LCA Commons Submission Guidelines

December 10, 2015

USDA-NATIONAL AGRICULTURAL LIBRARY

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Introduction

Thank you for your interest in submitting your data to the LCA Commons' LCI database. Data submitted to the LCI database must adhere to strict data documentation, formatting, and nomenclature requirements to ensure lossless loading of data and accurate representation in the database.

The LCI database application gives users access to your data in all major LCA data formats, and permits connectivity between your data and other LCA data resources. If your main interests are data archiving and discovery, and the following requirements are too resource intensive, consider submitting your data to the LCA Commons collection in the Ag Data Commons. That collection is an online catalogue of research data and resources, using the latest in search and discovery technologies.

The guidance and requirements in this document are intended do the following:
1. Help the data provider prepare sufficient metadata to accurately describe unit processes
2. Help users identify flow provenance, and connect flows to and from the unit process and their providing/receiving LCA elements
    a. These LCA elements may be other unit processes or impact methods

Thank you again for your interest in contributing your data to the LCA Commons. Prior to submitting data, please review the Data Use Disclaimer Agreement, the Data Contributor's Content License Agreement, and the Placing Your Data in the Public Domain sections of this document. If you have any questions, concerns, or recommendations, please contact us through our online web form.

Placing Your Data in the Public Domain

To support increased access to and sharing of scholarly resources, as well as to promote novel and innovative uses of LCA data, USDA-NAL is requiring that all datasets submitted to the LCA Commons be placed in the public domain under the terms of the Creative Commons Zero, Public Domain Dedication License (CC0 1.0 Universal (CC0 1.0)). By placing your datasets in the public domain, you are, according to the CC0 1.0 license, removing "all of [your] rights to the work worldwide under copyright law, including all related and neighboring rights, to the extent allowed by law."

Please review the legal code of the CC0 1.0 Universal license prior to submitting your datasets, as well as the Data Use Disclaimer Agreement and the Data Contributor's Content License Agreement.

Dataset Citations

It should be made clear that although the *legal* requirement to cite datasets is removed under the terms of the CC0 1.0 Universal license, individuals who use these datasets are not absolved from institutional and scholarly norms requiring dataset citation. Individuals who use LCA Commons datasets are *strongly encouraged* to cite these datasets to comply with institutional and scholarly norms, as well as to acknowledge and credit the work of data creators.

Data Requirements

The USDA LCA Commons will accept unit processes related to agricultural production. Multi-functional unit process should include all co-products, and may also include allocation factors or displaced products (according to the discretion of the submitter). Unit processes may be submitted as single gate-to-gate processes, or related processes grouped as product or intermediate product systems.

- **Data Reliability and Reproducibility:** Flow data within the unit process(s) must be based on measurements using a specified and standardized measurement method, OR estimated using methods and data described in specified archival or other publically available sources. Furthermore, data should represent a novel contribution to the LCA community and be non-proprietary. Unit processes that represent proxy upstream processes should not be submitted.

- **Nomenclature:** Upstream exchanges that are not represented by a unit process dataset (which meets the above requirements and is being submitted), AND are not represented in an external database or software program should be labeled "CUTOFF" in accordance with the guidelines described in detail below. Proxy unit processes belonging to a commercial/external database or software program should not be submitted. They should be represented as a technosphere flow using exactly the same name, location code, and units that are used in the external database or software program and be categorized by provenance as described below.

Formatting Data for the LCA Commons

The LCA Commons is structured upon the openLCA 1.4 database schema. Unit process datasets submitted to the LCA Commons should be edited in openLCA to ensure all metadata elements persist throughout submission[1]. Once you edit your unit processes in openLCA, export and submit them in the openLCA ILCD format. openLCA can be downloaded free of charge at openLCA.org.

EcoSpold (v1) and ILCD submissions generated by SimaPro, GaBi, ecoEditor, the ILCD editor, or any other editor may not support required metadata fields and datasets may be returned to you. Please import and edit these datasets in openLCA and export files in the openLCA ILCD format for submission. Inspecting your data in openLCA prior to submission is an opportunity to preview how your data will appear in the LCA Commons.

Alternatively, we have developed an LCA Commons data formatting template, linked to below. You may populate it with your data and metadata for unit processes, and submit it through our submission application. We have developed a plug-in that allows us to import data from the spreadsheet into openLCA. The template and submission instructions can be found here:

http://data.nal.usda.gov/dataset/us-federal-lca-commons-life-cycle-inventory-unit-process-template

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[1] This requirement exists to enable data transfer and does not imply an official endorsement of openLCA as a life cycle modeling tool

Nomenclature

▪ **Original Technosphere flows and Unit Processes:** Name all *original* technosphere flows (product and intermediate flows) that you submit as unit processes to the LCA Commons, according to the ILCD naming convention (see Metadata Guidelines below for element definitions):

> *base name; treatment, routes, standards; production type, location type; quantitative flow properties*

> When *original* technosphere flows are specified in submitted datasets, but the associated "upstream" datasets are not simultaneously submitted, the flow name must begin with the word "CUTOFF" and otherwise follow the ILCD structure, for example:

> *CUTOFF* corn grain; average tillage practice mix; at farm; 15% moisture

▪ **External Database Technosphere Flows and Unit Processes:** When technosphere flows belong to an external software/database, DO NOT submit them as unit processes. Submit them as technosphere flows that use EXACTLY the same *name*, *location code,* and *units* that are used in the external software/database and categorize them according to their provenance. This assists users and LCA Commons staff and/or users in mapping flows in your unit process to those in the external dataset. See "Categories" section below for more detail.

▪ **Modified External Database Technosphere Flows and Unit Processes:** If you have modified or customized a unit process from an external database, do not submit the unit process. Submit the flow labeled as "CUTOFF" and named like the original flow with an indication that it is a modified version of the original. For example, a modified ecoinvent flow should look like this: CUTOFF carbon dioxide liquid, at plant/RER U with US electricity.

▪ **Elementary Flows:** Elementary flow names must correspond directly to the impact method used in the Life Cycle Impact Analysis (LCIA). Again, this assures users that your dataset can connect your elementary flows to the associated LCIA method. The submission form asks you to select the impact method(s) corresponding to your elementary flows from the list included in openLCA. If an LCIA method other than those listed was used, please select "other", and enter the name of the method in the submission application's comment field. If data being submitted have NOT been used in a Life Cycle Impact Assessment, please use either ecoinvent or ILCD flow names.

Units

openLCA includes a set of reference unit groups and units. To ensure data are properly imported into the LCA Commons, the units included in the openLCA reference unit groups must be used. If the openLCA reference units are not appropriate (or when they do not match corresponding flows in external databases), contact the LCA Commons staff to add a unit to the list.

Categories (Figure. 1)

▪ **Original Technosphere Flows and Unit Processes:** The LCA Commons uses ISIC rev. 4 (International Standard Industrial Classification of All Economic Activities) codes to categorize technosphere flows and unit processes in openLCA, and openLCA reference data categories for flows to and from the environment. To ensure consistent categorization and assist in data management and discovery, use this categorization scheme for *original* flows.

When using openLCA, categorize all *original* technosphere flows using the ISIC rev 4. codes in the following manner:

- Level 1 category: the class name corresponding with the top level ISIC code.
  - Example: *Agriculture, forestry and fishing*

- Level 2 category: the 4-digit code and name, prefixed with the term "ISIC".
  - Example: *ISIC 0112: Growing of rice*

▪ **External Database Technosphere Flows and Unit Processes:** Do not submit external database unit processes; only their underlying flow. Categorize external technosphere flows according to the provenance of the flow. For example, if the flow is from ecoinvent, create an ecoinvent folder that also indicates the ecoinvent database version number i.e. "ecoinvent 2.2."

▪ **Modified External Database Technosphere Flows and Unit Processes:** If you have modified or customized a unit process from an external database, do not submit the unit process. Submit the flow labeled as described above and categorize it according to ISIC rev. 4. For example, a modified ecoinvent flow CUTOFF_carbon dioxide liquid, at plant/RER U with US electricity should be categorized: ISIC rev.4: 2011 Manufacture of basic chemicals.

▪ **Elementary Flows:** Categorize all *original* flows to and from the environment using the EcoSpold (v1) categorization scheme.
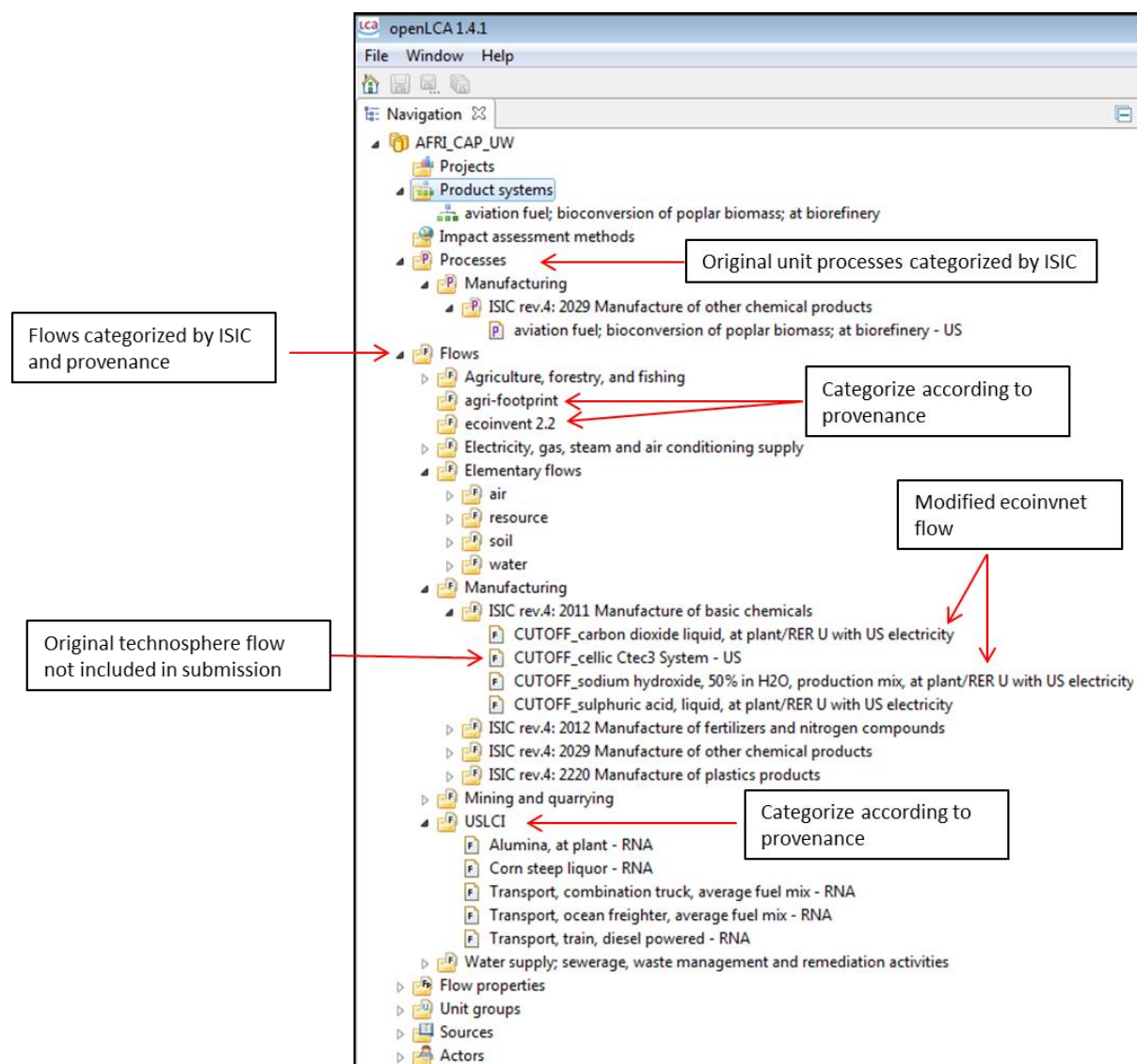
Figure 1. Categorizing original, external database, and modified external database flows

Dataset Submission Instructions

Submit data to the LCA Commons as either an openLCA ILCD formatted export or the LCA Commons excel template format. The instructions for exporting ILCD datasets from openLCA framework 1.4 can be found in the "Comprehensive openLCA User Manual (March 2015)" http://www.openlca.org/manuals. Alternatively, you can find the LCA Commons excel formatting tool along with instructions on the Ag Data Commons (http://data.nal.usda.gov/dataset/us-federal-lca-commons-life-cycle-inventory-unit-process-template). Once you have exported data from openLCA, submit through the LCA Commons Submission Portal as follows:

1) **After confirming that your file has been successfully exported from openLCA, go to the LCA Commons LCI Database.**

2) **Click on the "Submit Data" page.**

3) **In the "Upload Data" field of the "Submit a Dataset" page, attach the ZIP file containing the ILCD-formatted datasets exported from openLCA (see next page for screenshot).**

★ **NOTE**: The ZIP file MUST be directly exported from openLCA to be successfully imported into the LCA Commons Submission Portal. <u>Do not manually create a ZIP file containing multiple datasets</u> – this will increase the likelihood of datasets being imported without complete information, which can result in errors.

Submit a Dataset

Please provide information about the dataset(s) you are submitting to the LCA Commons using the form below. Select the "Complete" button if you are ready to submit your data to the LCA Commons editorial staff. Select the "Cancel" button if you wish to remove your data and start over. Please review the LCA Commons Submission Guidelines prior to submitting this form. For assistance, please contact the LCA Commons staff.

Descriptive Title ❓	market pig; deep pit manure mgmt; at farm_sandefur_06242015	
Life Cycle Impact Methods ❓	Other or None. / selected LCI results, additional / selected LCI results / ecosystem damage potential	
Mass Balance Estimate ❓	● Yes ○ No	

Update Data	Upload File...	Browse
Supporting documentation (optional) ❓	Upload File...	Browse
Recommended reviewers and additional comments ❓		
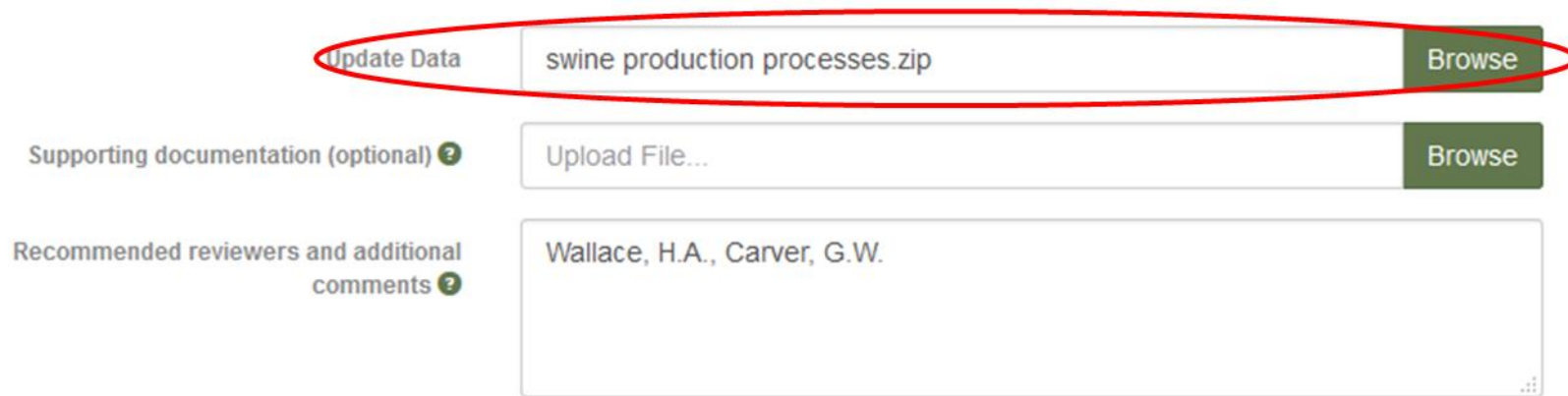
Quality Indicators	Reliability & Reproducbility ❓	Flow Data Completeness ❓	Technological Coverage ❓	Geographical Coverage ❓	Temporal Coverage ❓	Precision ❓	Uncertainty ❓
	A	B	A	A	B	B	B

4) Once you've selected the ZIP file you want to attach, the file name will appear in the "Upload Data" field. Confirm that the correct file has been attached.

5) Fill out the rest of the form and submit your datasets.

Metadata Mappings (Process data sets)

Below is a table showing the correspondences between Process dataset fields in openLCA – USDA LCI (1.4), ILCD 1.1, EcoSpold v1, and ISO 14048:2002.

openLCA – USDA LCI Element Name	ILCD Element/Attribute Name	ISO 14048:2002 Field Name	EcoSpold v1 Element/Attribute Name
Name	Name	Name	Name (referenceFunction)
Base name	Base name		
Treatment, standards, routes	Treatment, standards, routes		
Mix and location types	Mix and location types		
Quantitative product or process properties	Quantitative product or process properties		
Category	Classification	Class	
		Reference to nomenclature (Class)	
	Top category	Name (Class)	category
	Subcategory		subCategory
Version	Data set version	Version number	
Last change			timestamp
Description	General comment on data set	Process description	generalComment
Quantitative Reference	Quantitative reference	Quantitative reference	name (Flow data)
	Type of quantitative reference	Type	
	Reference flow(s)	Name	
	Functional unit, Production period, or Other parameter	Unit	
Start date (mm/dd/yyyy)	Reference year	Start date	startDate
End date (mm/dd/yyyy)	Data set valid until:	End date	endDate
Description (Time)	Time representativeness description	Time span description	text (Timeperiod)
Location	Location	Geographical location	location

openLCA – USDA LCI Element Name	ILCD Element/Attribute Name	ISO 14048:2002 Field Name	EcoSpold v1 Element/Attribute Name
KML			
Description (Geography)	Geographical representativeness description	Area description	text (Geography)
Description (Technology)	Technology description including background system	Technical content and functionality, Operating conditions	text (Technology)
Intended Application	Intended applications	Intended application	generalComment (Reference Function)
Data generator (Actor data set)	Data set generator / modeler (Contact data set)	Data generator	person (Data generator and publication)
Data set owner (Actor data set)	Owner of data set (Contact data set)		person (Data generator and publication)
Data documentor (Actor data set)	Data set documentor (Contact data set)	Data documentor	person (Data generator and publication - Data entry by)
Project	Project		
Publication (Source data set)	Unchanged republication of (Source data set)	Publication	Source
			text (Source)
Access and Use Restrictions	Access and use restrictions	Access restrictions	accessRestrictedTo
Creation Date	Timestamp (last saved)	Date completed	timestamp
Copyright (Y/N)	Copyright?	Copyright	copyright
LCI Method	LCI method and allocation		allocationMethod (Flow dataset)
Process type	Type of data set	parts of: Modelling principles, Modelling choices, including criteria for excluding elementary flows	type (Dataset Information)

openLCA – USDA LCI Element Name	ILCD Element/Attribute Name	ISO 14048:2002 Field Name	EcoSpold v1 Element/Attribute Name
Data completeness	Data cut-off and completeness principles	parts of: Modelling principles, Modelling choices, including criteria for excluding elementary flows	generalComment (Flow data set)
Data treatment	Data treatment and extrapolations principles	(Adaptation principles), Data treatment	generalComment (Flow data set)
Treatment of missing data to or from the environment			
Treatment of missing intermediate flow data			
Mass balance			
Sampling procedure	Sampling procedure	Sampling procedure	samplingProcedure
Data collection period	Data collection period	Collection date	text (Timeperiod)
Reviewer	Reviewer name and institution	Validator	proofReadingValidator
Other evaluation	Review details	(Procedure), (Result)	otherDetails (Validation)
Sources	Data sources used for this data set (Source data set)	Information sources	Source
Inputs / Outputs	Inputs and Outputs		Exchanges - Input / Output Group
Flow (Flow Data set)	Flow (Flow data set)		Name
Category	Classification		Category
			Subcategory
Flow property	Flow property		
Unit	Reference unit (Flow property data set)		Unit
Amount	Mean amount & Resulting amount		

openLCA – USDA LCI Element Name	ILCD Element/Attribute Name	ISO 14048:2002 Field Name	EcoSpold v1 Element/Attribute Name
Uncertainty	Uncertainty distribution type		Uncertainty type
Default provider			
Pedigree uncertainty			
Parameters	Variable / Parameter	Parameter	
Global/Input/Output Parameters			
Name	Name of variable	Name of variable	
Value	Mean value	Value of variable	
Formula	Formula	Formulae	
Uncertainty	Uncertainty distribution type		
Description	Comments, units, defaults		

Metadata Guidelines

The following guidelines describe how to create metadata for LCA Commons datasets. The listed metadata elements are available in openLCA 1.4, which is the database management system the LCA Commons uses to store its data. The LCA Commons uses openLCA metadata elements to describe LCI data, and ILCD (International Reference Life Cycle Data System) definitions to describe these elements[2]. USDA subject matter experts have also created several custom elements and definitions for the LCA Commons metadata structure.

The LCA Commons metadata elements are divided into the following categories:

- General Information
- Administrative Information
- Modeling and Validation
- Parameters
- Flows (Exchanges)
- Actors
- Sources

The LCA Commons metadata elements are listed in the tables below, along with their definitions, element examples, whether they are required or optional, and notes for further guidance. Please review the documentation below before creating metadata for your datasets.

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[2] This product includes portions of the ILCD Format and/or the ILCD Editor, created by the European Commission's JRC-IES, European Platform on Life Cycle Assessment together with the KIT, IAI. Copyright (C) 2011, European Commission. All Rights Reserved.

Controlled Vocabulary for Specific Fields:

LCA Commons is using an external metadata schema to help users discover data. We are leveraging the National Agricultural Library Thesaurus (NALT) to define controlled keywords for the openLCA metadata fields "Geographic representativeness comment", "Technology description", and "Intended application." Use of this thesaurus will better help users find the data they are looking for. Please pay close attention to the following fields as you document your model, and use the appropriate keywords. Again, this will make it easier for users to find and re-use your data.

Geographic representativeness comment:

Indicate if your model is aggregated to the national, regional, state, county, hydrologic unit, crop management zone or any other geographic unit. If your model is aggregated to the national or state level please use ISO 3166-2 to specify geographic location. If you are modeling at the county, watershed, or regional level, please document the appropriate classification system, code, and name. For example, Autauqa county, Alabama would be "AL,01,001,Autauga County,H1" https://www.census.gov/geo/reference/codes/cou.html. At the watershed level, use Hydrological Unit Codes (HUC). Please document any other type of regional classification system. If your model is not location specific, describe it as "Unspecified."

Technology description:

Indicate the general scope of the model (e.g. cradle-to-gate) and a list of included processes (e.g. residue burning; soil preparation; planting or sowing; irrigation; application, storage, and transport of fertilizers, manures, liming materials, secondary materials, and pesticides; and harvest)

Intended application:

Describe the Goal and Scope of your study as described by the ILCD Handbook: General guide for Life Cycle Assessment-Detailed guidance,[3] chapter 5-Goal definition – identifying purpose and target audience. Pay close attention to Provision: 5.3 Classifying the decision context. Specifically identify if your study constitutes "micro-level decision support," "meso/macro-level decision support," or is an "Accounting" level study according to Provision 5.3 and use the general descriptors for the context for which the model was built e.g. carbon footprint, Environmental Product Declaration (EPD), policy development, policy information, generic unit process data, etc.

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[3] European Commission - Joint Research Centre - Institute for Environment and Sustainability: International Reference Life Cycle Data System (ILCD) Handbook - General guide for Life Cycle Assessment - Detailed guidance. First edition March 2010. EUR 24708 EN. Luxembourg. Publications Office of the European Union; 2010

General Information

Element	Required/ Optional	Repeatable?	Datatype	Definition	Example	Notes
Name	Required	Not repeatable	Free text (String)	General descriptive name of the process and/or its main good(s) or service(s) and/or its level of processing.	corn grain; average tillage practice mix; at farm; 15% moisture	Include the following four components in your model's **Name** field. Separate components with semi-colons. - Base name - Treatment/standards/routes - Mix type and location type - Quantitative product or process properties
Base name	Required	Not repeatable	Free text (String)	General descriptive name of the product produced.	corn grain;	

Treatment, standards, routes	Required	Not repeatable	Free text (String)	Qualitative information about the product produced, specifically: treatment received, standard fulfilled, product quality, use information, production route name, educt name, primary / secondary etc.	average tillage practice mix;	Separate each treatment, standard, or route by commas.
Mix and location types	Required	Not repeatable	Free text (String)	Specifying information on: - Whether the process is a production mix or consumption mix, if applicable, AND - A description of the location type of availability	production mix, at farm	Separate mix and location types by commas. Include only the location type of availability if the process is not a mix.

Quantitative product or process properties	Required, if applicable	Not repeatable	Free text (String)	Further specifying information on the good, service or process in technical term(s): qualifying constituent(s)- content and / or energy- content per unit, etc., as appropriate. Separated by commas.	15% moisture	
Version ("Process" data set)	Do not enter	Not repeatable	Version (XX.XX.XXX)	The data set version number. The first two digits refer to major updates, the second two digits refer to minor revisions and error corrections, and the final three digits are used for automatic and internal version counting during data set development. (ILCD)	01.00.000	Unless discussed with submitters in advance, the data set version number will be generated automatically by openLCA.
Last change	optional	Not repeatable	Timestamp	The date and time when the dataset was last saved. (LCA Commons)	2014-01-22 13:41:44.0	Encoded in ISO 8601 date/time format. If you are creating data in openLCA, this field will be automaticallygenerated.

Category (1st level)	Required	Not repeatable	Enumeration (ISIC Code)	The class name corresponding with the top level ISIC code as described in the 7-digit code and name as described in the _International Standard Industrial Classification of All Economic Activities, rev. 4._	Agriculture, forestry and fishing	Record the class name corresponding to the top level ISIC code (the first name in the hierarchy, noted with a single letter) in the following format: "Class name"
Category (2nd level)	Required	Not repeatable	Enumeration (ISIC Code)	The 4-digit code and name as described in the _International Standard Industrial Classification of All Economic Activities, rev. 4,_ prefixed with the term: "ISIC ."	ISIC rev 4: 0112 Growing of rice	Record the 4-digit ISIC code and its corresponding class name (the final name in the hierarchy) in the following format: "ISIC XXXX: Class name"

Description	Required	Not repeatable	Free text (String)	A description of the process, its technical scope (e.g. gate-to-gate or cradle- to-grave), and any aggregation. Describe the technology that was used, its operating conditions, and the process's general temporal and geographic representativeness.	This unit process/ gate-to-gate dataset represents the production of 1 kg corn coproduced with silage and residue. The process technologies are an aggregation of those applied in Iowa in 1996	
Quantitative Reference	Required	Not repeatable	Reference to "Flow" data set	Reference to which the size of the inputs and outputs in the process relate. This can be the functional unit (e.g. 1 ton · mi) or reference flow (e.g. 1 kg soybeans, with residue [unallocated]), and be used in another process.	corn grain; average tillage practice mix; at farm; 15% moisture (See **Name** field)	The name of the quantitative reference flow must be identical to the name of the unit process it is referencing. In ILCD and openLCA, quantitative reference information must be entered in the **Flow** record and linked to the **Process** record.

Start date	Required	Not repeatable	Date (dd/mm/yyyy)	Start date for the time period that the data represent.	01/01/1996	If you are submitting datasets in ILCD format, encode dates according to ISO 8601, e.g. "YYYY-MM-DD". If you are creating datasets in openLCA, encode dates in the following format: "dd/mm/yyyy"
End date	Required	Not repeatable	Date (dd/mm/yyyy)	End date for the time period that the data represent	12/31/1996	See **"Notes"** field for **"Start date"**
Temporal representativeness comment	Required	Not repeatable	Free text (String)	Description of the data's temporal characteristics, including the time period they refer to and for which they are valid, and any temporal aggregation and incongruence of supporting data.	"On farm milk production data were gathered using producer survey instruments issued through producer co-operatives between January 2009 and June 2009. Secondary data were collected from a variety of sources and range of years (1998-2009)."	
Location	Required	Not repeatable	Enumeration (ISO 3166-2 code)	If the data represent a U.S. state, use the appropriate ISO 3166-2 code indicating the data set's geographic location (US state).	US-CA	If you are using custom locations, describe these locations in the geographical representativeness comment.

KML	Optional	Not repeatable	Bounding coordinates derived from openLCA KML file (external KML files cannot be submitted)	Keyhole Markup Language file, which allows users to create a coordinate bounding box or polygon indicating the geographic area their data represent.	Polygon [-77.92, 39.55… -77.92, 39.55]	
Geographic representativeness comment	Required	Not repeatable	Free text (String)	Description of the data set's geographic representativeness and any geographic aggregation methods.	"US Region 4 (Center) includes US-AZ, US-CO, US-ID, US-KS, US-MT, US-ND, US-NE, US-NM, US-NV, US-OK, US-SD, US-TX, US-UT, US-WY."	If you are using a location than ISO 3166-2 (US states) to your data, provide the location name (e.g. HUCS codes, ANSI Codes, region names, GIS code number, and a description of the location system. If non-specific, "Unspecified."

Technology Description	Required	Not repeatable	Free text (String)	A short, general description of the process's technical scope. This description should inform users of the data's technical relevance. Include a list of processes/ activities (anthropogenic or natural) included in the dataset, including a description of any fate and transport modeling.	"This process produces corn grain, average tillage practice mix, at farm, 15% moisture. The process is assumed to represent production in Illinois (US State). Yields and related inputs and outputs represent a single year of operation, in 1996. Residue burning; soil preparation; planting or sowing; irrigation; application, storage, and transport of fertilizers, manures, liming materials, secondary materials, and pesticides; and harvest. Fate and transport of applications are not included as described in Cooper, J.S., Kahn, E., Noon, M. (2012), LCA Digital Commons Unit Process Data: field crop production Version 1.

Administrative Information

Element	Required?	Repeatable?	Datatype	Definition	Example	Notes
Intended application	Required	Not repeatable	Free text (String)	Describe the data set's intended application, including the context in which the data were developed and the objectives of the research. The intended application may differ due to project scope or system boundaries, data aggregation methods, and/or data gaps.	These data were developed as specific, average or generic unit process or LCI results data sets for use in accounting "Accounting" level LCAs (Situation A). A full inventory of environmental flows are included, thus this unit process can be used for a full range of LCIA impact categories, once the appropriate fate and transport considerations have been applied.	As described in European Commission - Joint Research Centre - Institute for Environment and Sustainability: International Reference Life Cycle Data System (ILCD) Handbook - General guide for Life Cycle Assessment - Detailed guidance. First edition March 2010. EUR 24708 EN. Luxembourg. Publications Office of the European Union; 2010.
Data set owner	Required	Not repeatable	Reference to "Actor" data set representing "Data set owner"	Name of the person or entity that owns this data set. The data set owner is not necessarily the copyright holder, if the data set is copyrighted.	John Smith	See the **Actor** section for instructions on how to fill out the **Data set owner** field. In openLCA and the ILCD editor, you must modify the **Actor (openLCA)** or **Contact (ILCD)** record for the **Data set owner** field to be changed in the **Process** record.

Data generator	Required	Not repeatable	Reference to "Actor" data set representing "Data generator"	Name of the person or entity responsible for generating the dataset.	Jane Doe	See **Notes** field for **Data set owner**.

LCA Commons Submission Guidelines, December 10, 2014

Data documentor	Optional	Not repeatable	Reference to "Actor" data set representing "Data documentor"	Name of the individual or entity that documented the data set. Documentation activities include entering information into an LCA modeling program or database.	Mary Smith	See **Notes** field for **Data set owner**.
Publication	Optional	Not repeatable	Reference to "Source" data set	Reference to an APA (American Psychological Association) formatted citation of a foundational publication that illustrates how the data were used.	(Cooper et al, 2012)	See the **Source** section for instructions on how to fill out the **Publication** field. In openLCA and the ILCD editor, you must edit **Publication** information in the **Source** record for it to appear in the **Process** record.
Access and use restrictions	Do not enter	Not repeatable	Free text (String)	A clear statement about how the data and metadata may be used.		USDA-NAL will prepopulate this field with a statement of usage terms and conditions.
Project	Optional	Not repeatable	Free text (String)	Information about the project in which the data were generated.	Data were prepared by the University of Washington Design for Environment Laboratory for the United States Department of Agriculture, National Agricultural Library under cooperative agreement number 58-8201-0-149.	Include the following information: - Project name - Funding institutions or organizations and - Grant or contract names and numbers

Creation date	Required	Not repeatable	Timestamp	The date and time when the dataset is submitted to the LCA Commons. (LCA Commons)	2013-12-31 09:33:29.0	Encoded in ISO 8601 date/time format. This field will be automatically generated when the dataset is accepted to the LCA Commons.
Copyright	Required	Not repeatable	Boolean (True/False)	A flag indicating whether or not the dataset is copyrighted. (LCA Commons)	N/A	A checkbox for the **Copyright** field is available in openLCA.

Modeling and validation

Element	Required?	Repeatable?	Datatype	Definition	Example	Notes
Process type	Required	Not repeatable	Enumeration (System process **OR** Unit process)	Indication of whether the data represent a unit or system process, where a system process is an LCI result.	Unit process	If you are creating your model in openLCA, you must choose either "System process" or "Unit process" in the "Process type" drop- down menu.
Data completeness	Required	Not repeatable	Free text (String)	Include the three elements below: - Treatment of missing intermediate flow data - Treatment of missing data to or from the environment and - Mass balance	See fields below	

| **Treatment of missing intermediate flow data** | Required | Not repeatable | Free text (String) | List and describe methods for accounting missing data (e.g., cut off rules, use of service processes) and/or intended omissions. As applicable, for crop/biomass production include mention of missing data on:

a. Co-production
b. Flows from the environment (occupied area, transformed area, water withdrawal, nutrients from air and soil (in crops, co-products, and above and belowground residues)
c. Technosphere/ intermediate flows (field residue burning, residue management, soil preparation, planting or sowing, seed or feed use and storage, irrigation, fertilizer application, liming material application, secondary materials application, pesticide application, application materials storage, transport/ distribution, harvest)
d. Flows to the environment (residue burning emissions, residue left on the field (above and below ground), water (in irrigation, with manure applications, in sewage sludge applied), substances applied in fertilizers, manures, secondary applications, and pesticides). As applicable, for equipment operation include mention of missing data on:
  a. Co-production
  b. Flows from the environment (water withdrawal, air used in combustion, other directly extracted resources)
  c. Co-production
  d. Flows from the environment (water withdrawal, air used in combustion, other directly extracted resources)
    Technosphere/ intermediate flows (energy use, product materials use, ancillary materials use, transport/ distribution, equipment construction and retirement, spare parts, facility use)
  e. Flows to the environment (operating emissions including unrecovered product and ancillary materials) | Missing data are represented as "service" processes, used in cases where the annual USDA Agricultural Resource Management Survey (ARMS) data are incomplete (such as when ARMS data has been omitted for privacy or specific ARMS variables do not represent 100% of the planted area).

These service processes are intended to ensure that missing data are represented as such (values are not zero but instead are unknown) and that ultimately data representing the range of possibly applicable practices are developed. | Not available in openLCA, GaBi, or SimaPro. The contents of this field will be added to the **Data completeness** field in openLCA. |

Treatment of missing data to or from the environment	Required	Not repeatable	Free text (String)	List and describe methods for accounting missing data (e.g., cut off rules) and/or intended omissions (e.g., to say that only select emissions such as greenhouse gases are represented).	Missing flow data to or from the environment are represented as unspecified flows (sometimes abbreviated as unspec). Also, fate and transport considerations are intentionally not included in unit process data preparation.	Not available in openLCA, GaBi, or SimaPro. The contents of this field will be added to the **Data completeness** field in openLCA.
Mass balance	Required	Not repeatable	Decimal	Either: a. Quantify and describe the mass imbalance (as the mass of outputs less that of inputs) OR b. Describe the mass balance as unknown	The mass imbalance for all exchanges is 0.00 kg.	See the **Notes** field for **Treatment of missing intermediate flow data.**

Data treatment	Required	Not repeatable	Free text (String)	Detailed description of the methods and assumptions used to transform primary and secondary data into flow quantities through recalculating, reformatting, aggregation, or proxy data. Also includes a description of data quality.	Data represent an aggregation of processes applied in Illinois in 1996. Data development is demonstrated by parameterization (presents all raw data and calculations).
Sampling procedure	Required	Not repeatable	Free text (String)	Detailed description of how boundary conditions were defined, how data were collected, and how uncertainty is estimated.	A delete-a-group jackknife is used by the USDA to estimate the ARMS sample means because the population means are unknown. Differences between a sample and population mean result from non-sampling and sampling errors. ARMS RSE data are based on a 15 sample delete-a-group jackknife. Because of this relatively small sample sizes, a Student's t distribution is used in this dataset as an appropriate representation of the ARMS data probability density functions. Other representations of uncertainty are described in Cooper, J.S., Kahn, E., Noon, M. (2012) "LCA Digital Commons Unit Process Data: field crop production Version 1."

Data collection period	Required	Not repeatable	Free text (String)	Time period in which the data were collected.	"Data were collected throughout 2009."	
Reviewer	Required	Not repeatable	Reference to "Source" data set	Name of the individual or entity who reviewed the dataset.	USDA National Institute of Food and Agriculture (NIFA) Peer-Review Panel	See the **Name** field of the **Actor** section for instructions on how to fill out the **Reviewer** field. In openLCA and the ILCD editor, you must adjust the corresponding **Actor** record to change the **Reviewer** field.
Data set other evaluation	Required	Not repeatable	Free text (String)	Review information pertaining to the dataset	Rob Anex, (Review Panel Chair, Biological Systems Engineering, University of Wisconsin Madison), Mike Edgerton (Monsanto), Jane Johnson (Agricultural Research Service, USDA), Tony Vyn (Agronomy Department, Purdue University), Marty Matlock (Department of Biological and Agricultural Engineering, University of Arkansas).	

| Sources | Required | Repeatable | Free text (String) – APA Formatte d citation | The primary and secondary resources used to compile the data. | Cooper, J.S., Kahn, E., Noon, M. (2012). LCA Digital Commons Unit Process Data: field crop production Version 1. Prepared for the US Department of Agriculture, National Agricultural Library. Retrieved from https://www.lcacommons.gov/ | Please provide an APA-formatted citation for all sources. The APA format is as follows:

First author (last name, initials only for first & middle names), additional authors (last name, initials only for first & middle names), title, publication name, publisher, place of publication, government agency, volume and issue, number, year, page numbers , DOI, URL. |

Parameters

NOTE: Parameters are NOT REQUIRED for datasets submitted to the LCA Commons, but if parameters are submitted, the following elements must be included:

Element	Required/ Optional	Repeatable?	Data type	Definition	Example	Notes
Name	Required if applicable	Not repeatable	Free text (String)	Parameter name	p001	
Formula	Required if applicable	Not repeatable	Integer/Decimal	Parameter formula	0.404686	
Numeric value	Required if applicable	Not repeatable	Decimal	Parameter numeric value	0.404686	
Description	Required if applicable	Not repeatable	Free text (String)	Brief description of how and why the parameter was developed.	Conversion factor for ha per acre	

Flow Data Set (Exchanges)

Element	Required?	Repeatable?	Datatype	Definition	Example	Notes
Name	Required	Not repeatable	Free text (String)	General descriptive and specifying name of the flow.	**Technosphere flow:** soybeans, at harvest, production mix at farm, 85%-92% moisture **Elementary flow:** 1,1,2,2-Tetrachloroethane	Product/technosphere flow names must include the following 4 components: - Base name - Treatment, standards, routes - Mix and location types - Quantitative flow properties The quantitative reference flow name must be identical to the name of the Process it is connected to.
Description	Required	Not repeatable	Free text (String)	Descriptive information about the flow	Technosphere flow developed by USDA	

Category	Required (for Technosphere or Product flows)	Not repeatable	Enumeration (For Technosphere/Product Flows – ISIC Codes. For elementary flows – EcoSpold v1 categories)	For technosphere flows, use the categorization guidance for unit processes (see General information section). For elementary flows, use the EcoSpold (v1) categories for flows to and from the environment	air, low population density (**Elementary flow**) Agriculture, forestry and fishing – ISIC 0112: Growing of rice (**Technosphere flow**)	
Version ("Flow" data set)	Do not enter	Not repeatable	Version (XX.XX.XXX)	The data set version number. The first two digits refer to major updates, the second two digits refer to minor revisions and error corrections, and the final three digits are used for automatic and internal version counting during data set development. (ILCD)	01.00.000	Unless discussed with submitters in advance, the data set version number will be generated automatically by openLCA
Last change ("Flow" data set)	Required	Not repeatable	Timestamp	The date and time when the dataset was last saved. (LCA Commons)	2014-01-22 13:41:44.0	Encoded in ISO 8601 date/time format. If you are creating data in openLCA, this field will be automatically generated.
CAS Number	Required for Elementary flows, Optional for Technosphere or Product flows	Not repeatable	Free text (String)	Chemical Abstract Systems number of the substance.	007785-26-4	Used only for elementary flows. The CAS Number in this entry represents "(1s) - (-)-alpha-pinene".

Formula	Optional	Not repeatable	Free text (String)	Chemical formula of the substance.	C10H16	Used only for elementary flows. The formula in this entry represents "(1s)-(-)-alpha-pinene".
Location Description	Optional	Not repeatable	Free text (String)	If the data represent a U.S. state, use ISO 3166-2 code indicating the data set's geographic location (US state).	US-MD	If the data represent a custom location, describe this location with free text.

Actor Data Set

Element	Required/ Optional	Repeatable?	Datatype	Definition	Example	Notes
Name	Required	Not repeatable	Free text (String)	Full name of the Actor associated with the dataset.	Jane Smith Jane T. Smith	Provide the actor's first and last names in the following order: [First name] [Last name] If you wish to include the Actor's middle initial or middle name, record them in the following order: [First name] [Middle initial **OR** Middle Name] [Last name]
Description	Optional	Not repeatable	Free text (String)	Description of the Actor's affiliations and position.	Agronomist, USDA Agricultural Research Service	Provide the Actor's: - Title - Department name (if applicable) AND - Organization name (if applicable)

Version ("Actor" data set)	Do not enter	Not repeatable	Version (XX.XX.XXX)	The data set version number. The first two digits refer to major updates, the second two digits refer to minor revisions and error corrections, and the final three digits are used for automatic and internal version counting during data set development.	01.00.000	Unless discussed with submitters in advance, the data set version number will be generated automatically by openLCA
Last change ("Actor" data set)	Required	Not repeatable	Timestamp	The date and time when the dataset was last saved. (LCA Commons)	2014-01-22 13:41:44.0	Encoded in ISO 8601 date/time format. If you are creating data in openLCA, this field will be automatically generated.
Address	Optional	Not repeatable	Free text (String)	The Actor's street or mailing address.	10300 Baltimore Avenue	In the following order, provide the Actor's - street number - street name, and - suite or apartment number (if applicable)
City	Required	Not repeatable	Free text (String)	The city in which the Actor resides or works.	Beltsville	City is included in the "Address" field

Country	Required	Not repeatable	Free text (String)	The country in which the Actor resides or works.	United States	Use the applicable ISO 3166 country code to indicate the country's name.
e-mail	Required	Not repeatable	Email	The Actor's email address.	janesmith@email.com	
Telefax	Optional	Not repeatable	Free text (String)	The Actor's fax number.	123 - 456 - 7890	International phone numbers are acceptable. If a fax number is available, please list the number in the following format, starting with the 3 digit area code: International telefax numbers are also acceptable, provided the appropriate country code is provided.
Telephone	Required	Not repeatable	Free text (String)	The Actor's telephone number.	098 – 765 - 4321	List the actor's telephone number in the following format, beginning with the 3-digit area code: XXX – XXX – XXXX If the phone number is from outside the United States, please provide the applicable country code.
Website	Required, if applicable	Not repeatable	URL	The Actor's website.	http://www.usda.gov/	Please provide the website's complete URL, including the HTTP prefix (http://)

Zip code	Optional	Not repeatable	Integer (5 digits)	The 5-digit zip code of the Actor's street or mailing address.	20705	Provide the 5-digit zip code that corresponds to the Actor's street address.

Source Data Set

Element	Required?	Repeatable?	Datatype	Definition	Example	Notes
Name	Required	Not repeatable	Free text (String)	Name of the publication or resource used to compile the dataset.	Commentary on issues in data quality analysis in life cycle assessment	
Description	Optional	Not repeatable	Free text (String)	Free text for additional description of the source. In case of use of published data it may contain a brief summary of the publication and the kind of medium used (e.g. CD-ROM, hard copy).	Data dictionary for LCA study	

Version ("Source" data set)	Do not enter	Not repeatable	Version (XX.XX.XXX)	The data set version number. The first two digits refer to major updates, the second two digits refer to minor revisions and error corrections, and the final three digits are used for automatic and internal version counting during data set development.	01.00.000	Unless discussed with submitters in advance, the data set version number will be generated automatically by openLCA
Last change ("Source" data set)	Required	Not repeatable	Timestamp	The date and time when the dataset was last saved. (LCA Commons)	2014-01-22 13:41:44.0	Encoded in ISO 8601 date/time format. If you are creating data in openLCA, this field will be automatically generated.
Doi	Required If applicable	No	URL	Digital object identifier of the resource.	http://dx.doi.org/10.1007/s11367- 011-0371-x	Attach the following prefix to the beginning of the Doi so that it is a resolvable URL: http://dx.doi.org/
Text reference	Required	No	Free text (String)	APA-formatted text citation.	(Ellis et al, 2007)	
Year	Required	No	Integer (4 digits)	Year in which the resource was created.	2014	Encode the publication year in the following format: "YYYY"

Utility Review

USDA-NAL administers a review of submitted datasets to evaluate metadata quality. The review will not necessarily judge the validity of modeling assumptions and results, but rather document complete metadata that ensure transparency. USDA-NAL's objective is to provide users with enough information to select and use datasets appropriately.

During the editorial review process, each submission will be distributed to 1-3 external reviewers. Reviewers will return feedback within 30 days and the editorial staff will work with submitters to address comments and any remaining formatting issues. Upon acceptance to the LCA Commons, USDA-NAL will assign each dataset a Digital Object Identifier (DOI) to ensure persistent access and citability.

The review process is not anonymous. It is designed to produce constructive feedback for practitioners, stimulate dialogue, and improve data quality to move the agricultural LCA domain forward.

Appendices A-C: Data Submission and Use Agreements

Appendix A: Data Use Disclaimer Agreement ("Agreement")

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