



# Green Chemistry Regulations and Standards

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# Session Overview

- Brief overview of NSF International and our involvement in Green Chemistry
- Drivers for Incorporating Green Chemistry and Examples of Solutions
- Green Chemistry Standard Project
  - Scope, Stakeholders, Status
- Questions and Discussion

# NSF is a Global Leader in Public Health and Safety

- Developer of 49 national consensus standards
- Service provider to over 12,000 companies in 100 countries
- Partner with key government agencies
- Collaborating Centre for the World Health Organization



# NSF Provides Public Health and Safety-Based Services

- Consensus Standards Development
- Product and Materials Testing and Certification
- Education and Training
- 2<sup>nd</sup> and 3<sup>rd</sup> Party Auditing Services
- Product Testing and Development
- Quality and Environmental Systems Registration
- Toxicology and Laboratory Services
- Regulatory Compliance Assistance
- Organic Certification

# Drivers for Incorporating Green Chemistry

- Response to Environmentally Preferable Purchasing
- Desire for product recognition/certification
- Desire for decreased liability
- Desire for increased sales due to differentiation in marketplace
- Response to chemical bans & phase-out initiatives
- Response to increased public awareness
- Desire to meet internal corporate objectives
- Desire to innovate and to develop new green products

Reference: L. Heine. & T. McGrath. Ch. 8. Tools and Strategies for greening Chemical Inventories in Small Businesses. Green Chemistry Metrics: Measuring and Monitoring Sustainable Processes. Eds A. Lapkin & D. Constable. Blackwell Publishing Ltd. 2009.

# EPP and Desire for Product Recognition/Certification

## **Driver:**

In the US, 64% of government departments or agencies have green procurement policies

## **Solution Examples:**

- Chemical products:
  - EPA Design for the Environment (DfE) Program
  - Ecolabeling programs for cleaning products, other consumables

# EPA's Design for the Environment

Formulator Recognition Program for safer product formulations

- Cleaning products: Household & I/I
  - Biological-based Products
  - Deicers
  - Industrial Coatings/Aircraft conversion coatings
  - Inks
  - Paints
  - More...see [www.epa.gov/dfe](http://www.epa.gov/dfe)
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- Encourages informed substitution for chemicals of concern
  - Helps companies win bids for EPP



# EPP and Desire for Product Recognition/Certification

## **Driver:**

Popularity of green building schemes, such as LEED and Green Globes

## **Solution Examples:**

- Building Products:
  - NSF standards for Carpeting, Resilient Flooring, etc.
  - BIFMA e3 Sustainable Furniture Standard partnership
  - Indoor air quality standards such as CA 01350 and GreenGuard

# Chemical Bans and Phase-out Initiatives

## **Drivers:**

- California Green Chemistry Initiative proposes to identify hazardous chemicals and encourage the use of alternatives
- State initiatives to ban products containing chemicals such as bisphenol A and phthalates
- International regulations such as REACH are also impacting U.S. businesses

## **Solution example:**

- NSF Green Chemistry Program offers Alternative Analysis
  - Supported by risk assessment and hazard assessment services

# Increased Public Awareness and Desire to Meet Corporate Objectives

## Drivers:

- Consumers are demanding “Greener” products
- Recent studies\* suggest that most consumers:
  - Are willing to pay a premium for green products
  - Want advice they can trust in evaluating green product claims
  - Consider a store’s green credentials when deciding where to shop
  - Think it is important for companies to provide information about environmental impacts

**\*Reference: BCG Report, Capturing the Green Advantage for Consumer Companies. January 2009.**

# Increased Public Awareness and Desire to Meet Corporate Objectives

Retailers are responding with solutions:

- Home Depot Eco Options
  - 5 Key Categories: Energy Efficiency, Water Conservation, Healthy Home, Clean Air, Sustainable Forestry
- Wal-Mart Sustainability Index
  - Step 1: Supplier Assessment
  - Step 2: Life Cycle Analysis Database
  - Step 3: Comprehensive Tool for Consumers

## **Solution example:**

- New tools for suppliers and retailers for managing the product supply chain (ex. TruCost)

# Solution Example: TruCost



TruCost measures product & supply chain environmental impacts

- Carbon footprinting
- Greenhouse gas emissions
- Raw material use & waste production
- Economic impacts
- “Hot spots” and liabilities in the supply chain





# Desire to Innovate and to Develop New Green Products

## **Drivers:**

- Need for a common communication tool from the chemical formulation stage to downstream chemical users and product formulators
- Use of a common tool that allows comparisons to be more easily made by chemical specifiers and purchasers

## **Solution:**

- Development of a consensus standard that defines metrics for the incorporation of green chemistry principles into the chemical enterprise

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# GCI and NSF Partnership

- GCI and NSF are partnering on a greener chemistry standards initiative in order to serve the broadest community of green chemistry stakeholders



# ACS Green Chemistry Institute®

- Incorporated in 1997; became part of ACS in 2001
- Mission is to “enable and catalyze the implementation of green chemistry and green engineering into all aspects of the global chemical enterprise”.
- Primary activities are hosting events, publishing materials, and increasing the public’s knowledge of green chemistry
  - Green Chemistry and Engineering Conference
  - Formulator and Pharmaceutical Roundtables

# Stakeholder Involvement

- Chemical manufacturers
- Chemical purchasers/users
- Product formulators and manufacturers
- Government (EPA and states)
- Academic and research institutions
- Consultants
- Green chemistry organizations
- Other interested parties

# What does a Green Chemistry Standard Look Like?

- Twelve Principles of Green Chemistry as defined by Anastas and Warner provide the framework for the practice of green chemistry
- Community of green chemistry practitioners has developed around the Twelve Principles
- Series of awards in the U.S. and other countries encourage adoption of the green chemistry principles
- Regulations are starting to require incorporation of green chemistry principles

# What does a Green Chemistry Standard Look Like?

- Initial stakeholder discussions have focused on defining scope of the standards activity
- Stakeholders developed white papers for others to consider
- Inventory of what processes and tools already exist that could be used as a foundation
- Assess the needs of the audience for the standard

# Principles → Standard?

- Users of the standard need the means to operationalize the green chemistry principles
- Concern about encroaching on the historical definition of “green chemistry”
  - Stakeholders decided the standard will define “greener” chemical products and processes
  - ▶ NSF/GCI 355 Greener Chemical Products and Processes Standard

# Standards Development Processes

- International (ex. ISO, IEC), regional (ex. CEN), and national systems (ex. ANSI, BSI)
- In U.S., many different types of organizations develop private sector standards
- Diverse standards development processes are used, typically categorized as either proprietary or consensus

# NSF Brings Industry, the Public Health Community, and End Users Together



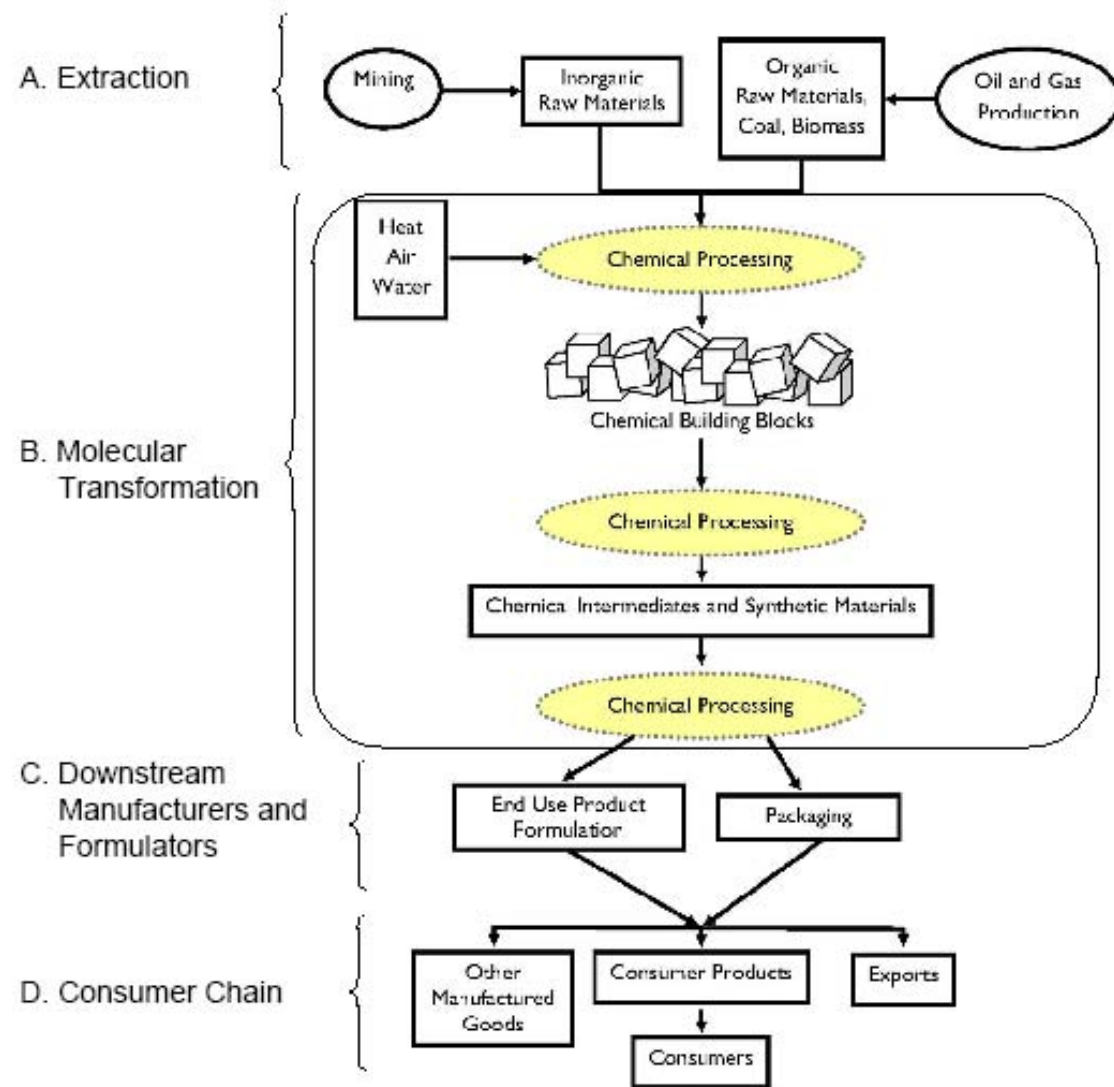
# NSF/GCI Project Initiation

- ANSI PINs filed in February 2009
  - NSF/GCI 355 Green chemicals
  - NSF/GCI 356 Green chemistry processes
- Kick off meeting held March 4-5, 2009
- Task Groups have been meeting
  - Project Boundaries
  - Greener Chemical Characteristics
  - Greener Chemical Processes
  - Project Integration

# Project Boundaries

- Charged with determining the scope of the initial version of the standard
- Scope will likely focus on the “molecular transformation” phase of the supply chain
- Future work on the standard may extend the scope to other segments of the supply chain

# Proposed Scope of the Standard



# Greener Chemical Characteristics

- Developing reporting criteria for the following areas related to chemical characteristics:
  - Safety
  - Health
  - Ecological impact
  - Renewability (bio-based)



# Greener Chemical Processes

- Developing reporting criteria for the following areas related to chemical processes:
  - Energy usage
  - Materials and waste prevention
  - Water usage
  - Safety
  - Social responsibility
  - Innovation



# Project Integration

- Coordinate the combination of the two components into a cohesive standard
- Ensure consistency with green chemistry and engineering principles





# NSF/GCI Challenges

- Assessing emerging areas of concern such as endocrine disruption and new technologies and processes
- Inclusion of issues such as consideration of risk and social responsibility within the project scope
- Providing a standard with the broadest range of utility

# NSF/GCI Challenges

- Reporting format of the communication to be decided
  - Narrative report
  - Nutritional label
  - Spider plots
  - Histogram
  - Combination?

Environmental Facts	
<b>Manufacturing:</b>	
Product Mass	2573 g
Content Sustainability:	
Post-consumer Recycled input	12%
Recyclable from product	74%
Renewable	17%
Process Impact:	
Carbon Footprint (thru mfg)	393 kg
Energy Used	457 MJ
Recoverable	7%
<b>Product Usage:</b>	
Power Demand:	
Hibernation	0.01 w
Stand By	0.2 w
Normal	47 w
Max	63 w
<b>Ingredients:</b>	
Regulated:	
Lead (Pb), exempt applications	0.2 g
Bromine (Br), exempt applications	23.6 g
Chlorine (Cl)	0.04 g
Other Halogens	5.4 g
REACH Candidate SVHCs >0.1%:	
Dibutyl phthalate	
Bis(2-ethylhexylphthalate) (DEHP)	
Other Ingredients >0.1%:	
iron, copper, ABS plastic, epoxy, nickel, tin, bioplastic, aluminum, silicon, tantalum, silver, titanium, chromium, boron, ruthenium, palladium, indium, beryllium, calcium	
Other Ingredients <0.1%:	
mercury, hexavalent chromium, PBBs, PBDEs, cadmium (<0.01%)	

# NSF/GCI Project Timeline

- Task Groups continue to meet into Fall 2009
- Next Stakeholder face-to-face meeting in Oct. 2009
- Goal: Initial draft complete by end of 2009
- Goal: Ballot and finalize standard by mid-2010



# Participation in the Project

- All meetings and conference calls are open to interested parties
- Voting membership is determined by an application process
  - Voting members determine consensus
- All other interested parties can actively participate and comment on the standard

[http://standards.nsf.org/apps/group\\_public/workgroup.php?wg\\_abbrev=greener\\_chemical\\_prod\\_and\\_proc](http://standards.nsf.org/apps/group_public/workgroup.php?wg_abbrev=greener_chemical_prod_and_proc)

# Standards can be funny!





# Questions?

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# Discussion Topics

- 1. Is your organization likely to find a greener chemical products standard useful – why or why not?**
- 2. What are other potential unmet needs in the green chemistry community that could be addressed with consensus standards?**