

# Design of Sustainable Product Systems and Supply Chains Scientific Workshop



National Science Foundation • September 12–13, 2011 • Arlington, Virginia

## Welcome to the Design of Sustainable Product Systems and Supply Chains Scientific Workshop

*National Science Foundation*

*Arlington, Virginia*

*September 12, 2011*

*Workshop Co-Sponsors:*

*U.S. Environmental Protection Agency,  
National Science Foundation, and  
American Institute of Chemical Engineers*

# Workshop Goals



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1. What tools and methods are currently available for design of sustainable product systems and supply chains?
2. How can these tools and methods be combined in new ways to improve our ability to design sustainable product systems and supply chains?
3. Where do the most promising opportunities exist for modifying product systems and supply chains?
4. What are the implications of new methods for design of sustainable product systems and supply chains for:
  - Reducing the life cycle environmental impacts of existing products and processes?
  - The process of developing and implementing new technologies?
  - The evaluation of new technologies?
  - The design of policies and technologies that reduce pollution and/or increase recycling?
5. What indicators and metrics of sustainability are appropriate and necessary for design of sustainable product systems and supply chains?

# Monday Morning Agenda

8:30 – 9:00	<p><b>Session I – Perspectives on the Design of Sustainable Product Systems &amp; Supply Chains</b></p> <ul style="list-style-type: none"> <li>• Welcome to NSF, Bruce Hamilton and Maria Burka</li> <li>• Workshop Goals and Overview, Troy Hawkins</li> <li>• Introduction of Organizing Committee and Staff Support, Troy Hawkins</li> <li>• Introductions of Participants – name, affiliation, and expertise/background relevant for this workshop</li> </ul>
9:00 – 10:30	<p><b>Design of Sustainable Product Networks and Supply Chains: The Need for a Systems View at All Levels</b>, <i>Bert Bras, Georgia Institute of Technology</i></p> <p><b>Consumption, Sustainability, and Social Benefits</b>, <i>Thomas Theis, University of Illinois, Chicago</i></p> <p><b>Avoiding Unintended Consequences in the Design of Sustainable Supply Chains</b>, <i>Sherilyn Brodersen, Kraft</i></p> <p><b>LCA from an Industry Perspective</b>, <i>Bill Flanagan, GE</i></p>
10:30 – 10:45	Break
10:45 – 11:30	<p><b>EPA Sustainability and the Design of Sustainable Product Networks and Supply Chains</b>, Joseph Fiksel, US EPA</p>
11:30 – 12:00	<p>Supporting Sustainable Engineering Research through NSF and EPA</p> <ul style="list-style-type: none"> <li>• <b>NSF Funding Opportunities</b> - Bruce Hamilton</li> <li>• <b>EPA NCER Activities</b> - Cynthia Nolt-Helms</li> </ul>

# Monday Afternoon/Evening Agenda

1:15 – 1:30	<b>Session II – Disciplinary Definition of the Problems and Opportunities Lead by Ignacio Grossmann</b>
1:30 – 2:40	Work in breakout groups
2:40 – 3:40	Breakout Groups Report Back – Group Discussion: Group 1 – 2:45-2:49    Group 4 – 3:00-3:04    Group 7 – 3:15-3:19 Group 2 – 2:50-2:54    Group 5 – 3:05-3:09    Group 8 – 3:20 – 3:24 Group 3 – 2:55– 2:59    Group 6 – 3:10-3:14    Group 9 – 3:25 – 3:30
3:40 – 3:55	Break
3:55 – 4:15	<b>Session III – What are the common problems, common areas of need, complementary areas to be interfaced, and opportunities for cross-disciplinary fertilization facilitated by design of sustainable product systems and supply chains? Lead by Eric Williams</b>
4:15 – 5:25	Work in breakout groups
5:30 – 6:45	Break/Gather in bar area of Westin Hotel for drinks and discussion
7:05 leave	Meet group in hotel lobby to walk to dinner (optional) - Westin Hotel
7:15	Group dinner (optional) – Ted’s Montana Grill

# Questions for Session II – Definition of the Problem and Opportunities

1. What are the challenging industry and societal problems to be solved? What are the future drivers for design of sustainable products, manufacturing systems and supply chains? What are the next generation sustainable-design enabled strength areas in the US?
2. Where are the gaps in knowledge? What are the problems faced by existing sustainable design capabilities?
3. What are the opportunities for design of sustainable products. manufacturing systems and supply chains?

# Questions for Session III

Group 1 – How does sustainable design affect or impact economic drivers?

Group 2 – What technologies/tools and their integration are needed, where is the expertise, and what is the state of technical capability?

Group 3 – What are the respective roles of industry, government, and academia and how should they interrelate? What partnerships/coalitions are needed?

Group 4 – How will new and emerging technologies and capabilities need to affect organization roles and responsibilities – academia/industry, researcher/research teams, etc.

Group 5 – Where are education and training needed?

# Tuesday Morning Agenda

8:00– 8:20	Check-in - NSF, 1st floor Visitors Desk Greeting and refreshments, provided by AIChE
8:30 – 9:45	<b>Continue Session III Breakout Group Reporting, Lead by Eric Williams</b> Summary of Monday Progress Continue Questions and Group Discussion
9:45 – 10:00	Break
9:45-10:15	<b>Workshop Session IV – Workshop Deliverables</b> <b>Lead by Darlene Schuster</b> Introduction to Day 2
10:15 – 11:15	Work in breakout groups, facilitated by Darlene Schuster <ul style="list-style-type: none"><li>• Develop recommendations in the context of near- and long-term, priority, and reality.</li></ul>
11:15 – 11:45	Session IVa Breakout Groups Report Back – Group Discussion, moderated by Darlene Schuster

# Questions for Session IV – Workshop Deliverables

1. Identify and exemplify major application impacts, directions, and the potential for design of sustainable product systems and supply chains?
2. Identify and recommend research areas that aim toward the fulfillment of this potential
3. Identify associated areas of needed emphasis with sustainable design education and training, interdisciplinary development, and support and approaches to collaboration.



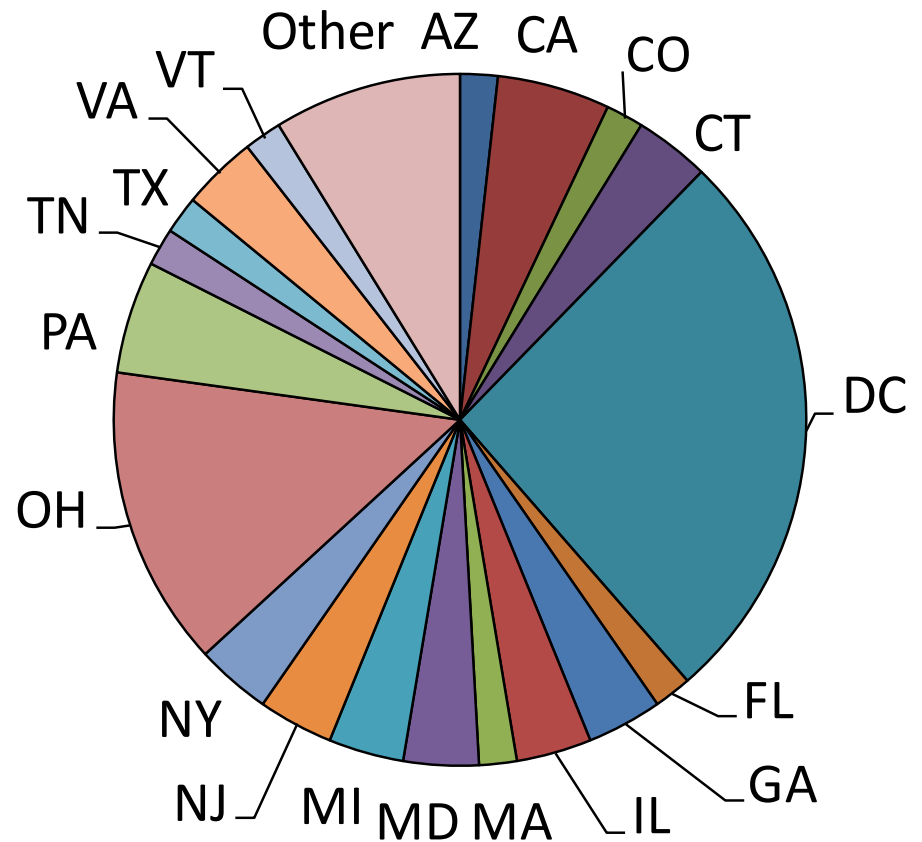
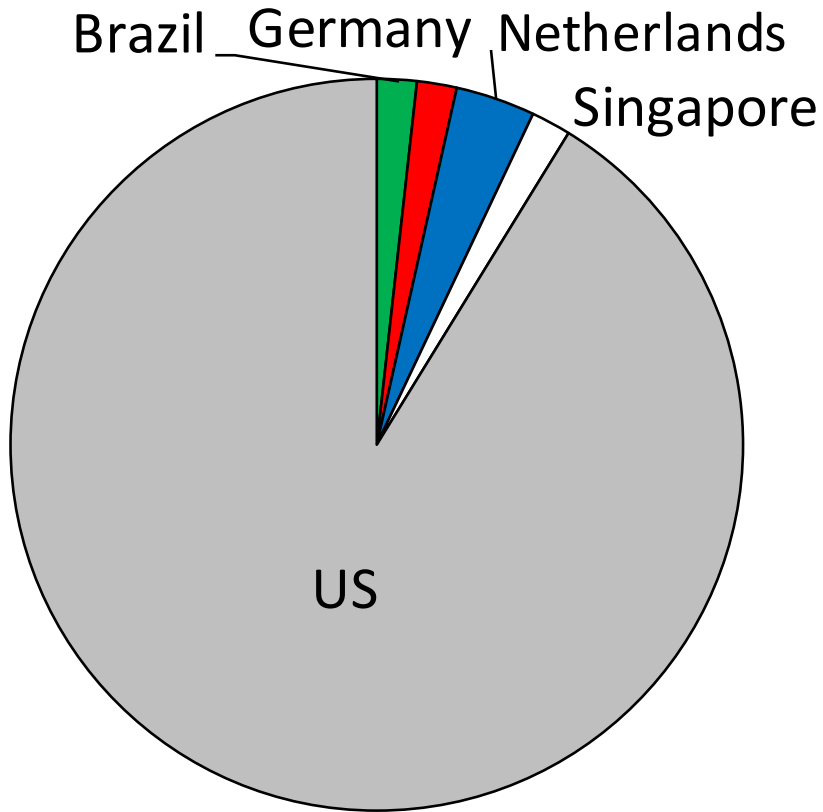
# Tuesday Afternoon Agenda

12:30 – 1:15	Continue Session IVa - Breakout Group Reporting, moderated by Darlene Schuster
1:15 – 1:30	Collective vote on priorities, lead by Darlene Schuster
1:30 – 2:00	Summarize priorities
2:00 – 2:45	Work in breakout groups, facilitated by Darlene Schuster (1) What investments are needed by whom, financial and other? (2) What are the key learnings and take-aways from the workshop?
2:45 – 3:00	Break / Load breakout session presentations
3:00 – 4:00	Session IVb Breakout Groups Report Back, Group Discussion, moderated by Darlene Schuster
4:00 – 4:30	Wrap up, next steps, Troy Hawkins

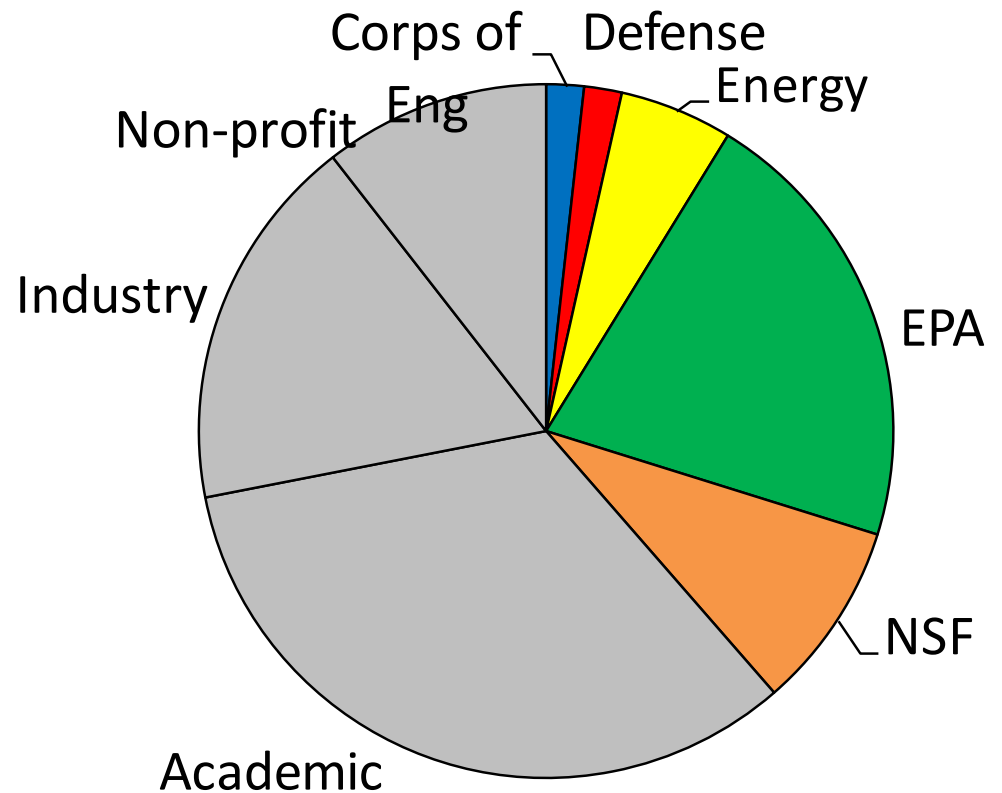
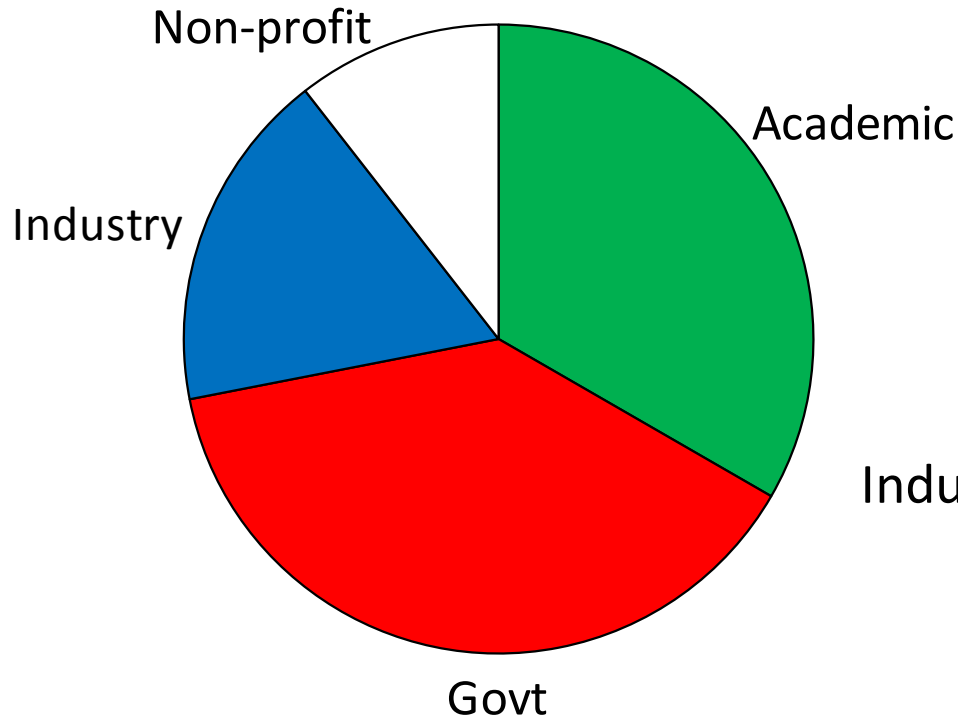
# Opportunities Following the Workshop

- Contribute to workshop report
- Assist in dissemination of workshop findings
- Participate in workshop email distribution list
- Pursue research collaboration funding opportunities

# Who are we?



# Who are we?



# Special thanks to...



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<b>Organizing Committee</b>	<b>Advisory Committee</b>	<b>Staff</b>
Maria Burka	Bhavik Bakshi	Susan Anastasi
Heriberto Cabezas	Saif Benjafaar	Michelle Nguyen
Bruce Hamilton	Bert Bras	Eric Chan
Troy Hawkins	Ignacio Grossmann	Dan Tisch
Darlene Schuster	Alan Hecht	Donna Jackson
Raymond Smith	Raj Srinivasan	Sonia Williams
	Thomas Theis	
	Eric Williams	



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## Brief introductions...

Name, affiliation, and expertise/background relevant for this workshop

# Workshop Co-Sponsors

U.S. Environmental Protection Agency

U.S. National Science Foundation

American Institute of Chemical Engineers



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**Breakout Group 1**

Tom Seager\*, Ariz State U  
Andres Clarens, UVA  
Yinlun Huang, Wayne State U  
Christoph Koffler, PE International  
Phil Williams, Webcor Builders, USA  
Michelle Nguyen, AIChE

**Breakout Group 2**

Bert Bras\*, GA Tech  
Vikas Khanna, U Pittsburgh  
Troy Hawkins\*, EPA  
Vincent Camobreco, EPA  
William Flanagan, GE, USA  
Margaret Mann, NREL

**Breakout Group 3**

Raj Srinivasan\*, U Singapore  
Olivier Jolliet, U of MI  
Reid Lifset, Yale  
Sherilyn Brodersen, Kraft Foods  
Michael Hilliard, ORNL

**Breakout Group 4**

Thomas Theis\*, U Illinois  
Sergio Pacca, U Sao Paulo  
Alan Hecht, EPA  
Wes Ingwersen, EPA  
Andreas Ciroth, Green Delta  
Arnold Tukker, TNO

**Breakout Group 5**

Eric Williams\*, RIT  
B. Erik Ydstie, CMU  
Meadow Anderson, EPA  
Maria Burka\*, NSF  
John Glaser, EPA  
Eric Masanet, LBNL

**Breakout Group 6**

Ignacio Grossmann\*, CMU  
Fengqi You, Northwestern  
Ray Smith\*, EPA  
Mark Goedkoop, Pre Consultants  
Martha Stevenson, WWF US

**Breakout Group 7**

Darlene Schuster\*, AIChE  
Joseph Fiksel, EPA/OSU  
Cynthia Nolt-Helms, EPA NCER  
Sangwon Suh, UCSB  
Mark Tulay, Sustainability Risk  
Beth Beloff, Bridges to Sustainability

**Breakout Group 8**

Omar Romero-Hernandez, UC B  
Herb Cabezas\*, EPA  
Igor Linkov, Army Corps of Eng  
Don Versteeg, P&G  
Russell Barton, NSF  
Erin Chan, AIChE

**Breakout Group 9**

Jay Golden, Duke  
Marianthi Ierapetritou, Rutgers  
Angie Leith, EPA  
Carole LeBlanc, Dept of Defense  
John Carberry, DuPont  
Bhavik Bakshi\*, Ohio State

**Breakout Group 10**

Bruce Hamilton\*, NSF  
H. Gregg Claycamp, FDA  
Clare Lindsay, EPA  
Dima Nazzal, U Central Florida  
Rachuri Sudarsan, NIST  
Dennis McGavis, Shaw Inc