20210911 Jesse

Circularity Accounting Model Data from Life Cycle Inventories

Following are some notes on searching for and finding data sources. This includes my recent searches based on Ling's success. Ling's report is included.

Our model has some similarity to the **Life Cycle Inventory**:
https://www.sciencedirect.com/topics/engineering/life-cycle-inventory

> ***Life cycle inventory (LCI) is the methodology step that involves creating an inventory of input and output flows for a product system***. *Such flows include inputs of water, energy, and raw materials, and releases to air, land, and water. The inventory can be based on literature analysis or on process simulation. In the present work, the inventory analysis is based on the Ecoinvent v. 3 database for agricultural and logistic parts and Aspen Plus v. 8.6 software for process design* [1]

If a LCI exists for a product, then we can input that into out Circularity accounting system. we only focus on CO2, but an LCI contains information about many factors. A recent format is *ReCiPe2016*: 'a harmonised life cycle impact assessment' [2]

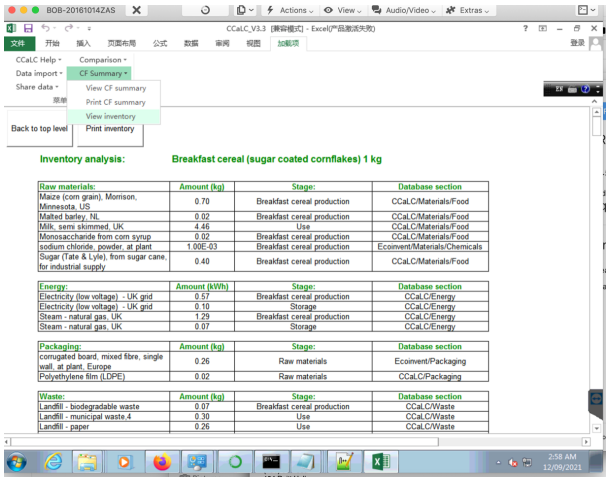
Some LCI data is available (milk [3] for example), and many other products either from indicidual papers, or from databases (listed following).

Software for calculating LCI:

LCSoft
https://www.pseforspeed.com/lcsoft/

SimaPro7.1
https://simapro.com/

CCaLC (research project)



Data repositories (which might also be software)

EcoInvent (see Ling's report following), which it seems most software uses.
Various: https://simapro.com/licences/#/business

ESU World Food LCA Database
http://esu-services.ch/data/fooddata/

DATASMART Life Cycle Inventory
https://ltsexperts.com/services/software/datasmart-life-cycle-inventory/

IDEA v2 Life Cycle Assessment
http://idea-lca.com/?lang=en

Accueil
https://doc.agribalyse.fr/documentation/

ALCIG - Agricultural Life Cycle Inventory Generator
https://alcig.quantis-software.com/#/tool

World Food LCA Database
https://quantis-intl.com/metrics/databases/wfldb-food/

SOCIAL HOTSPOTS DATABASE
http://www.socialhotspot.org/

There are similar circular diagrams which describe cycles, which are especially clear and used in chemical industry. I think this is a useful paper to look at as a format for our own, although this example is technical, it has the same general goal of exposing externalities and reducing impacts [4]

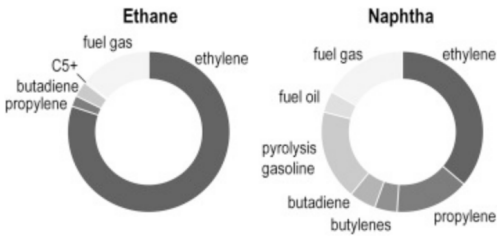


Image is also [4].

From Ling:
(20210911ES_Ling_ Database from organization/institution.pages)

Database from organization/institution

Life cycle database (https://ghgprotocol.org/life-cycle-databases)

- Lists several third-party databases (country, industry...)

1. **CEDA - Comprehensive Environmental Data Archive** (https://ghgprotocol.org/Third-Party-Databases/CEDA) (by VitalMetrics, a US firm)

   Data: 2014-now, annually updated

   Acquire: sale services?

2. **CCaLC - Carbon Calculations over the Life Cycle of Industrial Activities** (https://ghgprotocol.org/third-party-databases/CCaLC) (University of Manchester)

   Data: 2007-2010, a little out of date?

   Acquire: email to the chemistry professor for data

Ecoinvent (https://www.ecoinvent.org/home.html)

Buy a license?/ if universities have bought

Carbon reports of companies

1. **EU carbon market**

   Industry of active trading firms: fossil energy, gas, electric power...

2. **UK firms**

Carbon/ESG reports: total carbon number/year

Citations - please ignore.

[1] Chapter 4 - Life Cycle Assessment of Sugar Crops and Starch-Based Integrated Biorefineries,
P. Vaskan, E. Ruiz Pachón, E. Gnansounou,
Editor(s): Edgard Gnansounou, Ashok Pandey,
Life-Cycle Assessment of Biorefineries,
Elsevier, 2017, Pages 97-146, ISBN 9780444635853,
https://doi.org/10.1016/B978-0-444-63585-3.00004-8.
(https://www.sciencedirect.com/science/article/pii/B9780444635853000048)

[2] ReCiPe2016: a harmonised life cycle impact assessment method at midpoint and endpoint level
TY - JOUR
AU - Huijbregts, Mark A. J.
AU - Steinmann, Zoran J. N.
AU - Elshout, Pieter M. F.
AU - Stam, Gea
AU - Verones, Francesca
AU - Vieira, Marisa
AU - Zijp, Michiel
AU - Hollander, Anne
AU - van Zelm, Rosalie
PY - 2017
DA - 2017/02/01
TI - ReCiPe2016: a harmonised life cycle impact assessment method at midpoint and endpoint level
JO - The International Journal of Life Cycle Assessment
SP - 138
EP - 147
VL - 22
IS - 2
AB - Life cycle impact assessment (LCIA) translates emissions and resource extractions into a limited number of environmental impact scores by means of so-called characterisation factors. There are two mainstream ways to derive characterisation factors, i.e. at midpoint level and at endpoint level. To further progress LCIA method development, we updated the ReCiPe2008 method to its version of 2016. This paper provides an overview of the key elements of the ReCiPe2016 method.
SN - 1614-7502
UR - https://doi.org/10.1007/s11367-016-1246-y
DO - 10.1007/s11367-016-1246-y
ID - Huijbregts2017
ER -

[3] Towards a contribution to sustainable management of a dairy supply chain
https://www.scielo.br/j/prod/a/dBq3X6QfR3z3bHW6H8rmP8J/?lang=en&format=pdf

[4] Comparison of Attributional and Consequential Life-Cycle Assessments inChemical Manufacturing. Sean E DeRosa and David T Allen,The University of Texas at Austin, Austin, TX, United States. < https://reader.elsevier.com/reader/sd/pii/B9780124095489100697?token=A8B202465567D135732001C111531A8A27A61AF971AE977C01C91126BD303D58B1FAFF064FD4850C92C86F2A2FB17214&originRegion=us-east-1&originCreation=20210911203509 > not sure if the link will work though.