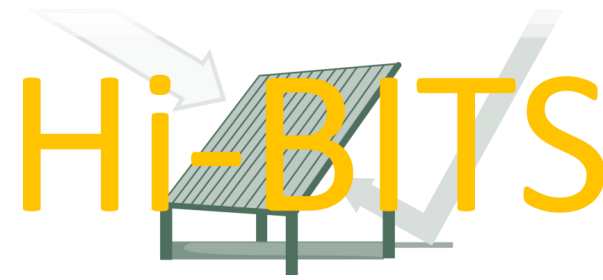




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GreenDeLTa

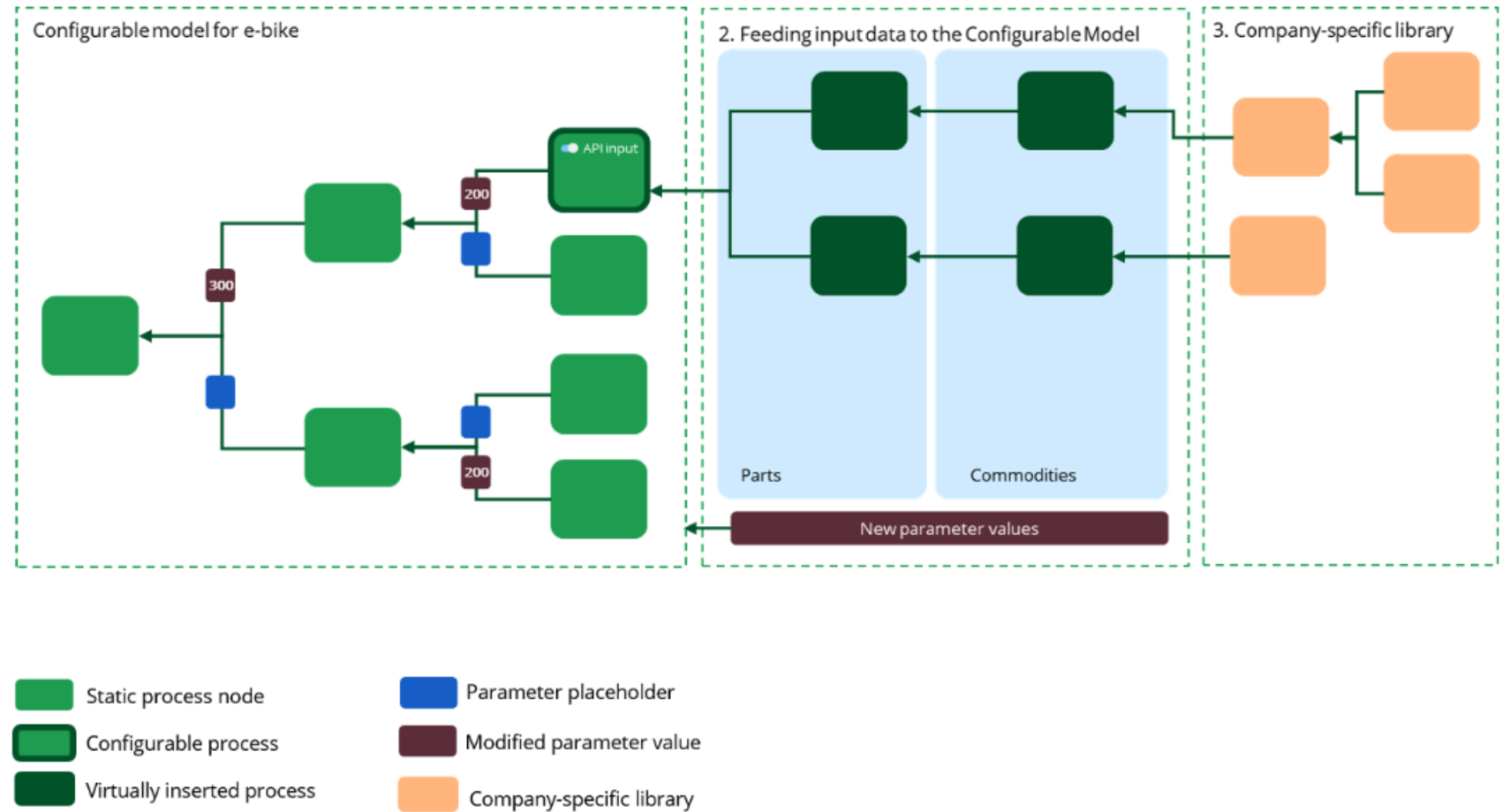
Product Category Templates (PCTs)

Open-source templates to support upscaling, comparability, compliance for product categories

Conrad Spindler, GreenDelta GmbH

Brightcon 2025, Grenoble

Companies use more and more parameterized and easy to configure LCA models.



AN ILLUSTRATION OF A CONFIGURABLE LCA MODEL THAT IS ENRICHED WITH INPUT DATA VIA API

But often it is like a very new tool or not disclosed to the public or company specific.



Flori Footprint Tool - Grower Portal

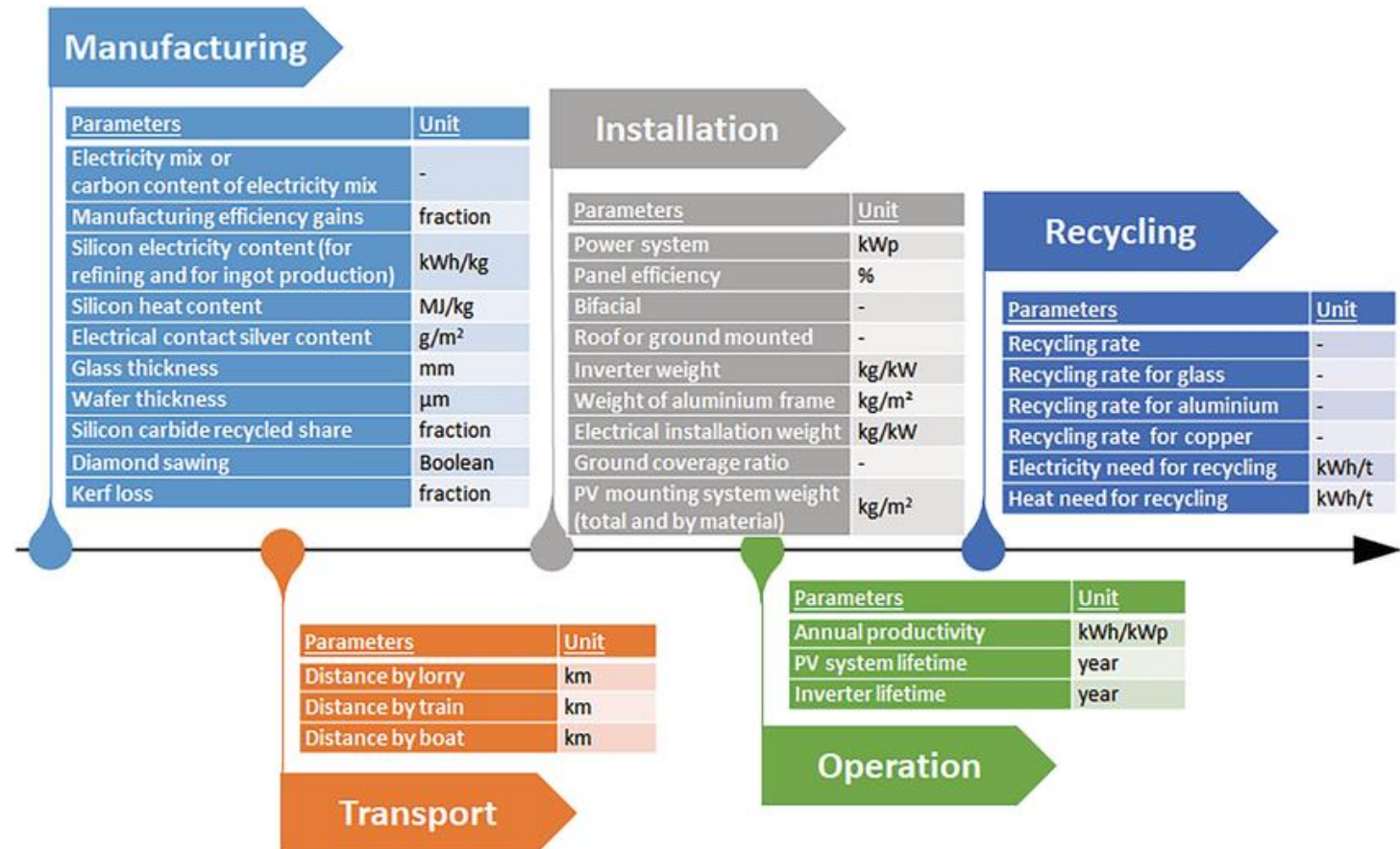
Most important features and possibilities listed:

- ▶ Environmental impact at **product- and location level**, calculated simultaneously
- ▶ Calculate **unlimited number of products**
- ▶ Process data easily
- ▶ **Visual insight** in results
- ▶ Footprint declaration document: your data at hand for questions from customers
- ▶ Possibility for **an API connection** with registration systems (not included)
- ▶ Create unlimited **scenarios** at product level

€**2.375**
per year

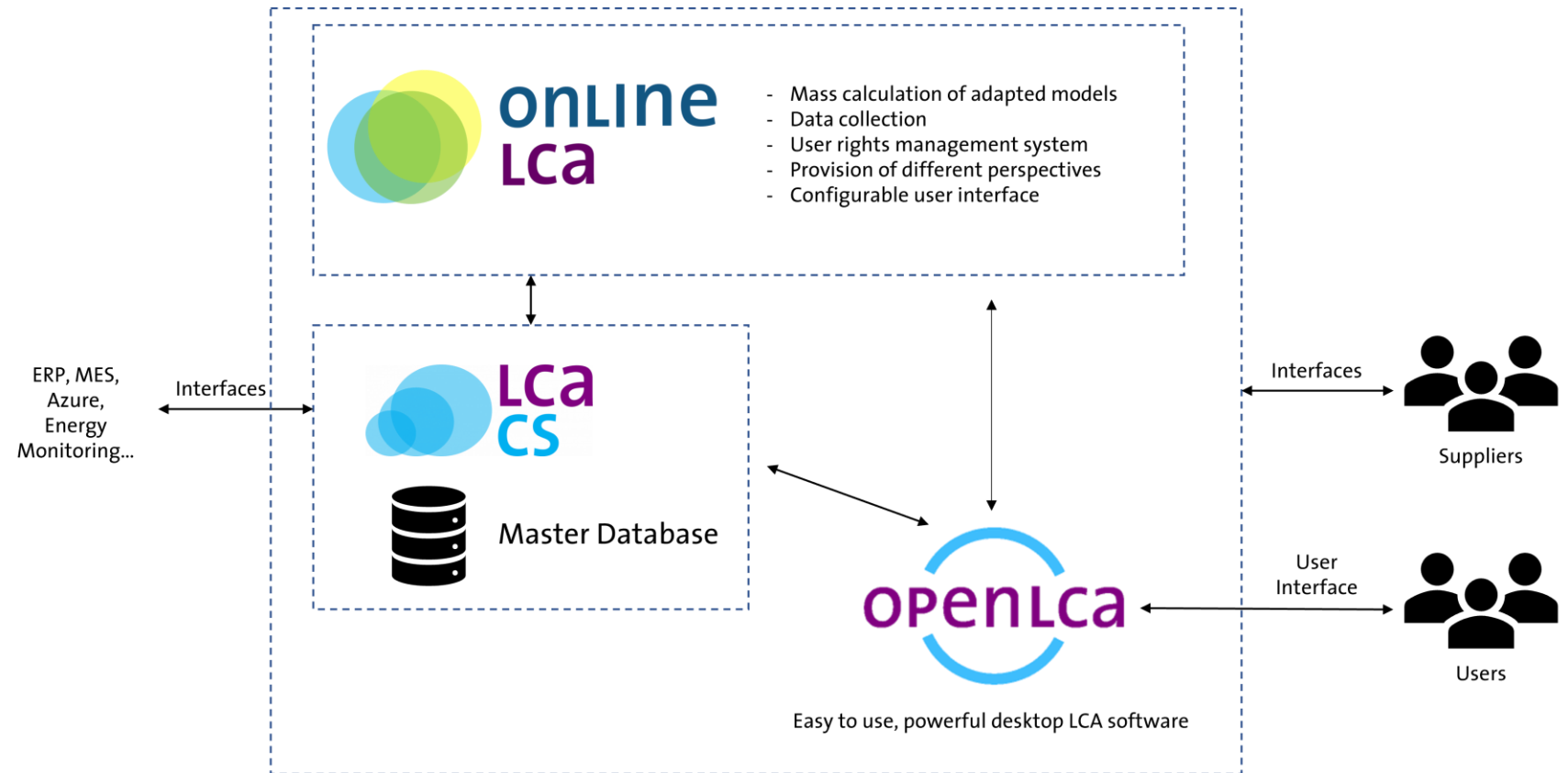
Also Brightway
obviously has many
configurable models.
e.g. PARASOL_LCA

But I want to take a step
back and create a more
general concept.
→ The tool / model can
be shared in LCA formats



Also at GreenDelta we have developed onlineLCA to serve the need from customers for configurable models.

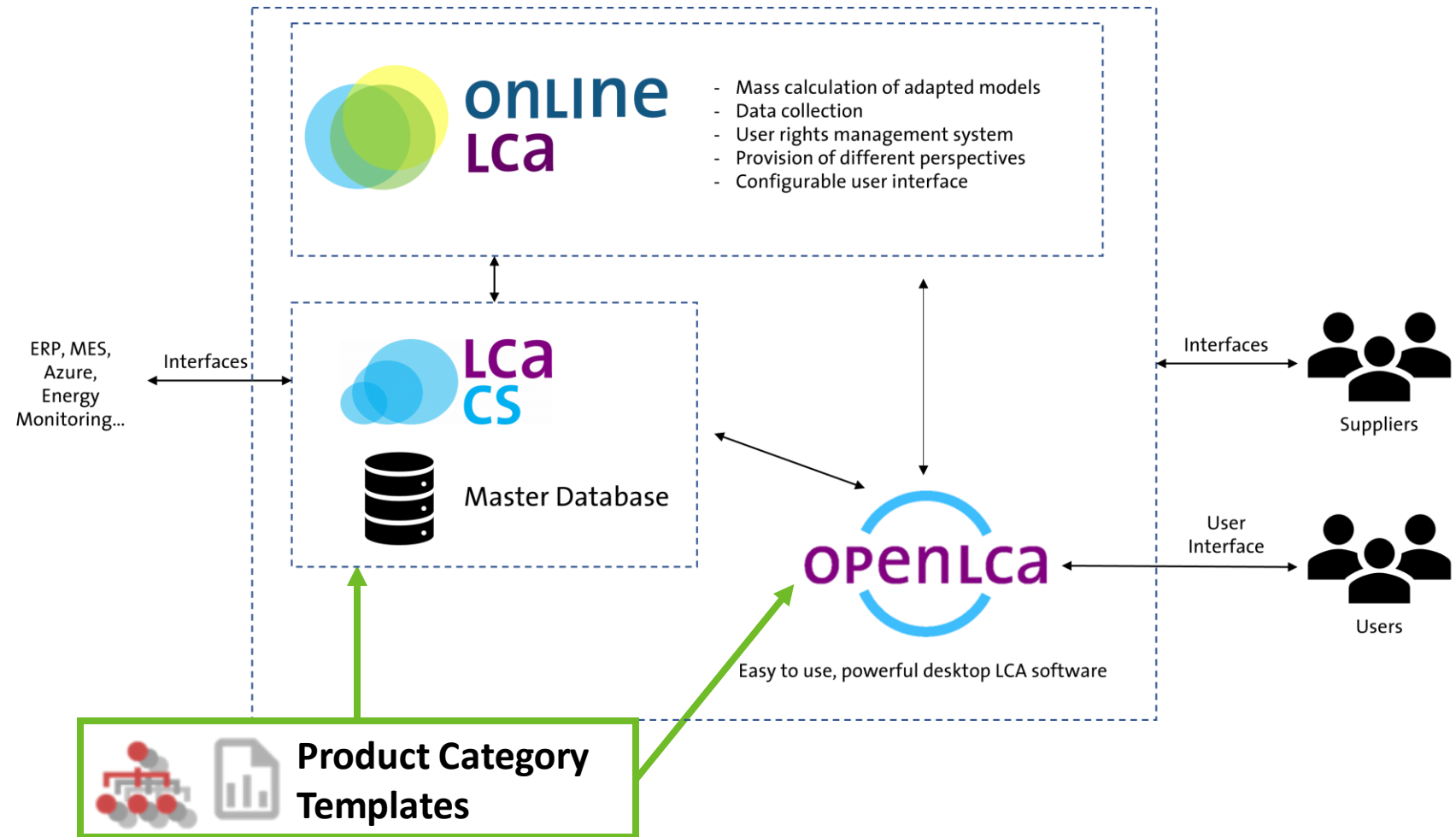
It can be private or disclosed to the public with licensing, but serves a different purpose.

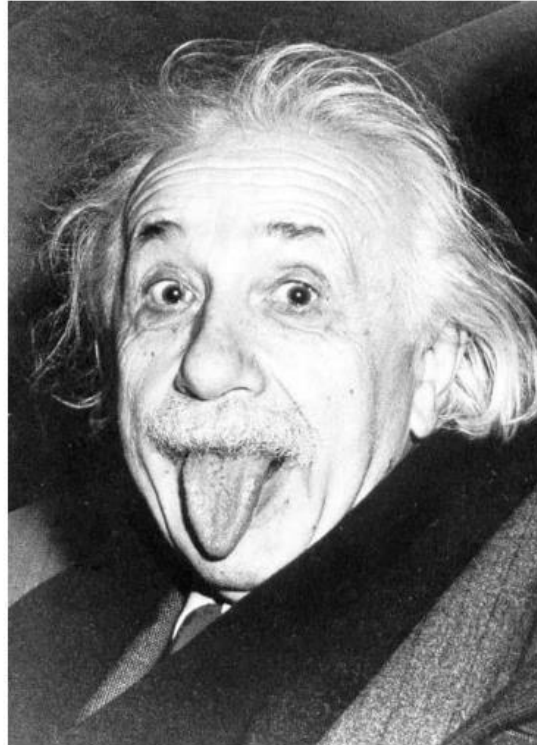


Product Category Templates

For research projects and public review or improvements of such configurable models by the community, we need a common concept.

→ Product Category Templates (PTCs)





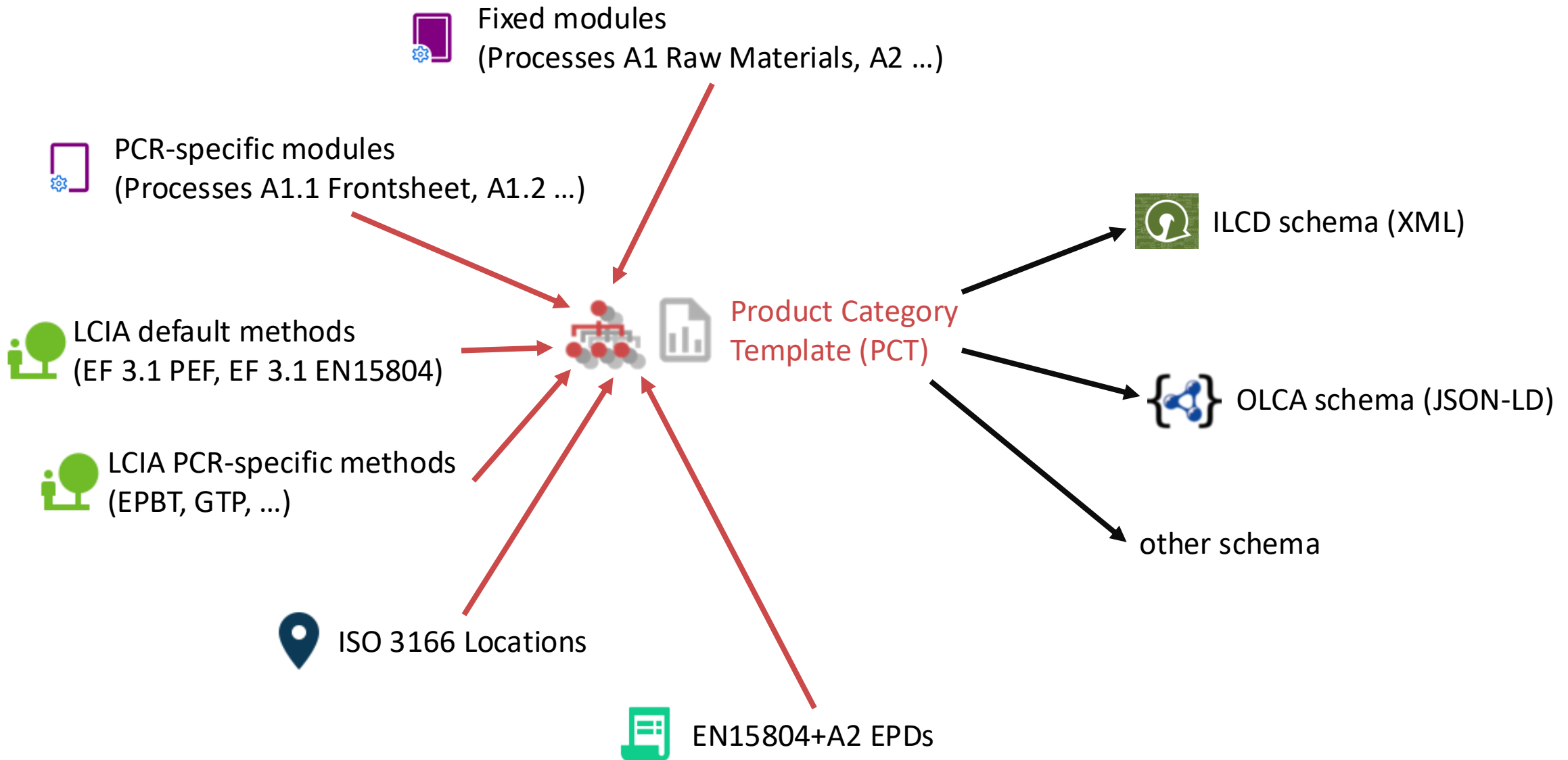
“Everything
should be made
as simple as
possible. But
not simpler.”

-Albert Einstein

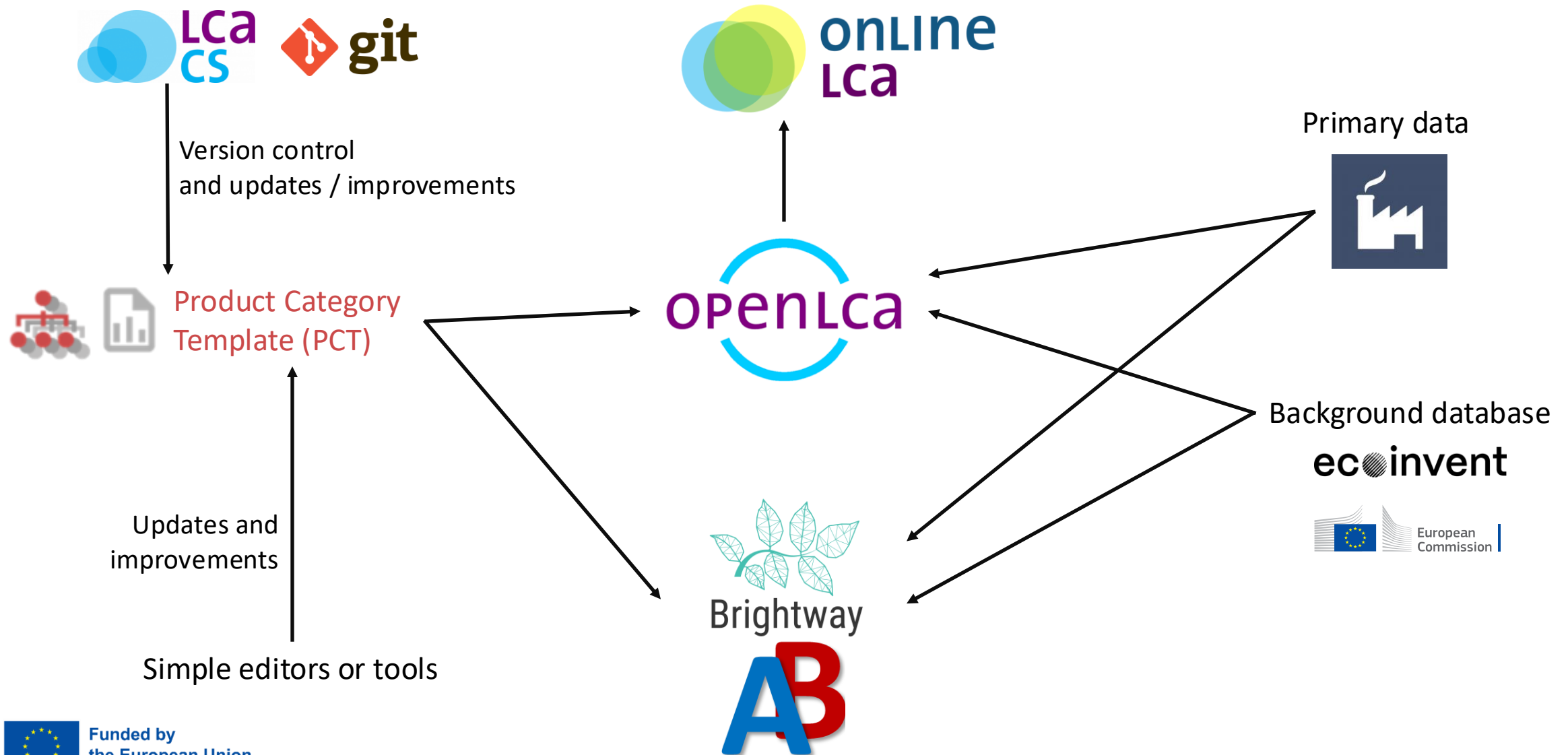
Concept

- Open data formats like JSON-LD or at least ILCD format
- Only essential database elements for data packages of a few megabytes
- PCTs contains rigid base modules (unit processes) with functional / declared units
- PCTs contain sub-modules (unit processes) that are specific to the product category
- Parameters are reduced to necessary minimum, plus optional dependent parameters
- Important EPD and PEF methods included by default (ecoinvent or EF compliant)
- Additional methods from guidelines / PCRs (e.g. EPBT, Material criticality ...)
- Product group specific EPDs already included if needed (e.g. inverter, glass, ...)
- Main foreground exchanges categorized and pre-linked to latest ecoinvent or EF data

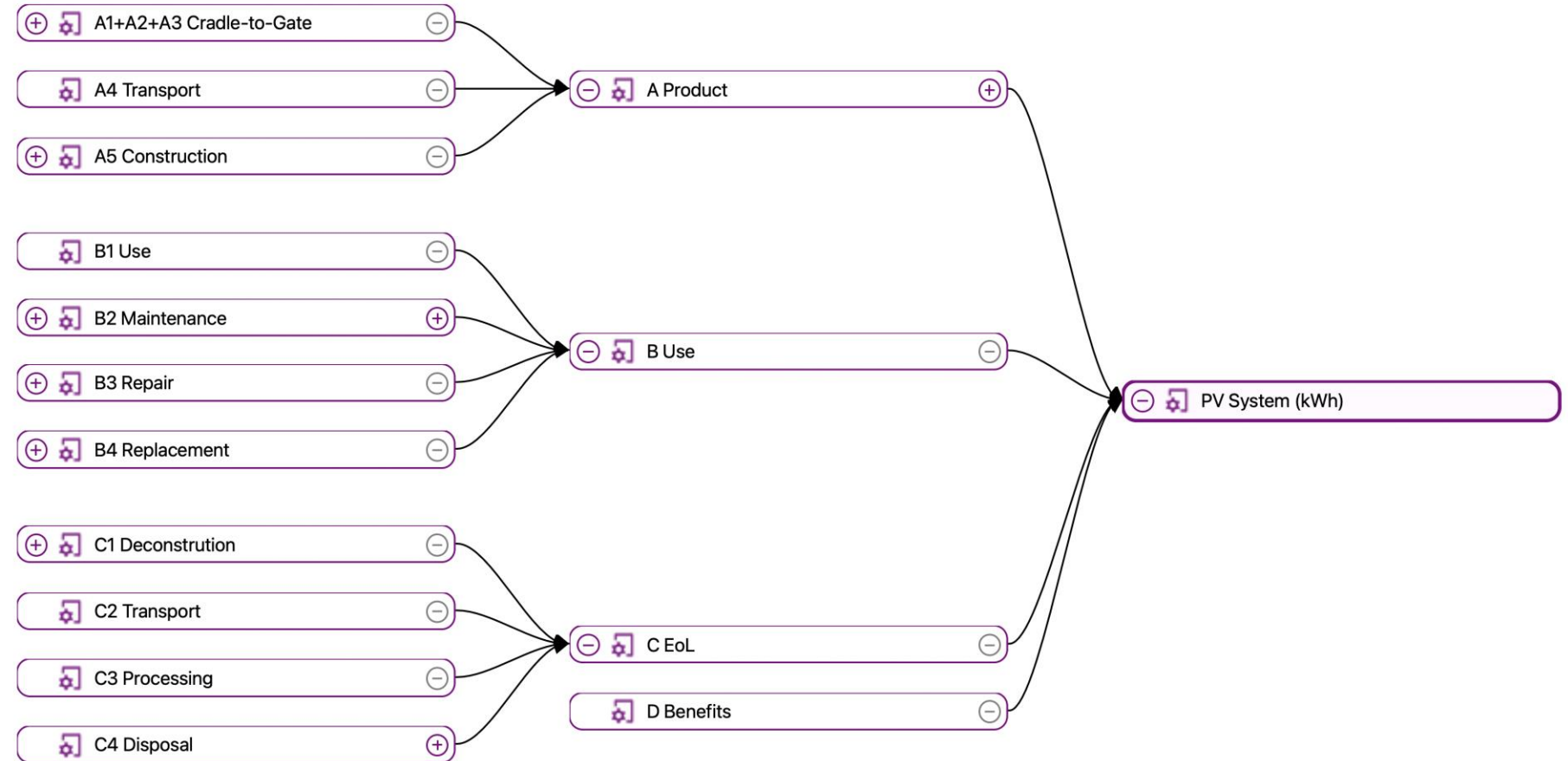
Concept

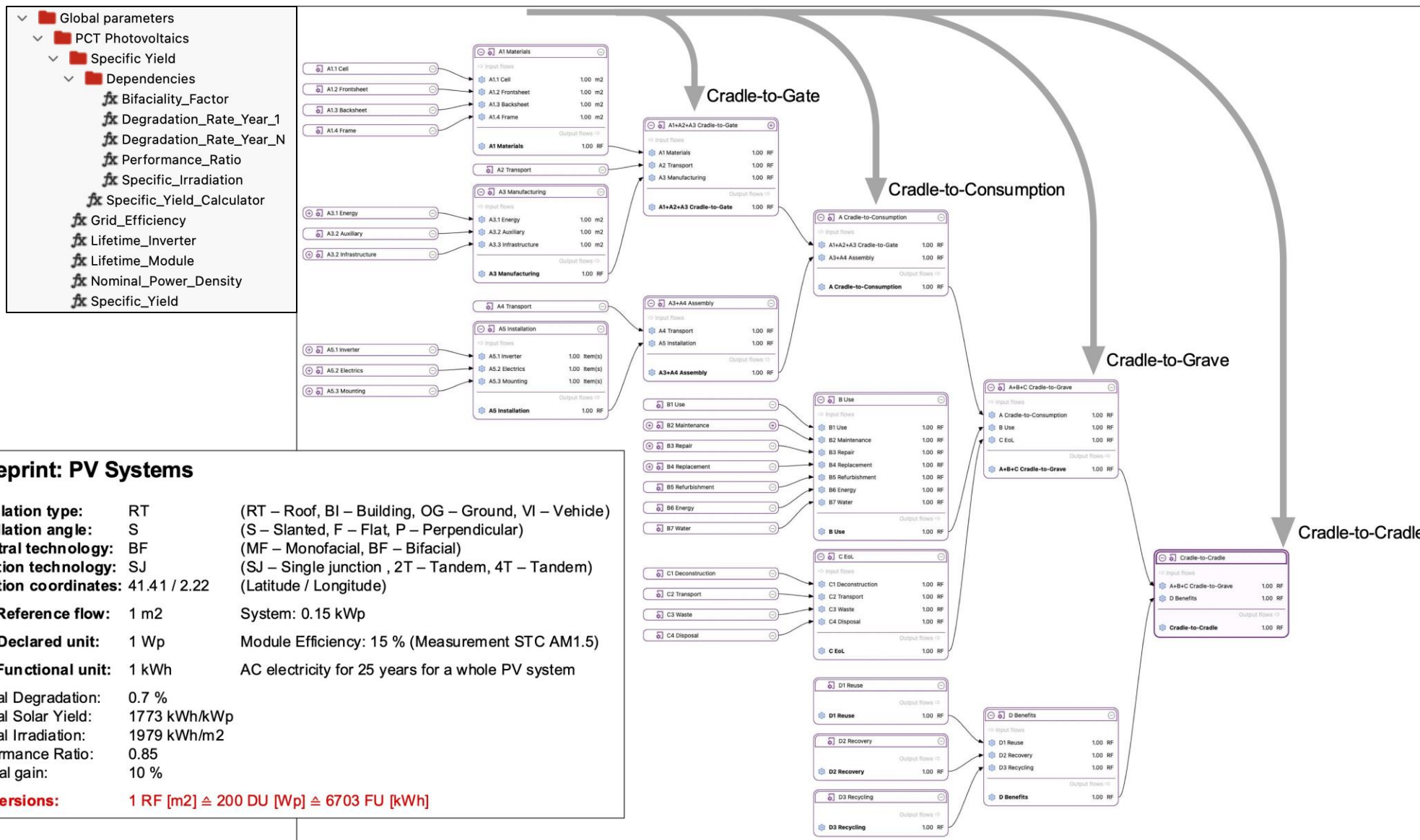


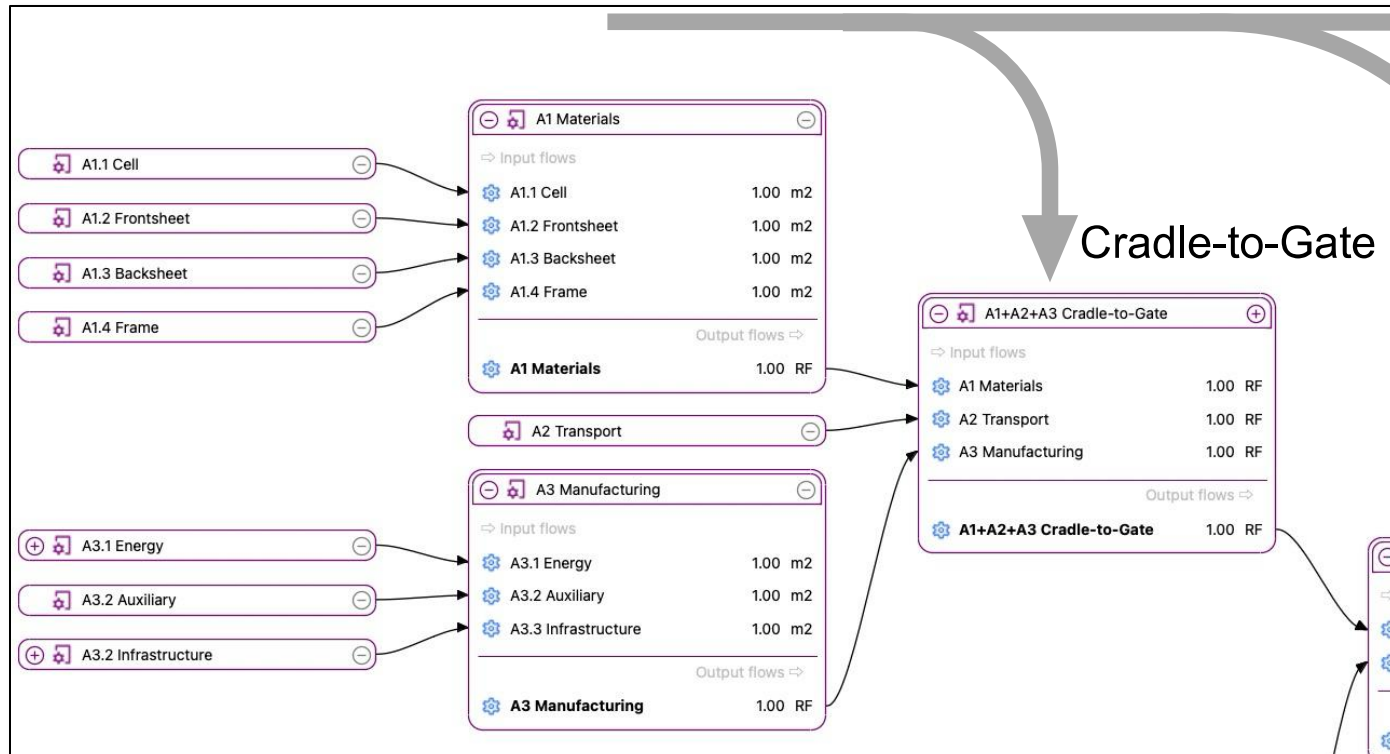
Concept

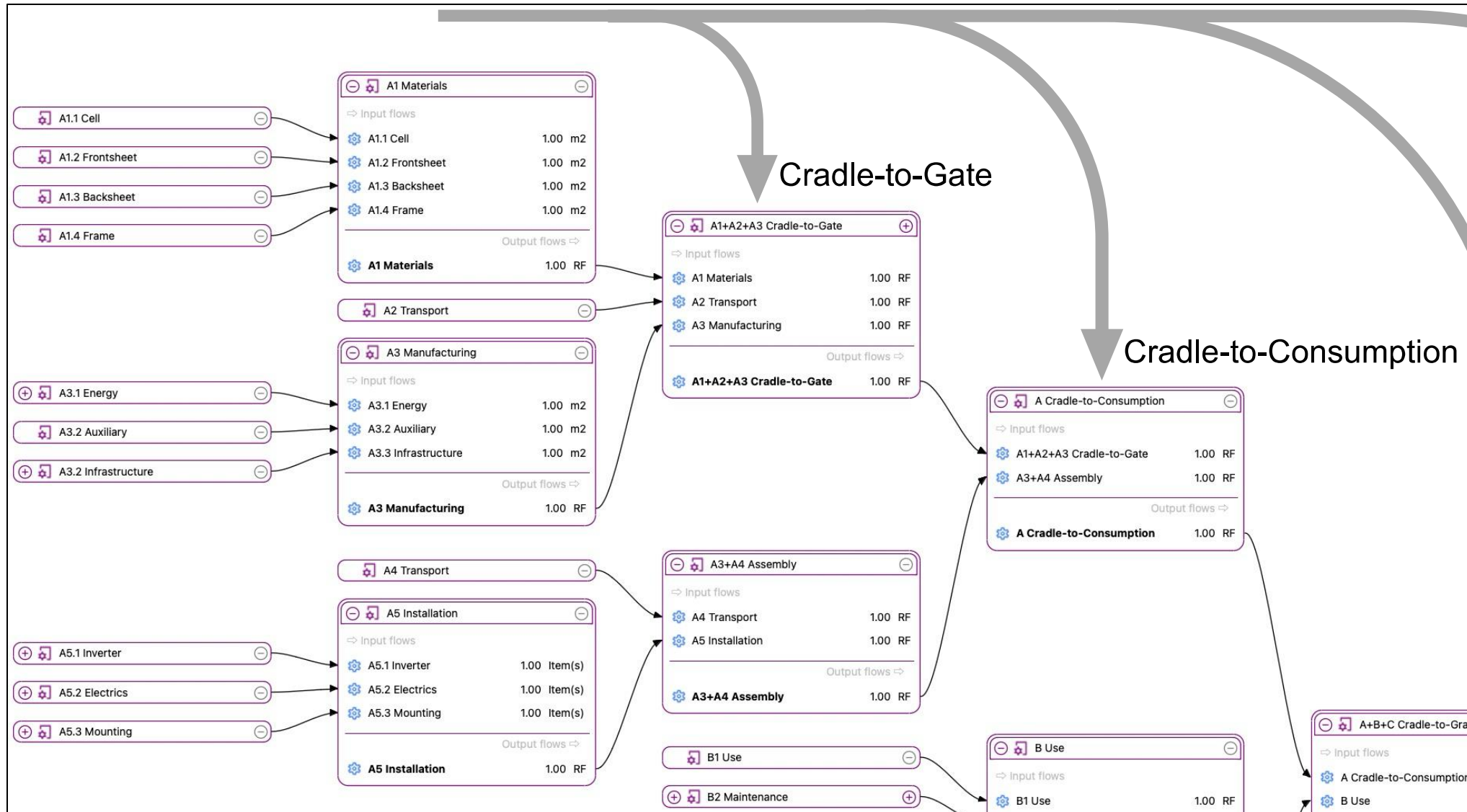


The base level is always similar, except for the functional unit or declared unit that depends on the product group.



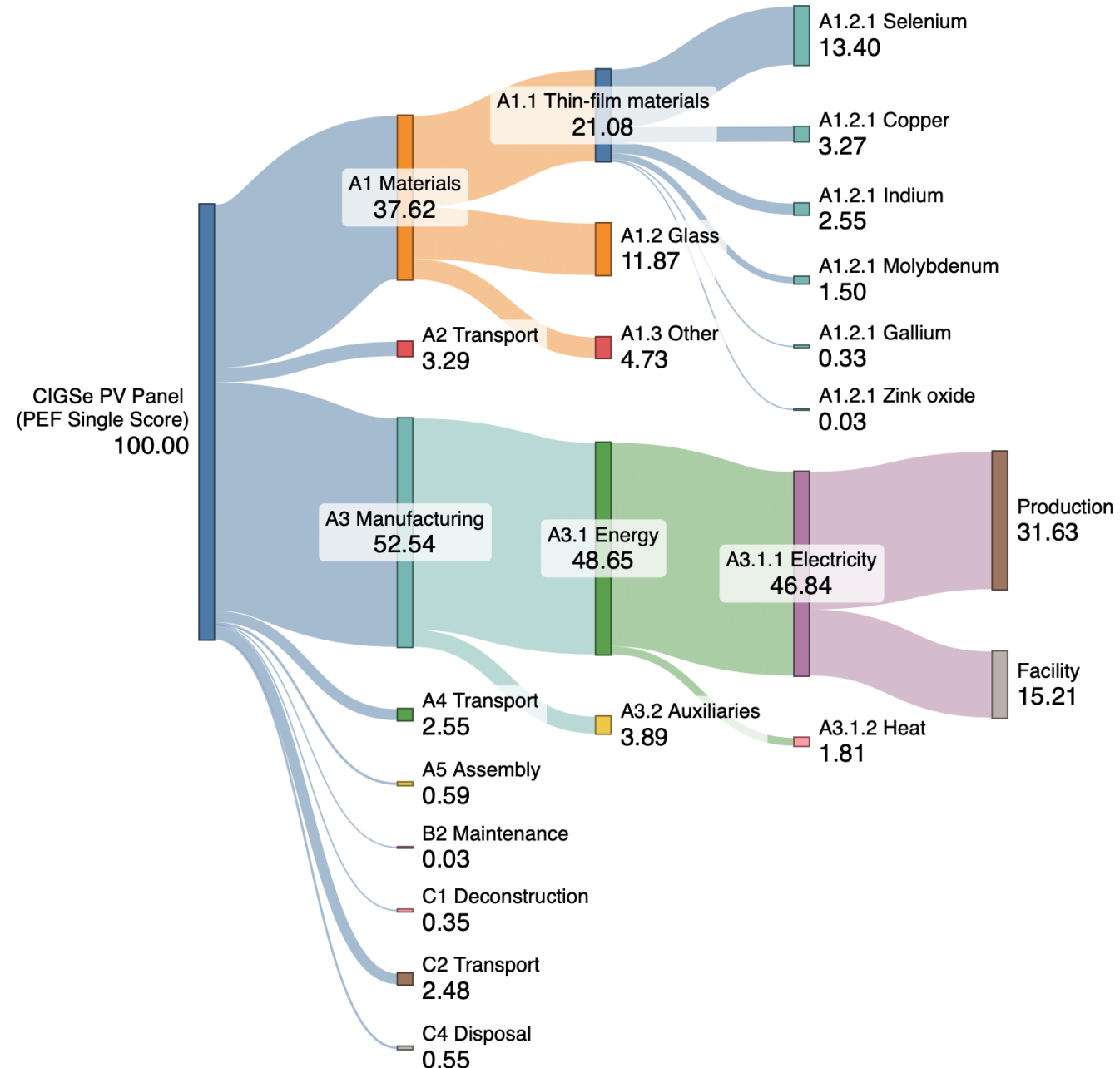






From a PCT, we can much easier derive harmonized Sankey diagrams.

Here shown for a CIGSe PV panel and the relative PEF single score normalized to 100%.



Parameters for PCT

- Reducing parameters to an absolute minimum → “the less the merrier”
- Additional dependent parameters should be grouped as “calculators” → users can decide to use the minimum amount of parameters or use additional ones
- Parameter calculations should be reviewed and updated/improved over time

Mandatory

~~fx~~ Grid_Efficiency
~~fx~~ Lifetime_Inverter
~~fx~~ Lifetime_Module
~~fx~~ Nominal_Power_Density
~~fx~~ Specific_Yield

Optional

▼  Specific Yield
 ▼  Dependencies
 ~~fx~~ Bifaciality_Factor
 ~~fx~~ Degradation_Rate_Year_1
 ~~fx~~ Degradation_Rate_Year_N
 ~~fx~~ Performance_Ratio
 ~~fx~~ Specific_Irradiation
 ~~fx~~ Specific_Yield_Calculator

And many more optional parameters

- It is a bit like a tool inside a tool as LCA data sets (here openLCA)
- From categorized products you can select all process provider or EPDs that fit the purpose
- Of course you can and should also add your own primary data processes

Inputs/Outputs – PV Panel | CIGSe | Hi-BITS Standard

▼ Inputs

Flow	Category	Amount	Unit	Provider
A1.1 Frontsheet	PCT Photovoltaics	1.00000	m2	Frontsheet Glass 2.0mm Custom - RER
A1.2 Encapsulation	PCT Photovoltaics	1.00000	m2	Frontsheet Glass 2.0mm Custom - RER
A1.3 Cell	PCT Photovoltaics	1.00000	m2	Frontsheet Glass 2.0mm+AR Custom - RER
A1.4 Backsheet	PCT Photovoltaics	1.00000	m2	Frontsheet Glass 3.2mm Custom - RER
A1.5 Diode	PCT Photovoltaics	1.00000	m2	Frontsheet Glass 3.2mm+AR Custom - RER
A1.6 Frame	PCT Photovoltaics	1.00000	m2	Frontsheet Glass 4.0mm Custom - RER
A1.7 Auxiliary	PCT Photovoltaics	1.00000	m2	Frontsheet Glass 4.0mm+AR Custom - RER
A3.1 Energy	PCT Photovoltaics	1.00000	m2	Energy CIGSe ecoinvent 3.11 - RER
A3.2 Infrastructure	PCT Photovoltaics	1.00000	m2	Infrastructure Generic ecoinvent 3.11 - GLO

▼ Outputs

Flow	Category	Amount	Unit	Provider
PV Panel	PCT Photovoltaics	1.00000	m2	

EPDs can be directly included in the PCT for modeling

- Even product group specific EPDs can be already included in the PCT file if wanted
- Can be imported and exported with ILCD+EPD
- Can be connected as provider to exchanges as with any other process
- Limitation that LCIA method used must be EF 3.1 EN15804 when using EPDs



Building a new PCT from scratch:

Modularization

- Creating main modules (= unit processes) that are equal for all PCTs
- Creating sub-modules (= unit processes) that are specific to PCTs

Parameterization

- Creating linking and parameters needed for the PCT

Categorization

- Categorizing product flows of main providers into single flows for quick modelling

Interoperability

- Export into ILCD or JSON-LD and make publicly available

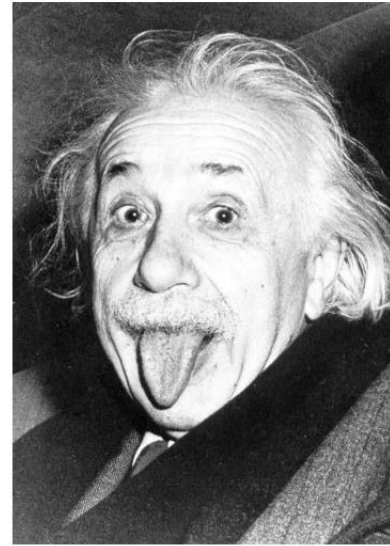


Funded by
the European Union



Thank you for your attention!

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GreenDelta GmbH
spindler@greendelta.com



“Everything
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possible. But
not simpler.”

-Albert Einstein



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