



**EPA**

United States  
Environmental Protection  
Agency

# Design for the Environment

US EPA Voluntary Environmental Program

Activities for Manufacturers

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## Alternatives Assessments

- Action plan & work plan chemicals
- Criteria
- Community of Practice

## Safer Product Labeling

- Requirements for the DfE Label
- Value of the DfE Label
- DfE criteria drives development of safer chemicals

# Multi-Stakeholder Projects at DfE



- **Alternatives Assessments**
- **Safer Product Labeling**
- Lifecycle Assessments





# Alternatives Assessments

# What are Chemical Alternatives Assessments?



Broadly: **Alternatives Assessment** is a process for identifying and comparing potential chemical and non-chemical alternatives that can be used as substitutes to replace priority chemicals or technologies.

**DfE Chemical Alternatives Assessment** (full methodology on our web site):

- Convene Stakeholders
- Identify potential alternatives
- Evaluate priority chemicals & potential alternatives
  - » High, Moderate, or Low ratings for:
    - Human health effects
    - Environmental fate & effects
- Provide information manufacturers can use to create more sustainable products through “informed substitution” & help minimize potential for unintended consequences

# DfE Alternatives Assessments



- Tetrabromobisphenol A (TBBPA) in Printed Circuit Boards
  - » combustion testing underway
- Nonylphenol and Nonylphenol Ethoxylates (NP/NPE)
  - » final report May 2012
- Bisphenol A (BPA) in Thermal Paper
  - » draft report Summer 2012
- Flame Retardant Alternatives to Decabromodiphenyl Ether (decaBDE) Used in Many Plastics
  - » draft report Summer 2012
- Certain Phthalates
  - » list of potential alternatives Summer 2012
- Flame Retardant Alternatives to Hexabromocyclododecane (HBCD) in Insulation Board
  - » draft report Fall 2012



## Human Health Toxicity

- Acute Mammalian Toxicity
- Carcinogenicity
- Mutagenicity/Genotoxicity
- Reproductive Toxicity
- Developmental Toxicity
- Neurotoxicity
- Repeated Dose Toxicity
- Respiratory Sensitization
- Skin Sensitization
- Eye and Skin Irritation/Corrosivity
- Endocrine Activity

## Environmental Fate & Effects

- Aquatic Toxicity
- Environmental Persistence
- Bioaccumulation

## Additional Endpoints

- Physical Hazards
- Ecotoxicity (birds, bees)
- And more ...

# DfE Alternatives Assessment on Flame Retardants in Furniture Foam (2005)



Human Health  
Hazard Concern

Ecotoxicity  
Hazard Concern

Environmental  
Hazard Concern



Company	Chemical	% in Formulation <sup>3</sup>	Human Health Effects							Ecotoxicity		Environmental		Potential Routes of Exposure							Reactive or Additive?			
			Cancer Hazard	Skin Sensitizer	Reproductive	Developmental	Neurological	Systemic	Genotoxicity	Acute	Chronic	Persistence	Bioaccumulation	Worker			General Population			Aquatic				
														Inhalation	Dermal	Ingestion	Inhalation	Dermal	Ingestion					
Albemarle	SAYTEX RZ-243																							
	Proprietary E Tetrabromophthalate diol diester		L	L	L*	L*	L	M*	L	L	H	L?	L	N	Y	Y	N	N	Y	Y				Additive
	Proprietary B Aryl phosphate		L	L	M*	M*	M	M*	L	H	H	L	M	N	Y	Y	N	Y	N	N				Additive
	Triphenyl Phosphate CAS # 115-86-6		L	L	L	L	L	M	L	H	H	L	L	Y	Y	Y	Y	Y	Y	Y				Additive
Ameribrom	FR513																							
	Tribromoneopentyl Alcohol CAS # 36483-57-5		M	L	M	M	M	M	M	M	M	L	L	Y	Y	Y	N	N	Y	Y				Reactive
Great Lakes	Firemaster 550																							
	Proprietary F Halogenated aryl ester		L	L	M	M	L	M	L	H	H	L?	L	N	Y	Y	N	Y	Y	Y				Additive
	Proprietary G Triaryl phosphate, isopropylated		L	L	M*	M*	M	M*	L	H	H	L	M	N	Y	Y	N	Y	N	N				Additive
	Triphenyl Phosphate CAS # 115-86-6		L	L	L	L	L	M	L	H	H	L	L	Y	Y	Y	Y	Y	Y	Y				Additive
	Proprietary H Halogenated aryl ester		L	L	M	M	L	M	L	H	H	L?	L	N	Y	Y	N	Y	Y	Y				Additive



Others are conducting Alternatives Assessments using related methods:

- States and NGOs
  - Washington, Maine and TURI in Massachusetts
  - Clean Production Action's (CPA) Green Screen
  - Green Chemistry & Commerce Council (GC3)
- Companies and trade associations
  - HP
  - Nike
  - Phosphorous, Inorganic & Nitrogen Flame Retardants Association (PINFA)



# Safer Product Labeling Program



# DfE Label: Multi-Attribute, Lifecycle-Based



**Recognized for  
Safer Chemistry**

[www.epa.gov/dfe](http://www.epa.gov/dfe)

- Human health effects
- Environmental effects
- VOC content
- Packaging
- Auditing
- Ingredient disclosure

# The DfE Standard



- Whole product requirements,
  - pH and synergistic effects
  - Product performance
  - Ingredient disclosure
- Criteria for Safer Ingredients
  - Health & Environmental Endpoints
    - Surfactants
    - Solvents
    - Chelating Agents
    - Fragrances
    - Master Criteria (for all other ingredient classes)
- Partnership Agreement: 3 years
  - Audits

A photograph of a product label with the heading "RIGHT TO KNOW" in bold blue letters. Below the heading is a list of ingredients and their corresponding CAS numbers. The text is printed in blue ink on a light-colored background.

Ingredients	CAS#
Water .....	7732-18-5
Dipropylene glycol n-methyl ether .....	34590-94-8
Dodecanol ethoxylate .....	68131-39-5
Potassium carbonate .....	584-08-7
Sodium carbonate .....	5968-11-6

More information available at: [www.epa.gov/dfc](http://www.epa.gov/dfc)

# Value of the DfE Label



## Ensures the use of safer chemicals

- Chemicals not allowed:
  - Identified through authoritative lists
  - Analogs to listed chemicals are not allowed
- Chemicals allowed:
  - Criteria for Safer Ingredients
  - Data are required to meet these criteria
  - No data = fail



## DfE Criteria:

- Defines safer chemicals by functional use class
- Promotes development of safer chemicals
  - Surfactants (not previously in commerce) which are more rapidly biodegradable
  - Dow, BASF, AkzoNobel
- Drives generation of new test data
  - Biodegradation
  - Aquatic toxicity
  - Carcinogenicity
- Are the basis for GreenBlue's CleanGredients®
  - Database of safer chemicals

# Growth to Date



- **2,800+** safer products / **500+** manufacturers / **750+** million pounds of safer chemicals per year
- **≈ 1,900** of products are industrial and institutional
- **800+** consumer products and growing rapidly
- Range of product categories:
  - Kitchen and bathroom cleaners, laundry detergents, disinfectants, field paint, car and boat care products, industrial coatings
- Potential for expansion to:
  - Personal care products, lubricants, pesticides, adhesives and many more

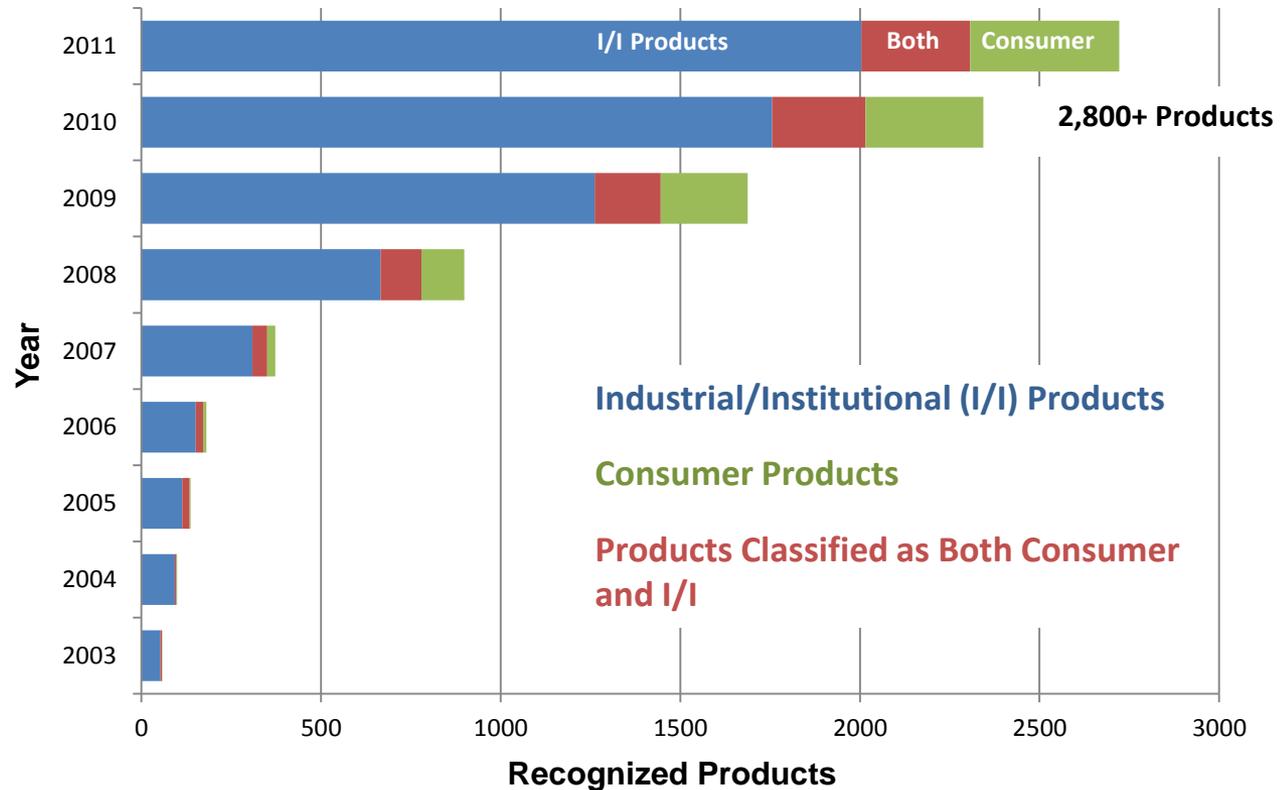


# Growth in Labeled Products



## Current Sectors:

aircraft cleaners, all-purpose cleaners, athletic field paints, automatic dishwasher products, biological-based products, car care, carpet cleaners, conversion coatings, degreasers, deicers, dish soaps, floor care products, graffiti removers, granite/stone cleaners, hand soaps, inkjet printing products, laundry products, marine/RV cleaners, kitchen/countertop cleaners, leather cleaners, metal cleaners/polishes, odor removal products, oven/grill/barbecue cleaners, pavement treatments, pet care cleaning products, toilet bowl cleaners, tub/tile cleaners, upholstery cleaners, window/glass cleaners, wood cleaners





# Thank you!

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