



California Green Chemistry Initiative:

Frequently Asked Questions

December 2008

For more information please visit: dtsc.ca.gov/GreenChemistry



What is green chemistry?

Green chemistry is the process for reducing or eliminating the use of hazardous materials. For the last century, environmental protection has concentrated on storing and disposing hazardous waste. Green chemistry is a fundamentally new approach to environmental protection, transitioning away from managing toxic chemicals at the end of the lifecycle, to reducing or eliminating their use from the start.

When implementing green chemistry, those designing consumer products and determining manufacturing processes consider the public health and environmental effects of products at the design phase. Green chemistry practitioners design new products and processes that reduce or eliminate the use or generation of hazardous substances in several phases: 1) when companies manufacture the products; 2) when consumers use the products; and 3) when the products (and their packaging) are disposed.

FOR EXAMPLE:

Columbia Forest Products completely eliminated urea-formaldehyde resins in veneer-core hardwood plywood by substituting a soy-based product.

Result: the company's switch

- avoids the need to address formaldehyde pollution
- reduces the adverse health effects from formaldehyde on workers and the community

Why do we need green chemistry?

With approximately 100,000 different known toxic chemicals used in production today, a comprehensive approach is needed to reduce or eliminate use of these chemicals. Green chemistry is long-term environmental protection. It promotes public health and helps protect our environment for generations to come. Green chemistry encourages cleaner and less-polluting industrial processes, and ensures that manufacturers take greater responsibility for the products they produce.

FOR EXAMPLE:

Consumers and others do not have information about what toxic chemicals are in the products they use; nor do they have complete information about the possible negative effects of those chemicals.

The Department of Toxic Substances Control tested a variety of consumer products in its Environmental Chemistry Laboratory, including:

- A child's necklace, labeled "nickel and lead free," was found to have 9,239 parts per million lead—which exceeds hazardous waste criteria.
- A child's lunchbox was analyzed and found to contain 912 ppm lead and 172 ppm of cadmium—another toxic metal.

These are just two examples of ordinary consumer products that contain toxic materials—either as an intended ingredient or just a toxic substance “along for the ride.”

What is the California Environmental Protection Agency (Cal/EPA) Green Chemistry Initiative?

The Cal/EPA Green Chemistry Initiative is a collaborative approach for identifying options to significantly reduce the impacts of toxic chemicals on public health and the environment.

The Green Chemistry Initiative recommends developing a consistent means for evaluating risk, reducing exposure, encouraging less-toxic industrial processes, and identifying safer alternatives.

Most importantly, the Green Chemistry Initiative ensures a comprehensive and collaborative approach, to increase accountability and effectiveness of environmental programs across state government.

What are the economic benefits of green chemistry?

Green chemistry, at its very core, is about designing products and processes to reduce or eliminate the need to manage and control waste at the end of the lifecycle. In addition, the Green Chemistry Initiative promotes better coordination of laws intended to manage single chemicals, creating a comprehensive system to ensure accountability and effectiveness. Many companies that are already using green chemistry principles are recognizing the economic benefits.

FOR EXAMPLE:

Nelson Nameplate Company in Los Angeles developed new manufacturing processes and formulated a new cleaning solution for cleaning metal and printing nameplates, by:

- Eliminating toxic chemical solvents and reformulating a non-toxic cleaning solution
- Commissioning a custom, automated washing machine for cleaning metal
- Converting its lithographic and screen printers to water-based solvents
- Replacing high solvent inks with pollution-free ultraviolet inks

The results not only reduced the health hazards for employees and the surrounding community, but also was good for business:

- Reduced the cost of chemicals and cost of managing the toxic waste
- Business has doubled
- Smog-causing emissions from the plant has gone down by 90%
- The research and development investment was paid off in just two years

Avalon Organics in Petaluma reformulated their products to:

- Eliminate chemicals banned in Europe
- Avoid other chemicals of concern
- Eliminate petroleum-based ingredients

Results:

- The company ranks first in health food cosmetics, with growth exceeding market sector growth rate by 37% to 300% in various product areas.

Interface Fabric (one facility in the City of Industry) developed new interior fabrics from a corn-based biopolymer. A new protocol was established to screen out dyes and other substances typically used that are persistent, bioaccumulative and/or toxic.

Results: The biopolymer exhibits superior performance in terms of stain resistance, flame retardancy, and reduced odors. The substitution resulted in reductions of:

- Water and fuel used
- Greenhouse gas emissions.

Interface Fabric saved \$300,000 annually because of consolidation of chemical suppliers to vendors who meet their protocol.

SC Johnson Company's Greenlist™ originally focused on five key categories of ingredients: surfactants, propellants, home storage resins, insecticides and solvents. Today, it covers 15 categories of materials, including: packaging, chelates and sequestering agents, antimicrobials/preservatives, fragrance, candle waxes/fuel, non-woven/fabrics and organic/inorganic acids and bases.

Results: Since 2001, SC Johnson has eliminated more than 11 million kg of hazardous chemicals and removed more than 10 million pounds of volatile organic compounds from its environmental footprint - and continues to remove about 2.6 million more each year.

Specifics:

- Phased out chlorine-based external packaging materials worldwide in December 2002
- Phased out bottles made of polyvinyl chloride (PVC) eliminating use of 1,300 metric tons of PVC.
- Phased out more than 50 metric tons of chlorine bleached paperboard.
- Reduced hydrocarbon propellant by 16 percent in key aerosol brands (eliminated 2.8 million pounds of VOCs).
- Reformulated the Saran™ Original plastic wrap formula that eliminated 1.8 million kg of PVDC
- Surpassed the California Air Resources Board's requirements by using a non-VOC solvent in one of our leading insect control brands.
- Reduced VOCs twice in two years in one of our top home cleaning formulas (eliminating 2 million pounds of VOCs while improving the product's effectiveness by 30 percent).

Ford Motor Corporation's "eco-effective" stormwater pollution prevention approach cleans the water and the air, provides habitat, and enhances the beauty of the landscape.

Result: Savings of as much as \$35 million, by one estimation.

How does the green chemistry differ from traditional efforts to reduce pollution?

The 20th century approach to environmental protection focused on pollution — air emissions, the discharges of contaminants to surface and groundwater, and the generation, storage and disposal of solid and hazardous wastes. While "pollution prevention" programs focus on reducing pollutants at the source, many of them do not focus enough on the design issues that are the core of "green chemistry."

The Cal/EPA Green Chemistry Initiative explored such issues as:

- The toxicity of chemicals found in products, processes and commerce
- The physical and chemical properties of chemicals, including their potential to leach or migrate from wherever they may be found
- The fate and transport of chemicals in the environment, and the health and environmental risks
- The economic and technical impacts of chemical and non-chemical alternatives to toxic chemicals, and their health and environmental risks
- Areas where investment in research and development is needed
- Identifying innovative technologies or alternatives
- Where chemical use restrictions may be warranted

FOR EXAMPLE:

California companies that implemented source reduction strategies reduced their hazardous waste generation by 11 percent and avoided more than 64,000 tons of hazardous waste and eliminated the cost of managing those wastes. Workers and community members were protected from adverse effects of exposure to those hazardous substances.

What is the goal of the Green Chemistry Initiative?

The goal of the Green Chemistry Initiative is to develop policy options for implementing green chemistry policies. To accomplish this, the Cal/EPA Green Chemistry Initiative will do the following: 1) Define the challenges we face, 2) solicit input from all, 3) identify options for addressing each challenge, and 4) develop recommendations for action.

The results of the Initiative were accomplished through a transparent process, with extensive stakeholder involvement. Communication was facilitated through workshops, symposia and conferences, stakeholder meetings, web site communications, and consultation with universities, other governments and U. S. EPA.

The Initiative utilized the expertise of various state agencies, including staff from Cal/EPA's boards, departments, and offices, as well as staff from the State and Consumer Services Agency, Health and Human Services Agency, Office of Homeland Security, the departments of Public Health, Conservation, Industrial Relations, General Services, and the Office of Emergency Services.

How will recently enacted legislation promote Green Chemistry in California?

AB 1879 (Chapter 599, Statutes of 2008) by Assemblymembers Mike Feuer, Jared Huffman and Sam Blakeslee provides the statutory authority for DTSC to establish the key regulatory components needed to advance green chemistry in California. AB 1879 gives statutory authority for DTSC to adopt regulations for identifying and prioritizing chemicals of concern in consumer products and for evaluating safer alternatives to toxic chemicals through a science-based approach. It also creates mechanisms to provide guidance and oversight through a new Green Ribbon Science Panel of experts and by expanding the role of the Environmental Policy Council, made up of the heads of Cal/EPA boards and departments.

SB 509 (Chapter 560, Statutes of 2008) by Senator Joe Simitian establishes an online Toxics Information Clearinghouse that will provide access to information about the toxicity and hazard traits of thousands of chemicals used in California today. It also contains general provisions defining the scope of the green chemistry regulations.

Both bills were passed by the legislature on 8/31/08 and were signed by the Governor on September 29, 2008.

What are the Recommendations made in the Green Chemistry Initiative Final Report?

The Green Chemistry Final Report makes six recommendations designed to improve the safety of consumer goods and products sold in California, provide information about the chemical ingredients, reduce toxicity and potential hazards of chemical ingredients, and enhance public health and our environment while creating new jobs, new technologies, and new markets.

Making consumer products and goods safer is not the end of the state's efforts. As our population grows and economy expands, more chemicals will be used and more wastes will be generated. California must move toward a more sustainable economy. Green chemistry and lifecycle design techniques will accelerate this necessary transition, promote development of clean and green technology, reduce our consumption of energy and natural resources, and create high-skill, high-wage employment.

The report's six recommendations will provide better information and savings for California households and businesses; drive investment, innovation, and job growth; improve public health and safety; and continue California's leadership in research, technology, and global economic markets. They are:

RECOMMENDATION #1: Expand Pollution Prevention

This policy component will position California industry and municipalities at the forefront of sustainable, greener practices. By applying lifecycle thinking, California facilities will shift their focus from end-of-pipe waste management to greener design and production. Business will save money, improve efficiency, and reduce liability for a "triple bottom line" profit. California communities will be safer as less hazardous chemicals are substituted and prevention planning reduces the risk of catastrophic accidents.

California will expand DTSC's existing pollution prevention program to include additional industrial and economic sectors. The focus of the program will shift from the end-of-pipe waste (source) reduction to include design, manufacturing, and distribution processes. Participating facilities will evaluate their entire "environmental footprint" by assessing how chemicals are used—from beginning to end-of-life for their products—rather than how their hazardous wastes are managed.

RECOMMENDATION #2: Develop Green Chemistry Workforce Education & Training, Research & Development And Technology Transfer

This policy component will increase California's education, research, and technology efforts by including green chemistry and green engineering design principles. California must improve its efforts to educate a knowledgeable workforce and society, to transform new ideas and innovation into new technologies and materials, and to garner new jobs and new markets in the worldwide chemicals and materials economy. School children and college students must learn green chemistry principles within the state's regular curriculum. Researchers will discover and invent new, safer materials and chemical processes. The state's public and private sectors will work together in commercializing new technologies and materials so California's products and people compete successfully in the global economy.

The state should expand its current K-12 curriculum to include understanding of toxic chemicals, risk, consumer choice, and lifecycle and sustainability concepts. The state should also explore ways to enhance California's scientific and academic leadership by training college students and researchers about these concepts, increasing green chemistry and materials research and development, promoting public-private partnerships for green innovations, and preparing Californians for green jobs.

RECOMMENDATION #3: Create An Online Product Ingredient Network

This policy component will create an online product ingredient web portal for California businesses, retailers, and consumers to access non-confidential information about product ingredients. This information will allow manufacturers, retailers, and ultimately consumers to make informed choices about the goods and products they buy and use.

RECOMMENDATION #4: Create An Online Toxics Clearinghouse (SB 509, Chapter 560, Statutes of 2008)

This policy component will increase our knowledge about the toxicity and hazard traits of the thousands of chemicals used in California everyday. An online clearinghouse will link scientific studies worldwide with individual chemicals, compounds so product manufacturers, policymakers, and Californians can determine what is known—or not known yet—about chemicals found in the goods, products, and commodities they produce, sell, and use everyday.

The state—building on and using authoritative, scientific work in other jurisdictions—will establish an online "toxics clearinghouse" that identifies chemical hazard traits and toxicity for California pursuant to the provisions of SB 509 (Chapter 560, Statutes of 2008). The clearinghouse will be a virtual system, using state-of-the-art web-based search algorithms. The state will first decide which particular hazard traits or toxicological end-points (not chemicals) will be required in the "clearinghouse" and will adopt a priority list of chemicals. Consistent with present federal law, chemical manufacturers will be required to make the required data accessible for the California clearinghouse.

RECOMMENDATION #5: Accelerate The Quest For Safer Products (AB 1879, Chapter 599, Statutes of 2008)

The existing environmental regulatory system applies traditional risk assessment to a single chemical and then determines a concentration limit for emissions or discharges of that chemical or simply bans it. This component adds a new, systematic approach which will determine whether a safer, greener alternative can be used or if risk can be reduced in one of several different ways. Rather than government focusing all resources on limits and bans, the state will require industry to find safer, greener alternatives at the design and manufacturing stages.

Under the provisions of AB 1879 (Chapter 599, Statutes of 2008), California will develop and implement new rules for alternatives analysis and related regulatory actions. To oversee this program, the existing Environmental Policy Council would be expanded and its duties updated. Additionally, the state will appoint members to a Green Ribbon Science Panel (GRSP), an expert panel of scientists to provide advice on scientific and technical matters to advance green chemistry in California, to provide chemicals policy recommendations and implementation strategies, to advise DTSC in the development and adoption of regulations and to ensure implementation efforts are based on a strong scientific foundation. The new regulations will set forth the circumstances and evidence required to begin review of a particular chemical, the specific steps for the alternatives analysis and decision-making processes, and the compliance mechanisms for different regulatory outcomes, such as engineering controls, use restrictions, or use bans.

RECOMMENDATION #6: Move Toward A Cradle-To-Cradle Economy

This policy component will harness market forces to accelerate innovation and selection of more sustainable, non-toxic choices for consumers. Product manufacturers who sell products in California will provide to retailers an environmental footprint metric—a simplified calculator or “green scorecard” based on lifecycle, multimedia attributes—for their products or categories of products. These may include product performance, reliability, safety and toxicity, resource consumption, waste and disposal, air and water impacts, and cost.

With the information provided by product manufacturers, California retailers will assess their portfolio of all goods, products, and commodities and then set a “baseline” using a simplified lifecycle methodology. From their inventory and baseline, retailers will set their own “targets” for continuous improvement toward safer, more sustainable products or product categories.

The state will establish a new non-governmental consensus standards organization, the “California Green Products Council,” to develop the tools for businesses to use. With enabling legislation, the state will formulate rules regarding how and when retailers will set their “baseline” and targets, report progress, and ensure compliance.