

# Integrating Chemical Hazard Assessment into Procurement & Design



**GreenScreen**<sup>®</sup>  
Practitioner Program

# Webinar Format

1. Introduction to the GreenScreen
2. GreenScreen Practitioner Program
3. Authorized GreenScreen Practitioners
4. Questions and Answers



**GreenScreen**<sup>®</sup>  
Practitioner Program

# Speakers



Dr. Lauren Heine

GreenScreen Program Director



Shari Franjevic

GreenScreen Training Program Manager



Curtis Wray

Authorized GreenScreen Practitioners



Pam Eliason



Dr. Eric Rosenblum

Toxicologist/Lead Instructor

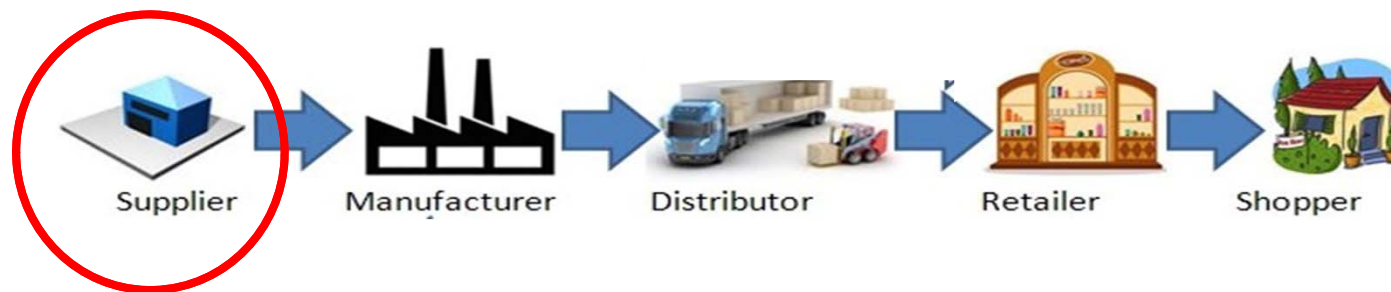


**PART I:**  
**Introduction to the**  
**GreenScreen for Safer Chemicals**

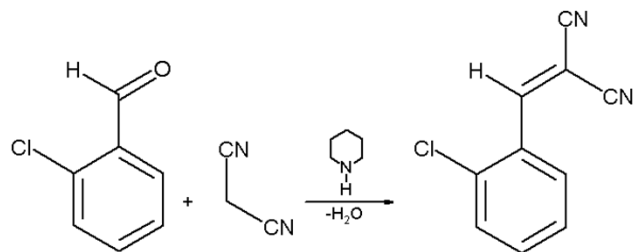
# Everyone Selects Materials



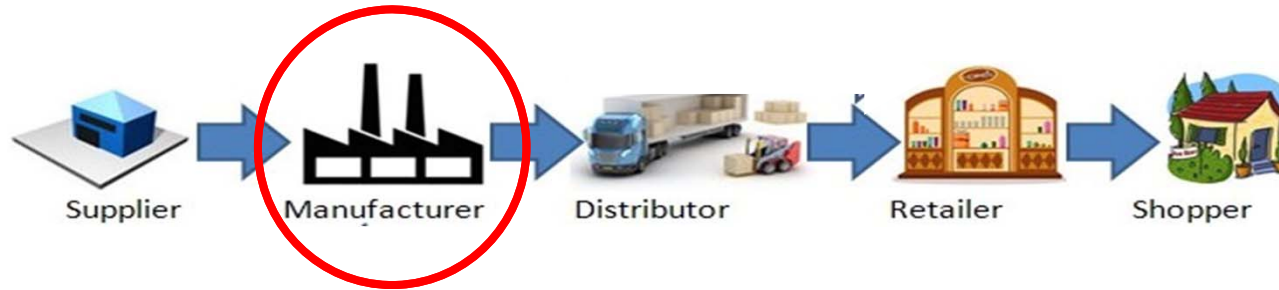
# Suppliers Select Materials



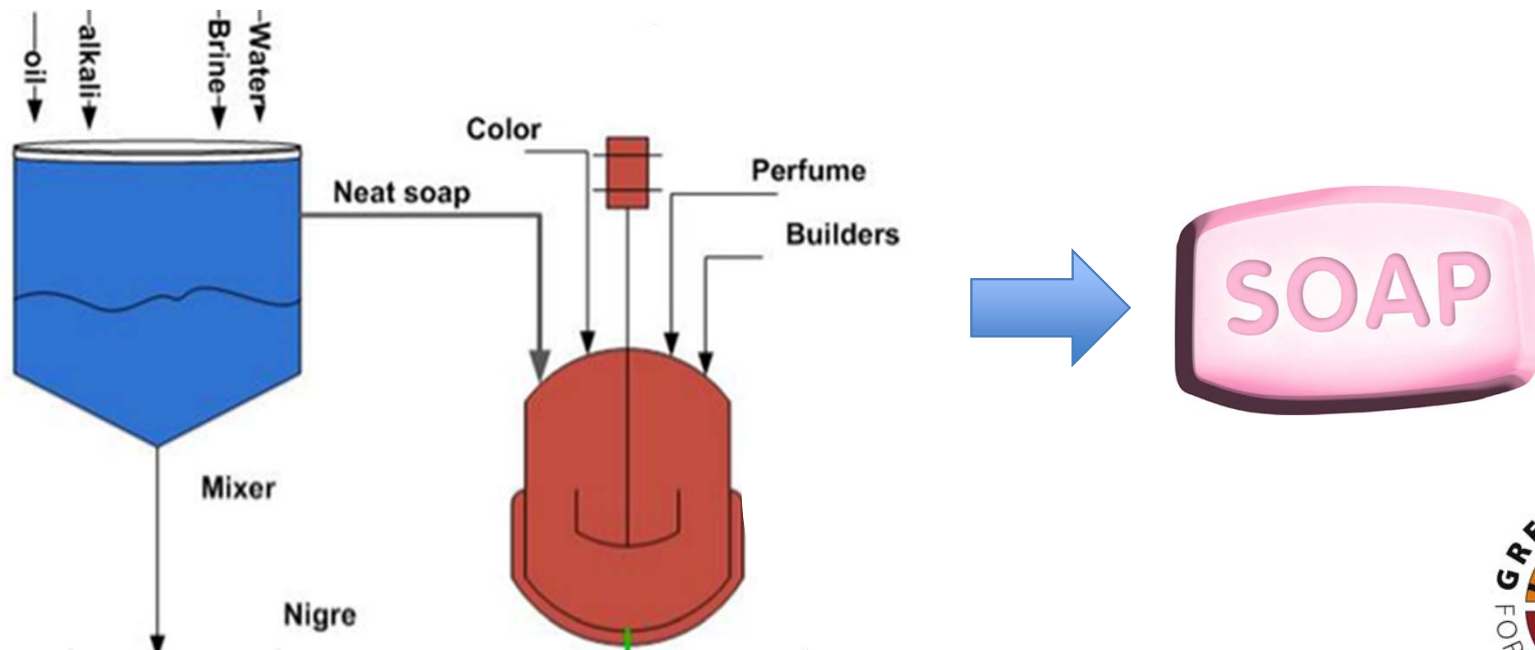
*e.g.,* Synthesis and processing chemicals



# Manufacturers Select Materials



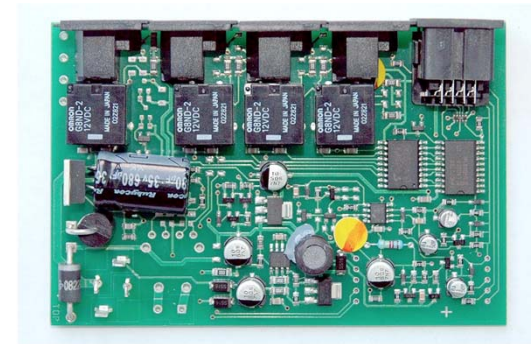
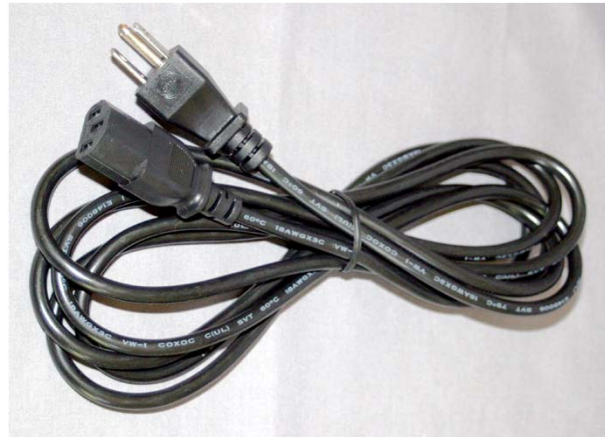
*e.g.,* Chemical ingredients in a product



# Designers Select Materials



*e.g.,* Materials for a complex products and articles





# Retailers Select Materials



*e.g.*, Products to put on the shelf



# End Users Select Materials

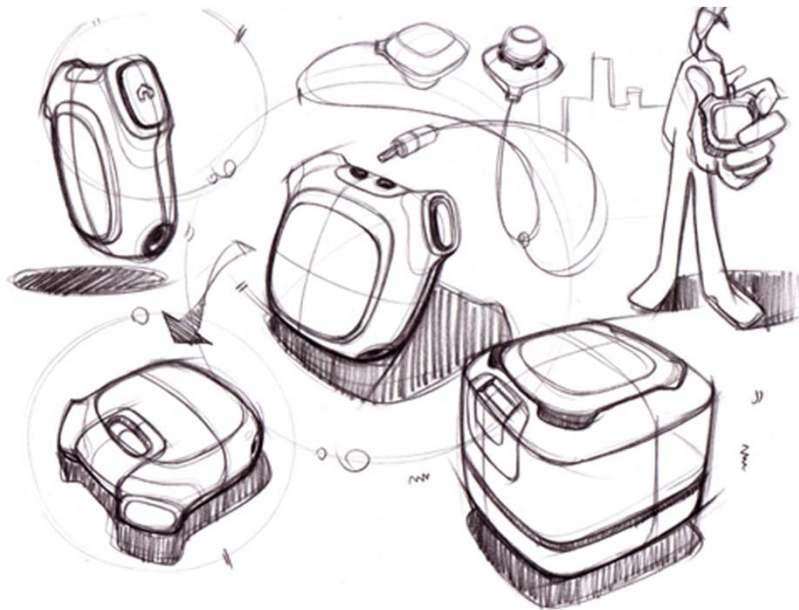


- Large-scale purchasers
- Specifiers
- NGOs and Governments
- Individual consumers



# Material Selection Choice Points

## 1. Design



## 2. Substitution



# Get it Right the First Time

Save money \$\$



# Get it Right the First Time

Avoid regrettable substitutions



# Get it Right the First Time

Avoid unintended consequences



# Get it Right the First Time

## Create Lasting Solutions

### BPA Free Thermal Paper Rolls



There is a growing health effect of exposure to a wide variety of products. You decide if the paper is important.

#### What is BPA?

- BPA is a chemical used to make polycarbonate plastic and epoxy resins.
- In January 2010, the FDA provided health information on BPA.
- BPA is found in many products, including:



# Material Selection Parameters





# Chemical Hazard

## Hazard



**SOME Concern**  
*for adverse effects*



**MINIMAL Concern**  
*for adverse effects*



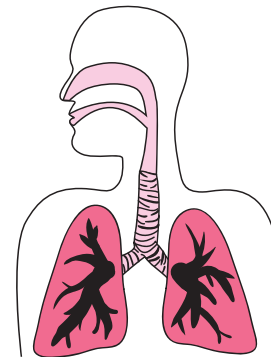
**NEGLIGIBLE Concern**  
*for adverse effects*

- Human Health e.g. Carcinogen
- Environmental Health e.g. Aquatic Toxicity
- Physical e.g. Flammable

## Routes of Exposure



**Dermal**  
**(skin)**



**Inhalation**  
**(respiratory tract)**



**Ingestion**  
**(stomach or digestive tract)**

# Chemical Hazard Metric?





## Chemical hazard assessment (CHA) method developed by Clean Production Action

- Transparent
- Systematic
- Scientifically robust
- Freely and publicly accessible

<http://www.greenscreenchemicals.org/method/method-documents>



**Simple:** Integer Score (1-4)

**Comprehensive:** Transparent, detailed documentation

# GreenScreen Assessment

1. Assess and classify hazards
2. Apply the Benchmarks
3. Make informed decisions



# GreenScreen Hazard Endpoints

Human Health Group I	Human Health Group II and II*	Environmental Toxicity & Fate	Physical Hazards
Carcinogenicity	Acute Toxicity	Acute Aquatic Toxicity	Reactivity
Mutagenicity & Genotoxicity	Systemic Toxicity & Organ Effects	Chronic Aquatic Toxicity	Flammability
Reproductive Toxicity	Neurotoxicity	<i>Other Ecotoxicity studies when available</i>	
Developmental Toxicity	Skin Sensitization	Persistence	
	Respiratory Sensitization		
Endocrine Activity	Skin Irritation	Bioaccumulation	
	Eye Irritation		

# GreenScreen Hazard Criteria

## Example - Carcinogenicity (C)

Information type	Information Source	List Type	High (H)	Moderate (M)	Low (L)
Data	GHS Category & Guidance	N/A	1A (Known) or 1B (Presumed) for any route of exposure	2 (Suspected) for any route of exposure or limited or marginal evidence of carcinogenicity in animals	Adequate data available, and negative studies, no structural alerts, and GHS not classified.
List (Sample included here)	EPA-C (1986)	Authoritative	Group A, B1 or B2	Group C	Group E
	IARC	Authoritative	Group 1 or 2A	Group 2B	Group 4
	Prop 65	Authoritative	Known to the state to cause cancer		

See GreenScreen® Hazard Criteria for a complete set of hazard criteria for all hazard endpoints.

<http://www.greenscreenchemicals.org/method/method-documents>

# GreenScreen Hazard Summary Table

Summarizes and displays results of Step 1 - Assess & Classify Hazards.

Green Screen Hazard Ratings																			
Group I Human					Group II and II* Human								Ecotox		Fate		Physical		
Carcinogenicity	Mutagenicity	Reproductive Toxicity	Developmental Toxicity	Endocrine Activity	Acute Toxicity	Systemic Toxicity		Neurotoxicity		Skin Sensitization*	Respiratory Sensitization*	Skin Irritation	Eye Irritation	Acute Aquatic Toxicity	Chronic Aquatic Toxicity	Persistence	Bioaccumulation	Reactivity	Flammability
						single	repeated*	single	repeated*										
L	L	L	M	M	L	L	L	vH	H	L	DG	L	L	H	H	vL	L	M	L



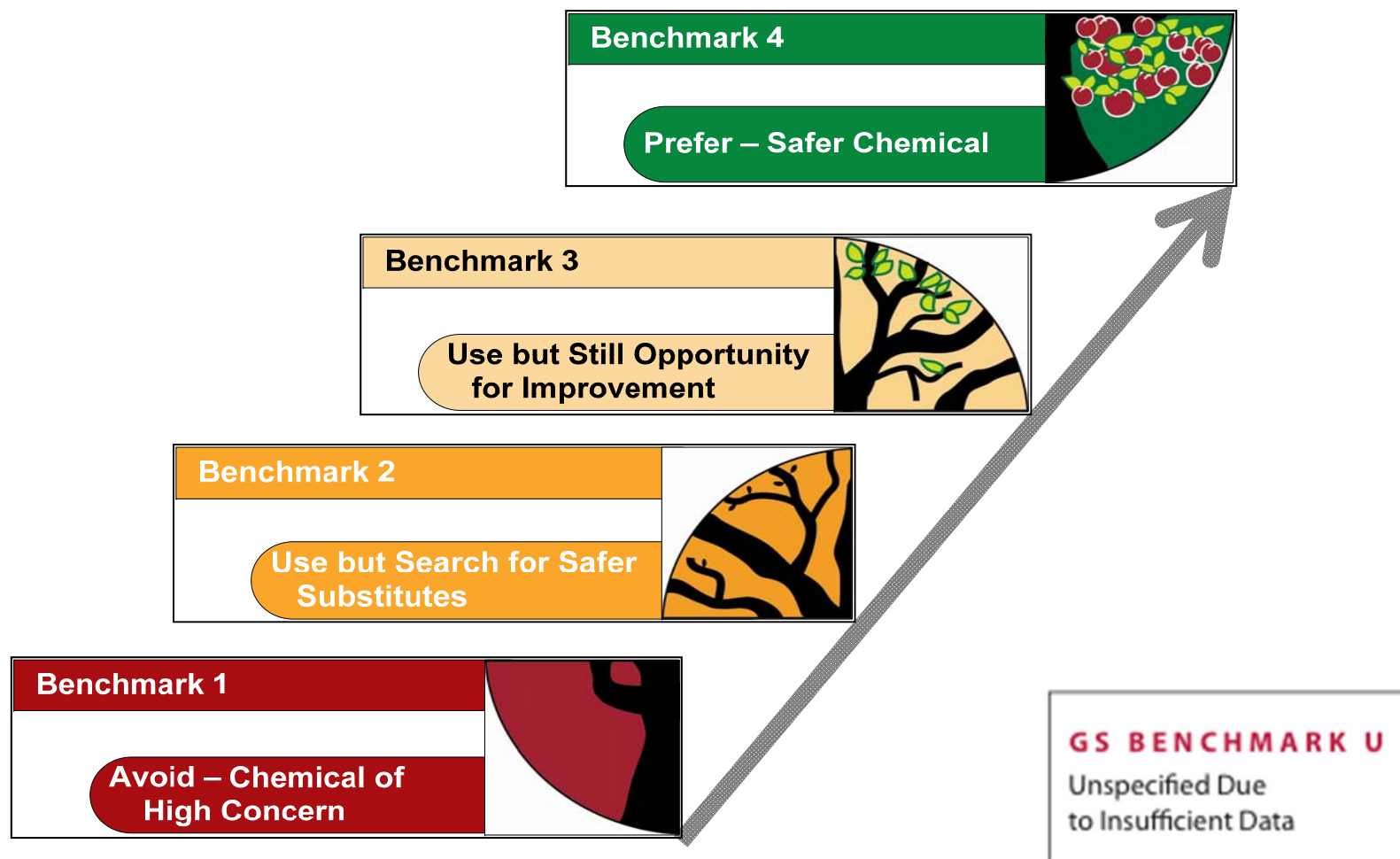
# GreenScreen Assessment

1. Assess and classify hazards
2. Apply the Benchmarks
3. Make informed decisions



# GreenScreen Assessment

## Step 2: Apply the Benchmarks



# GreenScreen Assessment

## Step 2: Apply the Benchmarks

**GS BENCHMARK 1**

- a. PBT = High P + High B + [very High T (Ecotoxicity or Group II Human) or High T (Group I or II\* Human)]
- b. vPvB = very High P + very High B
- c. vPT = very High P + [very High T (Ecotoxicity or Group II Human) or High T (Group I or II\* Human)]
- d. vBT = very High B + [very High T (Ecotoxicity or Group II Human) or High T (Group I or II\* Human)]
- e. High T (Group I Human)

**Avoid—Chemical of High Concern**

**ABBREVIATIONS**

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

See GreenScreen® Benchmark Criteria and GreenScreen® Guidance for a complete set of Benchmark Criteria and how to apply them. <http://www.greenscreenchemicals.org/method/method-documents>

# GreenScreen Assessment

1. Assess and classify hazards
2. Apply the Benchmarks
3. Make informed decisions



# Assessment Results

Three levels of results:

1. Final GreenScreen Benchmark Score with explanation
2. Hazard Summary Table with hazard ratings for the 18 hazard endpoints
3. Detailed review of data for each hazard endpoint and references

# 1. Benchmark Score

**GreenScreen Rating<sup>2</sup>:** Zinc borate was assigned a **Benchmark Score of 1** based on high concern level for reproductive and developmental toxicity. Zinc borate also has a very high concern level for environmental persistence<sup>2</sup> and very high concern for chronic aquatic toxicity of zinc borate, and high or moderate concern level for respiratory sensitization of zinc oxide as a potential combustion or biodegradation product. A data gap exists for neurotoxicity.

## 2. Hazard Summary Table

GreenScreen Hazard Ratings: Zinc Borate																			
Group I Human					Group II and II* Human						Ecotox		Fate		Physical				
C	M	R	D	E	AT	ST		N		<u>SnS*</u>	<u>SnR*</u>	<u>IrS</u>	<u>IrE</u>	AA	CA	p <sup>2</sup>	B	Rx	F
						S	R*	S	R*										
<b>L</b>	<b>M</b>	<b>H</b>	<b>H</b>	<b>M</b>	<b>L</b>	DG	M	DG	DG	<b>L</b>	<b>H</b>	<b>L</b>	<b>M</b>	<b>H</b>	<i>vH</i>	<i>vH</i>	<b>L</b>	<b>L</b>	<b>L</b>

Note: Hazard levels (Very High (*vH*), High (H), Moderate (M), Low (L), Very Low (*vL*)) in *italics* reflect estimated values and lower confidence. Hazard levels in **BOLD** font reflect values based on test data (See Guidance). For the purposes of this report, hazard levels derived from test data on boric acid or zinc salts were given a high level of confidence. Data on analogs or predicted data were given a low level of confidence.

# 3. Detailed Review of Data & References

## Group I Human Health Effects (Group I Human)

### **Carcinogenicity (C) Score (H, M or L):**

Zinc borate was assigned a score of **Low** for carcinogenicity based on: negative results in two chronic studies on boric acid.

### Authoritative and Screening Lists:

- Zinc borate, zinc, zinc hydroxide, zinc chloride and zinc oxide were all classified as Group D - Not classifiable as to human carcinogenicity (EPA, 2004).

### Zinc borate data:

- Carcinogenicity data were not identified for zinc borate (CAS #1332-07-6).

### Zinc salts and Boric acid data:

- No adequate experimental evidence has been found to indicate that zinc salts administered orally or parenterally are tumorigenic (WHO/IPCS, 2001).
- Carcinogenic effects were not observed in 2-year and 38-week feeding studies on boric acid or sodium borate in rats and dogs treated with up to 1170ppm B. This corresponds to approximately 213-333mg  $\text{B}_2\text{O}_3$ /kg-day, and 340-532mg  $3\text{ZnO} \cdot 2\text{B}_2\text{O}_3$ /kg-day based on boron equivalents. (Weir and Fisher, 1972).
- Carcinogenicity was not observed in a 2-year National Toxicology Program (NTP, 1987) dietary study in mice at boric acid doses up the highest dietary dose of 5,000 ppm boric acid (550 mg boric acid/kg-day or 96 mg B/kg-day as estimated by IRIS), which is on a boron equivalent basis approximately **837mg  $3\text{ZnO} \cdot 2\text{B}_2\text{O}_3$ /kg-day**.



# GreenScreen Assessment Process

## Step 3: Make informed decisions

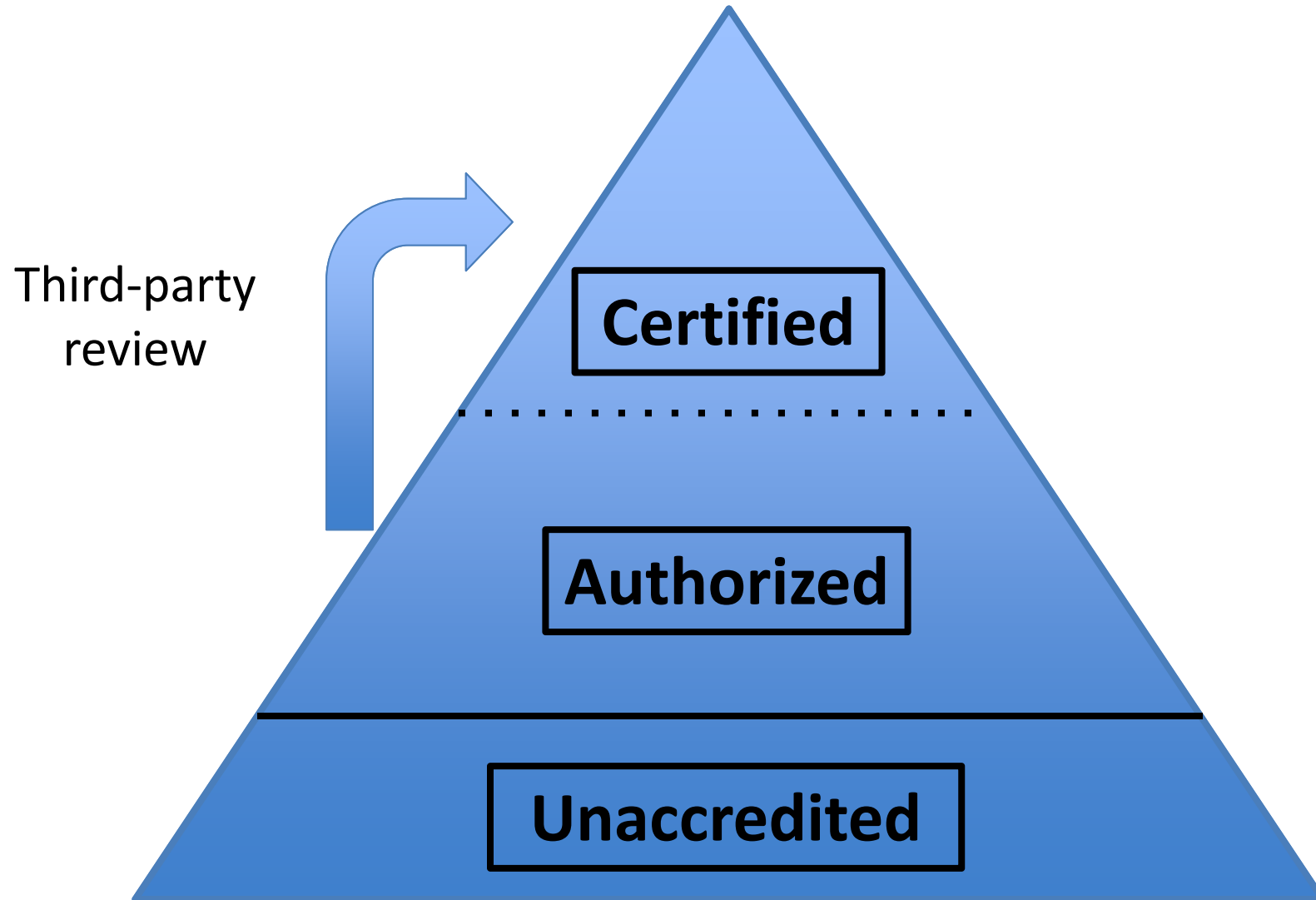


# GreenScreen Uses

1. State Regulations
2. Alternatives Assessment
3. Materials Procurement
4. Product Development
5. Corporate Policies
6. Software Tools
7. Standards, Scorecards and Ecolabels



# Types of GreenScreen Assessments



Note: GreenScreen List Translator assessments are another type of assessment, are significantly less comprehensive than a full GreenScreen assessment, and are not depicted here.

# GreenScreen Training

- Online Introductory Course coming fall 2015
- Custom training
- Advanced Topics Course
- Practitioner Program

For more information on Course Offerings, see the GreenScreen Education & Training website.

<http://www.greenscreenchemicals.org/training/course-offerings>





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**PART II:**  
**GreenScreen Practitioner Program**

# Practitioner Program

- Most advanced training offered
- Designed for individuals
- Leads to becoming Authorized GreenScreen Practitioner



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# Prerequisites

- Completion of a GreenScreen Standard Introductory Course or equivalent
- Ability to perform a literature search to find relevant data on a chemical of interest
- Familiarity with toxicological test methods
- Familiarity with reviewing toxicological studies
- Ability to assign hazard classifications to appropriate hazard endpoints
- Ability to perform Globally Harmonized System of Classification and Labeling of Chemicals (GHS)



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# Course Structure

1. Advanced Topics Course\*
  - Four 3-hour live, web-based classes
2. Practicum
  - Two comprehensive GreenScreen assessments

*\* May be taken without the Practicum*



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# Advanced Topics Course

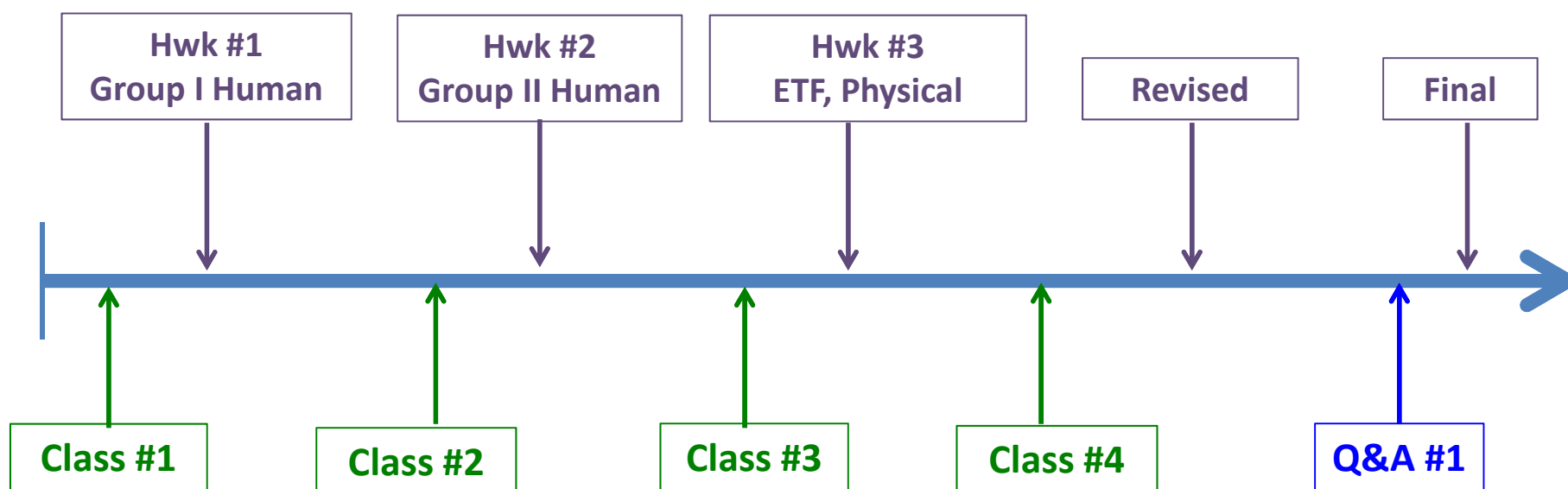
Class	Class Name	Topics
1	Advanced Hazard Assessment I	<ul style="list-style-type: none"><li>• GreenScreen Online Resources</li><li>• Assessing &amp; Classifying Hazard</li><li>• Hazard Assessment Tips – Group I Human Health</li><li>• Hazard Assessment Resources</li></ul>
2	Advanced Hazard Assessment II	<ul style="list-style-type: none"><li>• Hazard Assessment Tips – Group II Human Health</li></ul>

# Advanced Topics Course

Class	Class Name	Topics
3	Advanced Hazard Assessment III	<ul style="list-style-type: none"><li>• Hazard Assessment Tips – Environmental Toxicity, Fate and Physical Hazards</li><li>• Estimation</li></ul>
4	Advanced Benchmarking	<ul style="list-style-type: none"><li>• Hazard Assessment Special Cases: Inorganic chemicals, polymers</li><li>• Advanced Benchmarking: Data Gaps, Transformation Products, Inorganic Chemicals, Mixtures</li></ul>

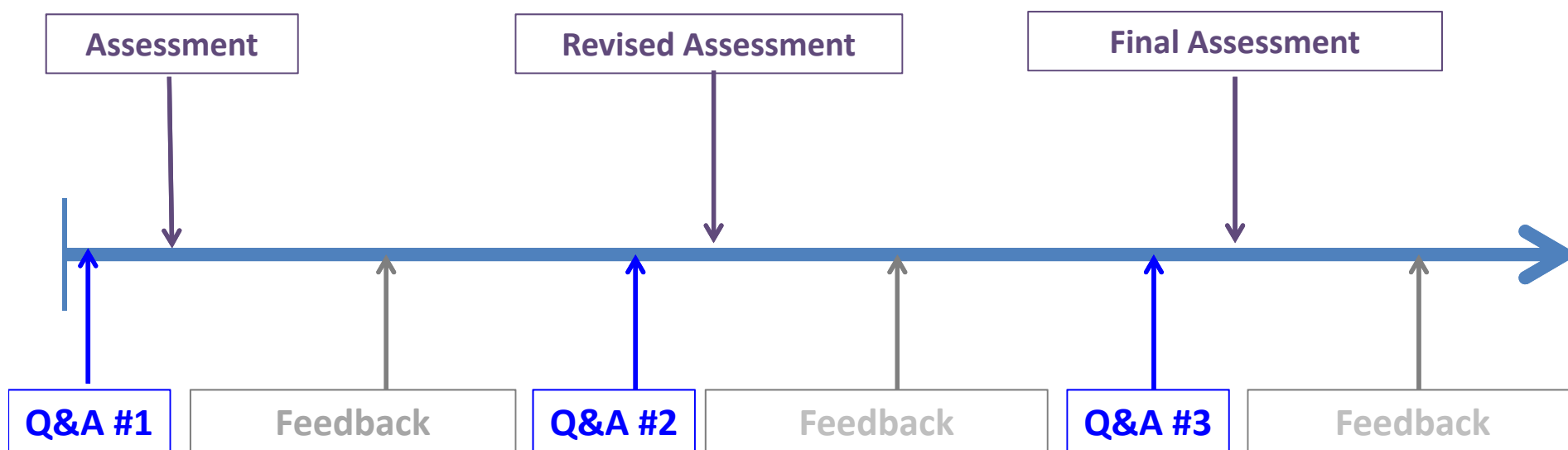
# Practicum Process

## Chemical #1



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# Practicum Process Chemical #2



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# Course Structure

- Total time commitment (class, practicum, and homework) = ~120 hours
  - Practicum: ~20-60 hours per chemical
  - Class: 17 hours (includes Q&A, orientation, closure)
  - Class homework: ~ 4 hours
- Time involved is highly dependent on participants' prior experience and expertise.

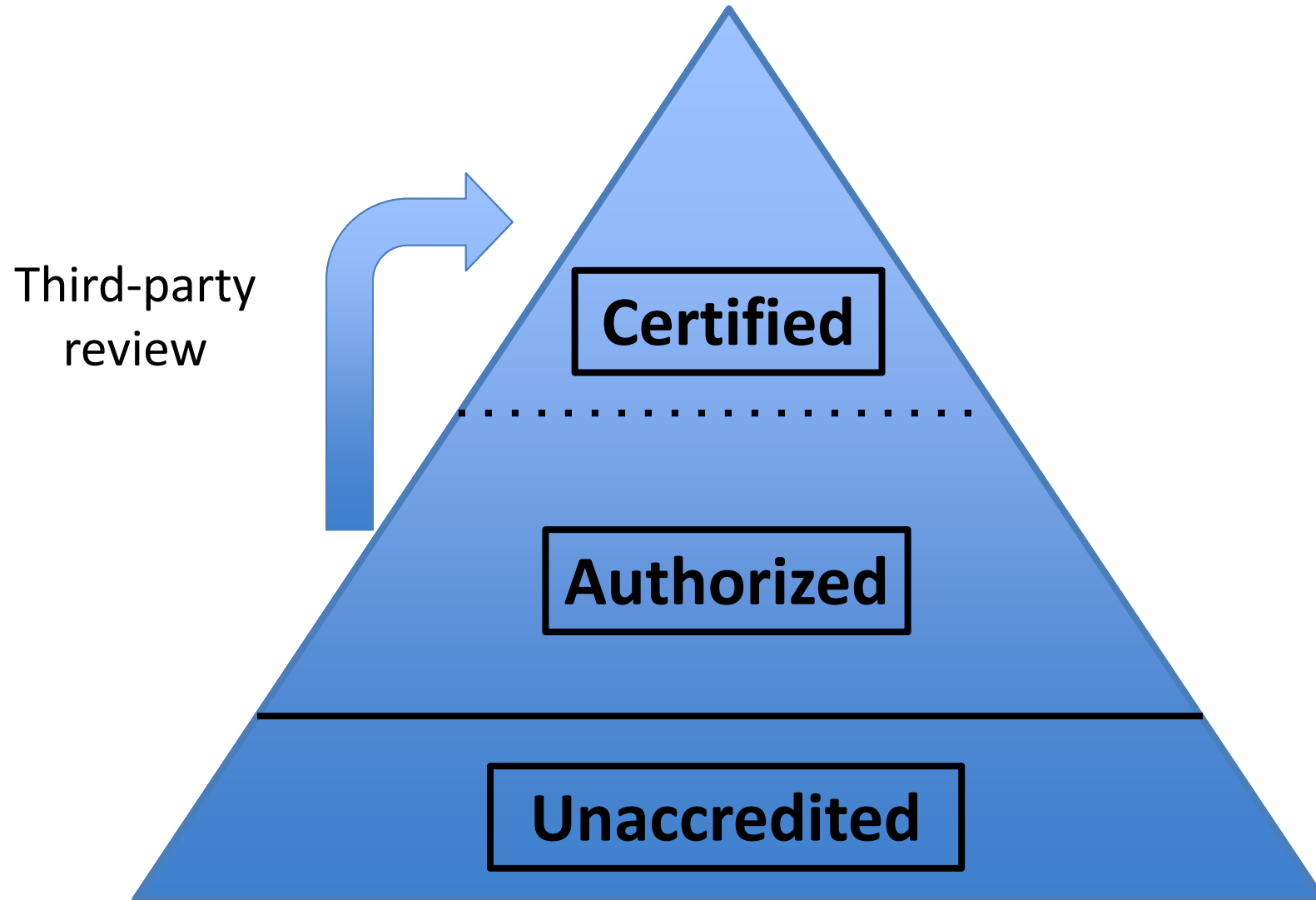


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**PART III:**  
**Authorized GreenScreen Practitioners**

# Types of GreenScreen Assessments



Note: GreenScreen List Translator assessments are another type of assessment, are significantly less comprehensive than a full GreenScreen assessment, and are not depicted here.

# Authorized GreenScreen Practitioner

- License to author assessments for his/her registered organization, and
- License to submit authorized assessments for third party review resulting in certified assessments.

For Benefits to Individuals and Organizations, see:

<http://www.greenscreenchemicals.org/training/certified-practitioner-program>





# Authorized GreenScreen Practitioners

Authorized GreenScreen Practitioner	Date of Completion (three-year renewal period)	Registered Entity
Jonathan Ostrowski	April 2014	Clarke
Cory Robertson	April 2014	Hewlett Packard
Truus Tiemersma	April 2014	DSM AHEAD
Curtis Wray	April 2014	Hewlett Packard
Catherine Bobenhausen	November 2014	Vidaris, Inc.
Leah Boyd	November 2014	Anchor Glass
Pam Eliason	November 2014	University of Massachusetts Lowell
Mark Snyder	November 2014	Minnesota Pollution Control Agency



# Authorized GreenScreen Practitioners



## Curtis Wray

- Registered Organization: HP
- Date of completion: 4/14



# Authorized GreenScreen Practitioners



## Pam Eliason

- Registered Organization: Toxics Use Reduction Institute
- Date of completion: 11/14



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PRACTITIONER

# **PART IV:**

## **Questions and Answers**

### **Available to respond to questions:**

- Lauren Heine: GreenScreen Program Director
- Shari Franjevic: GreenScreen Training Program Manager
- Curtis Wray: Authorized GreenScreen Practitioner, HP
- Pam Eliason: Authorized GreenScreen Practitioner, TURI
- Eric Rosenblum: Toxicologist/ Lead Instructor



# REFERENCE SLIDES



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# Types of GreenScreen Assessments

Type	Assessor	Description
<p><b>Certified</b></p>	<p><b>Licensed GreenScreen Profiler</b> (Toxicology firm)</p>	<ul style="list-style-type: none"> <li>- Highest quality</li> <li>- Organization qualified and licensed by CPA</li> <li>- Meets standards and ecolabel requirements</li> </ul>
<p><b>Authorized</b> <i>*May be upgraded to Certified with third party review</i></p>	<p><b>Authorized GreenScreen Practitioner</b> (Individual)</p>	<ul style="list-style-type: none"> <li>- High quality</li> <li>- Individuals trained and credentialed by CPA</li> </ul>
<p><b>Unaccredited</b></p>	<p><b>Anyone</b></p>	<ul style="list-style-type: none"> <li>- No oversight by CPA</li> <li>- Method is freely available</li> <li>- Use for internal purposes</li> </ul>

# How to Obtain Certified and Authorized Assessments

Approach	Pros	Cons
1. Purchase existing assessments	<ul style="list-style-type: none"> <li>- Highest quality</li> <li>- Cost effective</li> </ul>	<ul style="list-style-type: none"> <li>- Limited of chemicals have been assessed to date</li> </ul>
2. Develop credentialed expertise	<ul style="list-style-type: none"> <li>- Perform in-house</li> <li>- Savvy consumer of assessments</li> <li>- Appropriate efficiencies</li> </ul>	<ul style="list-style-type: none"> <li>- Initial investment of time and money</li> </ul>
3. Hire a Licensed Profiler	<ul style="list-style-type: none"> <li>- Highest quality</li> <li>- Any chemical</li> <li>- Third party</li> </ul>	<ul style="list-style-type: none"> <li>- Costly to hire for every chemical of interest</li> <li>- May pay to assess chemicals you will not use</li> </ul>

# Benefits of becoming an Authorized GreenScreen Practitioner:

- Increased competitive advantage with professional credentialing
- Experience developing robust hazard assessments used in alternatives assessments, risk assessments, and Safety Data Sheets
- Recognition on the CPA website



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PRACTITIONER



# Benefits for Organizations with Authorized GreenScreen Practitioners

- **Reduce costs:** Increase efficiencies by developing staff capacity to generate valuable authorized chemical hazard assessments
- **Increase sales:** Meet customer demands for chemical hazard assessments in support of:
  - Materials procurement requirements
  - Environmentally preferable product development
  - Compliance with alternatives assessment regulations
  - Compliance with sustainability standards and ecolabel requirements



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# Benefits for Organizations with Authorized GreenScreen Practitioners

- Reduce risk:
- Better communicate and meet internal safer chemistry product development targets
- Gain access to CPA third party review of authorized assessments through the GreenScreen Certification Process



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