Dialogs Up and Down the Supply Chain: Challenges of Getting Safer Products to the Market Place

Greening Our Cleaning Products Supply Chain

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Cradle to Grave Supply Chain

Take → **Make** → **Waste**

Raw material extraction and synthesis

Manufacturing, production, distribution, use

Landfill, incineration

Supply Chain Impact
Growing Garbage Footprint

- **In year 1990, average American generated 2.5 lbs of garbage.**

- **Today each American generates nearly 5.0 lbs of garbage.**

Supply Chain Impact
Growing Plastic Beverage Bottle Footprint

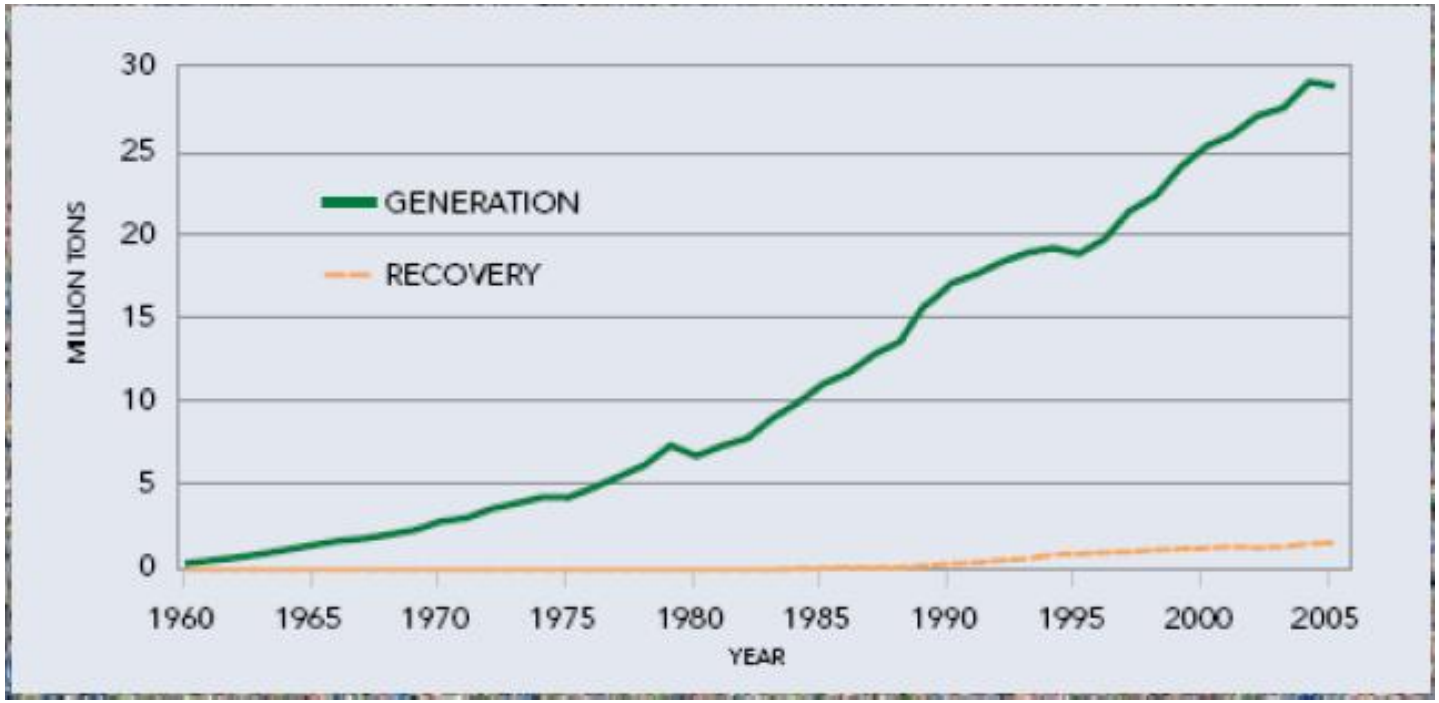
24 million plastic beverage bottles are discarded every minute in the U.S.

Supply Chain Impact
Growing Plastic Bag Footprint

750,000 plastic bags are discarded every minute in the U.S.

Supply Chain Impact
Growing Plastics Footprint

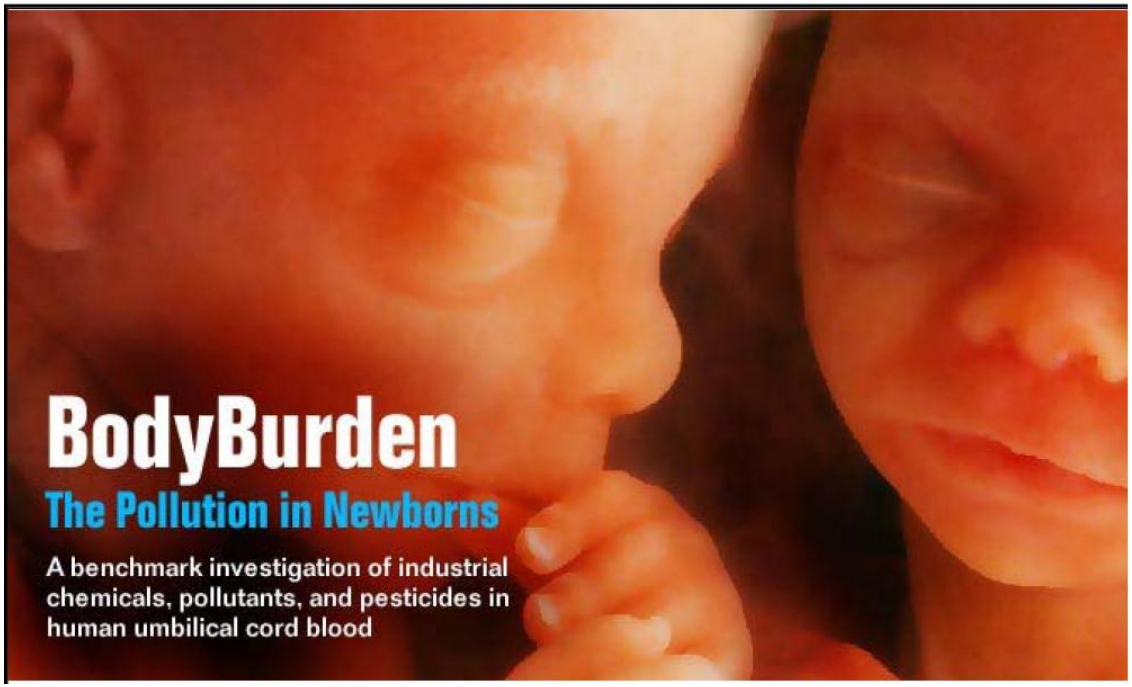
Only 3% of plastic is recycled in U.S.



Supply Chain Impact
Chemicals of Concern
Cell Phones That Become Toxic Garbage

420,000 cell phones are retired each day in the U.S.

Supply Chain Impact
Chemicals of Concern
Found in Newly Born Babies Blood

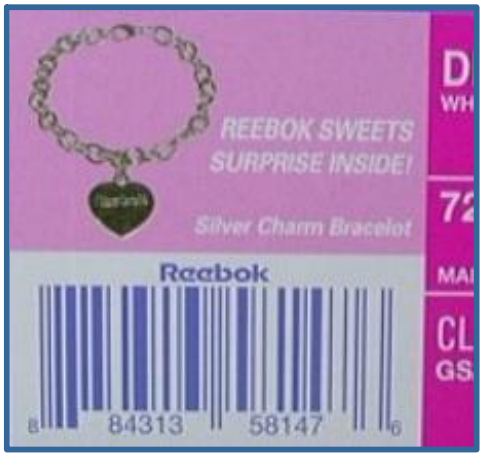


287

- **Tests show 287 industrial chemicals in 10 newborn babies**
- *Among the 287 chemicals found in the study, 134 can cause cancer, 151 can cause birth defects, 154 can cause hormone disruption, 186 are associated with infertility and 130 affect the immune system*

Supply Chain Impact
Chemicals of Concern
In Children's Toys

Supply Chain Impact
Chemicals of Concern
Promotional Silver Colored (99% Lead) Bracelet



EXAMPLE: Lead Poisoning: February 2006

•A four year old boy died of lead poisoning after swallowing the charm from a 'silver' bracelet that came with a pair of Reebok children's shoes.

•While the Consumer Products Safety Commission advises no more than 0.06% lead in jewelry sold in the US, the charm consisted of 99% lead.

•Reebok Recalls Bracelet Linked to Child's Lead Poisoning Death

Supply Chain Impact
Chemicals of Concern
Formulated into Professional Cleaning Products

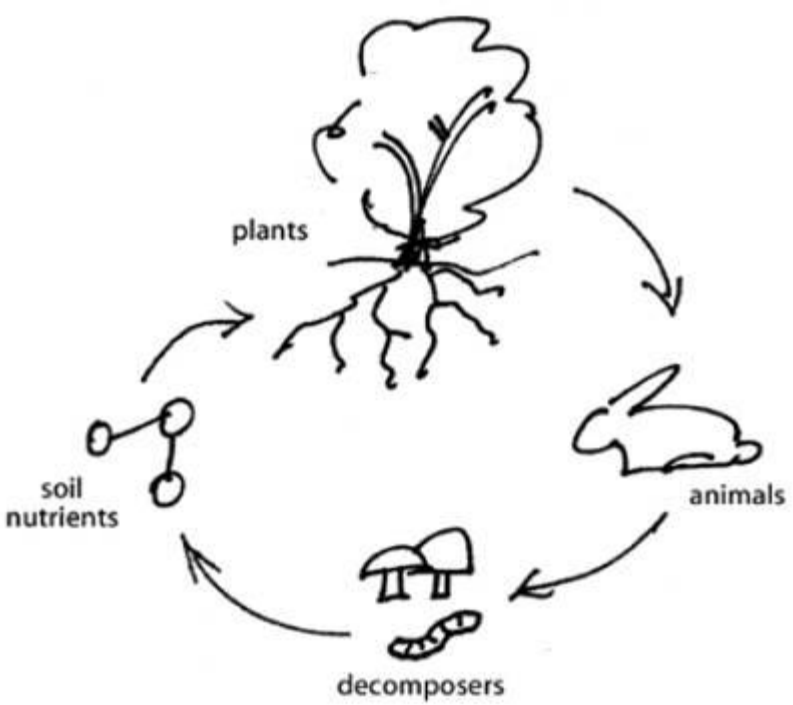
CHEMICAL OF CONCERN	CAS NUMBER	PRODUCT TYPES	HAZARD
Formaldehyde	50-00-0	Hand soaps, finishes and sealers	CARCINOGEN
Crystalline Silica Quartz	14464-46-1	Floor sweeping compounds	CARCINOGEN
Trichloroethane 1,1,1	71-55-6	Carpet spotters, laundry spotters and graffiti removers	CARCINOGEN
Paradichlorobenzene	106-46-7	Urinal blocks	CARCINOGEN
Amaranth (Red dye #2)	915-67-3	Colorant	CARCINOGEN
Saffrole	94-59-7	Fragrance	CARCINOGEN
Hydrofluoric Acid	7664-39-3	Mineral stain removers	HIGHLY CORROSIVE
Hydrochloric Acid	7647-01-0	Toilet bowl cleaners	HIGHLY CORROSIVE
Phosphoric Acid	7664-38-2	Toilet bowl cleaners; Tub and Tile Cleaners	HIGHLY CORROSIVE
Sodium Hydroxide	1310-73-2	Highly duty cleaners; Wax strippers and degreasers.	HIGHLY CORROSIVE
Dibutyl phthalate	84-74-2	Floor finishes and sealers	ENDOCRINE DISRUPTERS
Nonylphenol Ethoxylates (NPE)	9016-45-9	Glass cleaners, all-purpose cleaners and fragrances.	ENDOCRINE DISRUPTERS
Ammonium Hydroxide	1336-21-6	Wax strippers, all purpose cleaners and glass cleaners.	INHALATION IRRITANT

Our Mission

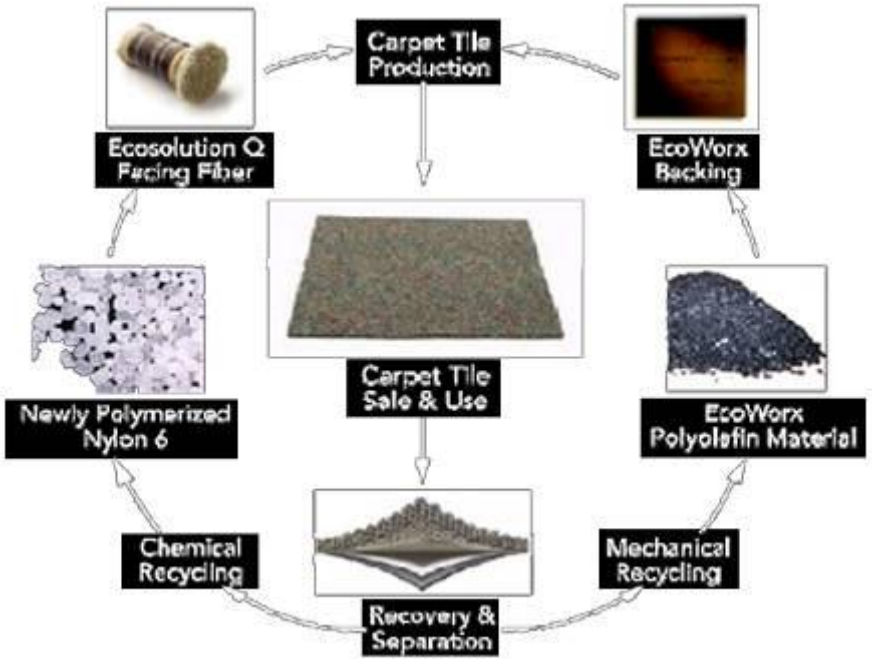
To eliminate the hazards of chemicals of concern from our own cleaning products supply chain and replace them with safer alternatives.

We selected supply chain partners that adopted a paradigm shift towards Cradle-to-Cradle (C2C)

This is How Nature Does it



This is How Humans Can Do it



GreenBlue

We Partnered with the EPA Design for the Environment Formulator Initiative to help us identify safer alternatives

Surfactants

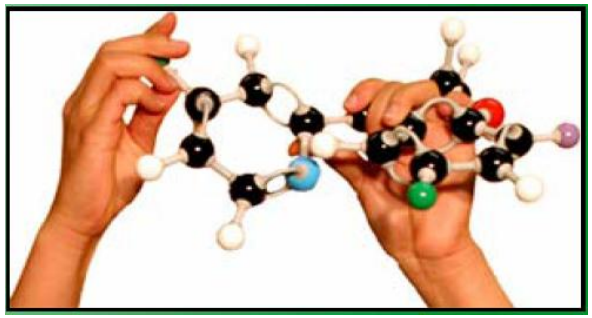
Of Concern	Improved	Sustainable
Alkyl phenol Ethoxylates degrade to more toxic and persistent byproducts	Linear Alcohol Ethoxylates degrade readily to less toxic byproducts	Alkyl polyglycosides are less toxic and degrade to nontoxic byproducts

Source: EPA Design for the Environment (DfE)

We Employed Green Chemistry and Design for the Environment Strategies and aligned with supply chain partners that educated us about value of greening our supply chain.

Green Chemistry is the **design** of chemical products and processes to reduce and/or eliminate substances **hazardous** to human health and the environment*.

*Anastas, P.T. and J. Warner. 1999. Green Chemistry Theory and Practice



Obstacles and barriers we encountered as we began to green our cleaning products supply chain?

- Supply chain confusion about “what is green?” and what is a safer alternative?
- To get suppliers to begin thinking and acting green.
- Perception that green products and safer alternative ingredients are too expensive and don’t perform
- Customers unwillingness to pay for environmental quality
- Need for affordable access to credible environmental, health and safety information about chemicals. Too many data gaps and poor data quality.
- Fear of green washing or being accused of green washing
- Typical resistance to change

Greening our cleaning chemical supply chain provided a driver for continuous process improvements

- Challenged us to take a careful look at chemicals, materials and products in our own brand cleaning product supply chain.
- Identified a list of chemicals of concern that were being used to formulate commercial cleaning products.
- Created an internal sustainable cleaning product design standard to guide us in our cleaning product design.
- Conducted a safer alternatives assessment working closely with several supplier partners that aligned with us or were willing to do a paradigm shift to gain competitive advantage.
- Began formulating or re-formulating a full line of commercial cleaning products with the objective of eliminating chemicals of concern and substituting safer alternatives without sacrificing performance.

CASE STUDY
Utilizing Green Chemistry to help green our supply chain

Applied the 12 Green Chemistry Principles when Designing Our Sustainable Cleaning Products

Green Chemistry Principle 1
Prevent Waste

- **<u>Conventional design</u>** – many cleaning products or their ingredients become waste at the end of their useful life.
    - Nonyl phenol ethoxylates

- **<u>More sustainable design</u>** – cleaning products become technical and/or biological nutrients rather than waste at the end of their useful life.
    - Alkyl polyglucosides

Green Chemistry Principle 2
Optimized Formulation and Production

- **Conventional design** – many cleaning products are designed to optimize the formulation and production to primarily benefit the manufacturer.
    - Water content is more than 75%

- **More sustainable design** – cleaning products are designed to optimize the formulation and production to benefit the entire supply chain from sourcing, manufacture, distribution, use and disposal.
    - Water content is less than 25%

Green Chemistry Principle 3
Focus on Eliminating the Hazard

- **<u>Conventional design</u>** – traditional approach to managing chemical risk is reducing exposure to what is called an "acceptable level." Acceptable to whom?
    - Formulate hand soaps or floor finishes using formaldehyde as a preservative or biocide.
- **<u>More sustainable design</u>** –guiding principle in green chemistry supports the Hippocratic protocol, **"first, do no harm."** If the hazardous chemical is not in the product then it can't harm us.
    - Formulate hand soaps or floor finishes using safer, non-formaldehyde preservative.

Green Chemistry Principle 4
Never Sacrifice Quality or Performance

- **Conventional design** – focuses on make products as cheap as possible to be the "low bidder" and spend resources defending quality when it is questioned.
  - Formulate "bid floor polishes" to meet minimum specifications..
- **More sustainable design** – focuses on make "lowest life cycle cost" product without sacrificing high quality.
  - Formulate high quality floor polishes that are durable, long lasting providing the best value and lowest total cost.

Green Chemistry Principle 5
Avoid volatile organic compounds (VOC) whenever possible

- **Conventional design** – make products that have a strong solvent smell to indicate to cleaning professionals the product is POWERFUL and STRONG.
    - Formulate with high levels of VOC and still meet California CARB regulations.
- **More sustainable design** – make products with zero volatile organic compounds to eliminate them from our indoor and outdoor air.
    - Formulate with zero or near zero VOCs.

Green Chemistry Principle 6
Design for Energy Efficiency

- **Conventional design** – make products using cheap builders that are difficult to rinse away and need to be used in warm water to perform well.
    - Energy consumption during life cycle is seldom considered when designing cleaning products.
- **More sustainable design** – make products designed to be energy efficient throughout the life cycle.
    - Cleaning products are formulated to be used in cold water and free of chemicals that require excessive water rinsing.

Green Chemistry Principle 7
Use Renewable Raw Materials

- **Conventional design** – make products using raw materials that are derived from oil, a non-renewable resource.
  - Formulate using petroleum derived surfactants or solvents.
- **More sustainable design** – make products using readily renewable materials
  - Formulate using plant derived surfactants or solvents.

Green Chemistry Principle 8
Avoid Unwanted Derivatives

- **Conventional design** – make products that require other chemicals to be used to make them work or neutralize their negative effects.
    - Formulate carpet cleaning products that produce moderate to high levels of foam requiring the use of anti-foaming or defoamer agents.
- **More sustainable design** – make products that do not require unwanted derivatives, by products or modifiers.
    - Formulate the carpet cleaning product so that it doesn't require the use of anti-foaming or defoamer agents.

Green Chemistry Principle 9
Use Catalysts Whenever Possible

- **Conventional design** – make products without synergistic considerations due to cost limitations.
    - Formulate floor coatings to be frequently burnished and recoated.
- **More sustainable design** – make products designed to be synergistic
    - Formulate floor coatings that are hardened by adding small amount of catalyst resulting in more durable coating to reduce need for burnishing and prolong need for recoating.

Green Chemistry Principle 10
Design for Degradation

- **Conventional design** – make products containing ingredients that are toxic, bioaccumulate or persist in the environment and justify by providing exposure controls.
    - Formulate using PFOA into floor finishes and carpet protectants.
- **More sustainable design** – make products designed to readily biodegrade into benign substances or become biological nutrients.
    - Formulate by eliminating PFOA and replace with non-PBT alternative identified by using informed substitution.

Green Chemistry Principle 11
Pollution Prevention

- **Conventional design** – make products that become pollutants.
    - Cleaning product packaged in single-use containers that are not readily recyclable or reusable.
- **More sustainable design** – make products designed to eliminate pollutants
    - Cleaning product packaged in refillable containers.

Green Chemistry Principle 12
Minimize the Potential for Accidents

- **Conventional design** – make products that require personal protection equipment like gloves and goggles to be used to protect against hazards.
  - Formulate toilet bowl cleaner with 23% hydrochloric acid and require gloves, goggles and special safety training.
- **More sustainable design** – make products that do not require personal protection equipment or special safety procedures to be implemented.
  - Eliminates hydrochloric acid and formulate toilet bowl cleaner with non-acid safer ingredients that require no gloves, goggles or special safety training.

What is the cost of a product?

Write down on a piece of paper
the cost of the last automobile you purchased.

Did you include:

- ❑ cost of auto insurance?
- ❑ cost of financing?
- ❑ cost of fuel?
- ❑ cost of regulatory compliance?
- ❑ cost of maintenance?
- ❑ cost of depreciation?

Life Cycle Costs

- Initial price of the product
- Cost of handling and use of the product
- Cost of product disposal, recycling or reuse

We challenged each stakeholder in the supply chain to consider the impact of life cycle costing and creating value by reducing those costs.

PARADIGM SHIFT

Beginning to green our cleaning product supply chain moved us from basic compliance and controlling exposure towards value creation and hazard elimination.

Traditional Approach

- Assure Compliance
- Minimize Risk
- Maintain Health
- Protect the Environment
- Control Exposure

Emerging Value Creation

- Improve Productivity
- Build Credibility
- Promote Innovation
- Enable Growth
- Eliminate Hazard

THANK YOU