

***Is it
necessary?***

**Going for the
gusto with
green
chemistry**



Presented by Dorothy
Wigmore
Worksafe Inc.

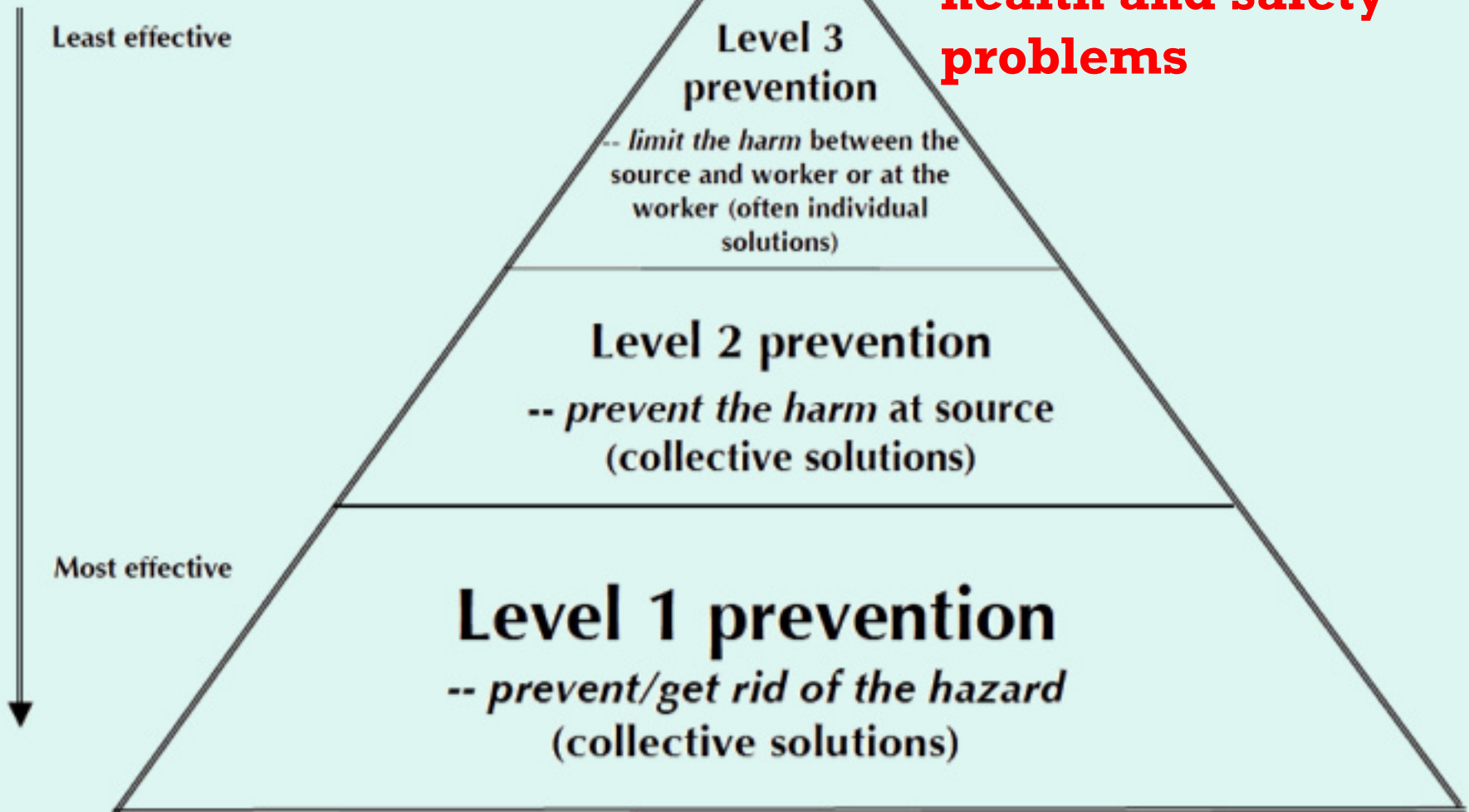


CARWH 2014



The prevention triangle:

**principles for solving
health and safety
problems**

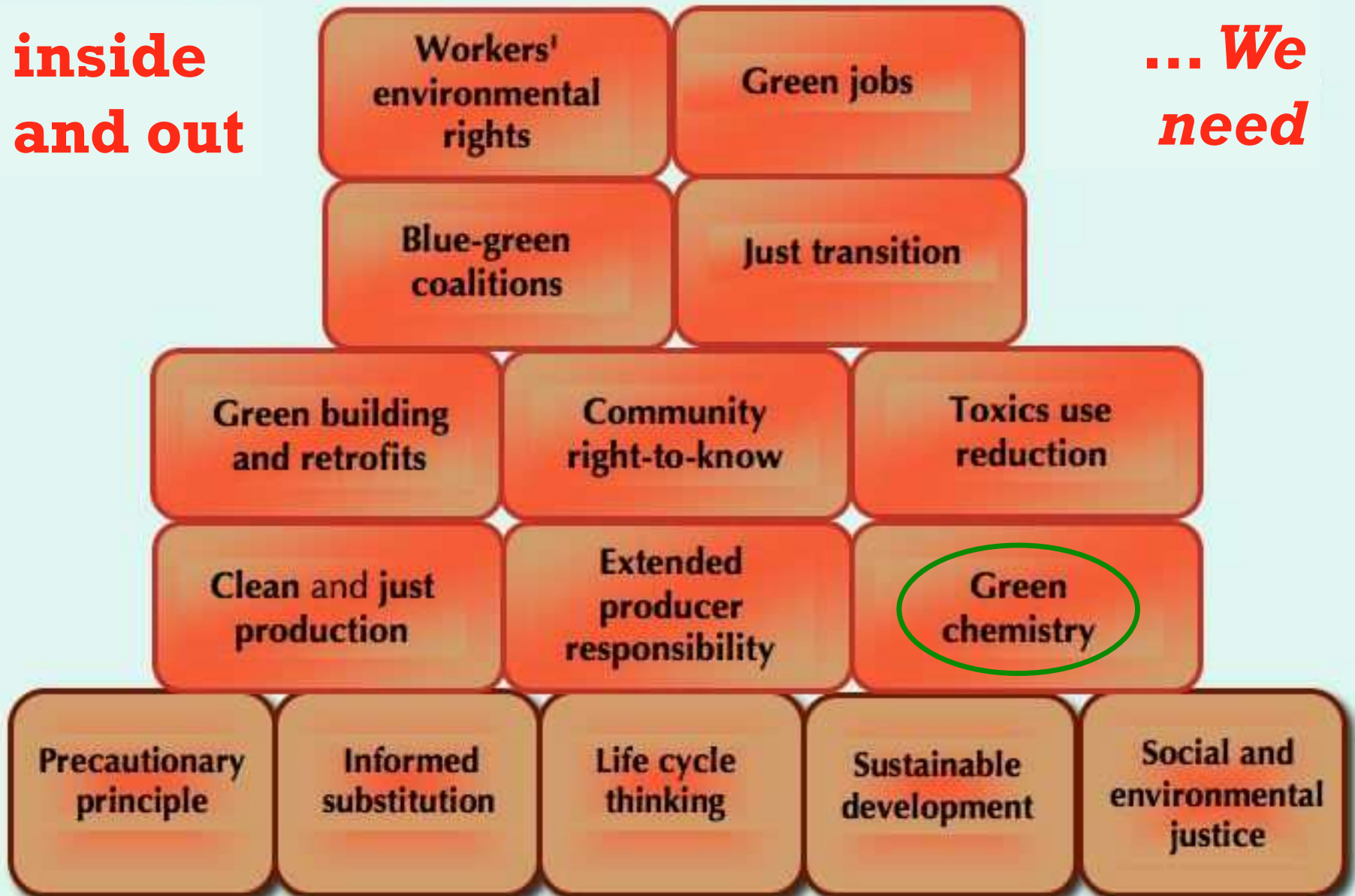


* What happens if it's upside down? It falls over!

For a healthy environment ...

**inside
and out**

**... We
need**



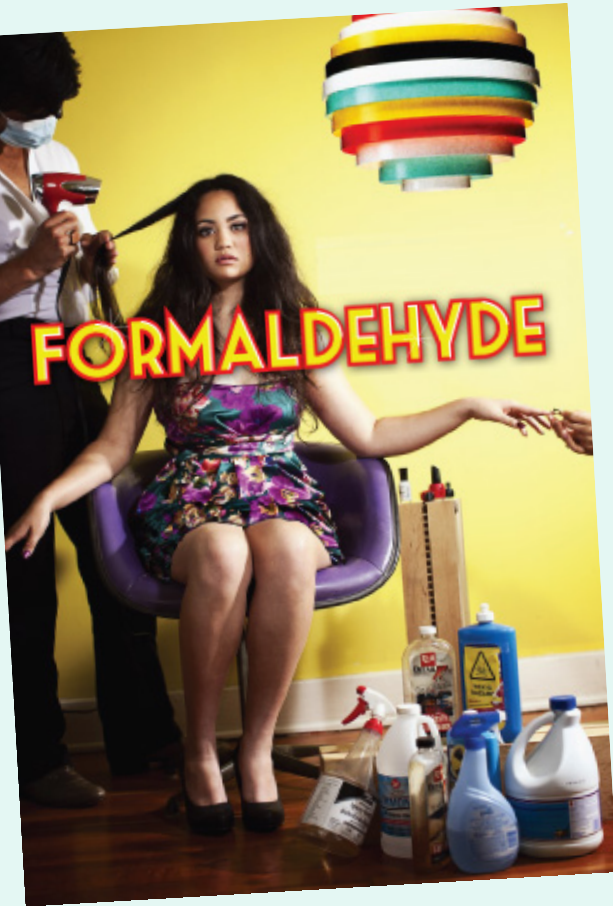
Why are toxic chemicals used now?



- by “accident”?
- on purpose?

There is a method to the madness

The reactionary principle – don't worry 'til we have to



- ☐ design new chemicals, materials and technologies without thinking about how they could affect people's health and/or the environment.
- ☐ *demand 100% proof about the harm from each hazard before doing anything about it. Tackle hazards one at a time.*
- ☐ expect the public and government to prove something is harmful, after it is on the market, and keep chemical information secret ("confidential business information").
- ☐ *use the "Delay game" as long as possible.*
- ☐ discourage a public voice – including workers' and consumers' experiences -- about the need to deal with these hazards.

Delay game - the four dog defence



My dog doesn't bite.



My dog bites, but it didn't bite you.



My dog bit you, but it didn't hurt you.



My dog bit you, and hurt you, but it wasn't my fault!

**You're running the world.
You get to design products
and what goes into them.**

**Think of the plastic name
tag you're wearing, or the
phone you're using.**

**What “rules” would you
have so that workers
making them don't get
sick?**



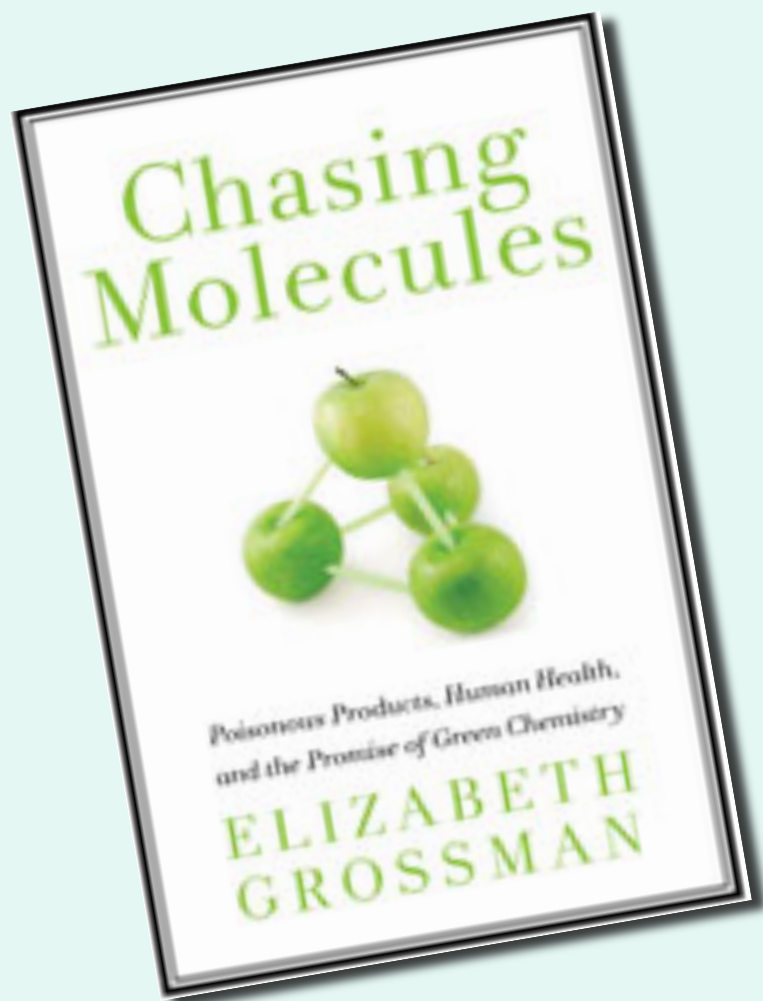
Hwang Yu-mi died at the age of 23 of leukaemia after working in a South Korean Samsung semiconductor factory. Her job was applying heat to semiconductor plates and using gas or chemical solution to smooth their surface. After two years of work, she came down with leukemia and died two years after that.

The precautionary principle -- better safe than sorry



- ✓ Take action to prevent harm, even if we are not sure about (all) the hazards.
- ✓ Shift the "burden of proof" to companies. Before it is sold, used or put on the market, make them prove that something will not harm people or the environment.
- ✓ Look at a lot of options or alternatives. Go for the non-toxic or least toxic.
- ✓ Increase public participation. Be democratic. Make sure that workers, consumers, and environmentalists are in all conversations and decisions about how to deal with chemicals and products.

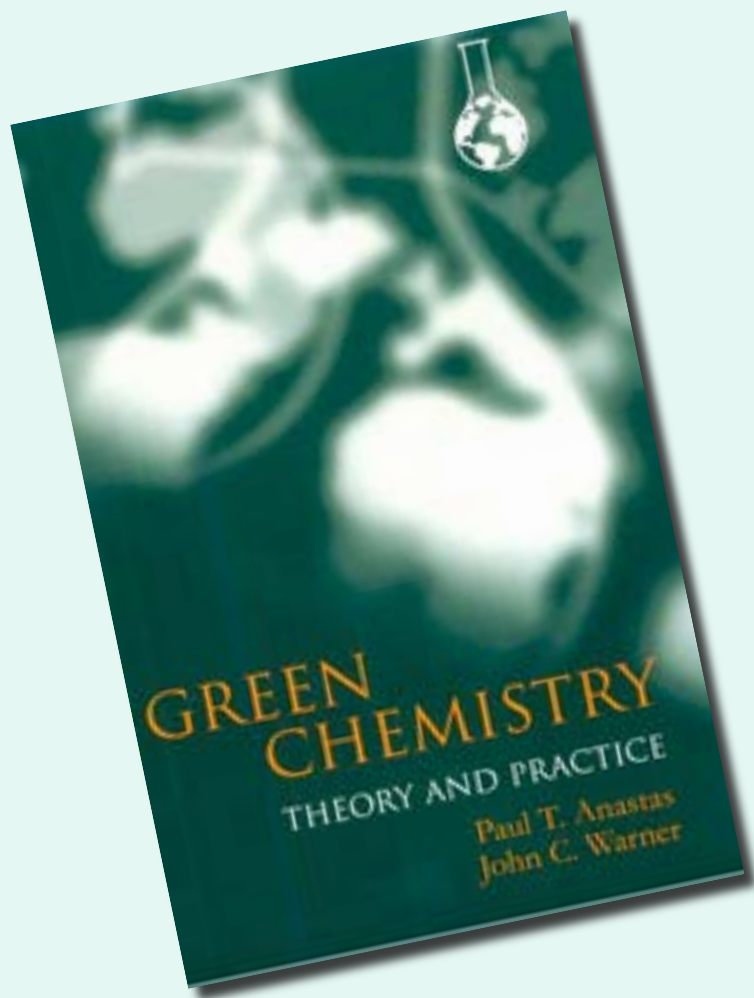
It's the hazards, stupid!



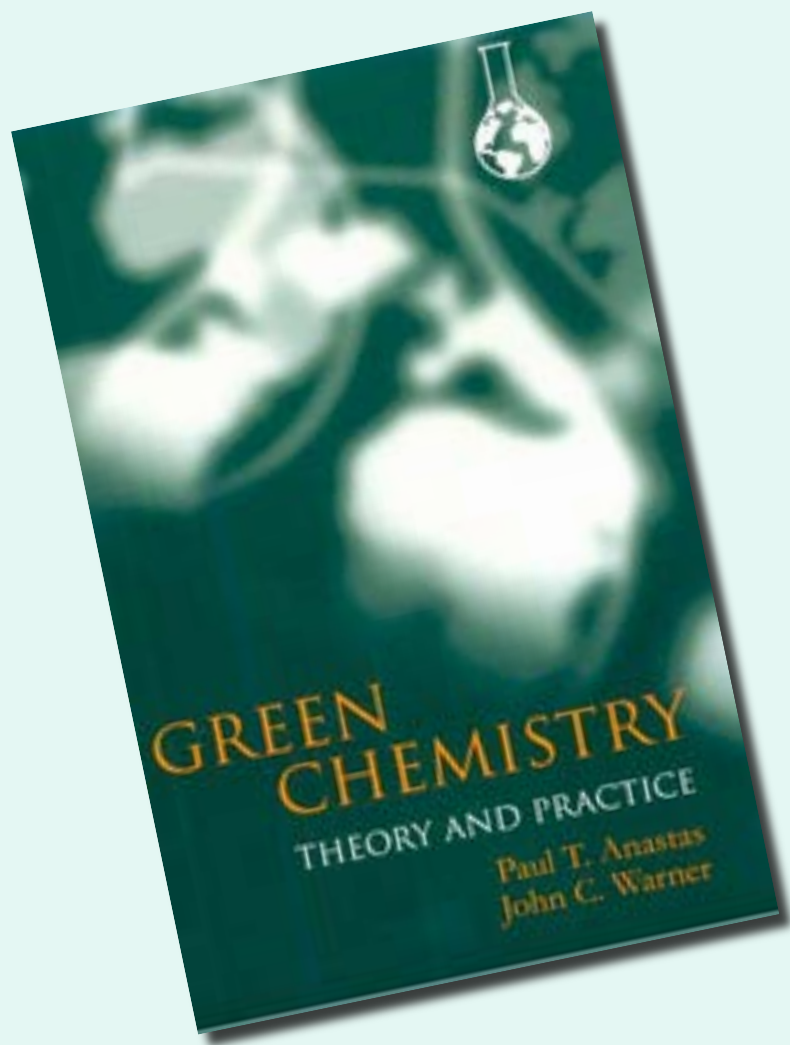
Prevention requires focussing on the chemical's hazard, not the risk it will harm (so why talk of “risk factors”?).

It's not about “safe” exposure levels or “controlling” the hazard.

Green chemistry is ...



- ✓ asking “Is this chemical/ product necessary for this task?”
- ✓ about prevention -- using the precautionary approach
- ✓ better recipes -- designing safer chemicals, products and processes for healthier people, communities and environments
- ✓ not having to say you’re sorry (or making it less likely)



*Green chemistry is the **design** of chemical products and processes that reduce or eliminate the **use and/or generation** of hazardous substances.*

John Warner, Warner Babcock
Institute for Green Chemistry
*Green chemistry: The missing element
in chemistry education*, presented
October 15, 2014 in the Green
Chemistry Webinar series.

Green chemistry ...

.. is a framework for the design of products and processes such that the goals themselves, e.g. degradability or less toxic products, are essential performance criteria.

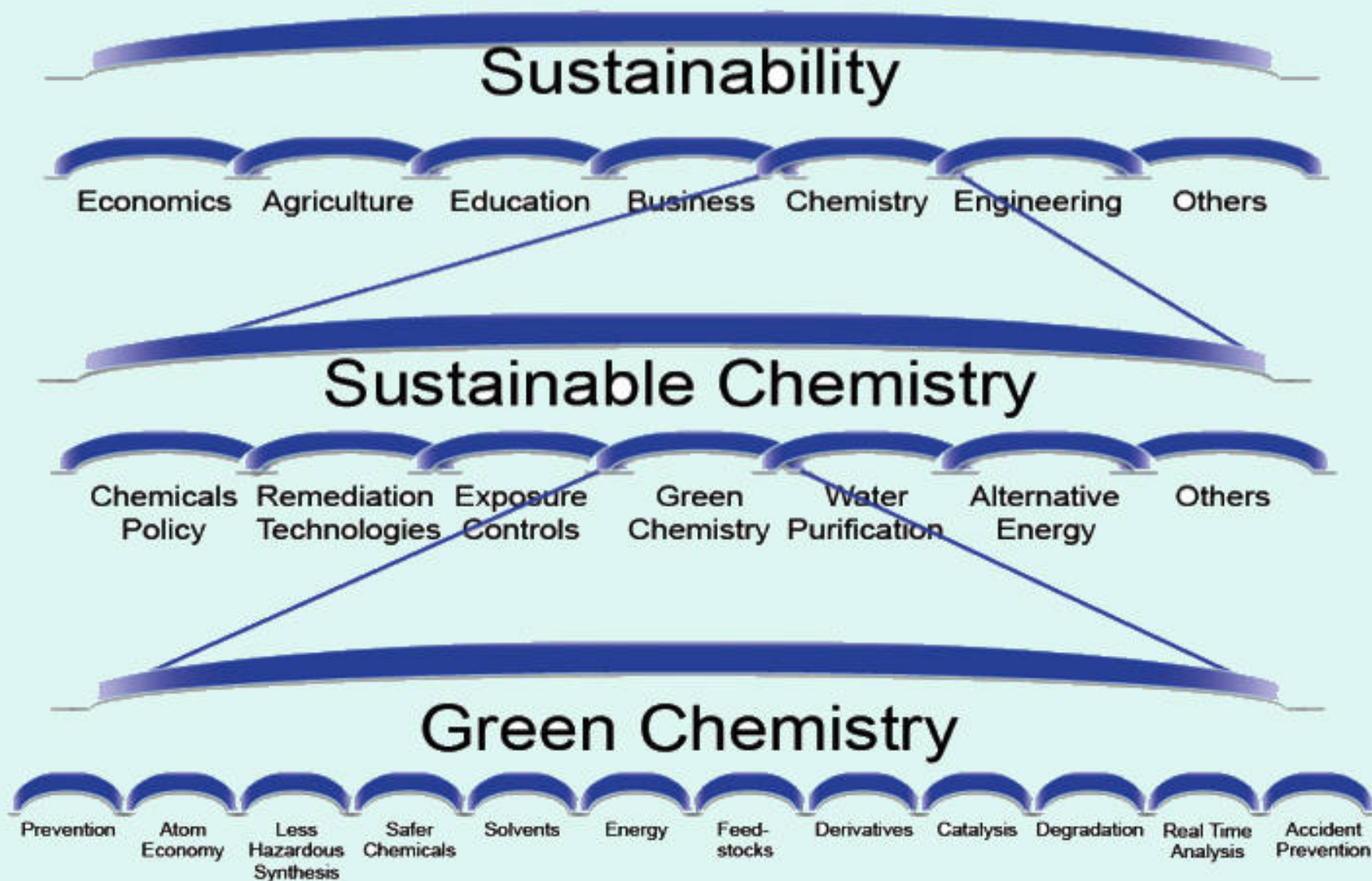
It will be important that these goals are intrinsic design specifications. In that way, it will be obvious that when a hazardous and unsustainable product or process is produced, there are only two explanations: (1) there is a design flaw or (2) it was designed to be hazardous.



Paul Anastas

Paul Anastas and Evan Beach, "Green chemistry: the emergence of a transformative framework", Green Chemistry Letters and Reviews, March, 2007.

Green chemistry is part of sustainability



From: John Warner, Warner Babcock Institute for Green Chemistry
Green chemistry: The missing element in chemistry education,
presented October 15, 2014 in the Green Chemistry Webinar series.

Green chemistry is important to workplaces and workers

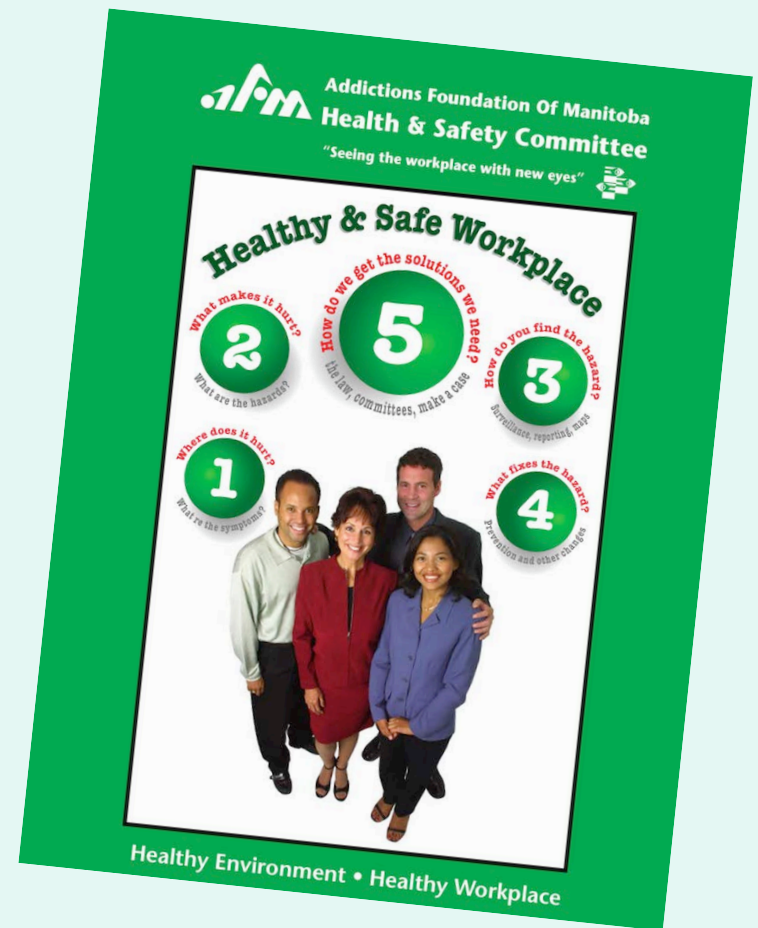


- ✓ addresses the unique effects of toxic chemicals on workers' health
- ✓ prevents workplaces from contaminating the environment and communities
- ✓ promotes integrated strategies to protect workers, communities, and the environment
- ✓ builds on safer/healthier chemical alternatives already out there

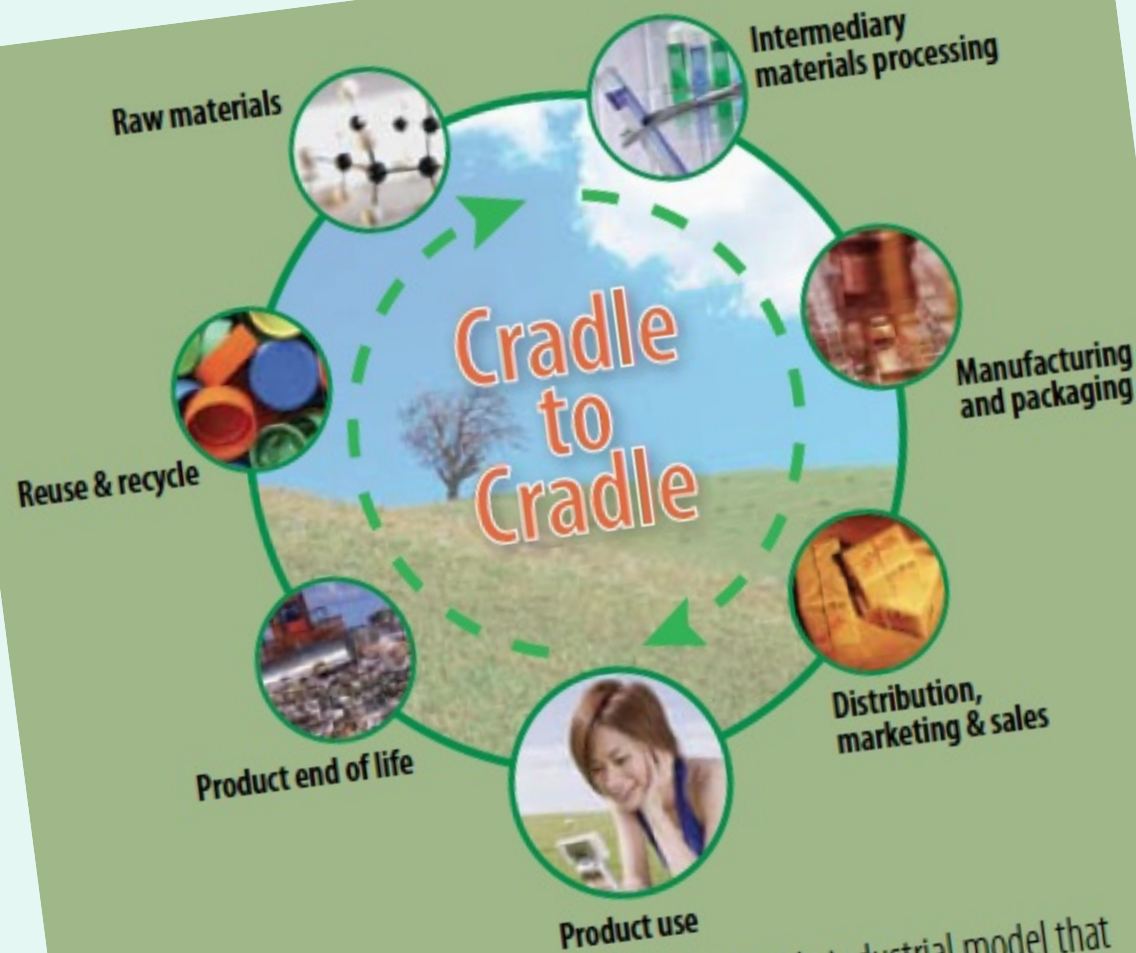
Based on Julia Quint's presentation at a Green Chemistry Initiative workshop, 2010

Benefits of green chemistry

- ✓ healthier workplaces and communities
- ✓ links healthy workplaces to a healthy environment
- ✓ economical
- ✓ less waste
- ✓ fewer “accidents”
- ✓ safer/healthier products
- ✓ lowers cost of production and regulation
- ✓ competitive advantage



Thanks to Clean Production Action



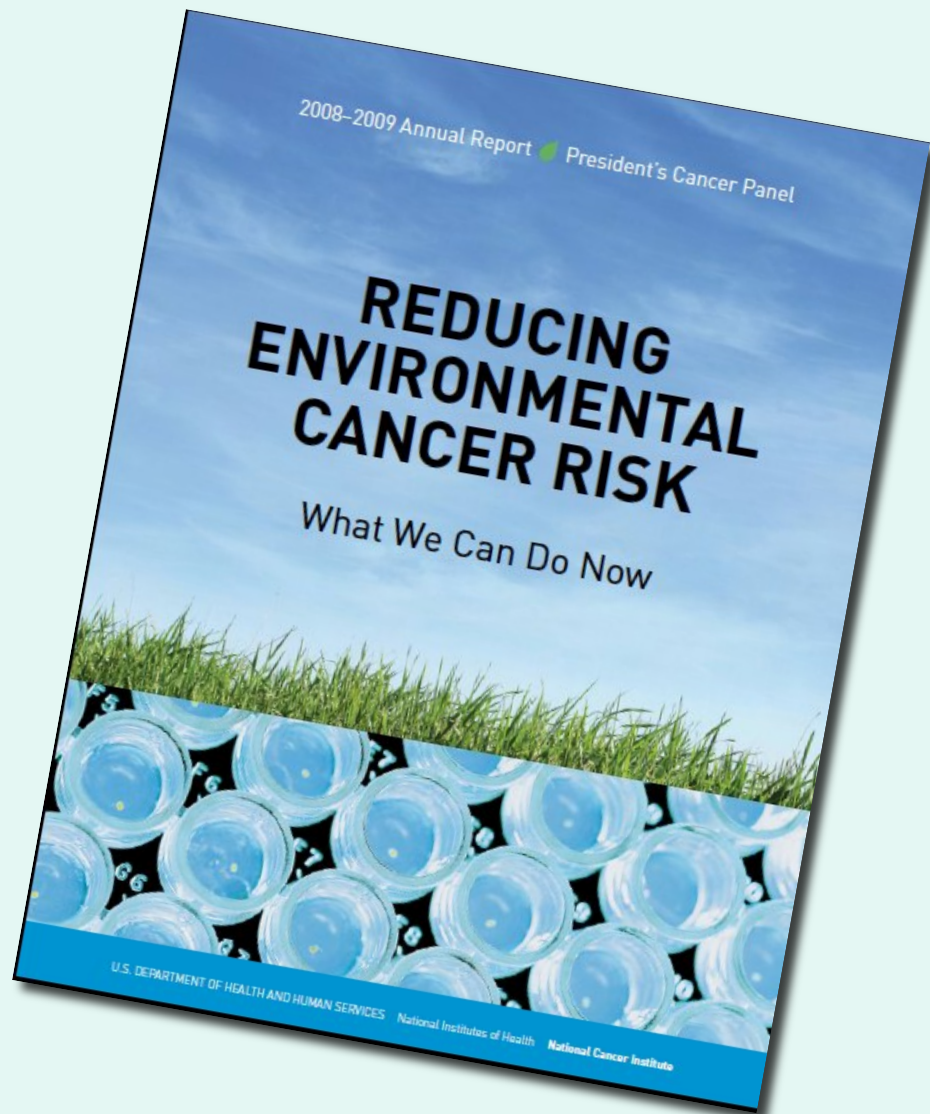
It takes us to different ways of thinking about the design of materials and products and the chemicals that go into them

Cradle-to-Cradle is an innovative and sustainable industrial model that focuses on design of products and a production cycle that strives to produce no waste or pollutants at all stages of the lifecycle.

Braungart and McDonough
Cradle-to-Cradle: Remaking the Way We Make Things (2002)

Use informed substitution

“Green chemistry” initiatives and research, including process redesign, should be pursued and supported more aggressively, but new products must be well-studied prior to and following their introduction into the environment and stringently regulated to ensure their short- and long-term safety.



California has a Green Chemistry Initiative – and regulation



1. Expand pollution prevention
2. Develop green chemistry capacity
3. Create an on-line product ingredient network
4. Create an on-line toxics clearinghouse (SB 509)
5. Accelerate the quest for safer products (AB 1879)
6. Move toward a cradle-to-cradle economy

Safer Consumer Products Regulation

The screenshot displays the DTSC website's Safer Consumer Products (SCP) page. The header includes the CA.GOV logo, the department name, and navigation links for About DTSC, Jobs & Exams, Calendar, E-Lists, and Contact. A search bar is also present. The main navigation bar lists HOME, RESTORING COMMUNITIES, SAFEGUARDING COMMUNITIES, and PROTECTING FUTURE GENERATIONS. The SCP section features a logo with four colored diamonds and the text 'SAFER CONSUMER PRODUCTS (SCP)'. A green button prompts users to 'Submit questions/feedback on the SCP Program'. A sidebar on the left contains a list of links: SCP Home, News Coverage, Workshops, SCP Program Overview, Priority Products, Chemical Lists, Alternatives Analysis, Toxics Information Clearinghouse, Green Ribbon Science Panel, and Petitions. The main content area is titled 'Safer Consumer Products' and includes sections for 'SAFER CONSUMER PRODUCTS REGULATIONS', 'PRIORITY PRODUCT WORK PLAN', and 'PRIORITY PRODUCTS'. A video thumbnail at the bottom left shows Matt Rodriguez, Secretary for Environmental Protection, with the text 'Statement by Matt Rodriguez, Secretary for Environmental Protection'.

CA.GOV California Department of Toxic Substances Control

HOME RESTORING COMMUNITIES SAFEGUARDING COMMUNITIES PROTECTING FUTURE GENERATIONS

SAFER CONSUMER PRODUCTS (SCP)

GO Submit questions/feedback on the SCP Program

- SCP Home
- News Coverage
- Workshops
- SCP Program Overview
- Priority Products
- Chemical Lists
- Alternatives Analysis
- Toxics Information Clearinghouse
- Green Ribbon Science Panel
- Petitions

Safer Consumer Products

SAFER CONSUMER PRODUCTS REGULATIONS

The Safer Consumer Products program strives to reduce toxic chemicals in products consumers buy and use. It identifies specific products containing potentially harmful chemicals and asks manufacturers to answer two questions: 1) Is this chemical necessary? 2) Is there a safer alternative?

The program requires manufacturers to conduct a thorough analysis of alternatives to make sure they don't pose environmental or health problems. The result is that consumers will have confidence that the products they buy are safe for their families and the environment.

[Program Overview](#)

PRIORITY PRODUCT WORK PLAN

DTSC is developing a [Priority Product Work Plan](#) which identifies product categories from which Priority Products will be selected over the next three years. DTSC invites you to participate in our workshops to discuss the draft Priority Product Work Plan. Workshops will be held on September 25, 2014 at the CalEPA Headquarters in Sacramento, and on September 29, 2014 at DTSC's regional office in Cypress. For workshop details and registration, please see our [workshops web page](#). The draft Work Plan is available for public comment using our [California Safer Products Information Management System \(CalSAFER\)](#) until 5 p.m. (PDT) on October 21, 2014.

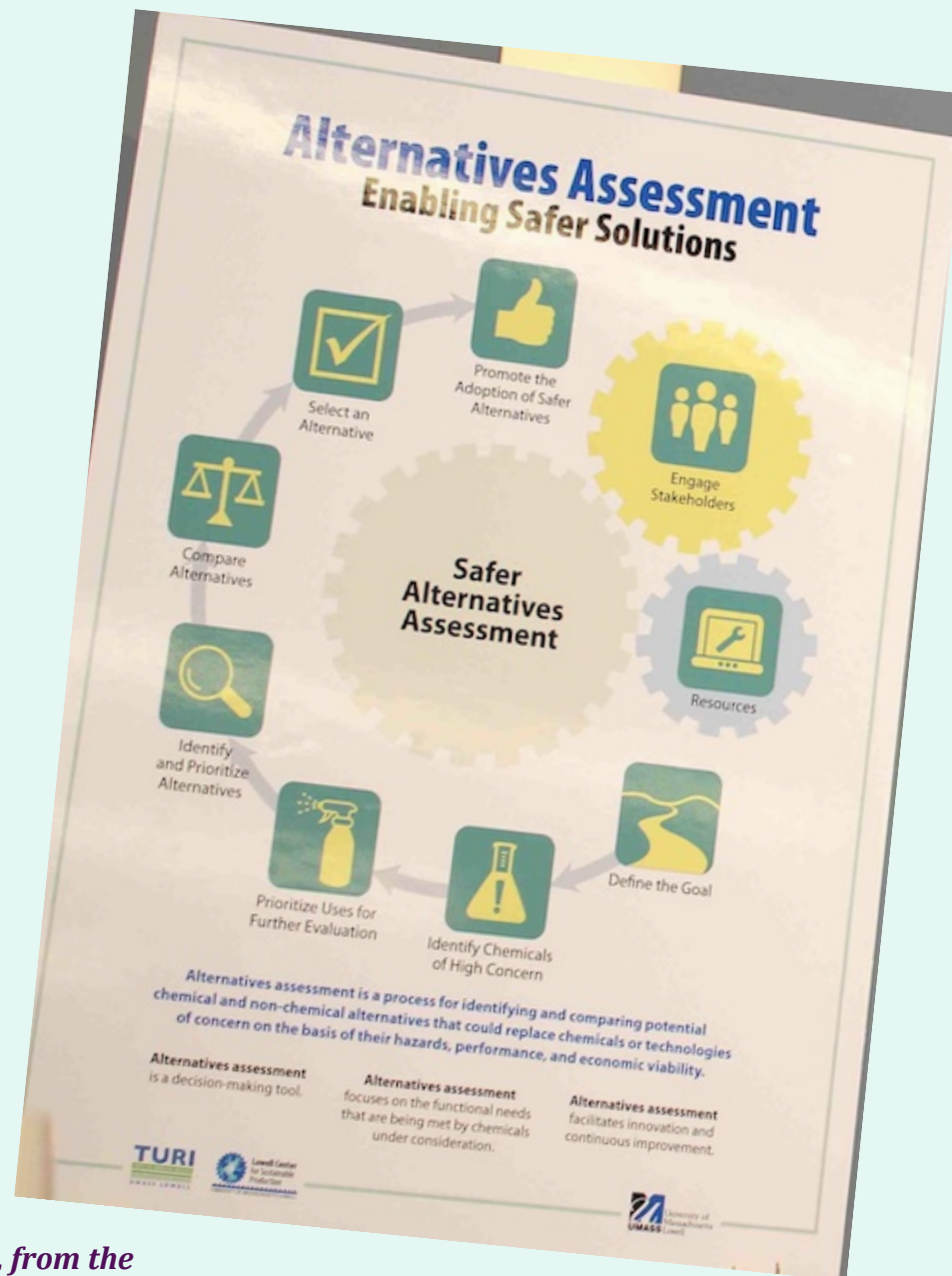
PRIORITY PRODUCTS

What is a Priority Product? A Priority Product is a consumer product that contains one or more chemicals – known as Candidate Chemicals – that have a hazard trait that can harm people or the environment. A proposed list of three product-chemical combinations was released on Monday, September 22, 2014.

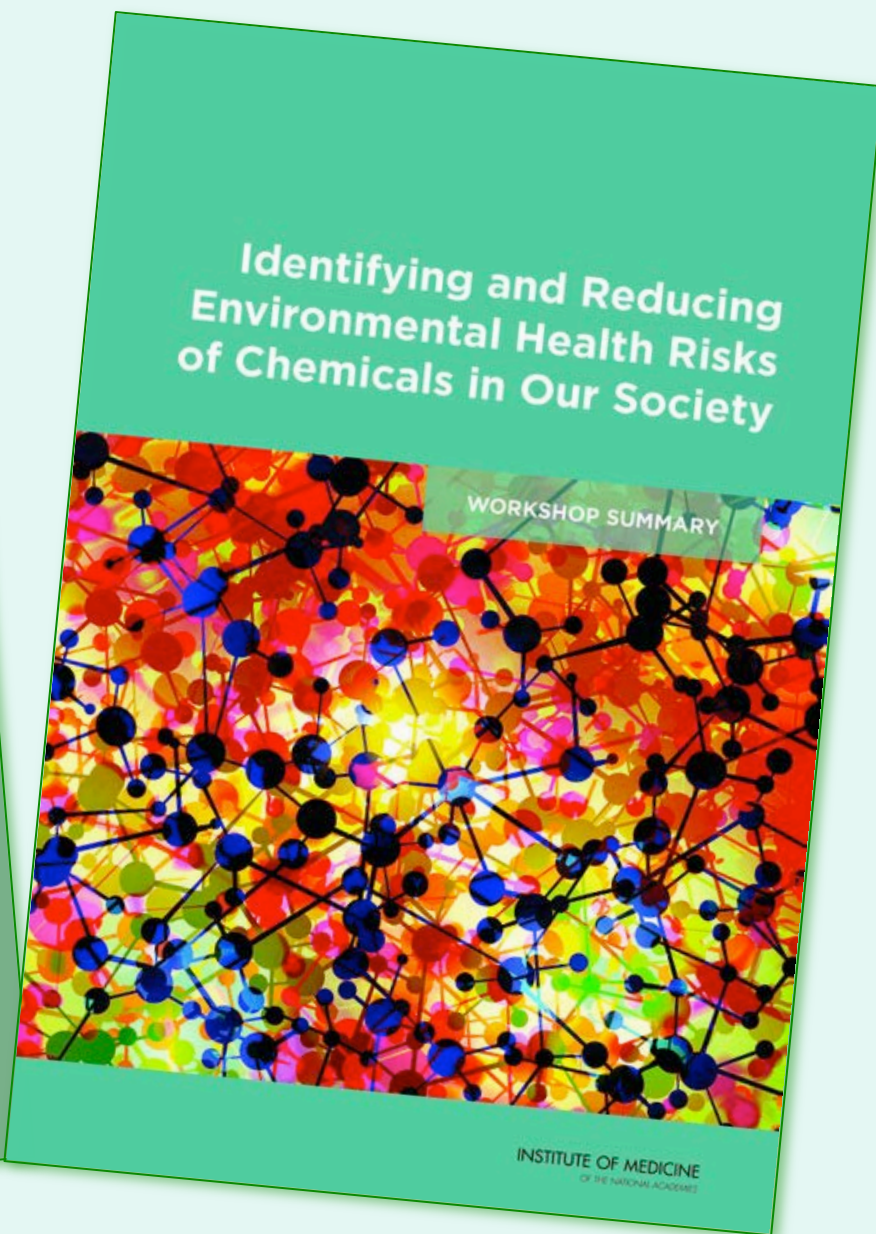
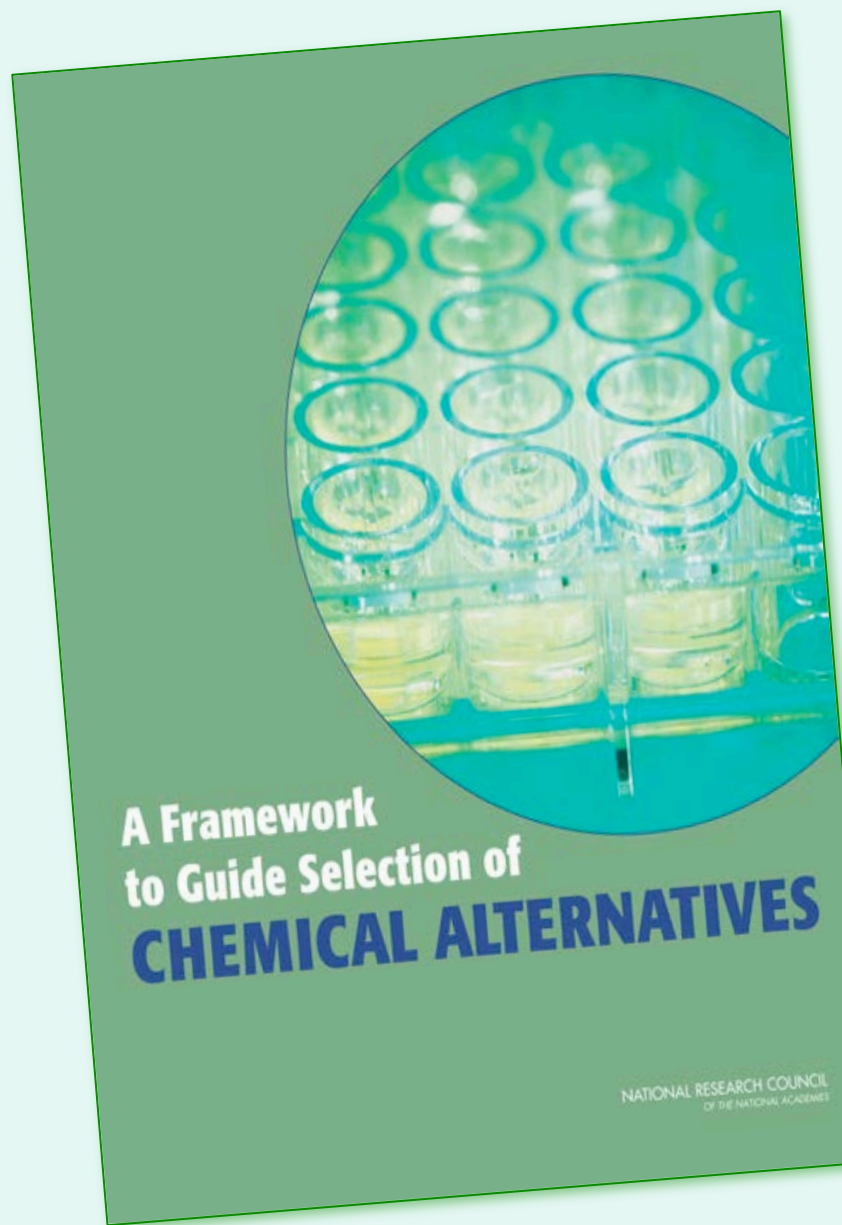
Statement by Matt Rodriguez, Secretary for Environmental Protection

Quick Links:

Alternatives assessment is the route to less toxic products



An alternatives assessment process, from the Massachusetts Toxics User Reduction Institute (TURI), and more, at <http://www.ic2saferalternatives.org/page/Tools+for+Assessing+Alternatives>



Recent reports from the US National Academies Press

***So where are there
opportunities and
openings for green
chemistry change in
Canadian workplaces?***

Canadian green chemistry efforts are limited



An Environmental Scan of Toxic Use Reduction Activities in Canada

A report commissioned by the
National Committee on Environmental and Occupational Exposures
Primary Prevention Action Group
Canadian Partnership Against Cancer

Prepared by: Dorothy Wigmore
June 14, 2010

The views expressed herein represent the
views of the research and writing team
and as such, do not necessarily represent
the views of the Partnership.

- green chemistry one of the least common methods found in hundreds of government/non-government activities
- emphasis tends to be on commercialisation, working with industry
- only evident links to occupational health with unions, BlueGreen Canada, Clean Production Action, Canadian Centre for Pollution Prevention and the Canadian Coalition for Green Healthcare
- little policy/regulation (e.g., BC substitution rules for carcinogens, Ontario TUR law)

***One project: Tools and strategies
for informed substitution to adopt
safer chemicals in cleaning and
maintenance work***



- *working with BCGEU and contracted company responsible for cleaning BC government buildings*
- *links procurement policies, joint health and safety committees, individual workers, union reps and employer health and safety staff*
- *expect approach to be effective because:*
 - *it involves key players in purchasing and using cleaning and maintenance products, and*
 - *addresses the biggest obstacle to informed substitution: appropriate and easy to use screens that identify hazardous products and suitable alternatives*

The plan

1. Review procurement policies for cleaning and maintenance products
2. Identify/interview key informants about workers' experiences of using products → identifying hazards → determine priorities for substitution



The plan

3. List all ingredients using data sheets and follow-up clarification with suppliers

■ focus on CMRs?

3. Composition / Information on Ingredients

Components	CAS #	Percent
2-Butoxyethanol	111-76-2	2.5 - 10
Ethyl Alcohol	64-17-5	2.5 - 10
Butane	106-97-8	1 - 2.5
Propane	74-98-6	1 - 2.5
Other components below reportable levels		90 - 100

Substance	CAS #	Health Concerns ¹	Products
2-Butoxyethanol- also butyl cellosolve, ethylene glycol monobutyl ether, ethylene glycol butyl ether, ethylene glycol n-butyl ether, butyl cellusolve, butyl glycol, and butyl oxitol.	111-76-2	Suspected human carcinogen, cardiovascular, developmental, endocrine, gastrointestinal or liver, kidney, central nervous system, reproductive, respiratory and skin or sense organ toxicant Absorbed through the skin ⁴	All-purpose cleaners Baseboard strippers Carpet cleaners Disinfectants Floor strippers Glass cleaners

GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS (GHS)

Fifth revised edition



UNITED NATIONS
New York and Geneva, 2013

The plan

4. *Benchmark toxic properties using new on-line screening tools*
5. *Identify less toxic alternatives for tasks. choosing most appropriate tool for needs*
 - *US EPA's Design for Environment/DfE Safer Chemicals Ingredient List/SCIL*
 - *CleanGredients*
 - *ChemHAT*
 - *GreenScreen List Translator and full GreenScreen*

About

[FAQ](#)[Benefits](#)[Subscription](#)[How to Search](#)[Glossary](#)[Policy and Guidelines](#)[Process and
Organizational Model](#)[Sponsorship](#)[Key Staff](#)[History](#)

Benefits of Participation

CleanGredients® is a unique partnership between GreenBlue, the U.S. EPA, and industry that benefits suppliers and formulators alike in a number of important ways.

CleanGredients builds on market demand for “green” products.

Demand is steadily increasing for cleaning products that contain healthy and safe ingredients. This is a market opportunity, and many companies seek to meet this demand by creating new, “green” products.

CleanGredients creates opportunities for product recognition by U.S. EPA.

CleanGredients streamlines participation in the U.S. EPA DfE Formulator Initiative by listing ingredient chemicals that are “pre-screened” against U.S. EPA criteria. CleanGredients helps suppliers to market – and formulators to identify – chemicals that will support formulation recognition by the U.S. EPA.

CleanGredients helps purchasers to identify “green” products.

CleanGredients helps purchasers by: 1) increasing the number of products bearing the U.S. EPA DfE logo, and 2) providing valuable information by which to compare competing products.

CleanGredients helps formulators and suppliers to communicate.

Formulators currently do not have reliable, up-to-date information about new “green” ingredient chemicals. Suppliers do not have a standard format to describe the “green” advantages of new ingredient chemicals. CleanGredients provides an “online marketplace” of green chemicals to address these needs.



What's the Problem with Chemicals?

Chemicals can be dangerous. Chemicals can ignite. Chemicals can explode. They can corrode pipes, poison fish and damage trees and other plants.

Chemicals can also harm the health of human beings. This isn't a new story. Lead poisoning in ship builders was documented 2000 years ago. For hundreds of years, people have known the arsenic is a poison, that mercury damages the nervous system and that coal and cotton dust cause lung disease.

But there are some dramatic changes in our scientific understanding of how chemicals can harm us. We used to think that "the dose made the poison." Occupational safety and health was built around the concept that we could protect people by keeping their exposure under a certain number (permissible exposure limits (PELs) or recommended exposure limit (RELs). Now we know that it's not just the dose that matters.

New science has taught us that levels of chemical exposure that were once considered safe can actually be quite dangerous. We are learning, for example, that there are no safe levels of lead exposure for children – every bit does some damage to a child's brain and nervous system. The new idea of small amounts of chemical exposure doing big amounts of damage to our health and development is especially true for the chemicals called endocrine disruptors which can cause harm at very low doses.

New science has also taught us that there are many different factors that affect how we respond to chemicals. These include dose but also include:

- Timing of exposure
- Duration of exposure
- Previous chemical exposures
- Age
- Sex
- State of health
- Genetic makeup
- Individual metabolism
- Environmental and economic factors
- Route of exposure

[Chemical Dangers](#)[Hierarchy of Controls](#)[Occupational Safety & Environmental Health](#)[Green Chemistry](#)[Existing Regulation](#)[Current Regulations Aren't Enough](#)

GreenScreen™ for Safer Chemicals v 1.2 Benchmarks

Start at Benchmark 1 (red) and progress to Benchmark 4 (green)



ABBREVIATIONS

- P** Persistence
B Bioaccumulation
T Human Toxicity and Ecotoxicity

This chemical passes all of the criteria.

BENCHMARK 4

Low P* + Low B + Low T (Ecotoxicity, Group I, II and II* Human) + Low Physical Hazards (Flammability and Reactivity) + Low (additional ecotoxicity endpoints when available)



Prefer—Safer Chemical

BENCHMARK 3

- Moderate P or Moderate B
- Moderate Ecotoxicity
- Moderate T (Group II or II* Human)
- Moderate Flammability or Moderate Reactivity



If this chemical and its breakdown products pass all of these criteria, then move on to Benchmark 4.

Use but Still Opportunity for Improvement

BENCHMARK 2

- Moderate P + Moderate B + Moderate T (Ecotoxicity or Group I, II, or II* Human)
- High P + High B
- High P + Moderate T (Ecotoxicity or Group I, II, or II* Human)
- High B + Moderate T (Ecotoxicity or Group I, II, or II* Human)
- Moderate T (Group I Human)
- Very High T (Ecotoxicity or Group II Human) or High T (Group II* Human)
- High Flammability or High Reactivity



If this chemical and its breakdown products pass all of these criteria, then move on to Benchmark 3.

Use but Search for Safer Substitutes

BENCHMARK 1

- PBT = High P + High B + [very High T (Ecotoxicity or Group II Human) or High T (Group I or II* Human)]
- vPvB = very High P + very High B
- vPT = very High P + [very High T (Ecotoxicity or Group II Human) or High T (Group I or II* Human)]
- vBT = very High B + [very High T (Ecotoxicity or Group II Human) or High T (Group I or II* Human)]
- High T (Group I Human)



If this chemical and its breakdown products pass all of these criteria, then move on to Benchmark 2.

Avoid—Chemical of High Concern

BENCHMARK U

- Unspecified Due to Insufficient Data

Group I Human includes Carcinogenicity, Mutagenicity/Genotoxicity, Reproductive Toxicity, Developmental Toxicity (incl. Developmental Neurotoxicity), and Endocrine Activity. **Group II Human** includes Acute Mammalian Toxicity, Systemic Toxicity/Organ Effects-Single Exposure, Neurotoxicity-Single Exposure, Eye Irritation and Skin Irritation. **Group II* Human** includes Systemic Toxicity/Organ Effects-Repeated Exposure, Neurotoxicity-Repeated Exposure, Respiratory Sensitization, and Skin Sensitization. Immune System Effects are included in Systemic Toxicity/Organ Effects. **Ecotoxicity** includes Acute Aquatic Toxicity and Chronic Aquatic Toxicity.

Note: The level of hazard indicated is the lowest hazard level at which a chemical would fail that criterion. However, if the chemical has a higher hazard level than what is listed (e.g. chemical is very High and the criterion is High), it would also fail that criterion.

* For inorganic chemicals with Low B, Low T (Ecotoxicity, Group I, II and II* Human) and Low Physical Hazards (Flammability and Reactivity), persistence alone will not be deemed problematic. Inorganic chemicals that are only persistent may achieve Benchmark 4.

The Green Screen from Clean Production Action. See the latest version at <http://www.cleanproduction.org/Greenscreen.v1-2.php>



GreenScreen® List Translator

What is the GreenScreen® List Translator?

The GreenScreen® List Translator is an abbreviated version of the full GreenScreen method that can be automated. It is based only on the hazard lists that inform the GreenScreen method. The GreenScreen® List Translator maps authoritative and screening hazard lists, including GHS country classifications, to GreenScreen hazard classifications. It can quickly rule out known chemicals of concern and help to identify those chemicals that are best suited for a full GreenScreen® assessment.

Searching authoritative and screening hazard lists can be monotonous and time-intensive. The time needed to search for chemicals and their associated hazard classifications and Benchmark scores can be greatly reduced through automation. CPA partners with Healthy Building Network in the development of their Pharos database, and with The Wercs in the development of their GreenWERCS database by integrating the GS List Translator into their software tools. There is also the ChemHAT database, a chemical screening tool based on the GreenScreen® List Translator.

[the signal news & notes](#)[building product library](#)[chemical and material library](#)[certifications and scoring](#)

Chemical and Material Library

There are 35125 materials profiled in the Chemical and Material Library

Reduce your project's environmental and health hazards.

- Search over 34,000 substances screened against 60 authoritative hazard and warning lists
- View prioritized environmental and health hazards, restrictions, and potential health hazards in the life cycle

Search Made Simple

- Search chemicals, wood species, and other materials by common name, scientific name, or CAS number
- Autocomplete offers chemical selections as you type

Chemical and Material Library

Explore Pharos

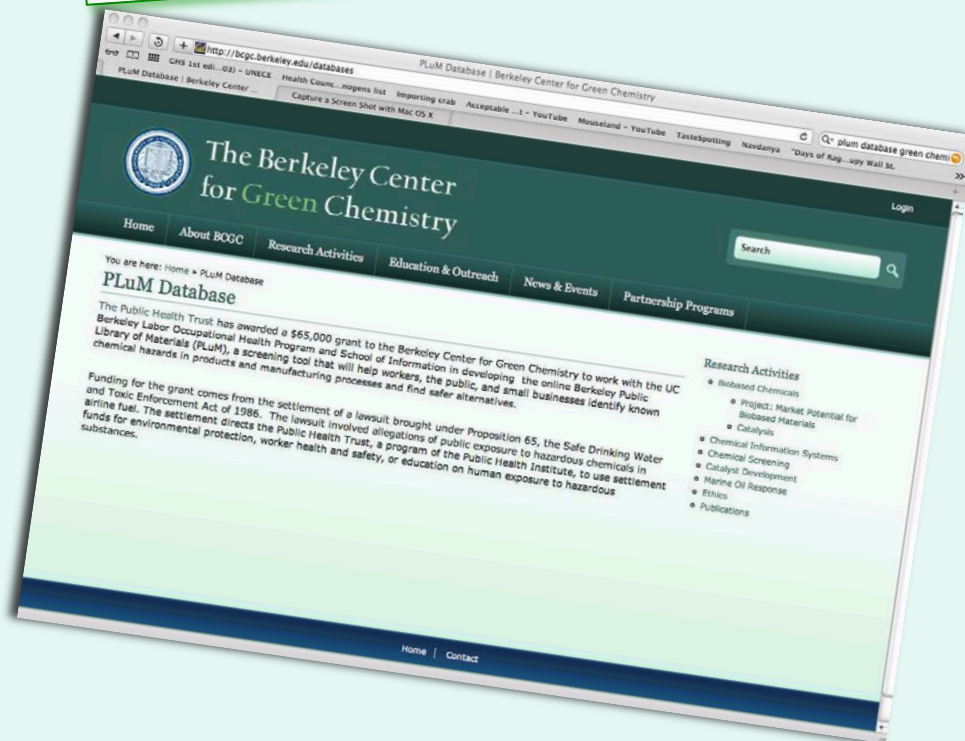
30-day free trial

"Pharos team -- As usual you are right on top of the emerging details that help us all better understand the nuances of these complex issues."

Rick Schwolsky, Editor in Chief,
EcoHome

Other sources of information

- the SIN list (www.chemsec.org)
- PLUM database (<http://bcgc.berkeley.edu/databases>)
- RISCTOX (<http://www.etui.org/fr/Themes/Sante-et-securite/Produits-chimiques-et-REACH/Base-de-donnees-RISCTOX-EN>)
- San Francisco Department of Environment (www.sfapproved.org)
- Responsible Purchasing Network (www.responsiblepurchasing.org)
- TURI CleanerSolutions database (www.cleansolutions.org)



The plan

6. Evaluate the tools and methods with the partners
7. Develop and deliver a how-to guide to screen, identify and substitute less toxic chemicals in cleaning and maintenance products
8. Do a similar longer-term project in Manitoba?



Think big.

Think solutions.

Think tools.

Think collective
action.

Think justice.

With thanks to Ken Geiser, formerly at Umass
Lowell, Toxics Use Reduction Institute