

# The Green Chemistry Checklist: A Guide for Businesses



The Michigan Green Chemistry Roundtable

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# Outline



- Michigan Green Chemistry Roundtable
- GC3 & the Education Policy Statement
- The Checklist – a tool for tracking progress
- Take action! Become part of the pilot

# Drivers for Green Chemistry



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*Safer*



# Michigan Green Chemistry Roundtable



Multi-stakeholder group advancing green chemistry in Michigan since 2008.

- Academia
  - Michigan Tech
  - University of Michigan
  - Wayne State
  - Grand Valley State
  - Skyline High School
- Business
  - GM
  - Dow
  - Herman Miller
  - Dow Corning
  - BioSolutions
- Administration
  - DEQ
  - MEDC
  - MDCH
- NGO and consultants
  - MI GC Clearinghouse
  - Ecology Center
  - DWEJ
  - MLA
  - Guy Williams
  - Rebecca Head



# Work of the Roundtable

- Develop & implement MI Green Chemistry Program
- Michigan GreenUP conferences
- Michigan Governor's Award
- 2013 update of strategic plan: form Industry Working Group
  - How can we drive and encourage use of green chemistry by industry in Michigan?
    - Need a vision of what that looks like
    - Need metrics that could be tracked (by a company)

# GC3 – Green Chemistry & Commerce Council

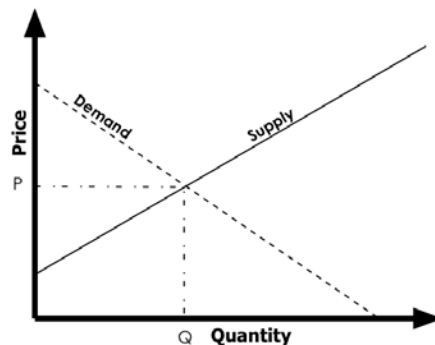
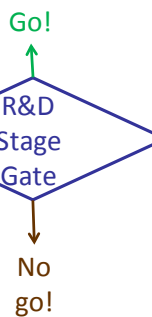
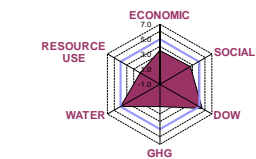
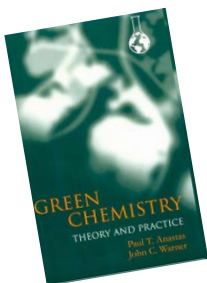
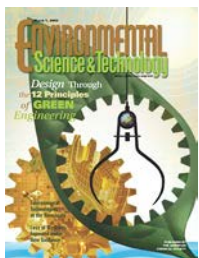


- Business-to-business forum
  - ~75 members
  - ~75% corporations & businesses
  - ~25% government & NGO
- Goal: advance the application of green chemistry and design for environment across supply chains
- Methods include:
  - Webinars
  - Selected, focused project teams:
    - 2012-2013: GCE Policy Statement



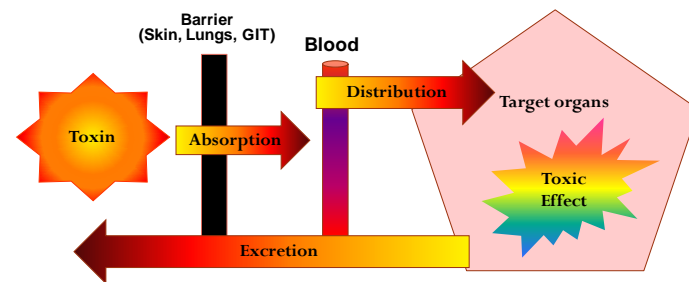
**GC<sup>3</sup> | Green Chemistry & Commerce Council**  
Moving Business Toward Safer Alternatives

# Green Chemistry Elements in Policy Statement



United States Patent (11) 4,599,262  
Hollings et al. (21) Date of Patent: Jul. 3, 1984  
Patent Number: 4,599,262  
Date of Patent: Jul. 3, 1984  
[The rest of the patent text is illegible]

## "Tox 101"





# Corporate Commitments

*(all else being equal)*

- Value and support continuing education on these subjects for a range of staff and across supply chain
- Preferential hiring of people with demonstrated knowledge and ability of the recommendation
- Providing resources and support to work with academic institutions and suppliers in advancing recommendations
- Encourage and support application of green chemistry to innovation & development



# Signers



- Dow Chemical
- Green Depot
- Herman Miller
- Hewlett Packard
- Johnson & Johnson
- Method Products, Inc.
- NatureWorks, LLC
- Center for Environmental Health
- Environmental and Public Health Consulting
- EPEAT, Inc.
- GreenBlue Institute
- Minnesota Pollution Control Agency
- Nike, Inc.
- Pacific Northwest Pollution Prevention Resource Center
- Segetis, Inc.
- Seventh Generation
- Steelcase
- The Wercs Ltd.
- Valspar Corporation
- Pure Strategies, Inc.
- Sustainable Research Group
- ToxServices, LLC
- University of Toledo
- WA State Department of Ecology

# GC3 policy as a framework



- Defines many ways a business can encourage and apply green chemistry
  - Although focus is interaction with academia, the opportunities are broader
- Businesses can sign on
  - *joel\_tickner@uml.edu*
- Businesses can use the concepts & content as a benchmark
  - Use the Roundtable Green Chemistry checklist!



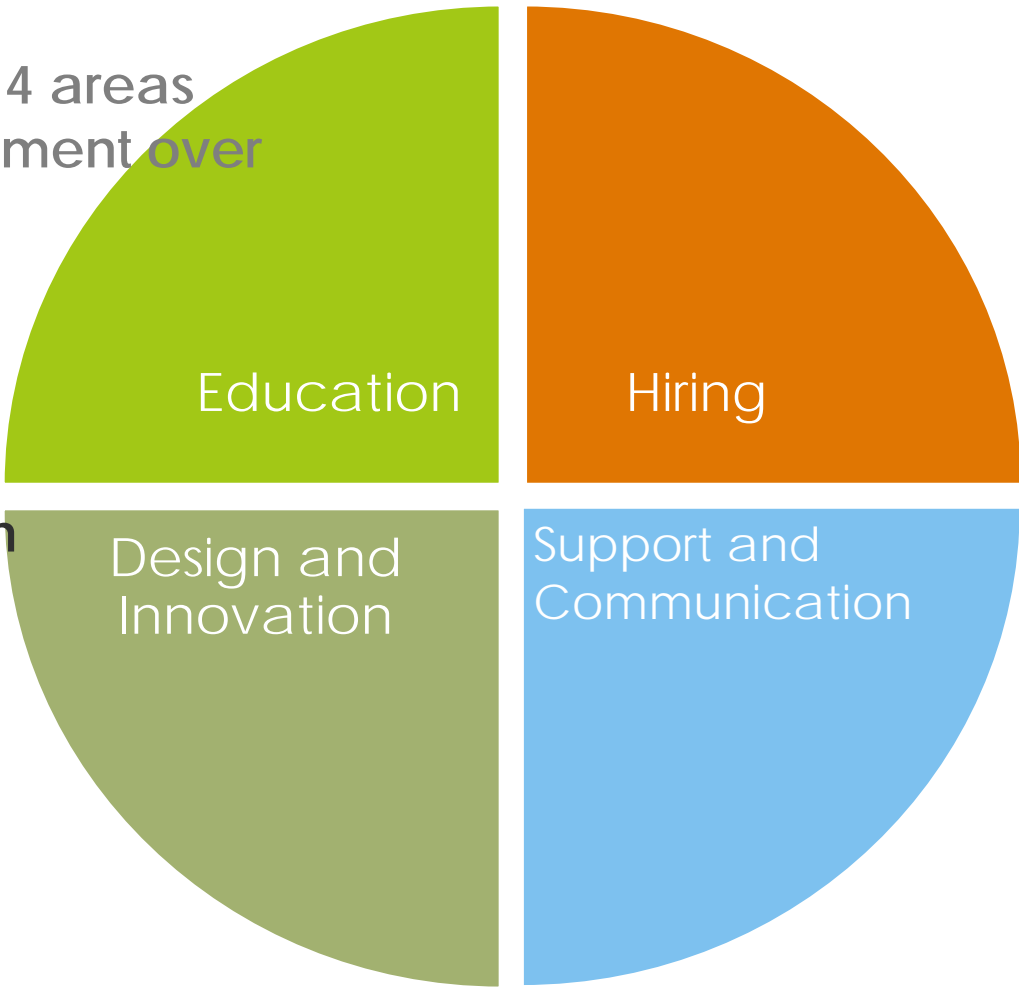
# The Checklist

- For product manufacturers as well as chemical manufacturers
- Meant to be complimentary with chemicals management systems
- Does not REPLACE chemicals management systems
- Voluntary and internal
- Encourage external reporting

# Green Chemistry and Engineering Checklist, v.1.0

- Goal: Activity in each of the 4 areas
  - With continuous improvement over time

- Education
- Hiring
- Support and Communication
- Design and Innovation



# □ What do we mean by Green Chemistry?

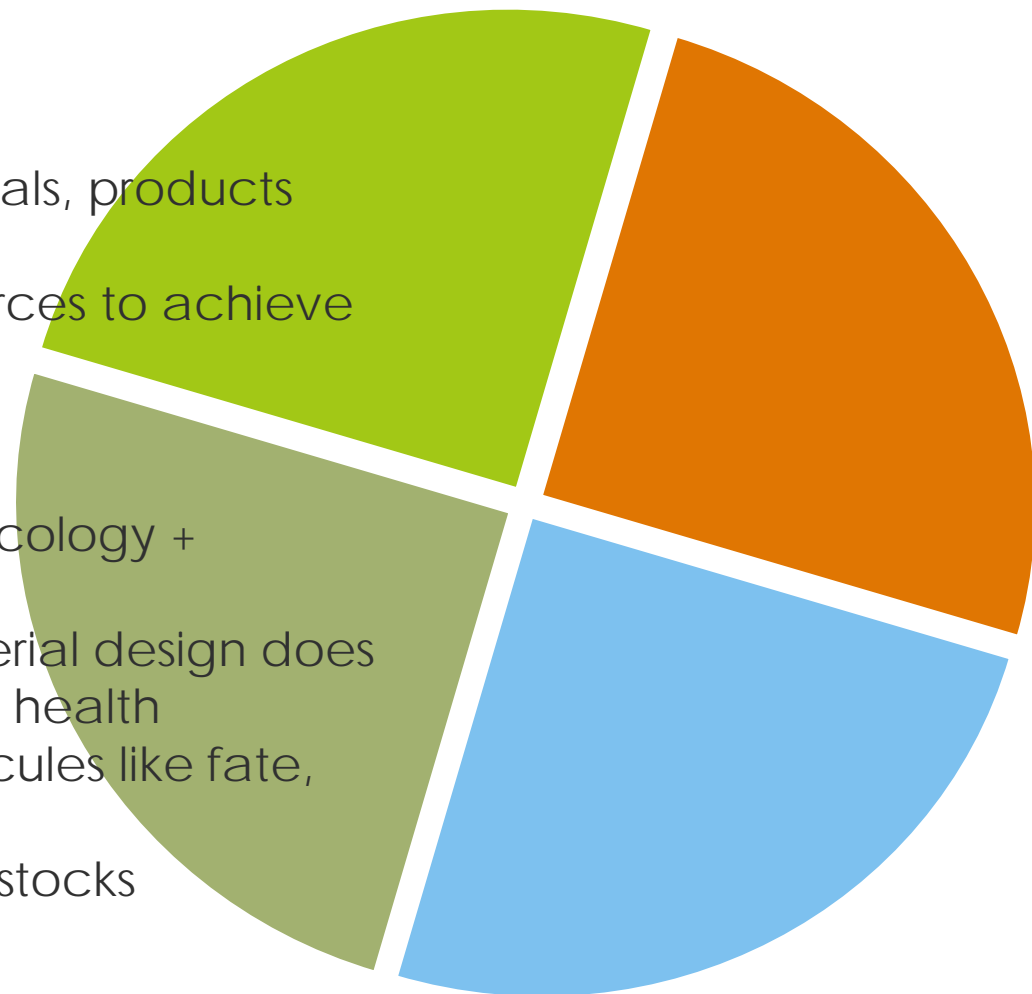
## □ Green Chemistry:

Principles of Green Chemistry =

- efforts to create safer chemicals, products and processes
- efforts to create tools & resources to achieve goal

The GC Principles assume:

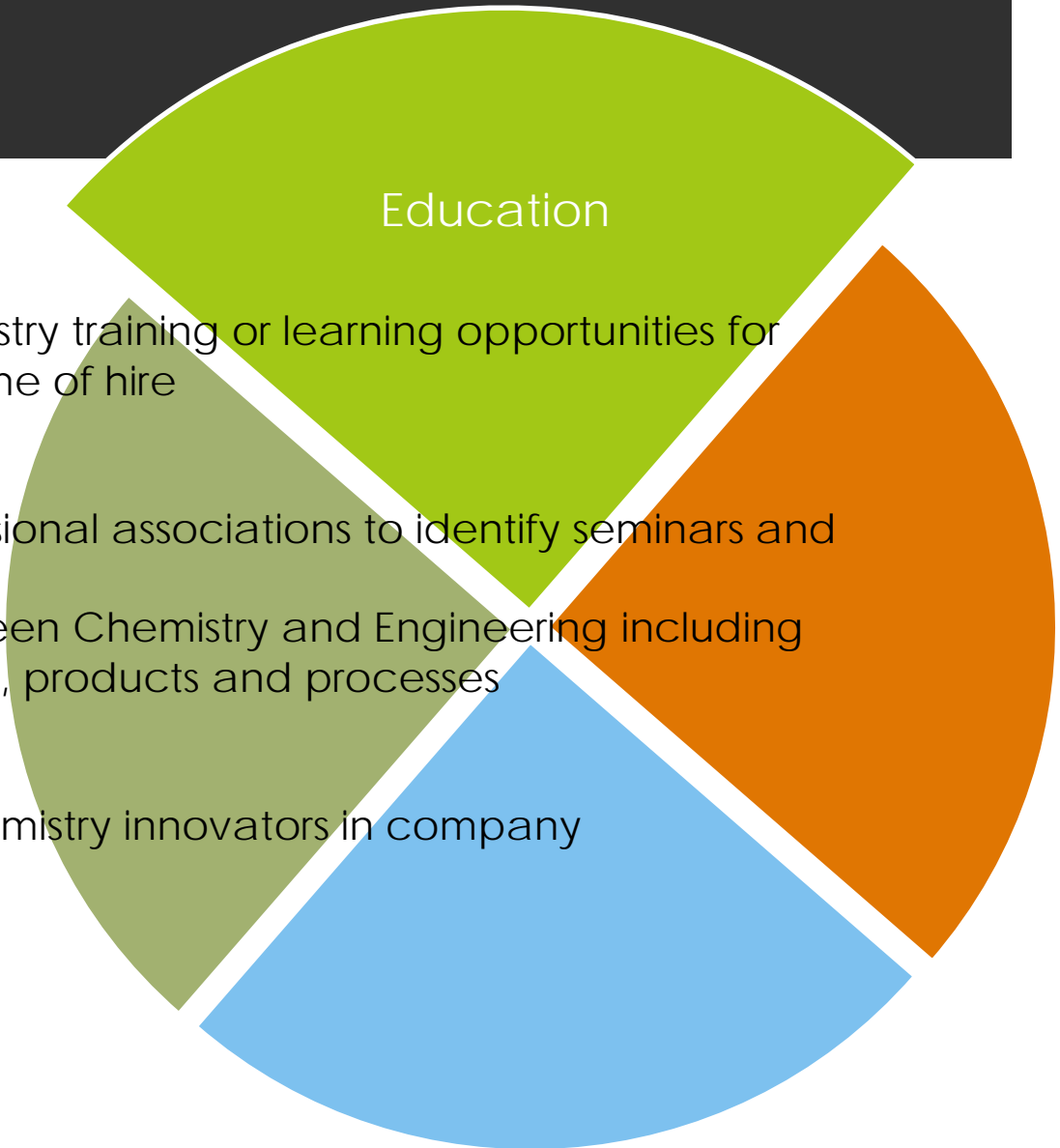
- knowledge of toxicology, & ecology + chemistry & business
- understand molecular & material design does impact environmental & human health
- investigate attributes of molecules like fate, transport & biogeochemistry
- consider sustainability of feedstocks



# Education

## Activities

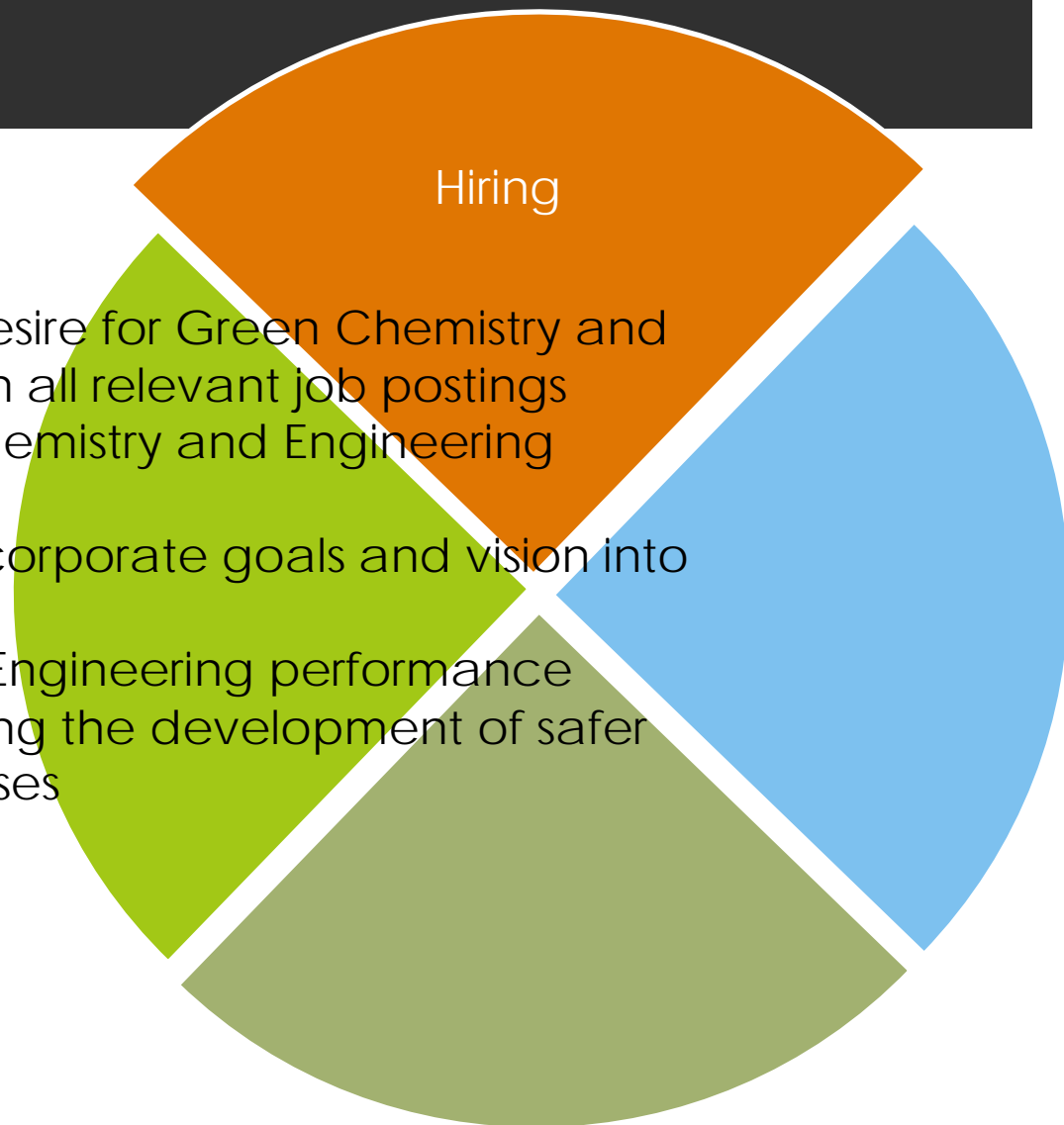
- Identify and support Green Chemistry training or learning opportunities for
  - relevant employees at the time of hire
  - for all relevant employees
  - for suppliers
- Work with sector trade and professional associations to identify seminars and training for sector members
- Recognize outstanding work in Green Chemistry and Engineering including the development of safer chemicals, products and processes
  - by staff
  - by suppliers
- Include recognition for Green Chemistry innovators in company compensation considerations



## □ Hiring

### □ Activities

- Include explicit reference to desire for Green Chemistry and Engineering academic training in all relevant job postings
- Hire candidates with Green Chemistry and Engineering training all things being equal
- Incorporate Green Chemistry corporate goals and vision into relevant new hire orientation
- Include Green Chemistry and Engineering performance requirements in job goals including the development of safer chemicals, products and processes



## Support and Communication

### Activities

- Work with academic institutions:
  - Provide co-op internship placements for students working in Green Chemistry and Engineering fields
  - Provide support to local academic institutions to encourage Green Chemistry and Engineering training for students
  - Work with local institutions on innovations needed for a green economy
- Work with Suppliers:
  - Communicate company Green Chemistry goals
  - Provide assistance in meeting their Green Chemistry goals
- Publicly report
  - On Green Chemistry/Green Engineering progress including the development of safer chemicals, products and processes
  - Sign the *Policy Statement in Green Chemistry in Higher Education*



Support and Communication



# □ Design and Innovation

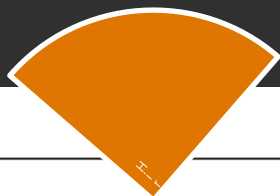
## □ Activities

- Establish Green Chemistry product and process development as a primary goal of the organization
- Regularly monitor progress toward Green Chemistry goals including greening product lines
- Embed Green Chemistry design criteria in product design guidelines and at each stage gate of product development
- Include Green Chemistry criteria in relevant sourcing protocols/specifications/contracts
- Screen all new chemical ingredients for Green Chemistry attributes
- Devote R and D dollars to Green Chemistry innovation
- Commercialize products with Green Chemistry advantages over existing chemicals or products
- Commercialize inherently green chemicals or products (product designed to be green from the ground up)
- Commercialize products designed to be restorative or to increase resilience in ecosystems



Design and Innovation





# □ Hiring: metrics



Activity	Possible Metrics
<input type="checkbox"/> Include explicit reference to desire for Green Chemistry and Engineering* academic training in all relevant job postings	# of <u>job</u> postings with reference to GC and GE/all relevant job postings
<input type="checkbox"/> Hire candidates with Green Chemistry and Engineering training all things being equal	# of <u>hirings</u> with experience in GC and GE
<input type="checkbox"/> Incorporate Green Chemistry* corporate goals and vision into relevant new hire orientation	New hire trainings include Green Chemistry corporate goals
<input type="checkbox"/> Include Green Chemistry and Engineering performance requirements in job goals including the development of safer chemicals, products and processes*	# of <u>employees</u> with Green Chemistry and Engineering performance requirements



# Examples of metrics

-   For Education
  - # of Green Chemistry/GE student interns;
  - # of GC/GE placement opportunities
  
-   For Hiring
  - % of job postings with reference to GC and GE/all relevant job postings
  
-   For Support and Communication
  - # of GC/GE student interns/# of GC/GE placement opportunities
  
-   For Design and Innovation
  - # GC products commercialized; value of products commercialized
  - GC criteria embedded in design guidelines, tools, processes and practices and at each stage gate of development



# Piloting the Checklist

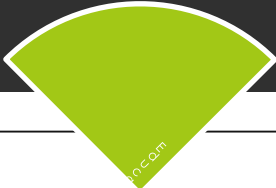
- Agree to use the Checklist
- Download from [migreenchemistry.org/public/the-green-chemistry-checklist/](http://migreenchemistry.org/public/the-green-chemistry-checklist/)
- Pilot timeline: Jan.-Nov. 2014. v.2 expected Dec. 2014
- Provide feedback throughout the process
  - This can be informal. Questions like:
    - What parts of the business needed to be engaged?
    - How was it introduced to employees?
    - What were the barriers to implementation?
    - What would you change about the checklist?
    - What can be improved?



# Green Chemistry Checklist, v. 1.0

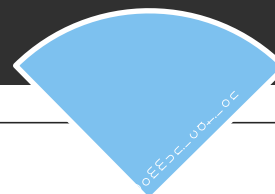
- Thank you!
- Guideline document, with full list of possible metrics is available at:
  - [www.migreenchemistry.org/public/the-green-chemistry-checklist/](http://www.migreenchemistry.org/public/the-green-chemistry-checklist/)

# Education: metrics



Activity	Possible Metrics
<input type="checkbox"/> Identify and support Green Chemistry* training opportunities for relevant employees at the time of hire	# of new hire trainings; # times per year offered; # new hires taking training, % of relevant new hires completing the training
<input type="checkbox"/> Identify and support regular Green Chemistry* training opportunities for all relevant employees	# of continuing education trainings offered, # of employees taking trainings
<input type="checkbox"/> Identify and support Green Chemistry* training or learning opportunities for suppliers	# of c.e. training/seminars/meetings or other engagement opportunities offered, # of suppliers engaged, # of supplier employees taking seminars/trainings etc.
<input type="checkbox"/> Work with sector trade associations or other groups to identify seminars and training for sector members	# of associations approached, # of trainings offered, # of sessions at conferences
<input type="checkbox"/> Recognize staff doing outstanding work in Green Chemistry and Engineering including the development of safer chemicals, products and processes*	Employee award created, # of employees recognized,
<input type="checkbox"/> Recognize suppliers doing outstanding work in Green Chemistry and Engineering including the development of safer chemicals, products and processes*	# of suppliers recognized
<input type="checkbox"/> Include recognition for Green Chemistry* innovators in company compensation considerations	# of employees recognized; Green Chemistry activity included in compensation reviews where appropriate

# Support and Communication: metrics



Activity	Possible Metrics
<input type="checkbox"/> Provide co-op internship placements for students working in Green Chemistry and Engineering fields	# of <u>Green Chemistry/GE</u> student interns; # of <u>GC/GE</u> placement opportunities
<input type="checkbox"/> Provide support to local academic institutions to encourage Green Chemistry and Engineering training for students	# of <u>institutions</u> approached with information
<input type="checkbox"/> Work with local academic institutions on innovations needed for a green economy	# of <u>publicly announced</u> collaborations
<input type="checkbox"/> Communicate company Green Chemistry* goals to suppliers	# of <u>meetings/seminars</u> held with suppliers including this topic; inclusion of GC&E goals in CDP, GRI or other relevant B to B communication platforms
<input type="checkbox"/> Publicly report on Green Chemistry/Green Engineering progress including the development of safer chemicals, products and processes*	Report on innovations in Green Chemistry through the Toxic Release Inventory (TRI) and other public reporting; inclusion of GC&E goals in CDP, GRI or other similar reports; publishing case studies and reports on company progress toward GC/GE
<input type="checkbox"/> Provide assistance to suppliers in meeting their Green Chemistry* goals	# of <u>examples</u> ; impact of examples (\$, waste reduction, etc.)
<input type="checkbox"/> Signed the <i>Policy Statement on Green Chemistry in Higher Education</i> <sup>3</sup>	Sent message to GC3 with <u>signon</u>

# Design and Innovation: metrics



Activity	Possible Metrics
<input type="checkbox"/> Establish Green Chemistry* products and processes as a primary goal of the organization	Broad executive policy promoting green chemistry in place; tracking # of <u>KPI's</u> based on Green Chemistry principles
<input type="checkbox"/> Regularly monitor progress toward Green Chemistry* goals including greening product lines	Evaluation process in place to monitor progress toward safer chemistry goals including product development
<input type="checkbox"/> Embed Green Chemistry* design criteria in product design guidelines and at each stage gate of product development	Green Chemistry criteria embedded in design guidelines, tools, processes and practices and at each stage gate of development
<input type="checkbox"/> Include Green Chemistry* criteria in relevant sourcing protocols/specifications/contracts	Language in standard specifications/ protocols/ contracts requiring/rewarding greener chemical products or green chemical manufacturing
<input type="checkbox"/> Screen all new chemical ingredients for Green Chemistry* attributes	Policy and process in place for screening chemicals
<input type="checkbox"/> Devote R and D dollars to Green Chemistry * innovation	Dollars devoted to Green Chemistry innovation
<input type="checkbox"/> Commercialize products with Green Chemistry* advantages over existing chemicals or products	# of <u>products</u> commercialized; value of products commercialized
<input type="checkbox"/> Commercialize inherently green chemicals or products (product designed to be green from the ground up)	# of <u>green</u> chemical products commercialized
<input type="checkbox"/> Commercialize products designed to be restorative or to increase resilience in ecosystems	# of <u>restorative</u> products commercialized