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Introducing openLCA Nexus

(was: Collaboration and data exchange via the openLCA data hub and framework)

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Introducing openLCA nexus

1 Nexus
        a) what is it?
        b) why we started it
        c) current status

2 Details, LCA data modeling and harmonisation

3 Details, technical background

4 Practical demonstration

5 Outlook, outreach

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1 Nexus

1 Nexus, motivation

Availability of data (of good quality)
is one key aspect for Life Cycle modeling.

Life Cycle Databases are certainly growing currently,
but there is little interaction and no fluent exchange;
rather: users need to decide for one system.

→ This limits the availability of data.

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1 Nexus, motivation

Current situation rather: users need to decide for one system.

Silos on a farm somewhere in Indiana, United States, author: Valerie Everett

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1 Nexus, motivation

Motivations for creating Nexus are to
→ increase data availability for Life Cycle studies
→ by making data available from various sources, in good quality, in one system and LCA software,
→ without prescribing a certain methodological approach.

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1 Nexus, motivation
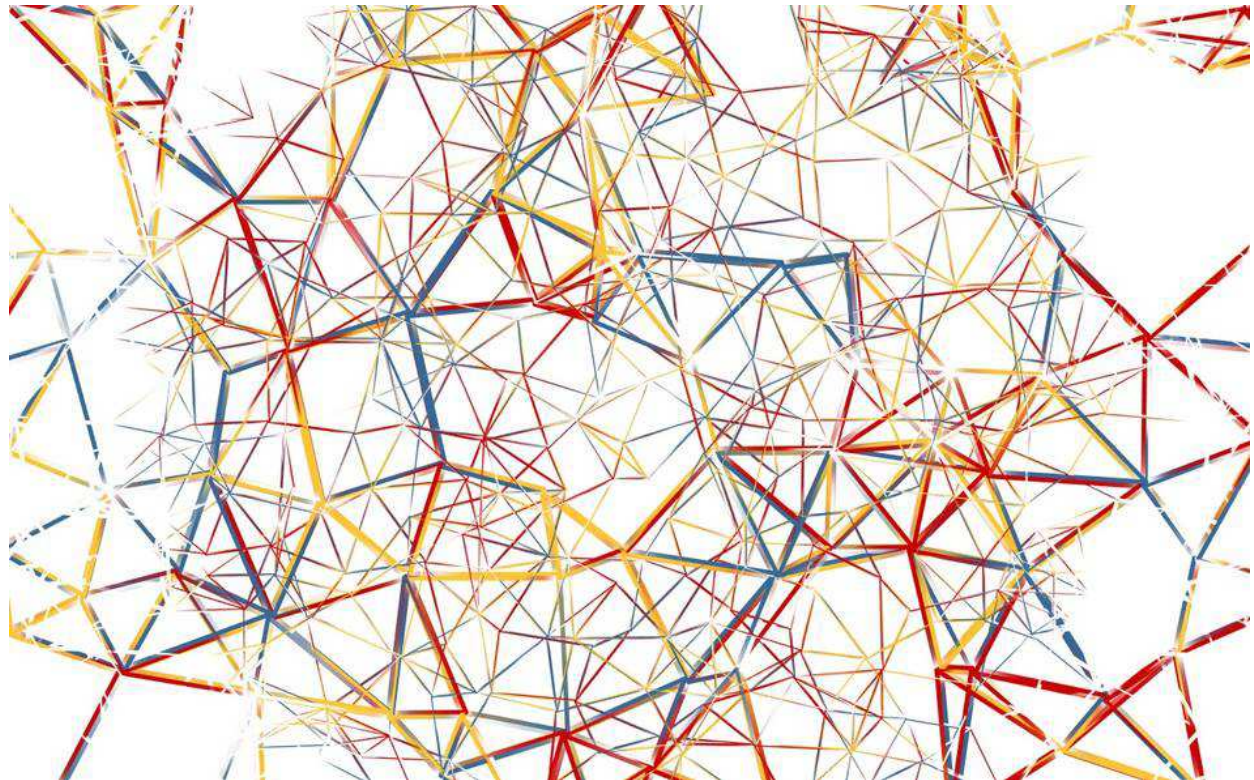
Casey Reas, Network C, 2012, custom software, variable size

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2 Details, status

2 Nexus, current status

The Nexus system has been created by GreenDelta in
2013,
building on the idea of the UNEP/SETAC database
registry.
Differences to the Registry:
      - Mild harmonisation of data sets
      - common flow list and common LCIA methods

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2 Nexus, current status

The Nexus system consist of
- a website where users can search for, find, and download data sets
- A plugin for openLCA (open source, free LCA software) to import Nexus data
- A security mechanism to prevent free distribution of data

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2 Nexus, website

https://nexus.openlca.org/
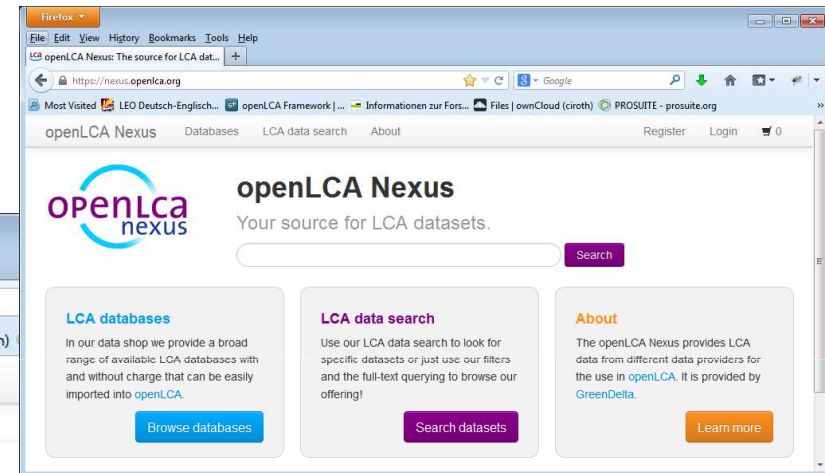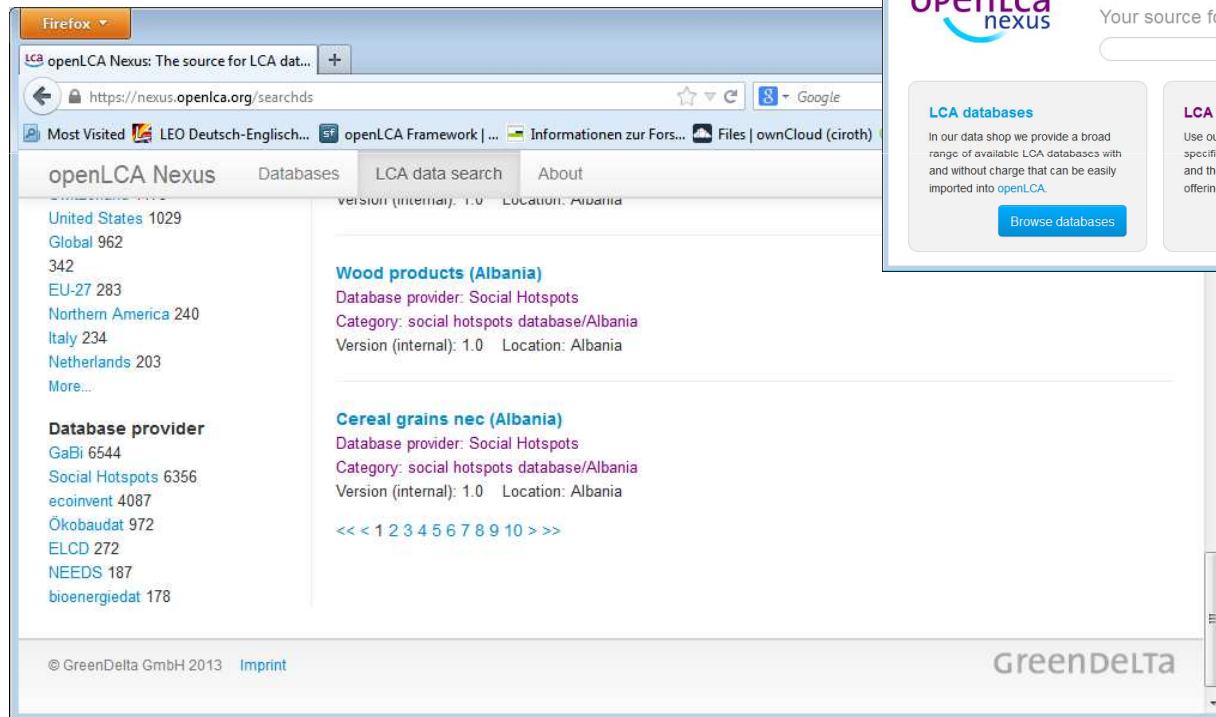
2 Nexus website

The website contains currently 18,500 data sets from these databases:

Database provider

GaBi 6544

Social Hotspots 6356

ecoinvent 4087

Ökobaudat 972

ELCD 272
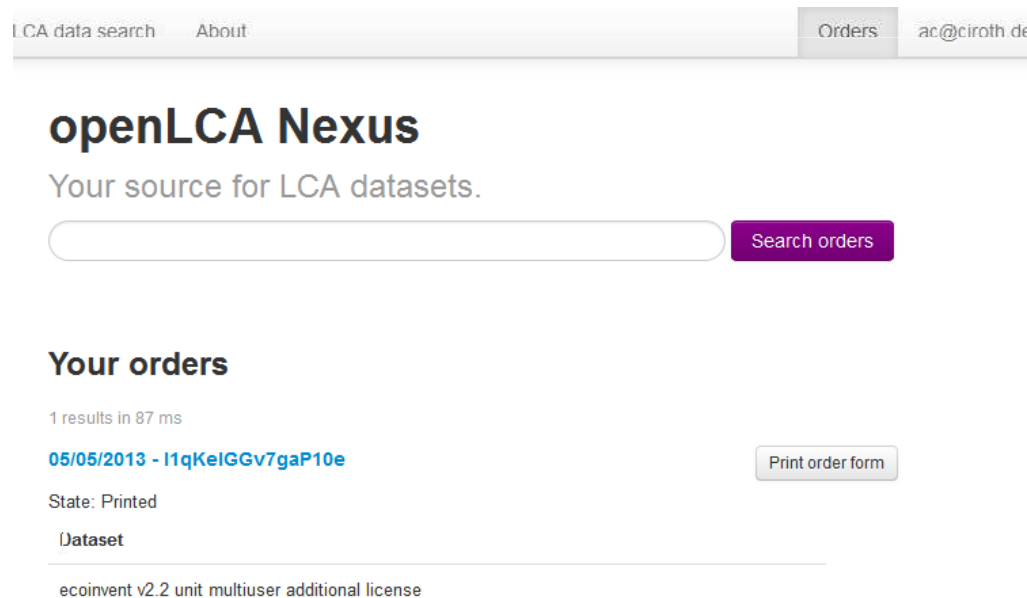
NEEDS 187

bioenergiedat 178

Some free and some "for purchase"

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2 Nexus website

Users register on the website and can then download; "for purchase" data needs to be ordered (webshop system)

LCA data search   About   Orders   ac@ciroth.de

openLCA Nexus
Your source for LCA datasets.

[   ] Search orders

Your orders
1 results in 87 ms

05/05/2013 - I1qKeIGGv7gaP10e   Print order form
State: Printed
Dataset

ecoinvent v2.2 unit multiuser additional license

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2 Nexus, current status: LCA tool side

The Nexus website works together with openLCA; openLCA (free, professional open source software for LCA, www.openlca.org) provides a "Nexus plugin" that allows import of data from Nexus

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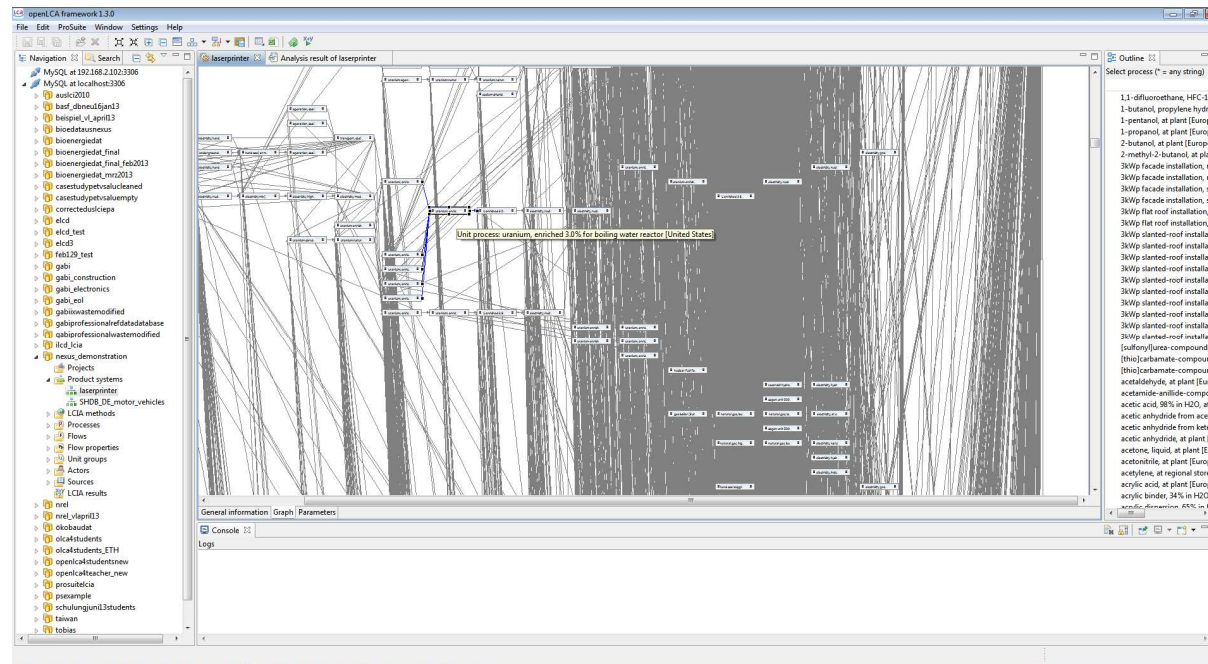
2 Nexus plugin for openLCA

Required for
for importing
nexus packs in
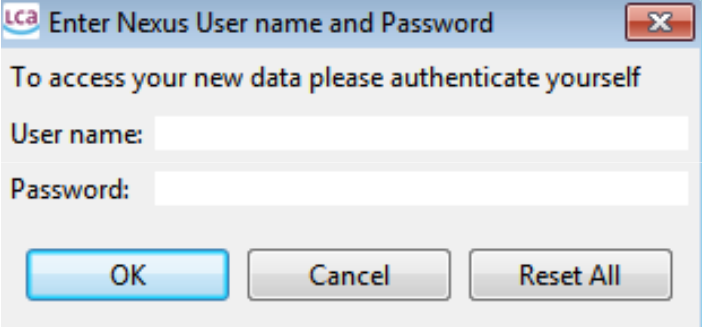openLCA
(freely available).
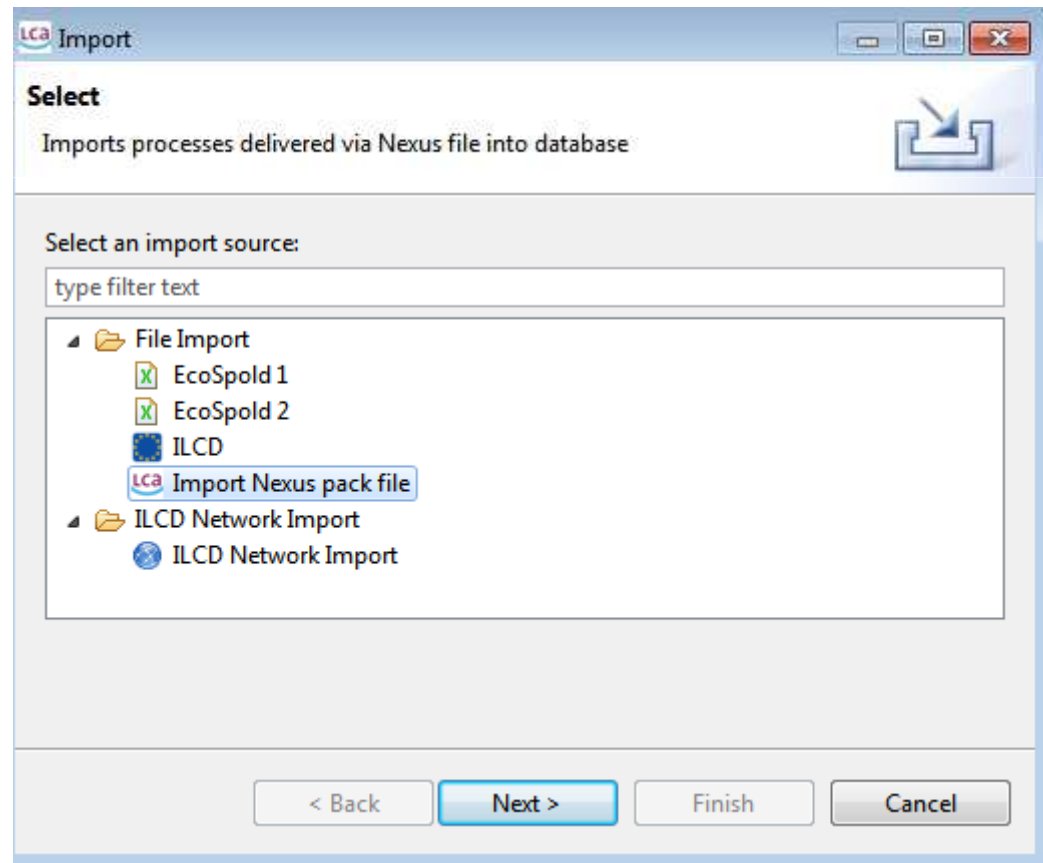
2 Nexus plugin for openLCA

For importing nexus packs in openLCA.

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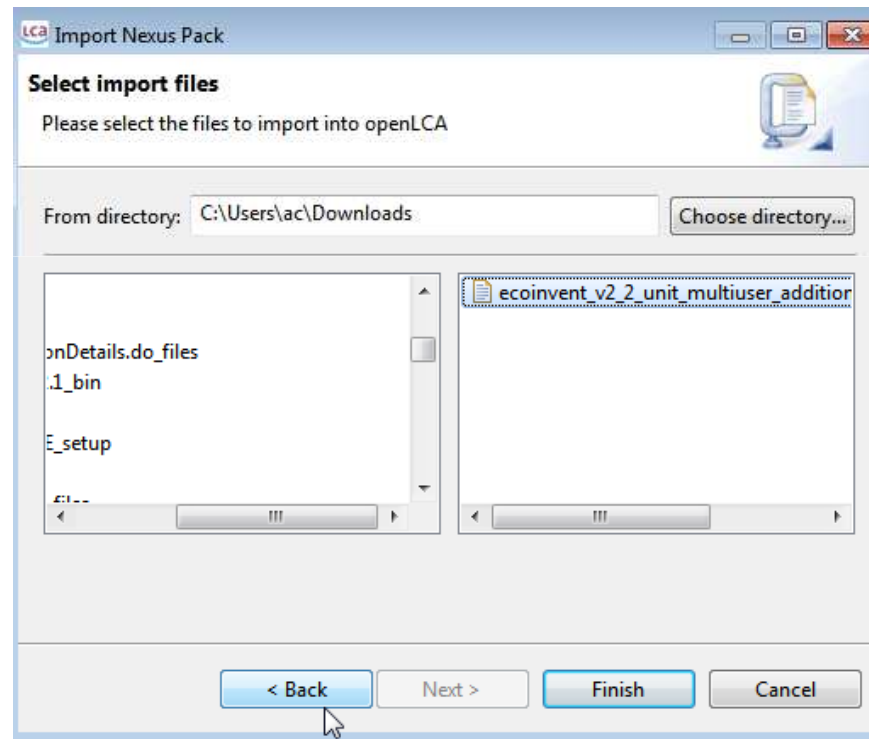
2 Nexus plugin for openLCA

"For purchase"
Packs require that you enter the user and pass that you used for the nexus website
→ Security measure,
→ Prevents broad distribution
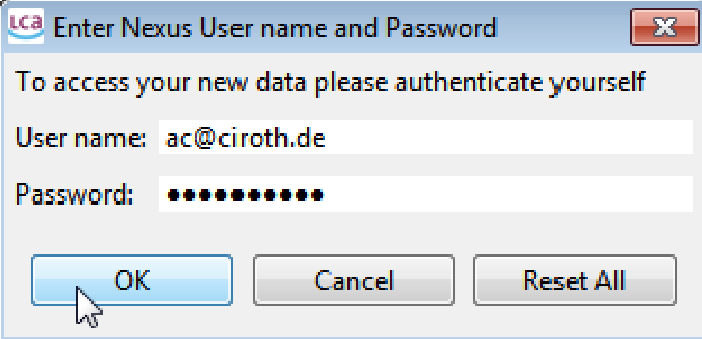
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3 Details, LCA data modeling and harmonisation in Nexus

3 LCA data modeling for Nexus

Recall: One aim of Nexus is that „various LCA data from various sources can be […] better combined in one case study and model"

→ one comprehensive list of

* compartments
* elementary flows
* units
* locations

→ when importing Nexus data from a given data source, then these elements are mapped to the Nexus lists

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3 Example: Elementary flows in openLCA Nexus
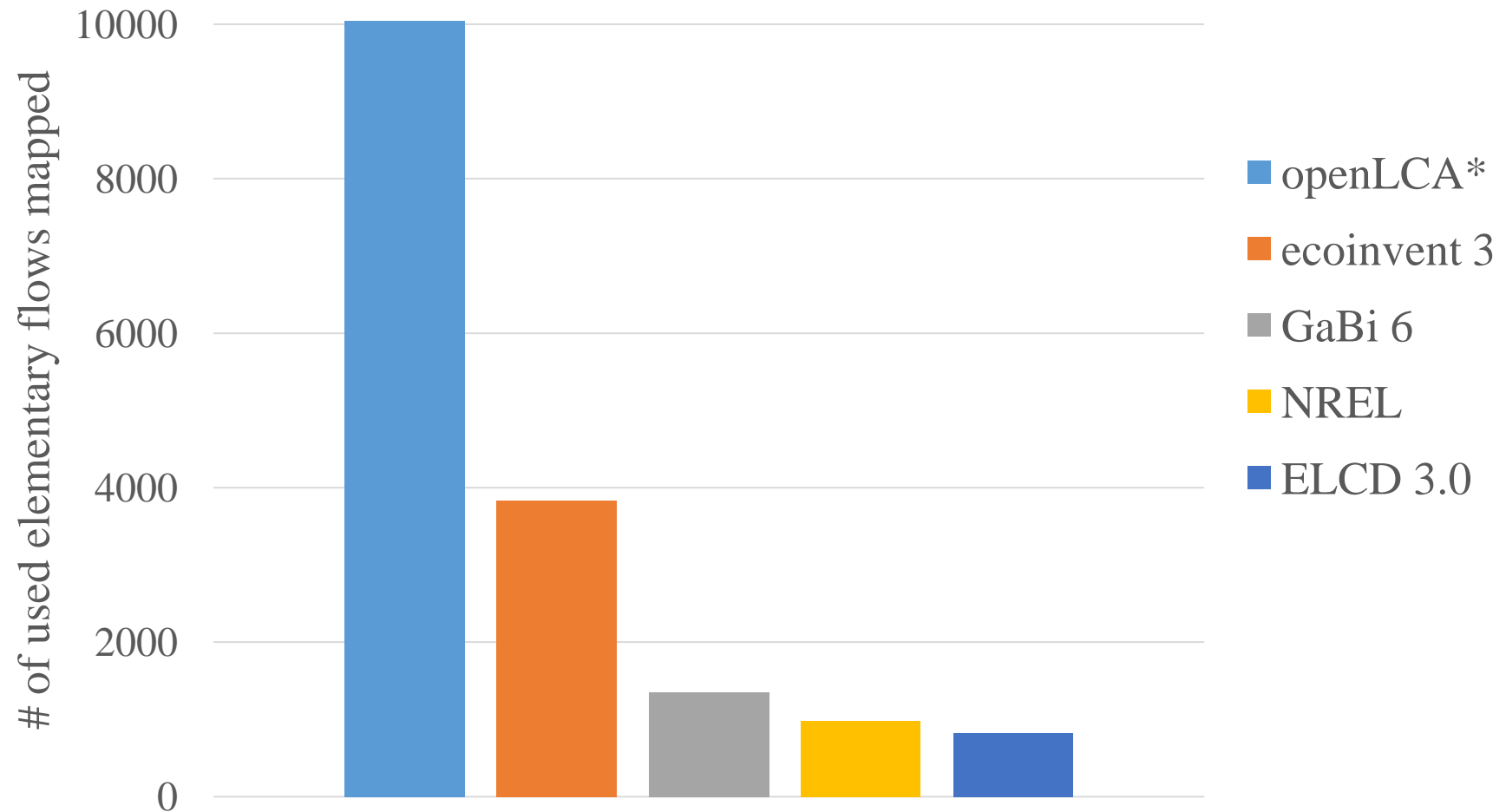
* Total # of elementary flows in reference list

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3 Data harmonisation, LCI

- Elementary flows
  - air
    - high population density
    - lower stratosphere + upper troposphere
    - low population density
    - low population density, long-term
    - unspecified
  - resource
    - biotic
    - in air
    - in ground
    - in water
    - land
    - unspecified
  - soil
    - agricultural
    - forestry
    - industrial
    - unspecified
  - water
    - fossil-
    - fresh water
    - fresh water, long-term
    - ground water
    - ground water, long-term
    - lake
    - ocean
    - river
    - river, long-term
    - surface water
    - unspecified

Mappings:

- Compartments

- Flows:

  - Name

  - CAS

  - Formula

- Units → Conversion factors

- Location

  → Location reference list

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3 Data harmonisation, LCI
Refactoring of data sets

e.g. GaBi data sets

- Radioactive wastes→ elementary flows
- Some product flows remodeled to waste flows
- Cargo only as output in transport processes

▼ Outputs

Flow	Category	Flow property	Unit	Resulting amount	Uncertainty	A
⚙ **Slag treatment in Slag, production ...**	**Deposited goods / Hazardous waste**	**Mass**	**kg**	**1000.0**	**No distri...**	☐
Radioactive tailings deposited	Deposited goods / Radioactive waste	Mass	kg	1.73005607883274	No distrib...	
High radioactive waste deposited	Deposited goods / Radioactive waste	Mass	kg	0.002213448475...	No distrib...	
Low radioactive wastes deposited	Deposited goods / Radioactive waste	Mass	kg	0.036372246889...	No distrib...	
Medium radioactive wastes deposited	Deposited goods / Radioactive waste	Mass	kg	0.018668732780...	No distrib...	
Waste (deposited)	Deposited goods / Stockpile goods	Mass	kg	1508.56326144908	No distrib...	

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3 Data harmonisation, LCIA

LCIA: Characterization factors for the elementary flows in reference list

# of CFs in openLCA compilation

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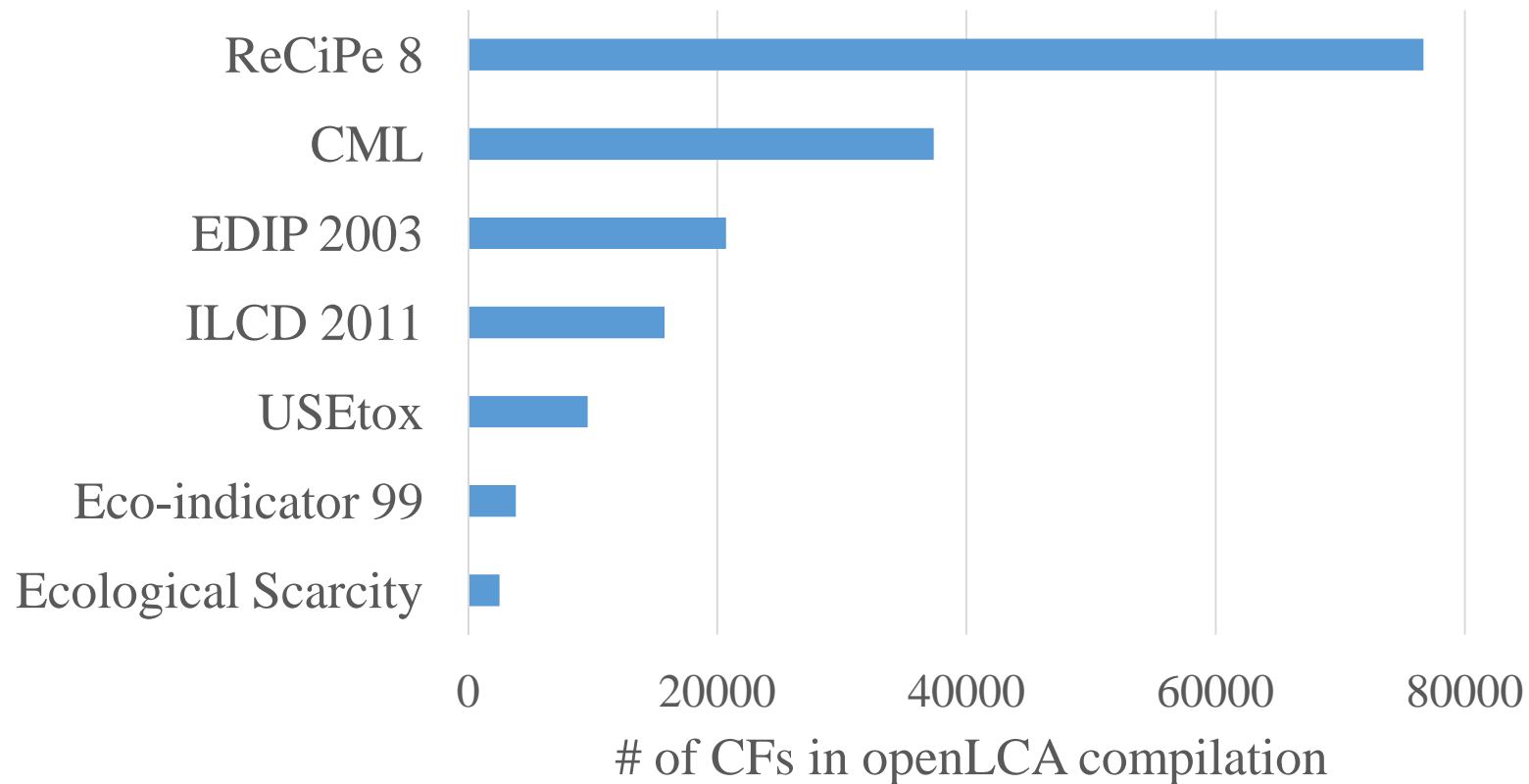
4 Discussion, and Outlook

4 Summary & discussion

- Nexus is comprehensive system to combine and link major and relevant LCA data sources worldwide, including ecoinvent and Gabi,..

- …which makes these data sources available in a free, open source LCA software, openLCA

- It brings thereby more modeling freedom to users, less dependency from one data source

- It covers both inventory and LCIA

- And includes a data protection system

- This was a major effort and step for us

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4 Summary & discussion

But of course we depend on you (and on users in general):

- Please test, evaluate, give feedback

- If you are a data provider (small or large):

  - we would be interested to expand the database..

  - ..and offer a secure access to a growing number of users

- As a user, please provide also feedback on the website and system: is this useful, too much, do you miss anything? Thank you.

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4 Outlook

- First case studies are starting that use a combination of different data sources (e.g. Nastorg/Ciroth, incandescent light bulbs, to be presented at avnir conference 11/2013)

- LCIA methods: common elementary flow list reduces effort for method developers → we are open for input and collaboration

- More experiences useful: how to reasonably combine system and unit processes, from different sources

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Thank you..

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4 Discussion

- (how to reasonably combine system and unit processes:
    - Often: better one additional system process than no information…
    - …although this may introduce a mistake
    - a network of unit processes can adapt to consistent system processes from one source but not from several different system processes
)

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