

# BizNGO Principles for Sustainable Plastics & Sustainable Plastics Scorecard Overview



Staples World HQ  
Framingham, MA  
Nov 30 - Dec 1, 2011

Monica Becker, Principal

Monica Becker & Associates Sustainability Consultants



# Agenda:

- 1:00 BizNGO Principles for Sustainable Plastics & Plastics Scorecard**
- Monica Becker, Monica Becker & Associates
- 1:20 Sustainable Plastics: Recycled vs. Biobased Content- What's preferred? How do we evaluate options?**
- Speakers**
- Brenda Platt, Sustainable Biomaterials Collaborative
  - Martin Wolf, Seventh Generation
- Commentator**
- Nancy Hirshberg, Stonyfield
- Facilitator**
- Dennis McGavis, Shaw
- 2:30 Break**
- 2:45 Small Groups—Sustainable Plastics**
- 3:30 Small Groups—Sustainable Plastics**  
Report Back
- 3:45 Sustainable Plastics: The Plastics Scorecard—Evaluating the Chemistry of Plastics**
- Speakers**
- Monica Becker, Monica Becker & Associates
  - Margaret Whittaker, ToxServices
- Facilitator**
- Lauren Heine, Consultant to Clean Production Action

# BizNGO Sustainable Materials Workgroup

The screenshot shows the BizNGO website interface. At the top left is a photo of a scientist in a lab coat. The BizNGO logo is prominently displayed, with the tagline "FOR SAFER CHEMICALS AND SUSTAINABLE MATERIALS". A navigation menu on the left includes links for "About Us", "Policy Initiatives", "Safer Chemicals", "Sustainable Materials", "Overview", "BioSpecs", "Participants", "Resources", and "Newsroom". The main content area is titled "SUSTAINABLE MATERIALS Overview" and features a sub-header "BioSpecs for Food Service Ware". Below this is a large image of white biodegradable plates, a fork, and a spoon. The text discusses the transition from a petroleum-based economy to one based on renewable materials, highlighting the challenges and opportunities of biobased plastics. A sidebar at the bottom left contains a link to the "SAFER CHEMICALS SUSTAINABLE MATERIALS BizNGO BLOG".



## BioSpecs for Food Service Ware *(BioSpecs v.1.0)*

Environmentally Preferable Specifications for  
Compostable Biobased Food Service Ware

Prepared by:



# BizNGO Sustainable Plastics Principles

- Articulates a vision for sustainable plastic.
- Provides the foundation for a BizNGO framework to evaluate, identify and select more sustainable plastics.
- Being used to guide the development of the *BizNGO Plastics Scorecard*: A tool for polymer and product manufacturers and specifiers to develop and select more sustainable plastics.
- Developed over a period of months, with significant input from many organizations – business, NGO, gov't, academia.



# BizNGO Sustainable Plastics Principles



“Current approaches to identifying more sustainable plastics tend to favor a single attribute, such as biobased content, reduced carbon footprint or recycled content. However, the sustainability of a plastic cannot be accurately assessed by a single metric or life cycle stage. There is a need for a systematic, holistic and principle-based approach to identifying more sustainable plastics.”

*Biz NGO Sustainable Plastics Principles*

# BizNGO Sustainable Plastics Principles



## Five Principles

1. Sustainable Resources
2. Closed Loop Systems
3. Energy Efficient & Renewable
4. Safer Chemicals
5. Healthy Workplaces & Communities

# BizNGO Sustainable Plastics Principles

**1) Sustainable Resources** – The growing, harvesting, sourcing and extracting of the natural resources used to manufacture a plastic should contribute to environmental quality, support biodiversity, build habitat and not compete with the production of food.

**2) Closed Loop Systems** – The lifecycle of a plastic and its associated product should minimize the use of raw materials by maximizing its longevity through reuse, repair, remanufacturing, recycling, composting or extended producer responsibility.

**3) Energy Efficient & Renewable** - At all stages in the life cycle of a plastic, energy should be derived from renewable sources (including solar, wind, ocean, hydropower, biomass and biofuels) and energy use and carbon footprint should be minimized.

**4) Safer Chemicals** – A plastic should be manufactured using inherently safer chemicals and processes. The byproducts and waste streams from manufacturing along with the degradation and transformation products from use and end-of-life management should be inherently safer and in balance with natural systems.

**5) Healthy Workplaces & Communities** – Industry practices at each stage in the life cycle of a plastic, from the growing or extracting of feedstocks to the manufacturing of a plastic and its end-of-life management should be healthy for workers, local communities and the environment.

# BizNGO Sustainable Plastics Scorecard Project

Objective: To develop a tool for evaluation and selection of plastics

## Tool Users:

- Polymer manufacturers
- Plastic compounders
- OEMs
- Product purchasers, specifiers (e.g., hospitals , architects)

*In harmony with the BizNGO Sustainable Plastics Principles*

# Plastics Scorecard Framework

Sustainable Plastic Principle	Life Cycle Stage			
	Feedstock Production	Polymer Manufacturing	Product Use (Product Content)	End-of-life
1. Sustainable Resources				
2. Closed Loop Systems				
3. Energy Efficient & Renewable				
4. Safer Chemicals				
5. Healthy Workplaces & Communities				

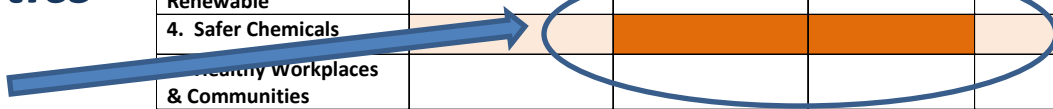
# Plastics Scorecard Framework

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# Plastic Scorecard Project Workplan

**2011:** Developed beta version of *Safer Chemistry Module of the Plastics Scorecard Tool* – Polymer Mfg. & Product Use Stages

Sustainable Plastic Principle	Life Cycle Stage			
	Feedstock Production	Polymer Manufacturing	Product Use (Product Content)	End-of-life
1. Sustainable Resources				
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- 2012:**
1. Pilot test *Safer Chemistry Module* to test, refine, and demonstrate the tool
  2. Develop strategy for building out the tool

*Based on input from this meeting*

# Plastics Scorecard:

## Safer Chemistry Module – Polymer Mfg. & Product Use Phases

	Life Cycle Stage			
	Feedstock Production	Polymer Manufacturing	Product Use (Product Content)	End-of-life
4. Safer Chemicals				

Identifies chemicals used in polymer manufacturing:

- Primary chemicals
- Intermediates
- Monomers
- Catalysts

Identifies chemicals used in the final plastic compound:

- Polymers
- Additives
- Unreacted monomers
- Oligomers
- Residual catalysts

# Plastics Scorecard: Safer Chemistry Module – Polymer Mfg. & Product Use Phases (cont.)

## Other Features:

- Uses the GreenScreen™ to score chemicals
- Developed in Excel – current form
- Can be used to compare the chemistry of:
  - Alternative polymer and additive options (petroleum-based and biobased)
  - Alternative manufacturing pathways for a single polymer
- Provides simple metrics & tools to track progress toward the development/selection of more sustainable plastics

**Plastics Scorecard  
Safer Chemistry Module**

**Preview**

# Plastics Scorecard:

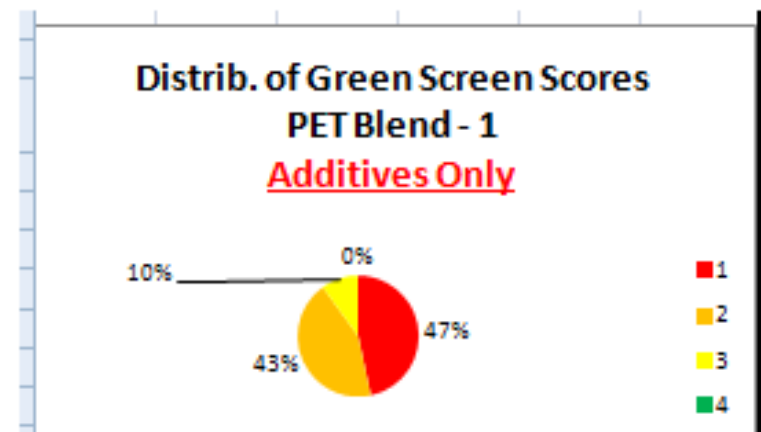
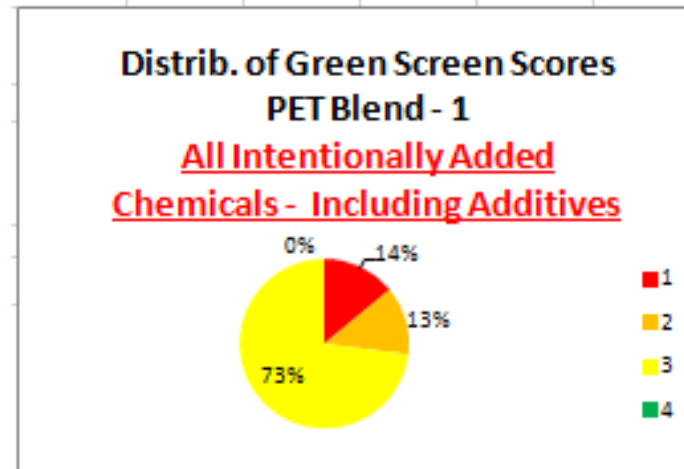
## Safer Chemistry Module – Polymer Mfg. Phase

### Polymer Manufacturing Phase

PET	Primary Chemicals		Intermediates				Monomer/Polymer			
<b>Pathway 1: DMT +</b>										
							<b>Monomer</b>	<b>Catalyst A</b>	<b>Catalyst B</b>	
					<b>Catalyst A</b>	<b>Catalyst B</b>				
Chemical	para-xylene	methanol	dimethyl terephthalate (DMT)	ethylene glycol	zinc oxide	manganese oxide	bis-(2-hydroxyethyl)-terephthalate (BHET)	antimony trioxide	antimony triacetate	
CAS	106-42-3	67-56-1	120-61-6	107-21-1	1314-13-2	11129-60-5	959-26-2	1309-64-4	6923-52-0	
% Input	40%	60%	61%	39%			99%			
Green Screen Score for Chemical	2	2	3	2	2	U	3	1	U	
Notes	Neurotox	Neurotox		Neurotox	very toxic to aquatic org.	No data	Risk Phrases 22-25	IARC Group 2B	No data	
<b>Lowest Scoring Chemical(s):</b>							<b>1</b>	<b>antimony trioxide</b>		
<b>Pathway 2: TPA +</b>										
							<b>Monomer</b>	<b>Catalyst A</b>	<b>Catalyst B</b>	
Chemical	para-xylene	acetic acid	terephthalic acid (TPA)	ethylene glycol			bis-(2-hydroxyethyl)-terephthalate (BHET)	antimony trioxide	antimony triacetate	
CAS	106-42-3	64-19-7	100-21-0	107-21-1			959-26-2	1309-64-4	6923-52-0	
% Input	70%	30%	63%	37%			99%			
Green Screen Score for Chemical	2	3	3	2			3	1	U	
Notes	Neurotox			Neurotox			Risk Phrases 22-25	IARC Group 2B	No data	
<b>Lowest Scoring Chemical(s):</b>							<b>1</b>	<b>antimony trioxide</b>		

# Plastics Scorecard: Safer Chemistry Module – Product Use Phase (Product Content)

PET Blend - 1			
Full Chemical Info. Avail.		Food Contact	
Lowest GS Score:		1	Flame Retardant B
Wtd average GS score for intentionally added chemicals in polymer blend:		2.59	
Wtd average GS score of additives only:		1.63	
			% Composition by Weight in Final Compound (recommended to include all chemicals > 100 ppm)
Cat.	Chemical	CAS No.	GS Score
Intentionally Added			
Polymers			
	Virgin PET	25038-59-9	3 0.7
Additives			
	Light stabilizer X		3 0.03
	Anti-Oxidant Y		2 0.04
	Colorant Y		2 0.09
	Flame Retardant B		1 0.14
Total		1.00	
Expected or Known Impurities			
Unreacted Monomers			
	bis-(2-hydroxyethyl)-terephthalate (BHET)		3
Oligomers			
	cyclic oligomers of PET		U



# Plastics Scorecard Framework

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## Agenda for 2012:

1. Pilot test *Safer Chemistry Module* to test, refine, and demonstrate the tool
2. Develop strategy for building out the tool

*We need your input!*

# BizNGO Sustainable Materials Workgroup

“If we paid closer attention to the materials that we produce, we could pay less attention to the impacts of those materials once they are released to the environment and people are exposed to them. Instead of investing in complex technologies for managing toxic pollutants and hazardous wastes and negotiating complicated institutional systems for permitting environmental releases and enforcing standards of human exposure, we could try to produce safer materials and use them more carefully.”

Kenneth Geiser

*Materials Matter: Toward a Sustainable Materials Policy, 2001*