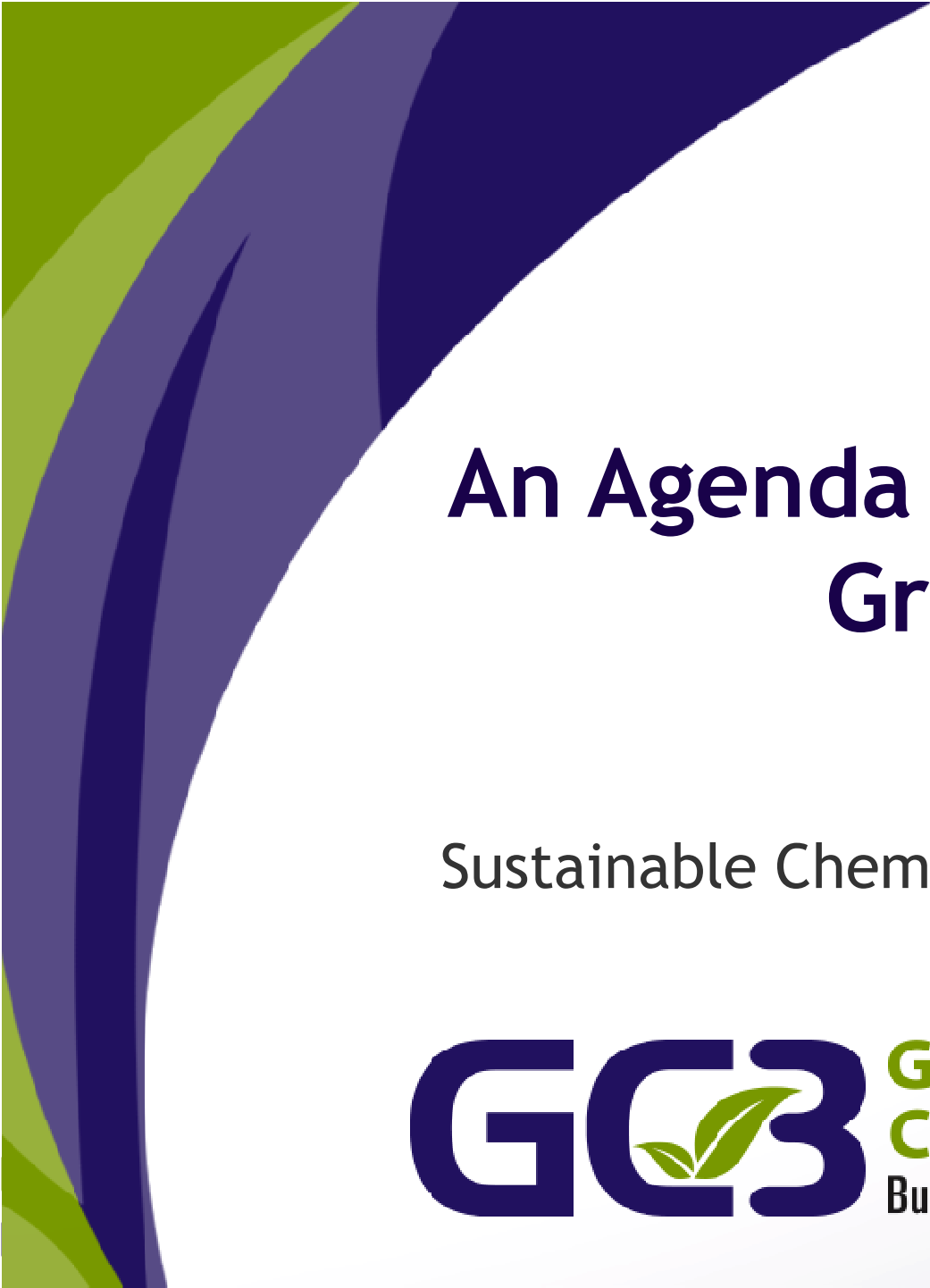




An Agenda to Mainstream Green Chemistry

Joel A. Tickner, ScD

Sustainable Chemistry: The Way Forward

September 24, 2015



About the GC3

- The Green Chemistry & Commerce Council (GC3) is a business-to-business forum that works collaboratively to accelerate the application of green chemistry across industry sectors and supply chains.



Mission

- The GC3 provides an open setting for companies to share information and experiences about the challenges to and opportunities for safer, more sustainable chemicals and products.
- The mission of the GC3 is to make green chemistry standard practice, contributing to innovation, improved public health, and protection of the environment.



Defining Green Chemistry

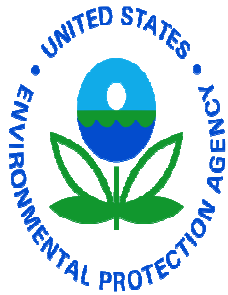
- Green chemistry is the design of chemical products and processes that reduce or eliminate the use and generation of hazardous substances.
- Green chemistry is a growing field of practice that builds on conventional chemistry and engineering by applying 12 fundamental principles that guide the design of sustainable chemical products and processes. It applies across the life cycle of a chemical product, including its design, manufacture and use.



Applying green chemistry

- Practiced primarily at the chemical development and formulation level.
- But product developers, manufacturers, brands, and retailers all play an important role in driving and adopting green chemistry.
- An element of “sustainable chemistry”

GC3 Members



State of Oregon
Department of
Environmental
Quality



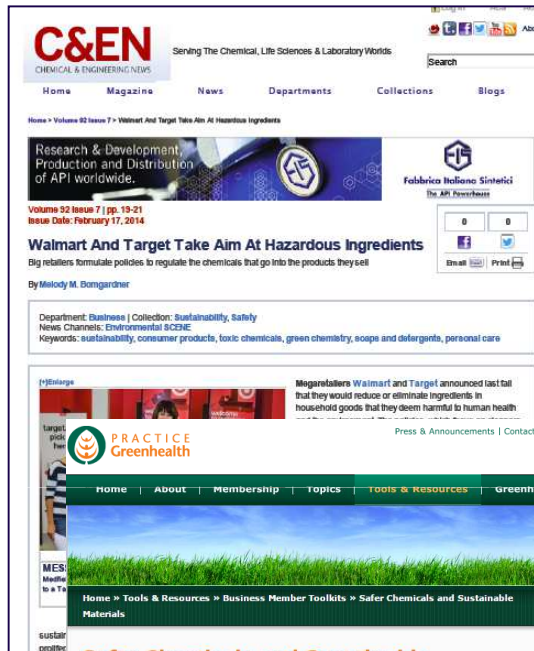
changing chemistry, changing the world



10 years of changes enhancing the need for greater green chemistry collaboration

- Changes in markets
- Changes in policy
- Changes in science
- Changes in chemistry/growth of green chemistry

Market drivers



Safer Chemicals and Sustainable Materials

- What are safer chemicals and sustainable materials?
- Why should healthcare suppliers and service providers address safer chemicals and sustainable materials?
- What resources are available to help suppliers and service providers address safer chemicals and sustainable materials?

What are safer chemicals and sustainable materials?

Many Practice Greenhealth member GPOs, hospitals, and health care systems are concerned about the toxic chemicals coming into their facilities via the products they buy, as well as the toxic chemicals released into the environment during the production or disposal of the materials used in the products they buy.

This is reflected in some of the Product- and Service-

Related Tools & Resources

- Webinar Calendar
- Business Member Benefits

Questions about Business Membership?

Contact Lara Sutherland
at 866-598-2210

Tools & Resources

- Greenhealth Tracker
- Sustainability in Health Care Book
- Hospital Member Toolkits
- Community Health Center Member Toolkit
- Business Member Toolkits
 - Join Practice Greenhealth
 - Safer Chemicals and Sustainable Materials
 - Business Membership Benefits
 - Business Directory Listings
- Sustainability Benchmark Report
- Energy Impact Calculator
- Greenhealth Magazine
- Supplier Directory
- Practice Greenhealth Mentor Program
- Listserv
- Forums
- Greenhealth Careers

Ø ZDHC

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AN AMBITIOUS PLAN

One that sets a new standard of environmental performance for the global apparel and footwear industry.

RØADMAP TO ZERO DISCHARGE OF HAZARDOUS CHEMICALS

ZDHC Group Releases Key Milestone: Manufacturing Restricted Substances List (MRSL)



ZDHC Guidance Sheets Released for Eleven MRSL-restricted Chemicals



ABOUT ZDHC



JOINT ROADMAP



NEWS BULL



Overview

LEED v4

Rating systems

Credits

Levels of certification

Why LEED?

Tools

LEED stands for green building leadership. LEED is transforming the way we think about how buildings and communities are designed, constructed, maintained and operated across the globe.

LEED certified buildings save money and resources and have a positive impact on the health of occupants, while promoting renewable, clean energy.

LEED, or Leadership in Energy & Environmental Design, is a green building certification program that recognizes best-in-class building strategies and practices. To receive LEED certification, building projects satisfy prerequisites and earn points to achieve different levels of certification. Prerequisites and credits differ for each rating system, and teams choose the best fit for their project.

LEED v4 is the newest version of the world's premier benchmark for high-performance green buildings.



Policy Drivers

ECHA
EUROPEAN CHEMICALS AGENCY

Search the ECHA Website

About Us | Regulations | Addressing Chemicals of Concern | Information on Chemicals | Chemicals in our Life | Support

ECHA » Regulations » REACH

REACH

REACH is a regulation of the European Union, adopted to improve the protection of human health and the environment from the risks that can be posed by chemicals, while enhancing the competitiveness of the EU chemicals industry. It also promotes alternative methods for the hazard assessment of substances in order to reduce the number of tests on animals.

» Understanding REACH
» Legislation

Substance Identity

Unambiguous substance identification is a pre-requisite to most of the REACH processes. Actors in the supply chain must have sufficient information on the identity of their substance.

» Read more

Processes

Companies have the responsibility of collecting information on the properties and the uses of substances that they manufacture or import at or above one tonne per year. They also have to make an assessment of the hazards and potential risks presented by the substance.

ECHA and the Member States evaluate the information submitted by companies to examine the quality of the registration dossiers and the testing proposals and to clarify if a given substance constitutes a risk to human health or the environment.

» Registration
» Evaluation

The authorisation procedure aims to ensure that the risks from substances of very high concern are properly controlled and that these substances are progressively replaced by suitable alternatives while ensuring the good functioning of the EU internal market.

Restrictions are a tool to protect human health and the environment from unacceptable risks posed by chemicals. Restrictions may limit or ban the manufacture, placing on the market or use of a substance.

CA.gov California Department of Toxic Substances Control

HOME | RESTORING COMMUNITIES | SAFEGUARDING COMMUNITIES | PROTECTING FUTURE GENERATIONS

SAFER CONSUMER PRODUCTS (SCP)

Submit questions/feedback on the SCP Program

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 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 March 13, 2014. This initial Priority Products list is the first set of product-chemical combinations to be named for consideration by DTSC to be regulated under the Safer Consumer Products regulations. Publication of this draft list of products imposes no new regulatory requirements on manufacturers until DTSC finalizes it by adopting regulations. Read more

Quick Links:
• SCP Regulations

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GROWTH
Internal Market, Industry, Entrepreneurship and SMEs

European Commission » Growth » Single Market and Standards » ... » Harmonised standards » Restriction of hazardous substances

Single Market and Standards | Industry | Entrepreneurship and SMEs | Access to finance for SMEs | Sectors

Restriction of the use of certain hazardous substances (RoHS)

Directive 2011/65/EU

Short name:	Restriction of the use of certain hazardous substances (RoHS)
Base:	Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (OJ L 174 of 1 July 2011)
Modification:	[-]

State of Washington

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Children's Safe Products Act

Reducing Toxic Threats » Children's Safe Product Act

Steps Toward Safer Chemical Policy

Overview of the law

Ecology's [Reducing Toxic Threats](#) Initiative is based on the principle that preventing exposures to toxics is the safest and healthiest way to protect people and the environment. The Children's Safe Product Act (CSPA - [Chapter 70.2](#)) is an important part of this initiative.

The [Children's Safe Product Reporting Rule](#) requires manufacturers of children's products sold in Washington to report unit product contains a [Chemical of High Concern to Children](#).

The CSPA also limits the amount of lead, cadmium, and phthalates allowed in children's products. These limits were preempted by federal law. Ecology works with the [Consumer Product Safety Commission](#) to ensure compliance with requirements.

Consumers	Manufacturers
Read our FAQs for consumers	Read our guidance for manufacturers
Search the information that manufacturers have reported	Learn how to use the CSPA Reporting Application
Search the information about products Ecology has tested	Report information using the CSPA Reporting Application

Enforcing the law

Ecology tests products for chemicals to ensure manufacturers are reporting accurate information about their child and to make sure that they are complying with laws regulating other chemicals (like [Bisphenol A](#), [polybrominated flame retardants](#), [lead](#), [cadmium](#), or [copper in vehicle brake pads](#).) These testing projects are summarized in [Ecology's Testing Projects](#).

You can also search the information from all of Ecology's testing in the [Product Testing Database](#).

News releases

- Children's products tested for toxic chemicals (April 14, 2014)
- Test changes made to children's product chemical list (October 29, 2013)
- Ecology set to carry out children's product reporting law (July 22, 2011)
- Pilot process will begin field testing state children's product law (January 28, 2010)

More information



Science Drivers

EPA United States Environmental Protection Agency
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Design for the Environment

An EPA Partnership Program

We're redesigning the DfE label.

Learn more >

EPA's Design for the Environment program helps consumers, businesses, and institutional buyers identify cleaning and other products that perform well and are safer for human health and the environment.

Look for products with the DfE label and protect your family's health and the planet.

Find Products with the DfE Label

Consumers | Industrial & Institutional Purchasers

- All-Purpose Cleaners
- Window Cleaners
- Toilet/Tile Cleaners
- Laundry Detergents
- more...

La información sobre los productos más seguros en español

What's New with DfE?

December 15, 2014 - EPA announces an updated draft report of the DfE Partnership to Consumer Panel. Report is in Public Comment Phase. Read the report.

December 9, 2014 - Safe Product Labeling Program announced 2015 Partner of the Year Awards.

November 20, 2014 - DfE has

Design for the Environment Videos

Pollution Prevention PSA
ELIMINATE
USE THE E
ELIMINATE
USE THE E

ACS Sustainable Chemistry & Engineering

The National Science Foundation's Investment in Sustainable Chemistry, Engineering, and Materials

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ABSTRACT: In 2012, the National Science Foundation (NSF) issued a new interdisciplinary research—Sustainable Chemistry, Engineering, and Materials (SCEM)—within its Science, Engineering, and Education for Sustainability (SEES) portfolio. NSF also issued a request for the community to review science and engineering that will provide humanity with safe, reliable, and sustainable supply of chemicals and materials without net new direct global demand. While NSF has historically supported research in this area, the SCEM effort focuses this research to priority for particular NSF support the discovery of new science and engineering that will (1) improve the efficiency and sustainability of chemical processes, (2) develop sustainable and sustainable chemical and materials for use in a wide range of applications, (3) control the release of chemicals and materials into the environment, (4) reduce energy consumption through improved synthesis, and (5) develop low-energy means of recycling, upgrading, reusing, and storing chemicals and materials. This article provides an overview of this interdisciplinary challenge that the fundamental, applied, and biological science and engineering communities are well-placed to address and provides the National Science Foundation's vision of the SCEM vision.

KEYWORDS: Chemicals, Chemistry, Engineering, Materials, Research, Innovation, Review, Science, Technology

It seems the technology we are so close to in the petroleum-based plastics that now use our cars and the value of the oil in our petroleum-based plastics is still being debated. It is also the challenge of global climate change that the technology we are so close to in the petroleum-based plastics that now use our cars and the value of the oil in our petroleum-based plastics is still being debated. It is also the challenge of global climate change that the technology we are so close to in the petroleum-based plastics that now use our cars and the value of the oil in our petroleum-based plastics is still being debated.

more importantly, the "world middle class" is now coming to the United States that value to those who will have the spending power to consume a significant amount of resources. In 2012, the National Science Foundation (NSF) issued the Sustainable Chemistry, Engineering, and Materials (SCEM) vision to support the discovery of new science and engineering that will (1) improve the efficiency and sustainability of chemical processes, (2) develop sustainable and sustainable chemical and materials for use in a wide range of applications, (3) control the release of chemicals and materials into the environment, (4) reduce energy consumption through improved synthesis, and (5) develop low-energy means of recycling, upgrading, reusing, and storing chemicals and materials. This article provides an overview of this interdisciplinary challenge that the fundamental, applied, and biological science and engineering communities are well-placed to address and provides the National Science Foundation's vision of the SCEM vision.

ACS Publications | 41000 Publication Number | 10.1021/bk-2015-0101 | 10.1021/bk-2015-0101 | 10.1021/bk-2015-0101

OECD
BETTER POLICIES FOR BETTER LIVES

HOME ABOUT RESOURCES GLOSSARY

OECD Substitution and Alternatives Assessment Toolbox

Welcome to the OECD Substitution and Alternatives Assessment Toolbox (SAAT) — a compilation of resources relevant to chemical substitution and alternatives assessments. Visit the four resource areas below to learn more about chemical substitution and alternatives assessments and get practical guidance on conducting them.

Learn about...

the current landscape of substitution and alternatives assessment practices in the:

OECD Meta-Review of Current Practices

Alternatives Assessment Tool Selector

A filterable inventory of chemical hazard assessment tools and data sources to help you identify tools most relevant to your substitution and alternatives assessment goals. A listing of non-hazard assessment tools is also available.

Learn more

Alternatives Assessment Frameworks

A summary of the current frameworks that can be used to assess alternatives. Guides and other resources for conducting a chemical substitution or alternatives assessment are included.

Learn more

Case Studies

CHEMISTRY TOXICOLOGY

DESIGN OF SAFER CHEMICALS AND PRODUCTS

The Nexus of Toxicology and Chemistry

APRIL 23–24, 2015

LOCATION
McMenamins
2126 SW Halsey Street, Troutdale, OR
www.mcmenamins.com

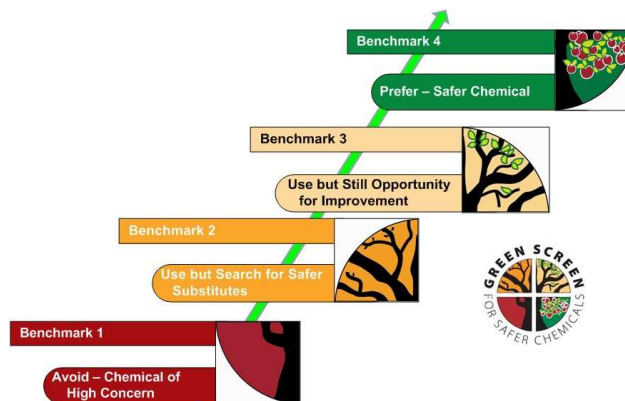
This 2-day course is for professionals who design new chemicals, formulations, and commercial products, as well as those interested in supporting safer products and processes within public, private, and non-profit organizations. Recognized leaders in chemistry, toxicology, ecotoxicology, nanotoxicology, and other disciplines will guide participants in the use of the most prominent tools used in chemical design and predictive toxicology. Participants will have the opportunity to discuss cutting-edge science and practical strategies for the design of safer chemicals and products.

Registration
http://www.ngcworkshop.eventbrite.com

W **MODRN** **N**
Environmental & Occupational Health Sciences | School of Public Health | University of Washington

A Framework to Guide Selection of CHEMICAL ALTERNATIVES

NATIONAL RESEARCH COUNCIL OF SCIENCE AND TECHNOLOGY



GCB

Growth of Green Chemistry Efforts

ACS Chemistry for Life[®] ACS Green Chemistry Institute[™] PROGRAM REGISTER TRAVEL STUDENTS SPONSORS & EXHIBITORS MEDIA

19TH ANNUAL GREEN CHEMISTRY & ENGINEERING CONFERENCE

Catalyzing Innovation
Smarter Research, Greener Design, Better World

JULY 14-16, 2015
N. BETHESDA, MD

Catalyzing Innovation
Smarter Research

re:chem

Renewable Chemicals
and Materials Alliance

Northwest Green Chemistry

Home About Initiatives Events NW Innovators Advisory Council Tools

Green Chemistry Solutions

The goal of the Center is to enhance human and environmental health by fostering pollution prevention through green chemistry innovation while simultaneously promoting economic growth.

UPCOMING EVENTS

GreenCentre Canada

changing chemistry, changing the world

We transform green chemistry breakthroughs into green products and services that enhance and preserve our quality of life and our environment for future generations.

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LATEST TWEETS!

Beyond Benign[®]

The Green Chemistry Commitment
TRANSFORMING CHEMISTRY EDUCATION

Green Chemistry Who's Committed? Participate Resources Contact Faculty Students Companies

The Green Chemistry Commitment empowers colleges and universities to commit to changing the education of tomorrow's scientists. **Commit Now.**

12 Principles of Green Chemistry

ATOM ECONOMY

For Students One student makes a world of difference.

For Faculty It often begins with one faculty member.

For Companies Support the next generation of.

News Sign up for the next webinar on April 15.

UNIVERSITY OF OREGON

Sign Up Sign In

GCEdNet
Green Chemistry Education Network

"Advancing green chemistry through a global network of educators who develop, implement and disseminate greener educational materials."

HOME PROFILE EVENTS EMPLOYMENT FUNDING NEWS GROUPS FORUM MEMBERS RESOURCES EDUCATION

GCEdNet is a social network.

GREEN CHEMISTRY EDUCATION NETWORK MISSION

The Green Chemistry Education Network (GCEdNet) serves as a catalyst for integrating green chemistry in chemical education at all levels. As a network of educators we support opportunities to research, develop, implement and disseminate green educational materials. The GCEdNet reaches out to all chemistry educators through collaboration and mentoring, facilitating professional growth, and fostering the synergistic integration of green chemistry in education.

What's New?

19th Annual Green Chemistry and Engineering Conference • Catalyzing Innovation: Smarter research, greener design, better world
July 14-16, 2015 in the Washington DC metro area.

Abstract submission is open – deadline March 13, 2015
Program Information - <http://www.gcende.org/program/>
Business Plan Competition - <http://www.gcende.org/program/business-plan-competition/>
Advanced Registration - May 29, 2015 - <http://www.gcende.org/registration/>
NCE Student Travel Scholarship - Application deadline March 13, 2015

Welcome to GCEdNet
Sign Up
or Sign In

SHARE THIS
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GC3

But have we mainstreamed green chemistry?

- A time when...

Green chemistry becomes standard practice throughout the economy so that all chemistry is, by default, green chemistry

We have made progress but have a long way to go...

- Despite significant successes in programs, collaborations and recognition of need, it's still a marginal consideration.
- The green chemistry community lacks a coherent long term strategy, strong coordination, and significant, stable funding.
- Much of the progress has been on the demand side and not on the supply side.

GC3 Approach - How do we “mainstream” green chemistry

- What can be done to make all chemistry green chemistry?
- What are the current barriers and drivers?
- What partnerships will have to be built,
- policies put in place, educational needs met, and investments made?

Process

- Member survey
- Literature review
- Mainstreaming Green Chemistry Advisory Group
- GC3 Strategic Research Initiatives



THE GC3'S PLAN TO ACCELERATE GREEN
CHEMISTRY INNOVATION AND ADOPTION

GC3

Short Term Goals of the GC3 Agenda to Mainstream Green Chemistry

- Scale green chemistry innovation;
- Elevate the importance of green chemistry in education and research;
- Develop and pass smart policies that support markets, research, and innovation.

Priority Short Term Actions

- Support the proposed federal “Sustainable Chemistry R&D Act of 2015
- Expand the development and use of innovative tools to accelerate green chemistry
- Convene a National Summit on green chemistry research and education
- Identify metrics and ways to measure green chemistry and advocate for gathering of such information
- Continue to Advance Collaborative Supply Chain Partnerships



Green chemistry may not be mainstream, but the avenues to get there are evolving

- Cross-sectoral, value chain collaboration is growing...
- Tools and metrics are evolving....
- Innovative new chemistries and materials are being developed...
- Education and awareness are changing

A unique point in time to accelerate green chemistry

- Build incentives for R&D, adoption and scale
- Enhance green chemistry education
- Grow the scientific base
- Accelerate supply chain collaborative partnerships to solve problems
- Communicate the stories
- Transform the chemicals and materials economy
- Create a stronger, more vibrant, integrated green chemistry community





Thank you.

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