Plastic Recycling

A Snapshot on Markets, Technology, and Trends

Keefe Harrison, Director of Communications

Liz Bedard, Director of Rigids Recycling Development

The Association of Postconsumer Plastic Recyclers

Key Terms For Today

PCR – Post Consumer Resin

Recycler/Reclaimer/Reprocessor – Companies who turn post consumer/industrial material into manufacturing material

Flake – After material is collected, it's ground into flake. Cleaned.

Pellet – Generally PCR is converted to pellet for use as a manufacturing feedstock.

Resin Identification Codes

1 = PETE (polyethylene teraphthalate)
2 = HDPE (high density polyethylene)
3 = V (vinyl)
4 = LDPE (low density polyethylene)
5 = PP (polypropylene)
6 = PS (polystyrene)
7 = Other/mixed plastics

http://en.wikipedia.org/wiki/Resin_identification_code

The Association of Postconsumer Plastic Recyclers

Current Market Trends

- Supply, supply, supply.
- Plastics Recycling Industry has invested in:
  - Technology
  - Flexibility
  - Growth potential
- Capacity is exponential. More lines, more shifts, more material.

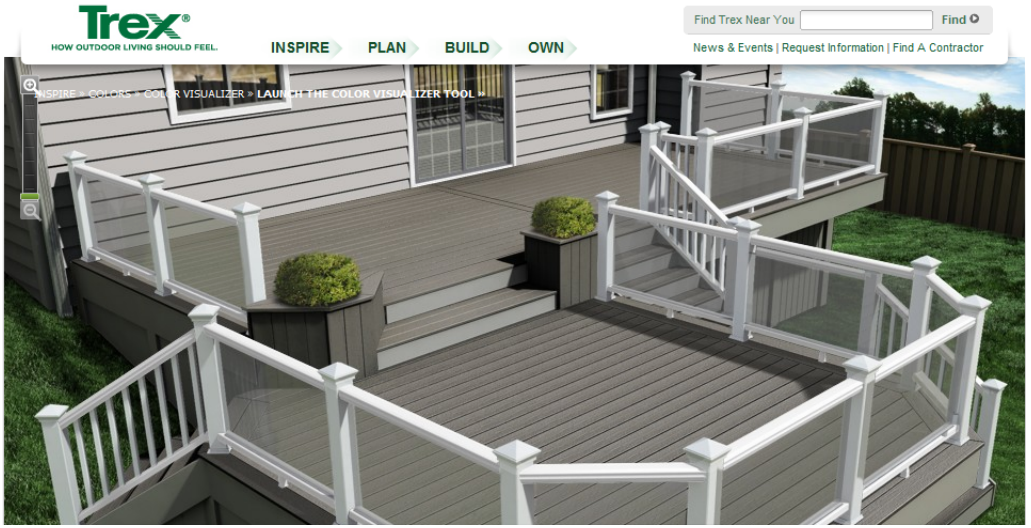
The Association of Postconsumer Plastic Recyclers

Example: Technology

Envision Plastics

The Association of Postconsumer Plastic Recyclers

Example: Flexibility



The Association of Postconsumer Plastic Recyclers

Example: Growth Potential

The Association of Postconsumer Plastic Recyclers

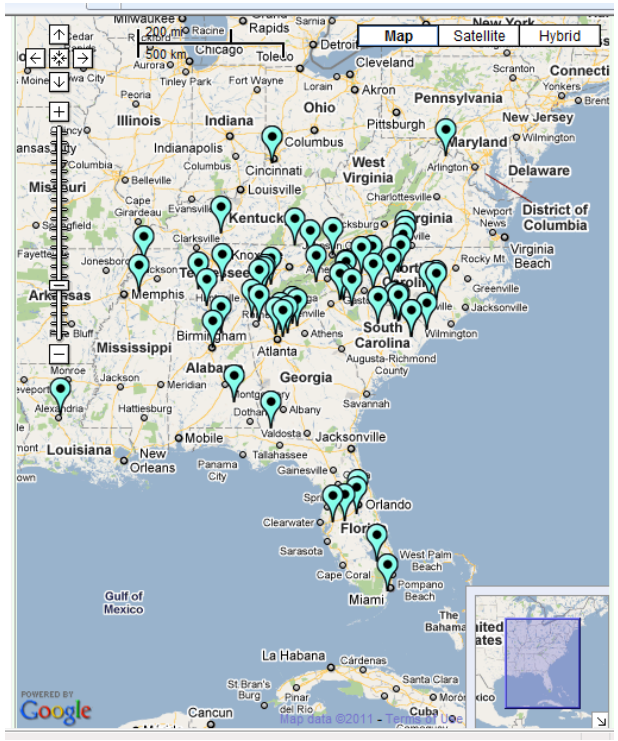
Factors Influencing PCR

- Increased demand for PCR. Why?
  - Good, clean feedstock.
  - Increasingly affordable.
  - Consumer demand.
  - Legislation to support and expand markets, infrastructure, use of PCR.

The Association of Postconsumer Plastic Recyclers

Mapping Demand for PCR

- Southeast Recycling Development Council
- 60 companies that look to recycled plastic feedstock
- Need for Glass, Aluminum, Paper, Plastic, Steel in the Southeast: More than 206 companies depend on recycled feedstock. They employ over 47,525 people and see a tax revenue exceeding $29.4 billion



www.serdc.org

The Association of Postconsumer Plastic Recyclers

The Growth of Rigid, Non-Bottle Recycling

- Tubs & lids
- Caps
- Buckets
- The wide, wild world of plastics…

The Association of Postconsumer Plastic Recyclers

Ongoing Work to Grow Domestic Recycling Options

- Bale audit: What is currently being recycled? How much is available to be recycled? Growth potential
- Bale specs: Establishing consistency so the market can plan, grow. Strong partnerships with MRFs to ensure adoption.
- Target material sources: Grocery stores. Approximately 354 million pounds per year generated. Of that, 212 million pounds/year is deemed "easily recoverable."
  - Two predominant resin types HDPE:30 to 55%, PP: 45 to 70%

The Association of Postconsumer Plastic Recyclers

Polypropylene

- Blow molded: Containers
- Injection molded: Caps, lids
- End uses: Auto parts, bottles/containers, ag applications, growing move towards HDPE-type applications

The Association of Postconsumer Plastic Recyclers

HDPE

- Blow molded – Detergent, milk jugs
- End uses: Pipe, bottles, playground equipment, blended for film, buckets
- Growing recovery efforts for rigid non-bottle containers
- Grocery stores example untapped potential

The Association of Postconsumer Plastic Recyclers

PET, Growth in Non-Bottle Packaging

- Blow mold: the soda bottle
- Also thermoforms (salad trays)
- End uses: Bottles, carpet, fiber fill, strapping, thermoform sheet
- Can it be mixed?

The Association of Postconsumer Plastic Recyclers

Understanding Film

- LDPE, LLDPE & HDPE
- Blended per use
- LLDPE is the most stretchable & strongest but similar properties can be achieved through clever blending
- LDPE is also used for containers, 6-pack rings, flexible applications
- Collection tends to be industry based – not consumer level.

The Association of Postconsumer Plastic Recyclers

Polystyrene

- What's the problem with styrene?
  - Full of air
  - Full of grease
  - Not a good curb-side commodity
- Industrial applications ensure clean, dense loads.
- Example: Rooms to Go, Avangard Innovative, Houston, TX

The Association of Postconsumer Plastic Recyclers

Other Plastic Trends - Biobased

- Bioplastics – Plastics made from plant material. Rayon is a bioplastic as is cellulose acetate in cigarette filters. Some plastics are made entirely from plant materials, others could have plants as some of the raw materials.
  - Coke Plant Bottle – Test show that it can be recycled with PET resin.
- PLA - Polylactic Acid Resin. Based on lactic acid, from corn or sugar cane. Essentially, another thermoplastic, like PET, polyethylene, PVC, polypropylene, and polystyrene.
  - PLA is not an additive, it is a material type.

Degradable Additives

- Oxo-Degradable Additives – Catalytic – chemical process.
  - Triggered by light/heat/flexing. Degradation is throughout the plastic. Once started, the catalytic degradation process continues. Fragments available to microbial attack.

- Bio-degradable Additives – Non-catalytic – biological process.
  - Triggered by microbial environment. Not starch.
  - Degradation can be very slow, decades.

Degradable Additives

- We cannot machine-identify when a bottle has additives present – all become suspect.
- If the additives do their job, the plastic item will ‘fall apart’. The question is when?
- Recycled plastic is often used to make durable goods that need to last a long time (carpet) and can be exposed to weather and microbial environments (strapping and pipe).
- Who is liable when recycled plastic underperforms when containing degradable additives?
- There is no sustainability with respect to plastic packaging without recycling. There is no such thing as a plastic so “green” that it can just be thrown away. - Mike Schedler, NAPCOR

The Association of Postconsumer Plastic Recyclers

Few Words on Export

- Pulls material from domestic need
- Has been used as easy fix to collection confusion but that is changing
- Increased demand expected domestically and abroad

The Association of Postconsumer Plastic Recyclers

What's Next?

- This industry has made a significant investment in collection, processing, placement infrastructure.
- Creative problem solving is our specialty.
- We're ready to grow, change, partner.
- Consistent quantity = opportunity.
- Supply, supply, supply.

The Association of Postconsumer Plastic Recyclers

For More Information

- APR Members - http://plasticsrecycling.org/membership-information/member-profiles
- Who recycles what? http://plasticsrecycling.org/market-development/materials-buyers-and-sellers-list

The Association of Postconsumer Plastic Recyclers

Questions?

Keefe Harrison
keefe@plasticsrecycling.org
864.222.2997

Liz Bedard
ebedard18@gmail.com
603.528.1896

www.plasticsrecycling.org

The Association of Postconsumer Plastic Recyclers