TRANSITIONING FROM THE BUCKET TO THE BARREL
WEBINAR SERIES
NC STATE UNIVERSITY

An Introduction to OpenLCA and the USDA LCA Commons

October 16, 2014
The webinar starts at 2:00 PM(Eastern Time)

Presenter(s): Peter Arbuckle, USDA National Agricultural Library
Dr. Ezra Kahn, USDA National Agricultural Library
Dr. Jesse Daystar, Triangle Life Cycle Assessment
Host: Brent Bailey, 25x'25
Moderator: Helene Cser, NCSU-Extension Forestry

IBSS
Southeastern Partnership for Integrated Biomass Supply Systems

"The IBSS project is supported by Agriculture and Food Research Initiative Competitive Grant no. 2011-68005-30410 from the USDA National Institute of Food and Agriculture."

USDA United States Department of Agriculture
National Institute of Food and Agriculture

"The webinar project is supported by The Renewable Resources Extension Act National Focus Fund Grant no. 2011-46401-31144 from the USDA National Institute of Food and Agriculture."

Webinar Program

- Orientation: Helene Cser
- Introduction: Brent Bailey, 25x'25
- Speakers:

  Peter Arbuckle & Ezra Kahn, USDA National Agricultural Library

  Jesse Daystar, Triangle Life Cycle Assessment
- Moderated Q&A: Helene Cser & Brent Bailey

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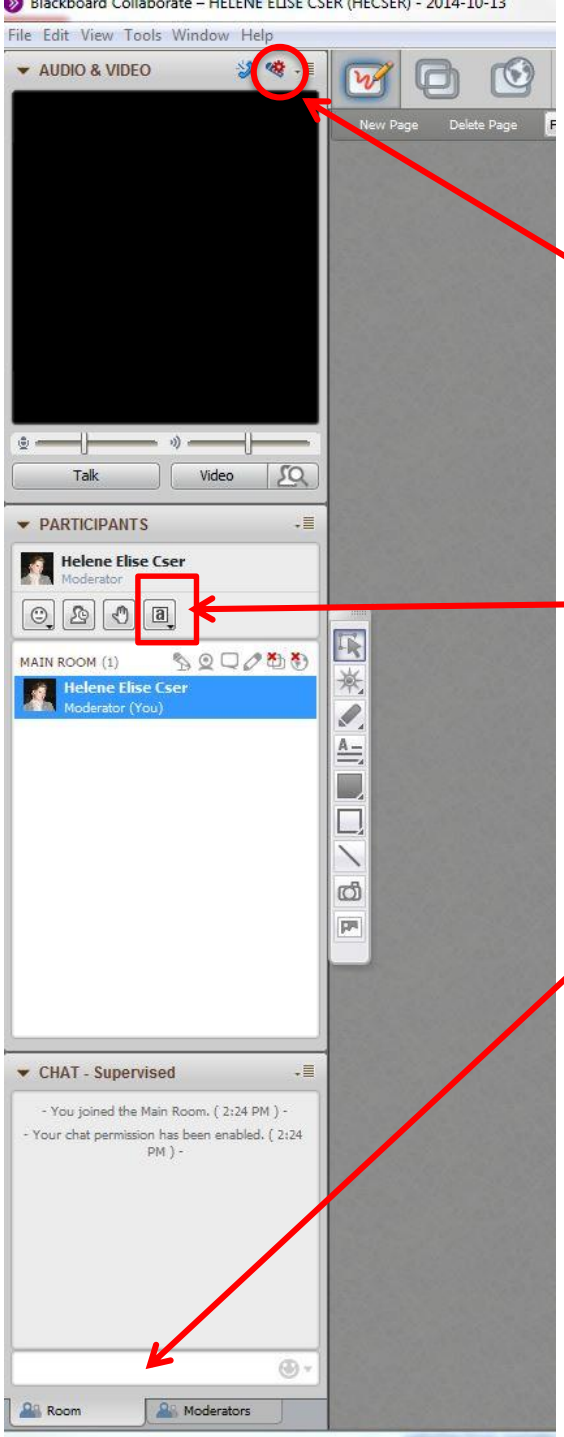
6. Complete the Continuing Education Form (CEU Form) with your continuing education program license or identification information if applicable and certify that you have participated or viewed the webinar in its entirety.

Orientation



1. Audio Setup Wizard – Allows you to ensure your audio is set up properly.

2. Polling - Allows you to answer yes/no questions and respond in a multiple choice format

3. Chat - If the chat says "Supervised," be aware that the presenter/moderator can see all messages, even those marked private.

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Why did you join today's webinar?

A. Need continuing education credits
B. Subject matter
C. Subject matter and CEUs
D. Requested by boss
E. Other

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What best describes your occupation?

A. Extension or Education Agency
B. Government Agency
C. Private Industry
D. Landowner
E. Other

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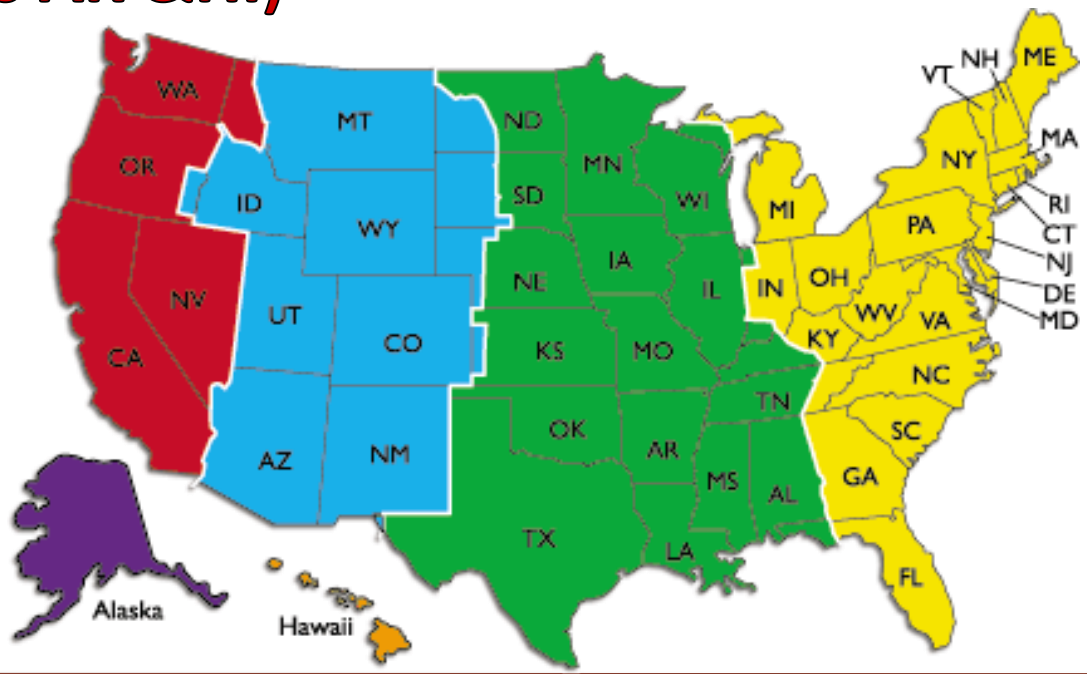
A. **Pacific (Includes AK &HI)**
B. Mountain
C. **Central**
D. Eastern
E. **Other**



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Thank You!

To qualify for and receive continuing education credits you must

1. Complete the satisfaction survey
2. Take and pass the short quiz
3. Complete the Continuing Education Unit Request Form
4. Certify that you have participated or viewed the webinar in its entirety

Brent Bailey

State Activities Coordinator
25x'25 Alliance

Brent began his professional career as an Environmental Consultant for two central Mississippi environmental engineering firms. In 1999, Brent went to the Mississippi Farm Bureau Federation to become the organization's Environmental Programs Coordinator and served in that capacity for over seven years.

In October 2006, Brent began an association with the 25x'25 Initiative and serves as the State Activities Coordinator. The 25x'25 vision entails production agriculture and forestry producing 25% of total U.S. energy needs by the year 2025 while continuing to produce safe and abundant food and fiber. Brent is working with agriculture and forestry leaders to mobilize support for renewable energy solutions from the agriculture and forestry sectors.

Brent also serves as the Project Coordinator for the Southeast Agriculture and Forestry Energy Resources Alliance.

Dr. Jesse Daystar

Triangle Life Cycle Assessment

Dr. Jesse Daystar is a leader in the field of life cycle assessment of forest biomaterials and currently leads Triangle Life Cycle Assessment as President. Dr. Daystar completed his PhD in Forest Biomaterials focused on the environmental impacts of second-generation biofuel. He has presented his research findings at several major conferences including the American Center for Life Cycle Assessment and the Advanced Materials for Energy and Green Technology. Additionally, he has lectured at North Carolina State University and Duke University on the topics of sustainability and LCA software. He has author and co-author on publications in the journal of Fuel Processing Technology, Forest Products Journal, and BioResources. Prior to his graduate studies, Dr. Daystar led in the implementation of proprietary cellulosic ethanol production technologies as the Technical Director of Biofuels for Pesco-Beam Environmental Solutions.

Triangle LCA

AN INTRODUCTION TO OPENLCA AND THE USDA LCA COMMONS

Jesse Daystar[1], Peter Arbuckle[2], Ezra Kahn[2]

[1] *Triangle Life Cycle Assessment, Raleigh, North Carolina, & NCSU.*

[2] *USDA-ARS-National Agricultural Library, Knowledge Services Division*

IBSS Southeastern Partnership for Integrated Biomass Supply Systems

October 16th, 2014

In collaboration with the IBSS E2O outreach program

1. Generate Solutions

Demonstrate implementable 'real-world' solutions that effectively address the economic and environmental barriers that currently limit sustainable and reliable biofuels production, while reducing deployment risks, lowering feedstock and conversion costs, and maximizing societal gains.

2. Develop New Tools

Develop, validate and utilize new tools and metrics for effective decision-making in the selection and deployment of biomass-to-biofuels production that addresses our national energy needs and revitalizes rural economies.

3. Integrate Education

Provide creditable, impactful, and integrated education, extension and outreach (E2O) programs and communication tools that result in a well-trained workforce, and landowners, stakeholders and policy makers with the knowledge necessary to thoughtfully enable a biofuels industry.

What is best for the environment?

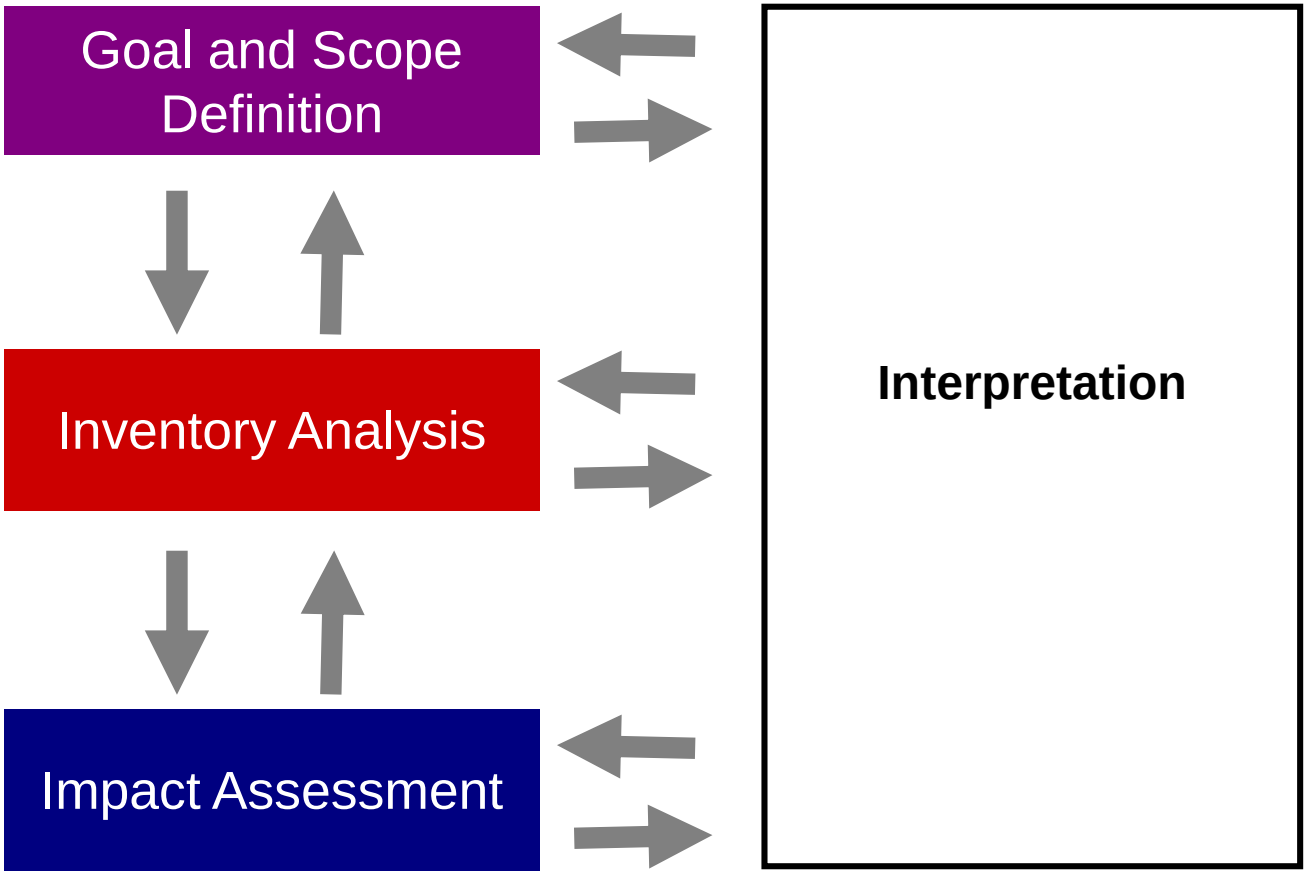
- What kind of bag is best?
- How long will the bag last?
- How will I know what bag is best?

What to expect from today's webinar

- Introduction to LCA
- Introduction to openLCA
- openLCA demonstration
- Introduction to the LCA Commons

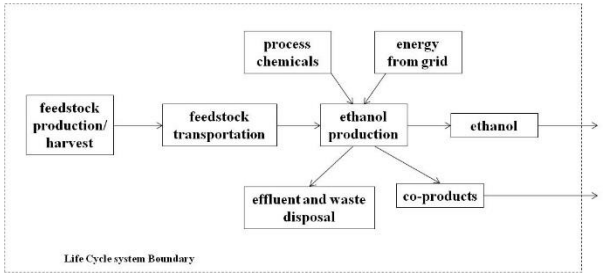
Life Cycle Assessment

LCA is a frame work to determine the environmental impacts of a product, service or good.



Defining Goals and Scope

- **Goals**
  - Should state the intent of the study
  - Intended application
  - Intended use
  - Intended audience
  - Should also include reason for the study
- **Scope**
  - Define functional unit of product
  - Establish system boundaries for the LCA
  - Determine data collection methods



Biofuel GHG Studies

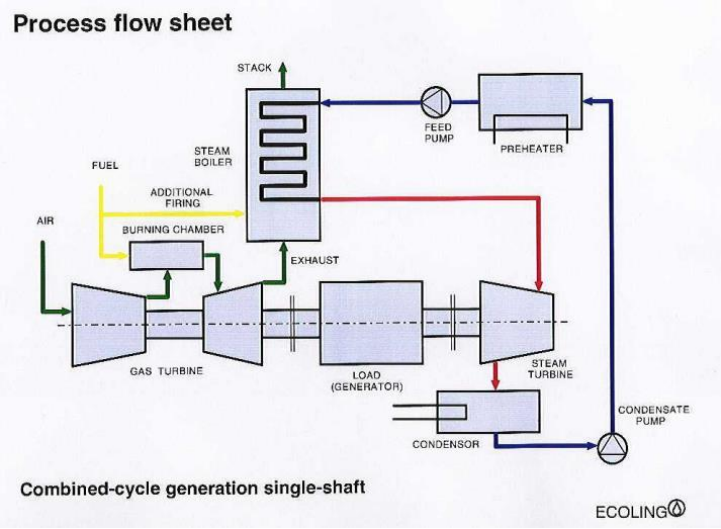
% GHG Reduction compared to gasoline			
Switchgrass	Source	Corn	Source
114	1	86	8
109	2	38	9
93	3	25	10
73	4	24	11
11	5	3	12
-43	6	-66	13
-50	7	-93	14

Sources: [1](Adler, Grosso et al. 2007), [2](Ney and Schnoor 2002), [3](Schmer, Vogel et al. 2008), [4](Wu, Wu et al. 2006), 5(Lemus and Lal 2005), [6](Delucchi 2006), [7](Searchinger, Heimlich et al. 2008), [8](Delucchi, 2006), [9](Adler, Grosso et al. 2007) [10](DiPardo 2004), [11](Wu, Wu et al. 2006), [12](Niven 2005), [13](Delucchi, 2006), [14](Searchinger, Heimlich et al. 2008) (Table modified from Davis et al 2009)

Life Cycle Inventory

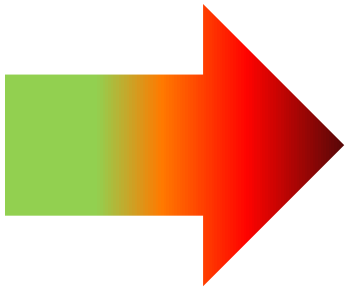
Four steps

1. Develop a flow diagram of the processes being evaluated.
2. Develop a data collection plan.
3. Collect data.
4. Evaluate and report results.



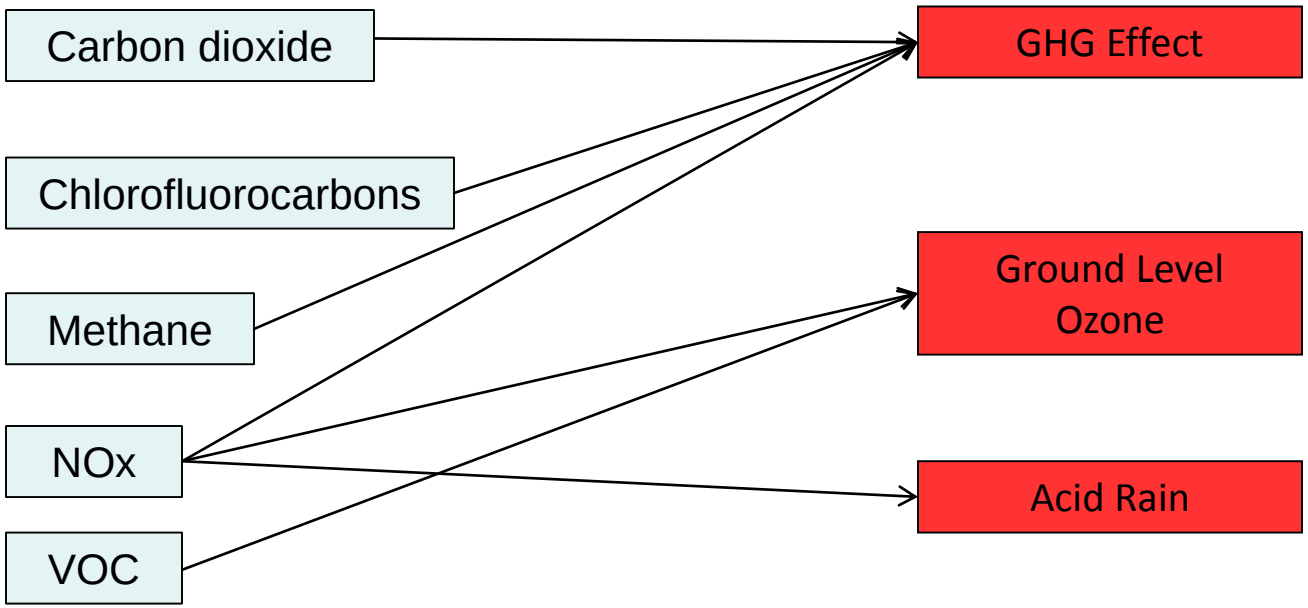
Impact Assessment

- **Describes the environmental consequences of the emissions quantified in the inventory analysis.**
- **Why?**
  - Simplifies data sets
  - Easier communication of results
  - Improve readability of results
    - Categorizes hundreds of emissions down into 15 or less impact categories



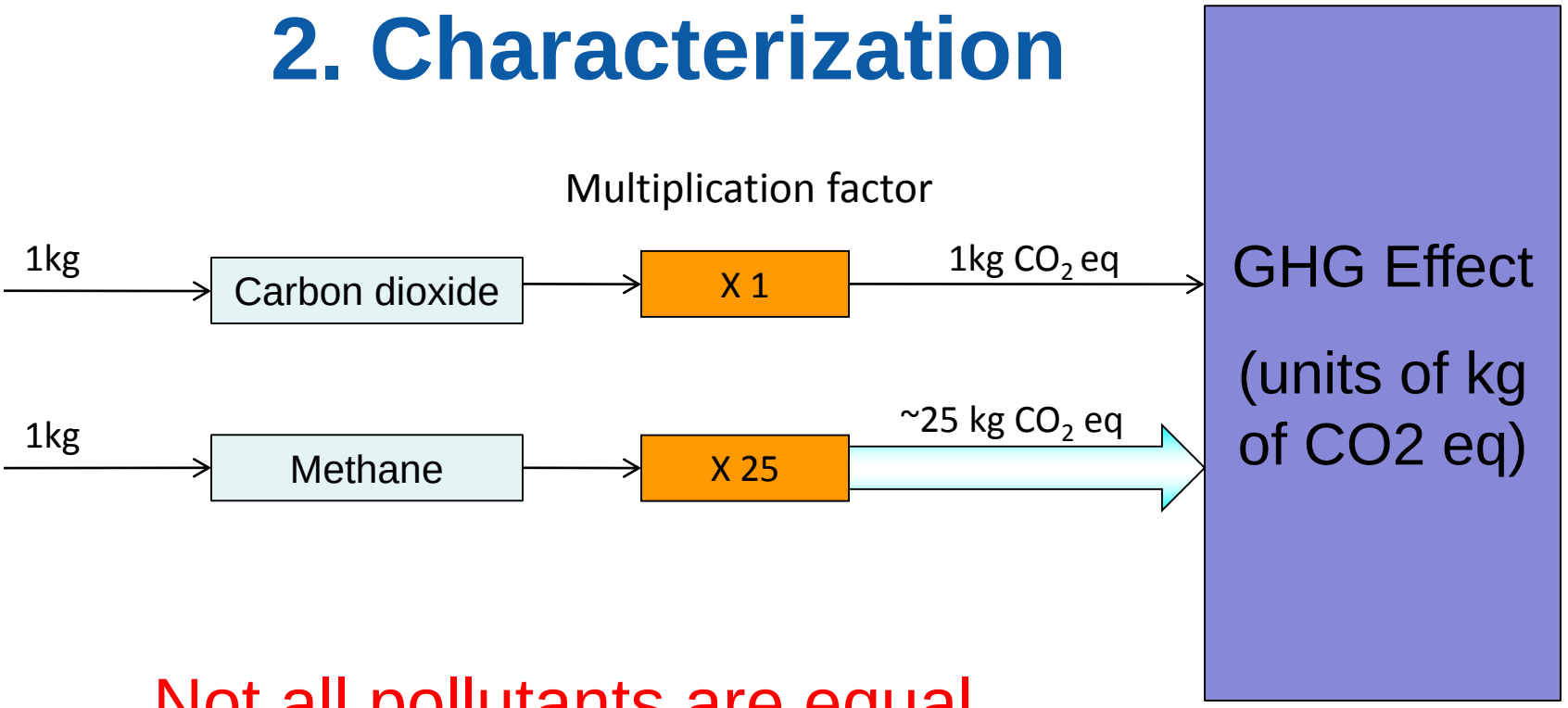
1. Classification

From LCI:



- Classification sorts pollutants according to the effects they have on the environment

2. Characterization



Not all pollutants are equal

Reference: http://www.epa.gov/RDEE/energy-resources/calculator.html#results

What to expect from today's webinar

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- Introduction to the LCA Commons

LCA Software vs. Data

LCA Software

Pictures from: http://lumberjocks.com/projects/19808; http://www.sslumbr.com/lumber.html; http://rooftrussdesign.net/prefabricated-roof-trusses/; http://www.rockcustomdecks.com/rockbuiltlofts/lumber.html

LCA Software vs. Data

LCA Software

LCA Data

Pictures from: http://lumberjocks.com/projects/19808; http://www.sslumbr.com/lumber.html; http://rooftrussdesign.net/prefabricated-roof-trusses/; http://www.rockcustomdecks.com/rockbuiltlofts/lumber.html

Overwhelmed by LCA tools…

SimaPro

openLCA Framework

GaBi Product Sustainability Performance

eiolca.net

Argonne's GREET Model Driving Transportation Solutions

Quantis SUITE 2.0

umberto® know the flow.

Overwhelmed by LCA tools and datasets

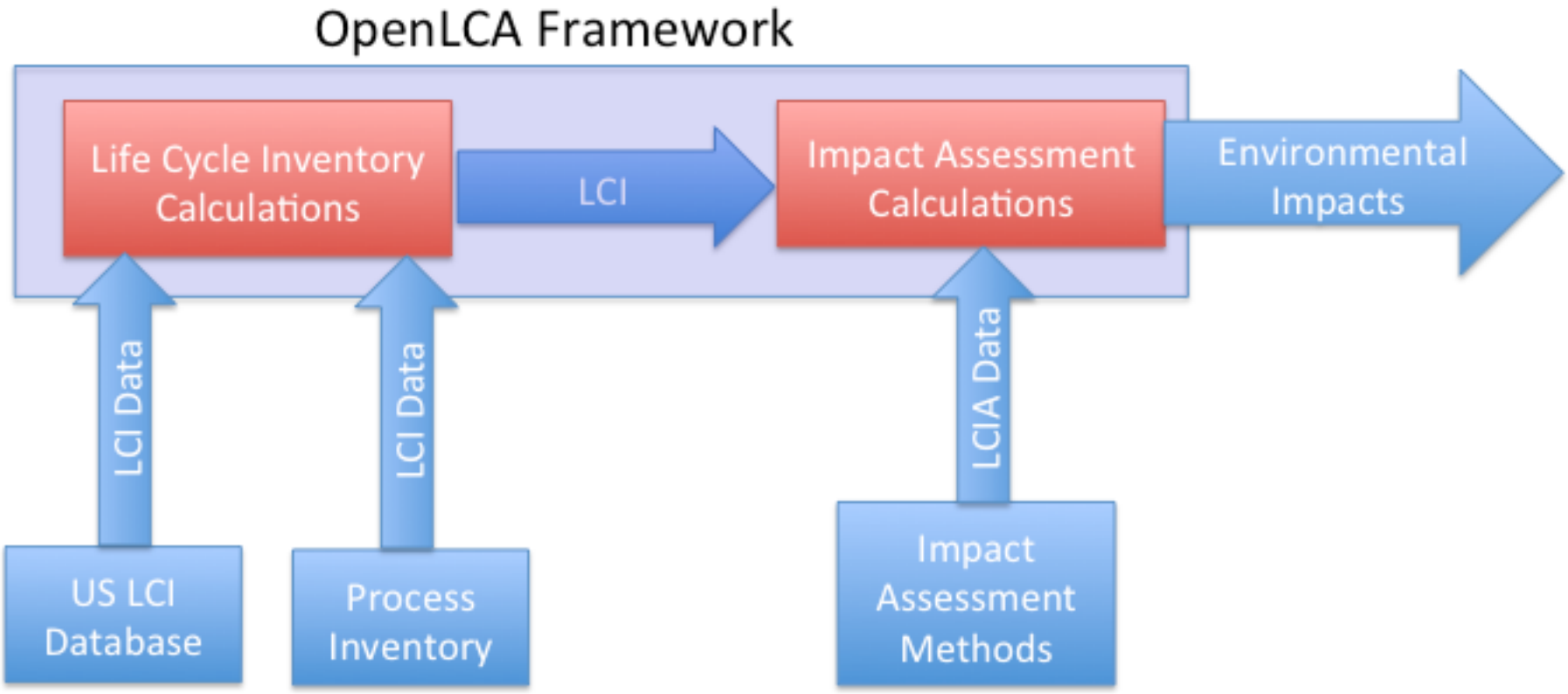
LCA Software vs. Data

Software

- SimaPro (PRe)
- GaBi (PE International)
- OpenLCA (GreenDelta)
- Umberto (ifu)
- Quantis Suite 2.0

Databases

- Ecoinvent (Ecoinvent Centre)
- GaBi (PE International)
- US LCI (NREL)
- ELCD (EC JRC)
- IO Databases (e.g. EIO-LCA)


OpenLCA Framework
Life Cycle Inventory Calculations
LCI
Impact Assessment Calculations
Environmental Impacts
LCI Data
LCI Data
LCIA Data
US LCI Database
Process Inventory
Impact Assessment Methods

Datasets

- Process-based LCA
  - EcoInvent
  - GaBi
  - LCA Digital Commons
  - US LCI
  - ELCD
- Input-Output LCA
  - US datasets: OpenIO, EIOLCA, and CEDA
  - Multiregional datasets: GTAP, EXIOPOL, EUREAPA, and Eora

LCA Software data issues

- Compatibility
- Transparency
- Availability
- Quality

GaBi
Product Sustainability
Performance

USDA United States Department of Agriculture
National Agricultural Library
LCA Digital Commons
Data and Community for Life Cycle Assessment

ecoinvent Centre
Swiss Centre for Life Cycle Inventories

Table 1: Supported LCA data formats in the openLCA converter, version 3

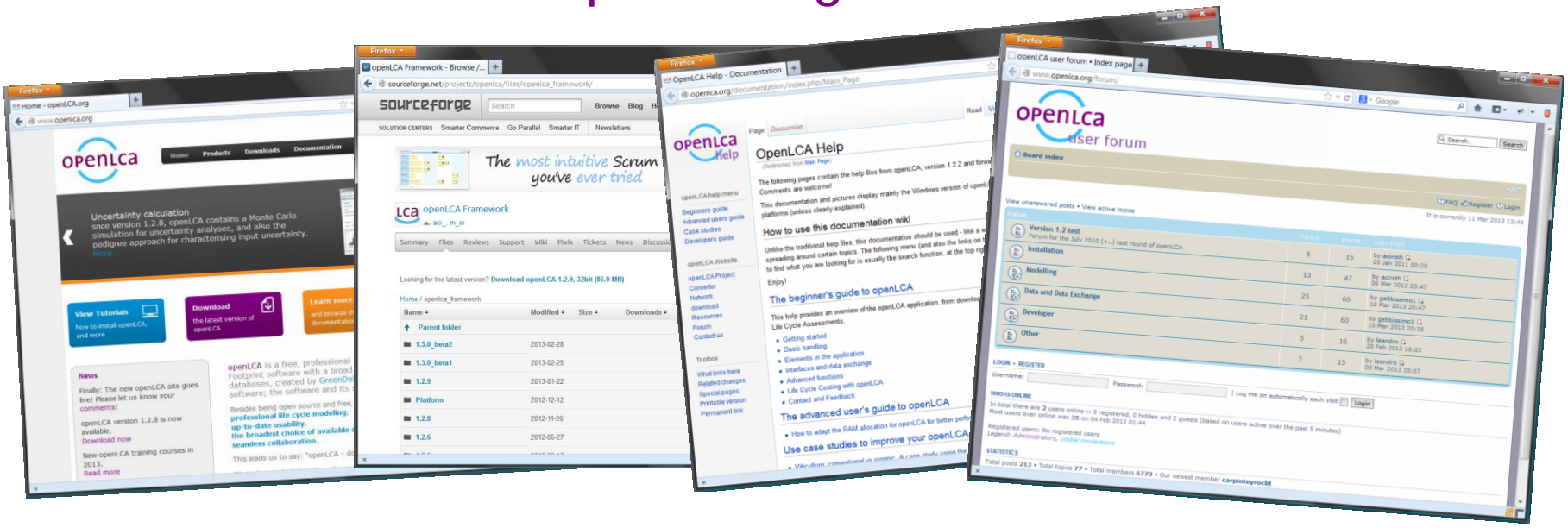
from/to	EcoSpold 1	EcoSpold 1 (SimaPro)	EcoSpold 2	ILCD 1.1	CSV (SimaPro)
EcoSpold 1		x	x	x	-
EcoSpold 1 (SimaPro)	x		x	x	-
EcoSpold 2	x	x		x	x
ILCD 1.1	x	x	x		-
CSV (SimaPro)	-	-	x	-	

openLCA Nexus (https://nexus.openlca.org/)

- Search, download data
- Direct purchase of data suitable for openLCA

openLCA resources

- Website: www.openlca.org
- Download site: www.sourceforge.net/projects/openlca
- Help and documentation: www.openlca.org/documentation
- User forum: www.openlca.org/forum



openLCA Demonstration

- Orientation
- Elements of openLCA
- Calculating results
- Interpreting results
- Transferring data

Five things to know about openLCA

1. A robust LCA tool
2. Free and open source
3. Enables higher levels of collaboration with increased model sharing
4. Compatible with most common commercially available datasets
5. Used by the USDA to upload LCA commons data

OpenLCA Training and Service Contracts

- Training from beginner to advanced
  - Online
  - Onsite short courses

- Service contracts ensuring seamless use of software
  - Installation help
  - General modeling questions
  - Database uploading
  - Program error resolution

Triangle Life Cycle Assessment

For more information:

- TriangleLCA.com
- info@triangleLCA.com

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919-800-7470

Acknowledgements

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Development of the OpenLCA Framework provided by GreenDelta, Michael Srocka and Andreas Ciroth.

USDA's LCA Commons

Peter Arbuckle and Ezra Kahn
USDA-ARS-National Agricultural Library
Knowledge Services Division

October 16, 2014

Peter Arbuckle

USDA National Agricultural Library

Peter Arbuckle works on the LCA Commons project at the United States Department of Agriculture's National Agricultural Library. The LCA Commons is an initiative to gather and disseminate life-cycle data that represent United States agriculture. Prior to joining the National Agricultural Library in 2012, he worked for the USDA National Institute of Food and Agriculture, incorporating life-cycle thinking into USDA extramural research grant programs for bioenergy and bioproducts. Before coming to government in 2009, he was a sustainability consultant working on energy and environment issues for federal and commercial clients including the U.S. Army, Air Force, and the Sysco Corporation. He has a Master's degree from the University of Michigan School of Natural Resources and Environment.

Dr. Ezra Kahn

USDA National Agricultural Library

Ezra Kahn received his Ph.D. in Mechanical Engineering from the University of Washington in 2012, with a focus on modeling uncertainty in Life Cycle Assessment. Since then has served as a Technical Information Specialist at the Knowledge Services Division of the United States Department of Agriculture's National Agricultural Library where his primary responsibility has been the USDA LCA Commons.

National Agricultural Library

Established in 1862…

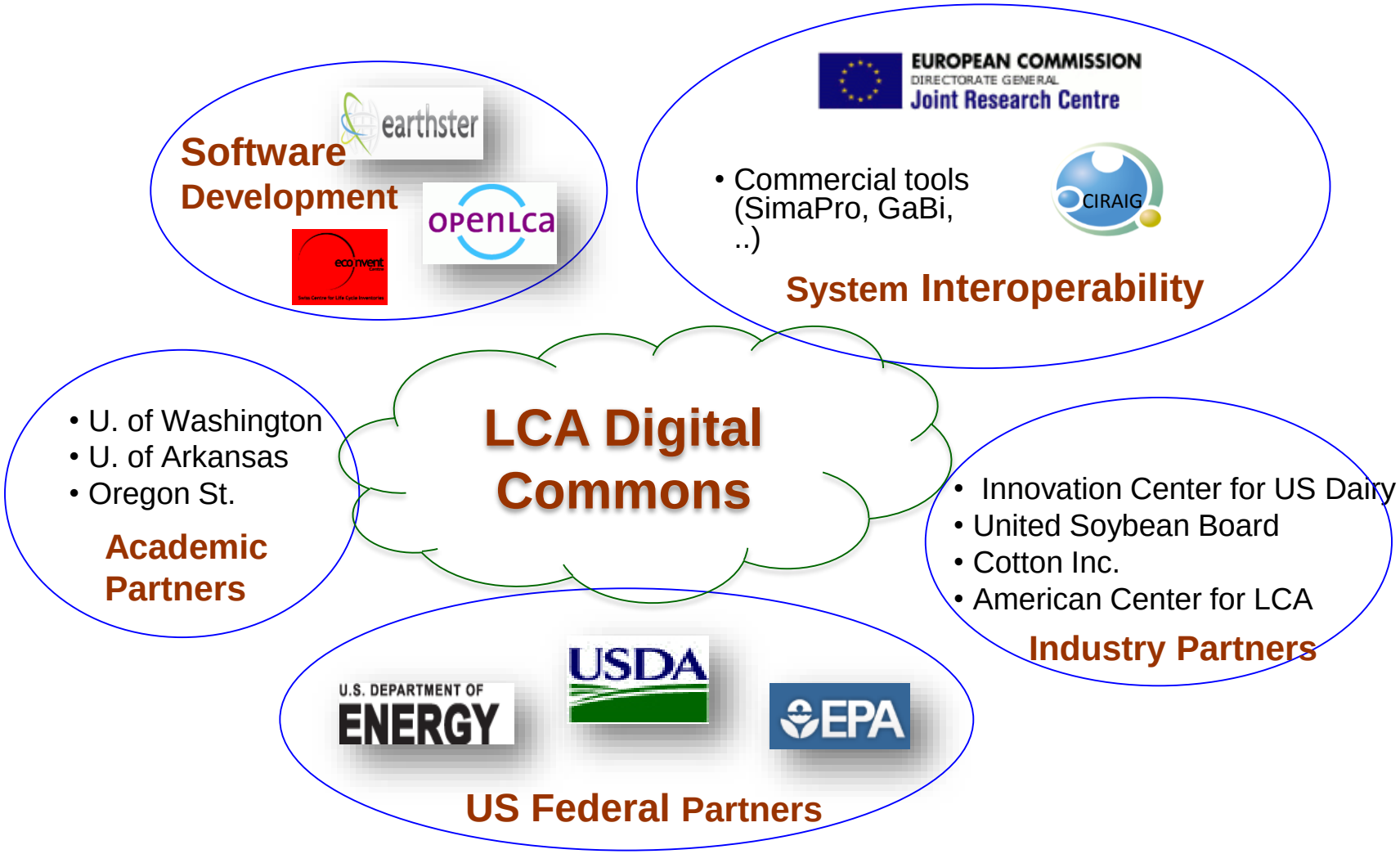
"to acquire and to diffuse among the people of the United States useful information on subjects connected with agriculture and rural development"

Knowledge Services Division:

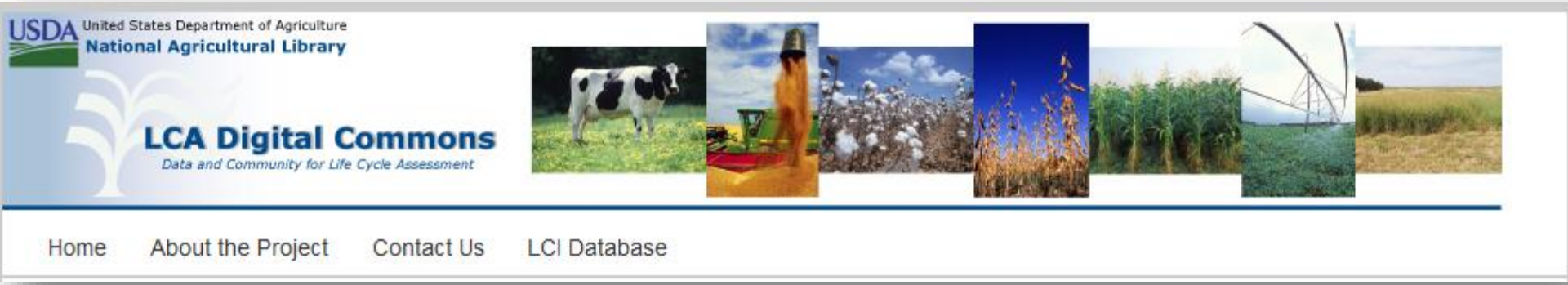
1) advance knowledge discovery in agricultural sciences through the acquisition, preservation, and description of scientific datasets

2) make datasets accessible through the development of data transformation and visualization tools

LCA Commons Concept: Agricultural Data and Data Exchange



LCA Commons: Purpose
Agricultural Data and Data Exchange



- Unit processes representing U.S. Agriculture
- Data interoperability
- Data publishing and discovery

http://www.lcacommons.gov/

Q&A

Peter Arbuckle
peter.arbuckle@ars.usda.gov
301-504-5047

USDA

Questions and Discussion

Moderated by Brent Bailey and Helene Cser

Thank You For Your Participation!

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