Virtual Local Section Agenda

Item	EST	CST	MST	PST
YP Meeting	8:00 pm	7:00 pm	6:00 pm	5:00 pm
Sound Check	8:45 pm	7:45 pm	6:45 pm	5:45 pm
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Closing Comments	9:55 pm	8:55 pm	7:55 pm	6:55 pm

Neil Yeoman

“Firsthand Experience of Superstorm Sandy”

AIChE Virtual Local Section

Nov 15, 2012


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Google earth
Imagery Date: 3/6/2012
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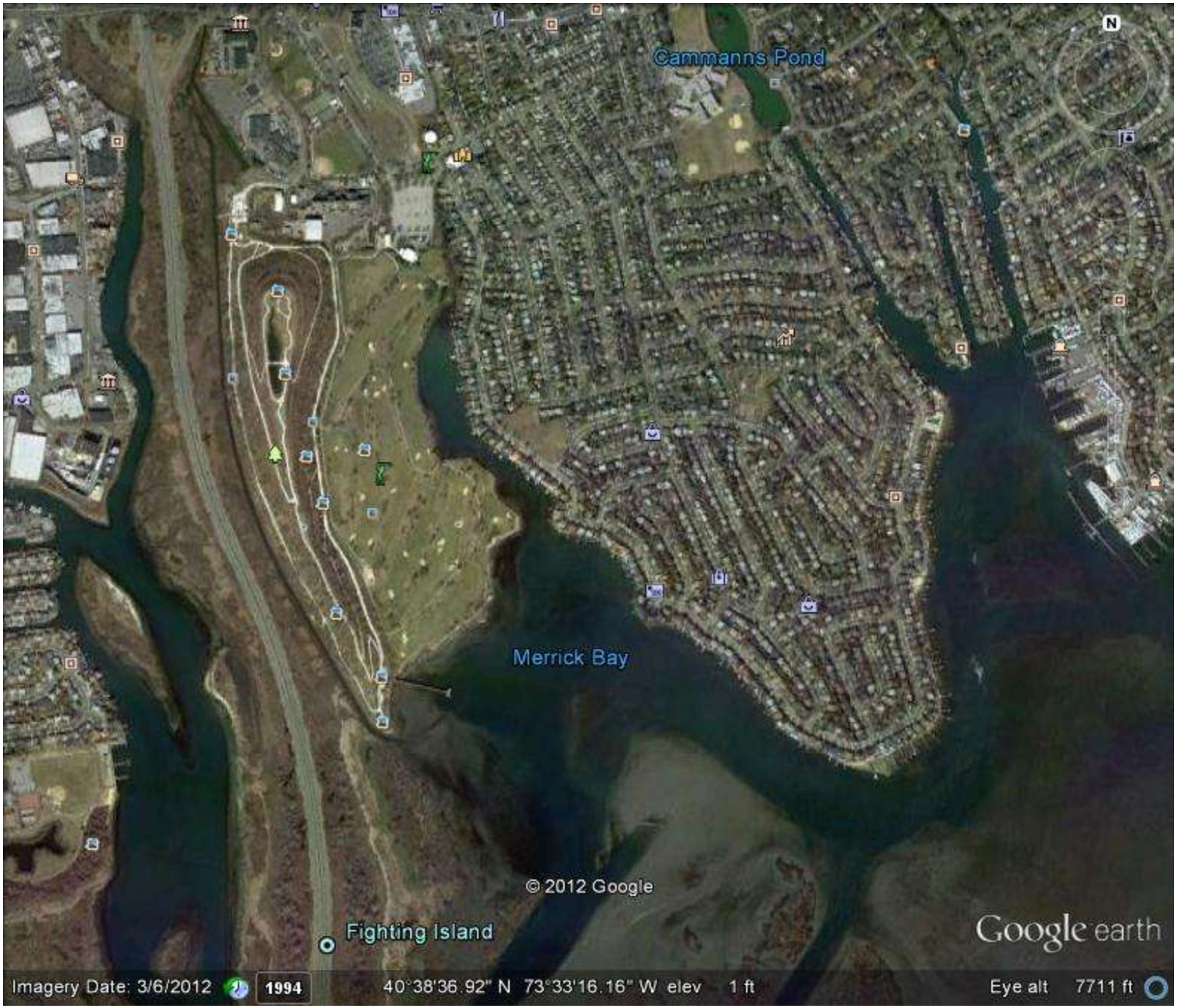
Eye alt 1121 ft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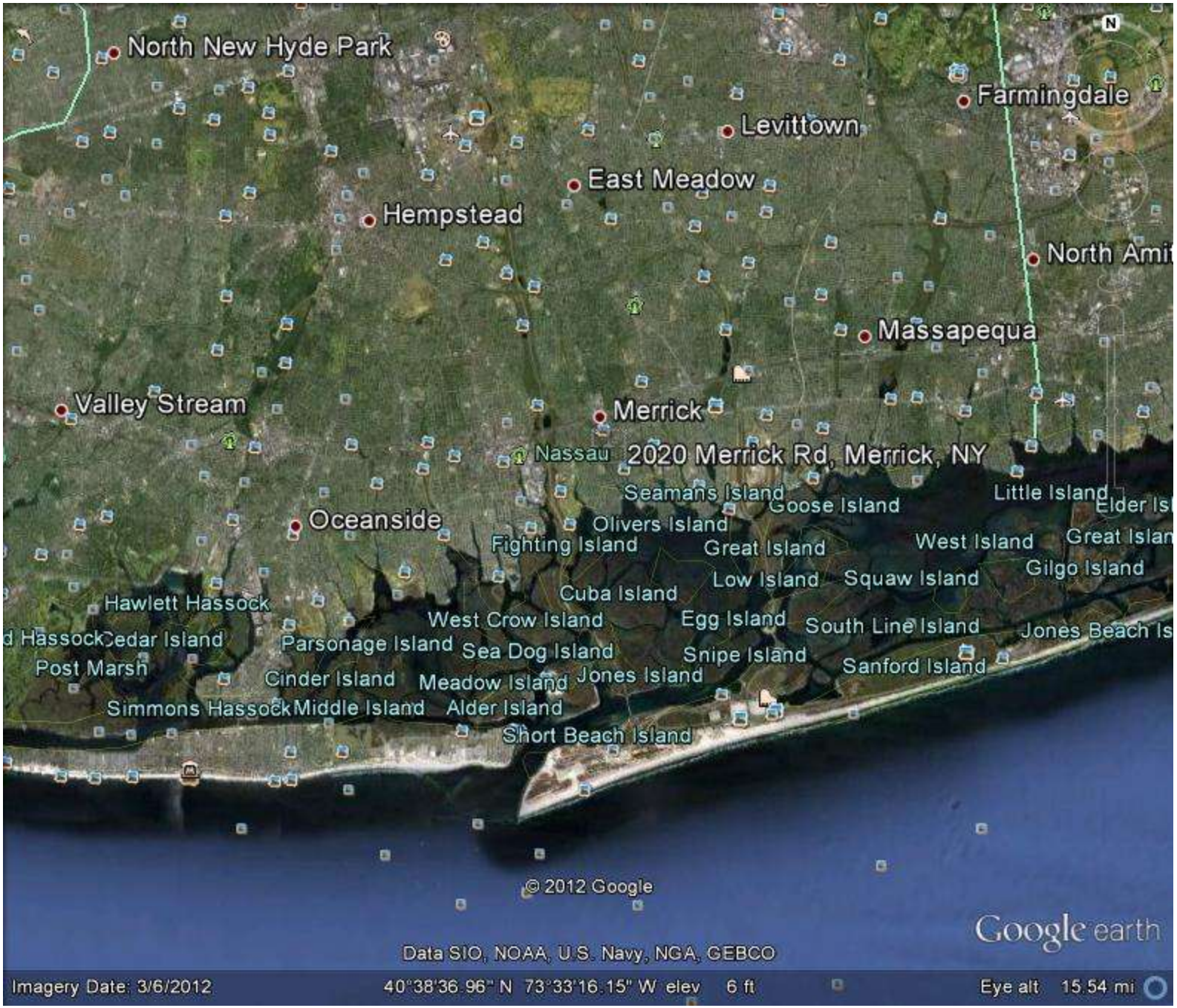
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New Haven
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Fishers Island Ridge
Gardiners Island
Long Island Sound
Stamford
New York
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Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Hudson Shelf Valley
40°45'54.15" N 72°59'11.44" W elev 35 ft
Eye alt 104.91 mi
Google earth


Northumberland Strait
Ottawa
Lake Huron
Georgian Bay
Bay of Fundy
Nova Scotia
Vermont
Lake Ontario
New York
New Hampshire
Massachusetts
Lake Erie
Connecticut
Pennsylvania
Ohio
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Appalachian Mountains
New Jersey
Maryland
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Virginia
North Carolina
South Carolina
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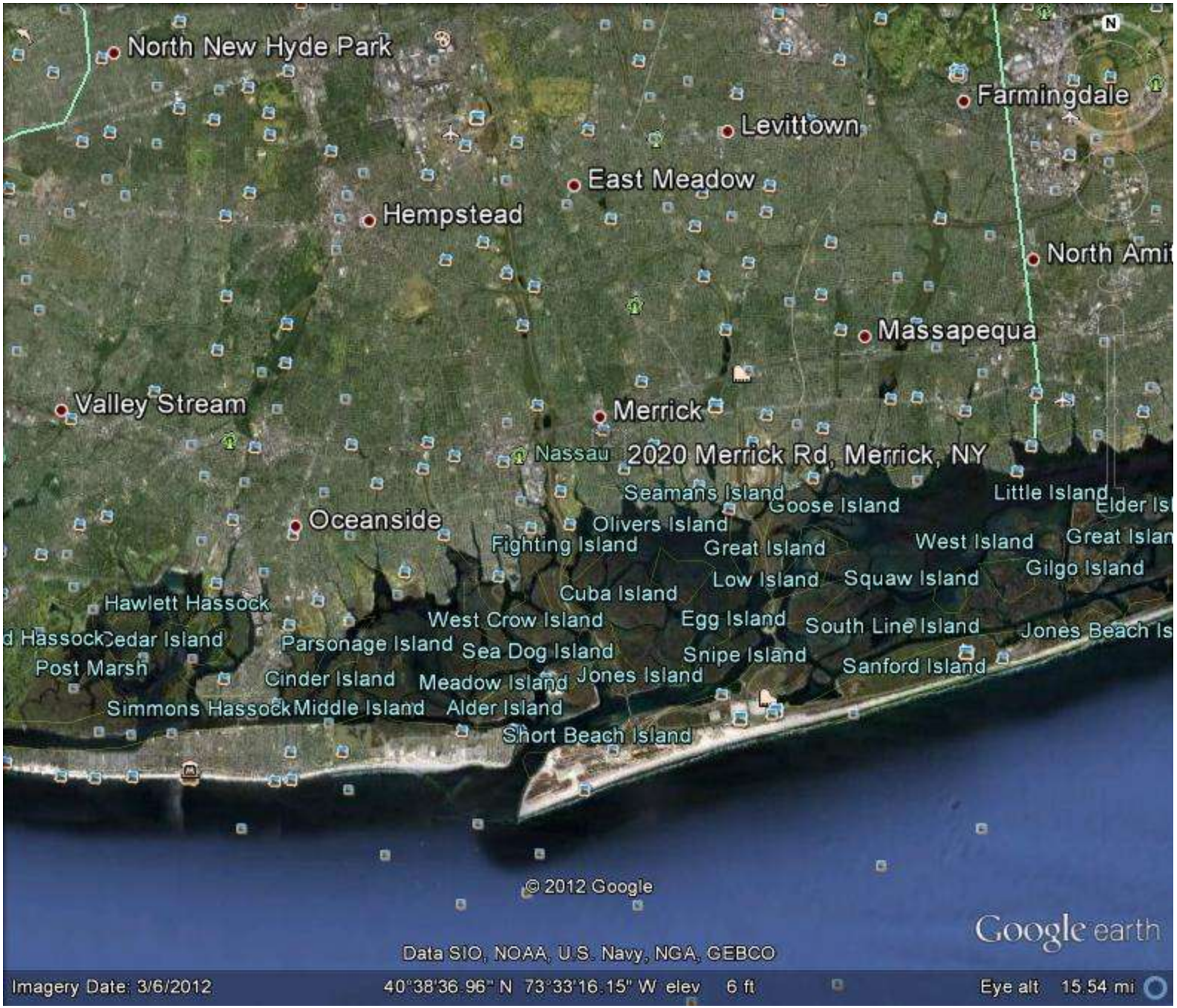
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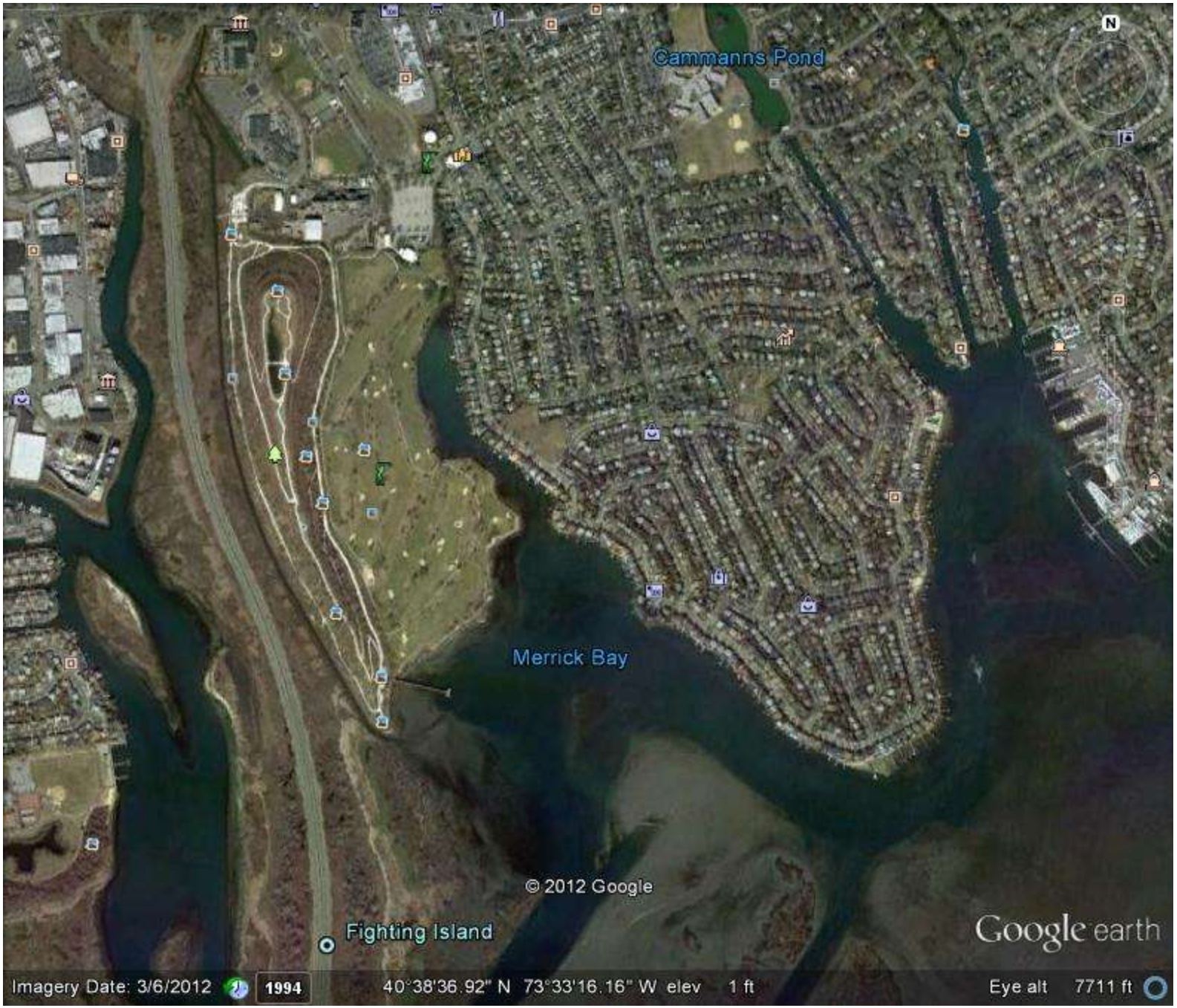
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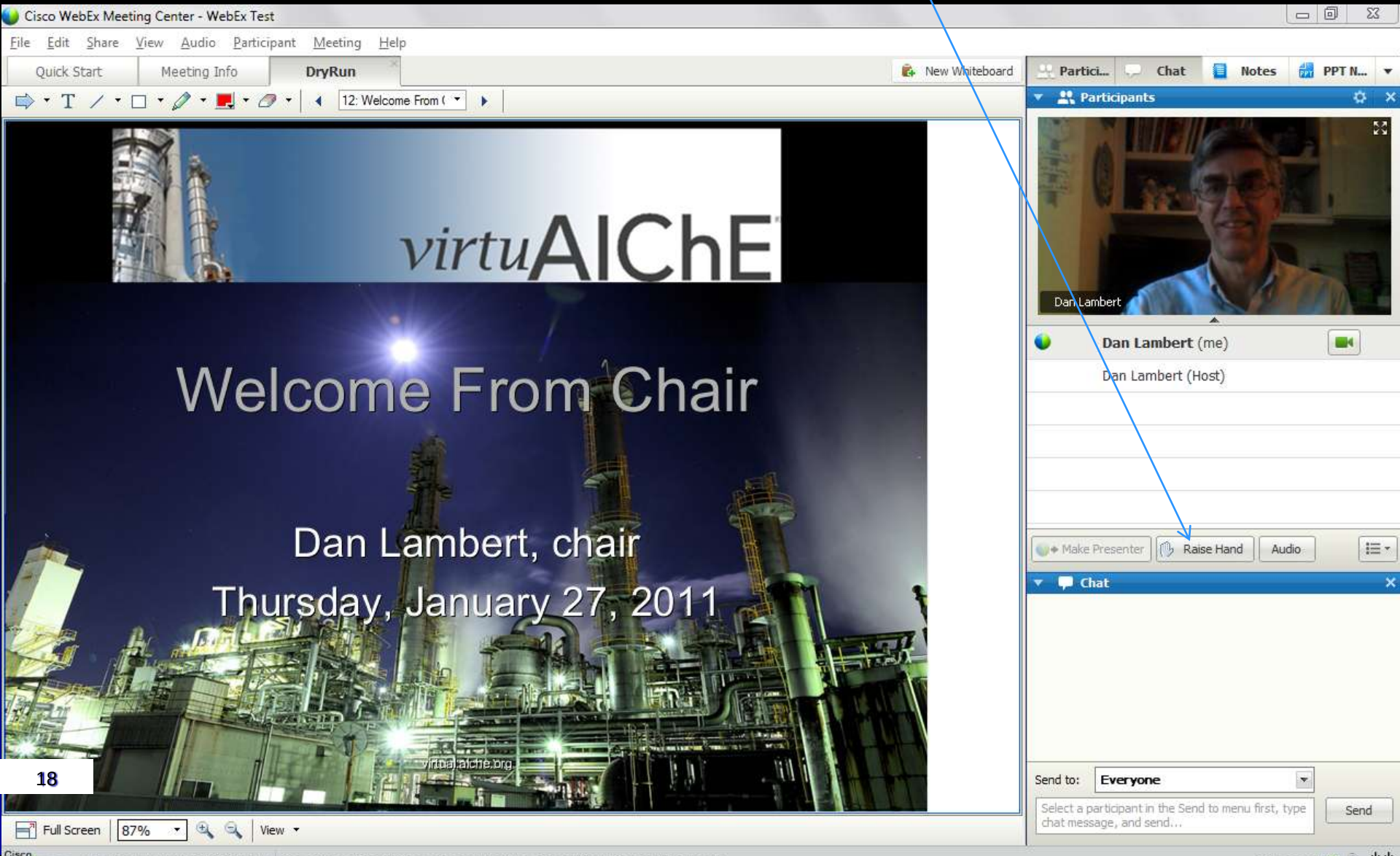
Welcome
Dan Lambert, VLS Chair

Questions and Comments

- Ask your question or make comment any time
- "Raise your hand" if you want to ask a question
  - We will call your name so you can ask your question
  - We unmute you (people will see you if webcam is on)
  - Please let us know where you are from and work
  - We will answer your question
- Send a chat message to Amanda Robben or Dan Lambert if you have a question
  - We will read the question for you
  - We will answer your question

Raise Hand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Participants
Dan Lambert
Dan Lambert (me)
Dan Lambert (Host)
virtuAIChE
Welcome From Chair
Dan Lambert, chair
Thursday, January 27, 2011
virtual.aiche.org
Make Presenter
Raise Hand
Audio
Chat
Send to:
Everyone
Select a participant in the Send to menu first, type chat message, and send...
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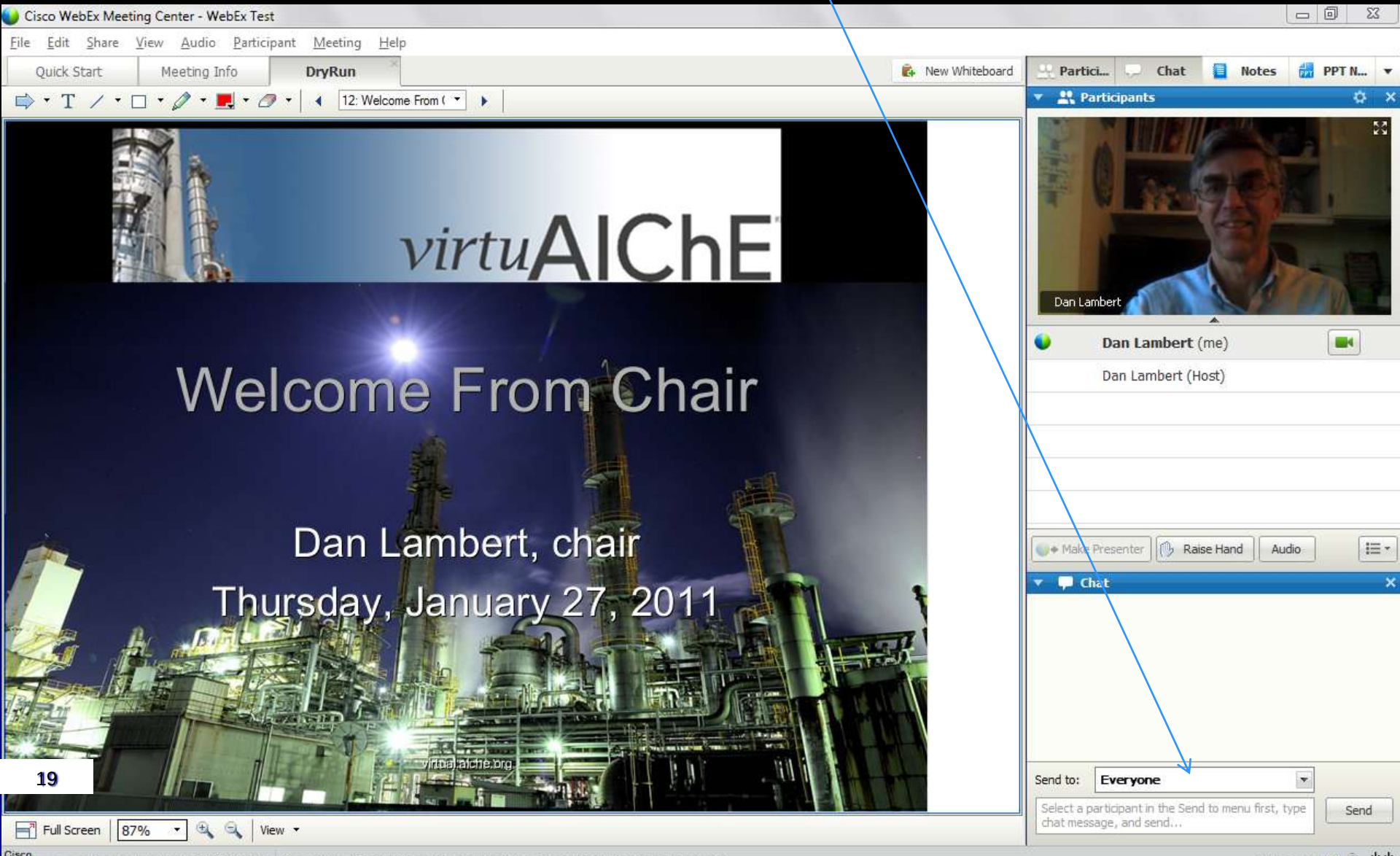
Chat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Dan Lambert (me)
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Chief Information Officer Update

Dan Lambert, VLS Chair

VLS Election

- If you are a VLS member, please remember to vote in the VLS election.
- Voting is open now until November 29.
- Voting link: http://virtual.aiche.org

UPCOMING CONFERENCES

http://www.aiche.org/resources/conferences

- Sustainability in (Bio) Pharmaceuticals
  - Sheraton Old San Juan, San Juan Puerto Rico
  - November 11 – 14, 2012
- 4th ICBE—International Conference on Biomolecular Eng
  - Hyatt Regency Pier 66, Fort Lauderdale, FL
  - January 13-16, 2013
- 2013 Spring Meeting & 9th Global Congress on Process Safety
  - Hyatt, San Antonio, Texas
  - April 28 - May 2, 2013

UPCOMING WEBINARS

http://www.aiche.org/resources/webinars

Safety in LNG Value Chain

- Presented by Georges Melhem and Henry Ozog
- Wednesday, December 12, 2012, 2:00pm-3:00pm EST

Strategies for Addressing ABET Safety Curriculum Requirements

- Wednesday, February 6, 2013, 2:00pm-3:00pm EST
- Presented by Thomas Spicer and Kimberly Ogden

Leadership Is Everyone's Responsibility

- Presented by Greg Shaffer
- Wednesday, February 20, 2013, 2:00pm-3:00pm EST

New in VLS
4th Thursday 9:00 pm EDT

- It's Time to Change How We Promote the Profession
  - Dr. John Anderson
  - Thursday, December 20, 2012 VLS
- Entering a New Golden Age of Chemical Engineering
  - Phil Westmoreland, 2013 AIChE President
  - Thursday, January 24, 2013
- Chocolate Processing is Delicious
  - Hershey ChEs
  - Thursday, February 28, 2013

VLS Leadership Team

virtuAIChE

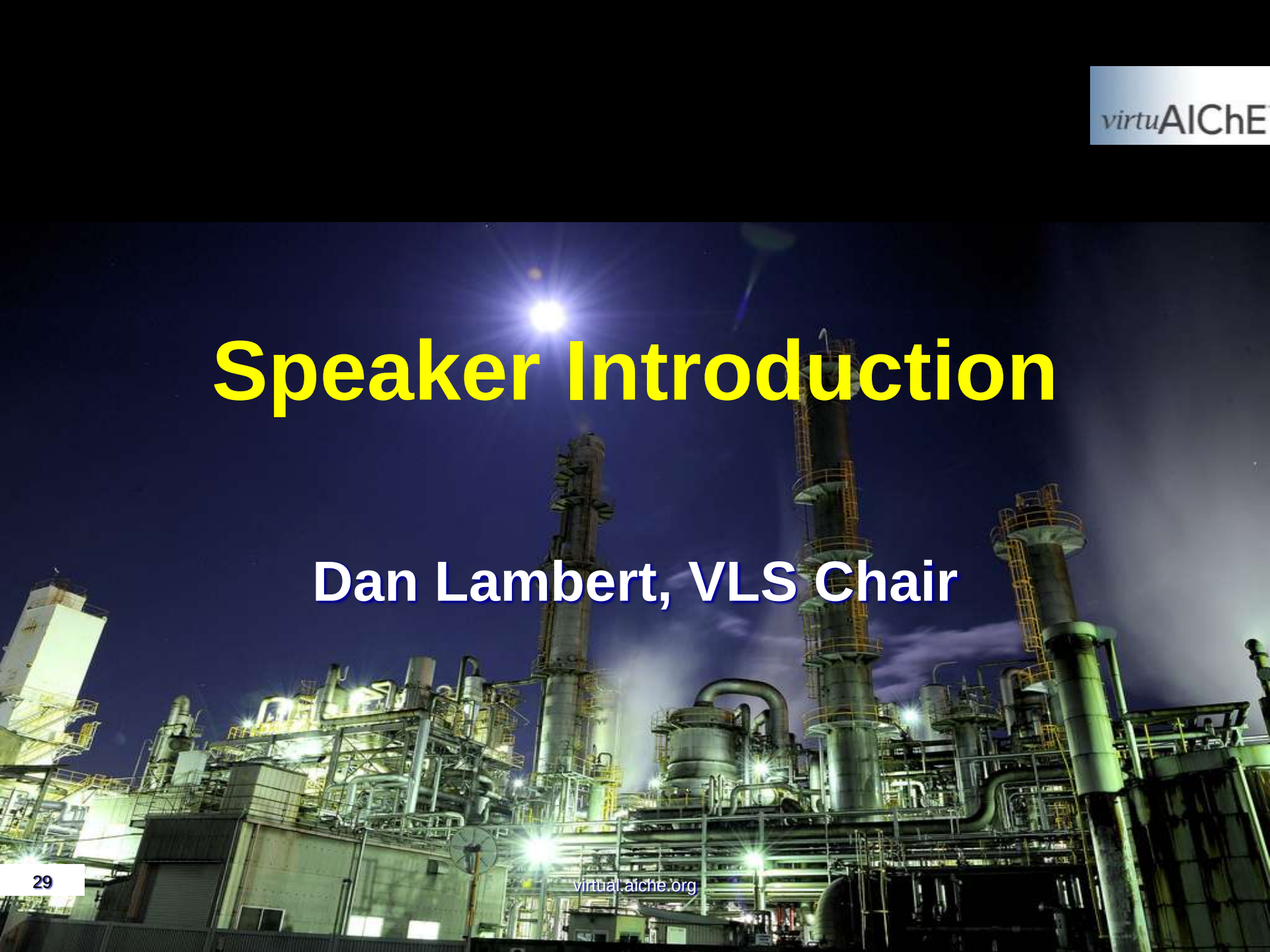
Dan Lambert Chair 	**Amanda Robben Vice Chair** 	**Neil Yeoman Treasurer** 	**Laura Gimpelson Secretary** 
David Eckhardt Director 	Bill Doumas Director 	Noah Meeks Director 	George Andrew Huttick Director 
Amanda Scalza Membership Chair 	Gwen Barnhardt Social Networking Chair 	Yangzi “Isabel” Tian Newsletter Editor 	Deb Grubbe YP Chair 
Ben Herzog 2013 Director 	Anthony Fregosi 2013 Director 	Shannon Brown 2013 Director 	

Election Starts November 3

VLS Recognized

- The VLS was named prominently in AIChE accomplishments in 2012 by AIChE president Dave Rosenthal and 2013 AIChE president Phil Westmoreland
- Thanks to all the VLS leaders and members who made this happen

VLS Members from Europe


virtuAIChE
Speaker Introduction
Dan Lambert, VLS Chair

Keynote Speaker
Dr. Mary Ann Curran

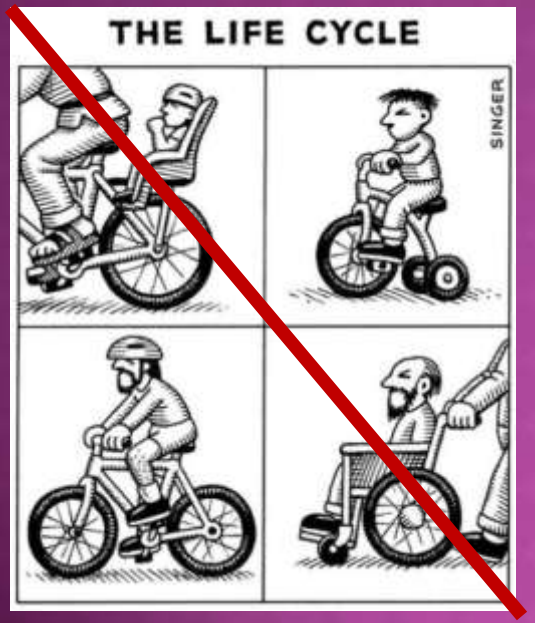
- Internationally-recognized expert in Life Cycle Assessment (LCA)
  - Worked for the US EPA's National Research Laboratory
  - Her research turned to industrial pollution prevention
  - New environmental management approach, LCA
- After 32 years of federal service, entered private practice as an LCA consultant (BAMAC, Ltd)
- Education
  - BS ChE University of Cincinnati
  - MSc Lund University, Lund, Sweden
  - PhD Erasmus University
- AIChE Fellow

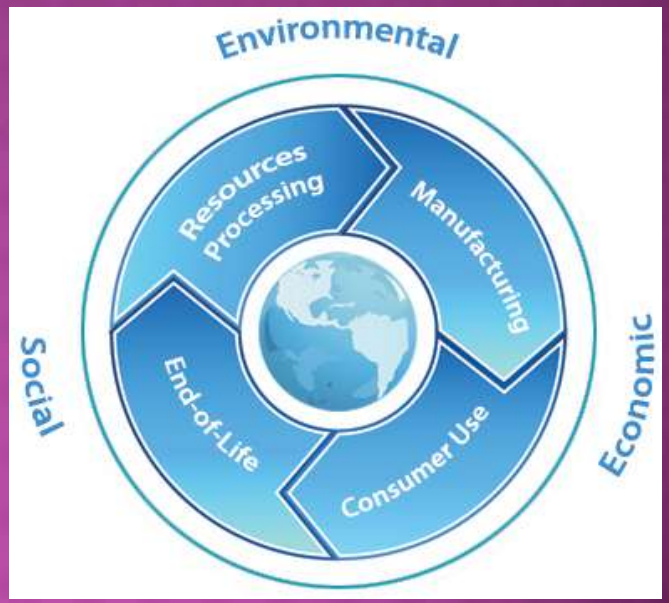
Disclaimer

- ***Neither the American Institute of Chemical Engineers (AIChE), the presenters and author(s) of this work, their employer, nor their employers' officers and directors, warrant or represent, expressly or by implication, the correctness or accuracy of the content of the information presented. As between (1) the AIChE, the presenter and author(s) of this work, their employers, and their employers' officers and directors, and (2) the user/viewer of this work, the user/viewer accepts any legal liability or responsibility whatsoever for the consequence of its use or misuse.***

SUSTAINABILITY THROUGH LIFE CYCLE MANAGEMENT: WHAT IS LIFE CYCLE ASSESSMENT?

Mary Ann Curran, PhD, FAIChE
Cincinnati, Ohio 45244
macurran@cinci.rr.com





BAMAC, Ltd.

November 15, 2012

LIFE CYCLE ASSESSMENT

STAGES

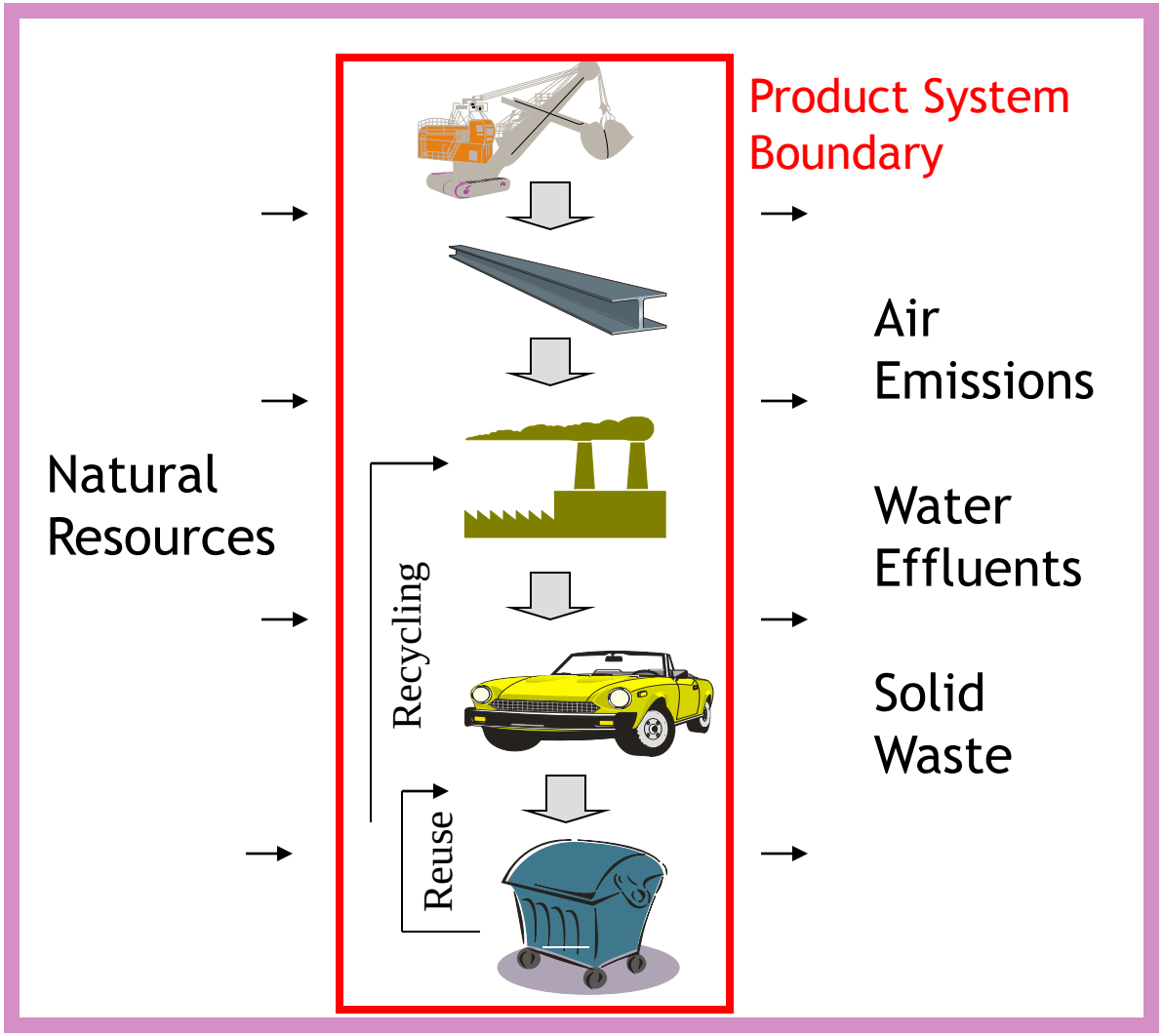
Raw Material Acquisition

Material Processing

Production

Use and Maintenance

End-of-Life Management



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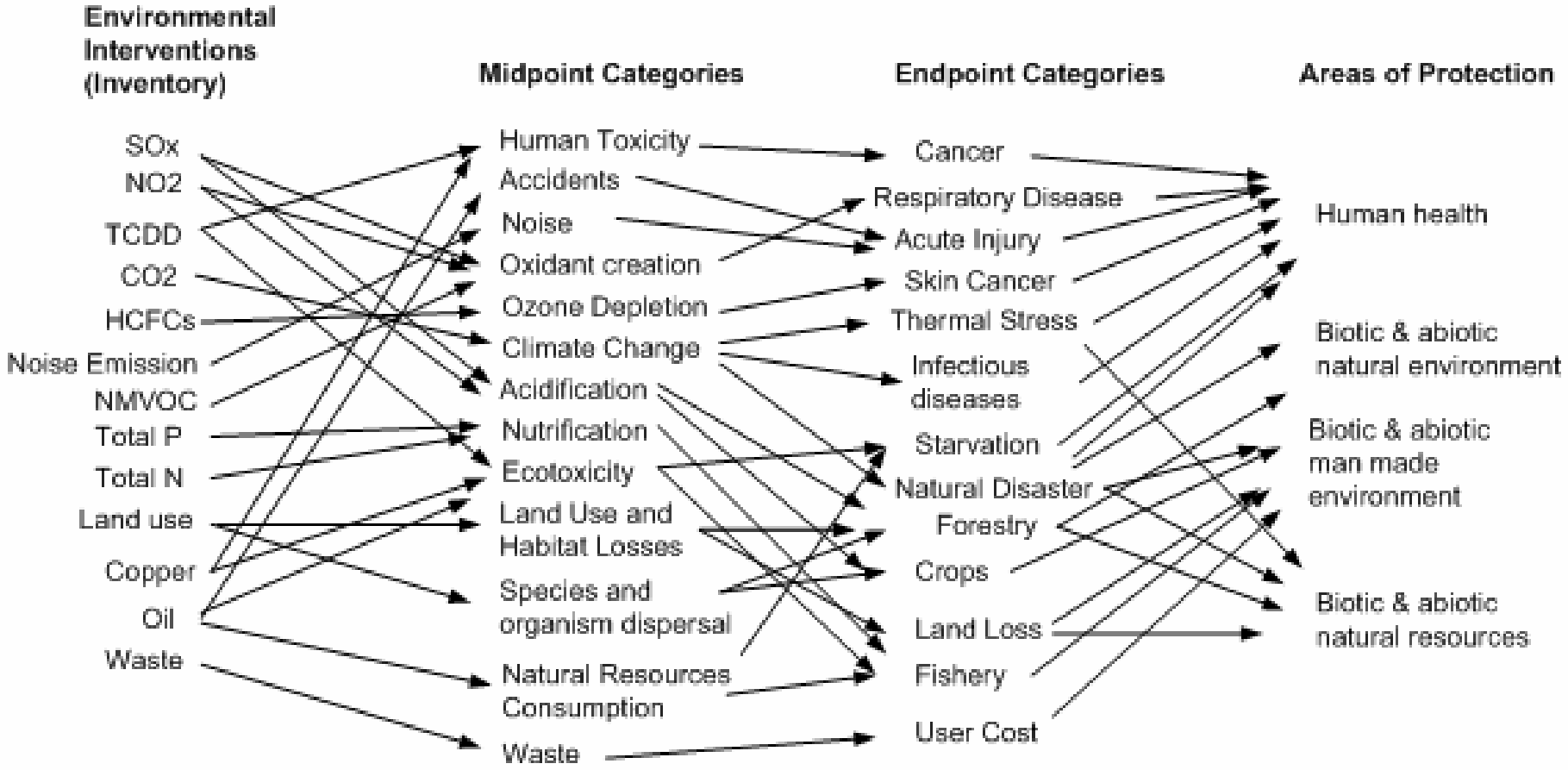
LIFE CYCLE IMPACT CATEGORIES

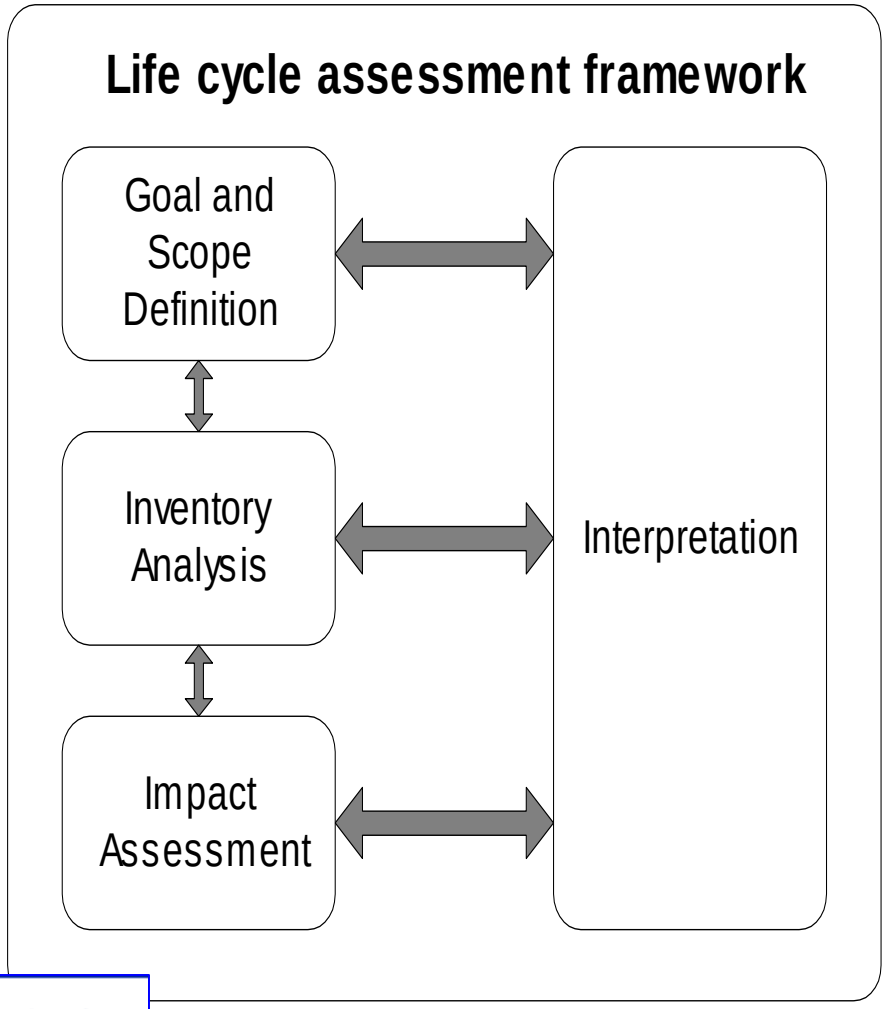


From Jolliet et al. (2004) The LCIA Midpoint-Damage Framework of the UNEP/SETAC Life Cycle Initiative, *IJLCA* **9** (5) 394-404.

CHARACTERISTICS OF LIFE CYCLE ASSESSMENT

- Examines system-wide effects (cradle-to-grave)
- Analyzes multi-media (air, water, waste, etc.)
- Analyzes multi-attributes (all impacts)
- Helps identify *trade-offs* among alternatives
- Identifies opportunities for *improvement*
- Supports environmental decision making
- Provides the environmental pillar of Sustainability

ISO 14040 SERIES



International Organization for Standardization

THE ISO LCA STANDARD

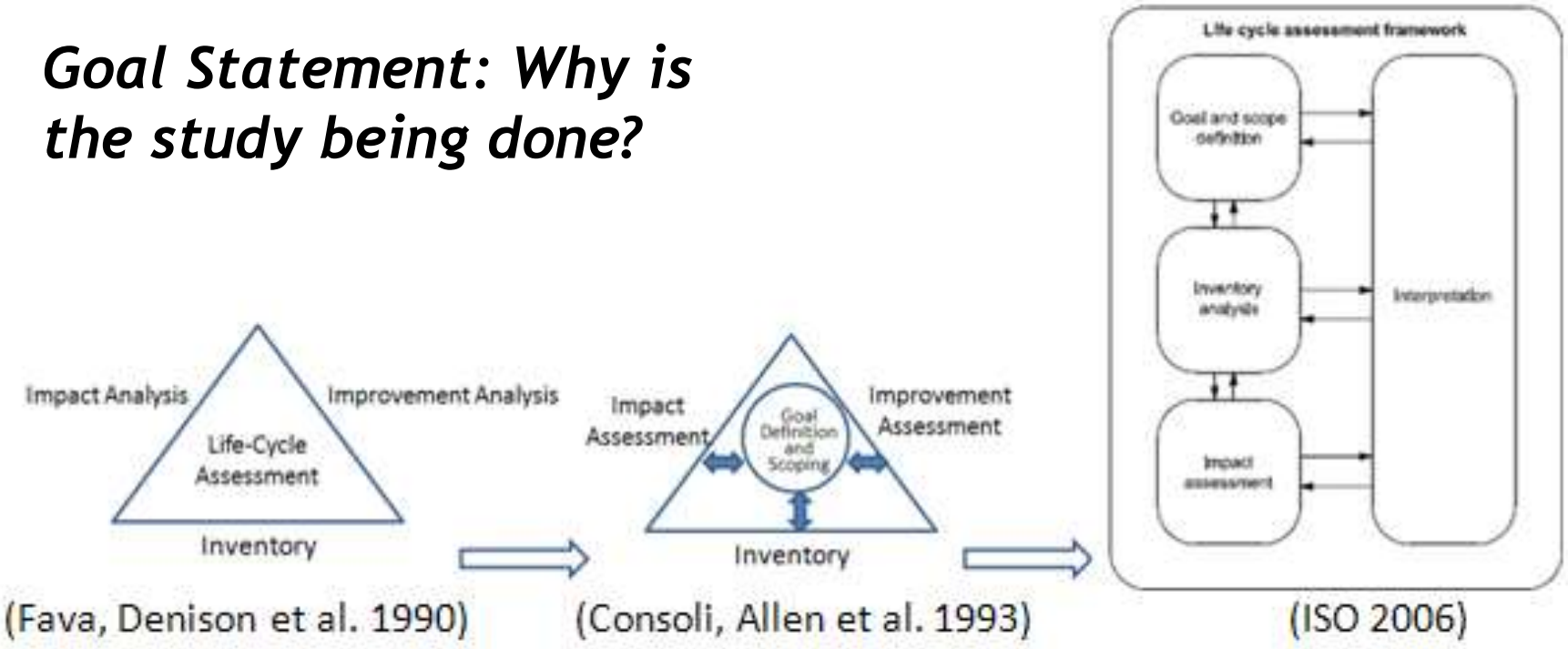
- Defines Life Cycle Assessment
- Gives the approach legitimacy
- Outlines the basic principles
- Does not provide step-by-step instructions on how to conduct an LCA
- “Flexible standard”
- Allows for a lot of interpretation
- Variability in the tool may not be obvious

THINGS TO CONSIDER WHEN EVALUATING AN LCA

1. *Are the goal and functional unit clearly defined?*
2. *How are inputs & releases allocated among co-products?*
3. *Was credit given for "avoided burden?"*
4. *Was a Consequential LCA approach applied?*
5. *Are the inventory data accessible and transparent?*
6. *Is the uncertainty of the data provided?*
7. *Life Cycle Impact Assessment is not Risk Assessment*
8. *Report qualitative as well as quantitative information*
9. *LCA does not always (Usually) declare a "Winner"*
10. *LCA is an iterative process, increasing in detail*

1. ARE THE GOAL AND FUNCTIONAL UNIT CLEARLY DEFINED?

Goal Statement: Why is the study being done?



Evolution of the LCA Framework

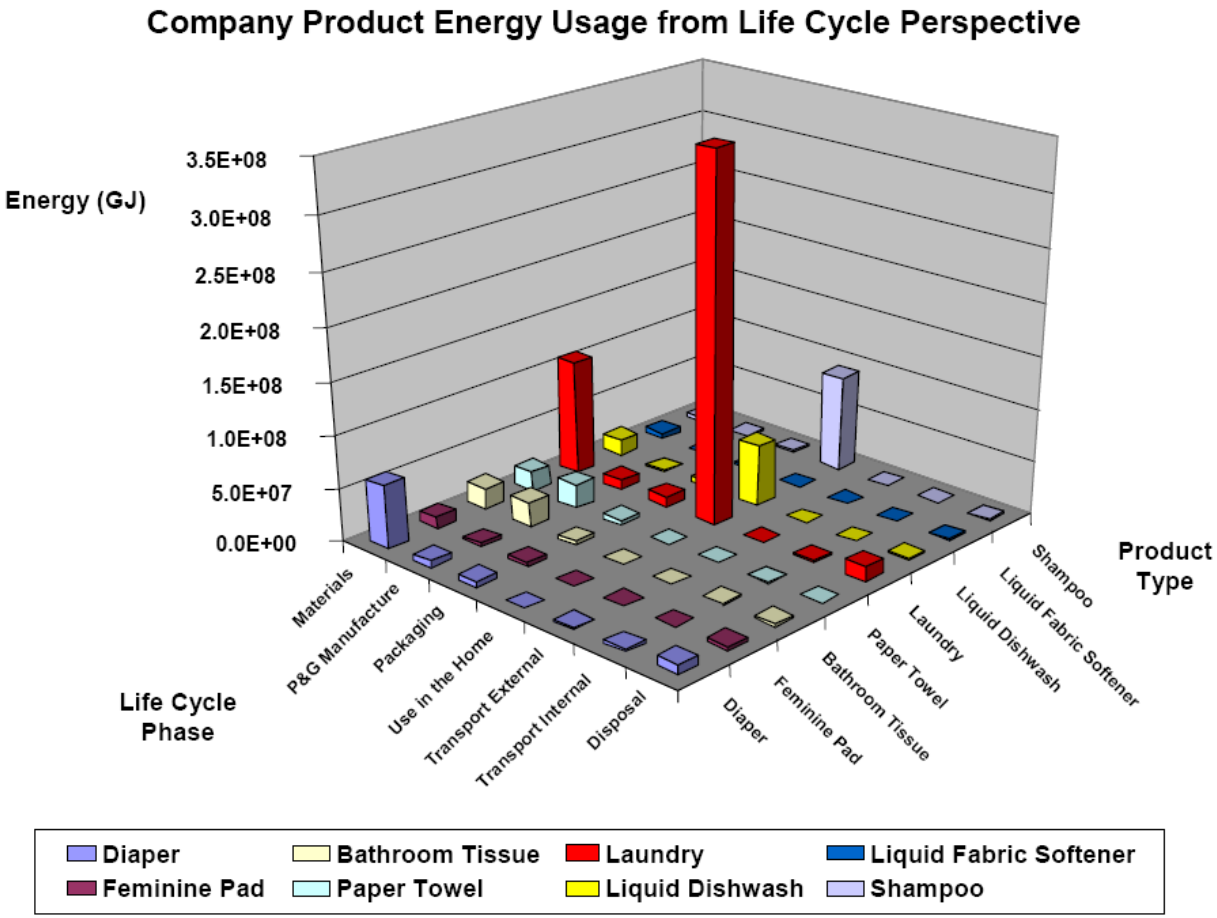
Functional Unit is a unique feature of LCA

The *functional unit* is a quantified description of the service provided by the product system. It is shaped by the study goal to answer the question (concern) at hand. Especially important for comparative studies.

For example: Covering 20 m^2 of wall A with 98% opacity and 5 year durability.

A reference flow is a quantified amount of manufactured product necessary for a product system to deliver the performance described by the functional unit.

For example: 2.3 liters of paint A



FROM "SUSTAINABLE INNOVATION PRODUCTS"

LEN SAUERS, PHD

VP, GLOBAL SUSTAINABILITY, PROCTER & GAMBLE

P&G initially focused on manufacturing (cradle to gate), and compared surfactants from “natural” palm oil to crude oil.

They found that a total substitution is not recommended :

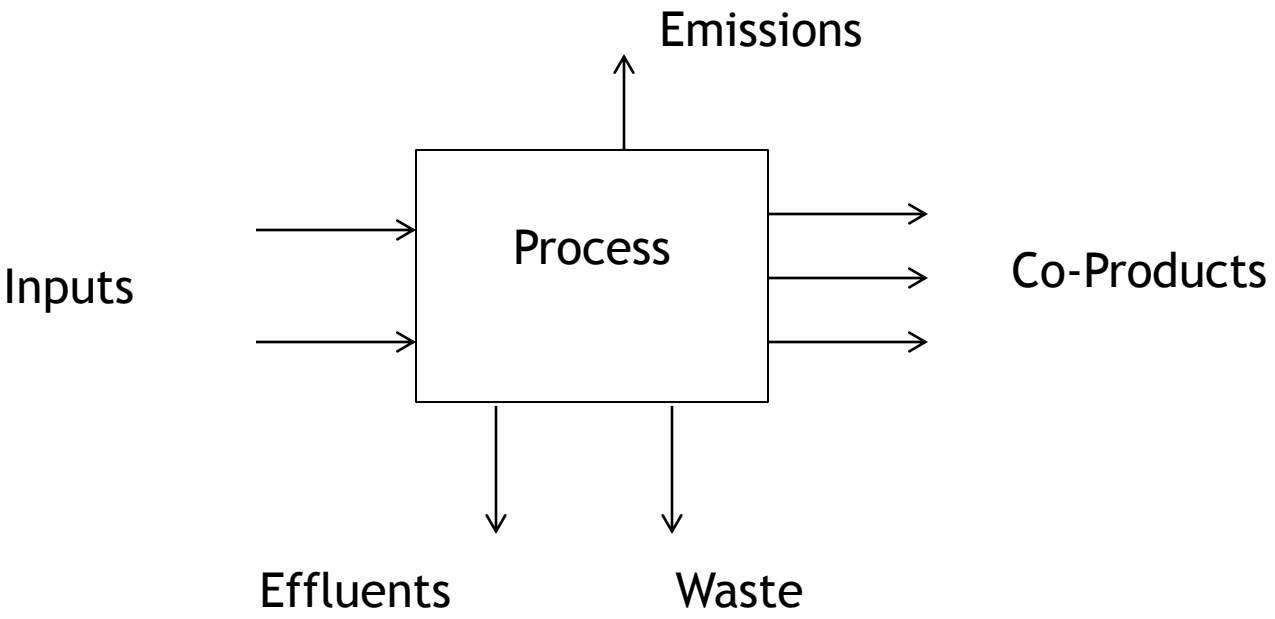
- The wide range in consumer needs (wash conditions) would be more difficult to meet with oleochemical surfactants alone.
- Data from biodegradation, removal by sewage treatment, toxicity and other assessments support that petrochemical and oleochemical surfactants are of comparable environmental quality.
- Replacement of petrochemical by oleochemical surfactants would not lead to any significant reductions in water or air emissions

The results make it clear that neither surfactant can be supported as environmentally superior. Rather, there are trade-offs: lower environmental resource requirements are offset by higher emissions.

Broadening the boundaries to include a cradle-to-grave perspective revealed 80% of the overall energy consumption is associated with the use of the product by the consumer when heating the water and running the washing machine. According to their calculations, if every U.S. household used cold water for laundry, the energy savings would be 70 to 90 billion kilowatt hours per year, which is 3% of the nation’s total household energy consumption. These savings would translate into 34 million tons of carbon dioxide per year not released into the environment.

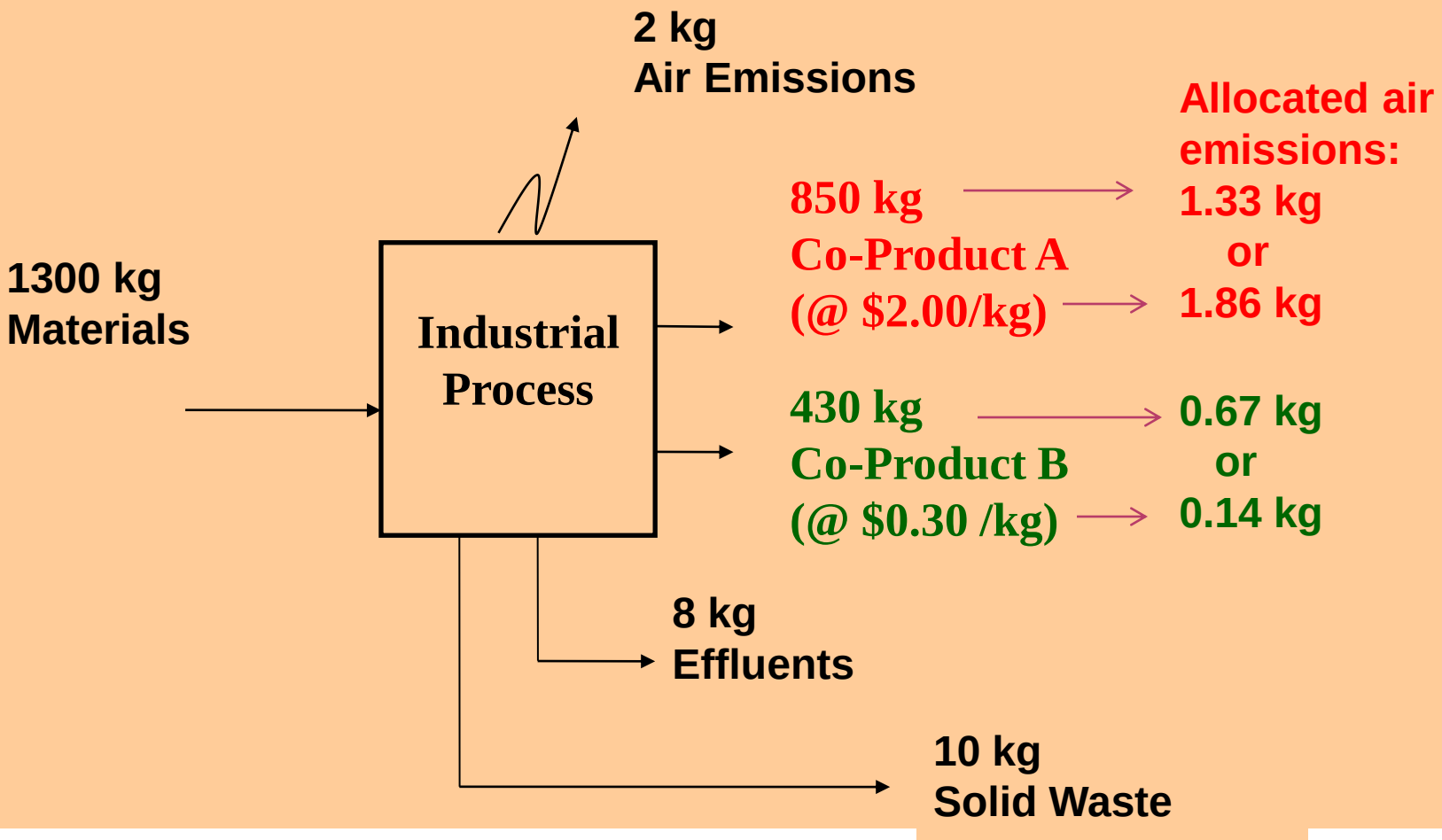
Tide Coldwater was introduced by P & G in 2005 , and marketed to consumers as a way to reduce their energy bills.

2. HOW ARE INPUTS & RELEASES ALLOCATED AMONG CO-PRODUCTS?



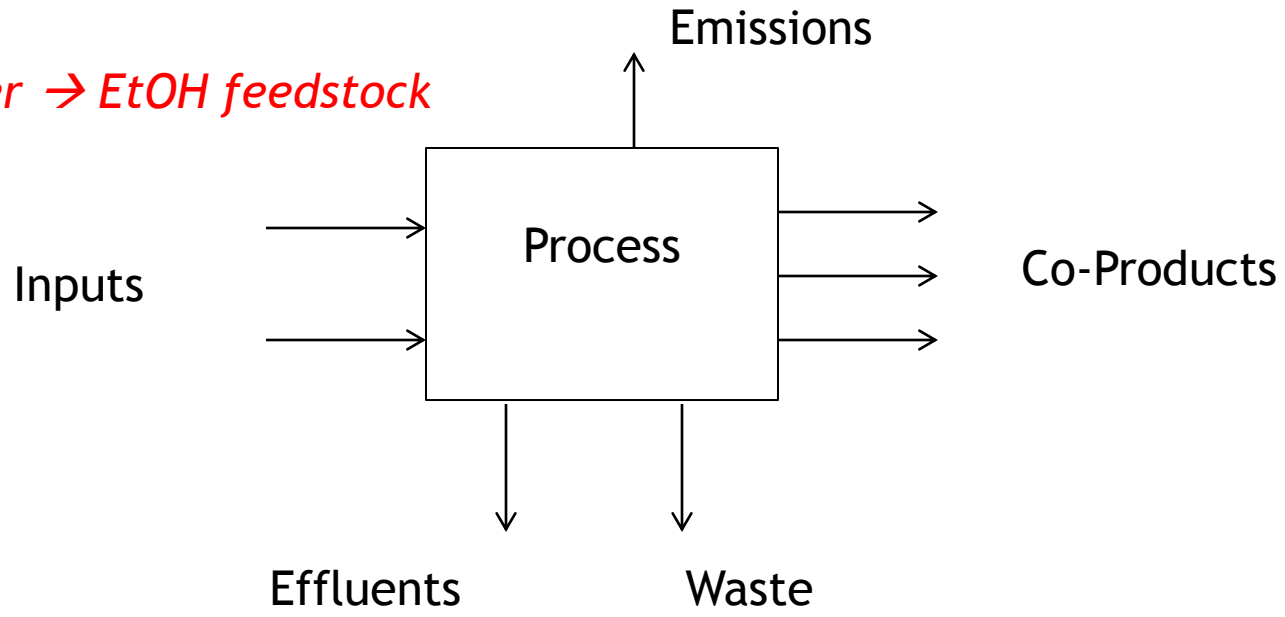
Allocation can be based on mass, energy, market value, etc.

EXAMPLE ALLOCATION



WHAT IF A WASTE IS A MARKETABLE PRODUCT?

Corn stover → EtOH feedstock



Coal ash → roadbed material

3. WAS CREDIT GIVEN FOR "AVOIDED BURDEN?"

	Ethanol Coproducts		Energy use without coproduct credit	Energy use with coproduct credit	NEV with coproducts	Energy ratio
	Percent	Percent	Btu/gal	Btu/gal	Btu/gal	Btu/gal
Output weight basis:						
Wet mill	48	52	79,503	39,987	44,974	2.15
Dry mill	49	51	74,447	37,289	46,672	2.25
Weighted average	48	52	77,228	→ 37,895	46,066	2.22

USDA (2002). The Energy Balance of Corn Ethanol: An Update. AER-813. Washington, DC.

4. WAS A CONSEQUENTIAL LCA APPROACH APPLIED?

- *Attributional LCA* – accounts for the inputs and outputs of a defined system, in a static material balance.
- *Consequential LCA* – predicts potential consequences of implementing actions within a system.

For example*, a 20% *decrease* in GhGs was calculated in an attributional analysis of US corn ethanol.
A consequential analysis predicted a *47% increase* in emissions due to land use changes from additional demand.

*Searchinger, T., R. Heimlich, et al. (2008). "Use of U.S. Croplands for Biofuels Increases Greenhouse Gases Through Emissions from Land-Use Change." Science **319** (5867):1238-1240.

5. ARE THE INVENTORY DATA ACCESSIBLE AND TRANSPARENT?

Commonly used databases:

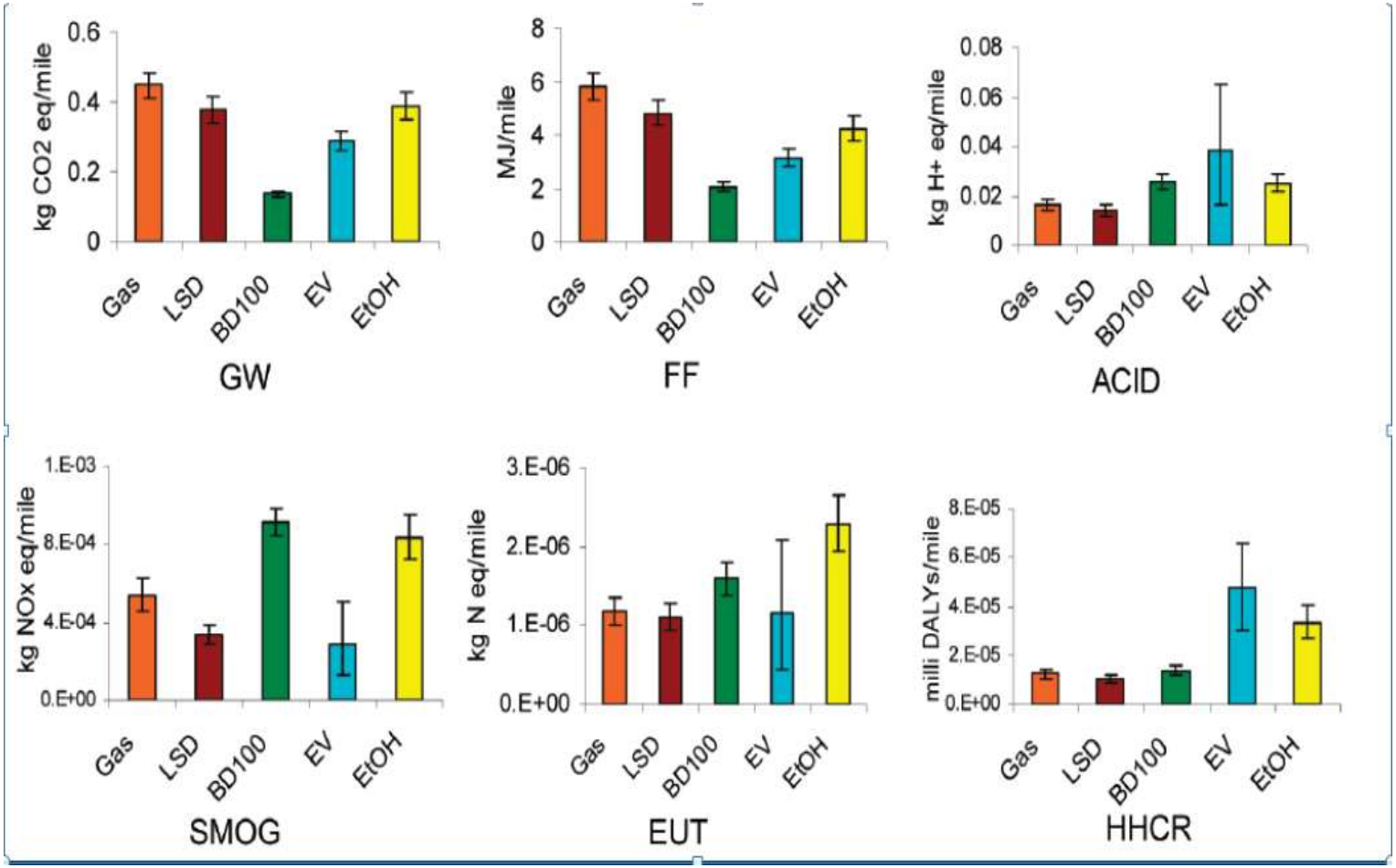
- EcoInvent database

  www.ecoinvent.org
- European Commission's International Reference Life Cycle Data System (ILCD) Data Network http://lct.jrc.ec.europa.eu/assessment/data
- US LCI database (through USDA)

  https://www.lcacommons.gov/nrel/search

Makes it easier to "plug and chug" without understanding how the data were modeled.

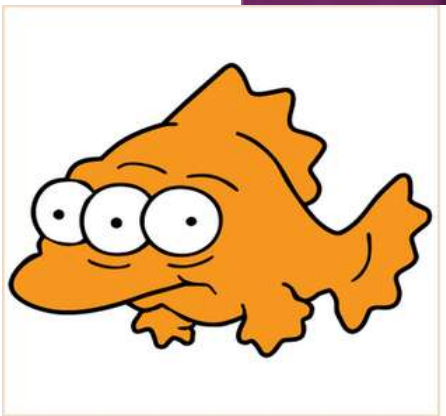
6. IS THE UNCERTAINTY OF THE DATA PROVIDED?



Rogers K. and Seager T. (2009). " Environmental Decision-Making Using Life Cycle Impact Assessment and Stochastic Multiattribute Decision Analysis: A Case Study on Alternative Transportation Fuels " ES&T **43**(6): 1718-1723.

7. LIFE CYCLE IMPACT ASSESSMENT IS NOT RISK ASSESSMENT

Life Cycle Impact Assessment (LCIA) characterizes emissions over a product's life cycle; it reports emissions at an aggregated level and for a chosen functional unit basis.



Risk Assessment (RA) characterizes the nature and magnitude of health risks to humans and the environment from potential chemical contaminants and other stressors at the site-specific level.

8. REPORT QUALITATIVE AS WELL AS QUANTITATIVE INFORMATION

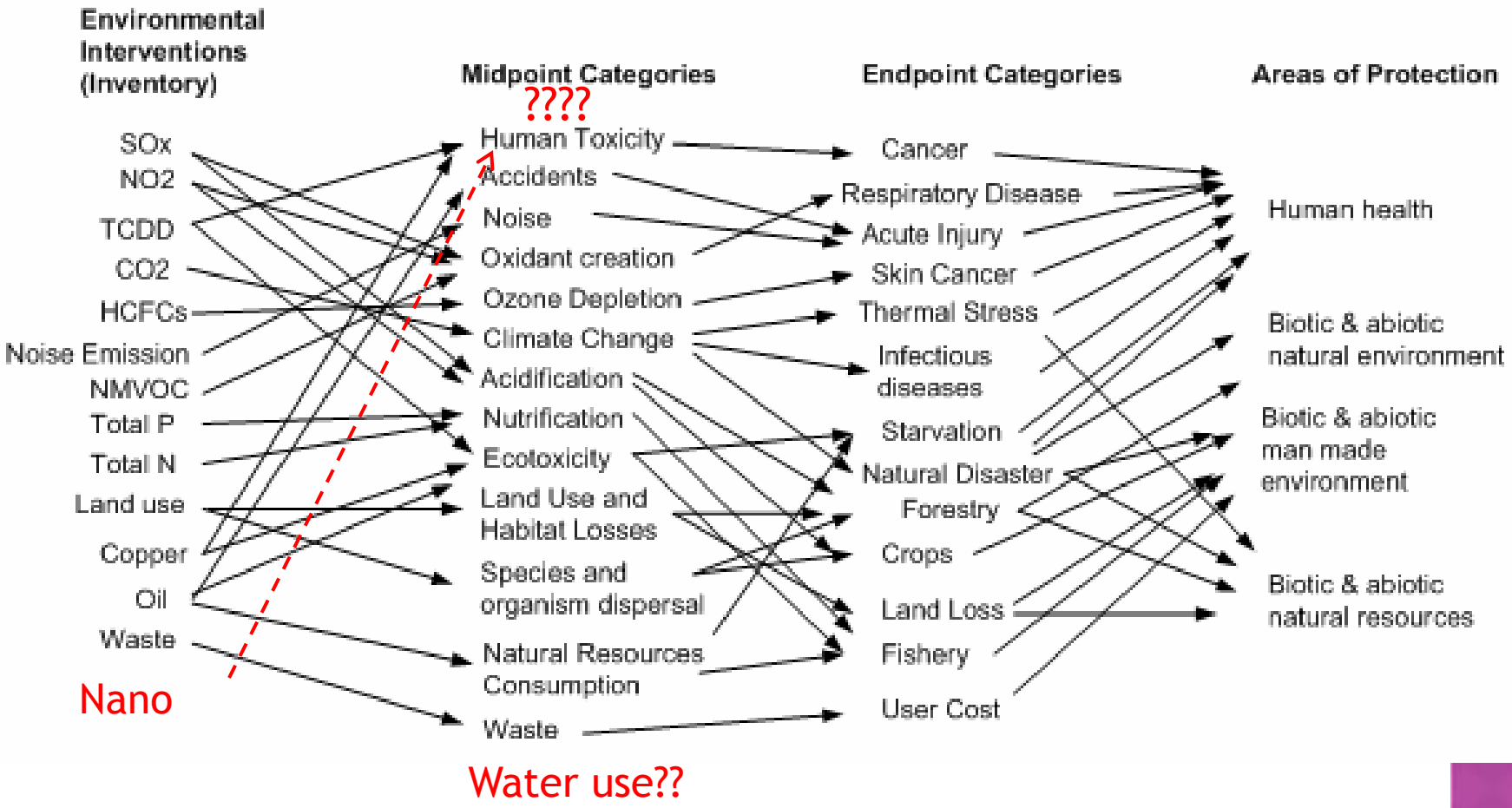
The ISO developers defined:

- Analysis: Limited to quantified information

- Assessment: Includes qualitative information

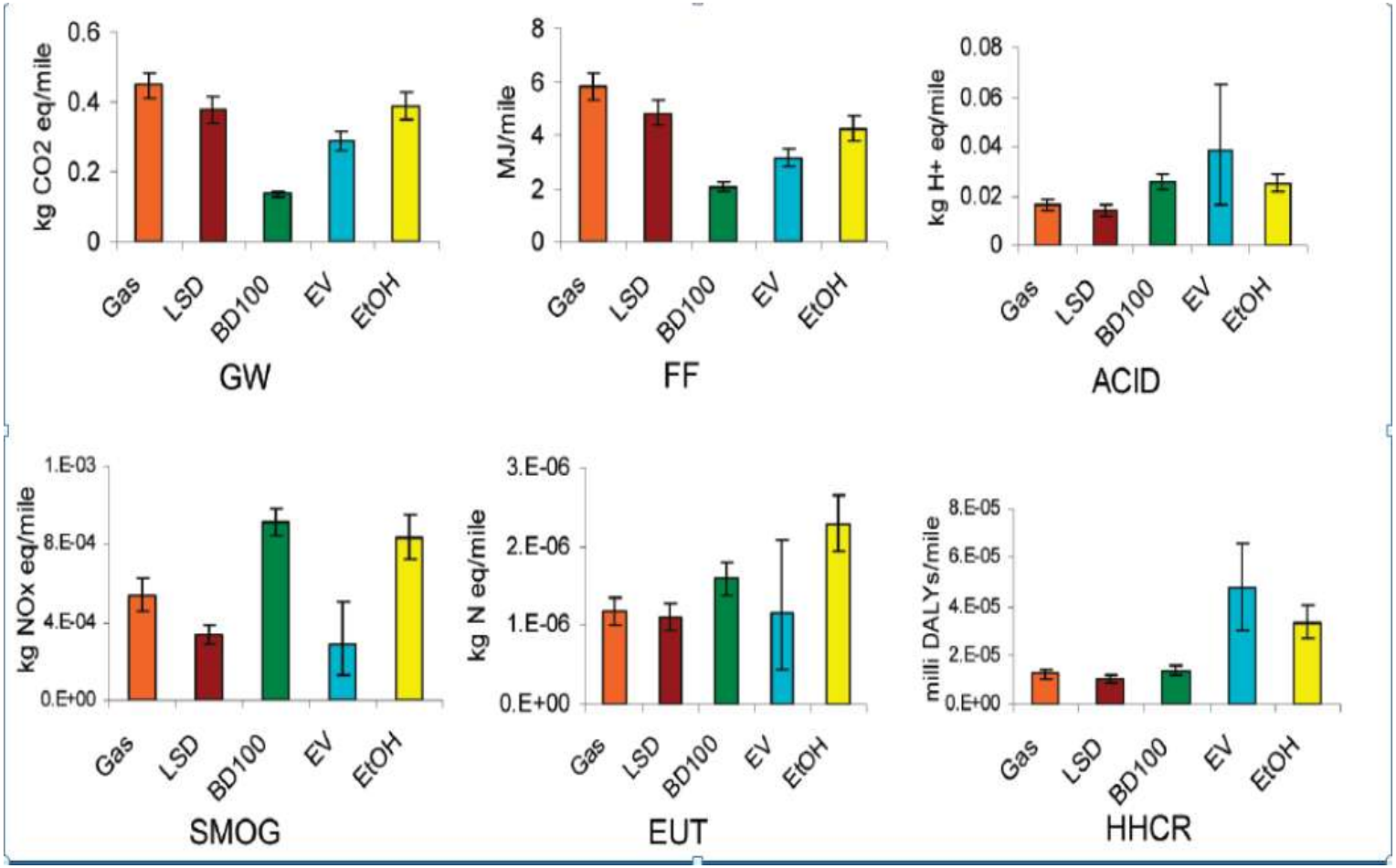
This is why the term **Life Cycle Assessment** was chosen – the original intent was to allow for reporting both types of information.

EXAMPLE OF QUALITATIVE INFORMATION: POTENTIAL TOXICITY OF NANOCOMPONENTS



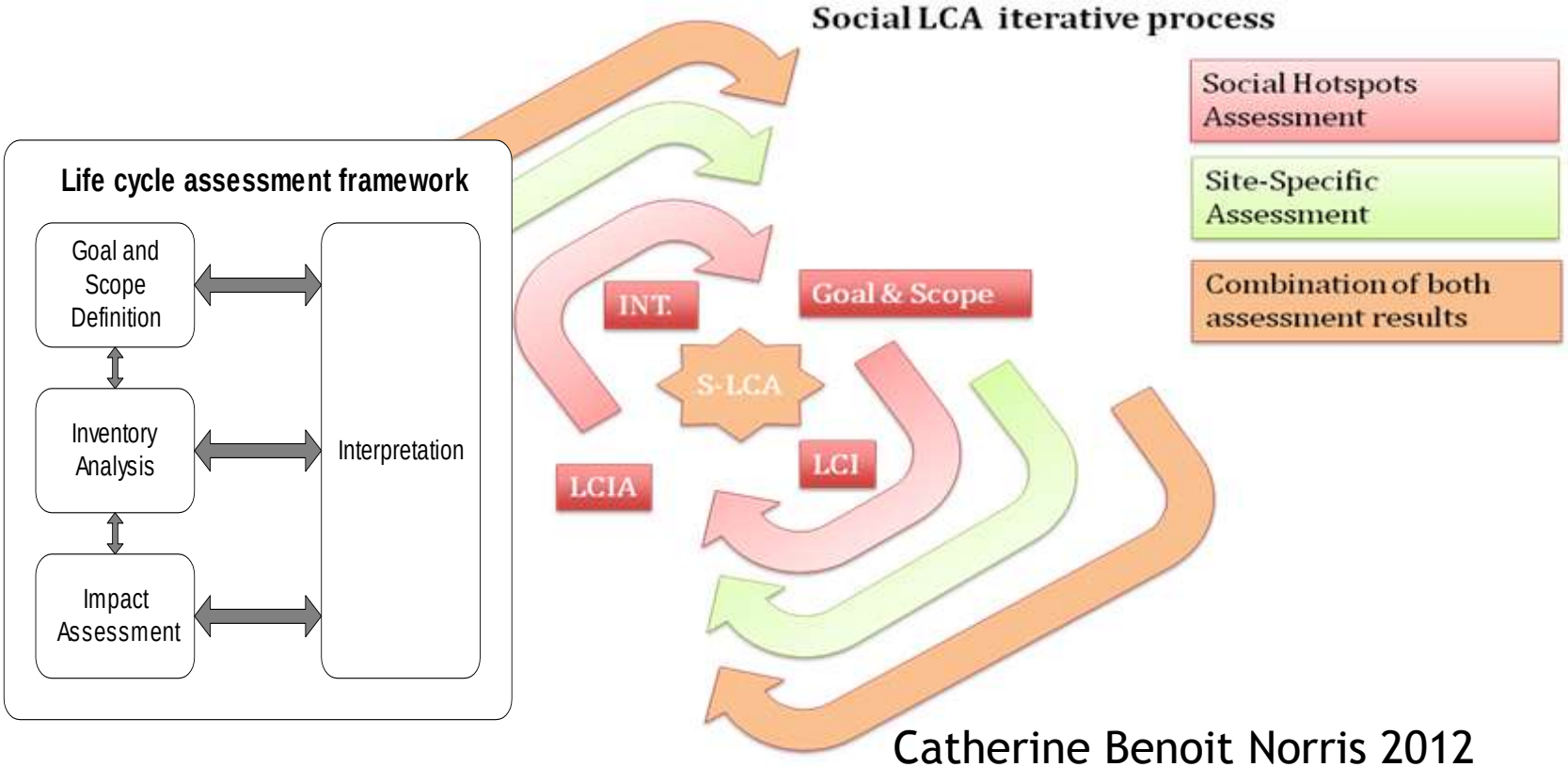
9. LCA DOES NOT ALWAYS (USUALLY) DECLARE A "WINNER"

GAS IS "BETTER" IN 4 IMPACT CATEGORIES , "WORSE" IN 2



10. LCA IS AN ITERATIVE PROCESS, INCREASING IN DETAIL

Figure 1. Social LCA iterative process

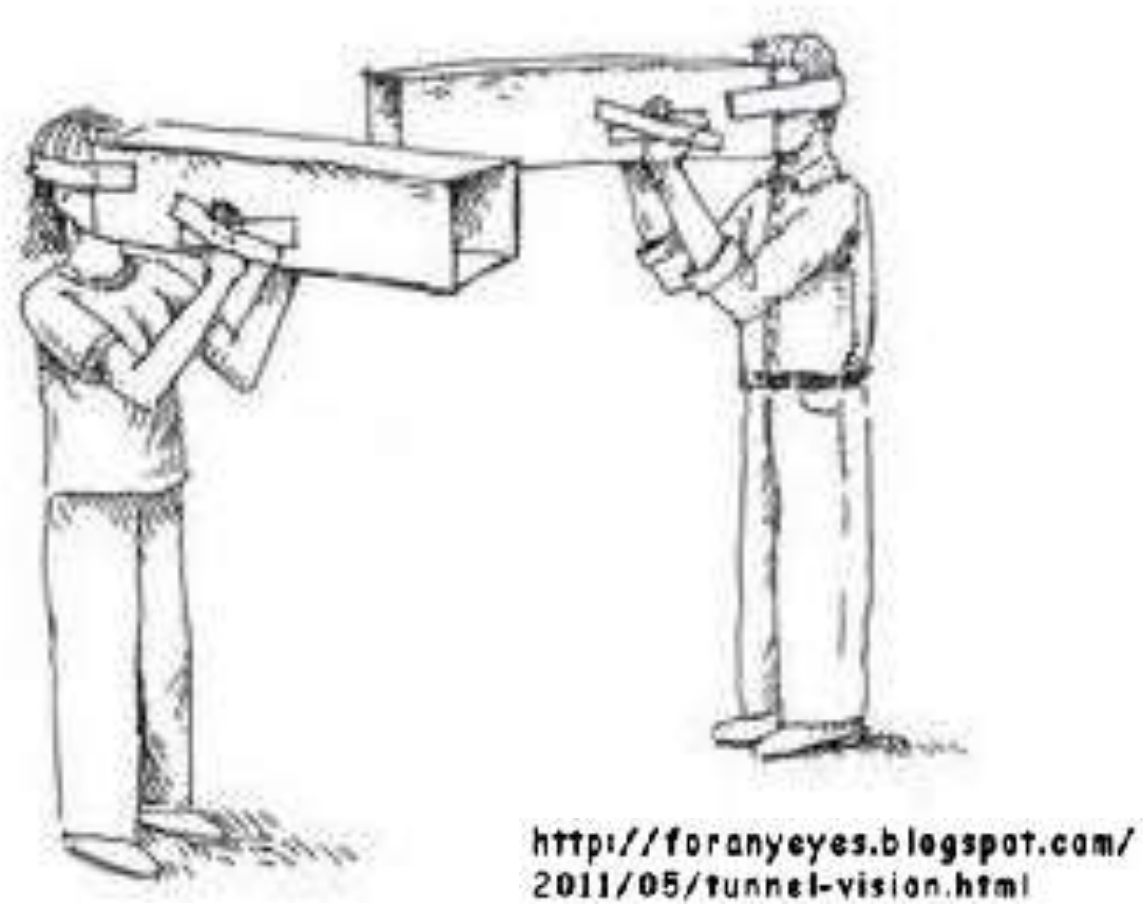


Catherine Benoit Norris 2012

AN EFFECTIVE LIFE CYCLE ASSESSMENT

- Examines system-wide effects (cradle-to-grave)
- Analyzes multi-media (air, water, waste, etc.)
- Analyzes multi-attributes (all impacts)
- Helps identify *trade-offs* among alternatives
- Identifies opportunities for *improvement*
- Supports environmental decision making
- Provides the cornerstone of Sustainability

LCA HAS BECOME A POPULAR TERM BUT IS OFTEN VIEWED USING TUNNEL VISION



http://foranyeyes.blogspot.com/2011/05/tunnel-vision.html

SELECTIVE LIFE CYCLE MANAGEMENT

Climate Change

Chemical Risk

Material Management

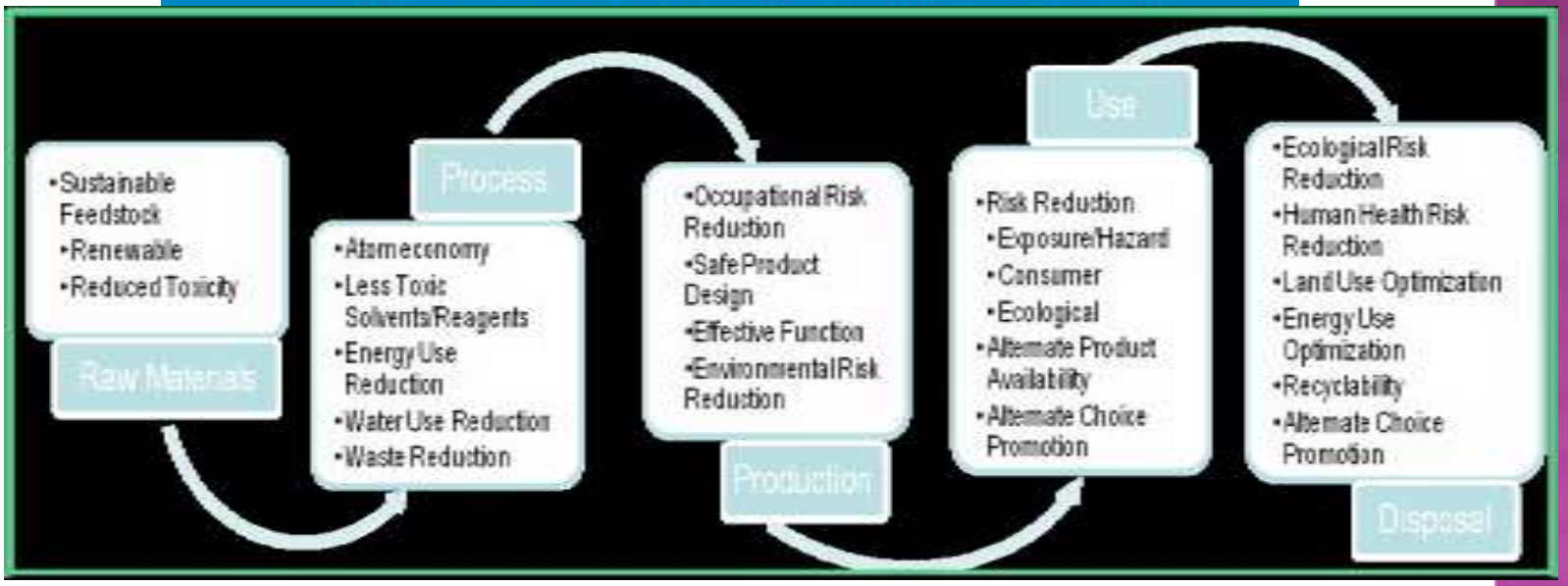
- Simplifies data needs
- Uses available expertise
- Addresses issues perceived as most important.

BUT IT MISSES THE VALUE OF LCA IN IDENTIFYING POTENTIAL TRADE-OFFS!

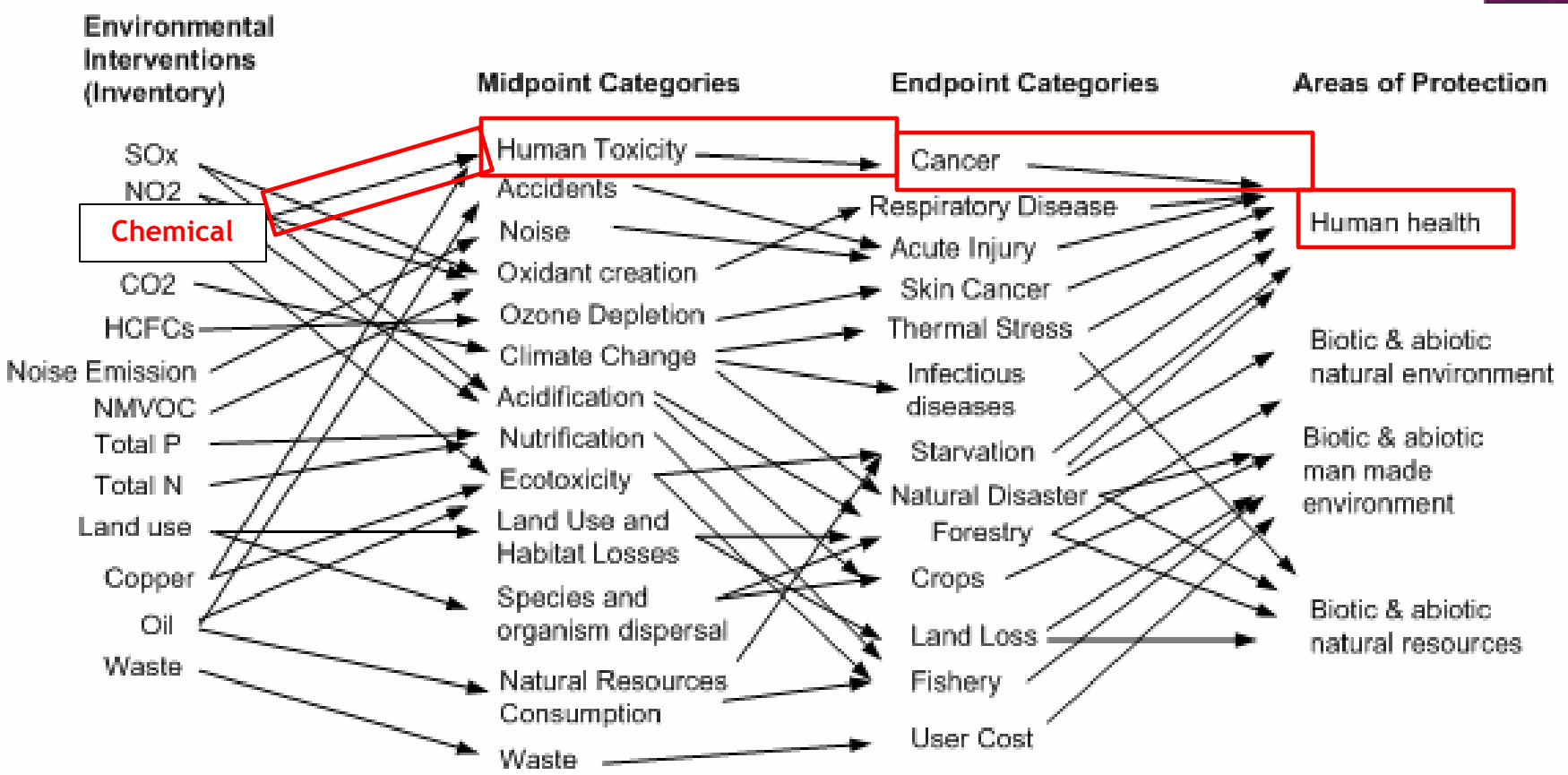
LIFE CYCLE: CHEMICAL RISK

EPA's Chemical Alternatives Assessment:

- Determine critical exposure points in the life cycle
  - Chemical, product, use, disposal
- In DfE CAAs, most focus has been on:
  - Use phase – exposure of consumer or occupational worker
  - Disposal phase
    - "Down the drain" - exposure to organisms in effluent receiving waters
    - "Direct release" - release to environment without sewage treatment

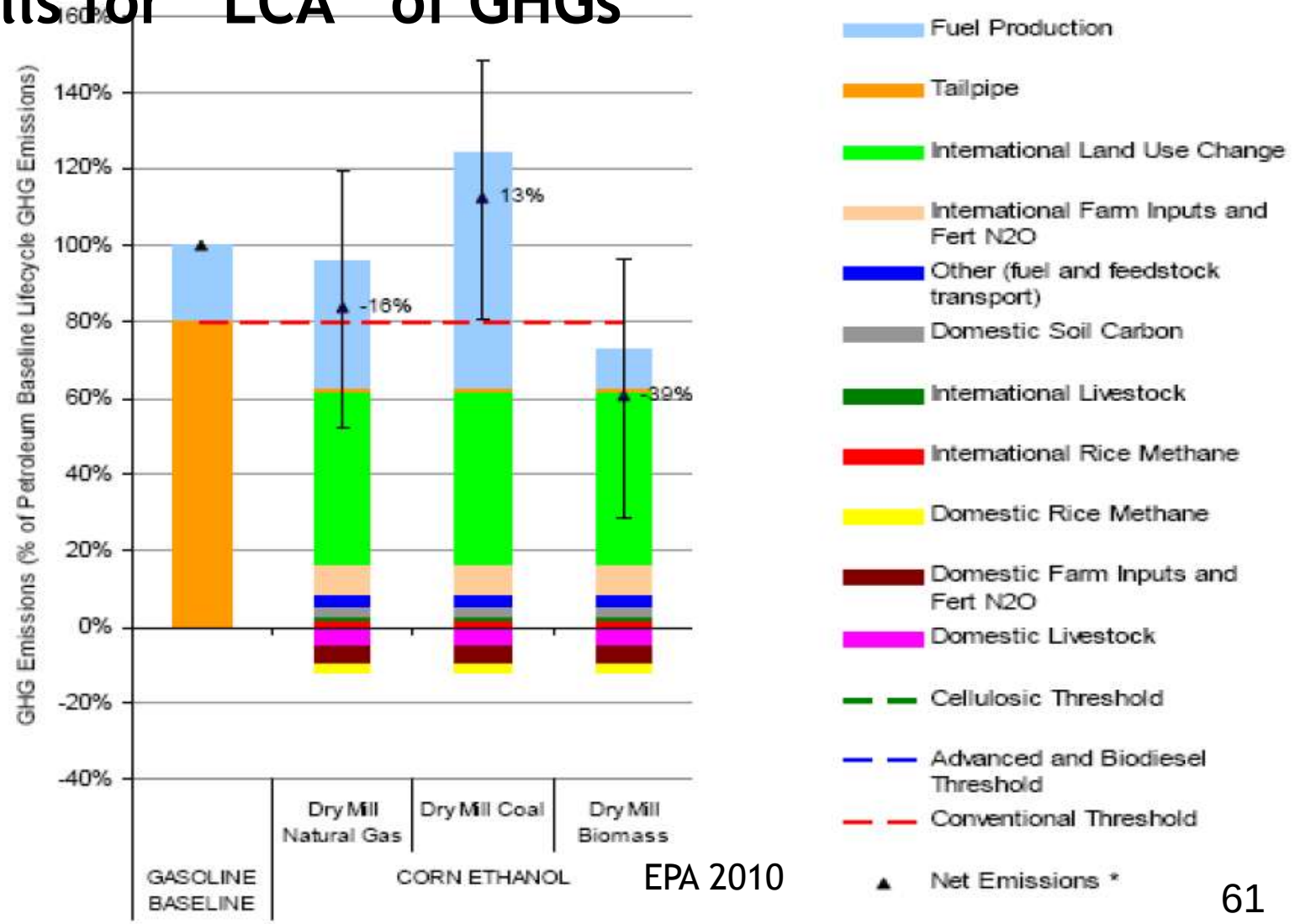


LIFE CYCLE: CHEMICAL RISK



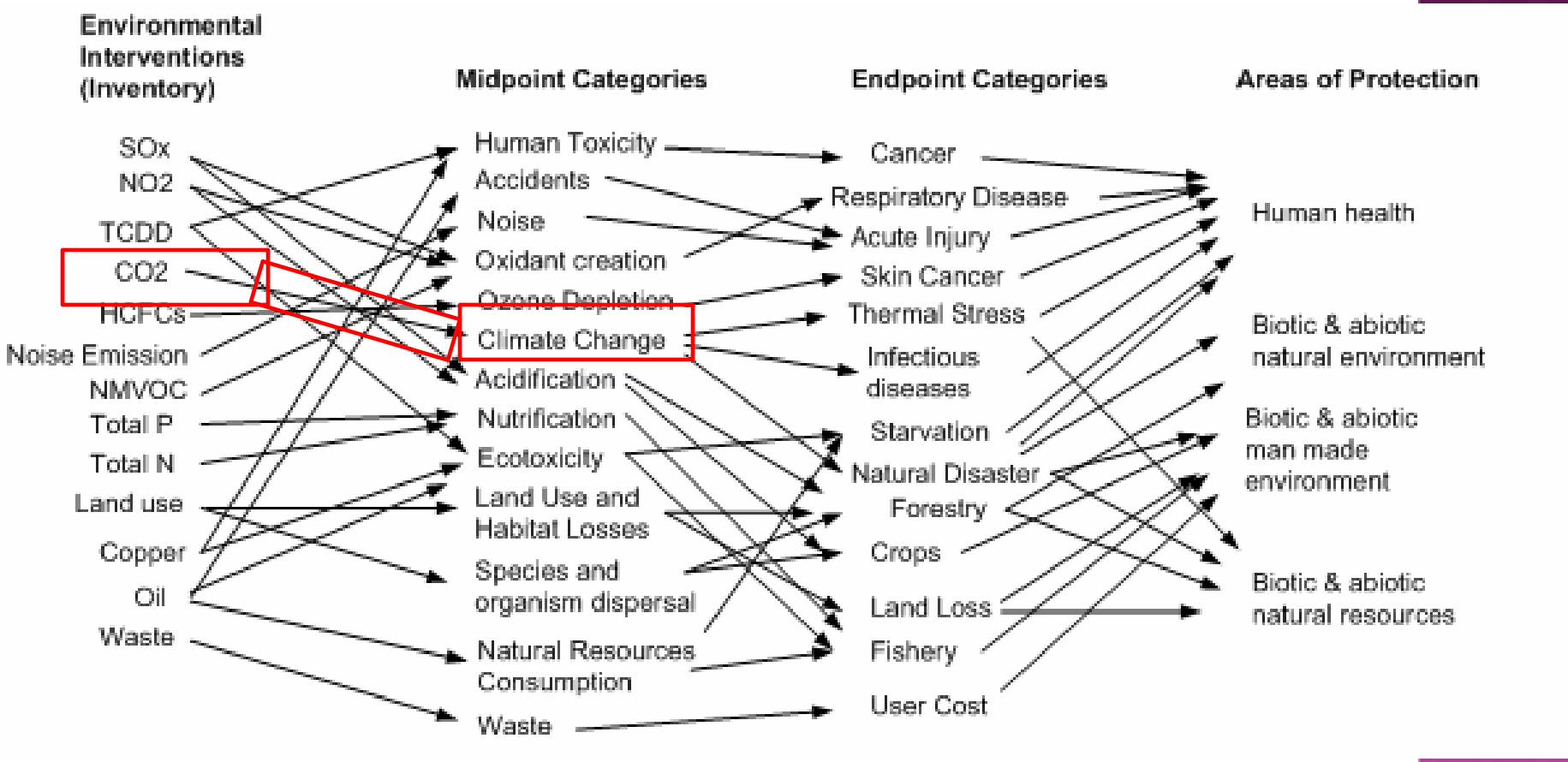
LIFE CYCLE: CLIMATE CHANGE

Renewable Fuels Standard (RFS) calls for "LCA" of GHGs

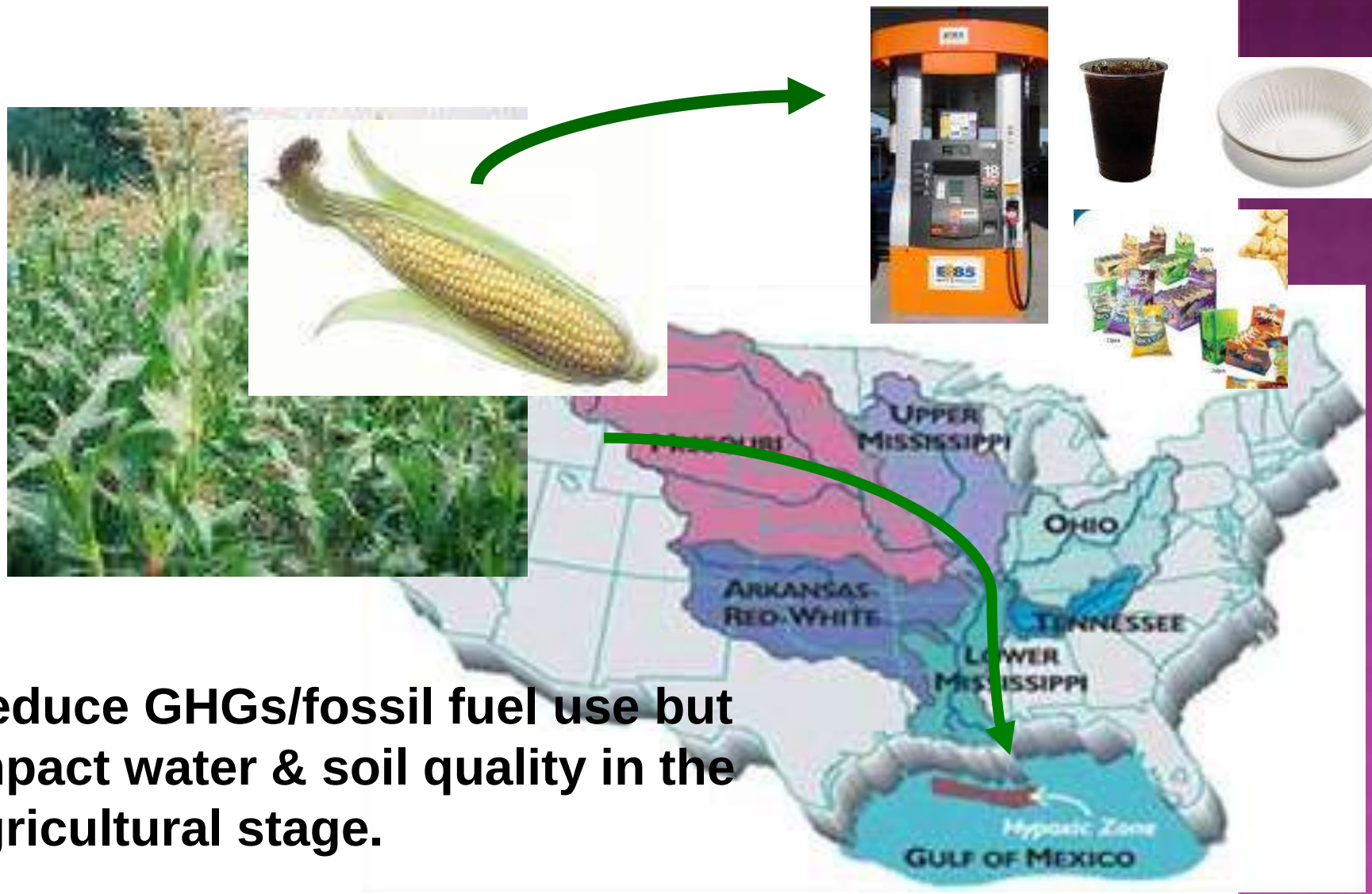


EPA 2010

LIFE CYCLE GHG ANALYSIS



BIO-BASED PRODUCTS



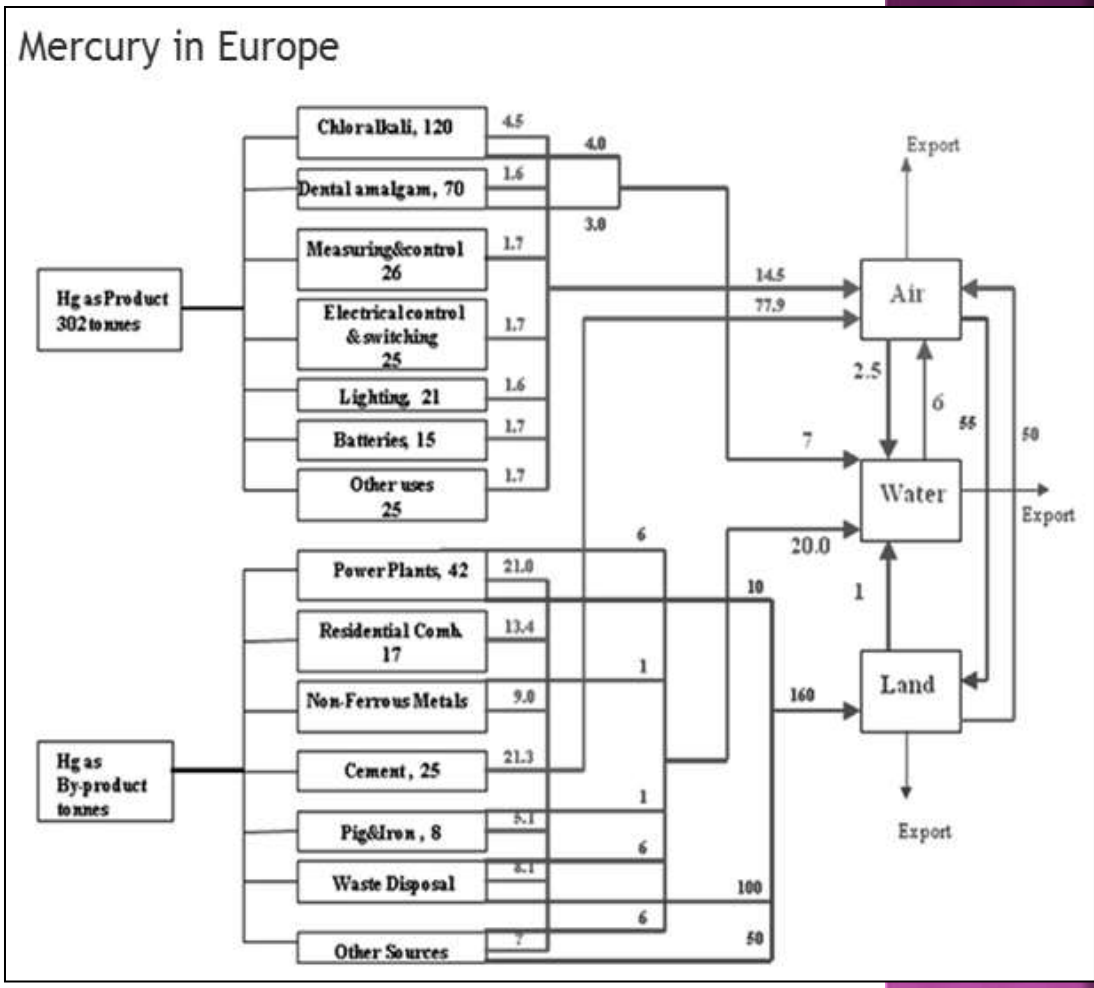
Reduce GHGs/fossil fuel use but impact water & soil quality in the agricultural stage.

LIFE CYCLE: MATERIAL MANAGEMENT

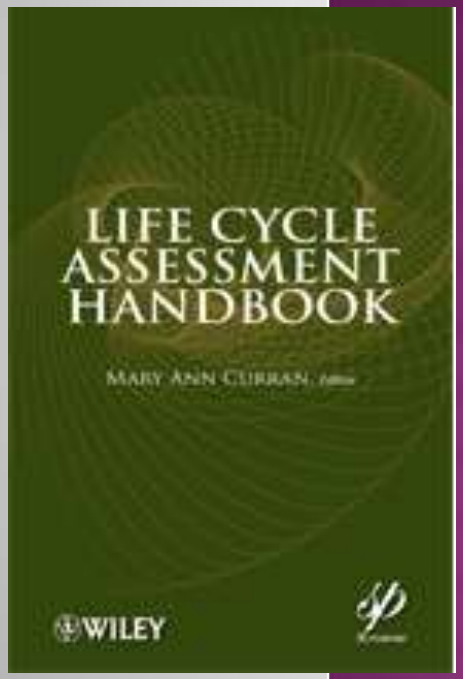
- End-of-Life (EOL) Management

(recycling, landfill, incineration

- Material Flow Assessment/Analysis (MFA)



LIFE CYCLE ASSESSMENT HANDBOOK:
A Guide to Environmentally Sustainable Products



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MARY ANN CURRAN, Editor

The first book of its kind, the LCA Handbook will become an invaluable resource for environmentally progressive manufacturers and suppliers, product and process designers, executives and managers, and government officials who want to learn about this essential component of environmental sustainability.

www.scrivenerpublishing.com/cart/title.php?id=154

Closing Comments

Dan Lambert, VLS Chair

Thank you Mary Ann!

- Thank you for speaking tonight
- As our way of saying thanks, we have shipped you a coffee cup

Thank everyone for attending

- Thank you!!
- VLS meeting next month
  - It's Time to Change How We Promote the Profession
    - Dr. John Anderson
    - Thursday, December 20, 2012 VLS