



# BIOSWITCH

Encouraging Brand Owners to  
Switch to Bio-based

BIOSWITCH TOOLBOX  
FIRST DRAFT

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This project has received funding from the Bio-Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No 887727.





# Terminology

- LCA = Life Cycle Assessment, a standardized (ISO 14040 & 14044) methodology to quantify the potential environmental impacts of a product, service or system over the whole life cycle.
- LCC = Life Cycle Costing, a method considering all the costs that will be incurred during the lifetime, including purchase price, operating costs and end-of-life costs.
- Footprint = The (negative) impact of a product/service/system/organisation on environment, e.g. climate change.
- Handprint = Shows the positive impact that the product/service/system/organisation can create. Handprints can be used for demonstrating the improvements in terms of environmental sustainability. Handprint concept is well-suited for the use of networked operators in a products value chain (Network LCA), because one firm can show how much its actions (changes in processes or materials to be more biobased) diminish negative impact (e.g. measured in terms of carbon footprint) of the other value chain partners.

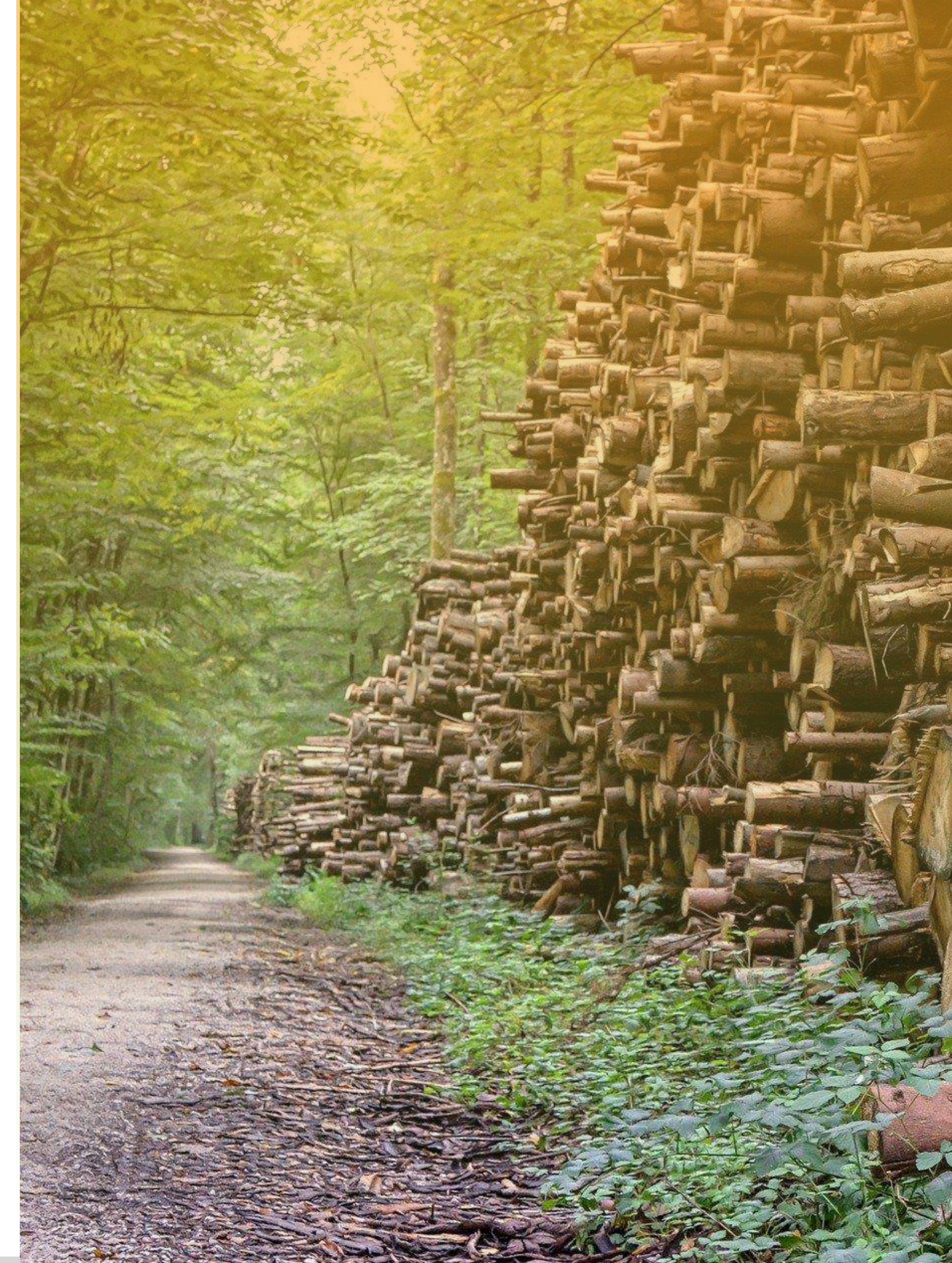




## WP2 (TASK 2.3) LCA & LCC tool development, Major Brand Owners' resources required

### Tool testing

- Mock-up evaluation (design choices of UI)
  - **Why:** Help developers to produce tools tailored for the brand owners
  - **Means of participation:** Answer questions on a web form
  - **Required effort:** Small
- LCA model development
  - **Why:** Help brand owners to get more reliable predictions of design choices of their processes and material choices of their products in the form of ecologic and economic indicators
  - **Means of participation:**
    - (1A) (LCI) data collection without previously collected data/LCA expertise
    - (1B) (LCI) data collection with previously collected data/LCA expertise
    - (2A) Admin tool training session
    - (2B) Simplified tool training session
  - **Required effort:** (1A) Large; (1B) Medium; (2A) Medium; (2B) Medium







# What services can we support through the toolbox?







# Sustainability assessment methods

SCREENING LCA FOR  
NEW TECHNOLOGIES  
AND PRODUCTS

CARBON FOOTPRINT  
(ISO14067)

CARBON  
HANDPRINT  
(NEW METHOD)

VALUE STREAM  
MAPPING AND  
MODELLING

LIFE CYCLE  
COSTING

LCA= life cycle assessment  
ISO = International standardization organisation





# LCA services: Why are they useful and what are they needed for?



# Life cycle assessment (LCA)

Scientific method applied broadly in business and research contexts. LCA is based on the ISO standards 14040 and 14044, acknowledged also by European Commission as the “best framework for assessing the potential environmental impacts of products” (EC 2018).

The method has an iterative nature which means, for example, that the scope of the study can be adjusted due to limited data availability during the data collection.

LCA enables calculating the potential environmental impacts throughout product’s life cycle, “cradle to grave”. Sometimes the study is framed to “cradle to gate” or “gate to gate” phases.

In LCA the direct, indirect as well as embodied emissions, energy, wastes and materials are taken into account.

Input data should preferably be specific primary data from the company, i.e. from the actual production processes, at least for the main actions. Average secondary data, i.e. from the life cycle inventory databases or literature, can be used to complete the life cycle and to fill in data gaps.

Examples of the use of LCA are product and process development, stakeholder communication and decision making.

According to the standards, critical review is required if the results of LCA are intended to be used in public comparative assertions.

## 4 STEPS IN LCA



LCA= life cycle assessment

ISO = International standardization organisation

Information source for EC 2018: [http://eplca.jrc.ec.europa.eu/?page\\_id=1058](http://eplca.jrc.ec.europa.eu/?page_id=1058)





# LCA services: Sulca is VTT's computational engine for impact assessments used as basis for the BIOSWITCH toolbox

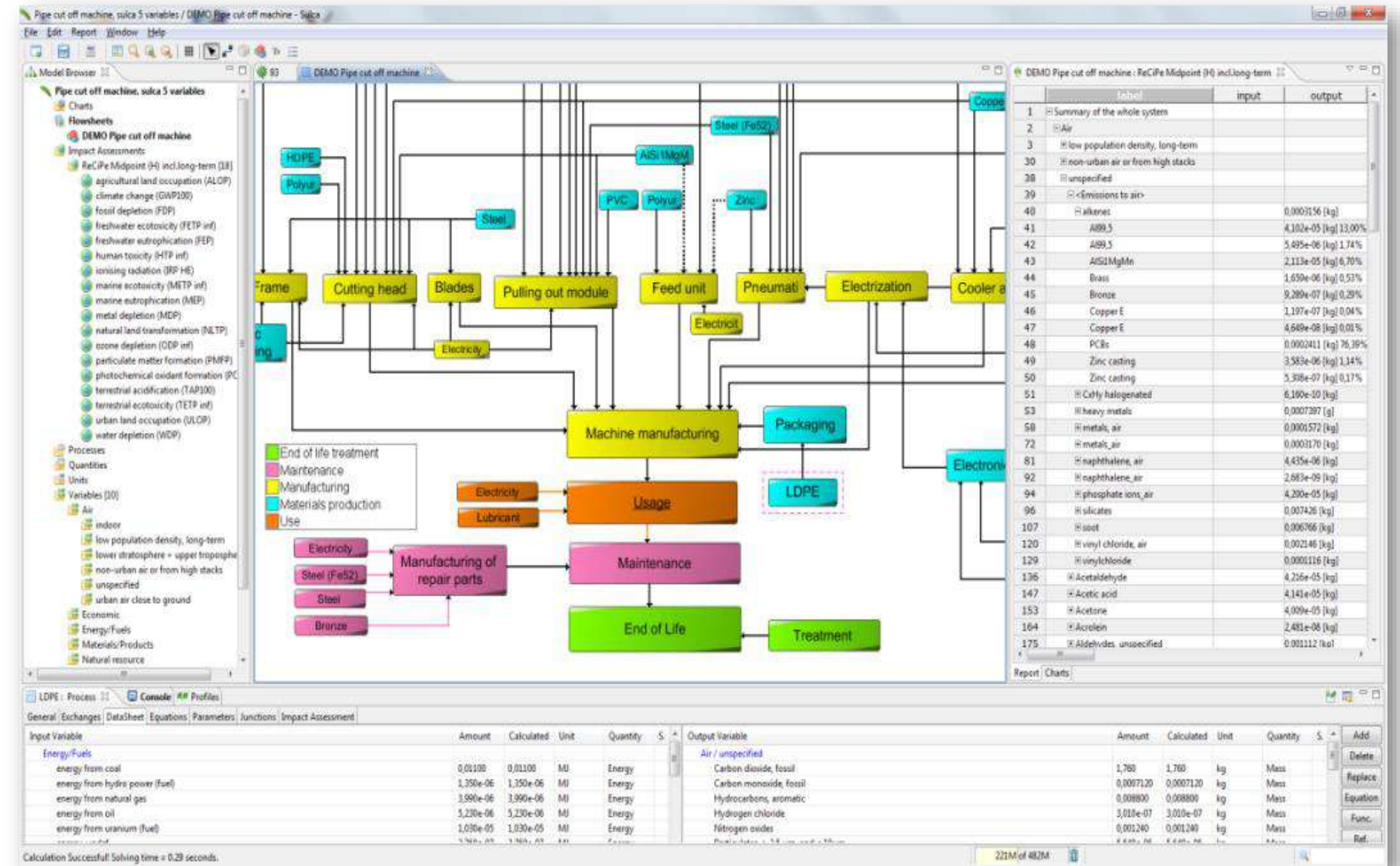






# LCA software tool SULCA 5.1

- SULCA is an LCA software which acts as the computational engine for life cycle assessments
- SULCA will be utilized for the major testing of the BioSwitch toolbox
- SULCA interacts with Life cycle inventory databases (such as Ecoinvent) and impact assessment methods.



  
**SULCA**





# New toolbox features help companies estimate and communicate positive results from bio-based alternatives which have been proved working: The Handprint concept



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# What is a *handprint* and why do we need it?

- All our actions cause impacts on environment, some negative, some positive.
- Life cycle assessment and carbon footprint measure the negative impacts.
- Handprint is a new concept that refers to **beneficial impacts of actions, the positive change** in what we do.
- **Handprints** can be used to **communicate** net-positive actions of companies and thus create competitive advantage. It refers to the beneficial environmental impacts that organizations can achieve and communicate by providing products or services that reduce footprint of other actors.
- **Carbon handprint** is the reduction of the carbon footprint of another actor. Carbon handprint can be used to show how one company's choices (e.g. used materials) can reduce the footprint of other companies which are part of the same value chain or value network.
- Handprints can be computed with SULCA software for the whole network (hence the name Network LCA).







# Handprint comparison services for companies



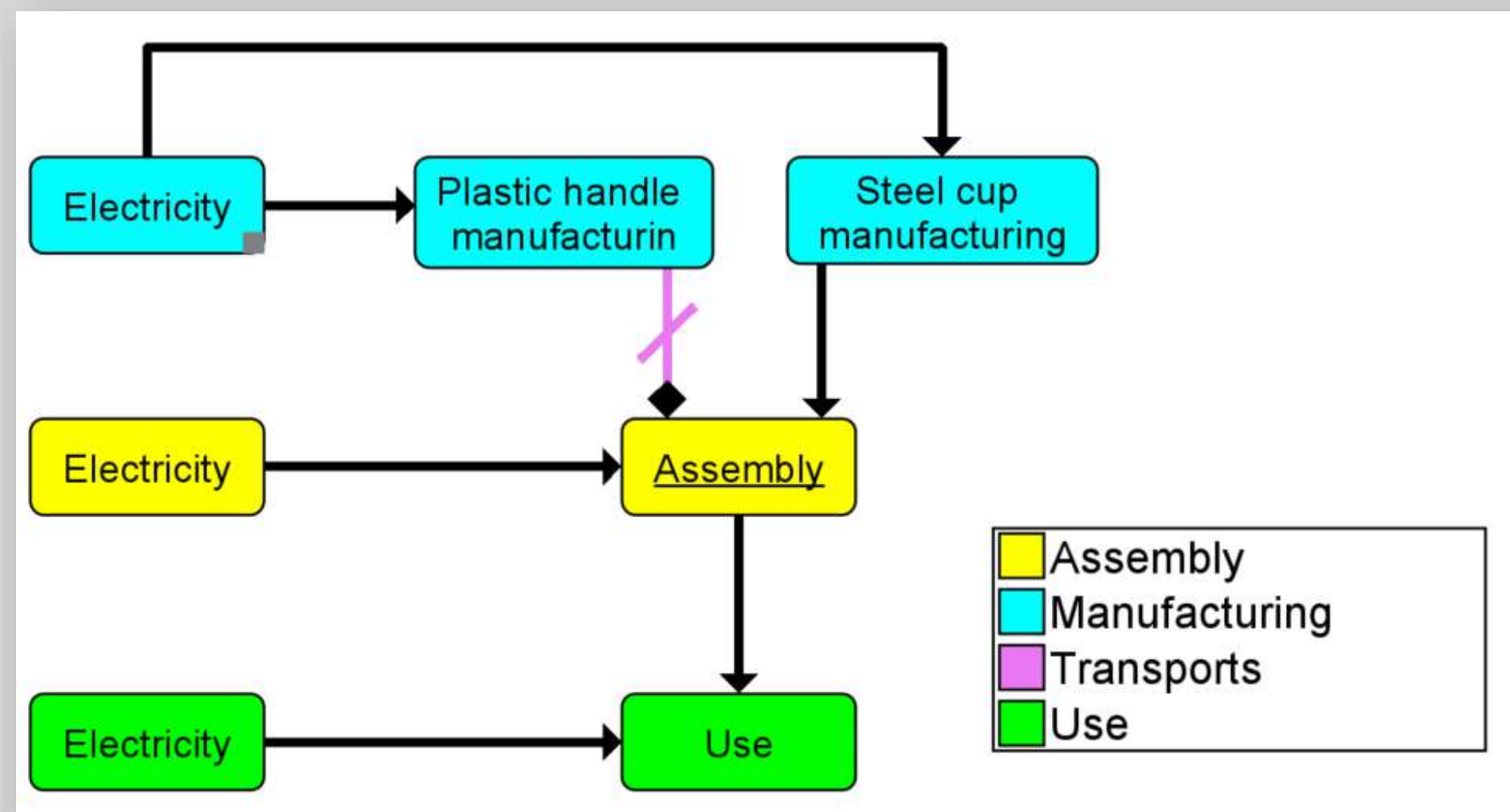
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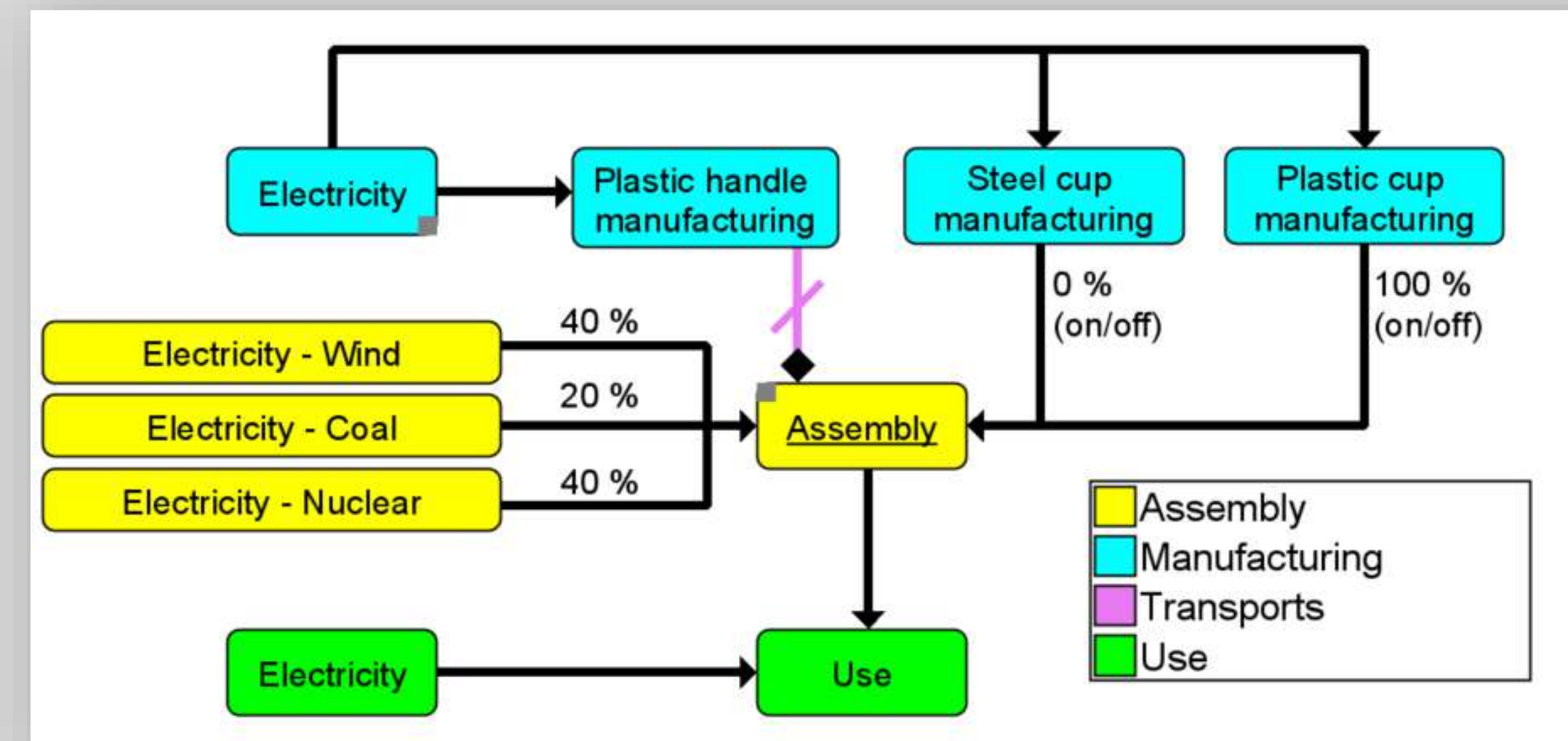


# Simple example (comparing two steel cup manufacturing methods)

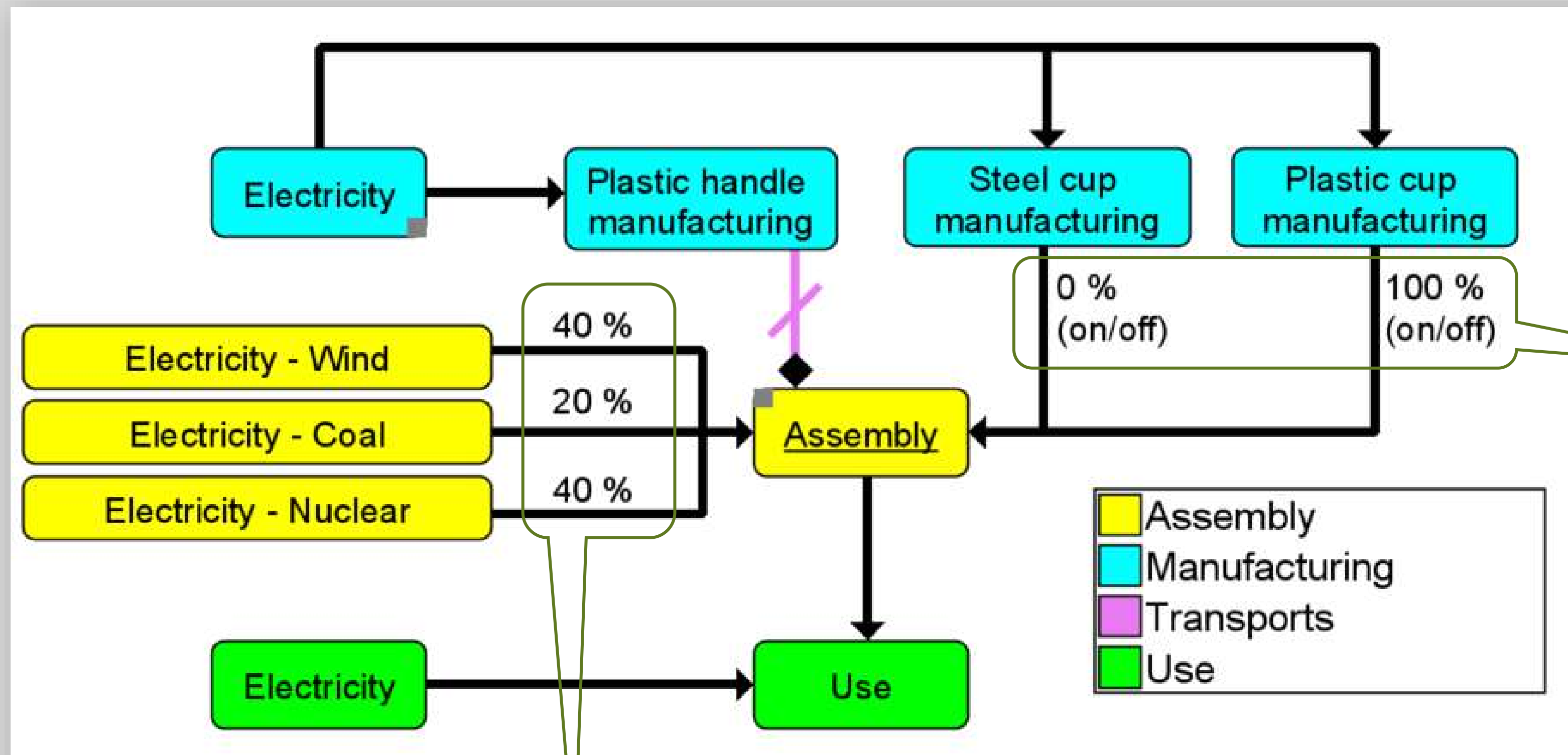
## BASELINE SYSTEM



## NEW PRODUCT SYSTEM







Can be modified by the user

Can be modified by the user





## Results table

Baseline system : ReCiPe Midpoint (H) incl.long-term		
label	climate change (GWP100) [kg CO2eq]	
1	Baseline system	
2	Primary Codes	3,688
3	Assembly	0,06250 1,69%
21	Manufacturing	0,5000 13,56%
49	Transports	0,0001800 0,00%
61	Use	3,125 84,74%
83	New product system	
84	Primary Codes	3,469
85	Assembly	0,03110 0,90%
121	Manufacturing	0,3125 9,01%
158	Transports	0,0001800 0,01%
170	Use	3,125 90,09%
192	New product system handprint	
193	Primary Codes	0,2189 5,94%
194	Assembly	0,03140 50,24%
239	Manufacturing	0,1875 37,50%
276	Transports	
288	Use	

Carbon footprint  
results for baseline  
system

Carbon footprint  
results for new  
product system

Carbon handprint – positive  
impact gained with the new  
product system





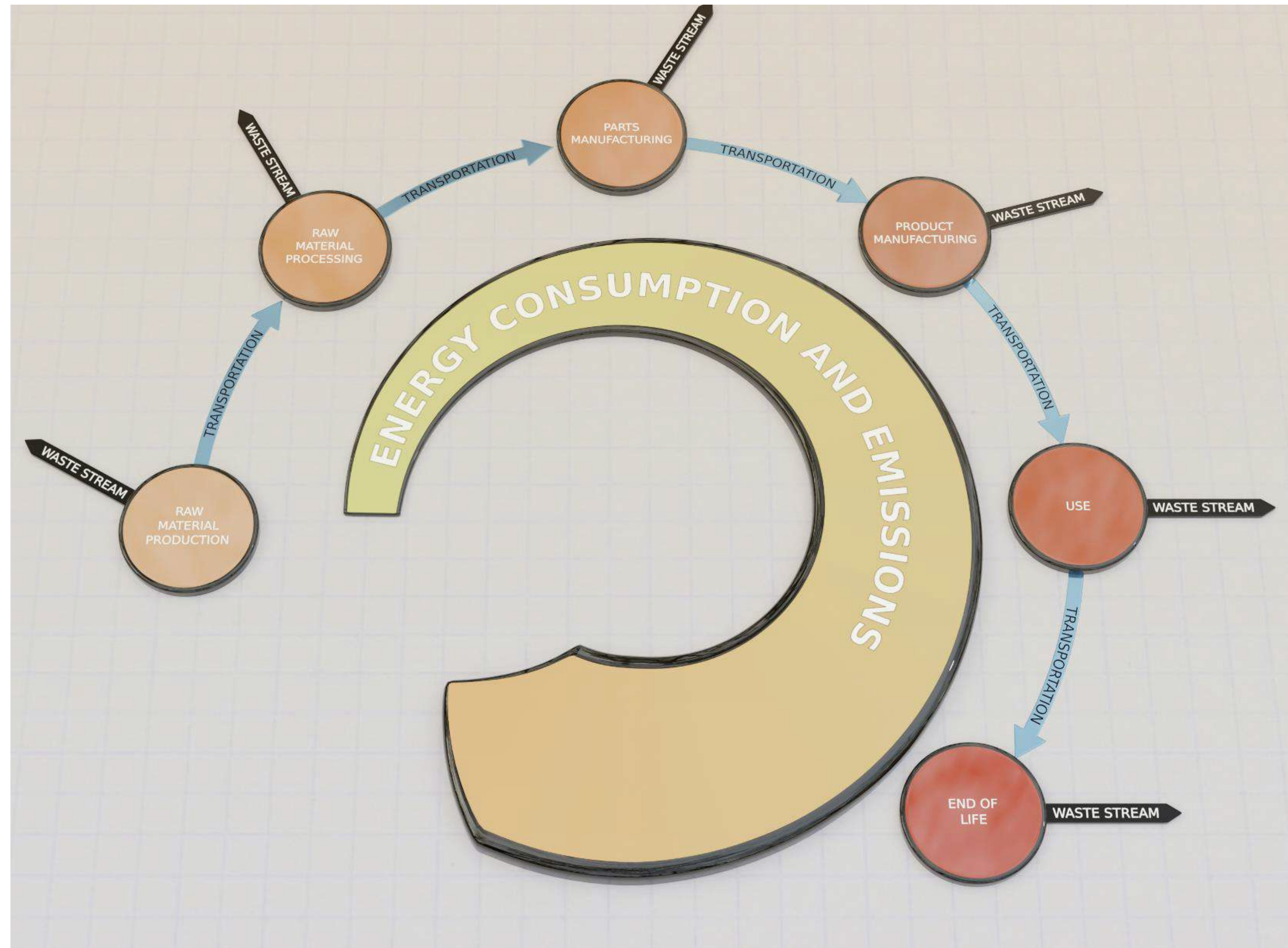
Handprints can be computed with  
SULCA software for entire product value  
chains or networks  
(=Network LCA functionality)





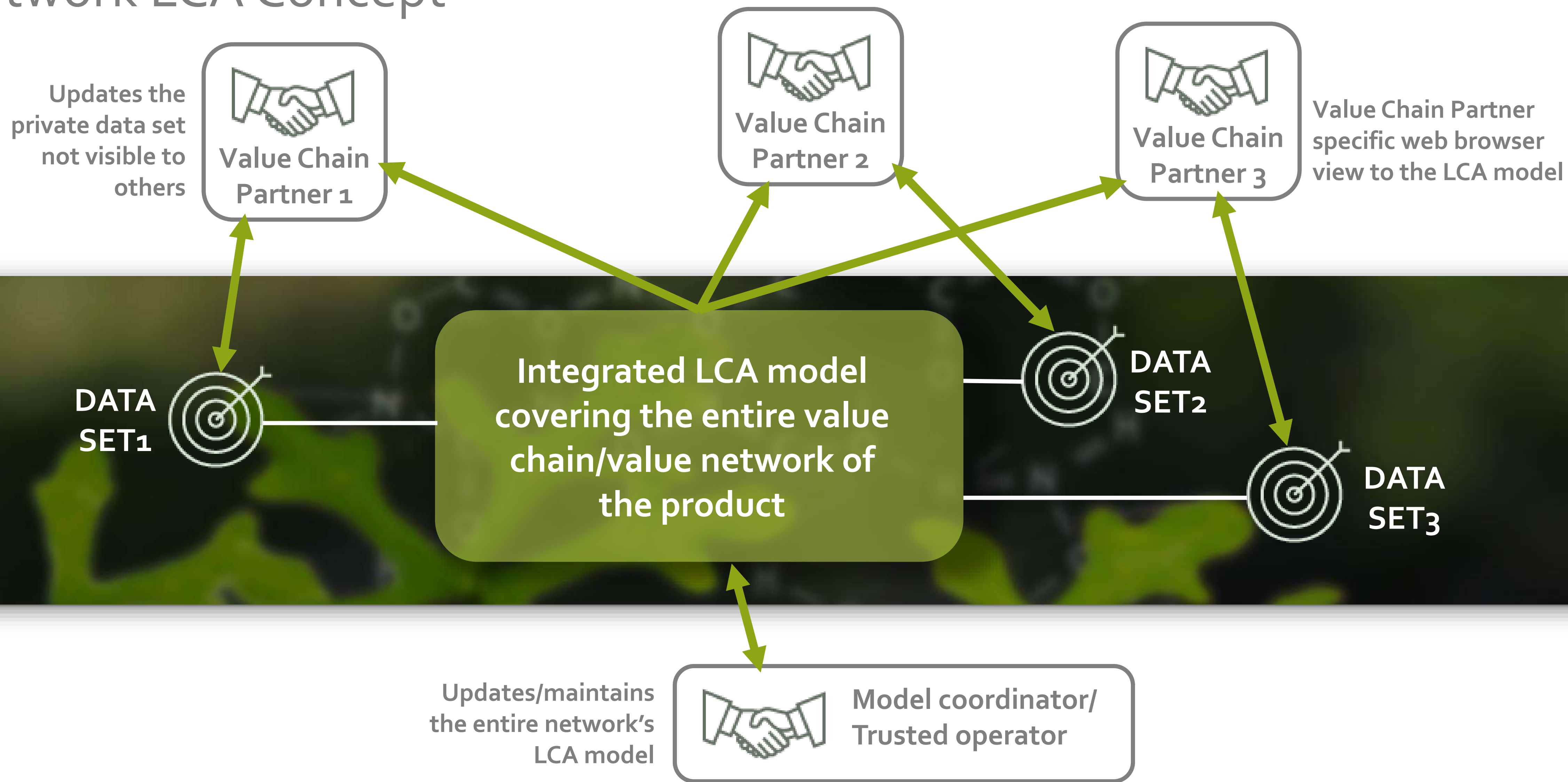
# Network LCA tool – background

- Circular economy requires tools which facilitate collaboration between various value chain partners from different companies
- The tools can also serve the supply chain operators within a single organization





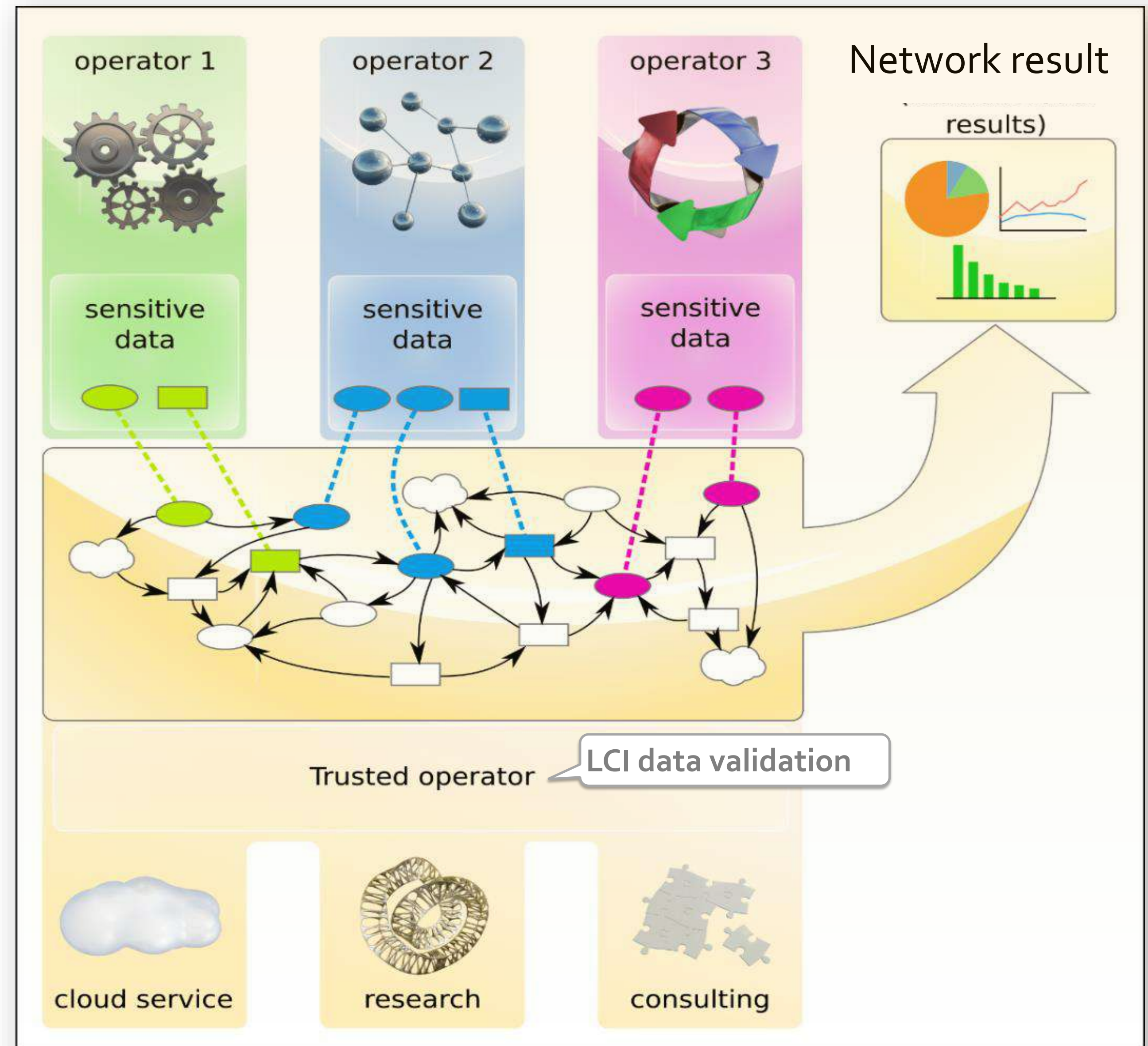
# Network LCA Concept





# Network LCA tool – Concept

- Network LCA is tool for LCA data collection, data analysis and sharing the LCA results inside the network.
- Operators/value chain partners inside the network supply their own process data via web browser without software installations.
- Trusted operator assigns the data and result viewing rights to appropriate network members (operators)
- Network members can test independently of the trusted operator how the changes to their local data affects their local and the network level results => process design & optimization







# Network LCA links

- Watch a video explaining the Network LCA concept

<https://www.youtube.com/watch?v=O0PbrPG70Lo&feature=youtu.be>





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