



Rethinking Our Reuse of Resources

Historically Humans Wisely Reuse Resources, Especially By Recycling*

- ▶ **500 BC** – Athens' law dictates that waste must be disposed of > 1 mile from city walls
- ▶ **1031** – Japan begins reuse of waste paper
- ▶ **1690** – Rittenhouse Mill, Philadelphia area, introduces recycling manufacturing process from cotton and linen rags = paper
- ▶ **1776** – American rebels recycle materials to fight for independence
- ▶ **1865** – Salvation Army is founded in London – begins reuse of goods scavenged by unskilled poor. Organization migrates to U.S. in 1890s.
- ▶ **1900's** – Recycling advocates embrace the phrase "Waste as Wealth"

*History taken from buschsystems.com

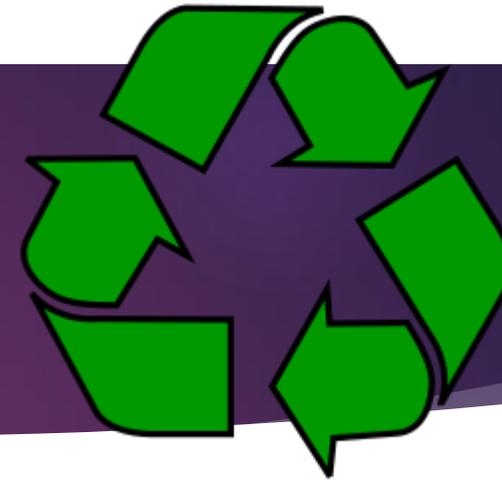
War and Depression Encourage Reuse

- ▶ **1916-1918** – Shortages of raw materials during WWI, U.S. invents “Don’t Waste Waste – Save It”
- ▶ **1930s** – Great Depression forces people to survive by peddling scraps of waste
- ▶ **1940-** Rationing and recycling supports the WWII effort

But in Prosperity - A Change in Priorities

- ▶ **1955** – Life Magazine article “Throwaway Living” encourages single-use items to be modern!
 - ▶ Product marketing on ease of use and convenience leads to littering of parks, forests, and highways

The Mobius Loop



- ▶ **1965 - Mobius Loop** Introduced: **Reduce, Reuse, Recycle**
 - ▶ Designed by Gary Anderson during an art contest to raise environmental awareness
 - ▶ Sponsored by a Chicago-based recycled-container company
- ▶ **1970** – First Earth Day – brings attention to increasing waste and importance of recycling
- ▶ **2000** – EPA confirms link between global warming and waste; reduction cuts down on greenhouse gas emissions

How Are We Doing Now? 48 Years After First Earth Day

▶ The Bad News

Americans Recycle About 66 Million Tons* of Waste Each Year



*Seattle Waste
Collection, *New
York Times*, 2018

Much of It Now Diverted to Landfills



Why?

- ▶ **We Lost a Destination Market:**

 - Since 1992 many developed countries have sent 106 million metric tons (about 45%) of the world's plastic waste to China to recycle

 - USA sent about 1/3 of its waste to China

 - Beginning 2018 China banned imported waste for the protection of the environment and their peoples' health

- ▶ **Our waste began piling up**, ending in landfills, being incinerated, floating into the waterways, or sent to other countries not equipped to properly manage it

- ▶ **How bad?** One Oregon recycler got a waiver to dump ~900 tons of recyclables into a landfill – no one will take it for recycling; another waste manager said it had disposed >2K tons of paper in landfills in last 6 months

A Wake-up Call!

It's never going to be recycled if:

- ▶ **America's "wishful recyclers" put dirty or un-recyclables in bins (sometimes 30% of that collected) or don't follow disposal guidelines!**
- ▶ **We don't have enough companies that use the recycled material!**
- ▶ **We don't reduce consumption! Especially of plastics...**

The Recycling of Plastics Challenge

- ▶ Additives and Blends Necessitate Sorting



Photo by Jenna Jambeck,
Univ. of Georgia

Sorting Plastic Bottles in China



A Getty Image

89% of U. S. exported plastic was single-use



Photo by Jenna Jambeck,
Univ. of Georgia

Shocking Facts About Plastic

1. **World plastic production** has increased from 2.3 million tons in 1950 to 448 million tons in 2015
2. As of 2015, >**6.9 billion tons of plastic waste** was generated. Of that only **9% was recycled**, 12% incinerated, and 79% sent to landfills or left on surface
3. **Plastic is 73%** of beach litter worldwide
4. More than **5 trillion pieces** of plastic are already floating in our oceans
5. By 2050 every seabird species on Earth will be eating plastic

From National Geographic

More Shocking Facts

- ▶ **~1 million plastic beverage bottles are sold every minute** somewhere on Earth
- ▶ **Plastic endures from 450 years to forever**
- ▶ The largest market for plastics today is packaging materials. That trash accounts for nearly 50% of all plastic waste – most of which is never recycled or incinerated
- ▶ About 700 species of marine animals have been reported to have eaten or become entangled in plastic
- ▶ **>40% of plastic worldwide is single use**

From National Geographic

Exporting Plastics – NPR 6/28/18

- ▶ **Cheaper to export than recycle in U.S., Japan, and Germany**
 - ▶ In 2017, U.S. sent 137,044 metric tons of plastic waste to Vietnam but they are now AT CAPACITY
 - ▶ No other country is currently equipped to handle the waste
- ▶ Some researchers call on the U.S. to develop and expand domestic systems and markets and to change product design – but this will take **time and the desire to do it**
- ▶ **Conclusion: we must shift our mindset about plastics!**

Unmarketable Recycling Goes Into Landfills



Getty Image

And In Our Water



AP Photo/NOAA Pacific
Islands Fisheries Science
Center

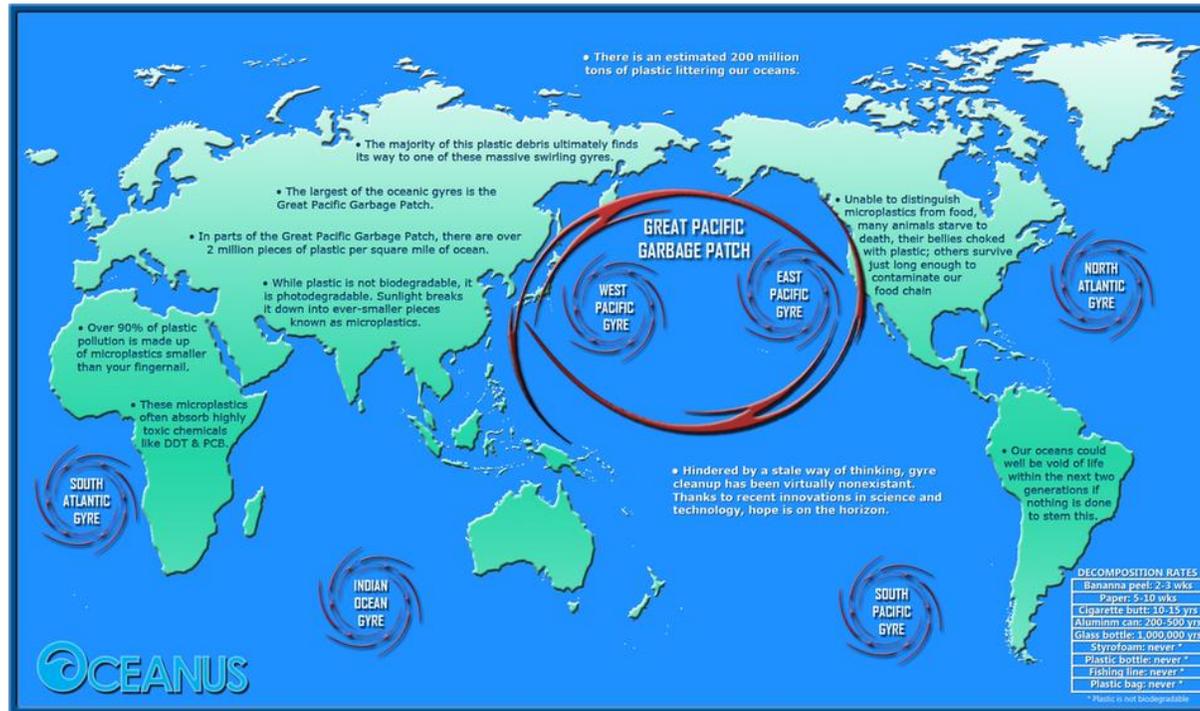
Great Pacific Garbage Patch

- ▶ 8 million tons* of trash goes into the ocean each year

It's Not Just One Patch!



And It's Not Really Compact



Great Pacific Patch Is Twice the Size of Texas

- ▶ 79,000 tons of discarded plastic
- ▶ Covers 617,800 square miles
- ▶ It is increasing in size
- ▶ Would take 67 ships one year to pick up 1% but it's growing daily!
- ▶ September 2018 – researchers estimate plastic is 16 times higher than thought

Learn More – Recommended Films

- ▶ Plastic Planet (2009)
- ▶ A Plastic Ocean (2016)

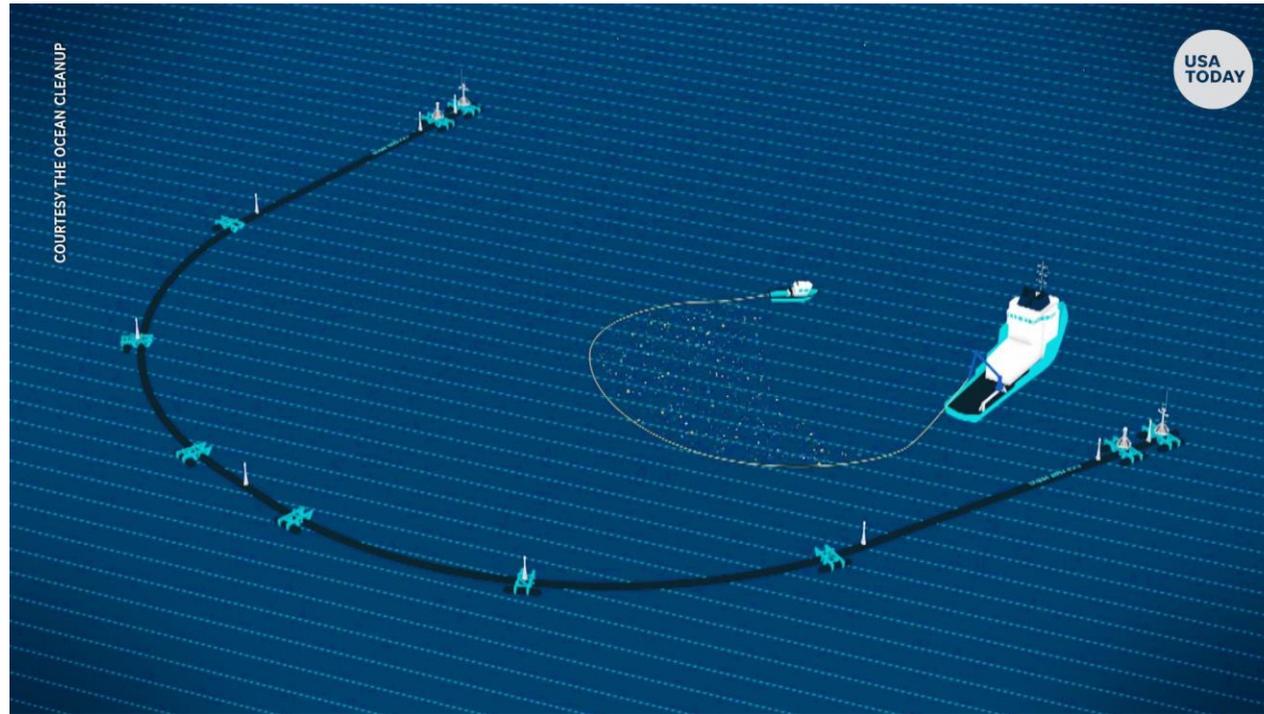
Solutions?

▶ The Good News:

The Ocean Cleanup

- ▶ Dutch Organization – Boyan Slat (24 year-old) – ships trawl meshed nets
 - ▶ Device is 2000 feet long with a 10-foot skirt that hangs below it
- ▶ Estimated that 46% of the plastic mass was made up of lost fishing nets
- ▶ Significant increase from 2011 tsunami that hit Japan
- ▶ Full fleet = 60 systems = removal ½ plastic in GPGP in 5 years
- ▶ Goal – reduce ocean plastic 90% by 2040
- ▶ Has already found problems and is back in research phase to fix issues

Schematic Courtesy of the Ocean Cleanup



The Trawler



Other Technical Innovations

▶ 2016 Bacteria That Eats Plastic

- ▶ Japanese discovered *ideonella sakainesis* secretes enzyme that turns PET into a chemical that is then used by the bacteria to create carbon and energy to grow – to eat more PET
 - ▶ Disadvantages of bacteria?

▶ 2017 Semiconductor Invention

- ▶ Biodegradable
- ▶ Flexible as skin
- ▶ Will drastically decrease e-waste in the future
 - ▶ >50 million tons of e-waste discarded in 2017

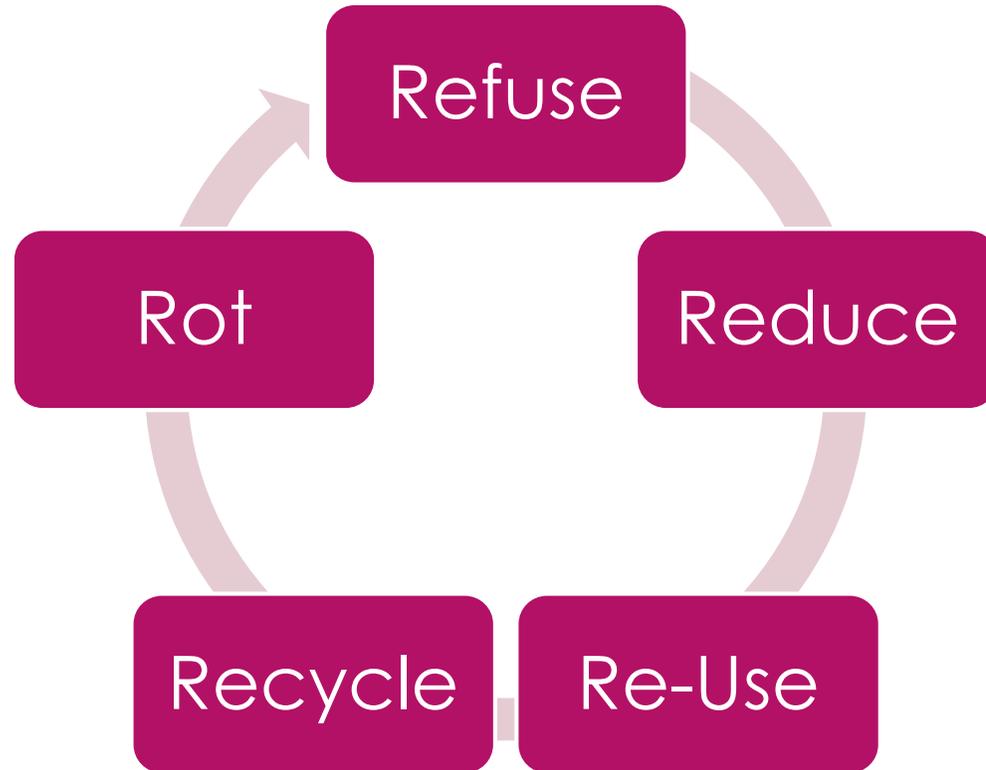
What We Can Do To Help

Reduce Our Personal Amount of Human Resource Waste!

Educate!

Advocate!

The New Paradigm – The Five R's



Let's Talk About Re-Use/Recycling

- ▶ Our chapter now has an Ad Hoc Committee to work on the Environment and Recycling
- ▶ Next Meeting – **January 18, 2019 (6 pm, Cedar Hill Ranch)**



Committee Ideas Being Pursued - Kathy Lester