

How to Use the US LCI Database

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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

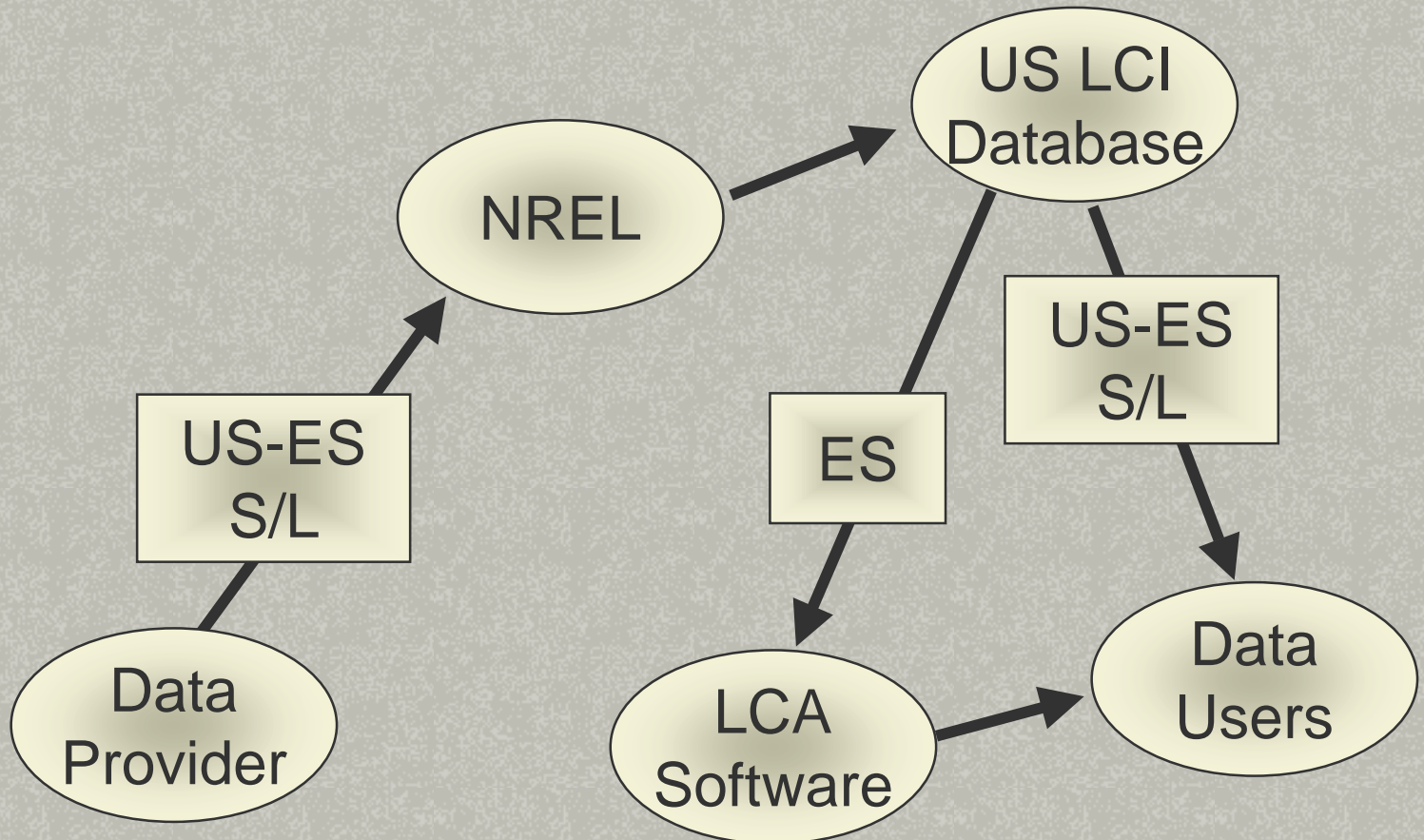
- Comprehensive taxonomy of documentation elements
- Exhaustive and theoretical
- Left aspects flexible, so that “ISO 14048-compliant” does not ensure effective exchange among users



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_Sheet1				
File Edit View Insert Format Tools Data Window Help Acrobat				
F9				
	A	B	C	D
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"> - seed production, - tillage, - fertilizer and pesticide application, - crop residue management, - irrigation, - harvesting. <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	USA and European average practices		
15	Technology Text	USA and European average practices (tillage, fertilizer and pesticide application, crop residue management, irrigation),		
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	Revised 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	3.08E+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							-	m2.yr	2.59E+03	
19							-	m2.yr	7.54E+02	
20							-	liter	0.00E+00	
21	-	liter	0.00E+00							
22	-	liter	0.00E+00							
23	Outputs to Nature	air		-	g	4.38E+03				
24				-	g	5.40E-01				
25				-	g	1.40E+00				
26				-	g	-1.09E+06				
27				-	g	0.00E+00				
28				-	g	4.05E+01				
29				waste management			g	1.53E+02		
30				-	g	1.27E-01				
31				-	g	0.00E+00				
32				-	g	6.18E-01				
33				-	g	1.18E+04				
34				-	g	3.54E+03				
35				-	g	0.00E+00				
36	-	g	4.67E+01							
37	-	g	2.32E-02							
38	-	g	6.00E-02							
39	-	g	1.74E+00							
40	-	g	5.43E-03							
41	-	g	2.65E-02							
42	-	g	8.88E+03							
43	-	g	1.91E+02							
44	-	g	2.81E+06							
45	-	g	1.21E+00							
46	Product / co-product outputs	waste management		-	kg	5.95E+02				
47				-	kg	2.98E+03				

	A	B	C	D
D25	Spelling			
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			Inventory of Greenhouse Sinks, 1990-2000
9	Name of Editors			
10	Title of Anthology			
11	Place of Publication	www.nass.usda.gov/B1/pedb/	http://ers.usda.gov/Data/cropproductionpractices/ShowTables.asp	www.ctic.purdue.edu/CTIC/CRM.html
12	Publisher			yosemite.epa.gov/oar/
13	Journal			t/ResourceCenterPublic.html
14	Volume No			
15	Issue No			
16	Copyright	no	no	no
17	Access Restrictions	Public	Public	Public
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1	Field name	<i>(tan shading below indicates that these cells will be linked to, by the yellow "Person" cell on the Process Info sheet.)</i>		
2	Name	Olivier Muller		
3	Address	PricewaterhouseCoopers 1301 K Street NW, Suite 800West, Washington DC 20005-3333		
4	Telephone	(202) 404 1837		
5	Email	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