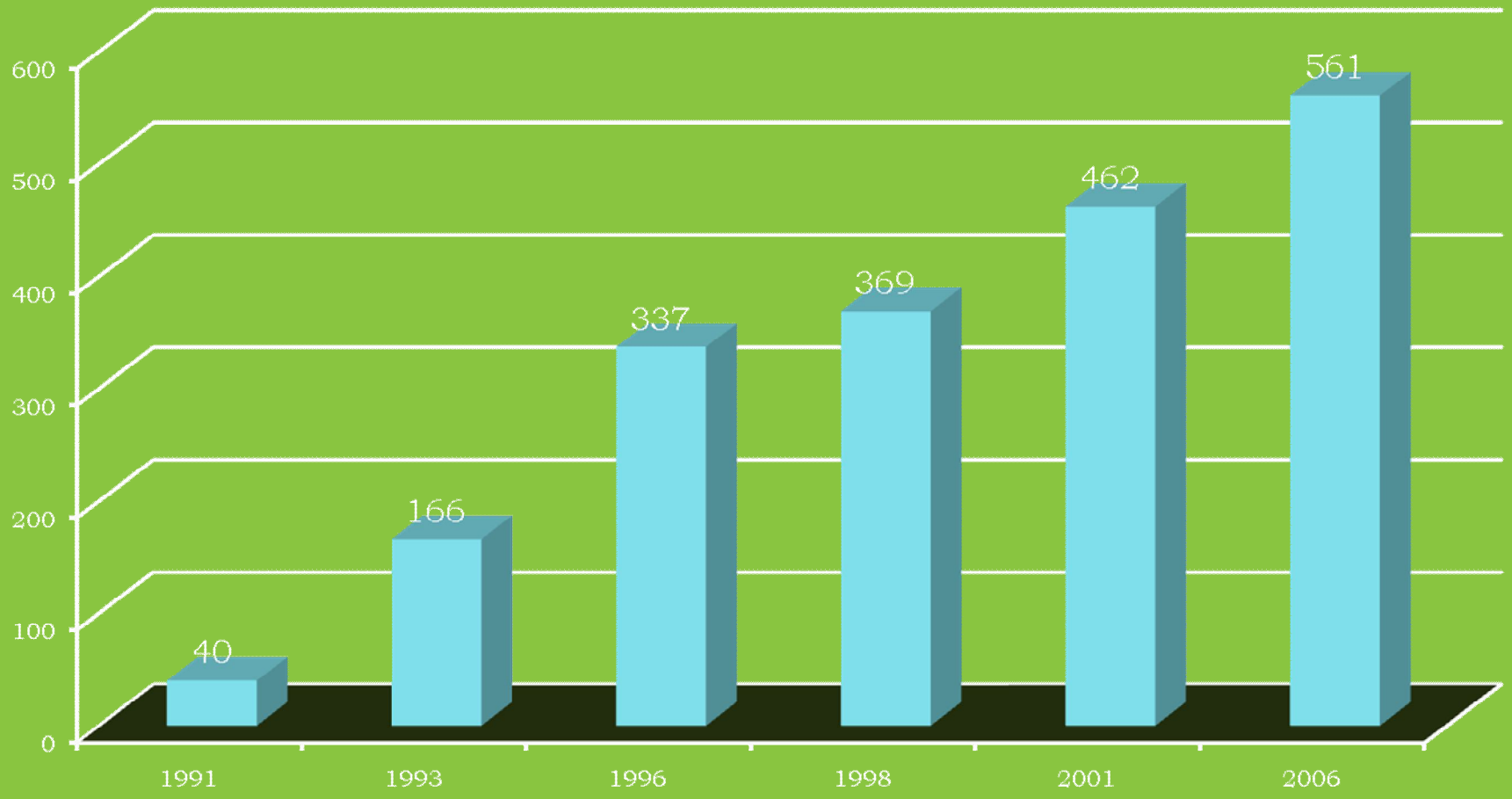
Total MRF's



1,323 Total MRFs

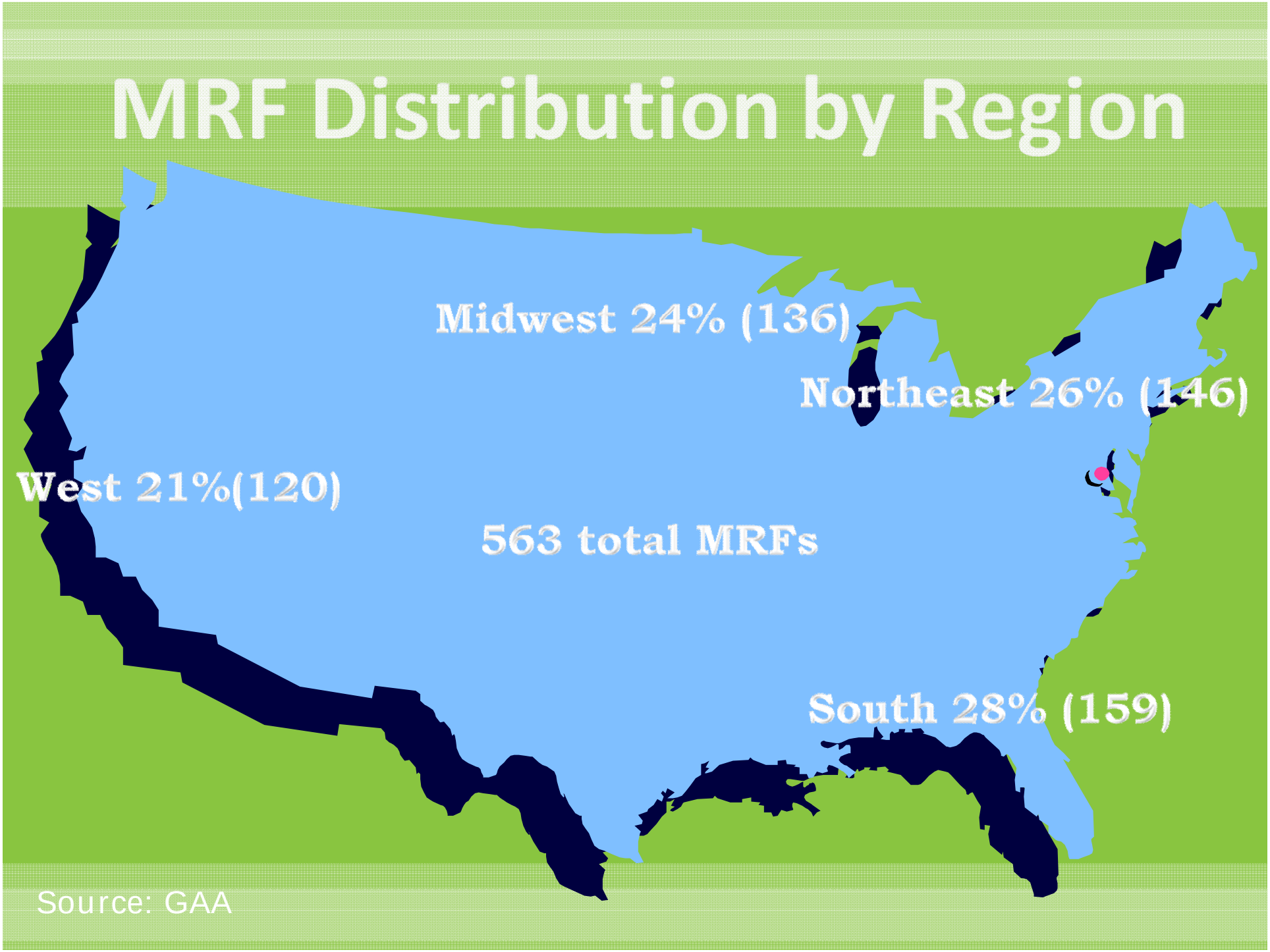
Sources: Governmental Advisory Associates and Waste Business Journal

Growth in Plants 1991 - 2006



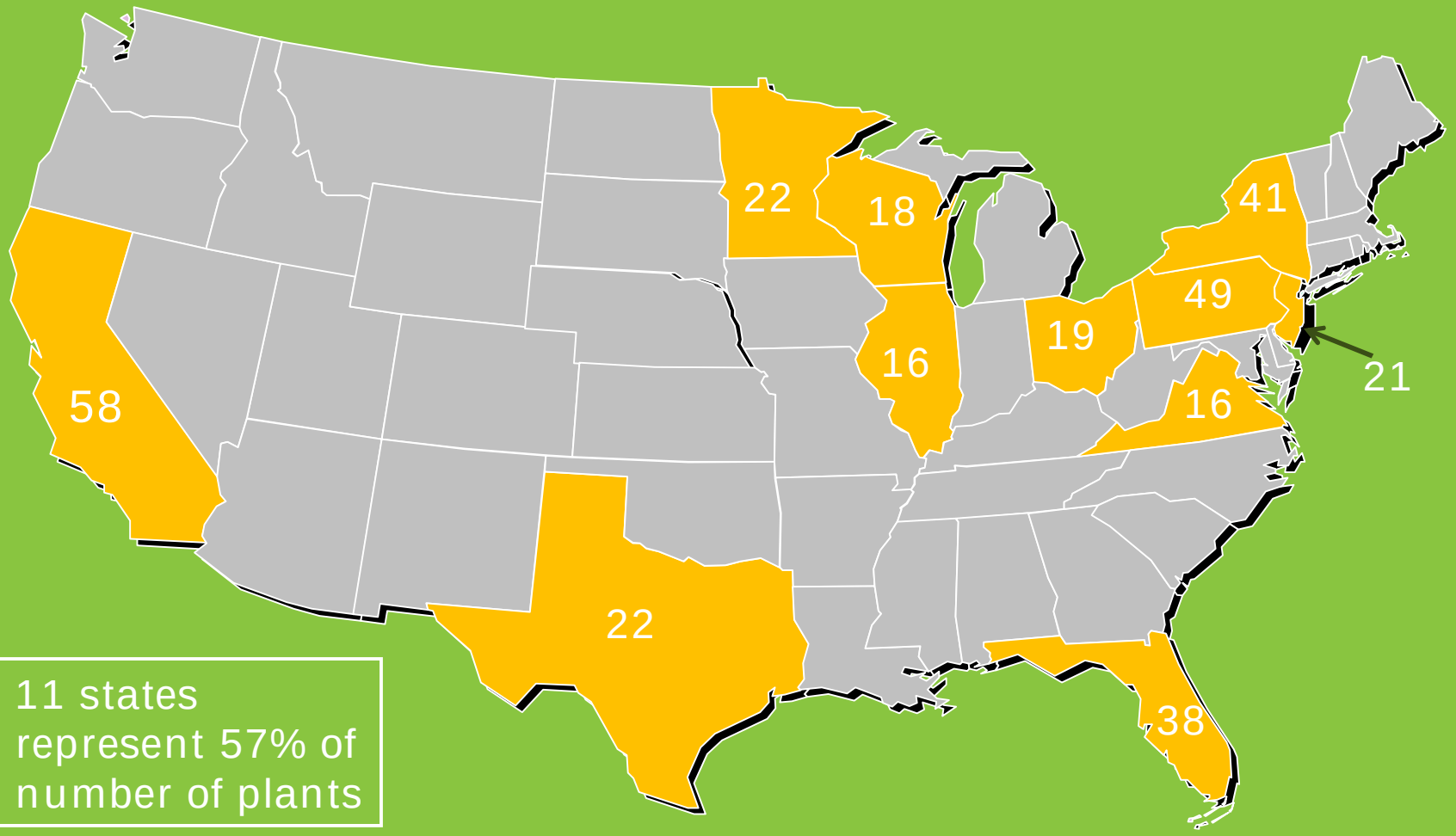
Source: GAA

MRF Distribution by Region



Source: GAA

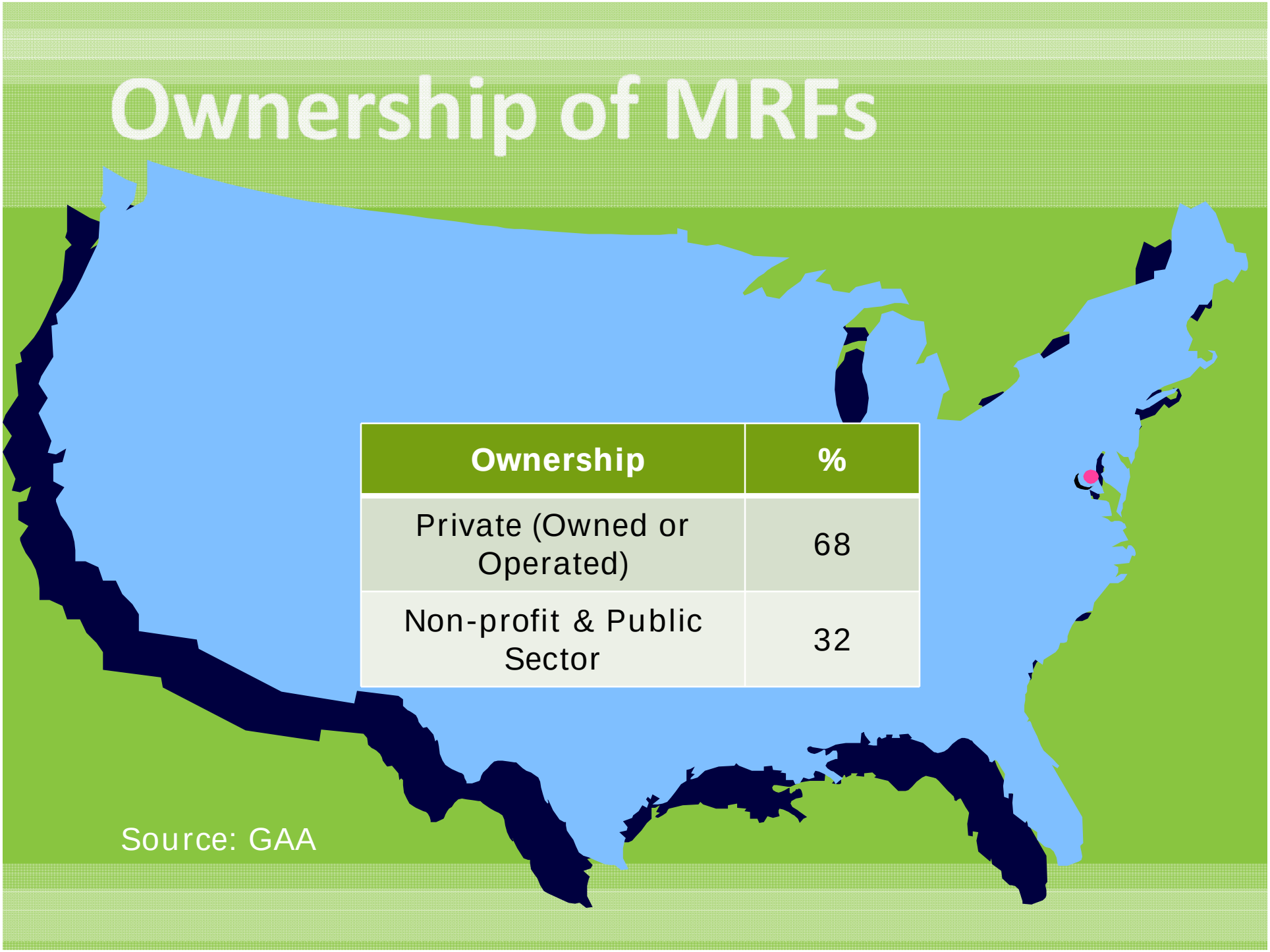
States with the most plants



11 states represent 57% of number of plants

Source: GAA

Ownership of MRFs

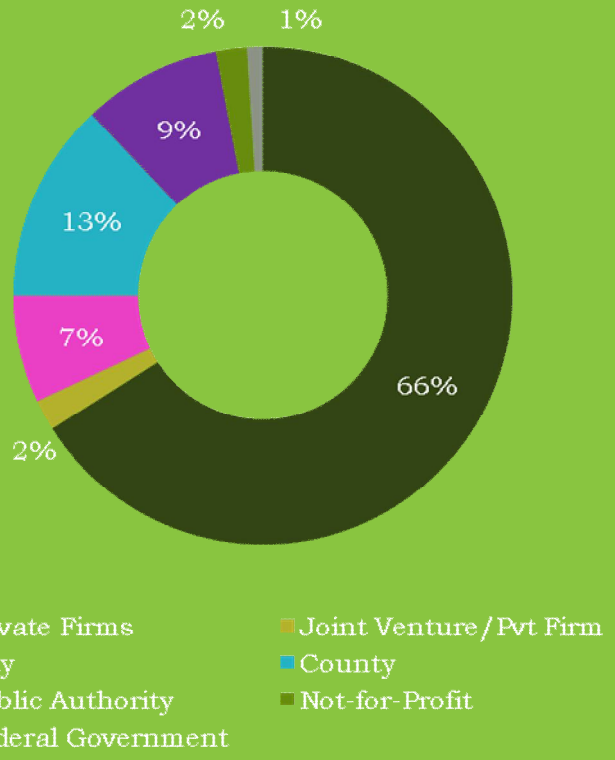


Ownership	%
Private (Owned or Operated)	68
Non-profit & Public Sector	32

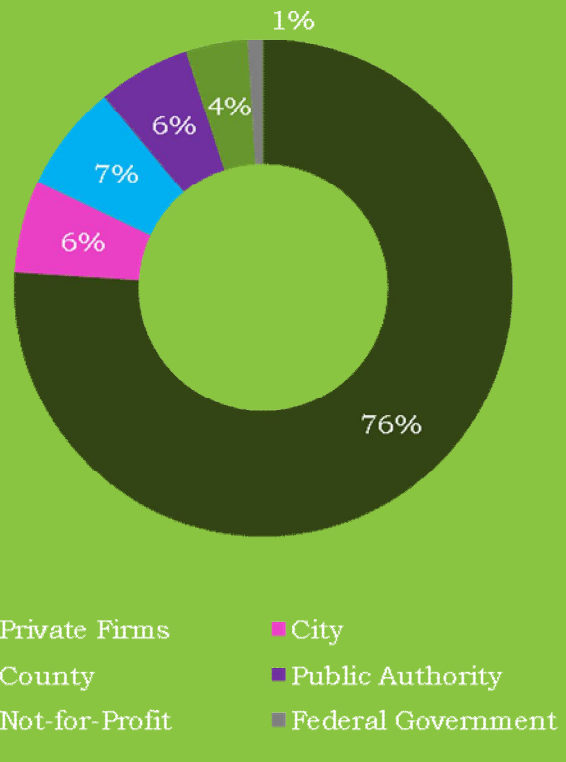
Source: GAA

MRF Owners and Operators

Owners



Operators



Source: GAA

MS by Operator - Tons/Day

	Operator	TPD	Percent
1	Waste Management	19,023	23.0%
2	Republic	7,774	9.4%
3	Casella	3,935	4.8%
4	Smurfit-Stone	3,404	4.1%
5	SP Recycling	2,706	3.3%
6	Resource Management	2,650	3.2%
7	International Paper	1,825	2.2%
8	Greenstar	1,580	1.8%
9	City Carton	1,250	1.5%
10	Far West Fibers	1,075	1.1%
	Total Top Ten	45,222	54.4%
	Other Private Sector	34,358	41.6%
	Public Sector	4,688	5.6%

Source: GAA, WM, Waste Business Journal

Market Share by MRF Operator

	Operator	Plants	Percent
1	Waste Management	95	16.8%
2	Republic	40	7.1%
3	Casella	24	4.3%
4	SP Recycling	14	2.5%
5	Greenstar (2010)	13	2.2%
6	Smurfit-Stone	12	2.1%
7	International Paper	8	1.4%
8	Western Recycling	7	1.2%
9	Hudson Baylor	6	1.1%
10	Rumpke	6	1.1%
	Total Top Ten	225	39.8%
	Other Private Sector	235	41.6%
	Public Sector	112	19.8%

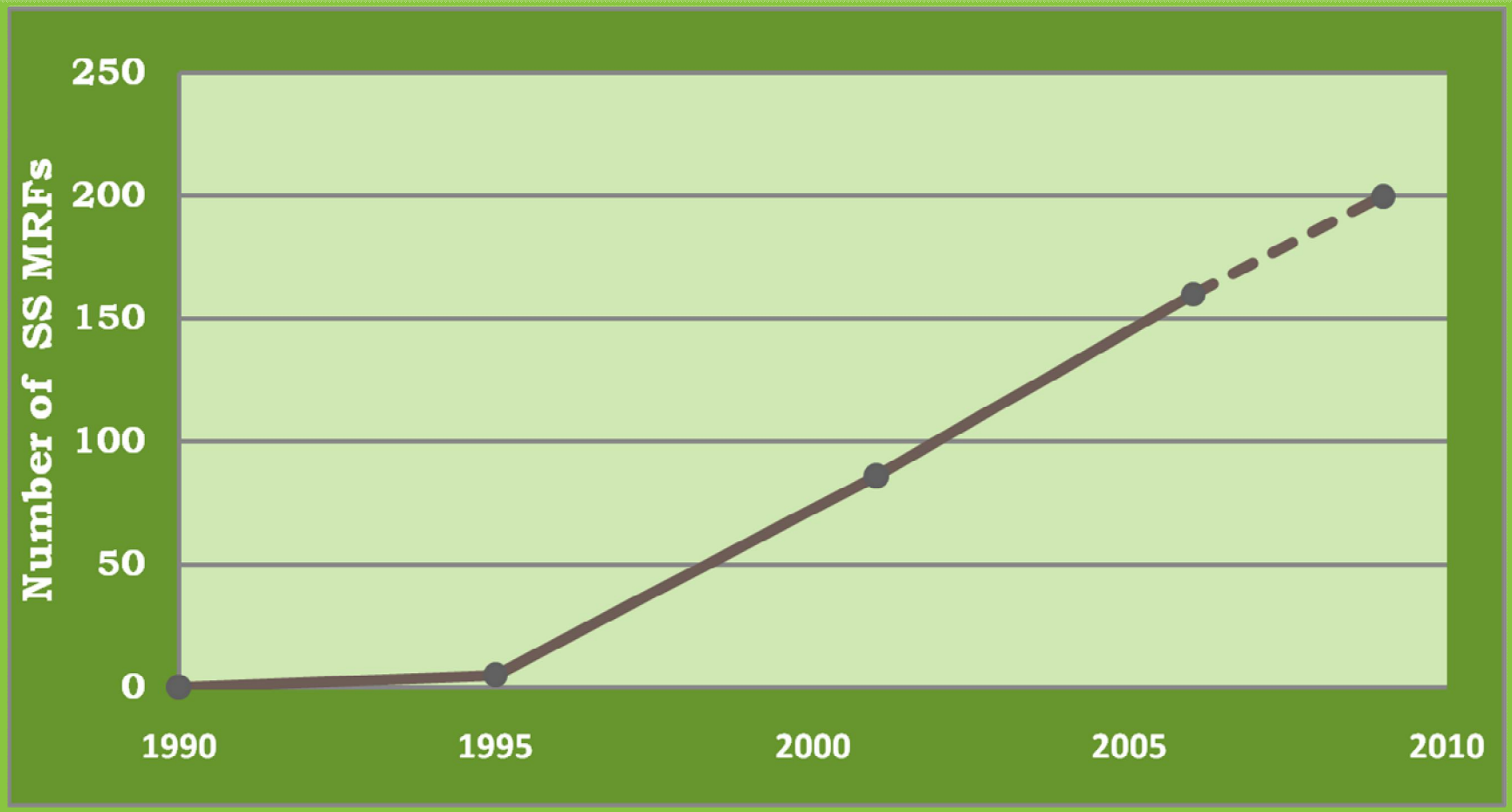
Source: GAA, WM, Waste Business Journal

Highlight of Study

	TPM	Cost/Ton
PUBLIC	2,731	$ 83.56
PRIVATE	4,777	$ 44.56
WM RECYCLE AMERICA	7,819	$ 43.17

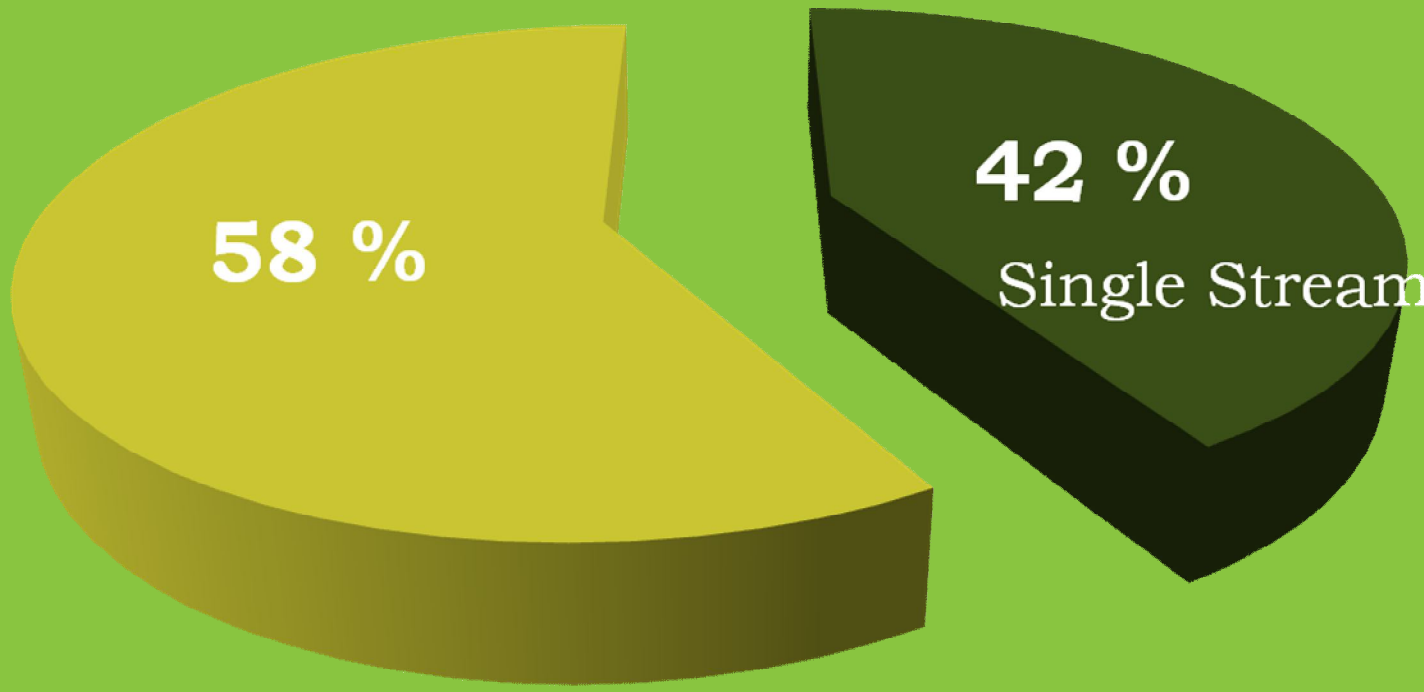
Source: Moore & Associates

Increase in number of SS MRFs since 1990



Source: GAA and Columbia University

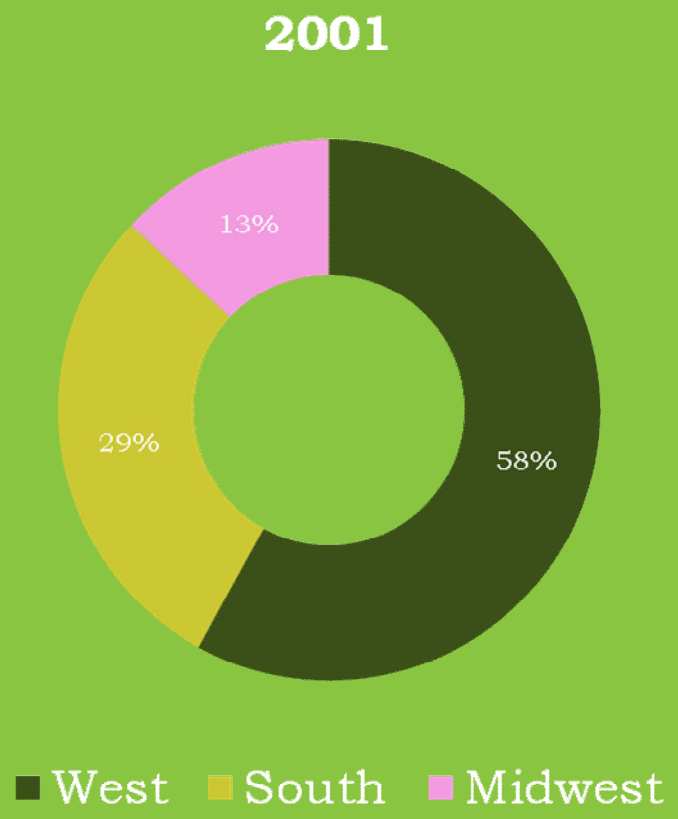
SS versus other MRFs

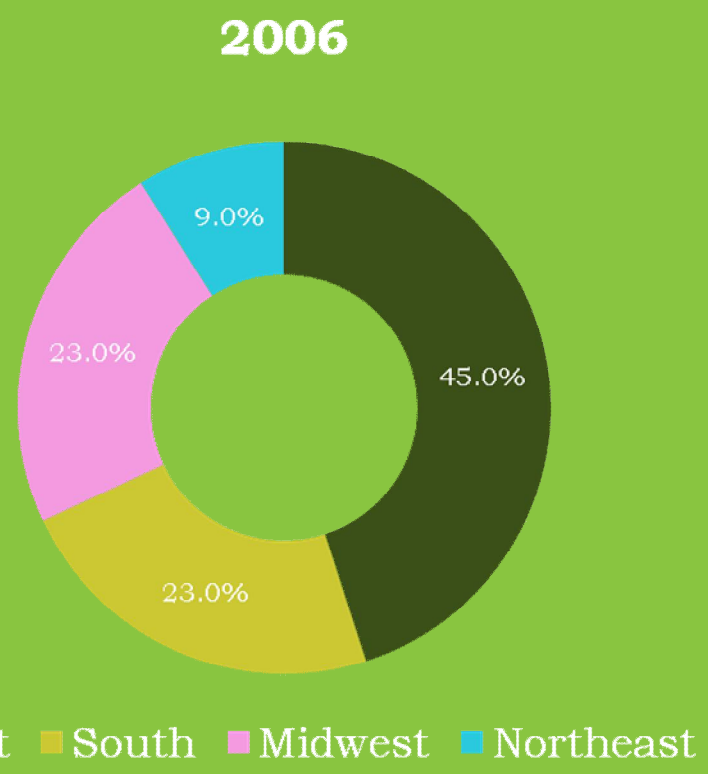


22.1 Million Tons of Total MRF Capacity

Source: GAA & Columbia University

Single Stream by Region



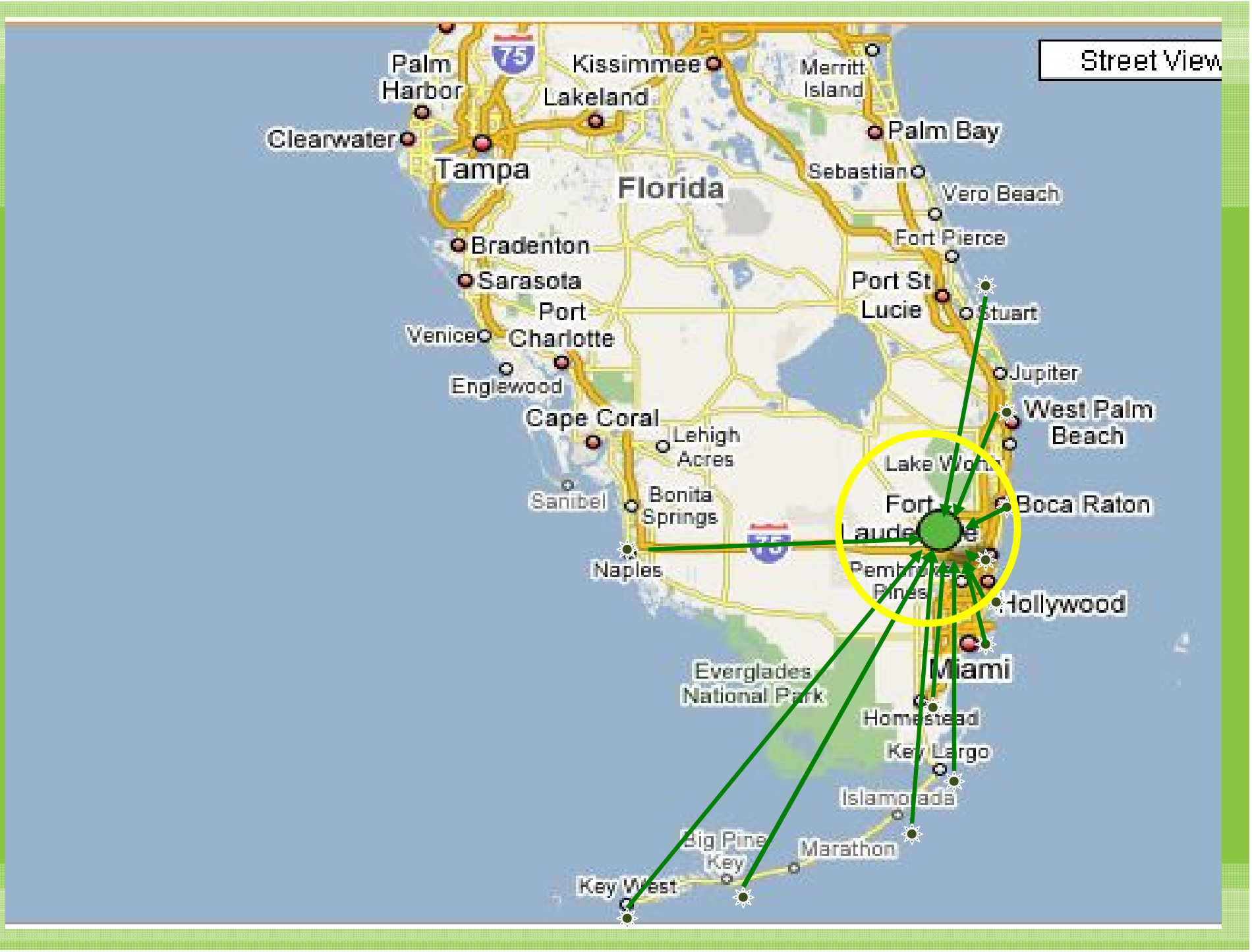


Source: GAA

Equipment Capital costs of SS and DS MRFs

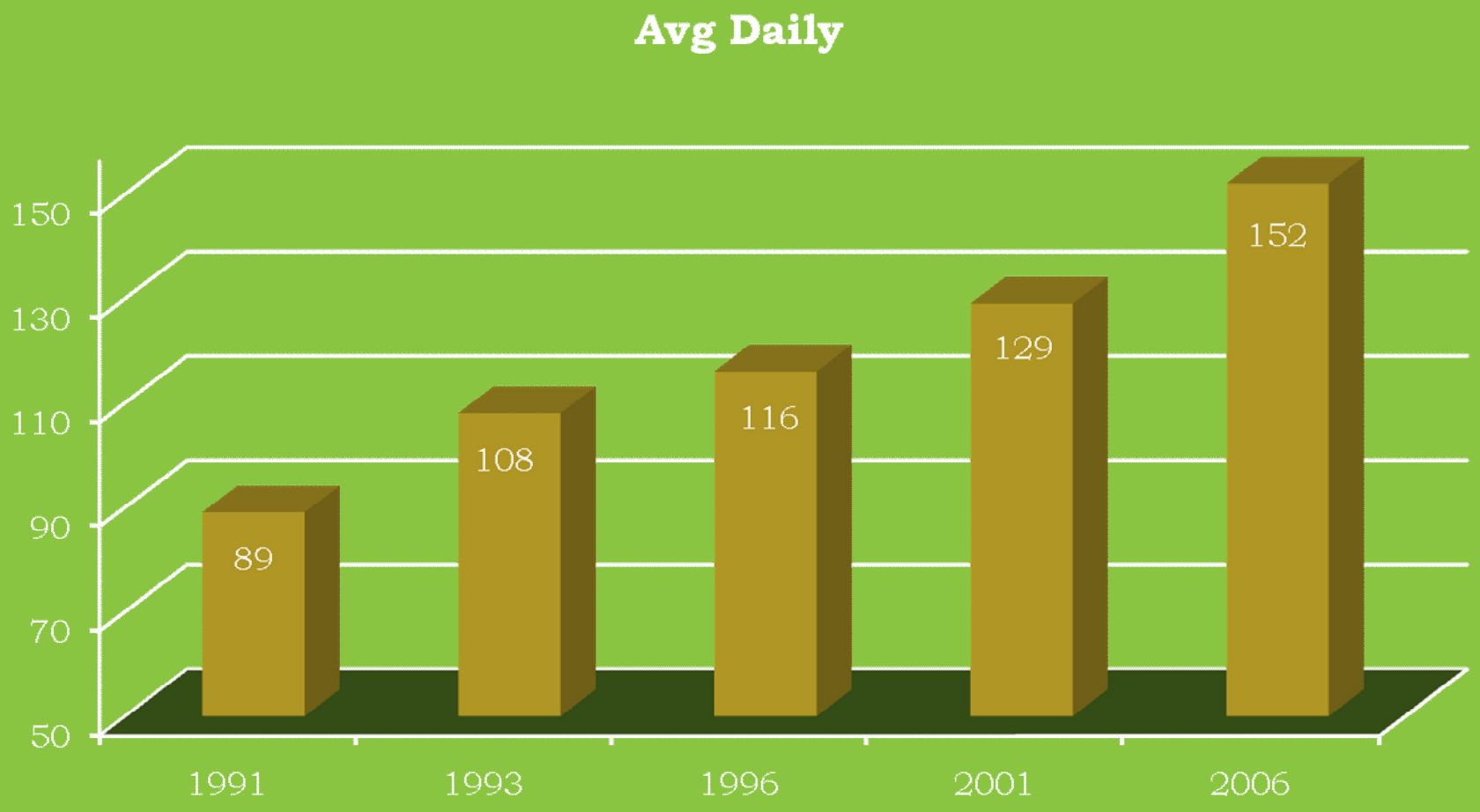
MRF	Average MRF Capacity (tons/day)	Average Equipment Capital Cost	Capitol
DS MRFs	152	$4,907,000	$105,690
SS MRFs	206	$7,551,000	$66,630

Source: GAA & Columbia University



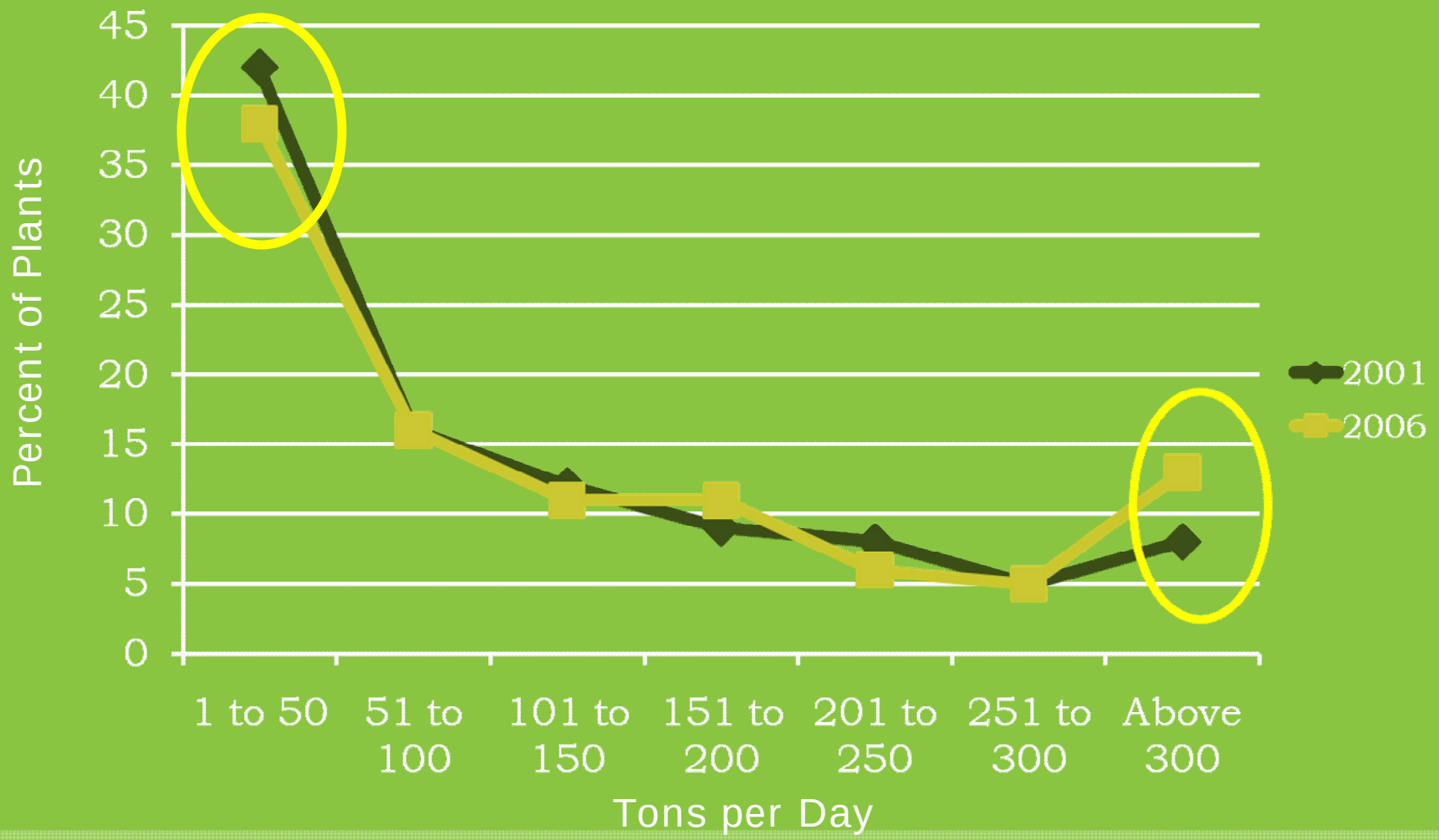
What is Being Collected/Separated

Tons Processed per Day

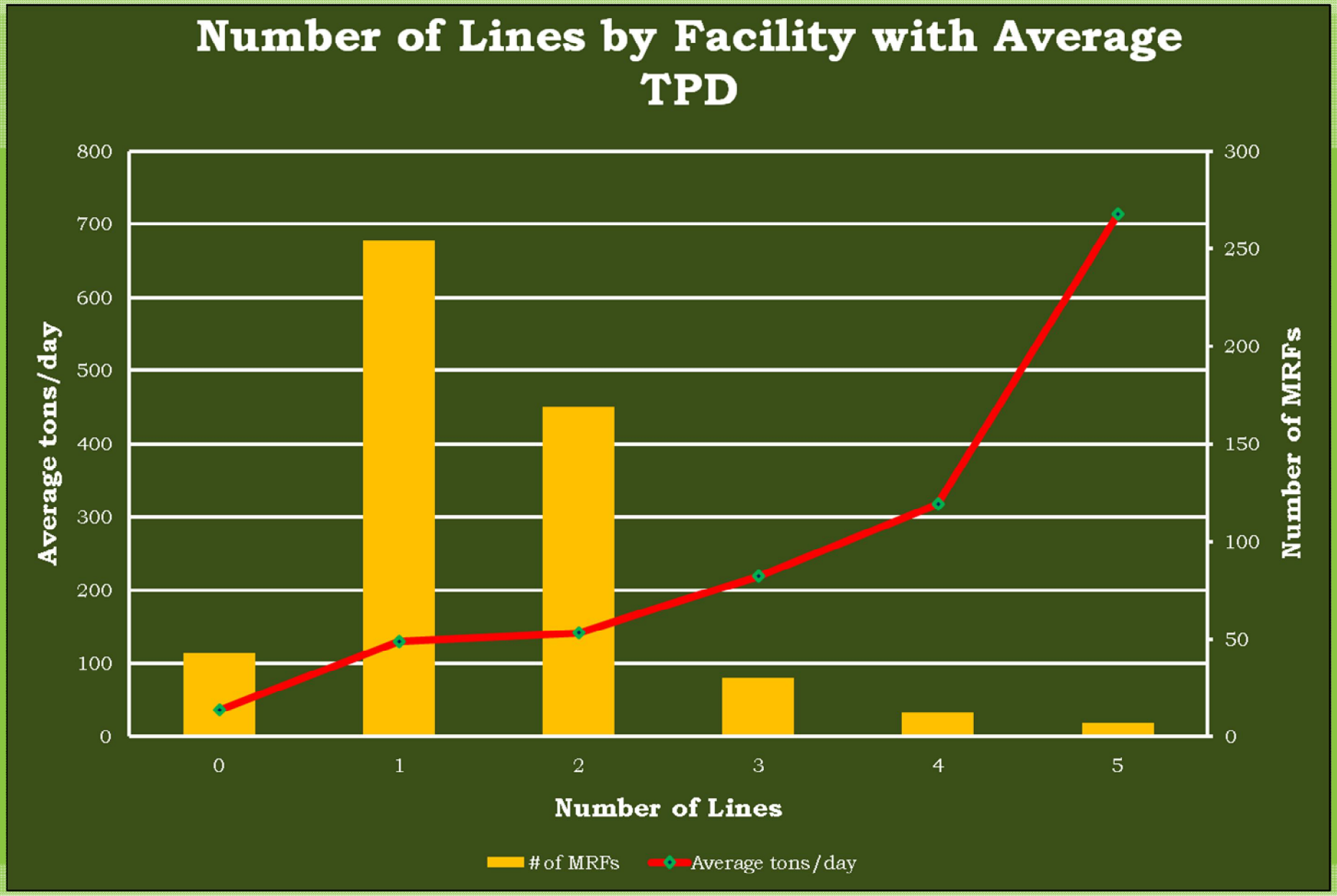


Source: GAA

Tons per Day 2001 and 2006

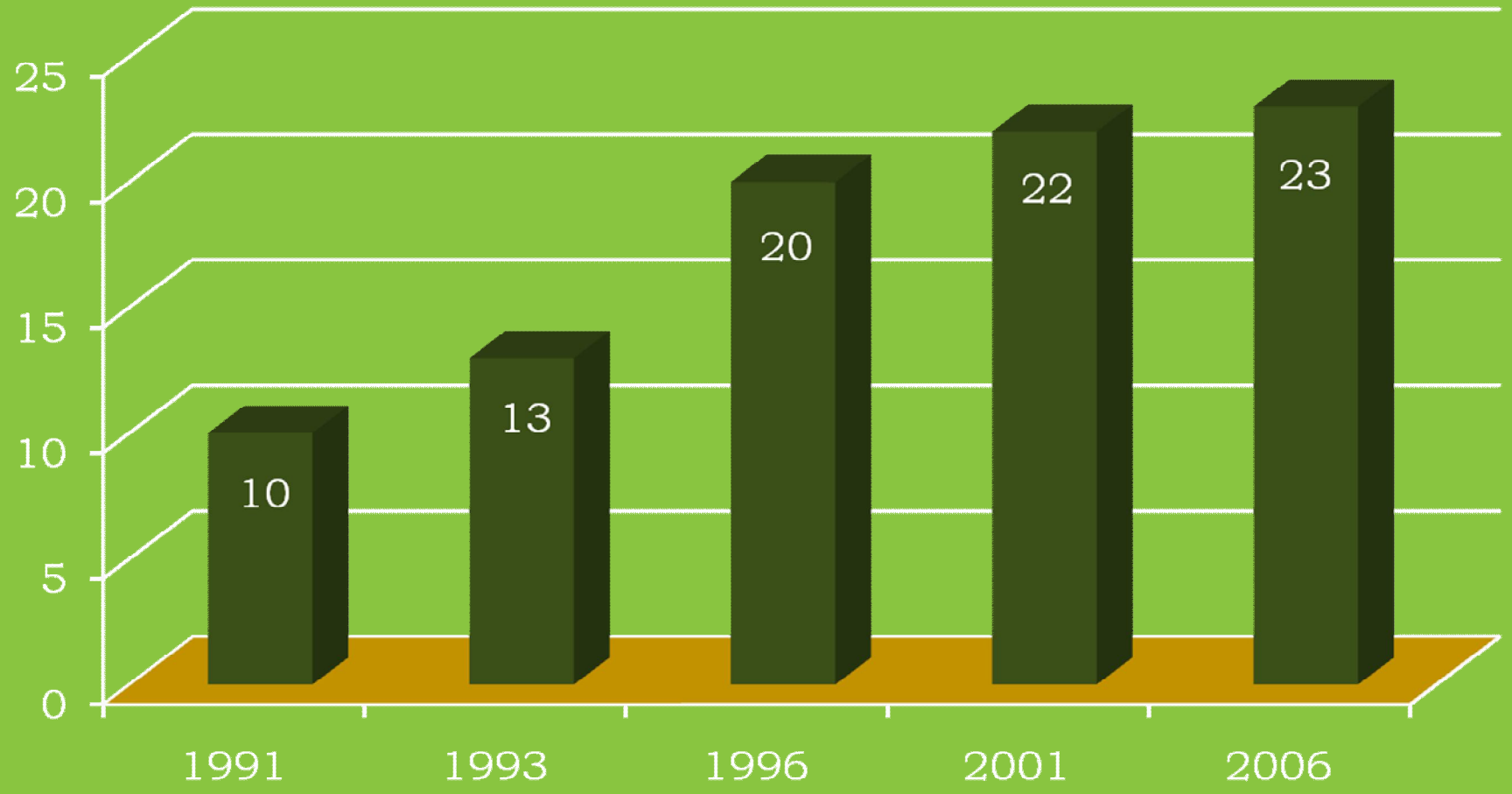


Source: GAA



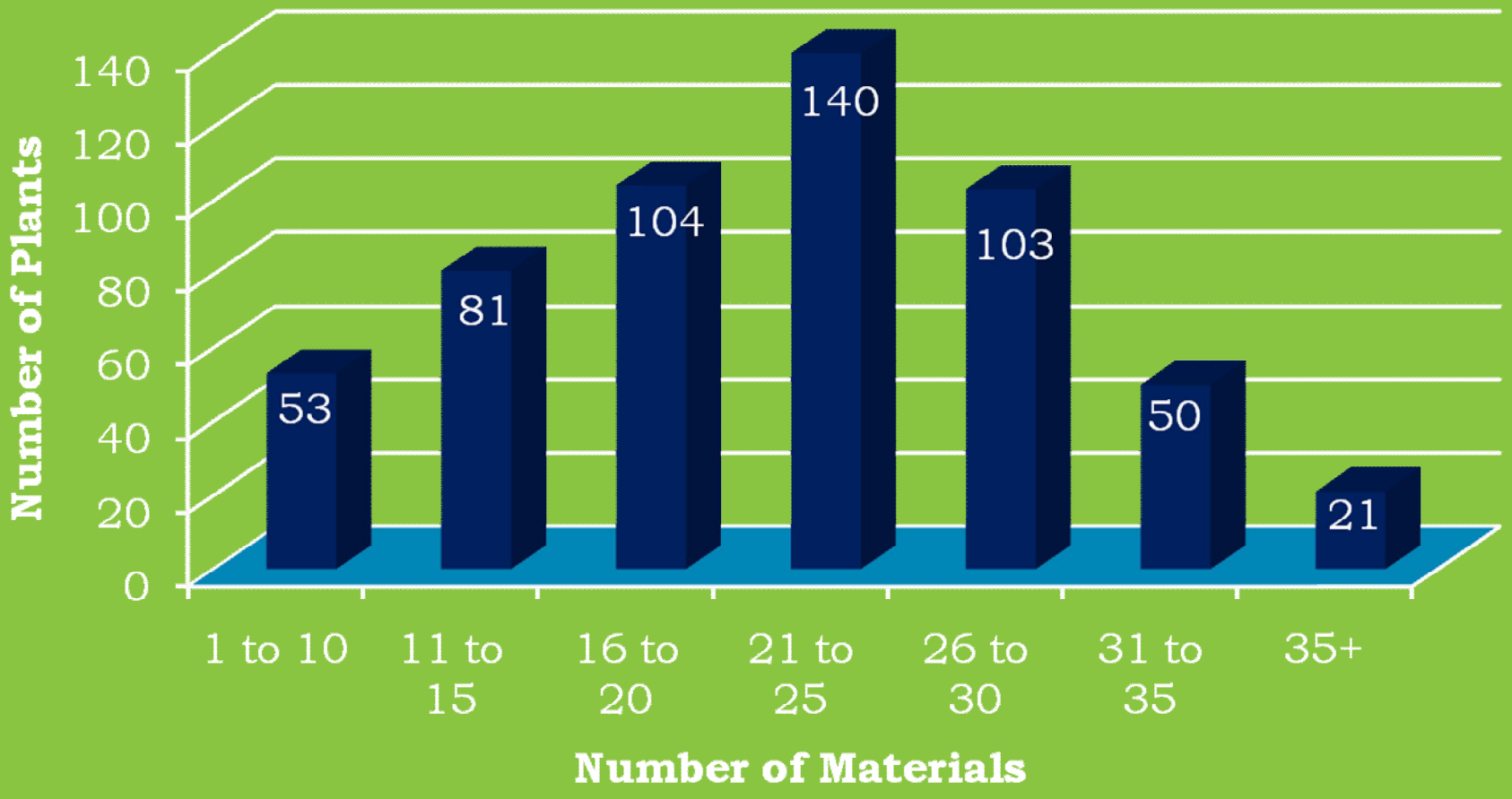
Source: GAA

Average Number of Materials Processed



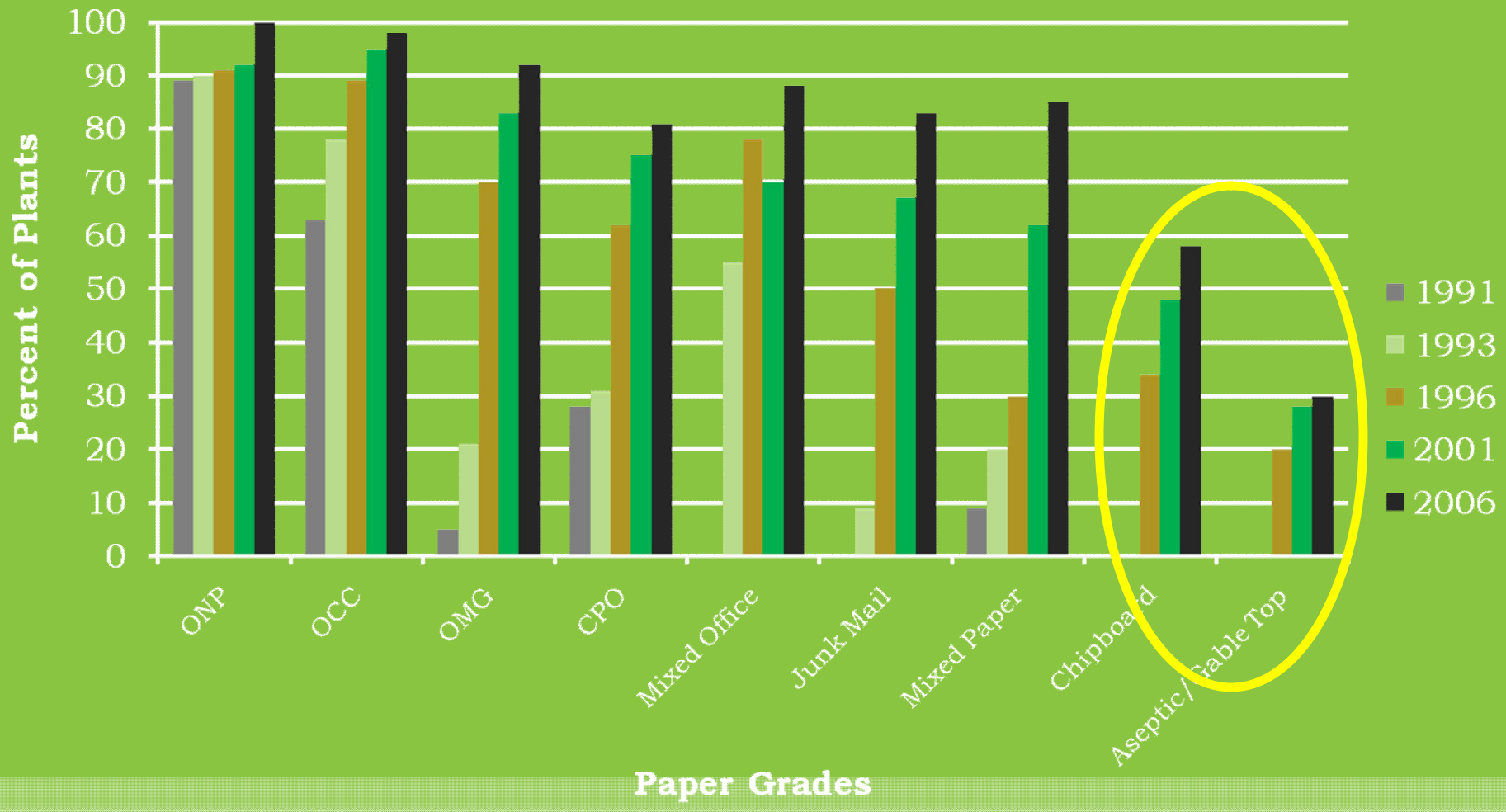
Source: GAA

Number of Materials Processed by MRFs



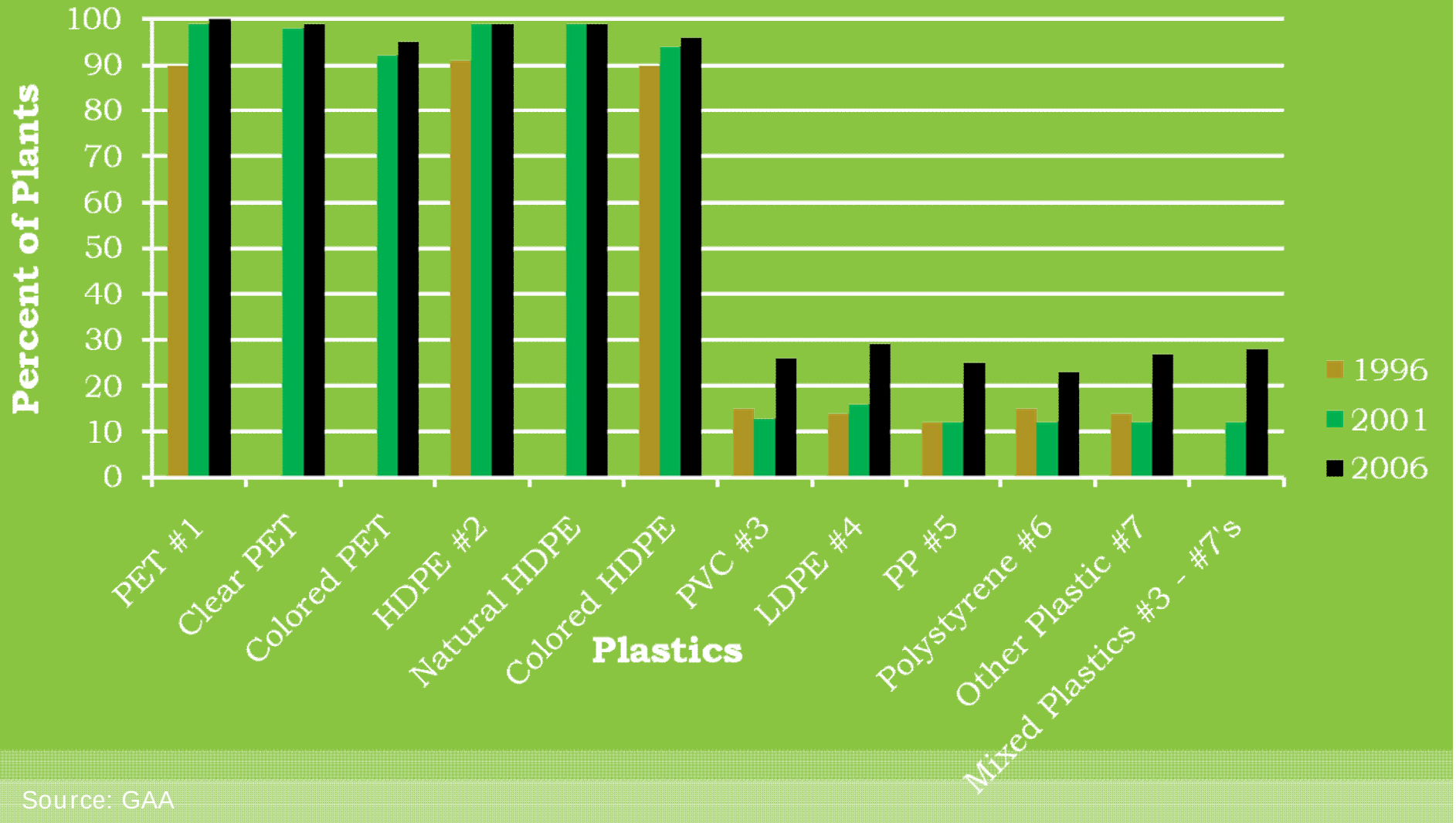
Source: GAA

Percent of Plants Recovering Various Paper Grades



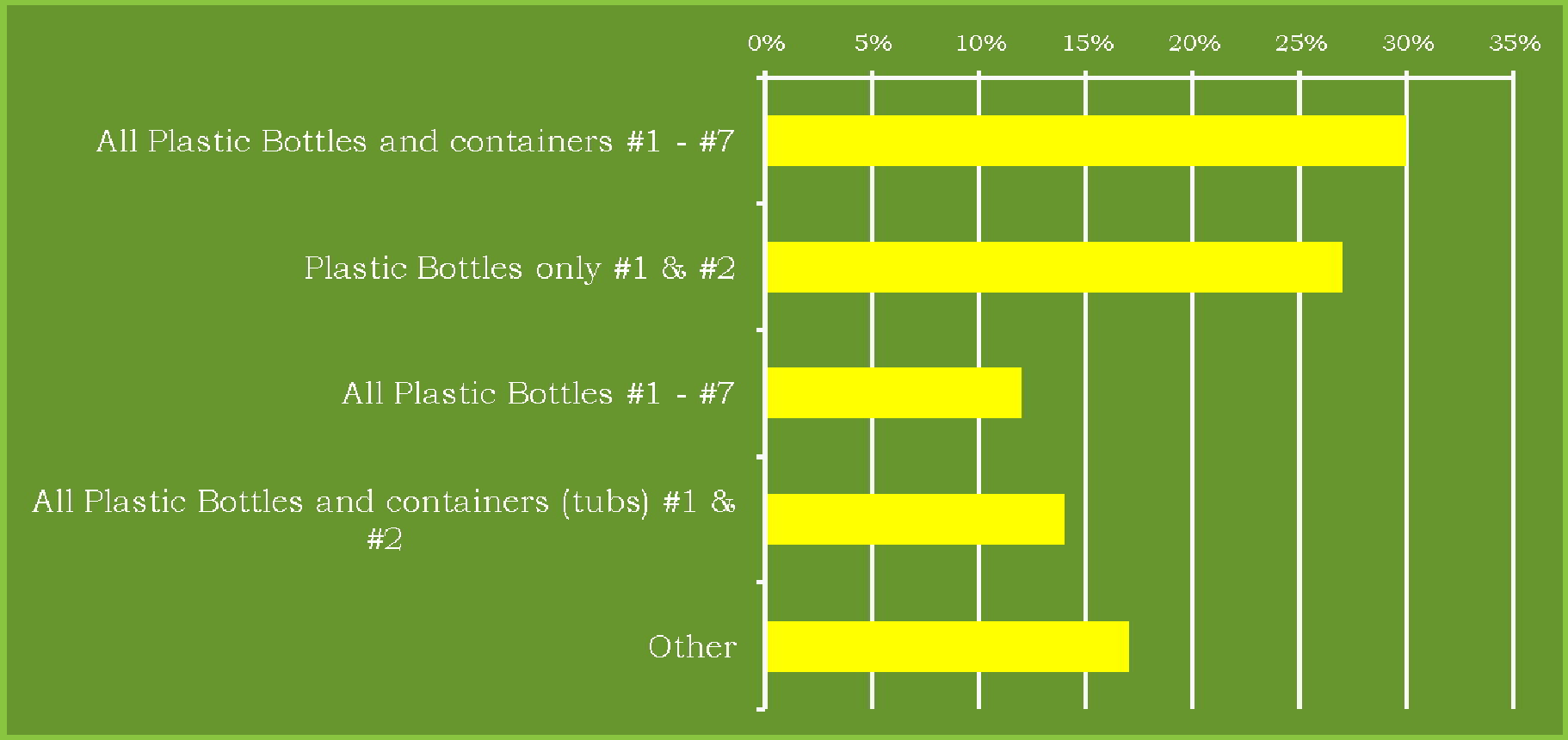
Source: GAA

Plastic Recovery in MRFs 1996 - 2006



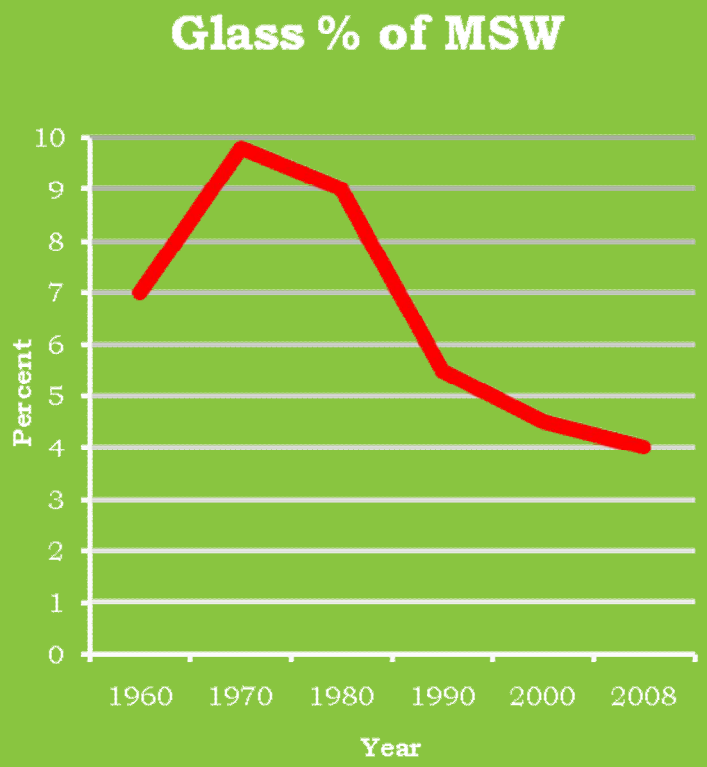
Source: GAA

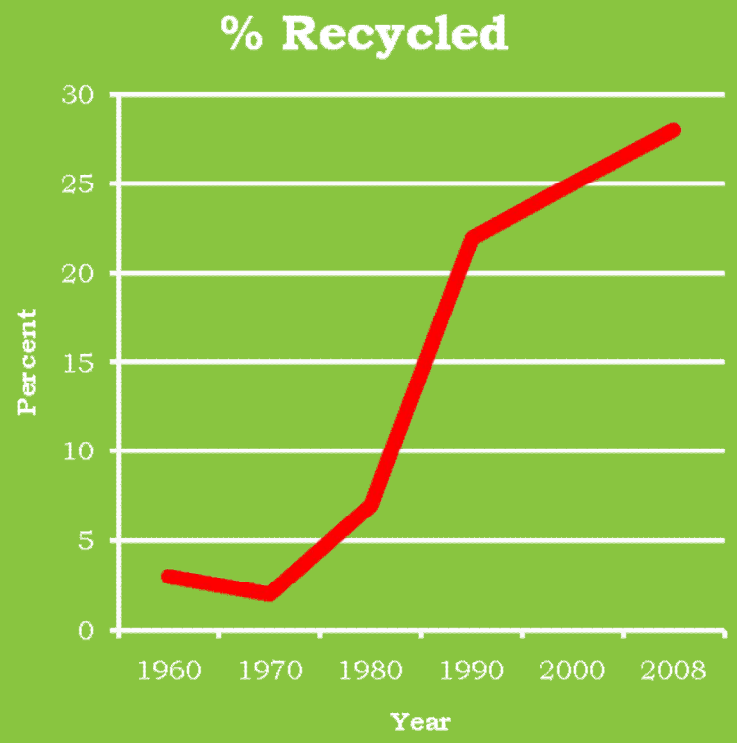
What Plastics are being recycled?



Source: NYC Dept of Sanitation

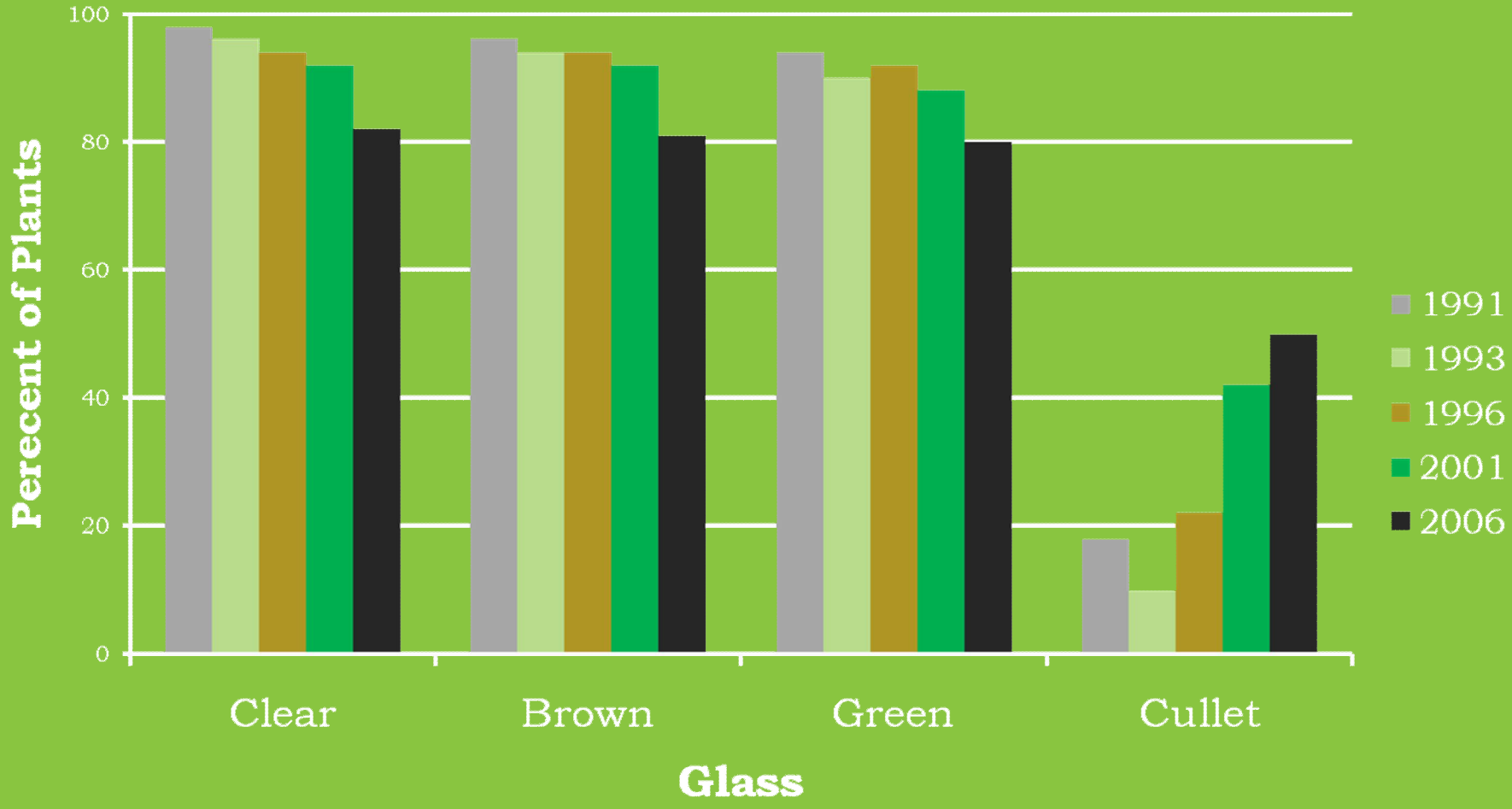
Glass Containers MSW & Recycled





Source: WasteAge.com

Glass Recycling Trends



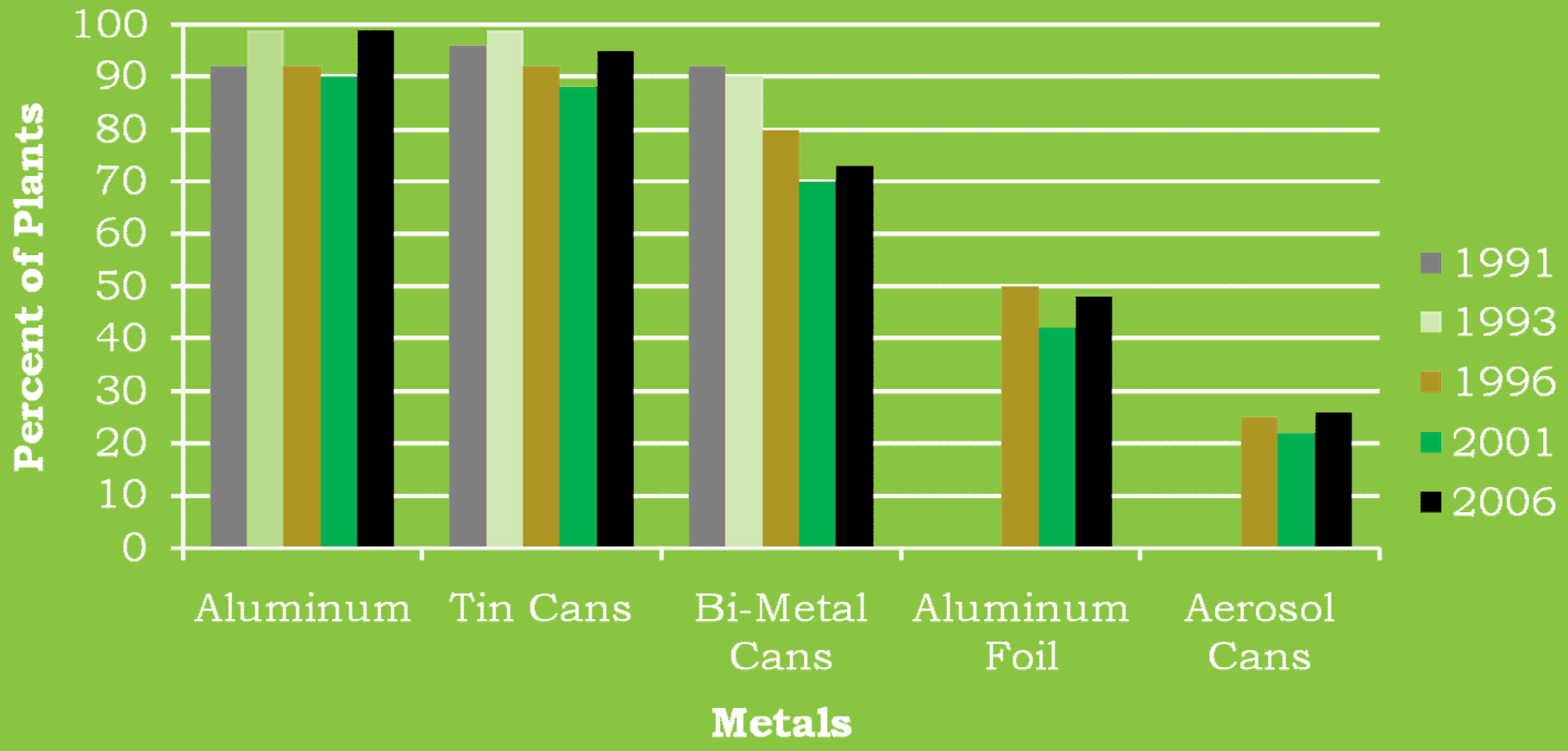
Source: GAA

Glass Recycling

- Recent resurgence in demand for glass cullet – Supply is becoming issue
  - Fiberglass industry
  - Bottle industry
- 5 Years ago Strategic Materials had zero Optical Sorters, today they have over 100.
- Planning on 5 new plants in 2011 all that include optical sorting.

Source: GAA

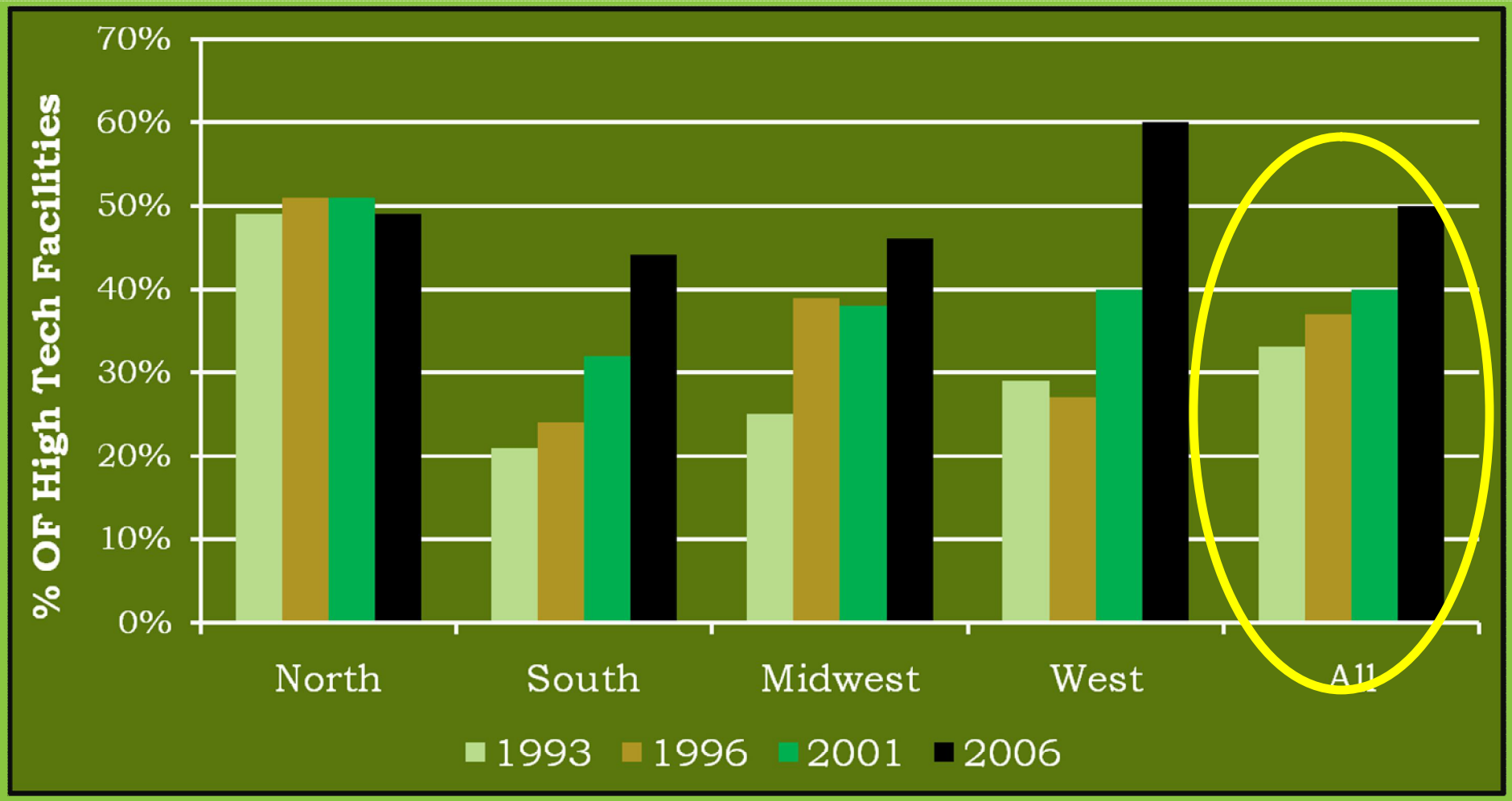
Metals Recovery at MRFs 1991-2006



Source: GAA

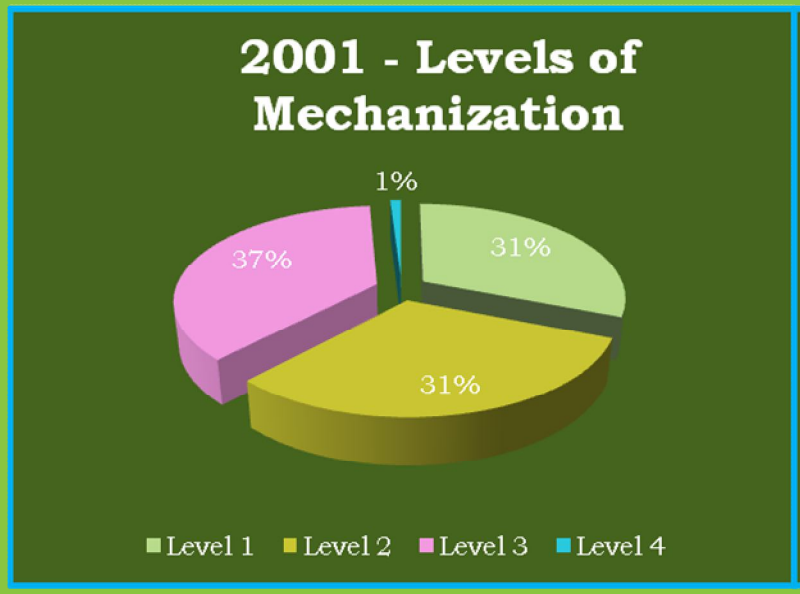
What is on the Technology Horizon?

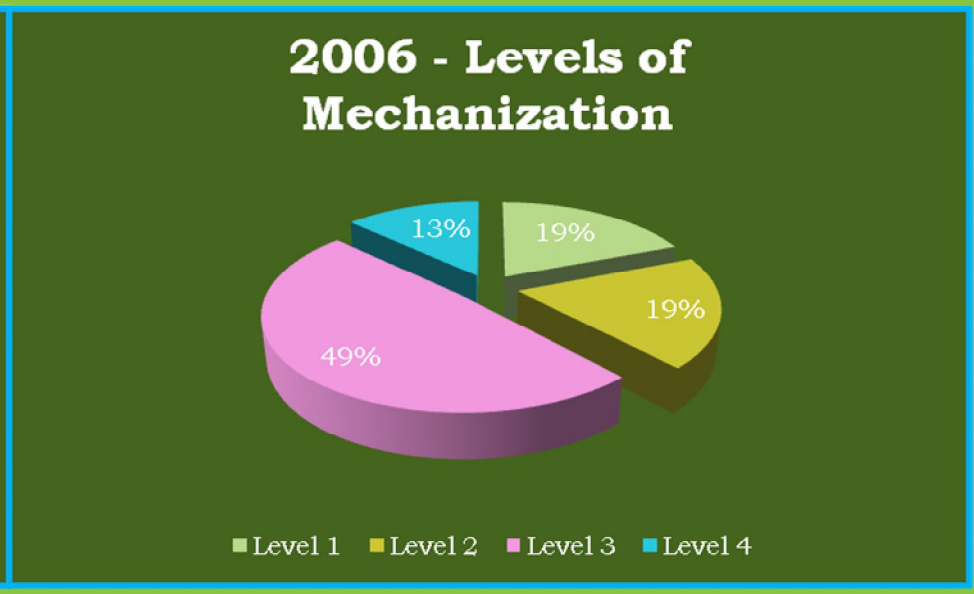
% Hi-Tech MRFs by Region



Source: GAA

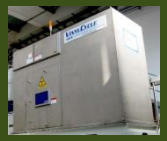
Levels of Mechanization in SS Plants





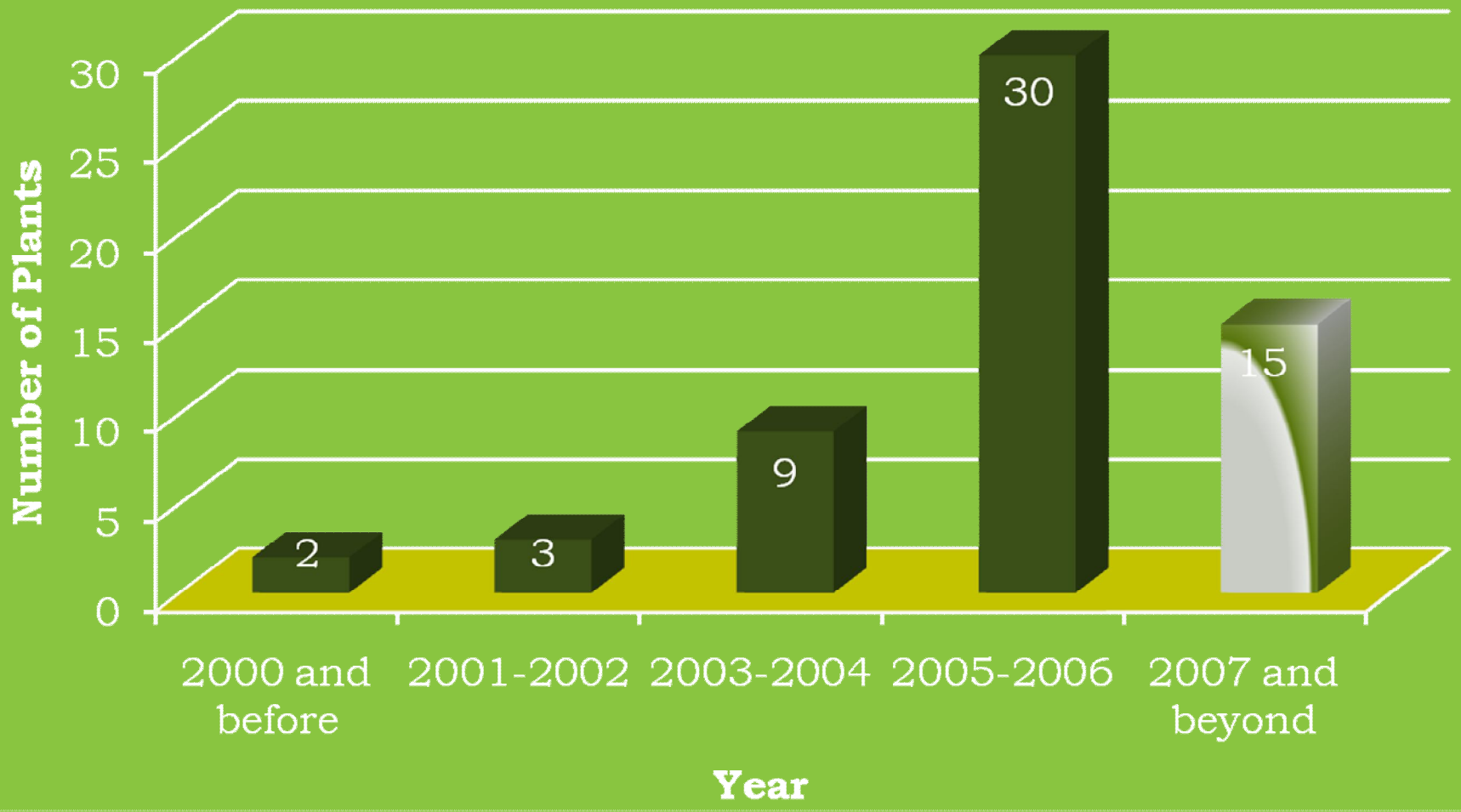
Source: GAA

Technology used to separate PET

Technology	Description	Key Players
Near-Infrared (NIR) 	• Sensor uses an infrared beam to identify the plastic type by recognizing a light intensity reading unique to each polymer	Titech, Pellenc, MSS, NRT, RTT, S+S, Rofin, Eveready, Buhler, EagleVizion
Laser 	• Referring to an impurity's spectrum, i.e. its physical "fingerprint," is able to detect and separate it from the product flow	Unisensor, Best
X-Ray 	• Distinguishes waste based on density • Useful for detecting additives • Two types: x-ray and x-ray fluorescence	NRT, Binder+Co, Best
Color Sorting 	• Separates shades of color seen by the human eye for mixed bottles or flake • Use vision technology (cameras) or spectroscopy	Titech, Pellenc, MSS, NRT, RTT, S+S, Rofin, Eveready, Buhler, EagleVizion, Satake, Best
Density Separation 	• Flakes sink or float based on relative density to a fluid • Different fluids in succession to separate many materials • New waterless technology using air	Eurohansa, TLT Turbo Lamiare Treantechnik, John Brown Machines, Sorema

Source: Waste Management

Installation of Optical Sorters by Year in SS Plants



Source: GAA

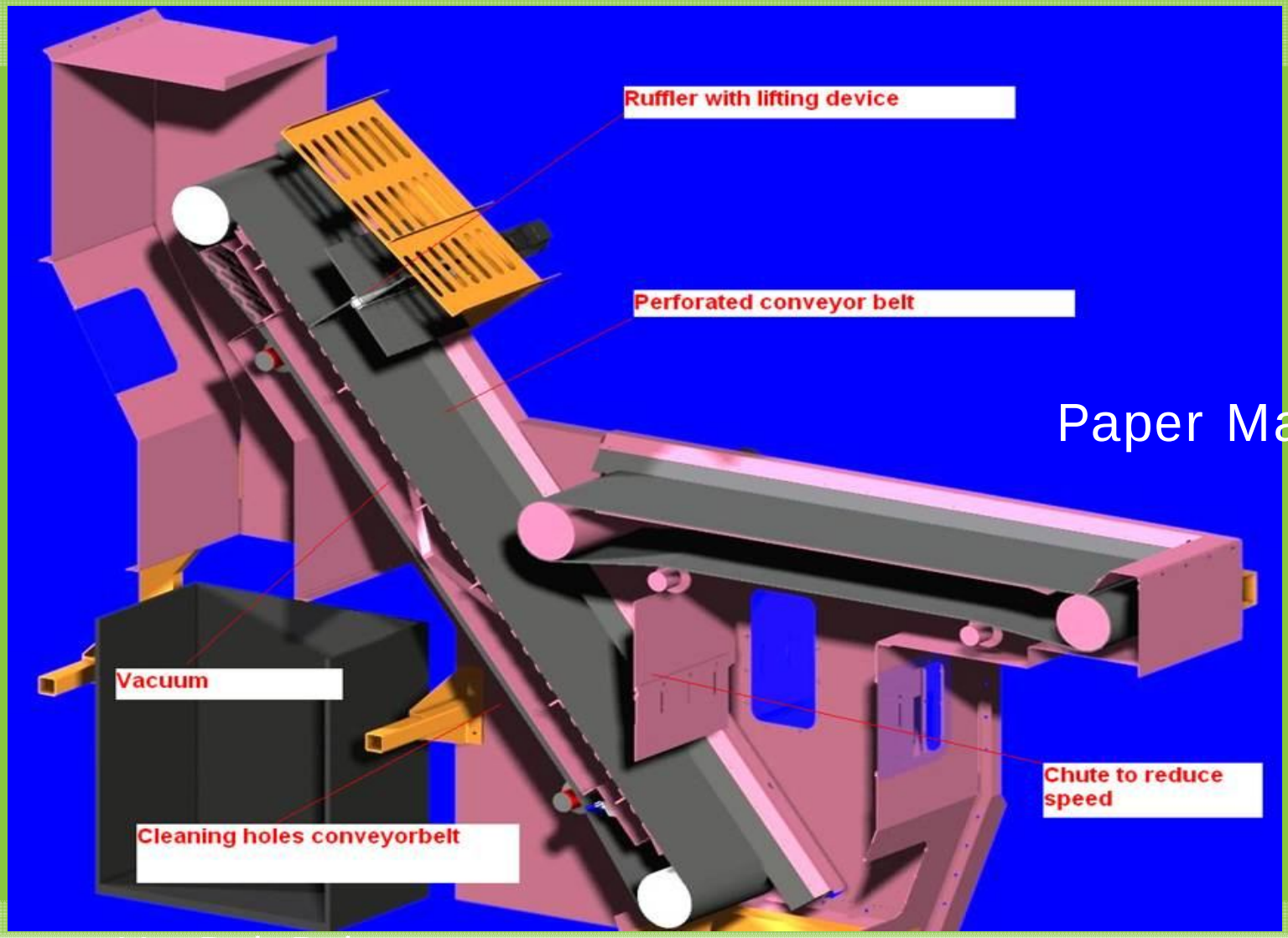
What is on the Technology Horizon?

New Technologies being deployed

PAPER SPIKE

Source: VanDyk Baler

New Technologies being deployed



Paper Magnet

Source: VanDyk Baler

Summary

Opportunities missing
Barriers to recycling more packaging
Additional issues

Summary

- Summary
  - MRFs are becoming more complex and to a great extent less flexible
- Barriers to recycling more packaging
  - Efficiency and cost
  - Outlying material types with not enough volume or markets
- Additional Issues
  - Increased amount of Lead in Glass in recent years

Questions?

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