

# Measuring MRFs Matters

Jerry Powell

*Resource Recycling*

Portland, Oregon

[www.resource-recycling.com](http://www.resource-recycling.com)

# What we'll look at today

We know a bunch about collections and end-use markets. But do we know enough about the middle step – processing? The goal of this presentation is to provide details on the status of single-stream processing in the U.S., and to describe several key trends.

# The database

This presentation contains data from 334 U.S. residential single-stream plants. The data is from *Resource Recycling*, Governmental Advisory Associates, the largest MRF equipment makers, and a handful of the largest MRF operators.

# Dual- and single-stream

Please recognize dual-stream processing remains a viable and important element in the U.S. recycling system, and several dual-stream plants – such as Sims’ New York City operation and the West Palm Beach facility – are large and effective. We plan to analyze dual-stream systems at a later date.

# The database

WASTE COMMISSION OF SCOTT CO	BUFFALO	IA	CP	32	4.45	43,125	1996	8	7
REPUBLIC SERVICES	CEDAR RAPIDS	IA	MACHINEX	196	2.7	44,400	1996	35	11
REPUBLIC SERVICES	DAVENPORT	IA		168		46,000	2001	20	12
MID AMERICA RECYCLING	DES MOINES	IA	CP; VAN DYK; MACHINEX	324	4	80,000	2010	59	25
WESTERN RECYCLING	BOISE	ID	CP	144	5	42,000	2014	15	12
WASTE MANAGEMENT SOUTHSIDE	CHICAGO	IL	VAN DYK; CP	450		110,000	2005	78	35
RESOURCE MANAGEMENT	CHICAGO RIDGE	IL	VAN DYK; CMD CONVEYOR	1,216		250,000	2008	130	60
GROOT INDUSTRIES	ELK GROVE VILLAGE	IL	MACHINEX	587	8	86,000	2013	85	35

# The database

**Specific data definitions and limitations:**

- Square footage of the plant, not the site.**
- Distinction between throughput and design capacity (they are never the same).**
- Age of the plant is determined by the last major installation.**
- Capital costs have not been adjusted for inflation.**

# The database

- We did not collect data on balers.
- Cost data were the hardest to obtain (only have data for 48 percent of the MRFs).
- We discarded a handful of outliers (poor data entry, lying, etc.).
- We did not include labor data for plants employing developmentally disabled workers or inmates.

# Equipment makers

About a dozen firms have manufactured, sold and installed single-stream sorting systems in the U.S. in the past few decades.



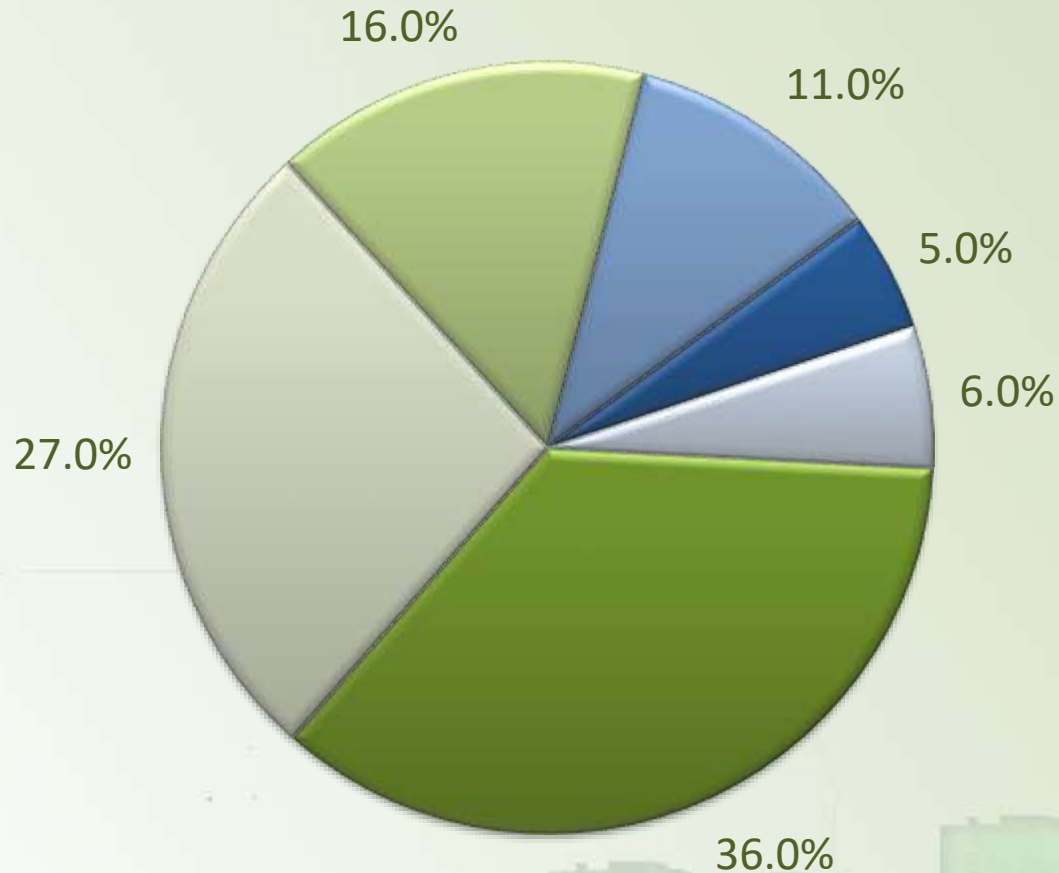
# Principal MRF system providers

AMUT	Karl Schmidt
BHS	Machinex
CP Manufacturing	Stadler
Green Machine	Van Dyk
Hustler	

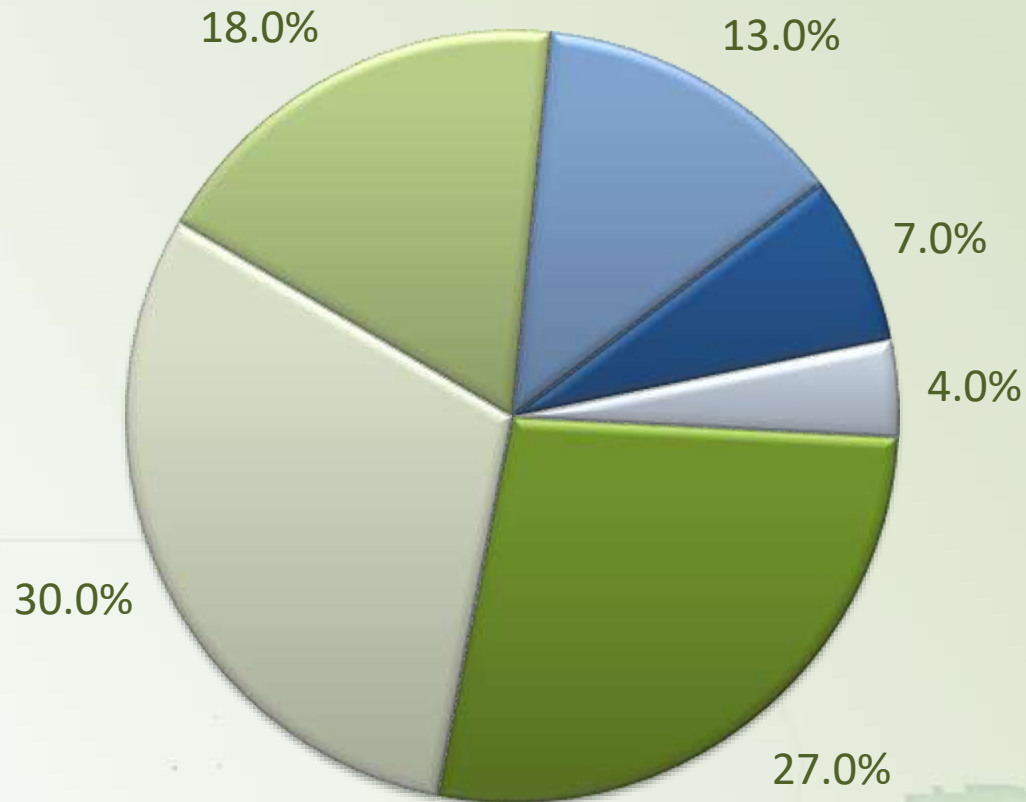
# **A handful of equipment makers dominate**

**The production of single-stream sorting systems is now dominated by a handful of U.S., Canadian and European producers. Ninety-five percent of today's single-stream throughput is handled by equipment made by just five producers.**

# Market share of equipment makers by gross throughput



# Market share of equipment makers by the number of installations



# MRF distribution and size

In terms of the location and size of MRFs:

-- the lack of large plots of land restricts the size of MRFs in many urban areas, especially in the East. This is less a factor elsewhere.

-- recent MRFs, such as in Nevada and Texas, are far larger than most older MRFs.

-- as I'll now show you, we still have many old plants.

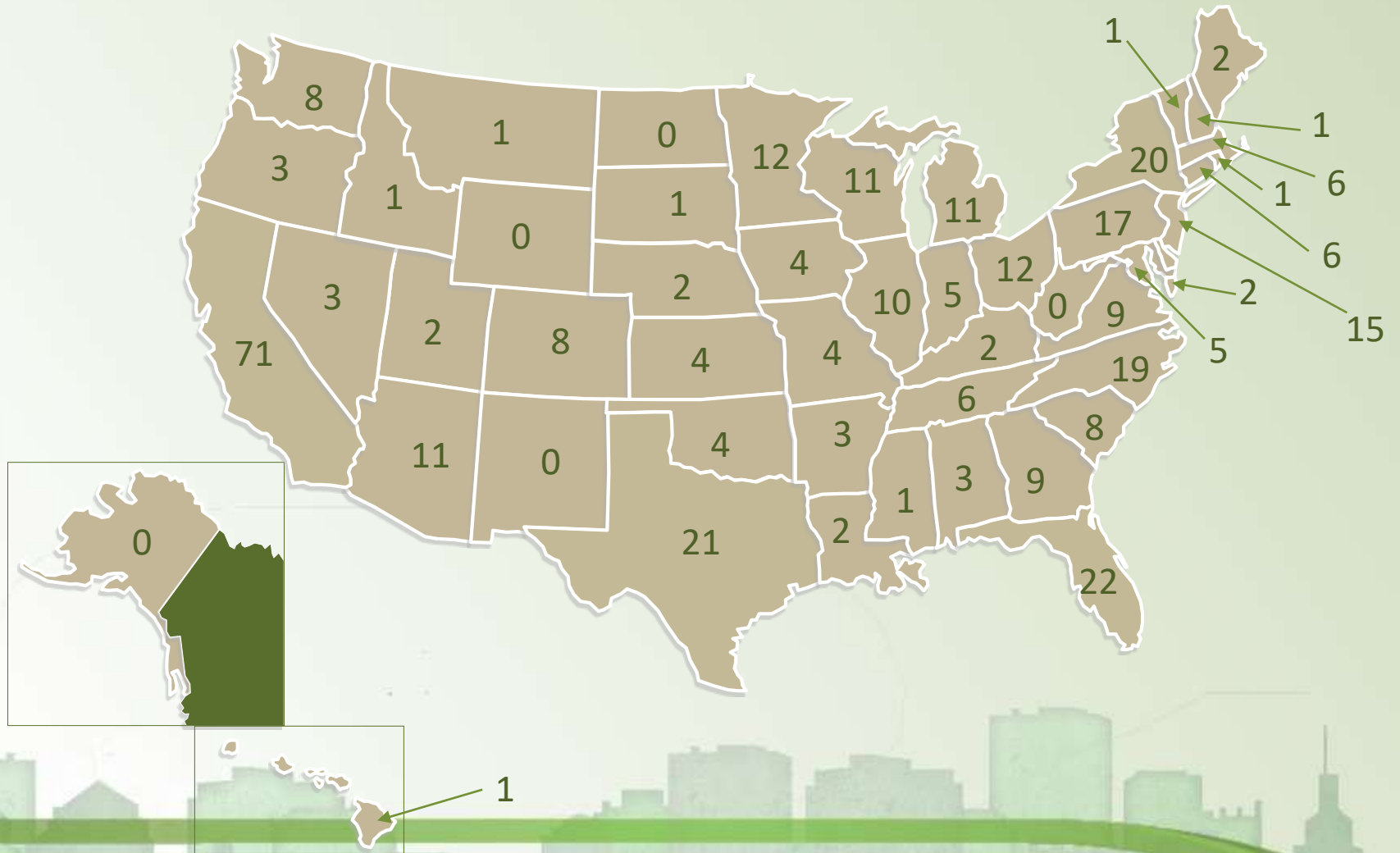
# Year of installation or major upgrade in percent



# MRF distribution and size

- Many of the earliest MRFs involved converting a dual-stream plant to single-stream.
- The number of MRFs per state has little bearing on overall throughput per state. Some states have numerous small plants.

# Number of MRFs per state

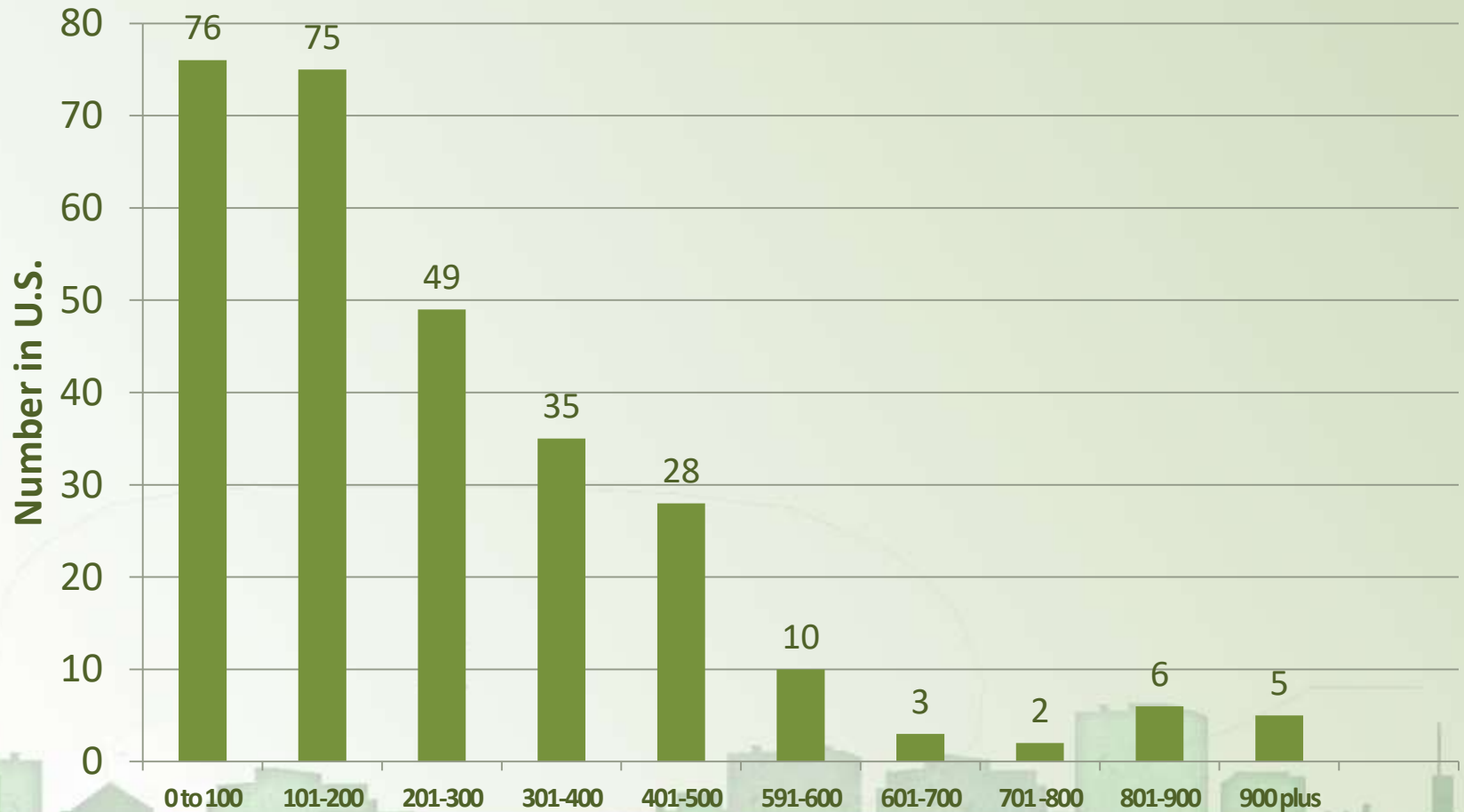




# MRF distribution and size

As you'll note on the following graph, more than two-thirds of MRFs have a daily throughput under 300 tons. However, the five largest MRFs in the U.S. have more throughput than the 76 MRFs with throughput under 100 tons per day. With more than two dozen MRFs with throughput over 500 tons per day handling 14,000 tons per day combined, we're seeing bigger and bigger plants.

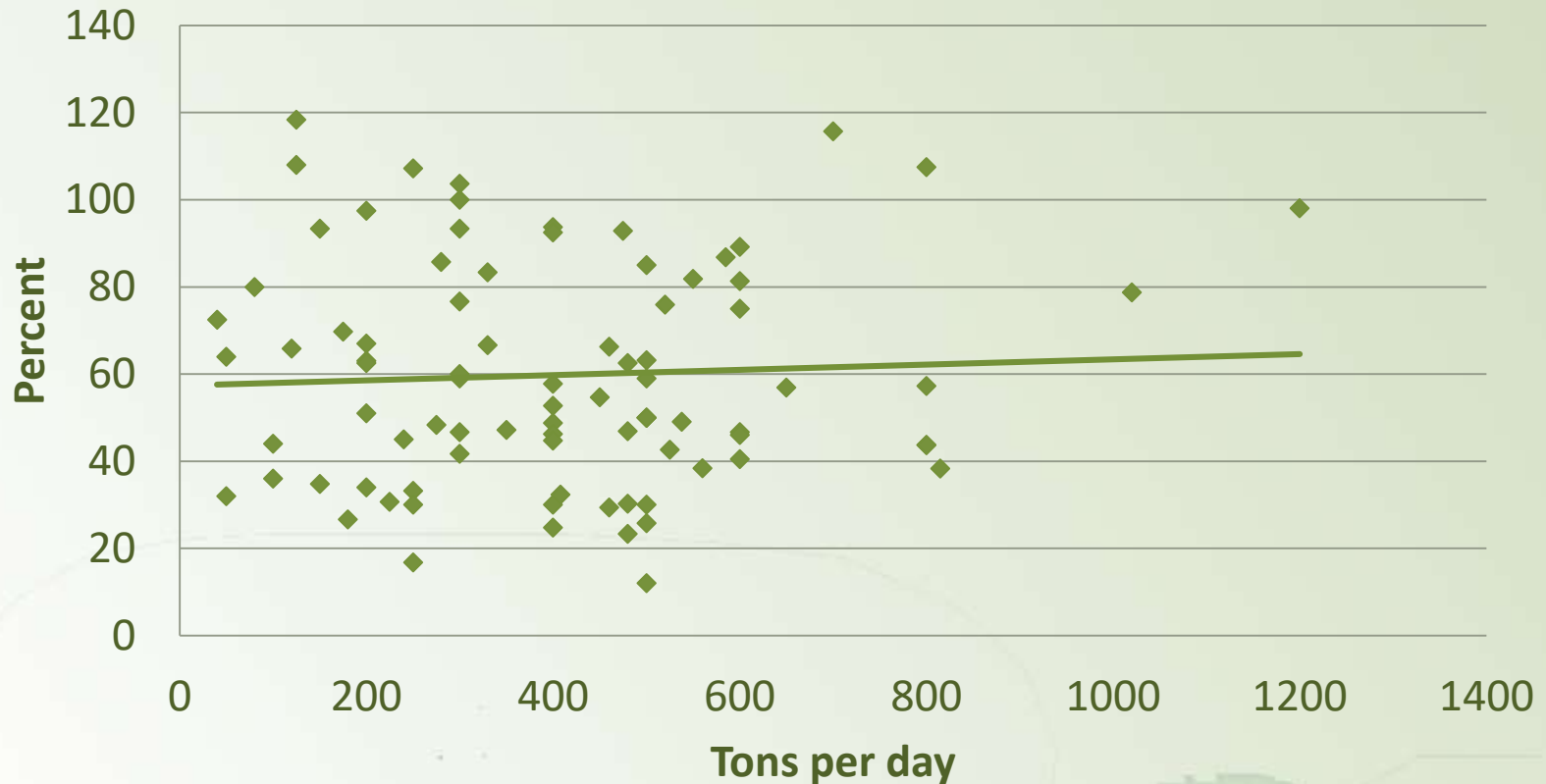
# Number of MRFs by size (tons per day throughput)



# Capacity utilization

We obtained data on the design capacity and the actual throughput for 86 plants. This led us to ask a compelling question: Are today's plants operating at or near capacity?

# The typical MRF has excess capacity

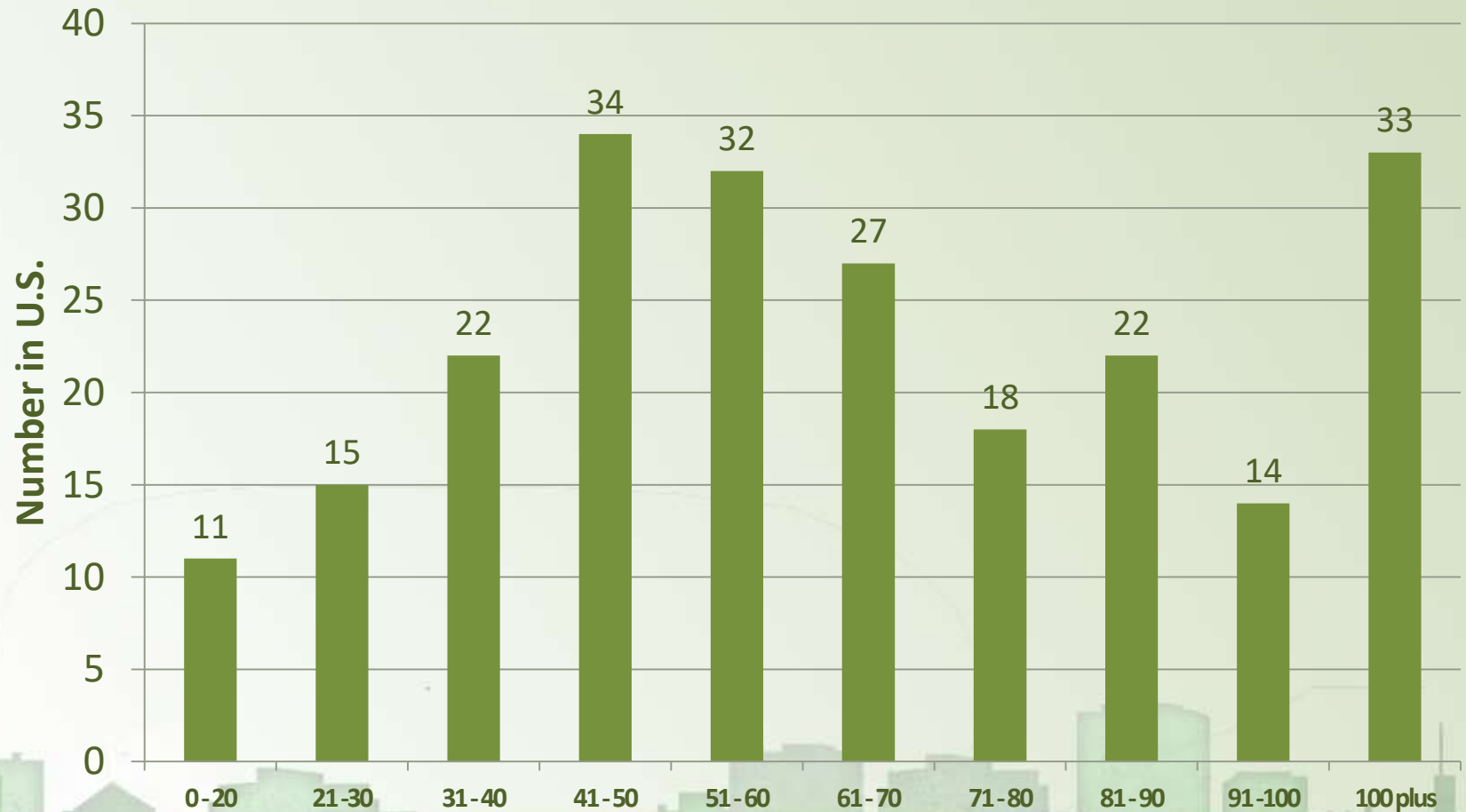


# MRF size

When looking at facility size as shown in the next chart, we see two trends:

- The majority of MRFs have a square footage of 30,000 to 70,000 square feet.
- Nonetheless, more than 30 MRFs are larger than 100,000 square feet, with four being over 200,000 square feet.

# MRFs by size (thousand square feet)

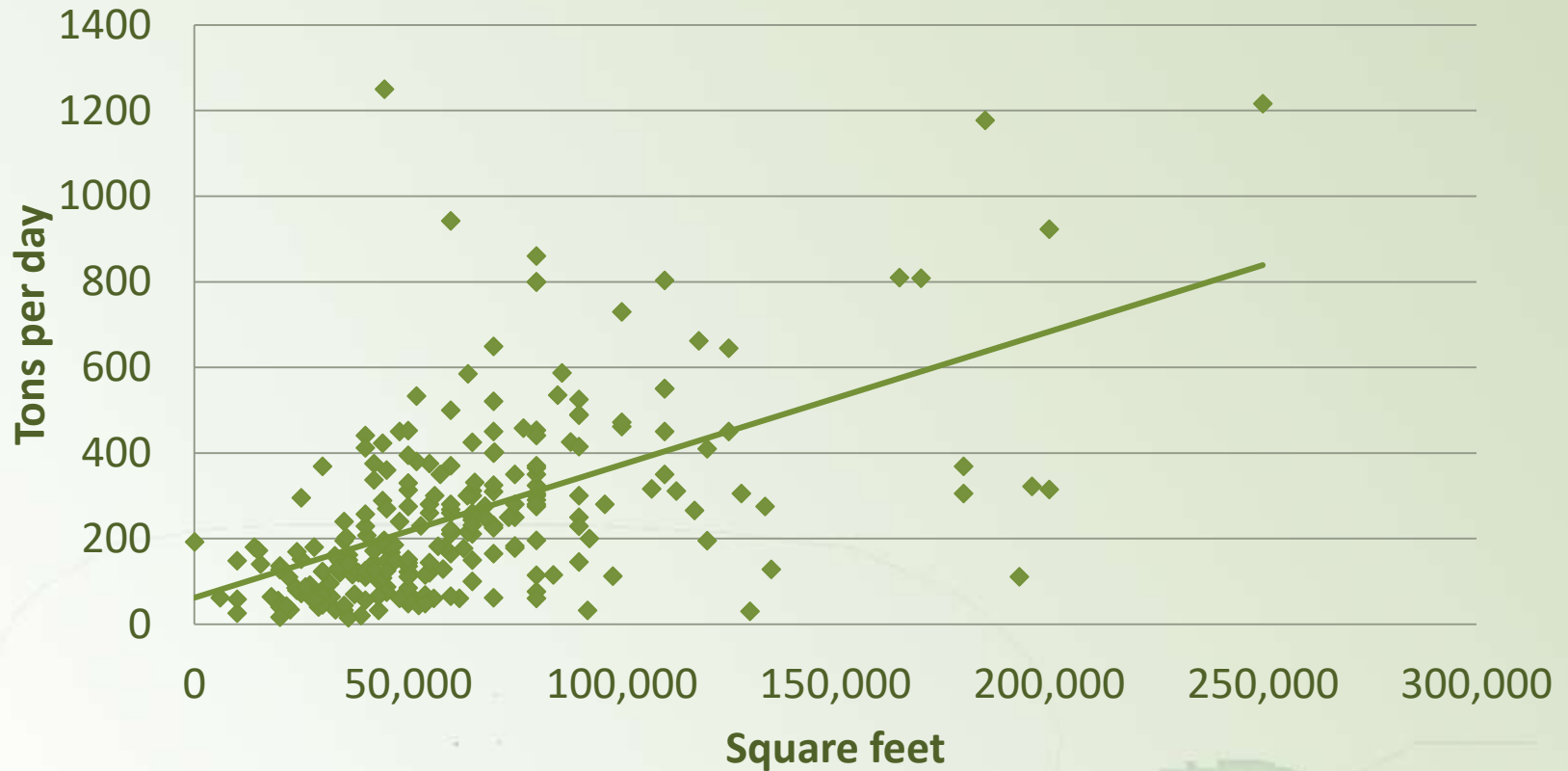


# MRF size

While there's a broad relationship between throughput and facility size, it's not a strong one, as we see on the next slide.

So what might explain this soft connection?

# Space requirements





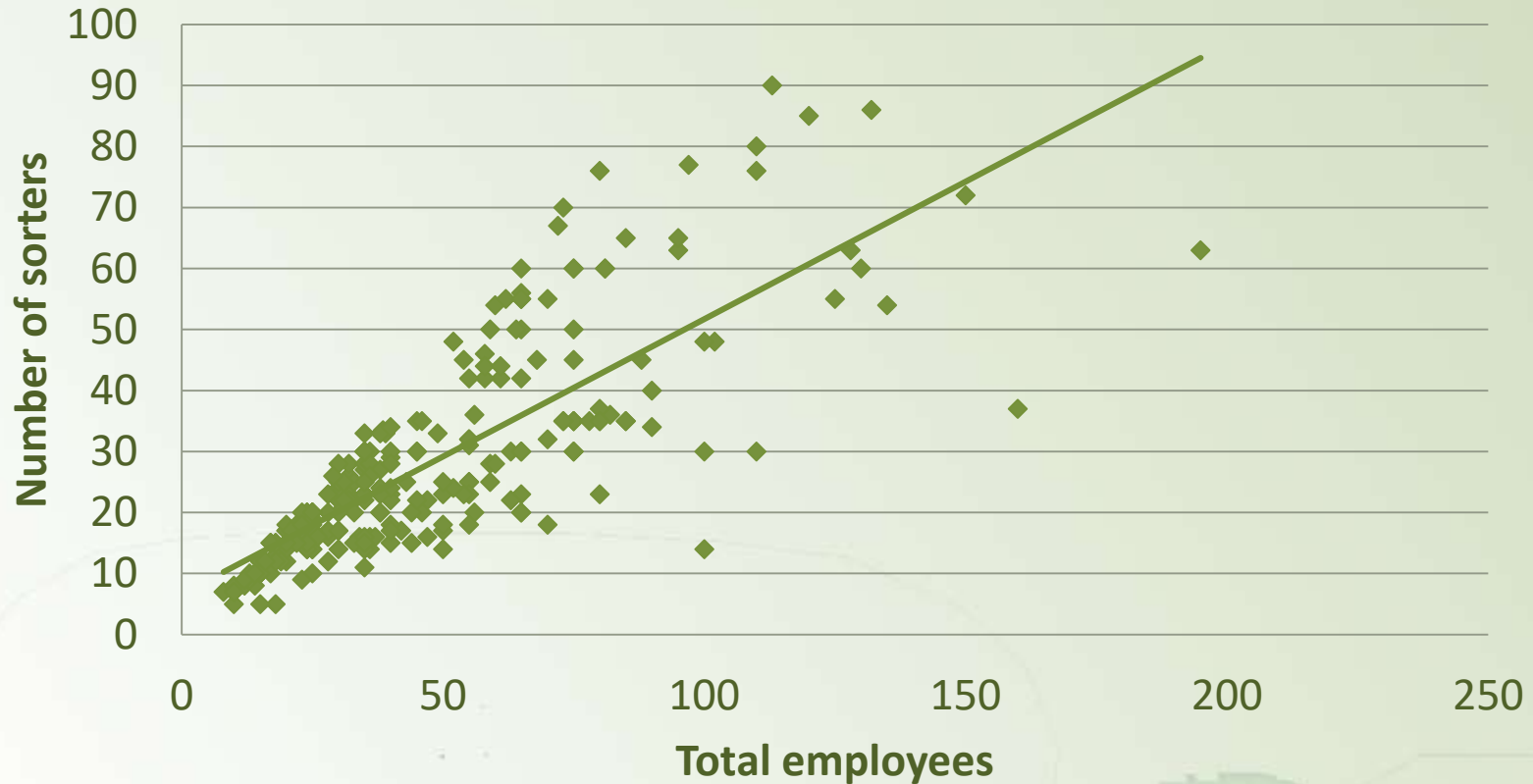
# MRF size

Interviews indicate a key variable in MRF size is bale storage. Some operators prefer or are provided on-site bale storage while other MRF owners need to load bales for shipment as quickly as possible, with few bales stored in the plant. Thus, plant-to-plant comparisons in terms of square footage and throughput need to take the bale storage area into account.

# Sortation needs

We close with some questions on sortation personnel. First, what percentage of a MRF's staff consists of sorters? And second, how much tonnage does a sorter handle each day?

# The number of sorters versus all employees



# Tons per day per sorter at various plant sizes



# Principal takeaways

Most MRFs operating today could handle about one-third more tonnage, using existing processing equipment. In other words, initiatives to add materials, boost participation or expand service areas would not necessitate much, if any, new capital investment, except possibly for additional loaders and forklifts. Personnel levels, of course, would rise.

# Principal takeaways

The average MRF has approximately:

- 245 tons per day of throughput
- 65,400 square-foot plant
- 27 sorters each handling 9.8 tons per day
- cost of \$9.4 million

# Principal takeaways

MRFs are getting larger. We'll thus see more and more smaller, older plants being closed, as processors move more toward a hub-and-spoke system employing large plants.

Workers are being replaced by equipment, especially optical sorters, and more personnel are moving to quality-control duties from sorting.

# Disclaimer

**This presentation is gluten-free. Any resemblance to real persons, living or dead, is purely coincidental. Some assembly required. Batteries not included. No warranty is made as to the accuracy of any prediction, opinion or conclusion. Contents may settle during shipping. Use only as directed. No other warranty expressed or implied. Do not use while driving a motor vehicle. No trans-fats. This is not an offer to sell or buy securities. Apply only to affected area. May be too violent for some viewers. For recreational use only. If condition persists, see your physician. Freshest if consumed before date on the carton. For off-road use only. Colors may fade. Past performance does not guarantee future results. One size fits all. Many suitcases look alike.**



# Drop me a line

**Jerry Powell**

***Resource Recycling***

**jpowell@resource-recycling.com**