

*Plastics Scorecard
(V.2.0 beta):*

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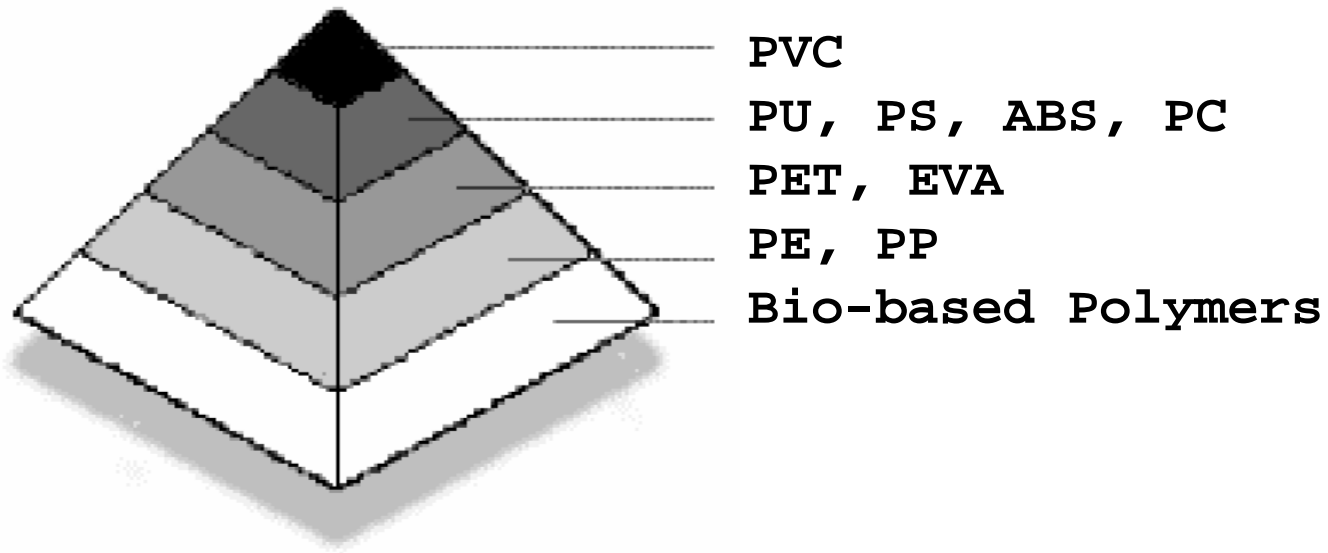
Our Goals

- Provide direction for the future of plastics development
- Encourage green chemistry, move away from legacy polymers
- Promote closed loop systems for plastics
- Call for design revolution in plastics

Issues

- Toxicity
 - Polymer
 - Monomer
 - Intermediates
 - Primary chemicals
 - Additives
 - Untested Nano
- Recycled content
- Compostable
- Recyclable
- Marine biodegradable
- Non food crop
- Transgenic seeds
- Sustainable Ag.

Plastics Hierarchy



Plastic: APR Design Guidelines

Closures/Closure liners Attachments	
Preferred	PP; HDPE & EVA with plastic
Undesirable	PVC and Aluminum; EVA with plastic
Basecups/Adhesives	
Preferred	No Basecups
If Basecup is used	Water-soluble adhesives or ones dispersible at temperatures between 140° and 180°F Unfilled HDPE or clear PET

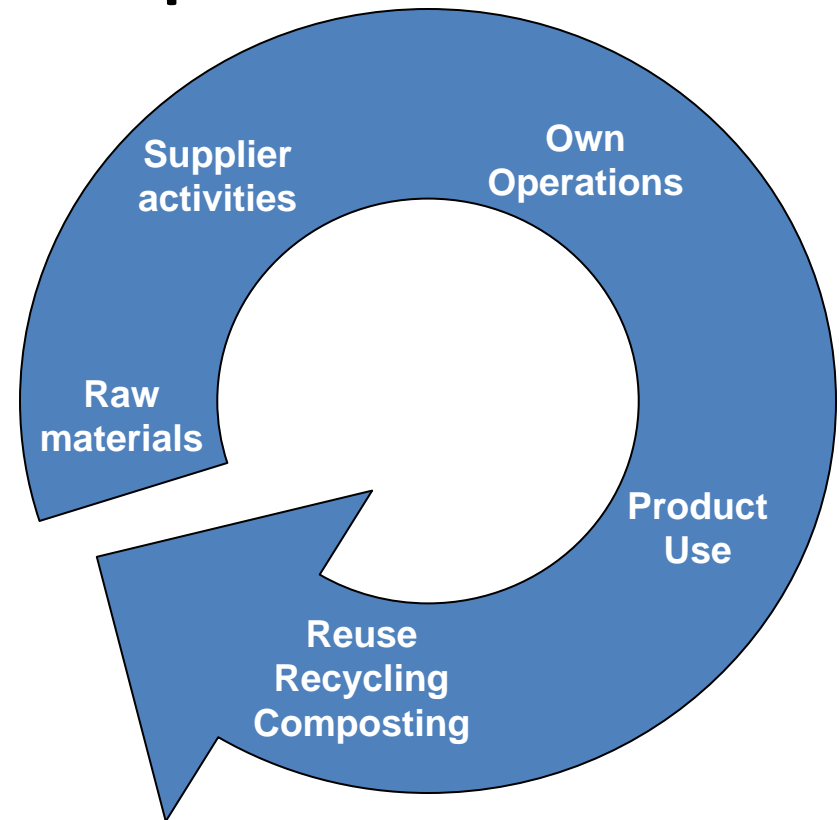
- ▶ Sleeves & Safety Seals
- ▶ Labels & Adhesives
- ▶ Direct Printing
- ▶ Inks & Adhesives
- ▶ Layers & Coatings
- ▶ Non-detaching components

www.plasticsrecycling.org

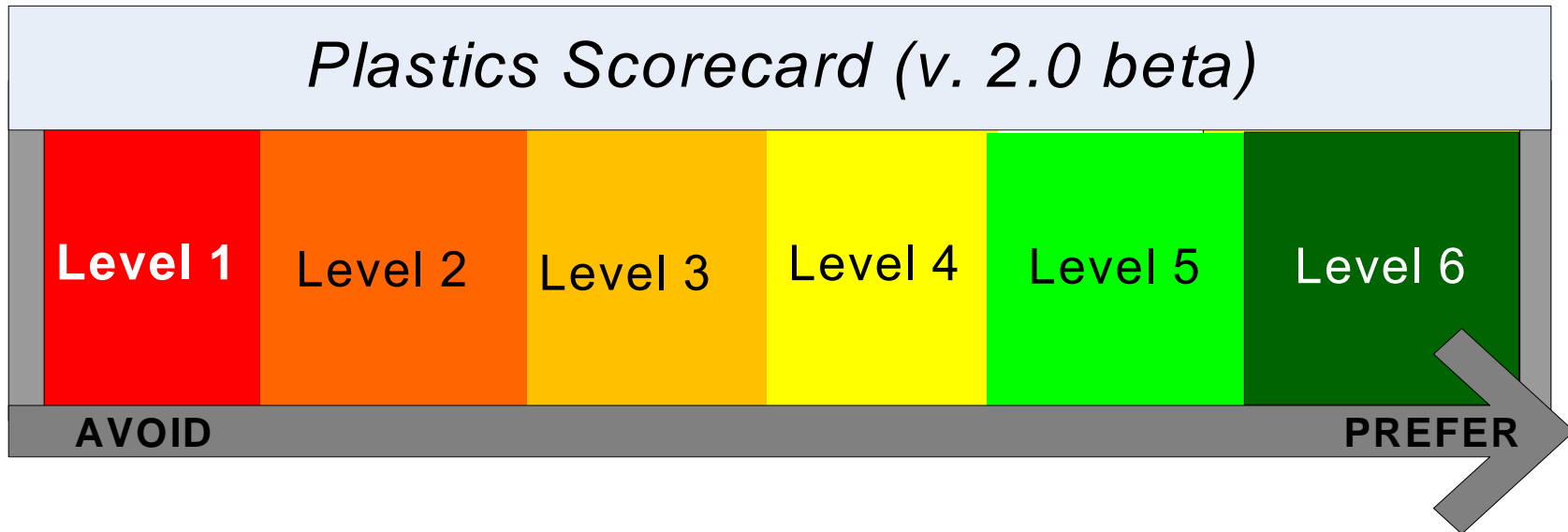
Guiding Principles

Life Cycle Thinking

1. Sustainable Agriculture
2. Renewable Resources
3. Green Chemistry
4. Closed Loop Systems



How can you maximize performance in each of these areas?



- This is a *beta* version! Comments welcome
- Plastic products scored on a scale of red to green
- Scorecard designed as a generic platform that can be applied across various product categories

Plastics Life Cycle

1. Feedstock production: extracting or growing
2. Plastics manufacturing
 - Primary chemicals – e.g., ethylene + chlorine
 - Intermediate chemicals – e.g., ethylene dichloride
 - Monomer – e.g., vinyl chloride monomer (VCM)
 - Polymer – e.g., polyvinyl chloride (PVC)
 - Additives – e.g., plasticizers, stabilizers, colorants, etc.
3. Product use
4. Product end of life management

Plastics Scorecard (v. 2.0 beta) – Summary

Feedstock Production	Manufacturing	Use	End of Life
<p><i>For bioplastics:</i></p> <ul style="list-style-type: none"> - Transgenic crop with offset (level 3) - No transgenic crop (level 4) - No use of prohibited pesticides (level 4) - Grown according to sustainable agriculture principles (e.g., not grown on biodiverse land) (level 5) - Not a food crop (level 6) 			

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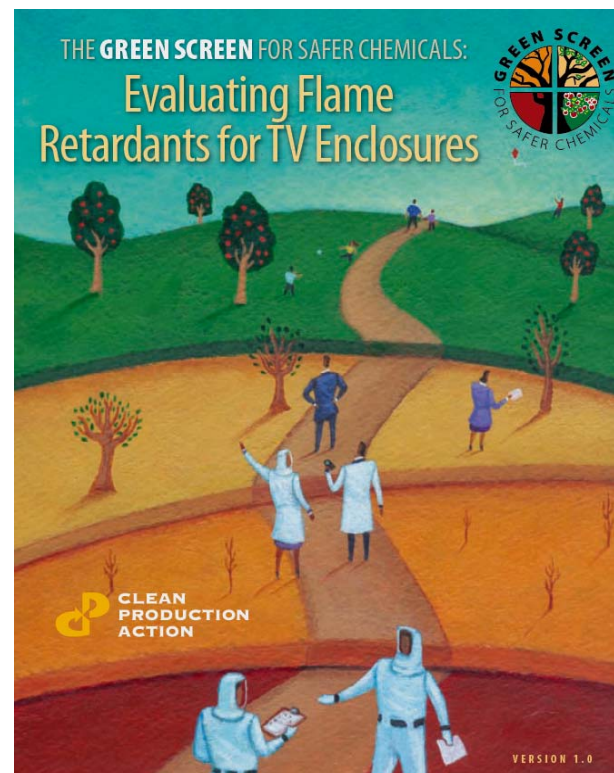
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Chemicals of High Concern

As defined by Benchmark 1 in the
Green Screen for Safer Chemicals

- PBT, vPvB, vPT or vBT
- Carcinogen
- Mutagen
- Reproductive or Developmental Toxicant
- Neurotoxicant
- Endocrine disruptor



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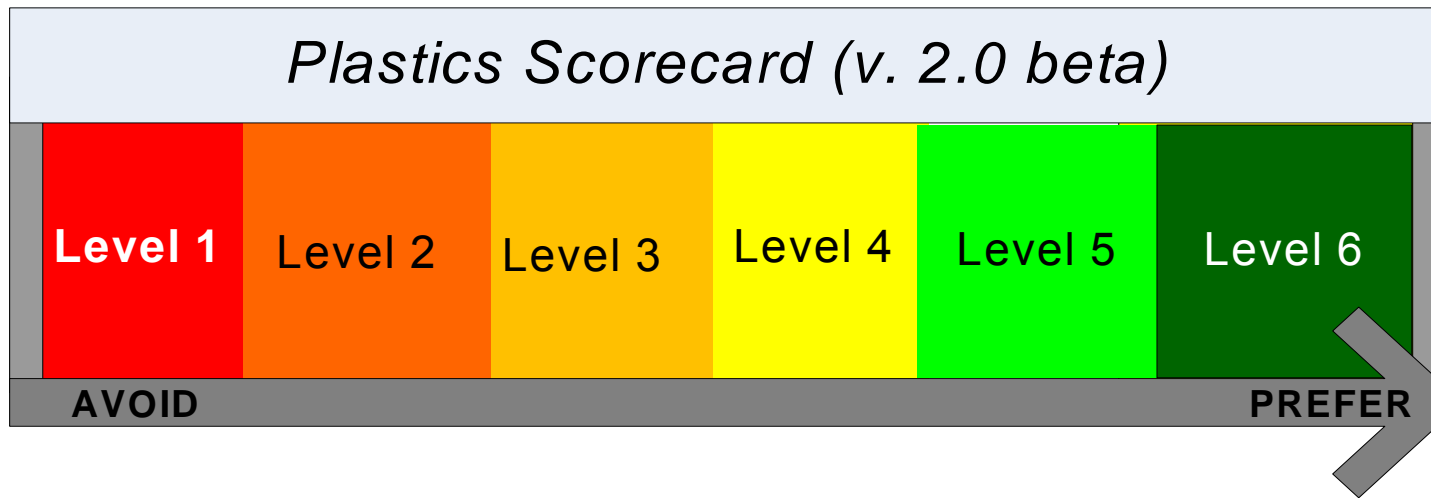
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Resin	Highest Level	Limiting Factor(s)
PVC	1-2	POPs formation (dioxin)
PC	1-2	Bisphenol A (BPA) - endocrine disruptor
PS	1-2	Styrene monomer - neurotoxicant
PET	3-4	Level 4 if it meets all PCR, nano and chemical requirements [Paraxylene & ethylene glycol]
Nylon	3-4	Level 4 if it meets all PCR, nano and chemical requirements [Adiponitrile]
PE	3-5	Level 5 if it meets all PCR, nano and chemical requirements [Ethylene]
PP	3-5	Level 5 if it meets all PCR, nano and chemical requirements [Propylene]
PLA	3-6	Level 6 if it meets sust ag, transgenic seed, additive, compostability, marine, non-food source, & 30% PCR requirements.

Recommendations

- **Biobased Polymers Mfgs** promote more sustainable ag practices
- **Move away from legacy polymers** based on monomers and additives of high concern to polymers based on green chemistry
- **Disclose all additives** in polymers
- **Increase use of post consumer recycled (PCR) content**

Thank You!

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