Chemicals without Harm

Policies for a Sustainable World

Ken Geiser
Lowell Center for Sustainable Production

March 14, 2016
A unique collaboration of companies and NGO’s working to advance safer chemicals in products

Visit BizNGO

Mark S. Rossi, PhD
Executive Director, Clean Production Action
Chair, BizNGO
Questions?

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- Presentation and recording will be available at www.bizngo.org
Chemicals without Harm
Policies for a Sustainable World

Ken Geiser
Lowell Center for Sustainable Production

March 14, 2016
There is a problem with chemicals:

Too many of the products that we need and use are made with hazardous chemicals.

BPA is found in 9 out of 10 Americans

232 toxic chemicals are found in umbilical cord blood of newborns in the US
The Conventional Federal Policy Response to Hazardous Chemicals

Federal Chemical Control Laws on the 1970s
• Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
• Federal Food, Drug and Cosmetics Act (FFDCA)
• Toxic Substances Control Act (TSCA)
• Consumer Product Safety Act of (CPSA)

For some 40 years we have relied on government regulations to manage the risks of dangerous chemicals
Limits of Federal Chemical Control Laws

• The laws depended on government to determine risks
• The processes focused on exposure control (risks) rather than reducing inherent hazards

• The processes addressed chemicals one-by-one
• The laws did not generate sufficient chemical information

• The processes have been slow, adversarial and costly
• The laws have not stimulated green chemistry and safer chemicals
Reforming the Toxic Substances Control Act

- Senate — S. 697
  - Creates Safety Assessments, Safety Standards, Safety Determinations
  - EPA identifies 10 High Priority Substances per year with 25 maximum and 10 Low Priority Substances with 25 maximum
  - States are pre-empted when EPA begins an assessment
  - Develops a Sustainable Chemistry Program
  - Sets a fee

- House — H.R. 2576
  - EPA conducts 10 or more Risk Evaluations per year
  - States are pre-empted when EPA finds a substance poses no unreasonable risk
  - EPA publishes a list of Persistent, Bioaccumulative and Toxic Substances
  - Sets a fee

TSCA reform will provide necessary, but modest improvements
The Push for Safer Chemicals is Widespread

- Consumers are looking for safer chemical products
- States are generating safer chemical laws and policies
- NGOs are driving safer chemical market campaigns
- Foreign and international governments are setting global chemicals policy
- Product manufacturers are establishing internal corporate chemicals policies
- Retailers are creating chemical screening programs
- Chemists are synthesizing new chemicals that are safer for human health and the environment
There are many safer chemical initiatives...

...however, they are fragmented and not scaled to adequately address the chemicals problem
We need to build a Comprehensive Safer Chemical Strategy

Consumer Awareness
NGO Campaigns
Brand Manufacturer Programs
Retailer Chemical Initiatives
International Government Policies
Green/Sustainable Chemistry
Safer Chemical Businesses

Strategy

The Chemicals Problem:
The Chemicals Economy
First Step: Reframe the Chemicals Problem

• Shift from a focus on controlling hazardous chemical risks in wastes, workplaces and products to a focus on converting the chemicals market and chemical industry to inherently safer chemicals
Shifting the Chemicals Problem Focus

The Chemicals Economy
- Chemicals in Production
- Products
- Workplaces
- Wastes

Chemicals in Wastes
- Pollution, Dumpsites

Chemicals in Workplaces
- Worker Hazards

Chemicals in Products
- Consumer Hazards

The Chemicals Economy includes Chemicals in Production, Products, Workplaces, and Wastes.
Second Step: Take a Systems Approach

• Consider the chemicals economy as a vast chemical production and consumption system and locate and press the most promising levers for change
Why focus on the Chemical Economy?

• Hazardous chemicals are the result of economic determinants
  – price, performance, competition, production efficiencies
• More fundamental solutions to can be achieved by examining the function and role hazardous chemicals play in the economy

• Raises questions such as:
  – What is the function of this chemical?
  – Is it necessary?
  – What other chemicals and functions are linked to this chemical?
  – Are there preferred alternatives on the market?
Why take a Systems Approach?

• Provides a big picture
• Incorporates life cycle thinking
• Reveals the linkages among chemicals

• Reveals the vulnerabilities and opportunities for intervening to make changes in the system
  – Regulate at the point of chemical use
  – Regulate at the point of chemical manufacture
  – Regulate at the point of emission or disposal
  – Provide technical assistance...where and to whom
  – Invest in research on alternatives
Principles for a Safer Chemicals Strategy

- **Comprehensive**—covers all chemicals
- **Transparent**—increases chemical information and public knowledge
- **Participatory**—engages multiple parties
- **Hazard-based**—focuses on intrinsic properties
- **Transformative**—transitions from high hazard to lower hazard substances
- **Innovative**—encourages research and green chemistry
Building Blocks for a Safer Chemicals Strategy

1. Set Goals and Plans
2. Characterize and Classify All Chemicals
3. Generate and Make Accessible Chemical Information
4. Work in Economic Sectors
5. Prioritize Chemical Groups in Sectors
6. Accelerate Substitution with Safer Alternatives
7. Promote Safer Alternatives
8. Reconstruct Government Capacity
1. Set National Goals and Plans

Models:
US EPA’s Clean Water Action Plan, Climate Change Action Plan
State Mercury Reduction Plans

European Union “Generational Goal”:

“By 2020...chemicals are only produced and used in ways that do not pose significant threats to human health or the environment”
2. Characterize and Classify All Chemicals

Preferred Chemicals
Use, but Periodically Review

Chemicals of Some Concern
Use, but with Care

Chemicals of Concern
Hazardous Chemicals
Seek Substitutes

Chemicals of Very High Concern
Highly Hazardous Chemicals
Avoid, phase out Use

Chemicals of Unknown Concern
Poorly Characterized Chemicals
Avoid, but promote Research

Universal Classification of Chemical Substances
Classifying Chemicals

Characterization Criteria

GHS—Globally Harmonized System for Classification and Labeling of Chemicals

WHO
Recommended Classification of Pesticides by Hazard

Internet
Public Review and Comment
AstraZeneca Solvent Selection Tool

Solvent Selection Guide

Solvent selection is a key part of process development. Because of the volumes used, solvents can often result in the biggest SHE impact of a process. This summary table assigns a score from 1 to 10 for each solvent under the respective categories with 10 being of concern and 1 suggesting few issues. This is further simplified by using colour coding with scores between 1 and 3 being green, 4 to 7 yellow and 8 to 10 red.

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<th>Substance</th>
<th>Name</th>
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<th>Safety</th>
<th>Health</th>
<th>Impact in Air</th>
<th>VOC Potential</th>
<th>Impact in Water</th>
<th>Potential Bioremediation Plan Used</th>
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</table>
ACS Green Chemistry Institute
Solvent Selection Guide

Scoring System: Five categories: safety, health, environment (air), environment (water), and environment (waste).

- Uses color coding to indicate rankings
  - Range 1 to 3 shown as green
  - 4 to 7 as yellow
  - 8 to 10 as red
3. Generate and Make Accessible Chemical Information

Promote Chemical Profiles on All Chemicals

Models:
- High Production Volume Chemical Challenge
- European Union REACH Chemical Dossiers

“No Data; No Market”
Tools for Generating Chemical Information

Models: EPA and European Tools for testing, screening, modeling, estimating

- **Hazard Assessments**
  - Authoritative lists
  - SARs, QSARs
  - EPA’s PBT Profiler, TEST
  - EPA’s Oncologic, ECOSAR

- **Release and Exposure Assessments**
  - TRI And PRTRs
  - EPA’s EPI Suite, ChemSTEER, E-FAST
  - Biomonitoring

- **Chemical Inventories**
  - EPA’s CDR
  - EU’s EINECS
  - Scandinavian product registries
  - NEMOA’s IMERC

- **Chemical Testing**
  - *Invivo - Invitro* lab testing
  - ToxCast, ToxRefDB
  - High throughput computational toxicology
4. Work in Economic Sectors

Why work in Sectors?

- Firms often use similar chemicals and have similar chemical problems
- Firms often share supply chains
- Multiple environmental problems can be solved at once
- Assessments of alternatives can be pre-competitive and considered collectively
- Firms can learn from and support each other
- Government initiative can leverage broader effects

Models: EPA’s Sectors Program, Common Sense Initiative
# Sectors with On-Going Safer Chemical Initiatives

<table>
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<tr>
<th>Sector</th>
<th>Promoters</th>
<th>Programs</th>
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<td>Health care</td>
<td>Health Care without Harm, Practice Greenhealth</td>
<td>CleanMed, Green Guide to Health Care</td>
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<td>EPA, GreenBlue Institute,</td>
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<td>Clothing and apparel</td>
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<td>Eco-labels, Eco-Index, Higg Index, Joint Roadmap for Zero Discharge, Environmental Product Declarations</td>
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<td>LEED, BASTA, Pharos, Environmental Product Declarations, Eco-labels</td>
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<td>ACS Green Chemistry Institute</td>
<td>Green Chemistry Pharmaceutical Roundtable</td>
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## Chemical Information Exchanges within Sectors

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<td>Automobile</td>
<td>Chemicals used in automobile assembly</td>
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<td>IPC 1752--Joint Industry Guide (JIG)</td>
<td>Electronics</td>
<td>Chemicals used in electronics</td>
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<td>BOMCheck</td>
<td>Electronics</td>
<td>Chemicals covered by REACH and the E,U. RoHS, Battery and Packaging Directives</td>
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<td>Outdoor Industry Association, Chemical Management Framework</td>
<td>Footwear and Apparel</td>
<td>Chemicals used in footwear and clothing production</td>
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<td>Cleangredients</td>
<td>Cleaning Products</td>
<td>Chemicals used in formulated cleaning products</td>
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5. Prioritize Chemical Groups in Sectors

Model: TSCA Work
Plan Chemicals Prioritization

Develop Candidate List of Chemicals for Prioritization
CMRs, PBTs, vPvBs
Chemicals of concern to vulnerable populations
Chemicals of concern by Sector

Hazard Score
Based on Chemical Classification Tiers

Human Exposure Score
Based on size of population, vulnerable populations and susceptibility, use and release

Environmental Exposure Score
Based on persistence, bioaccumulation, fate and transport

Calculate Chemical Score
Hazard Score + Exposure Score + Persistence/Bioaccumulation

If there are scores for Hazard, Exposure, Persistence and Bioaccumulation
Add scores for insufficient information for Hazard or Human Exposure or Environmental Exposure

Prioritize Chemical
Gather further Information
Grouping Chemicals

Grouping chemicals goes beyond the singular chemical focus—

Options:

• by chemical family
  – PFCs, halogens, heavy metals
• by end point
  – cancer, endocrine disruption, aquatic toxicity
• by exposure pattern
  – occupational hazard, hazard to children
• by function
  – flame retardant, stain prevention, degreasing
6. Accelerate Substitution to Safer Alternatives in Economic Sectors

Develop Economic Sector-Based Substitution Plans

Models:
- Massachusetts Toxics Use Reduction Plans
- Washington State Chemical Action Plans
- US EPA Chemical Action Plans
Methods for Assessing Alternatives

Alternatives Assessment Frameworks

Models:
- TURI/Lowell Center Framework
- EU-ECHA Framework
- Biz-NGO AA Framework
- IC2 AA Framework
- California Safer Consumer Product Regulation
- NAS Chemical Alternatives Framework
Tools for Assessing Chemical Hazards

- TURI Pollution Prevention Options Analysis System (P2OASys)
- German Column Model
- EPA’s SaferChoice (DFE Chemical Hazard Assessment) Framework
- Clean Production Action’s GreenScreen®
- Washington State’s Quick Chemical Assessment Tool (QCAT)
7. Promote Safer Alternatives

Green Chemistry and Engineering Centers

Models: Warner Babcock Institute for Green Chemistry
Center for Green Chemistry, University of Oregon
Institute for Green Science, Carnegie-Mellon
Center for Green Chemistry, UC Berkeley
Center for Green Chemistry and Engineering, Yale
School of Green Chemistry and Engineering, University of Toledo

Funding for Green Chemistry Research

Models: NSF Green Chemistry Basic Research Program
Green Chemistry Research and Development Bill
SaferMade
State Sponsored Green Chemistry Programs

• Michigan’s Green Chemistry Program
  – Green Chemistry Action Plan
  – Michigan Green Chemistry and Engineering Conference
  – Green Chemistry Governor’s Awards

• Northwest Green Chemistry
  – Workshops and technical assistance
  – Safer Chemicals Champion’s Awards

  – Center soon to be independent
## Businesses Making Safer Chemicals

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<th>Company</th>
<th>Characteristics</th>
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<tbody>
<tr>
<td>Segentis</td>
<td>Phthalate-free plasticizers</td>
</tr>
<tr>
<td>Metabolix</td>
<td>Chemical intermediates used in the production of resins, fibers, solvents, personal care products</td>
</tr>
<tr>
<td>SoyClean</td>
<td>Cleaners derived from soy and citrus, vegetable and seed oils</td>
</tr>
<tr>
<td>Air Products</td>
<td>Nonylphenol ethoxylates-free surfactants made from palm oil</td>
</tr>
<tr>
<td>Soy Technologies</td>
<td>Ready-to-use formulations for cosmetics, personal care products, paints and coatings</td>
</tr>
<tr>
<td>Allylix</td>
<td>Terpenes and derivatives for crop protection, biocides, flavors, fragrances and pharmaceuticals</td>
</tr>
<tr>
<td>SyntheZyme</td>
<td>Polyhydroxyalkanoate polymers and biosurfactants</td>
</tr>
</tbody>
</table>
8. Reconstruct Government Capacity

**Work within Current Federal Authorities**

- Promulgate new regulations and standards
- Set national goals and plans
- Collaborate in Economic Sector Work Groups
- Generate chemical information and databases
- Support Green Chemistry and Engineering

**Expand Federal Authorities**

- Reform current Chemical Control Statutes
- Create a new Chemicals Agency
A National Chemicals Agency

Develop a non-regulatory Federal Chemicals Agency

- collect and disseminate information
- promote chemical research
- conducts risk, life cycle and alternatives assessments
- promote safer alternatives

Models: Swedish Chemicals Agency (Kemi)

A supervisory authority that works within Sweden and the EU to promote legislation and programs that contribute to achieving “A Non-Toxic Environment”.

European Chemicals Agency

The Agency’s mission is to ensure consistency in chemicals management across the EU and to provide technical and scientific advice, guidance and information on chemicals.
We can solve the Chemicals Problem
We can have a vibrant, productive and safer economy

It will take a broad and inclusive movement for safer chemicals

For more information

www.materialspolicy.org
Questions?

• Post your question to the Questions pane in your GoToWebinar Control Panel

• Any unanswered questions can be asked at bizngo@cleanproduction.org

• Presentation and recording will be available at www.bizngo.org