

# How to Use the US LCI Database

**Gregory A. Norris**

*Sylvatica / Harvard School of Public Health*

**Wayne Trusty**

*Athena Institute*

**Jamie Meil**

*Athena Institute*



# Project Origins

- North Americans are trying to take a life cycle perspective:
  - Product design / labeling by manufacturer
  - “Green” building design and rating
  - Policy (e.g., Integrated Solid Waste Management)
  - Purchasing (Labels, Env. Preferable Purchasing)
- Major active sectors include
  - Electronics, Automotive, Building/Construction
- → Tools in North America support life cycle design / selection of materials
  - NIST BEES
  - Athena



# Project Objective

**Transparent, Peer-reviewed,  
publicly-available LCI Data  
Relevant to North America**



# Project Phases

- I - Initiation
  - Develop research protocol / Establish research parameters
  - Prepare Phase II work program.
  
- II - Inventory
  - Collect, analyze and review data
  
- III - Ongoing
  - Disseminate data, maintain/expand database



# Project Status

- Phase I completed 2002
- Phase II – Database development – underway
- Project home: NREL
- Project management: Athena Institute
- Website / data host development: NREL
- Peer review management: NREL
- Consulting support to Athena: FAL, Sylvatica
- Data development
  - Breadth of funders, consultants, data topics



# Project Funding

## ■ Phase I

- US Department of Energy
- US General Services Administration
- US Naval Facilities Engineering Command

## ■ Phase II

- US Department of Energy
- US General Services Administration
- US Naval Facilities Engineering Command
- US Environmental Protection Agency
- Vehicle Recycling Partnership (US Car Project)
- US Forest Service



# Key Database Criteria

- Consistent protocol meeting ISO guidelines and standards
  - transparent
  - representative
  - peer reviewed
- Uniform treatment of all materials
- Regional data development as necessary to reflect variations within and across sectors
- Fully accessible in format(s) to maximize use



# Unit Process Emphasis

- ISO Definition of “Unit Process”
  - The level at which data are gathered
- US LCI Database Unit Processes:
  - Representative unit process → weighted mean of data for sample of processes
- Transparency
  - Together with public availability
  - “World” provides secondary, ongoing peer review
- Modularity within database
- Modularity at point of use





# Data in Development

- Fuels (including combustion)
- Electricity
- Transport
- Bio-materials
- Wood products
- Plastics
- Aluminum casting
- Steel



# Additional near-term data candidates

- Cement
- Brick
- Minerals extraction
- Non-ferrous metals
- Electronics
- Solid waste management processes



# Accessing the Database

- <http://www.nrel.gov/lci/>
- Etc.



# Data/documentation format

- Maximize use:
  - Automated import into major LCA software
- Simple as possible for data providers
- Interconnectivity with other LCI databases would be a plus



# Data documentation: ISO Technical Specification 14048

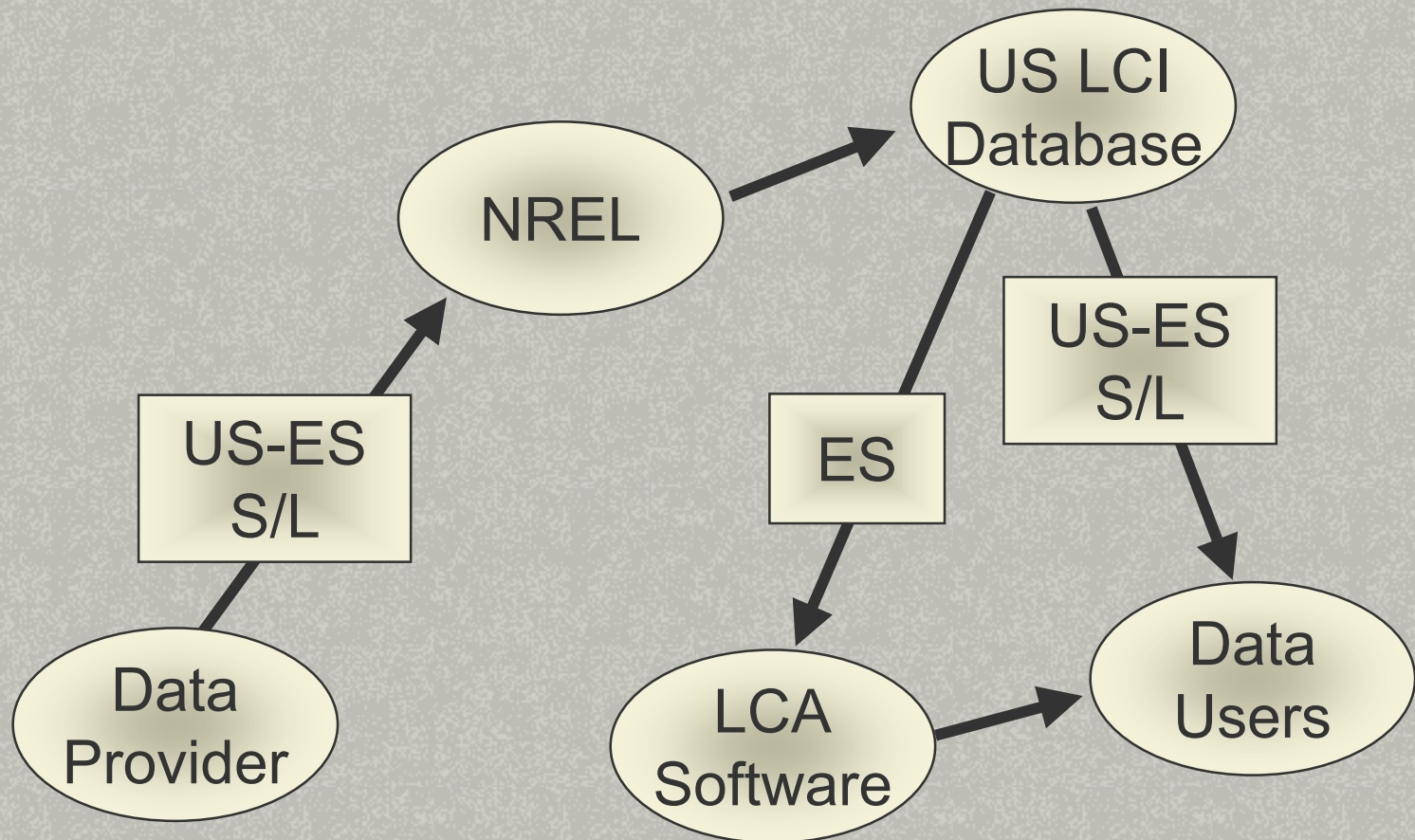
- Comprehensive taxonomy of documentation elements
- Exhaustive and theoretical
- Left aspects flexible, so that “ISO 14048-compliant” does not ensure effective exchange among users



# EcoSpold Format

- Data and documentation format developed for major Swiss project to update, harmonize, inter-link LCI databases across institutes
- Built on ISO 14048, SPOLD, SPINE
- Operational
- EcoSpold import being implemented by all major LCA tool developers
  - SimaPro, GaBi, TEAM, Umberto
- XML
- Spreadsheet format version (Excel)

# US LCI Project Approach: Streamlined US-ES Spreadsheet workbook template



Microsoft Excel - Streamlined_Spreadsheet1					
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F9					
	A	B	C	D	E
1	Field name	Entry	(tan shading below indicates that these cells will be linked to, by the yellow cells on the Flow info sheet.)		
2	Name	Rapeseed Production, USA domestic production, on the field			
3	Infrastructure process ?	yes			
4	Unit	kg	kg		
5	Amount				
6	Process Type	Cradle-to-gate system ("non-terminated system")			
7	Energy value type	Gross values (meaning "higher heating values", HHV)			
8	Preparer	Olivier Muller			
9	IncludedProcesses	<p>Farming of rapeseed on 1 planted acre for 1 year.</p> <p>The module includes:</p> <ul style="list-style-type: none"> <li>- seed production,</li> <li>- tillage,</li> <li>- fertilizer and pesticide application,</li> <li>- crop residue management,</li> <li>- irrigation,</li> <li>- harvesting.</li> </ul> <p>Harvested acres are 97% of the planted acre (1998-2000 US average).</p> <p>The impacts of producing 1 kg of seed are assumed equal to those of producing 1kg of grain.</p> <p>For Water, only consumptive use is taken into account (i.e. 60.7% of the total water consumption).</p>			
10	GeneralComment				
11	InfrastructureIncluded	yes			
12	Formula (optional)				
13	Data Years	1990-2000			
14	Geography Text	<p>USA and European average practices</p> <p>USA and European average practices (tillage, fertilizer and pesticide application, crop residue management, irrigation),</p>			
15	Technology Text				
16	Representativeness: Supply %				
17	Representativeness: Production %				
18	SamplingProcedure				
19	Extrapolations				
20	UncertaintyAdjustments				
21	Person	Olivier Muller			
22	DataPublishedIn	Data as such not published (default)			
23	References to Sources	1			
24	Page Numbers				
25					



1	A	C	D	E	F	G	H			
2	Explanations	Category (blue shading indicates no input required)	SubCategory	InfrastructureProcess	Units	Repeated Production, USA domestic production, on the field yes kg	Flow Comments (optional for each process)			
5	Inputs from Technosphere	resource	biotic	-	kg	2.55E-01				
6				-	liter	3.06E+01				
7				-	MJ elec	0.00E+00				
8				-	liter	0.00E+00				
9				-	kg	0.00E+00				
10				-	MJ	0.00E+00				
11				-	MJ	0.00E+00				
12				-	kg	7.28E+01				
13				-	kg	3.24E+01				
14				-	kg	2.02E+01				
15				-	kg.km	1.23E+05				
16				-	liter	2.97E+00				
17				Inputs from Nature	resource	in air		m2.yr	7.01E+02	
18					resource	in air		m2.yr	2.59E+03	
19								m2.yr	7.54E+02	
20								liter	0.00E+00	
21					liter	0.00E+00				
22	Outputs to Nature				liter	0.00E+00				
23		air			g	4.38E+03				
24		air			g	5.40E-01				
25		air			g	1.40E+00				
26		air			g	-1.09E+06				
27		air			g	0.00E+00				
28		air			g	4.05E+01				
29		waste management			g	1.53E+02				
30		air			g	1.27E-01				
31		air			g	0.00E+00				
32		air			g	6.18E-01				
33		air			g	1.18E+04				
34		air			g	3.54E+03				
35	air			g	0.00E+00					
36	air			g	4.67E+01					
37	water			g	2.32E-02					
38	water			g	6.00E-02					
39	water			g	1.74E+00					
40	water			g	5.43E-03					
41	water			g	2.65E-02					
42	water			g	8.88E+03					
43	water			g	1.91E+02					
44	water			g	2.81E+06					
45	water			g	1.21E+00					
46	Product / co-product outputs	waste management			kg	5.95E+02				
47					kg	2.98E+03				
48										

Microsoft Excel - Streamlined\_Spreadsheet1

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D25 Spelling =

	A	B	C	D	
1	Field name	(tan shading below indicates that these cells will be linked to, by the yellow "Reference to Sources" cell on the Process Info sheet.)			
2	Number	1	2	3	
3	Source Type	Separate publication	Separate publication	Separate publication	
4	First Author	USDA/National Agricultural Statistics Service	USDA/ERS	Conservation Technology Information Center, Purdue University	
5	Additional Authors				
6	Year	1998-2000	1998-2000	2002	
7	Title	Agricultural Statistics Database	Crop production practices data	Crop Residue Management	
8	Page Numbers				
9	Name of Editors				
10	Title of Anthology				
11	Place of Publication	<a href="http://www.nass.usda.gov/B1/pedb/">www.nass.usda.gov/B1/pedb/</a>	<a href="http://ers.usda.gov/Data/cropproductionpractices/ShowTables.asp">http://ers.usda.gov/Data/cropproductionpractices/ShowTables.asp</a>	<a href="http://www.ctic.purdue.edu/CTIC/CRM.html">www.ctic.purdue.edu/CTIC/CRM.html</a>	
12	Publisher				
13	Journal				
14	Volume No				
15	Issue No				
16	Copyright	no	no	no	
17	Access Restrictions	Public	Public	Public	
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1	<b>Field name</b>	<i>(tan shading below indicates that these cells will be linked to, by the yellow "Person" cell on the Process Info sheet.)</i>		
2	<b>Name</b>	Olivier Muller		
3	<b>Address</b>	PricewaterhouseCoopers 1301 K Street NW, Suite 800West, Washington DC 20005-3333		
4	<b>Telephone</b>	(202) 404 1837		
5	<b>Email</b>	olivier.muller@us.pwc.com, olivier.muller@fr.pwc.com		
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# Summary

- Transparent, peer-reviewed, publicly-available data relevant to North America
- Data providers submit to NREL using US workbook: streamlined EcoSpold format
- Users download in either:
  - EcoSpold format
    - automated import to LCA software
  - US Streamlined EcoSpold spreadsheet
- Documentation PDFs
- User's Guide