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User's meeting

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1. Presenting the new features of ecoinvent v3
2. Data suppliers
3. End user
4. Group's dicussion

The new features of the v3

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Introducing the new features of the v3

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- Flexible **system modelling**
- New **mathematical** dimensions
- Characterising the **flows**
- Better integration of **geographical** dimensions

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New dimensions in system modelling

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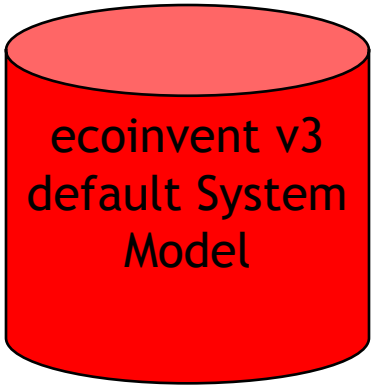
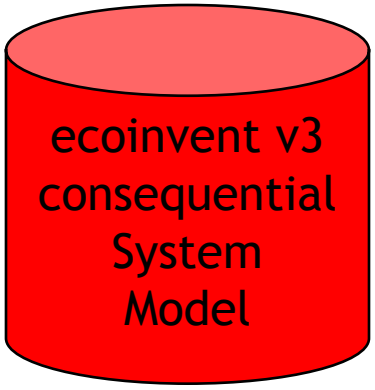


- All activities supply the market (average suppliers).
- By-products are allocated.



- Unconstrained (marginal) suppliers.
- By-products are treated by substitution (system expansion).

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New dimensions in system modelling

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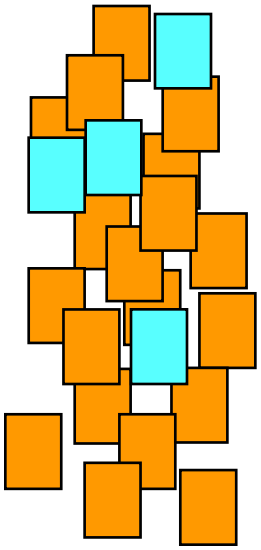
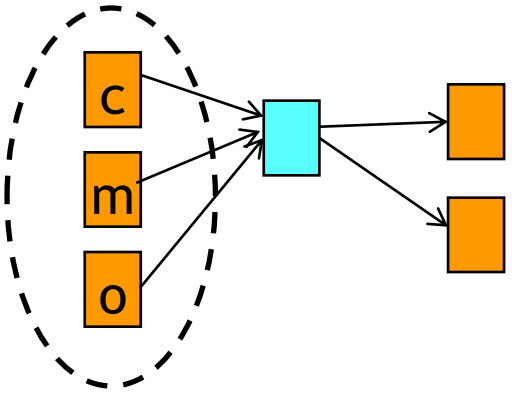
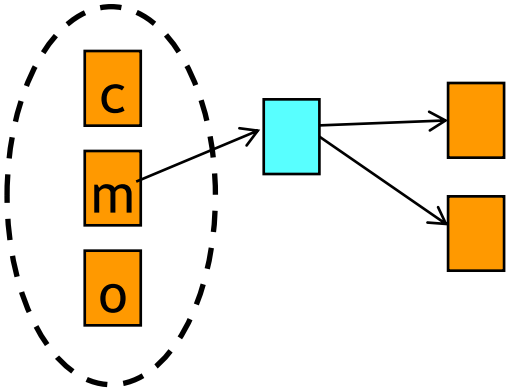


Unlinked
Unit Processes

Model without constraints (average suppliers)



Modelling technology constraints using technology level



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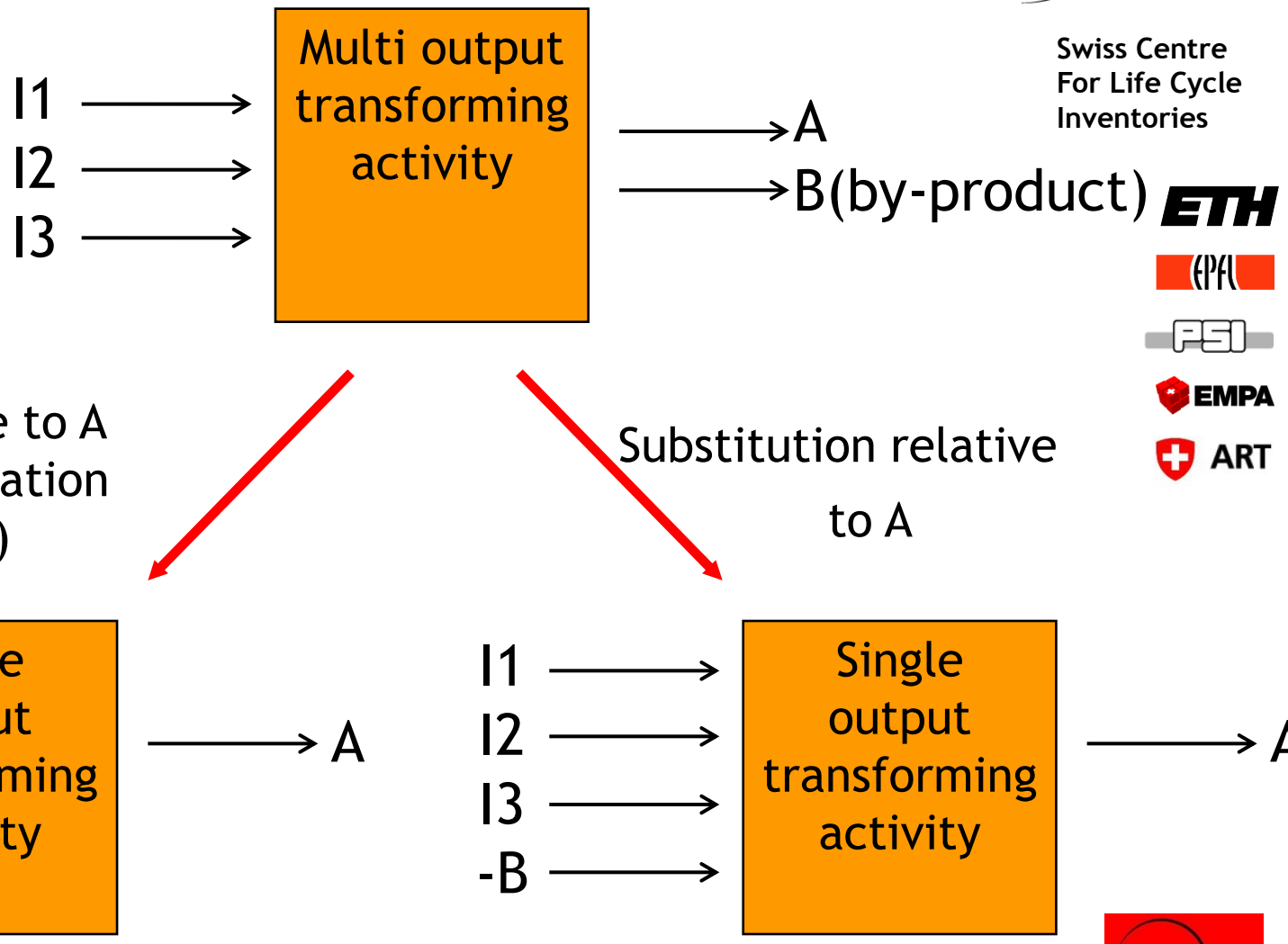
New dimensions in system modelling



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New data supply

- Freeware for creation, edition and review of v3 inventories.

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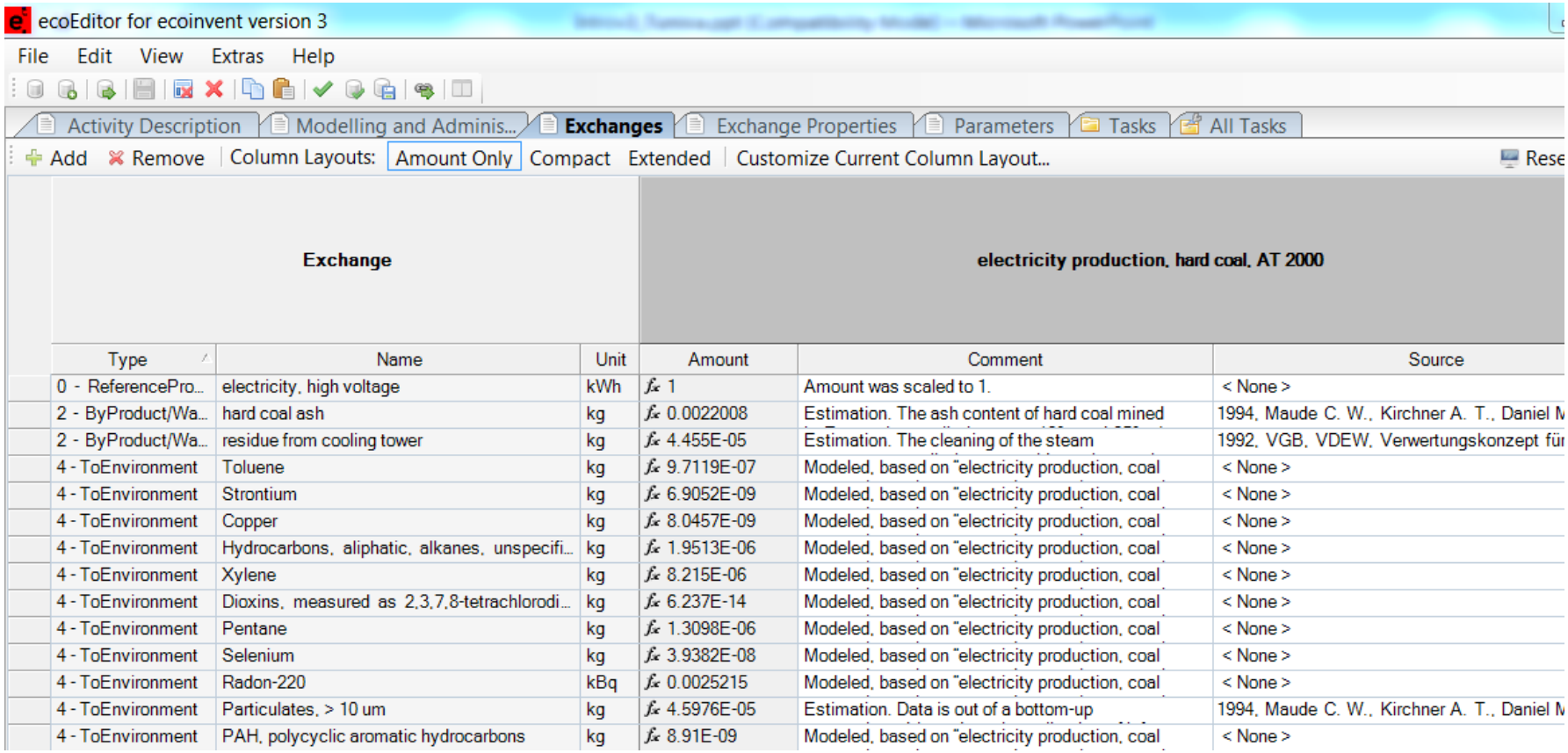

Exchange			electricity production, hard coal, AT 2000		
Type	Name	Unit	Amount	Comment	Source
0 - ReferencePro...	electricity, high voltage	kWh	1	Amount was scaled to 1.	< None >
2 - ByProduct/Wa...	hard coal ash	kg	0.0022008	Estimation. The ash content of hard coal mined	1994, Maude C. W., Kirchner A. T., Daniel M
2 - ByProduct/Wa...	residue from cooling tower	kg	4.455E-05	Estimation. The cleaning of the steam	1992, VGB, VDEW, Verwertungskonzept für
4 - ToEnvironment	Toluene	kg	9.7119E-07	Modeled, based on "electricity production, coal	< None >
4 - ToEnvironment	Strontium	kg	6.9052E-09	Modeled, based on "electricity production, coal	< None >
4 - ToEnvironment	Copper	kg	8.0457E-09	Modeled, based on "electricity production, coal	< None >
4 - ToEnvironment	Hydrocarbons, aliphatic, alkanes, unspecifi...	kg	1.9513E-06	Modeled, based on "electricity production, coal	< None >
4 - ToEnvironment	Xylene	kg	8.215E-06	Modeled, based on "electricity production, coal	< None >
4 - ToEnvironment	Dioxins, measured as 2,3,7,8-tetrachlorodi...	kg	6.237E-14	Modeled, based on "electricity production, coal	< None >
4 - ToEnvironment	Pentane	kg	1.3098E-06	Modeled, based on "electricity production, coal	< None >
4 - ToEnvironment	Selenium	kg	3.9382E-08	Modeled, based on "electricity production, coal	< None >
4 - ToEnvironment	Radon-220	kBq	0.0025215	Modeled, based on "electricity production, coal	< None >
4 - ToEnvironment	Particulates, > 10 um	kg	4.5976E-05	Estimation. Data is out of a bottom-up	1994, Maude C. W., Kirchner A. T., Daniel M
4 - ToEnvironment	PAH, polycyclic aromatic hydrocarbons	kg	8.91E-09	Modeled, based on "electricity production, coal	< None >

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New mathematical dimensions

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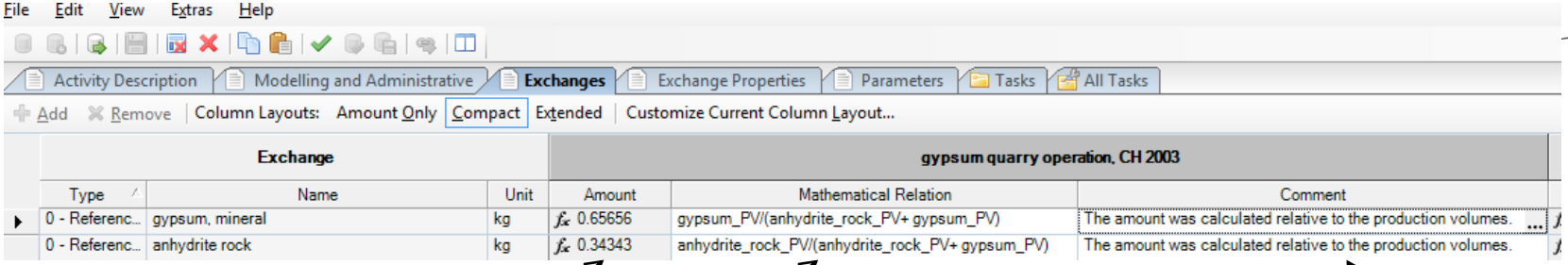
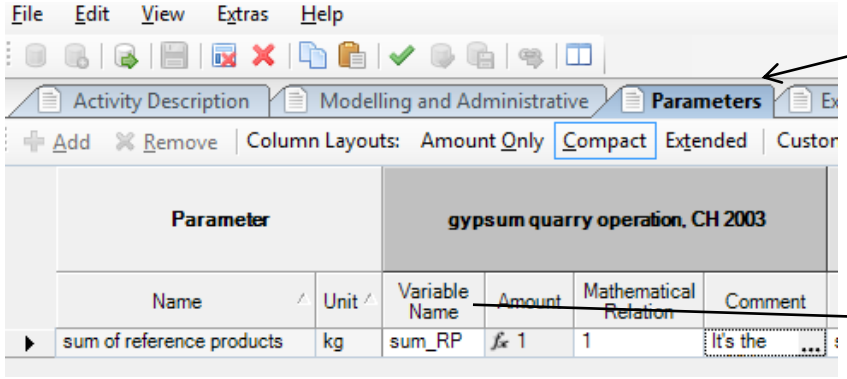


Amount

Formula

Explanation

Parameters



Variable names can be used in formulas, e.g. to express how in combined production an exchange is physically related to a (co-)product output

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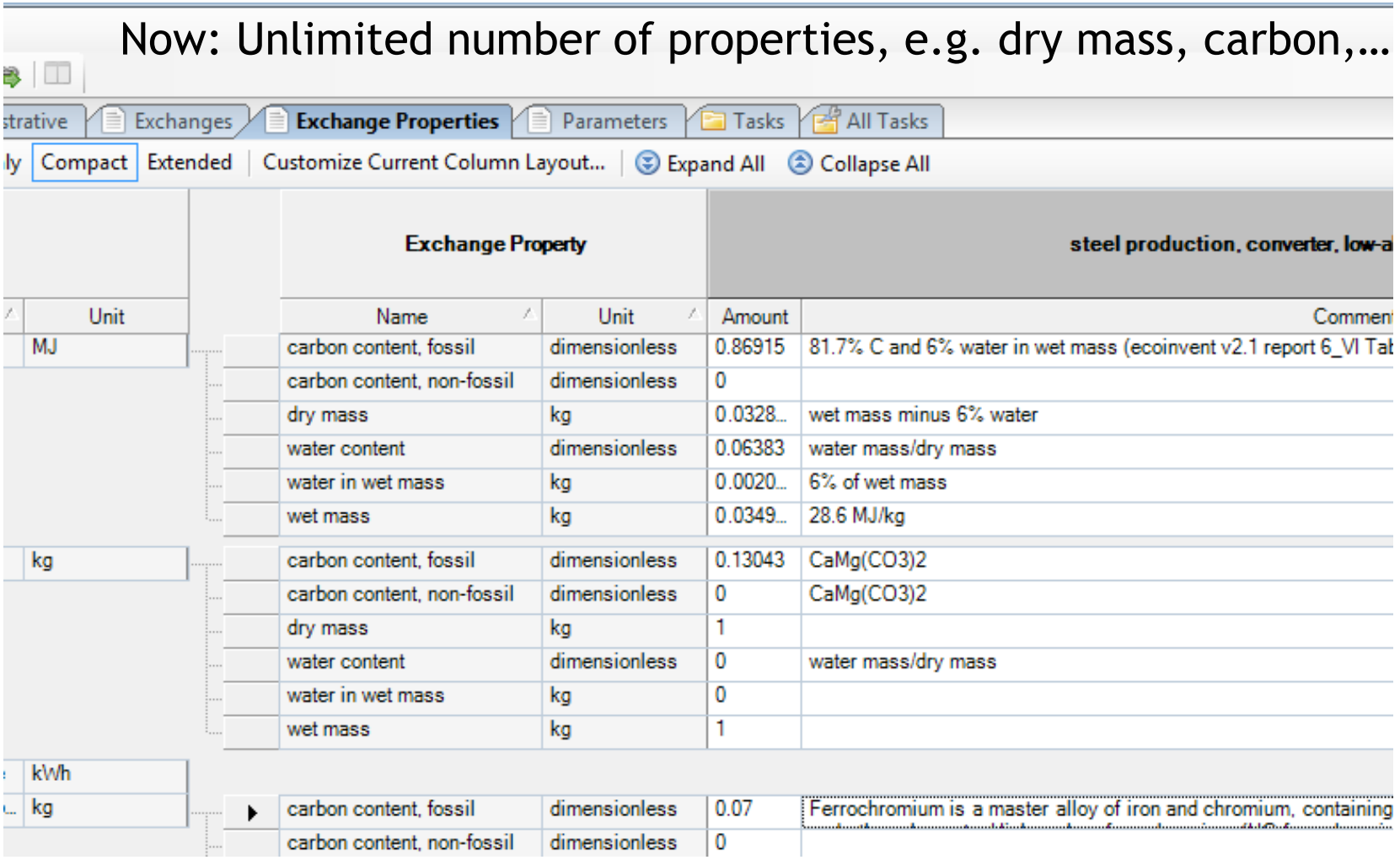
Characterizing the flows: properties

Previously one-dimensional: Only one amount and one unit

Now: Unlimited number of properties, e.g. dry mass, carbon,…



strative | Exchanges | **Exchange Properties** | Parameters | Tasks | All Tasks

ly | Compact | Extended | Customize Current Column Layout... | Expand All | Collapse All

Unit		Exchange Property			steel production, converter, low-a
		Name	Unit	Amount	Comment
MJ		carbon content, fossil	dimensionless	0.86915	81.7% C and 6% water in wet mass (ecoinvent v2.1 report 6_VI Tab
		carbon content, non-fossil	dimensionless	0	
		dry mass	kg	0.0328...	wet mass minus 6% water
		water content	dimensionless	0.06383	water mass/dry mass
		water in wet mass	kg	0.0020...	6% of wet mass
		wet mass	kg	0.0349...	28.6 MJ/kg
kg		carbon content, fossil	dimensionless	0.13043	CaMg(CO3)2
		carbon content, non-fossil	dimensionless	0	CaMg(CO3)2
		dry mass	kg	1	
		water content	dimensionless	0	water mass/dry mass
		water in wet mass	kg	0	
		wet mass	kg	1	
kWh					
kg		carbon content, fossil	dimensionless	0.07	Ferrochromium is a master alloy of iron and chromium, containing
		carbon content, non-fossil	dimensionless	0	

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Coping with regionalisation: child datasets

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- Start out as copy of the parent
- Values can be changed relative to the parent or overwritten completely
- Optional – independent datasets can serve the same function

	Exchange				electricity production,		
	Type	Name	Unit	Compartment	Amount	Variable Name	Mathematical Relation
	0 - Referenc...	electricity, high voltage	kWh		1		
	2 - ByProdu...	residue from cooling tower,...	kg		fx 0.000424...	amount_residue	ParentValue * 8
	2 - ByProdu...	hard coal ash, 0% water	kg		fx 0.056794	amount_ash	ParentValue * 1.2
	4 - ToEnviro...	Lead-210	kBq	air	9.66173170...		
	4 - ToEnviro...	Cobalt	kg	air	1.15031444...		
	4 - ToEnviro...	Selenium	kg	air	4.09224628...		
	4 - ToEnviro...	Propene	kg	air	2.95071439...		
	4 - ToEnviro...	Methane, dichloro-, HCC-30	kg	air	2.71338586...		
	4 - ToEnviro...	Strontium	kg	air	5.02695308...		

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New geographical dimensions

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- Towards a truly global database:
  - global datasets required for every locally implemented activity
  - global market datasets for every product
  - cooperation with local data networks
- Parent/Child functionality to make maintenance of large amounts of local datasets easier
- Geographies now defined with GIS coordinates:
  - automatic linking of supply chains using local markets

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The data supply revolution

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New dimensions in data supply

- Decentralisation of data supply: open to any supplier
- More central data additions and consistency checks

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Data providers

Central
additions

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New dimensions in data supply

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- Decentralisation of data supply
- More central data additions and consistency checks

  Not a contradiction:

  - more data decentralized providers, but also
  - **limiting** demand on data providers for data they may not have:
    - Who produces the inputs?
    - What allocation factors to apply?
    - Is my output a by-product or a waste?
    - What is the production and consumption mix?
    - What is the price of the products?
    - What is the elemental composition?
    - What is the transport distance and mode?
    - What is the amount and type of packaging?

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Implications for data providers

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- No requirement to **link to specific producing activities**, product inputs available that are linked to **market** inputs
- No requirement to provide **allocation factors** (optional)
- No requirement to **distinguish** between by-products, recyclable materials or wastes
  - Database automatically identifies **materials for treatment**
- No need to **supply market datasets**
  - A **global** market is autogenerated for new products
  - Local markets or other information **can be added**

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Implications for data providers

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- Correct **choice** of intermediate **outputs** is important
  - Choice determines the **market** & **alternative producers**
- **Reference product** needs to be specified
- **Technology level** should be considered (optional)
  - Determines marginal suppliers in the consequential system model
- Contribution to existing markets shall be provided
  - Specified via production volumes of activities
- **New requirements** – **detailed guidance** is provided

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New dimensions in data supply

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- So more and more of data are or will be supplied by central projects or routines, while still being editable by individual data providers.
- Both these trends are likely to increase in the **future**:
  - Crowd sourcing: More and more people involved in data supply and editing through increasingly easy tools
  - Cross-cutting data complementation, e.g. for consistency in reporting of toxic emissions, or adding new exchanges such as water, noise and social indicators

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Why would you become a data provider for ecoinvent? (1/2)

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- ecoinvent is **independent** and organized as a **non-profit** organization
- one of the **most trusted** LCI sources
- apply **thorough review process,** high quality is ensured
- ecoinvent is **fully transparent,** every value is documented including uncertainty information
- offer possibility for companies to present data in a way that **confidentiality is respected**, without compromising the transparency

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Why would you become a data provider for ecoinvent? (2/2)

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- **share your research** with experts all around the world
- datasets are presented with the **name of the data provider** and her/his contact information
- you **invest only your time**, we offer consulting on how to use our tool (ecoEditor) and review by an expert
- companies can demonstrate their **environmental commitment** by making their data available through ecoinvent

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Internasionalisation & v3

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- SECO project for dataset collection

India

- SECO project for dataset collection

South Africa

- SECO project for dataset collection

Brazil

- Colaboration for the development of a National Database in Québec

Canada

- UNIDO/SECO project for dataset collection

Tunisia

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Why partner with an existing LCI DB?

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- Retour from CIRAIG:
  - Quicker
  - Cheaper
  - Instantaneous integration in process networks

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Instantaneous creation of supply chains

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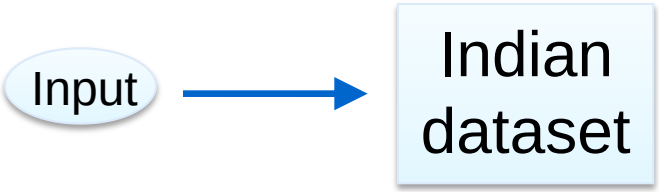

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Instantaneous creation of supply chains

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Instantaneous creation of supply chains

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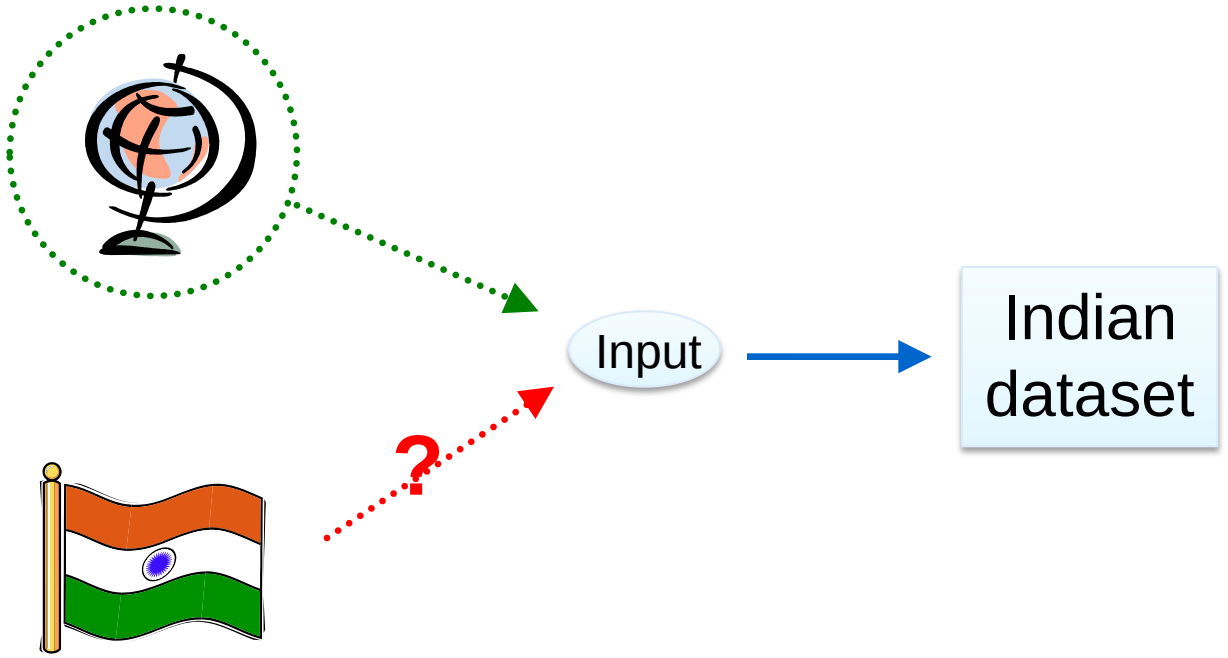

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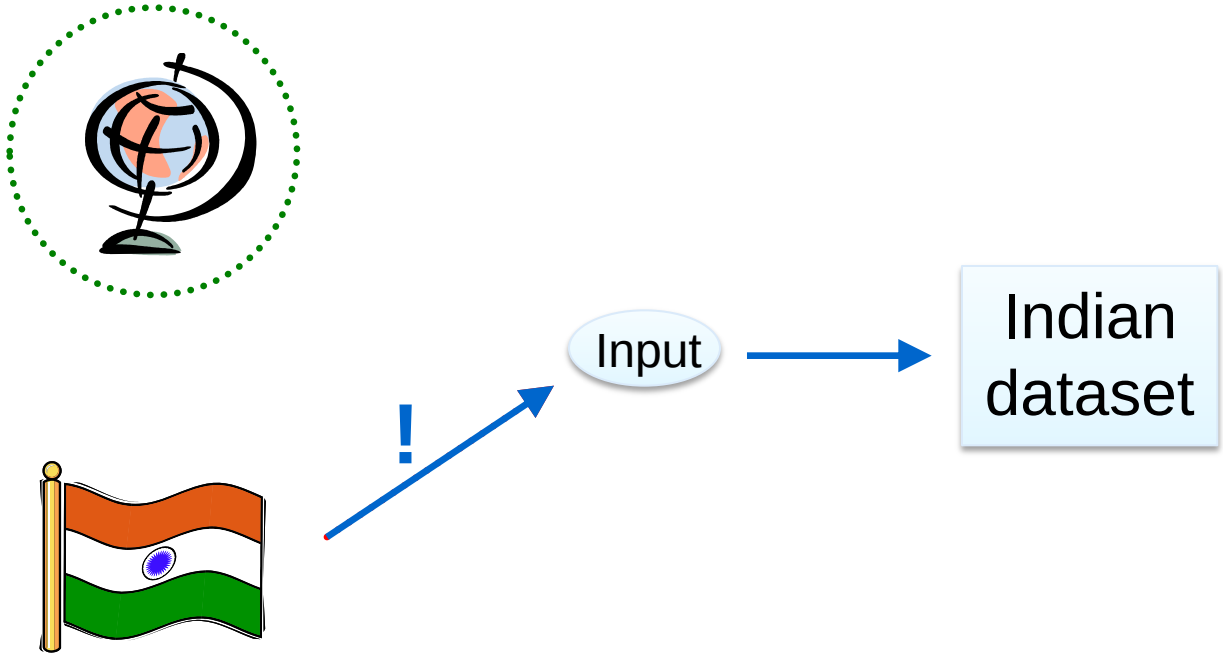
Instantaneous creation of supply chains



Why partner with ecoinvent? (CIRAIG)

- Unit process level database
- Comprehensiveness
- Coherence
- Uncertainty
- Use and resilience
- Expected methodological development (consequential model, regionalisation, IO, …)
- Openness towards other ideas
- Free data review
- Tools to submit data

Internationalization

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- The ecoinvent Centre is building a **network of collaboration partners**
- We wish to support other LCI initiatives by **offering** our **structure** and **experience**
- **Integrating** with existing data helps to **create datasets** and to reach **critical mass** for high quality database
- Transparent **unit-process** inventory modeling **facilitates** cooperation and data exchange

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Welcome end users of the v3!

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The v3: implications for end users

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- **Multiple system models** are available
  - Different system models serve **different purposes**, so the **applicability** of the ecoinvent database is broadened
  - Based on the **same underlying data** → discussion on system model choice is removed from discussion on data quality
  - Results will be **significantly different** between system models for certain products
    - Areas of significant technological change
- Existing data in ecoinvent is **automatically updated** with improved supply chain data over updates

The v3: implications for end users

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- **Consistency** with the existing approach is maintained in the **"Allocation, Default"** system model
- Data for **new system models** (technology levels, constraints) do not affect the quality of the default model
- **Linked unit processes**, cumulated **system inventories** and **impact assessment** results are all available
  - Data available on homepage in **ecospold2** and as **excel-sheets**

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New dimensions in size

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- Above 9000 datasets (more than double from v2.2)
- Approx. 6000 transforming activities
- Approx. 3000 products (and therefore market activities)
- > 5000 global datasets and > 3000 local
- Approx. 300 geographical child datasets

- Building on and expanding existing work, rather than starting from scratch

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Water data updates

- based on the Water Database project of Quantis Intl
- Update of water exchanges for database ecoinvent v2

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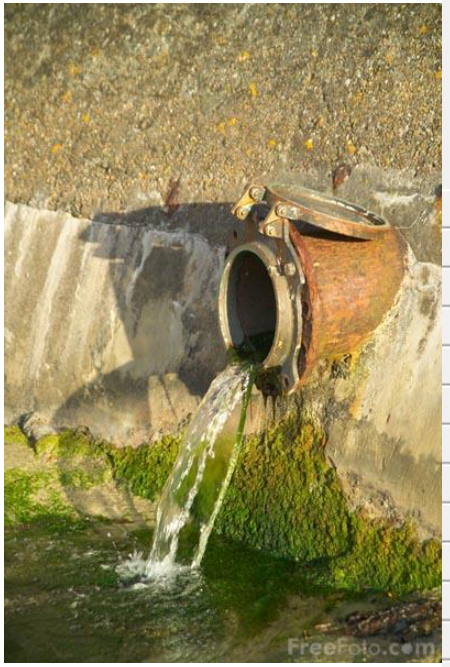

Exchange			esterification of palm oil, GLO 2006
Type	Name	Unit	Amount
4 - FromEnvironment	Carbon dioxide, in air	kg	0.22155
4 - ToEnvironment	Carbon dioxide, non-fossil	kg	0.3037
5 - FromTechnosphere	electricity, medium voltage	kWh	0.042296
2 - ByProduct/Waste	glycerine	kg	0.10908
5 - FromTechnosphere	heat, district or industrial, natural gas	MJ	0.92378
5 - FromTechnosphere	methanol	kg	0.1136
5 - FromTechnosphere	palm oil, crude	kg	1.0281
5 - FromTechnosphere	phosphoric acid, industrial grade, without water, in 85% solution state	kg	0.0046024
5 - FromTechnosphere	potassium hydroxide	kg	0.011356
5 - FromTechnosphere	tap water, at user	kg	0.016716
5 - FromTechnosphere	vegetable oil esterification facility	unit	9.346E-10
0 - ReferenceProduct	vegetable oil methyl ester	kg	1
2 - ByProduct/Waste	wastewater, from residence	m3	6.2531E-05
4 - ToEnvironment	Water	m3	0.00012307
4 - ToEnvironment	Water	m3	0.00021124
4 - FromEnvironment	Water, cooling, unspecified natural origin	m3	0.0003176

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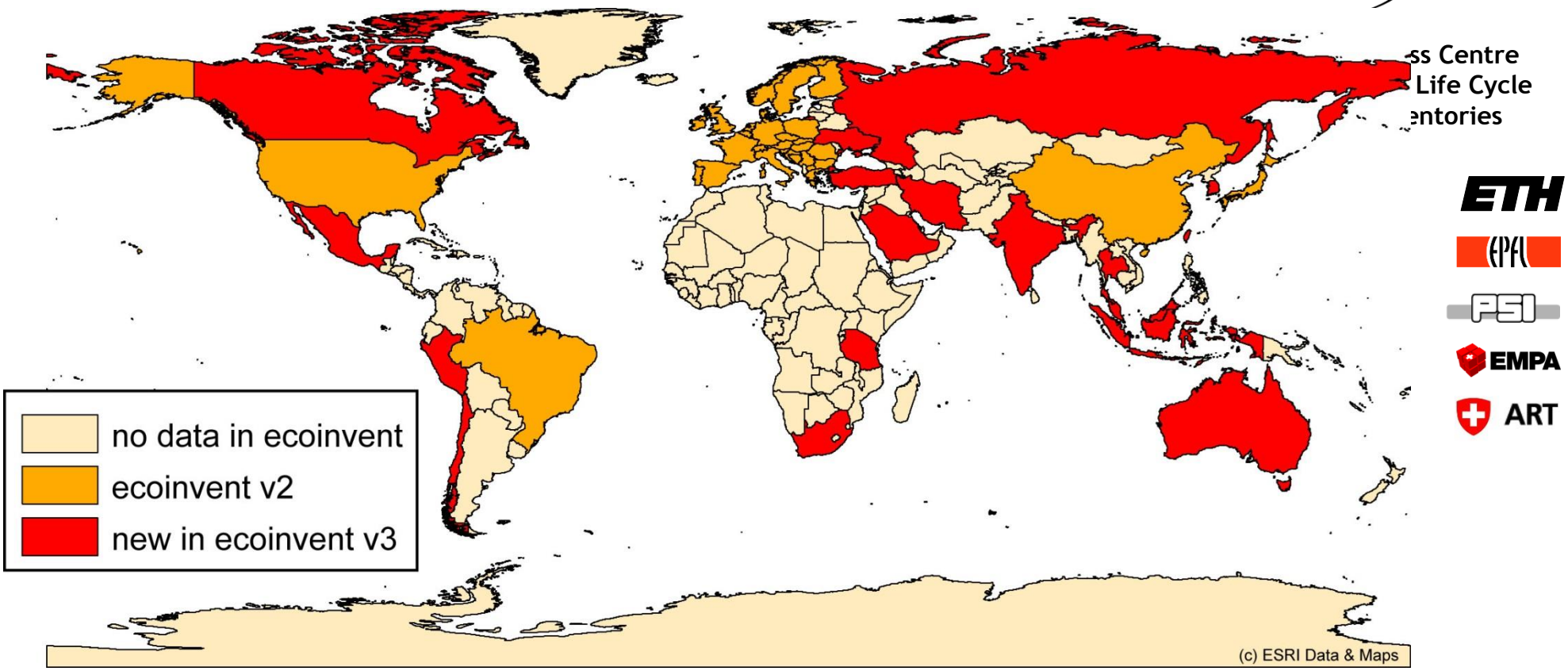
Electricity data

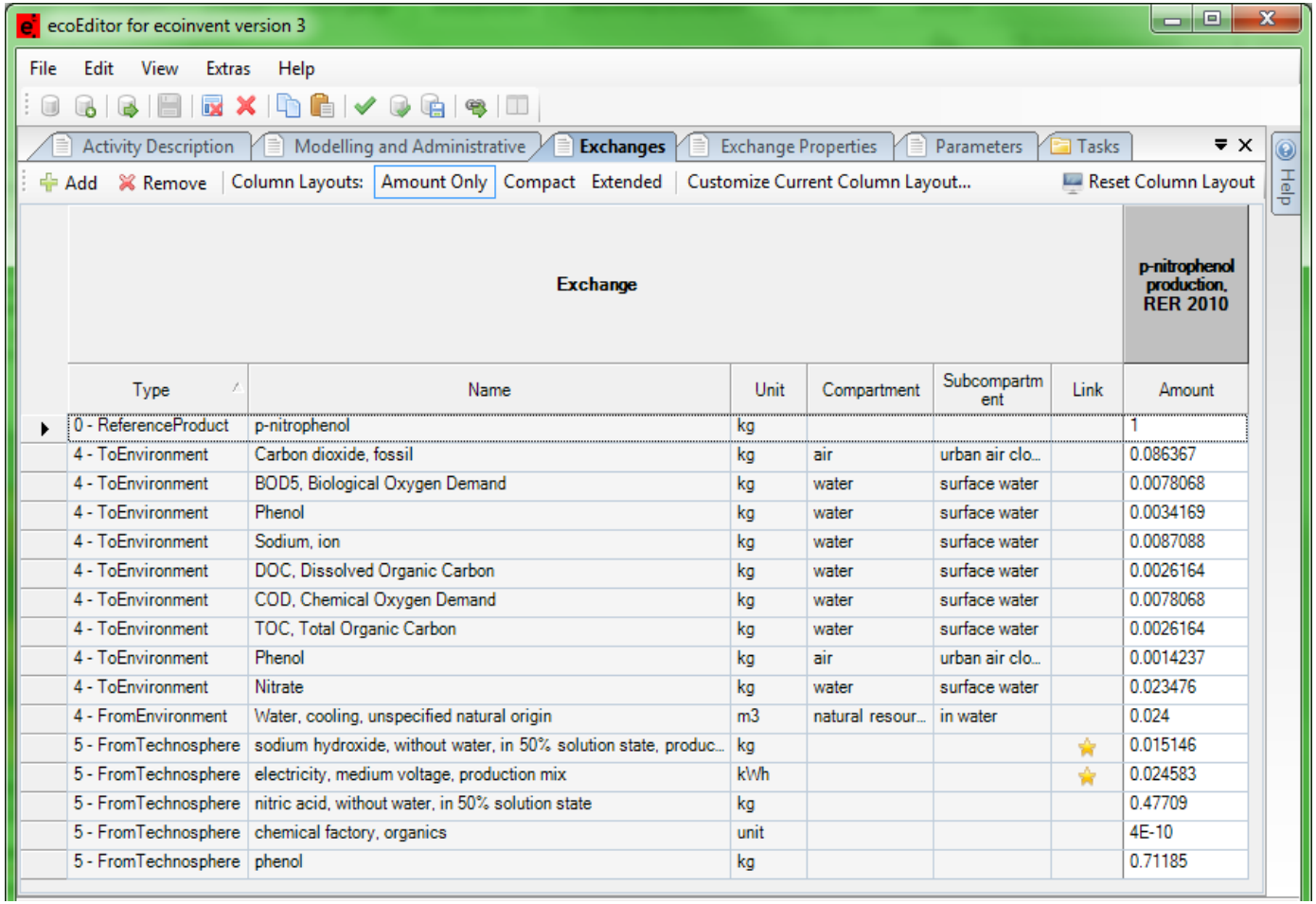


- Extension and update of country electricity mixes (PSI, 90% coverage)
- National specific production technologies
- Regional Canadian data (CIRAIG)

Figure : PSI

Chemicals

- About 80 new basic chemicals



Exchange						p-nitrophenol production, RER 2010
Type	Name	Unit	Compartment	Subcompartment	Link	Amount
0 - ReferenceProduct	p-nitrophenol	kg				1
4 - ToEnvironment	Carbon dioxide, fossil	kg	air	urban air clo...		0.086367
4 - ToEnvironment	BOD5, Biological Oxygen Demand	kg	water	surface water		0.0078068
4 - ToEnvironment	Phenol	kg	water	surface water		0.0034169
4 - ToEnvironment	Sodium, ion	kg	water	surface water		0.0087088
4 - ToEnvironment	DOC, Dissolved Organic Carbon	kg	water	surface water		0.0026164
4 - ToEnvironment	COD, Chemical Oxygen Demand	kg	water	surface water		0.0078068
4 - ToEnvironment	TOC, Total Organic Carbon	kg	water	surface water		0.0026164
4 - ToEnvironment	Phenol	kg	air	urban air clo...		0.0014237
4 - ToEnvironment	Nitrate	kg	water	surface water		0.023476
4 - FromEnvironment	Water, cooling, unspecified natural origin	m3	natural resour...	in water		0.024
5 - FromTechnosphere	sodium hydroxide, without water, in 50% solution state, produc...	kg			★	0.015146
5 - FromTechnosphere	electricity, medium voltage, production mix	kWh			★	0.024583
5 - FromTechnosphere	nitric acid, without water, in 50% solution state	kg				0.47709
5 - FromTechnosphere	chemical factory, organics	unit				4E-10
5 - FromTechnosphere	phenol	kg				0.71185

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Personal transport

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- established by Empa & PSI; funded by Swiss Competence Center Energy and Mobility (CCEM)
- ICE (petrol, diesel, natural gas) and electric
- Different sizes and EURO classes

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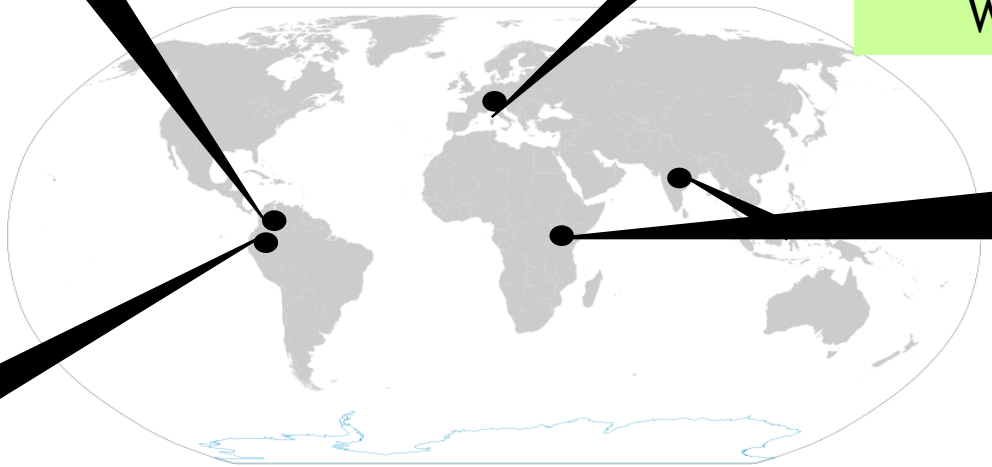
New biofuel crop inventories

Sugar cane
Colombia

Alfalfa-grass mixture, CH
Miscanthus, DE
Willow, DE



Jatropha
India
East-Africa

Oil palm
Colombia

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Work done by EMPA, ART
Slide: Thomas Nemecek, ART.

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33 new horticultural products

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nursery.com


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guardian.co.uk


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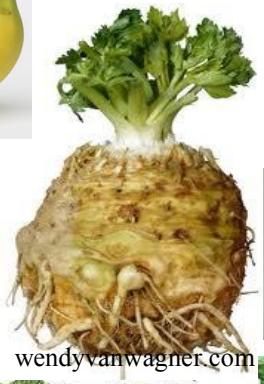
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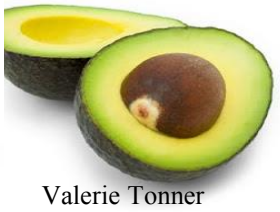
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www.ifu.ethz.ch/ESD

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Others

- Cement
- Aluminium
- Soybean and soybean oil supply chain

central data updates for v3

- **global average datasets** for all local processes

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- dry **mass,** wet **mass** and **carbon content** (for all intermediate exchanges and elementary flows).

5 - FromTec...	sugar beet pulp	kg					

carbon content, f...	dimen...	0
carbon content,...	dimen...	0.44213
dry mass	kg	0.25
water content	dimen...	3
water in wet mass	kg	0.75
wet mass	kg	1

- **price** and **production volumes** (where relevant; for linking via markets and application of system models)

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ART

Discussions in groups

ecoinvent Centre

Swiss Centre
For Life Cycle
Inventories

ETH
EPFL
PSI
EMPA
ART

1. What are your expectations to ecoinvent? (2 expectations)
2. Which main gaps do you see in ecoinvent? (2 gaps)
3. Which contribution could you make to ecoinvent?
   Which support would you need?

- 3 minutes per presentation