

# Resources for Building the Field and Practice: Professional Development/Higher Education

Saskia van Bergen

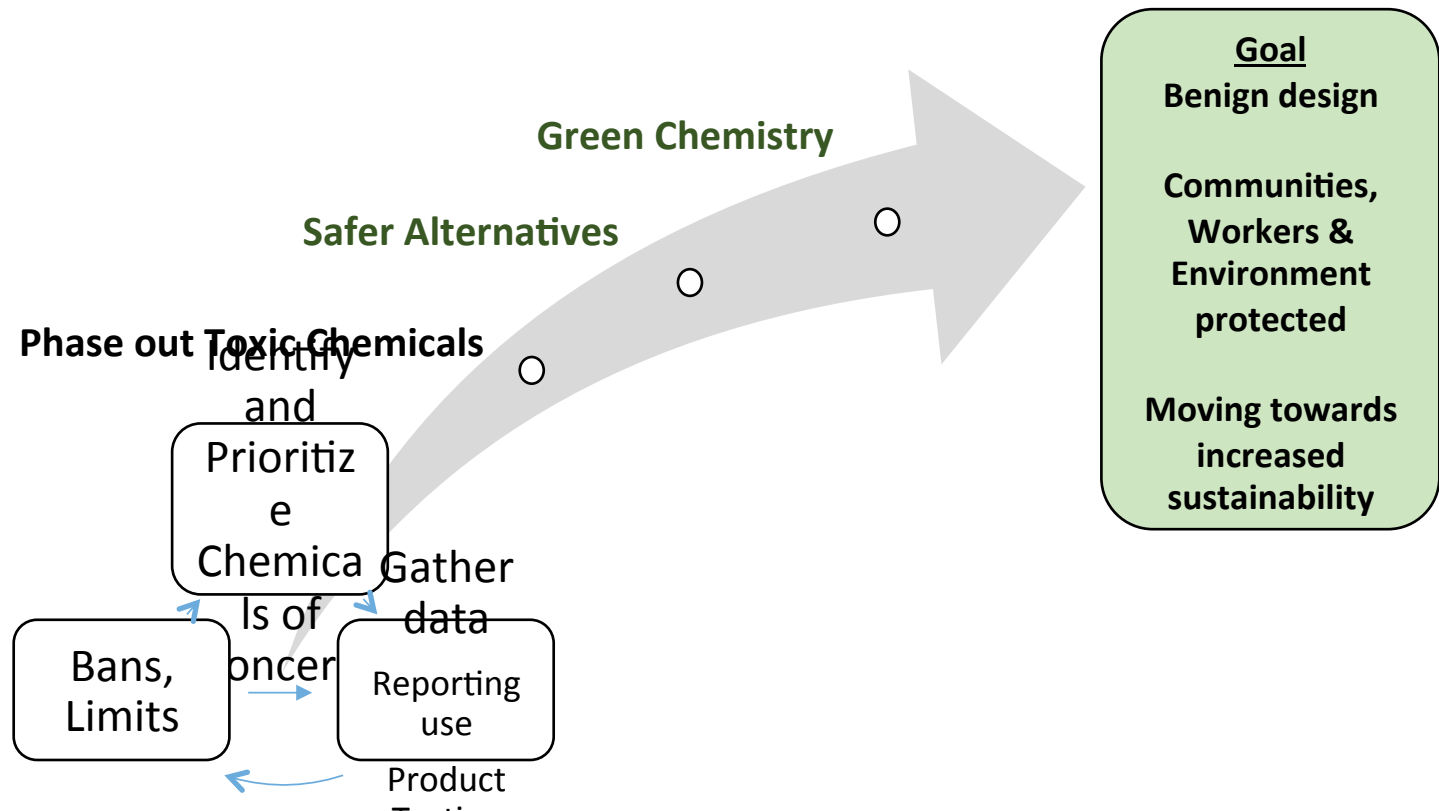
Washington State Department of Ecology

November 2, 2018

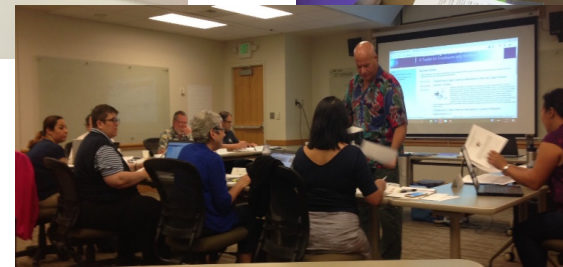
# Prevent and Reduce Toxic Threats

A Washington State Department of Ecology Priority

Averting toxic exposure is the smartest, cheapest, and healthiest approach.



# Increasing Awareness and Adoption through Tools, Training and Technical Assistance



# Critical Question- Who is your Audience?

- What Sector?
- What is their Role?
- **What is their education?**
- **What is their capacity?**



Do You Actually Even Have One?

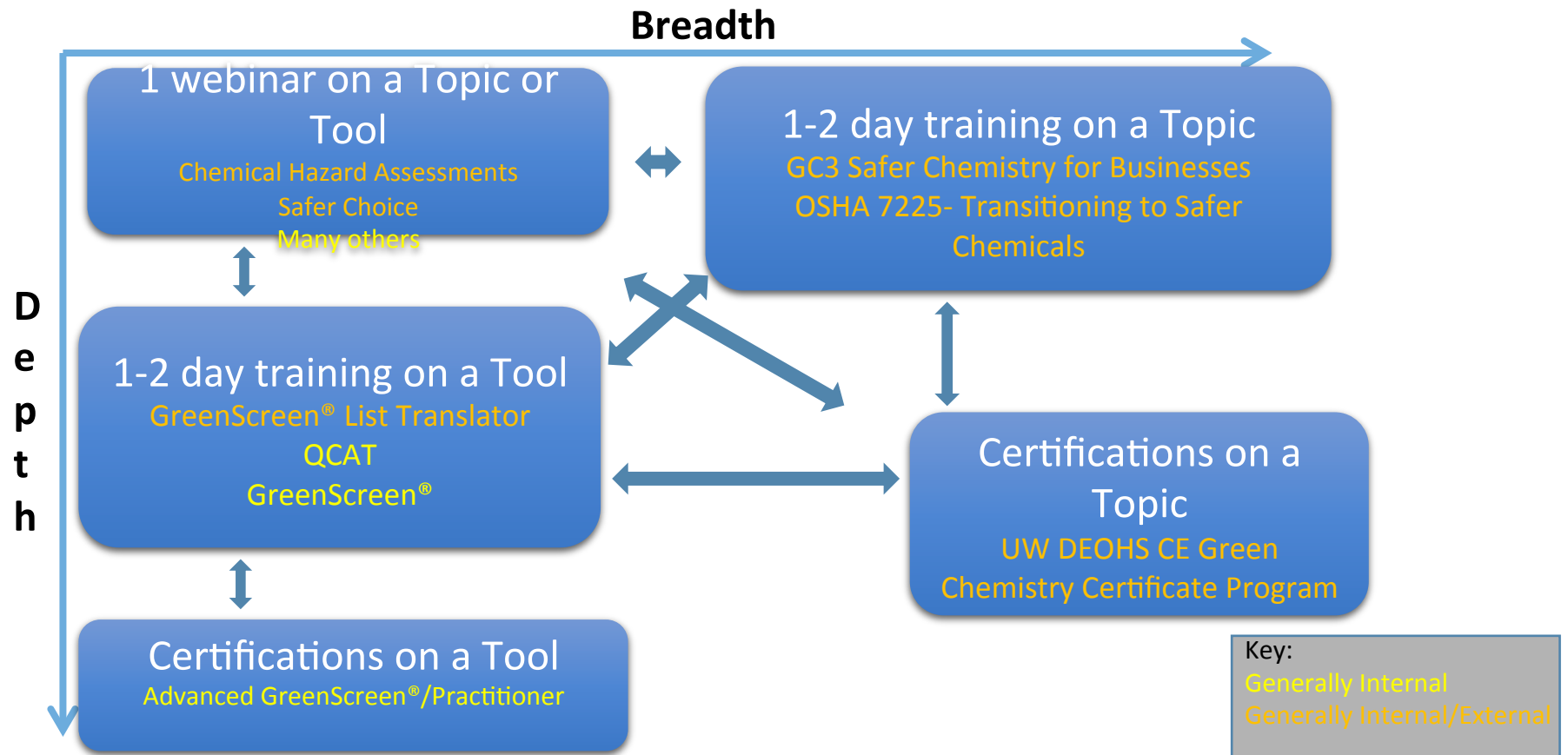
How much experience do they have with safer alternatives?

How much time are they willing to invest in training?

What is of value to your Potential Audience?

# Green Chemistry/Safer Alternative Trainings

Continuing Education- Broad Audience





# GC3 Safer Chemistry Training for Businesses (FREE)

Foundations for Green Chemistry and Green Engineering		
<b>Green Chemistry: Benign by Design</b> One of the fathers of green chemistry, Dr. John Warner, provides an introduction to green chemistry, as well as ideas for how to build this concept into education and practice.	<b>John Warner</b> Warner Babcock Institute for Green Chemistry	
<b>Introduction to Green Engineering</b> Green engineering applies principles similar to those of green chemistry to process and product design. In this webinar, experts in green engineering introduce principles, tools, and examples of this practice.	<b>Julie Zimmerman</b> Yale University	
	<b>Matthew Eckelman</b> Northeastern University	
	<b>Julie Schoenung</b> University of California Davis	
<b>The Role of Policy in Green Chemistry Research and Adoption</b> This webinar provides an overview of the range of policies that can affect chemical design and product development and adoption, with examples from a major chemical manufacturer.	<b>Robert Giraud</b> DuPont Company	
	<b>Joel Tickner</b> Green Chemistry & Commerce Council	
Green Chemistry in Business		
<b>The Value of Green Chemistry</b> Green chemistry leaders in industry discuss their efforts to build awareness and make a case within their firms, supply chains, and customers on the value of green chemistry.	<b>Helen Holder</b> Hewlett-Packard	
	<b>Tse-Sung Wu</b> Genentech	
	<b>Andy Shafer</b> Elevance Renewable Sciences	
<b>Building Market Share for Green Products</b> Is it better to advertise oneself as a green company, or to focus exclusively on product performance? Three companies share their approaches to marketing their sustainable practices.	<b>Steve Davies</b> NatureWorks	
	<b>Saskia van Gendt</b> Method	
	<b>Charlie Forslund</b> Steelcase	

Webinar Listings

## Chemical Hazard Assessment: Informing Decisions for Safer Chemicals, Materials, and Products

### Webinar Description

Chemical hazard assessment (CHA) assesses chemical substances across a suite of hazard endpoints and uses the resulting data to compare chemicals for various purposes. It is increasingly utilized by retailers, brands, and materials suppliers to make informed decisions about chemical use. CHA can be exercised through initiatives such as regulatory standards, ingredient disclosure schemes, voluntary ecolabels, and internal product development. This session introduces listeners to different types of CHA, sources of data, and strategies for dealing with data gaps. A number of example applications are presented to illustrate the range of possible uses.

### View the Webinar Online

[Watch on Vimeo](#)

### Download Webinar for Offline Viewing

[1 Slides Only \(PDF, 10 MB\)](#)

To download video, visit this webinar on [Vimeo](#) and click "Download" below the video description.

### Presenters



**Lauren Heine**  
Interim Executive Director, Northwest Green Chemistry  
Chemistry Rating: 1  
[➤ Read Biography](#)



**Margaret Whittaker**  
Managing Director and Chief Toxicologist, ToxServices, LLC  
Chemistry Rating: 1  
[➤ Read Biography](#)

- Description
- Slides
- Presentation(s)
- Additional Material

[www.greenchemistryandcommerce.org/safer-chemistry-training](http://www.greenchemistryandcommerce.org/safer-chemistry-training)



## OSHA 7225: Transitioning to Safer Chemicals

- OSHA's seven-step substitution planning process
  - 1: Form a Team to Develop a Plan
  - 2: Examine Current Chemical Use
  - 3: Identify Alternatives
  - 4: Assess & Compare Alternatives
  - 5: Select a Safer Alternative
  - 6: Pilot the Alternative
  - 7: Implement and Evaluate the Alternative
- Hands-on activities connect to:
  - Case Studies
- Tools, related resources and databases



<https://osha.washington.edu/osha/course/transitioning-safer-chemicals>

**FYI- 2019 dates  
posted!**



CONTINUING EDUCATION PROGRAMS  
NORTHWEST CENTER FOR OCCUPATIONAL HEALTH AND SAFETY

# Online Green Chemistry and Chemical Stewardship Certificate Program



*67% of global executives agree that sustainability strategies are necessary to be competitive.\**

**PROGRAM DATES**  
Sept 27, 2017–June 8, 2018

**COMPLIMENTARY  
INFORMATION SESSIONS**

April 18, 2017 10:00–11:00 am  
May 23, 2017 12:00–1:00 pm  
July 11, 2017 5:30–6:30 pm

*Sessions hosted via Adobe Connect  
All times are PST.*

To sign up for an online  
information session, visit the  
eLearning page of our website,  
[osha.washington.edu](http://osha.washington.edu)

**REGISTRATION**

Registration opens  
March 1, 2017  
\$910 per course  
*Successful completion of all  
three courses is required to  
receive a certificate.*

Register online at  
[osha.washington.edu](http://osha.washington.edu)

Businesses are facing increasing market and regulatory pressures to use less toxic chemicals in their manufacturing processes and products, and are in need of professionals who can provide innovative solutions and more sustainable substitutes.

**WHAT YOU WILL LEARN**

During this 3-course program, we will explore:

- The 12 guiding principles of green chemistry
- Business drivers and barriers to implementing sustainable practices
- Frameworks for incorporating chemical toxicity and human health considerations into product design, material selections, and supply chain decision-making
- Environmental, economic, and societal benefits of green chemistry
- The latest research and regulatory developments in the field
- New tools for chemical design and methods for comparative chemical hazard assessments

**THIS PROGRAM IS FOR YOU**

- Engineers, chemists, and materials scientists
- Environmental product managers
- Supply chain decision-makers
- Risk management researchers
- Product stewardship professionals
- Safety and health professionals
- Graduate level students in related fields
- High School teachers and academic faculty
- Legal professionals
- Building designers and architects

**Designed for:**

Professionals interested in learning and applying the principles of alternative chemistries and green toxicology in their work

**First Certificate started in 2015**

**2019 Enrollment information coming soon.**

**Three-course online certificate program**

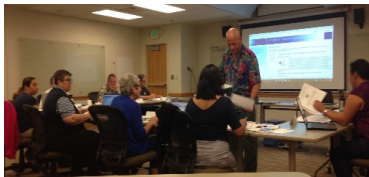
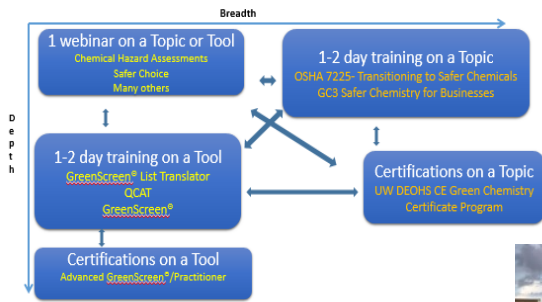
1. Sustainability, Toxicology & Human Health
2. Principles of Green Chemistry
3. Assessment Tools for Safer Chemical Decisions

<https://osha.washington.edu/pages/green-chemistry-chemical-stewardship-online-certificate->





# Continuing Education: Needs



## Transitioning to Safer Chemicals: A Toolkit for Employers and Workers

### Success Stories

Many organizations have already realized better health and safety benefits, increased productivity, and saved money by reducing the use of hazardous chemicals and implementing safer alternatives.

#### Safety Process: Systematically Evaluating Hazardous Products and Transitioning to Safer Alternatives

**Safety Process:** Seattle City Light  
Seattle City Light, one of the nation's largest municipally owned electric utilities, has successfully developed and implemented a chemical use reduction policy and process in response to public pressure to phase out the use of products that pose human health or environmental risks, and to increase the use of safer alternatives. To implement the policy, Seattle City Light developed the Safety Process. The Safety Process uses the hazard reduction tool kit to assess and determine whether a chemical is classified as a product that poses risks to public health or the environment.

Through the ongoing process, the utility has been able to identify and transition to chemical products in a variety of applications. For example, when Seattle City Light identified a hazardous chemical used in its water treatment process, it was replaced with a safer alternative. This transition was supported by the American Water Works Association's (AWWA) Water Treatment Chemicals Handbook, which provides information on alternative products and their use in water treatment.

#### Transitioning to Safer Alternatives in Bath Tub Stripping

**Background:** Seattle and the Seattle Bathing Club  
The Washington State Department of Labor and Industries (L&I) and Health Assessment and Research for Prevention (SHARP) program worked with two small businesses exploring alternatives to methylene chloride based paint strippers after Washington State passed legislation that restricts the use of these chemicals. The businesses, Seattle Bathing Club and Seattle Bathing Club, were looking for safer alternatives to methylene chloride based paint strippers. The businesses were interested in learning more about the risks of methylene chloride and the health impacts of methylene chloride based paint strippers. The businesses were also interested in learning more about the risks of methylene chloride based paint strippers. The businesses were also interested in learning more about the risks of methylene chloride based paint strippers.

Practice/Gather Information/Identify needs

What worked? What didn't?

# Higher Education: Toxicology Resources for Chemistry Faculty



About K-12 Higher Ed Curriculum Community Engagement Professional Development

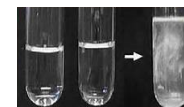
**Higher Ed**

**TOXICOLOGY PAST PRESENTATIONS**

View past conference presentations from Toxicology for Chemists symposia and workshops. The following presentations give guidance for those seeking additional information in integrating toxicology concepts into chemistry courses and programs.

conferences

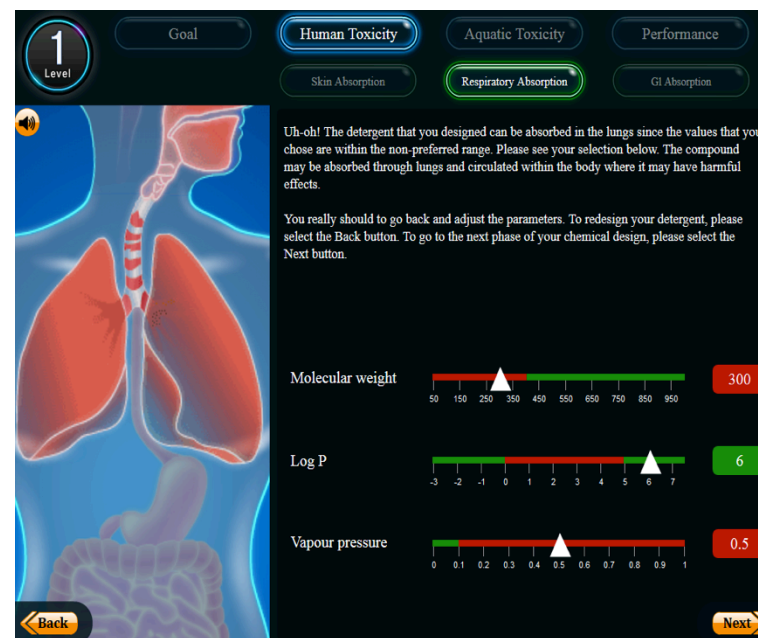
Rxn #:	Chemical name:	Data Source:	Physical Hazard:	Health Hazard:	Environmental Hazard:	Hazard Level:
1	<b>Lead (II) Nitrate</b>	SDS Data & H-Statements	H272	H302 (Medium), H332 (Medium), H350 (High), H360 (High), IARC Group 2A: Probably carcinogenic to humans (High) H318, H373, LD50 (intravenous, rat) – 93 mg/kg; LD50 (intraperitoneal, mouse) – 74 mg/kg	H400 (High), H410 (High), LC50 (fish, 96 hr) – 1.5 mg/l (High), LC50 (fish, 96 hr) – 0.4-1.3 mg/l (High), EC50 (daphnia, 48 hr) – 0.5-2.0 mg/l (High)	High
	<b>Potassium Iodide</b>	SDS Data & H-Statements		H302 (Medium), LD50 (oral, mouse) 1,000 mg/kg (Medium) H315, H319	LC50 (fish, 96 hr) 2,190 mg/l (Low), EC50 (daphnia, 24 hr) 2.7 mg/l (High- based on 48 hr criteria)	High
2	<b>Copper (II) Sulfate</b>	SDS Data & H-Statements		H302 (Medium), LD50 (oral, rat) – 482 mg/kg (Medium) H315, H319, LD50 (intraperitoneal, rat) – 20 mg/kg; LD50 (subc, rat) – 43 mg/kg; LD50 (intravenous, rat) – 48.9 mg/kg	H410 (High), LC50 (fish, 96 hr) – 1-2.5 mg/l (High), EC50 (daphnia, 48 hr) – 0.024 mg/l (High)	High
	<b>Potassium Carbonate</b>	SDS Data & H-Statements		H302 (Medium), LD50 (oral, rat) – 1,870 mg/kg (Medium) H315, H319, H335	LC50 (fish, 96 hr) < 510 mg/l (Low)	Medium
3	<b>Calcium chloride</b>	SDS Data & H-Statements		LD50 (oral, rat) – 2,301 mg/kg (Low) H319	LC50 (fish, 96 hr) – 10,650 mg/l (Low), EC50 (daphnia, 48 hr) – 2,400 mg/l (Low)	Low
	<b>Sodium carbonate</b>	SDS Data & H-Statements		LD50 (oral, rat) – 4,090 mg/kg (Low), LC50 (inh, rat, 2 hr) – 5,750 mg/l (Low) H314	LC50 (fish, 96 hr) – 300 mg/l (Low), EC50 (daphnia, 48 hr) – 265 mg/l (Low)	Low



<https://www.beyondbenign.org/lessons/module-chemical-hazard-awareness/>



# Safer Chemical Design Game



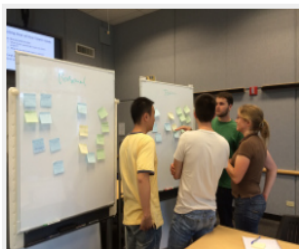
Design a detergent with optimal cleaning performance that is also safer for humans and the environment.

<http://greenchemistry.yale.edu/education/undergraduate-graduate>

# Opportunities: Project based classes/Capstone projects/Internships

## Greener Solutions

The Greener Solutions program is a project based class that partners students with companies, non-profits, and/or government agencies interested in promoting the adoption of more sustainable chemistry. Every year we recruit teams of graduate students and advanced undergraduates to work closely with our partner organizations on interdisciplinary projects that leverage students' knowledge in a real-world context.



### Integrating Design Principles and Alternatives Assessment A Case Study on Food Clamshell Take-Out Containers

Engineering students at Gonzaga University applied a combination of sustainability assessment tools to evaluate how four different food take-out containers aligned with green chemistry & engineering (GC&E) design principles. This project is part of a larger effort to develop a framework for sustainable product design & procurement. Users will be empowered to evaluate multiple, interrelated sustainability attributes and identify where design improvements would have the greatest benefit. The students identified which of the four containers were the most sustainable, using three GC&E principles to define "sustainable materials."



#### Grant: remooble

MPCA awarded the 2018 Green Chemistry & Engineering Summer Internship Grant to remooble, a 2017 start-up company based in Maple Grove that develops safe and effective paint, ink and adhesive removers for retail sale.



#### Grant: Ecolab

MPCA awarded a \$9,500 grant to Ecolab to support a green chemistry and engineering intern project at the company's Eagan facility in 2017.



#### Grant: Connect Ecology

Connect Ecology received a 2016 grant to support an intern for a Minnesota project in green chemistry.



Bring Safer Choice To Your Community

PLU Safer Choice Webinar



Tweets by @PLUSaferChoice



- 1-<https://bcgc.berkeley.edu/greener-solutions/>
- 2-<https://northwestgreenchemistry.app.box.com/s/gvcrxpg4taei36accf3p20gzmse37q0>
- 3- <https://www.pca.state.mn.us/waste/green-and-safer-product-chemistry-grants>
- 4- <http://plusaferchoice.com/bring-safer-choice-to-your-community/>



**Thank you!**