LCA Commons Submission Guidelines

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USDA-NATIONAL AGRICULTURAL LIBRARY

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Introduction

Thank you for your interest in providing access to your life cycle inventory (LCI) data through the LCA Commons. Data sets submitted to the LCI repository must adhere to specific data documentation, formatting, and nomenclature requirements to ensure lossless loading of data and accurate representation in the repository.

The LCI repository 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 publication goals 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:
    a. Provide sufficient metadata to accurately describe unit processes and/or product systems
    b. Prepare elementary flows for use in openLCA
2. Help users:
    a. Identify flow provenance
    b. Connect flows to and from the unit process and their providing/receiving LCA elements. These LCA elements may be other unit processes or impact methods.

The LCA Commons data curation process is collaborative and iterative. Upon submission, NAL will conduct an internal review of your data set to verify compliance with these LCA Commons Submission Guidelines and elementary flow connectivity with one or more impact methods. Upon culmination of the internal review, NAL will collaborate with you to reconcile issues identified in the internal review.

Once all internal review issues have been resolved, your data will be reviewed externally. After you reconcile review comments, the National Agricultural Library will publish your data with a Digital Object Identifier in 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 section of this document. If you have any questions, concerns, or recommendations, please contact us through our online 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 data sets 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 both **unit process** and **product system** models related to agricultural production. Multi-functional unit processes 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(es) 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 flows/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 1.7.2 database schema. Unit process and product system datasets submitted to the LCA Commons should be edited in openLCA 1.7.2 to ensure all metadata elements persist throughout submission[1]. Once you edit your unit processes or product systems in openLCA, share them through your institutional repository hosted by NAL or export and submit them in the openLCA JSON-LD format and NAL will publish the data to its own internal repository. 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 JSON-LD 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, if your work is in spreadsheets you can use the openLCA spreadsheet format to import your data into the openLCA desktop application.

Sending Data Sets to the LCA Commons

openLCA users can now commit data sets directly to NAL servers from their openLCA desktop application. When you are ready to send data sets to NAL, send a request/notificaiton to the LCA Commons team. We will set-up a repository for you and respond with the following information, which will allow you to access and commit data sets to our servers.

1) Access Credentials
2) Server URL
3) Repository path

With this information, you can follow the instructions provided in the openLCA Collaboration Server Manual beginning on page 10 “How to: Basic Work Flow.” Please contact us if you need additional support.

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

Nomenclature

Product/Intermediate and Elementary Flow Nomenclature

Original Product/Intermediate Flows

Name all *original* product and intermediate flows according to the ILCD naming convention (see Process Metadata for instructions). The name should reflect the **product or service** (i.e., not the activity which produced it) as follows:

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

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

All four components of the above naming convention are required as applicable to a flow. In cases where a naming component is not applicable, simply exclude it from the flow name.

In cases where original product/intermediate flows are called as inputs for one or more unit processes, but there is no upstream process to provide the flow(s), 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 Product/Intermediate Flow Nomenclature

When product/intermediate flows belong to an external software package or database, DO NOT submit them as unit processes. Instead, organize them as 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 LCA Commons staff and data users in mapping flows in your unit process to those in the external dataset. See "Categories" section below for more detail.

Elementary Flow Nomenclature

Elementary flow names must correspond directly to the impact method used in the Life Cycle Impact Analysis (LCIA). This assures users that your dataset can connect your elementary flows to the associated LCIA method. Document LCIA methods used in process metadata

as described below. If data being submitted have NOT been used in a Life Cycle Impact Assessment, please use flows from the openLCA reference list. If you are using SimaPro or GaBi modeling software and an impact method which is also provided for in openLCA, please run your inventory and impact results in openLCA and compare them to those of SimaPro or GaBi to confirm that openLCA is reading flows correctly.

Unit Process and Product System naming Conventions:

Original Unit Process Nomenclature

Name all *original **Unit Processes*** that you submit to the LCA Commons,according to the ILCD naming convention (see Metadata Guidelines below for element definitions). The name should reflect the **process or activity** as follows: *base name; treatment, routes, standards; production type, location type; quantitative flow properties*

> corn grain production; average tillage practice mix; at farm; 15% moisture
>
> All four components of the above naming convention are required as applicable to a process. In cases where a naming component is not applicable, simply exclude it from the process name.

External Database Unit Process Nomenclature

DO NOT submit unit processes which belong to commercial databases. For guidance on dealing with flows from external database unit processes, see the External Database Product/Intermediate Flow Nomenclature section above.

Modified External Database Product/Intermediate Flows and Unit Process Nomenclature

If you have modified or customized a unit process from a commercial database, submit the process named like the original process with an indication that it is a modified version of the original. For example, a modified ecoinvent process should look like this:

carbon dioxide liquid, at plant/RER U with US electricity

Please document the source of the original process and detail the changes in the process documentation. Categorize flows according to provenance as described below.

Product Systems

OpenLCA names product systems based on the name of reference process within the product system. Creating the product system from the reference unit process in openLCA will confer the name of that process.

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

▪ **Original Technosphere Flows and Unit Processes:** The LCA Commons currently uses ISIC rev. 4 (International Standard Industrial Classification of All Economic Activities) codes to categorize technosphere flows and unit processes in openLCA[2], 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*

[2] It is likely that the LCA Commons will move from ISIC rev. 4 codes to North American Industry Classification System (NAICS) codes in 2018.

▪ **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, 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 2011: Manufacture of basic chemicals.

▪ **Elementary Flows:** Categorize all *original* flows to and from the environment using the openLCA reference list categorization scheme.

For an example of the proper categorization of the different types of flows and processes, see Figure 1 below.

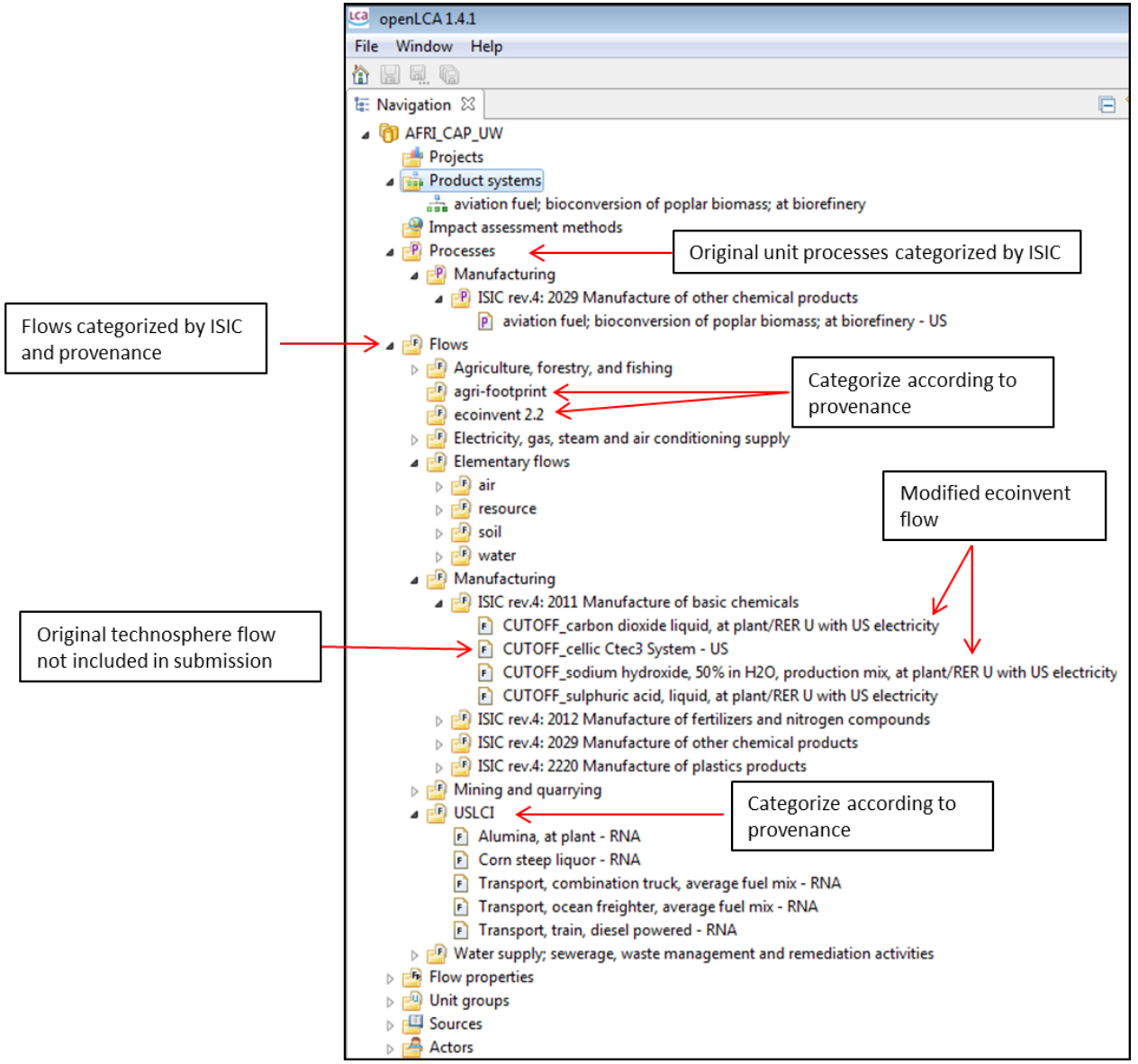

Figure 1. Categorizing original, external database, and modified external database flows

Metadata Guidelines

The following guidelines describe how to create metadata for LCA Commons datasets. The listed metadata elements are available in openLCA 1.7.2, 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[3]. USDA has also created several custom elements and definitions for the LCA Commons metadata structure.

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

Product System Metadata

Process Metadata:

- General Information
- Administrative Information
- Modeling and Validation
- Parameters
- Social aspects

Flows (Exchanges)
Actors
Sources

[3] 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.

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.

Controlled Vocabulary for Specific Fields:

LCA Commons uses 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 a geographic unit. Examples of potential geographic units include:

- National
- Regional
- State
- County
- Hydrologic unit
- Crop management zone

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,[4] 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.

[4] 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

Product System

This guidance is subject to change pending the recommendations of a Society of Environmental Toxicology and Chemistry (SETAC) working group on Life Cycle Inventory description.

Element	Datatype	Description	Example	Notes
Name	Free text (string)	OpenLCA names product systems based on the name of reference process within the product system.Creating the product system from the reference unit process in openLCA will confer the name of that process.		
Description	Free text (string)	A general description of the product system's technical scope. This should include a description of goal and scope of the LCA, the intended use of the data set, a list of processes/ activities (anthropogenic or natural) included in the dataset, including a description of any fate and transport modeling, and LCIA methods used. The product system description should be a synthesis of the	Product system boundaries include all material and energy flows associated with crop production and live poultry operations, including the handling and disposal of mortalities and manure. Inventory flows begin with one day old baby chicks in the grandparent generation, continue through the parent generation, and end with live market-weight broilers and culled hens ready for	You may also include details relating to the product system's temporal and geographical representativeness as defined by the goal and scope of the study.

		metadata elements included in the head unit process *General Information* tab and the *Intended Application* field on the *Administrative Information* tab in the openLCA desktop client.	transport to processing at the farm gate. Livestock Environmental Assessment and Performance (LEAP) Partnership were followed, which provided guidelines for assessing the greenhouse gas emissions (GHG) and fossil energy use from poultry (LEAP, 2015a) and animal feed supply chains (LEAP, 2015b). TRACI 2.1 was used for impact modeling.	

Process Metadata

General Information

Element	Required/ Optional	Datatype	Description	Example	Notes
Name	Required	Free text (String)	General descriptive name of the process/activity and/or its main good(s) or service(s) and/or its level of processing.	corn grain production; average tillage practice mix; at farm; 15% moisture	Include the following four components in your model's **Name** field (1-3 are required. Component 4 is required if applicable). Separate components with semi- colons. 1. Base name 2. Treatment/standards/routes 3. Mix type and location type 4. Quantitative product or process properties
Base name	Required	Free text (String)	General descriptive name of the product produced.	corn grain production;	

Treatment, standards, routes	Required	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	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	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	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	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.

Category (1st level)	Required	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	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 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	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	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	The name of the quantitative reference flow should describe the flow or product underlying the unit process/activity. In ILCD and openLCA, quantitative reference information must be entered in the **Flow** record and linked to the **Process** record.

Start date	Required	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	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	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	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	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	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-	*If you are using a location code different than ISO 3166-2 (U.S. States) (e.g., HUCS codes; ANSI codes)*

				NM, US-NV, US-OK, US-SD, US-TX, US-UT, US-WY."	*provide the location name, region name, GIS code number, and a description of the location system. If non-specific, "Unspecified."*
Technology Description	Required	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	Datatype	Description	Example	Notes
Intended application	Required	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	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	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**.

Data documentor	Optional	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	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	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	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	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	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.

Element	**Datatype**	**Description**	**Example**	**Notes**
Process type	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.
Modeling Constants	Free text (string)	Provide a description of how emissions were allocated among coproducts. Provide allocation factors and supporting calculations as necessary.	Physical allocation method with allocation factors as follows: Broiler LW: 2.591 kg Hen LW: 3.855 kg Eggs per spent hen: 184 (Barn average, total eggs laid / total spent hens) Baby chicks: 152 (Number of hatched baby chicks from spent hen eggs) Broilers: 146 (Number of broilers that reach market weight from baby chicks) Broiler to Hen Ratio: 0.00687 (Portion of a spent hen equivalent to one market broiler)	

Data completeness	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	Free text (String)	*List and describe accounting methods for missing data and/or intentional data omissions for each of the three elements below. Explanations for missing data often include a discussion about cut-off rules. Explanations for intentional data omissions often include a discussion about the process' scope (e.g., "This unit process only considers greenhouse gas emissions").* 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)	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.

		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)		

Treatment of missing data to or from the environment	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	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	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	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	Free text (String)	Time period in which the data were collected.	"Data were collected throughout 2009."	

Reviewer	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	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	Free text (String) – APA Formatted 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	Data type	Description	Example	Notes
Name	Free text (String)	Parameter name	p001	
Formula	Integer/Decimal	Parameter formula	0.404686	
Numeric value	Decimal	Parameter numeric value	0.404686	
Description	Free text (String)	Brief description of how and why the parameter was developed.	Conversion factor for ha per acre	

Flow Metadata (Exchanges)

Element	Datatype	Definition	Example	Notes
Name	Free text (String)	General descriptive and specifying name of the flow.	**Product/Intermediate 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 describe the flow or product of the unit process.
Description	Free text (String)	Descriptive information about the flow	Technosphere flow developed by USDA	

Category	Enumeration (For Technosphere/Product Flows – ISIC Codes. For elementary flows – openLCA categories)	For original technosphere flows, use the categorization guidance for unit processes (see General information section). For commercial database flows, categorize by provenance as described above.For elementary flows, use the openLCA 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)	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
CAS Number	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	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	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	**Datatype**	**Definition**	**Example**	**Notes**
Name	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	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**)**	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)	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	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	Free text (String)	The city in which the Actor resides or works.	Beltsville	City is included in the "Address" field

Country	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	Email	The Actor's email address.	janesmith@email.com	
Telefax	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	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	URL	The Actor's website.	http://www.usda.gov/	Please provide the website's complete URL, including the HTTP prefix (http://)

Zip code	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	Datatype	Definition	Example	Notes
Name	Free text (String)	Text reference (name and year) and source title	Cooper and Kahn, 2012, Commentary on issues in data quality analysis in life cycle assessment	Alternative example: IPCC, 2006, Guidelines for National Greenhouse Gas Inventories
Description	Free text (String)	Full citation of source material. APA 6th edition format		

Version ("Source" data set)	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
URL	URL	Digital object identifier of the resource.	http://dx.doi.org/10. 1 007/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	Free text (String)	APA-formatted text citation.	(Ellis et al, 2007)	

Year	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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