

Technical Helpdesk for National LCA Databases

Training on Data Acquisition and Dataset Development **Part 5 - National dataset development by adjustment**

Content from Amir Safaei, ecoinvent

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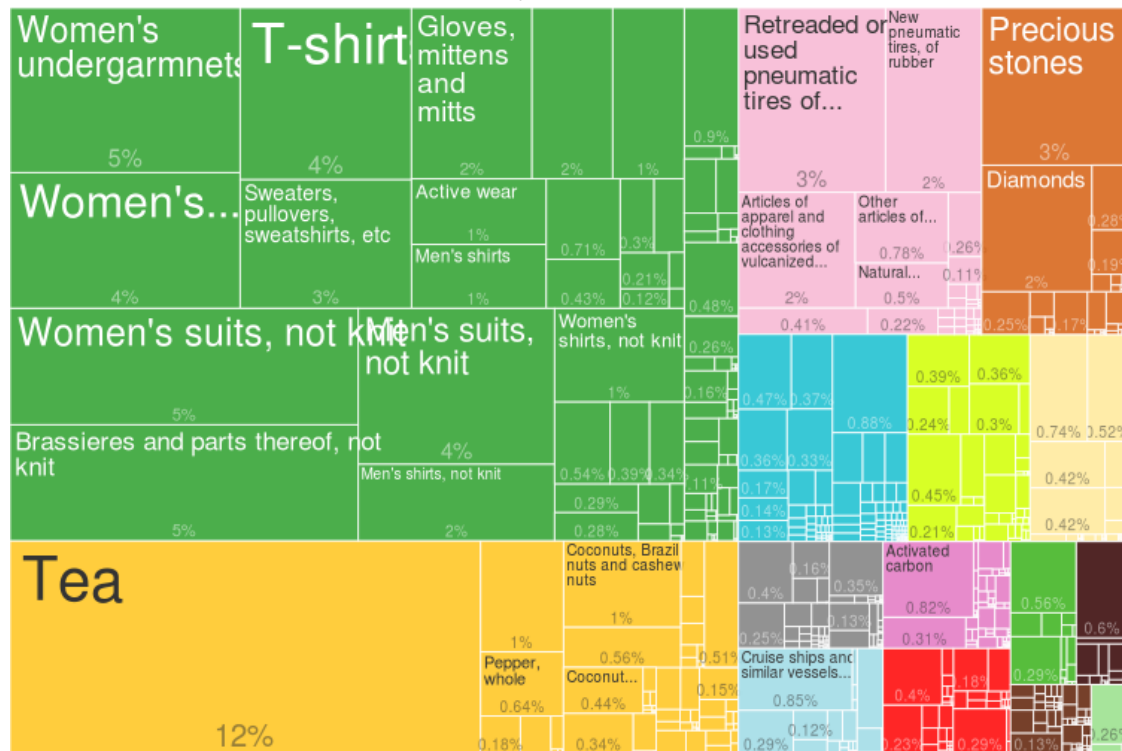
Different approaches to prioritize data collection



Economic Relevance

Use export statistics, production statistics to rank the relevance of products for the economy!

\$11.1B USD



- PEF - Product Environmental Footprint
- Others?
 - Contribution to GDP

From:<http://atlas.cid.harvard.edu>

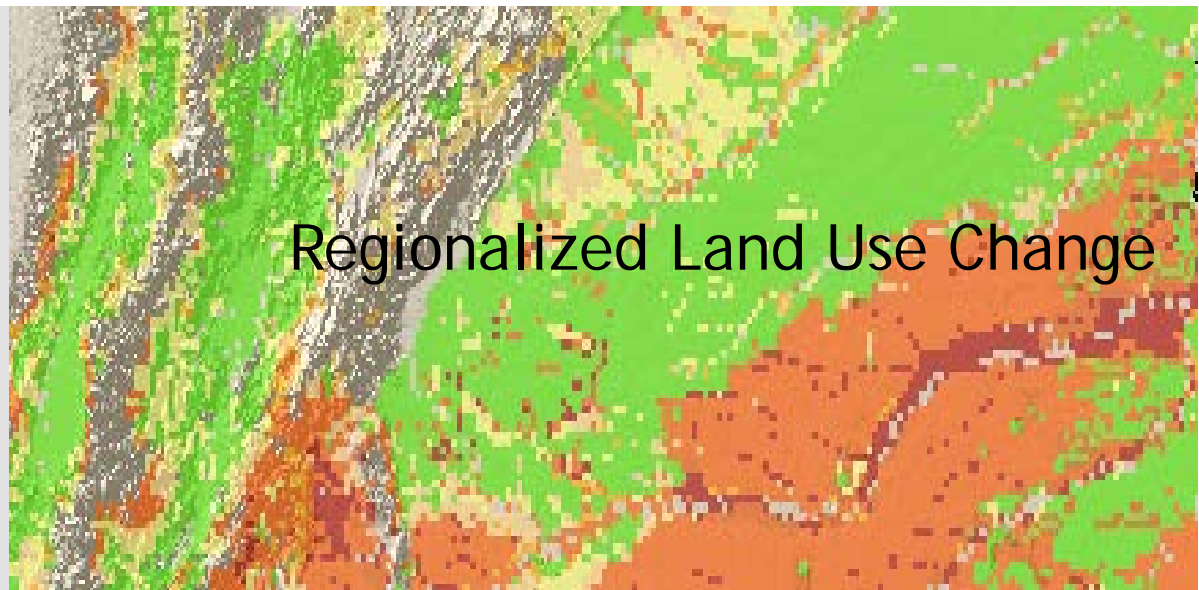
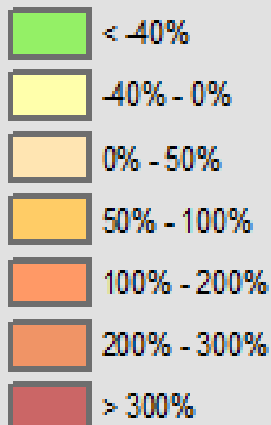
Sensitivity to the local context

- Some datasets are more sensitive to local conditions than others

Diesel burned in building machine

Sugar cane: Net-GHG emissions

[%]



Database Relevance

Case of Brazil



Goal and Starting Point

- Goal: Identification of the priority products for a national database based on expected contribution to environmental impacts;
- Starting point: The key products based on production and economic importance;
 - ▶ Source: The Brazilian Institute of Geography and Statistics (IBGE) report of production and sales of the top 100 products and/or industrial services in 2011, according to the national position in the value of sales;
 - ▶ Besides the report items, the electricity was also included in the assessment;

Chiumento e Ugaya, 2014

Method (1)

- After choosing the products: find their correspondence with database (ecoinvent 3.1);
 - ▶ 67 products of the report plus electricity were considered
 - ▶ Some data treatment were required to include relevant products
 - i.e. VHP sugar and crystal sugar were associated to the main correspondence: sugar.

Chiumento e Ugaya, 2014

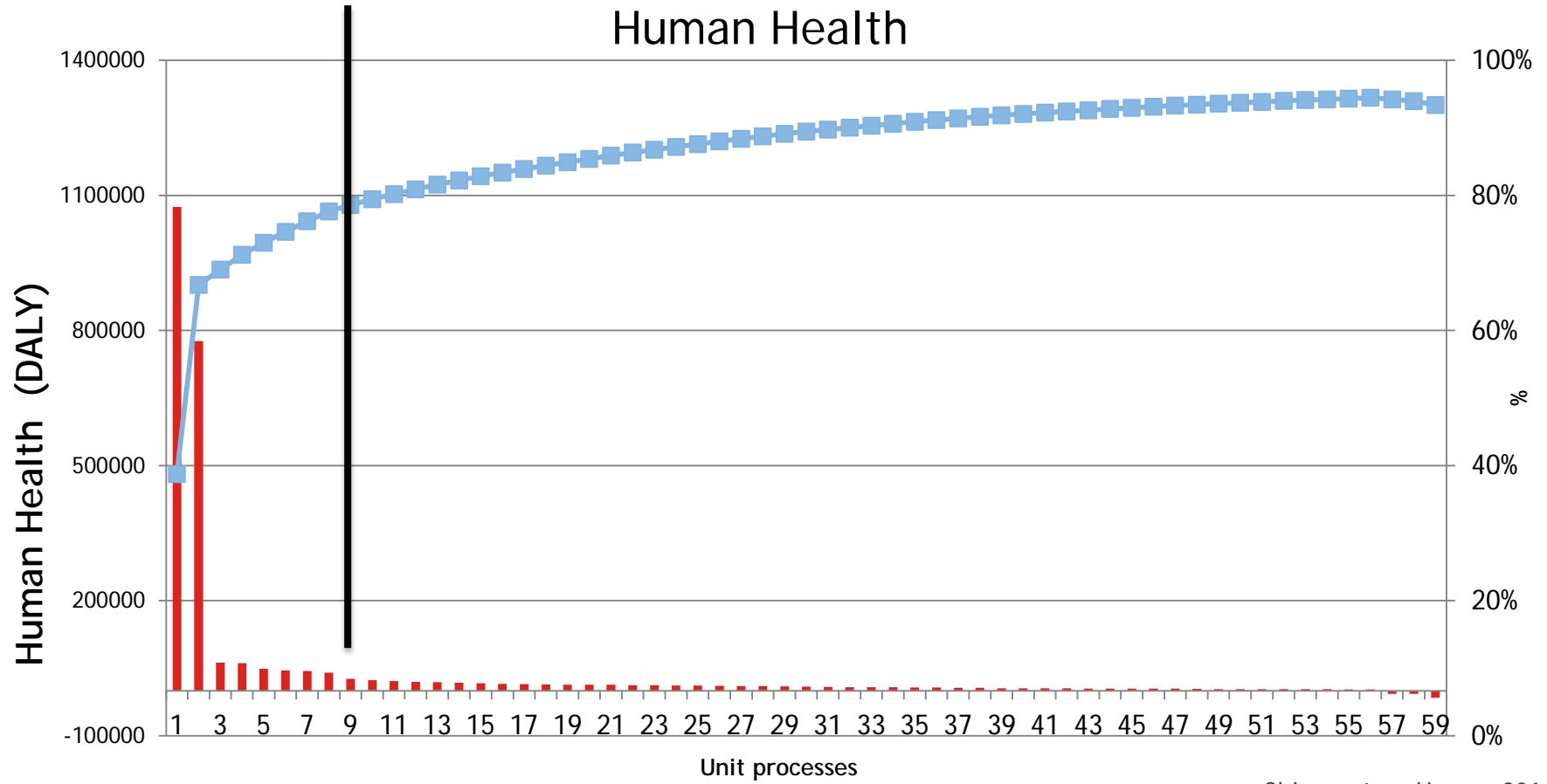


Method (2)

- Identification of priority unit process: LCA technique;
 - ▶ Life Cycle Impact Assessment Method: Impact 2002+ endpoint;
 - ▶ After classifying the products in each impact category, Pareto's principle was used as a cut-off rule to select the most relevant results.
 - ▶ Products contributing up to 80% of the LCIA totals were selected.

Chiumento e Ugaya, 2014

Results: Human Health

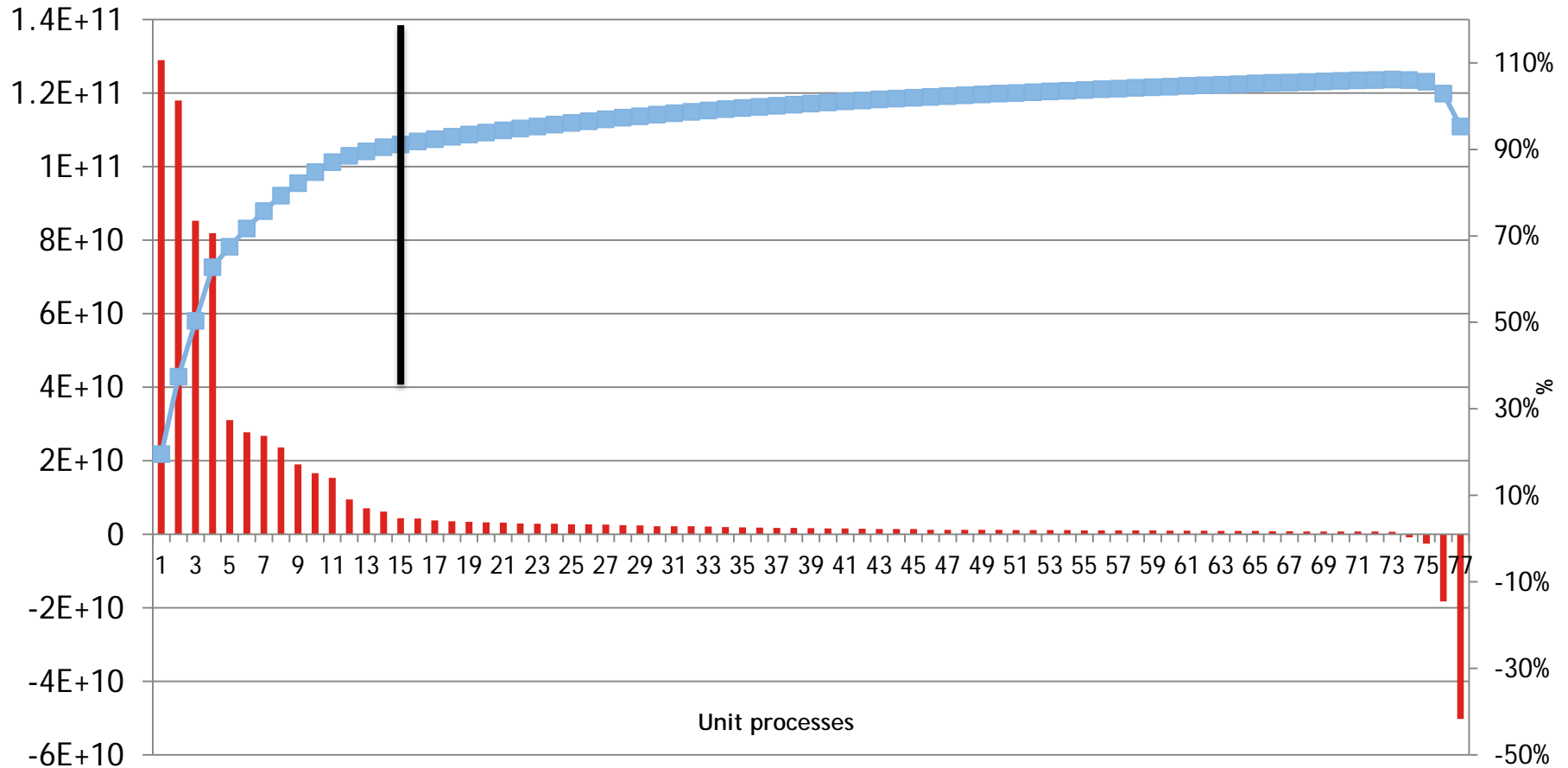


Chiumento e Ugaya, 2014

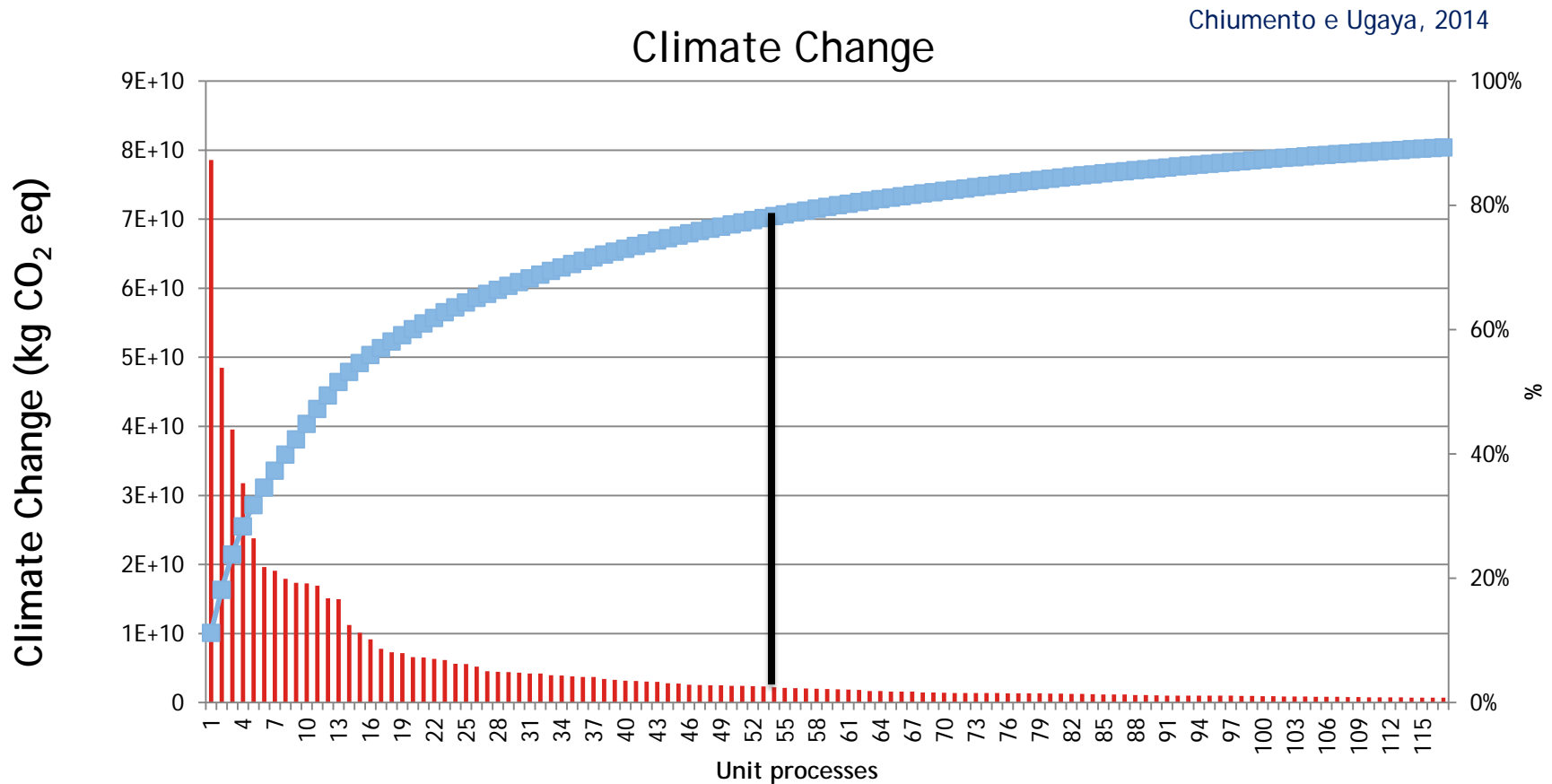
Results: Ecosystem Quality

Ecosystem Quality

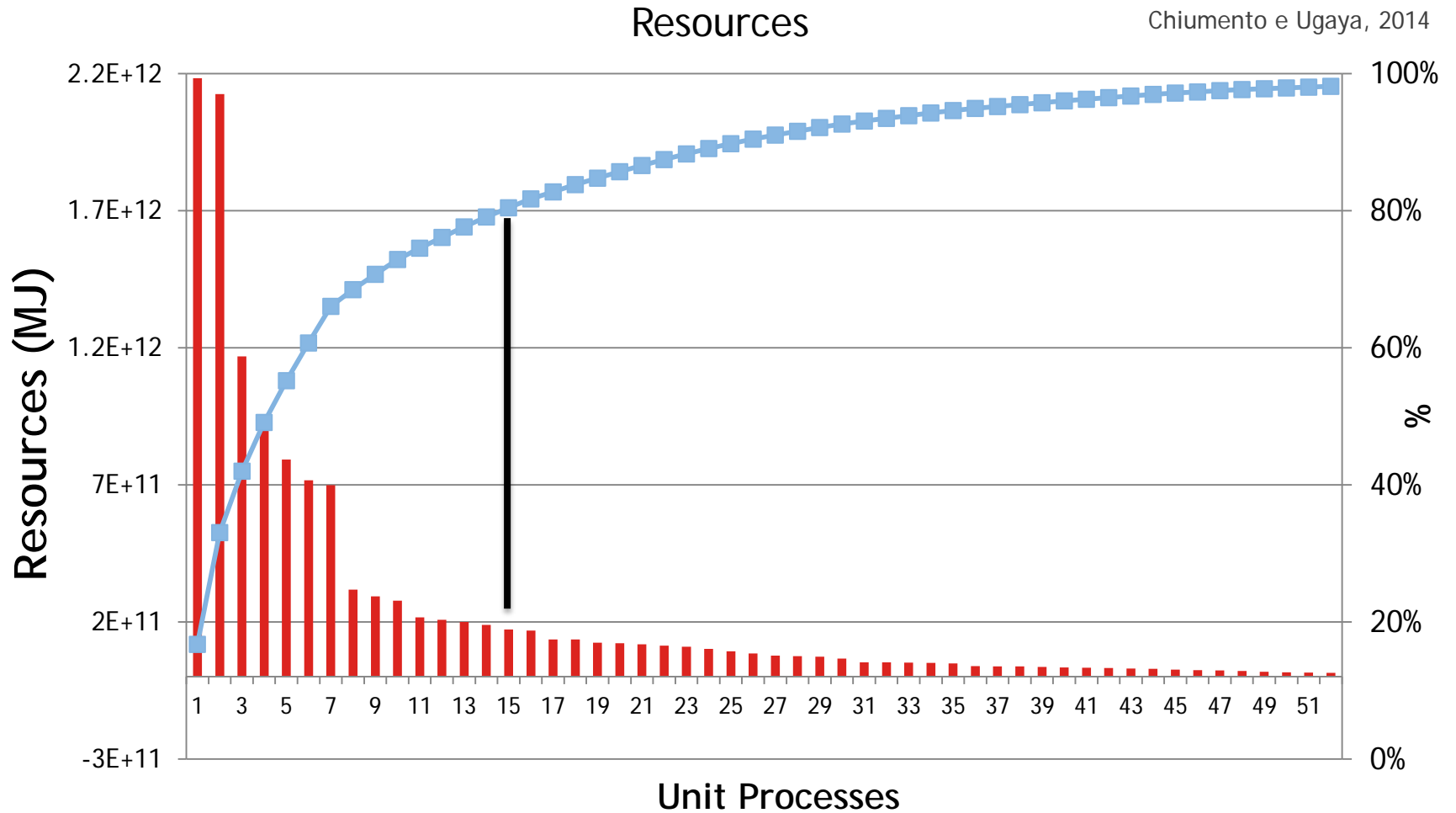
Chiumento e Ugaya, 2014



Results: Climate Change

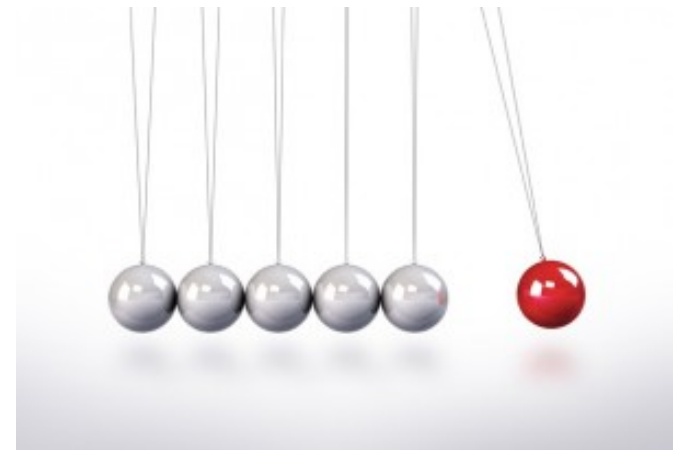


Results: Resources



Overall Results

- Few products are responsible for the impact assessment results in each category evaluated (and are listed in the next slide)



Specific Results

Top 15 unit processes

sugarcane//[BR] sugarcane production

sugarcane//[BR] sugarcane production, on land recently transformed

clinker//[RoW] clinker production

electricity, high voltage//[CN] electricity production, hard coal

electricity, high voltage//[BR] electricity production, hydro, reservoir, tropical region

pig iron//[GLO] pig iron production

cattle for slaughtering, live weight//[RoW] milk production, from cow

grass silage, Swiss integrated production//[CH] grass silage production, Swiss integrated production, intensive

land tenure, arable land, measured as carbon net primary productivity//[BR] clear-cutting, shrubland to arable land

land tenure, arable land, measured as carbon net primary productivity//[BR] clear-cutting, primary forest to arable land

digester sludge//[GLO] treatment of digester sludge, municipal incineration

heat, district or industrial, other than natural gas//[RoW] refinery gas, burned in furnace

heat, district or industrial, other than natural gas//[RoW] heat production, at hard coal industrial furnace 1-10MW

electricity, high voltage//[BR] electricity production, lignite

soybean//[BR] soybean production, on land recently transformed

Reference: Chiumento e Ugaya, Identificação de processos elementares prioritários para adaptação de Base de Dados de Inventário do Ciclo de Vida: estudo de caso para o Brasil. Anais do IV CBGCV. 2014. 10p.

Technical Helpdesk for National LCA Databases

Training on Data Acquisition and Dataset Development

Part 7 - Process Modelling for LCI Datasets - Regionalizing datasets

Content from Andreas Ciroth, GreenDelta and Amir Safaei, ecoinvent

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How to regionalize: Start with existing!



- Required product, correct region (Swiss electricity)



- Required product, wrong region (aluminium)



- No data at all!

Use Proxy
Adaptation

New dataset

How to regionalize: Start with existing!



Literature
Databases
etc.

Search:
Databases (link)
Literature

Ask:
LCA Discussion List

How to regionalize: Start with existing and adapt



~
Proxy

Proxy Datasets

Existing similar (proxy) unit process (e.g. a related technology or the same technology for another region or another time period).

- 1) one can reasonably assume that the values indeed would be the same or very similar,
- 2) the flow is not contributing much to the impacts
- 3) no other data sources are available (“better than nothing” principle).

Source: UNEP database guidelines

How to regionalize: Start with existing!

~
Adaption
of existing
datasets

**Example adaptation
only possible with unit processes!**

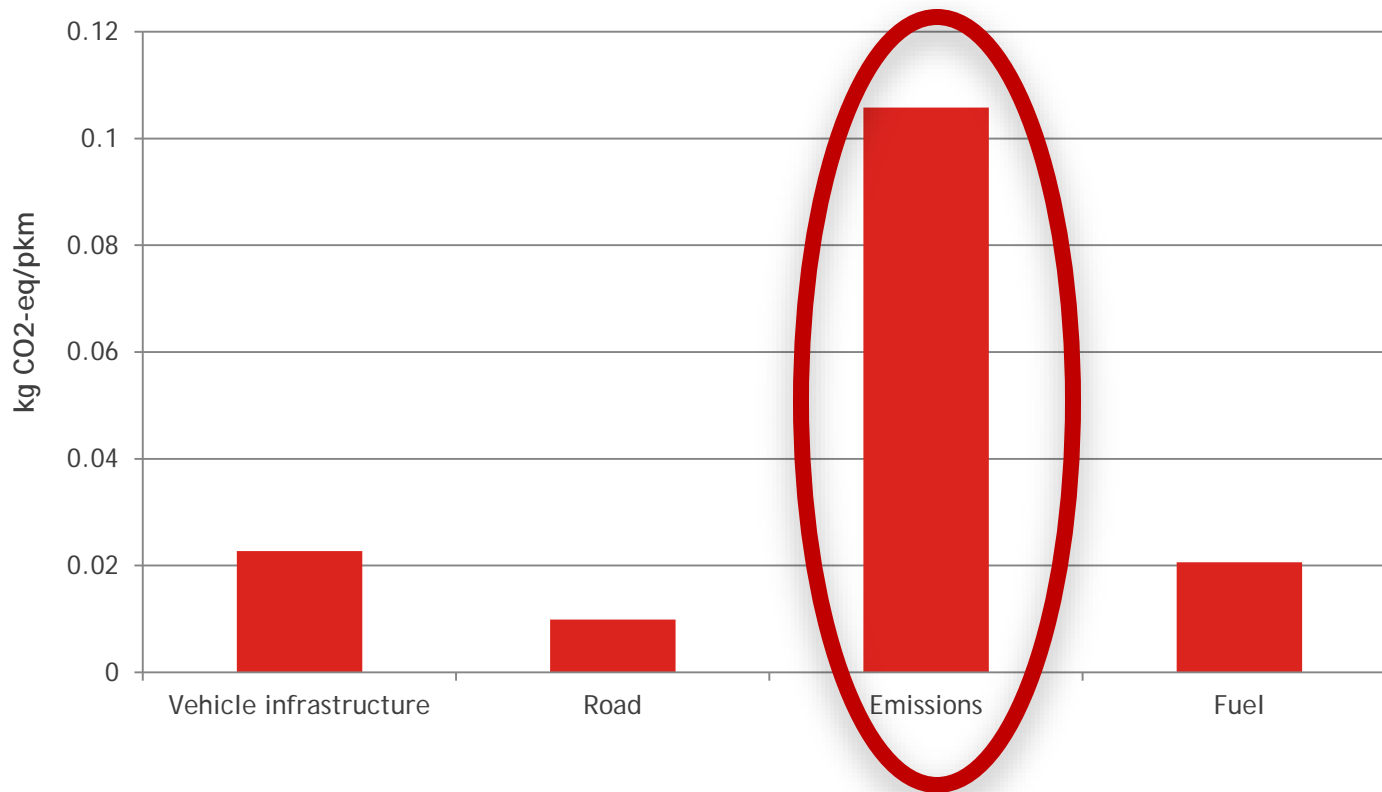
- 1. What exists?**
- 2. Identify what is important**
(sensitivity/contribution analysis)
- 3. Adapt accordingly**
(increase data quality)

Transport exchanges

- Infrastructure
 - ▶ Vehicle (car, truck, train, boat, plane, etc.)
 - ▶ Road infrastructure
- Fuel input
- Use phase emissions
 - ▶ Fuel related (Co₂, Sulphur, etc.)
 - ▶ Norm-regulated related (Euro 5, Euro 4, etc.)

Transport: relevant aspects (trends)

Diesel E5 passenger car GHG Emissions*



Adaptation of the use phase (emissions + fuel)

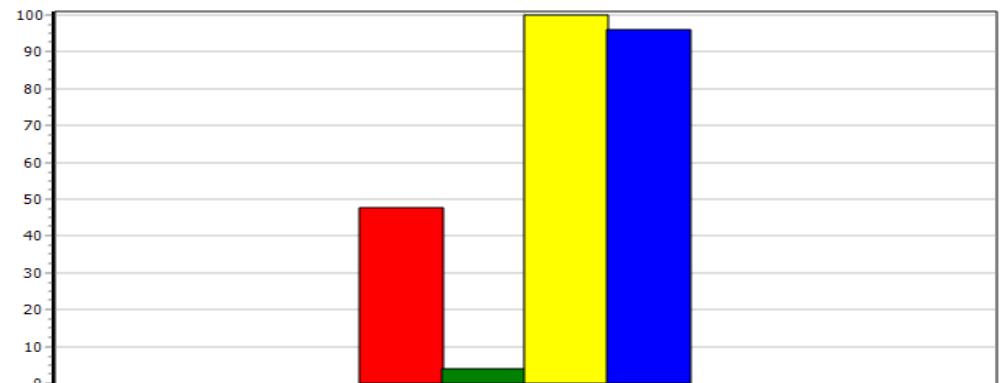
- **Available data: Same technology / fuel**
 - Consumption adaptation?
 - Adaptation of fuel consumption dependent emissions (CO₂, Sulfur, etc.)
 - Same technology - different norm
 - Does an equivalence exist between the available Euro-Norms and other national standards?
 - Can differences in the norms be used to scale available data?
 - Where and how is the original energy feedstock produced (oil/natural gas/...)?
- **Available data: Different technology / fuel**
 - Simply changing the fuel type can lead to large deviations.
 - Natural gas/ biogas: ~97% of gas content is methane. Changing the CO₂ and CH₄ emissions to/ from biogenic can give a good first idea.

Electricity

- Energy related processes are present in almost any process
- Can be a key contributor to the impacts
- Strong regional variability

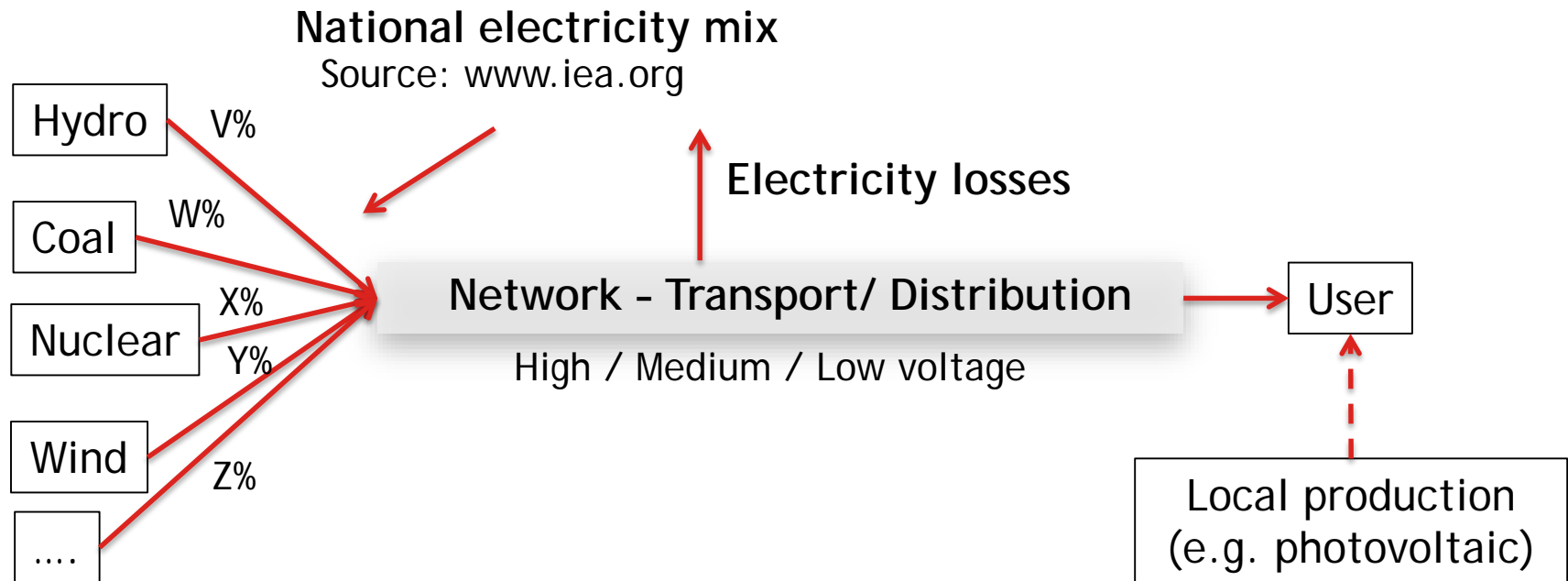


Sensitivity: mainly depending on generation technology
(example GHG emissions)



■ Electricity, low voltage, production AT, at grid/AT U ■ Electricity, low voltage, production CH, at grid/CH U
■ Electricity, low voltage, production DE, at grid/DE U ■ Electricity, low voltage, production IT, at grid/IT U

How to adapt



Regionalizing the main emissions

Minimum requirements for electricity generation technologies

| | hard coal | lignite | natural gas | oil | hydro | nuclear | wind | solar |
|--|-----------|---------|-------------|-----|-------|---------|------|-------|
| exchange amount_carbon dioxide, fossil | x | x | x | x | | | | |
| exchange amount_carbon monoxide fossil | x | x | x | | | | | |
| exchange amount_methane fossil | x | x | x | | | | | |
| exchange amount_nitrogen oxide | x | x | x | | | | | |
| exchange amount_NMVOC | x | x | | | | | | |
| exchange amount_NOx retained | x | x | x | | | | | |
| exchange amount_PM<2.5 | x | x | x | | | | | |
| exchange amount_PM>10 | x | x | x | | | | | |
| exchange amount_PM>2.5<10 | x | x | x | | | | | |
| exchange amount_SOx retained | x | x | x | | | | | |
| exchange amount_sulfur dioxide | x | x | x | | | | | |
| land use_occupation | | | | | x | | | |
| land use_transformation | | | | | x | | | |
| exchange_nuclear waste | | | | | | x | | |
| parameter_amount_efficiency | x | x | x | x | x | x | x | x |
| parameter_amount_gross el prod | x | x | x | x | x | x | x | x |
| parameter_amount_losses (gross to net) | x | x | x | x | x | x | x | x |
| parameter_amount_Wind load hours | | | | | | | x | |
| parameter_amount_lifetime | | | | | x | | | |
| parameter_solar yield | | | | | | | | x |

This is an example

For helpdesk questions –

- Become a Helpdesk member:
 - To access the Helpdesk exchange space (or any other Clearinghouse area), you will need to create an account:
 - Toward the bottom of the homepage you will see a button labeled ‘Join the Community now’. Click on this link and open a form to allow you to create a login and profile.
 - Once logged in, you can modify or update your profile or explore the various SCP topic areas.
 - Go to ‘About’ and then to ‘Exchange Spaces’ where you will find the Technical Helpdesk. In order to become a member of the Technical Helpdesk, proceed as follows: (need to add here how people can be added to the Helpdesk)
 - For your next login, you go directly to <http://spaces.spcclearinghouse.org/> and then choose the Technical Helpdesk space in the dropdown list.
- Helpdesk Manager - Bruce Vigon, Consultant to SETAC,
- Helpdesk Coordinator – Kristina Bowers, UN Environment, Economy Division