Data Quality Control and Data Quality Reporting in Large Scale Background LCI Databases: Procedures, Effects and Challenges

April 21st 2021, 77th LCA Discussion Forum, QUALITY CONTROL IN LCA

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What is quality in LCA?

Latest standard ?

Latest science ?

Micro-detail of technology and supply chains ?

Small scale regionalism ?

Maximal transparency ?

Novel-like documentation ?

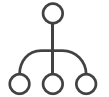# Quality in LCA……

Adequate standard and best practice

Adequate technology and supply chain

Adequate regionalism

Adequate tool and format

Adequate system model and transparency

Adequate documentation

Adequate data quality and up-to-dateness

Procedure – Consistency - Responsibility - Reliability

LCAs are like Mountaineering

"Data Quality" and "Descent" are compulsory !

Appropriate Data

Approximation – Calculation – Measurement

idea/concept

decision/proof

rational, fast
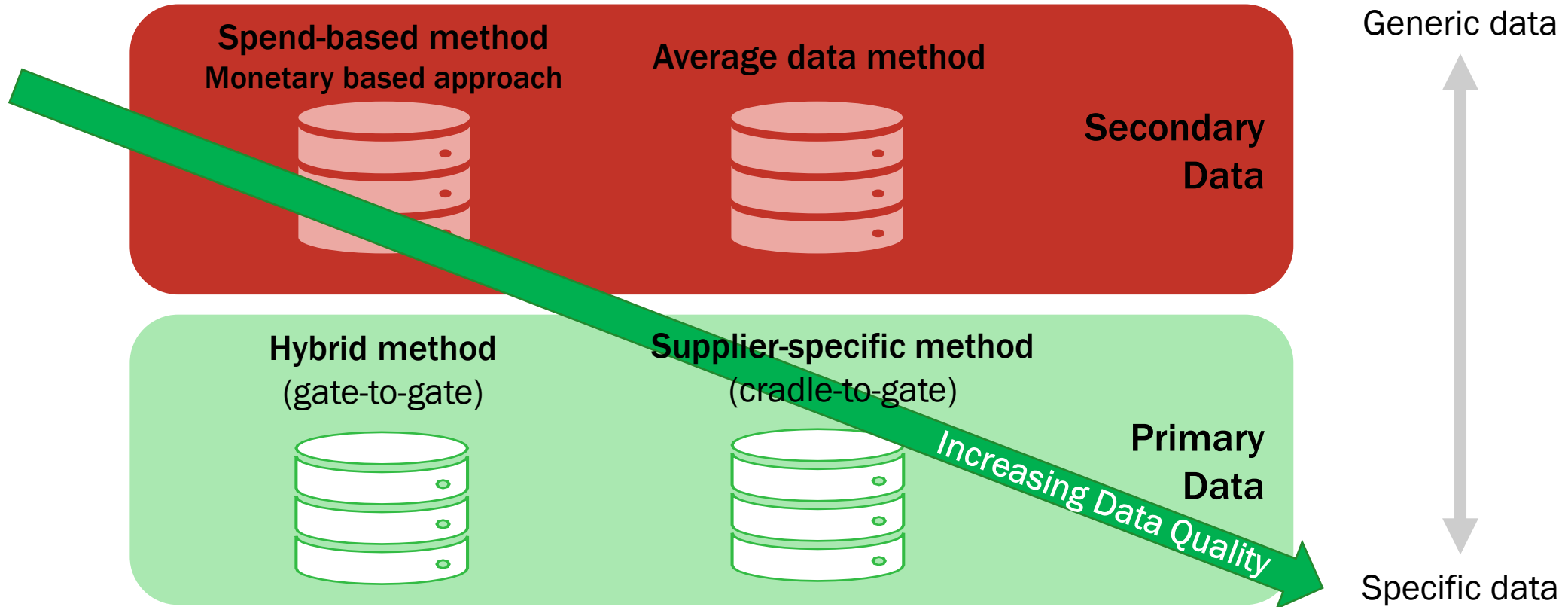
reliable, evidential

Upstream/ Background data

Supplier data

Asso- ciation data

Company data

Down- stream data

Data Quality over the supply chain

Approaches as per GHG protocol

Generic data

Spend-based method
Monetary based approach

Average data method

Secondary Data

Hybrid method
(gate-to-gate)

Supplier-specific method
(cradle-to-gate)

Primary Data

Increasing Data Quality

Specific data

Data Quality: Key to Unlock Correct Results

Relevancy, Adequacy, Consistency, Completeness, Representativity

Data Quality in the **foreground** of companies is **compulsory:**

- Well defined by engineering info (technology, composition, grade, ...steel is not just steel, concrete is not just concrete,....)

- Amount/specific of activity data (used fuel/electricity, materials/auxiliaries)

- Specific foreground emissions and wastes

Data Quality in **upstream / value chain** is highly **recommended:**

- Either by primary data (see above)

- Or quality secondary data....

  - well documented (technology, composition, grade, ...same here: steel is not just steel, ...)
  - consistent (no mix of methods and background data)
  - actual, maintained and regularly updated

Inhouse Sources for Primary Company-Specific Data

Process- or plant-level consumption data

Bills and stock/ inventory changes of consumables
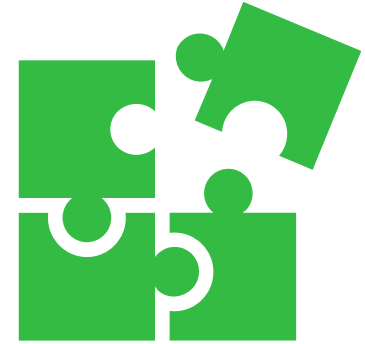
Data reports of mandatory emission regulations

Emission measurements (amounts and concentrations of emissions from flue gas and wastewater)

Compositions of products and waste (e.g., in quality assurance)

Procurement and sale department(s)/ unit(s)

Data Quality: Key to Unlock Correct Results
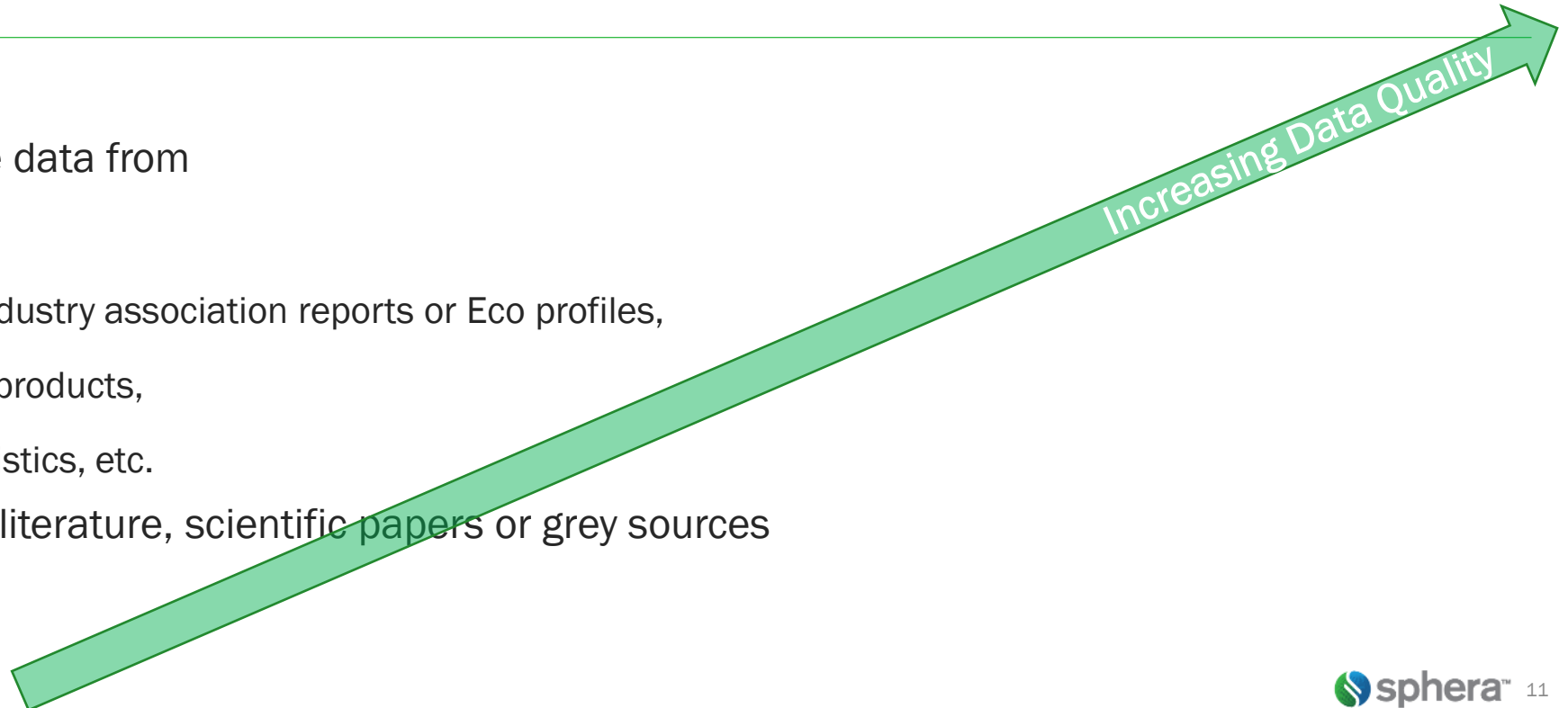
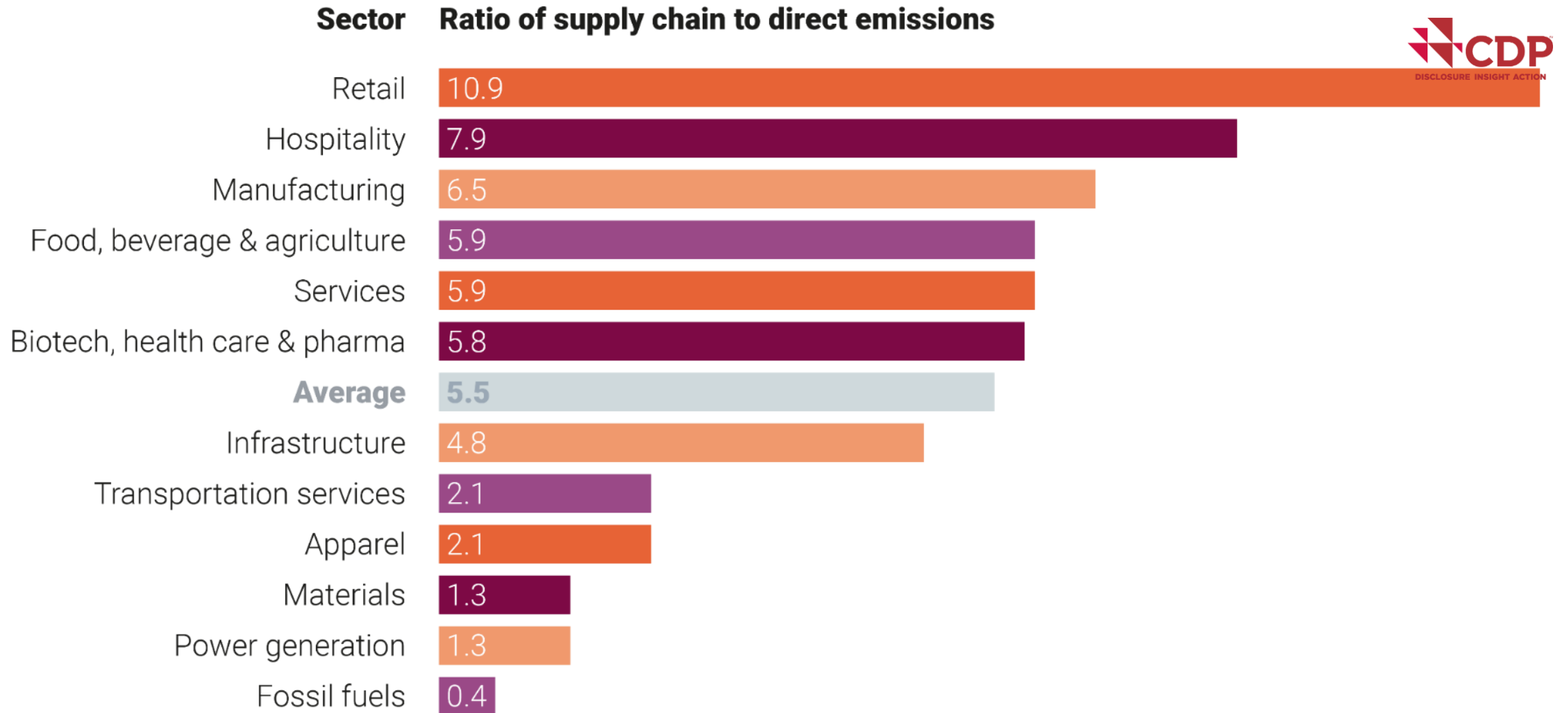## Combining Primary and Secondary Data

Primary data

- Directly measured or collected at a specific facility or set of facilities.

- Data shall include all known inputs and outputs for the processes.

- All inputs and outputs need to be scaled to the reference flow of the respective process/product.
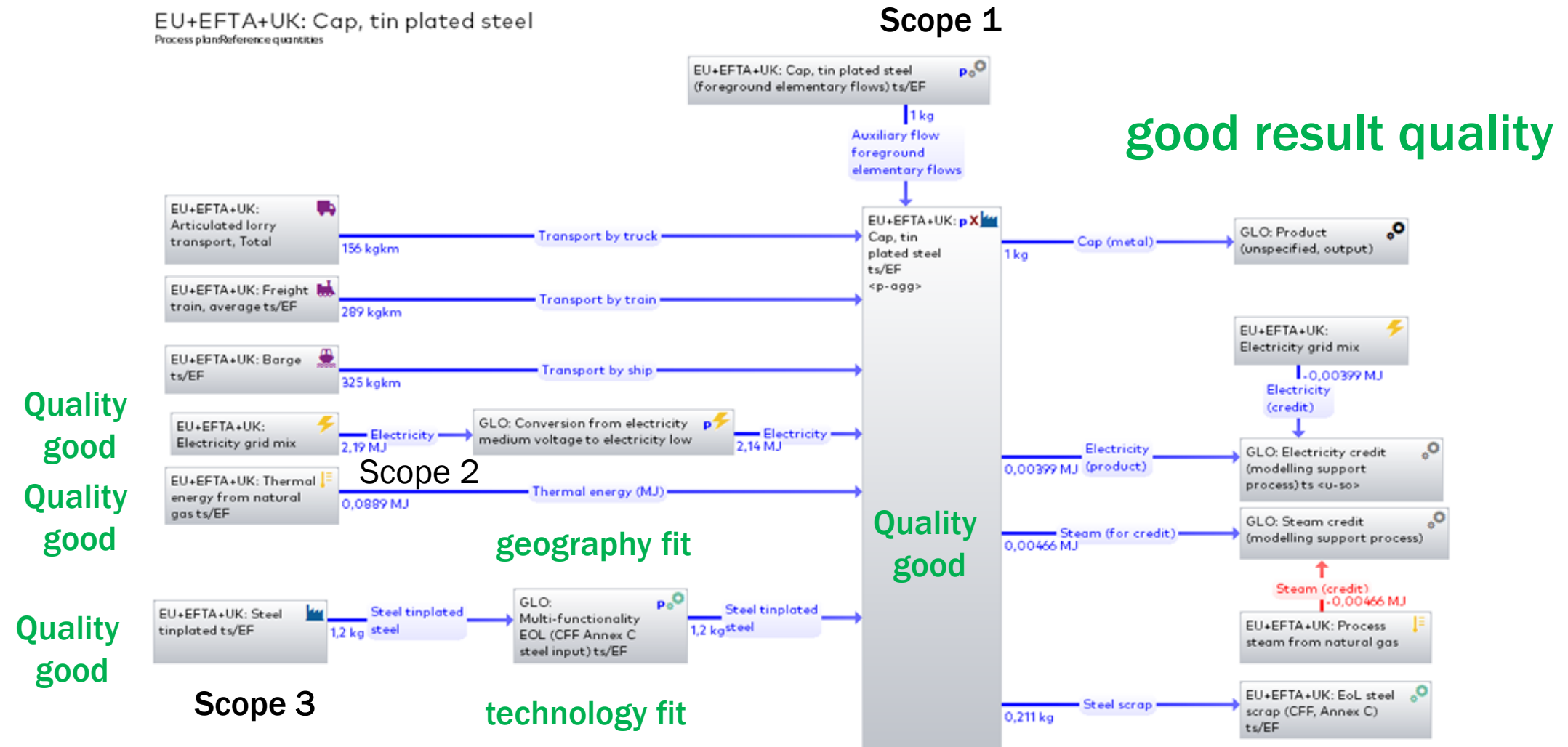
Secondary datasets

- Generic or average data from

  - LCI databases,

  - Company and industry association reports or Eco profiles,

  - EPDs of specific products,

  - Government statistics, etc.

- Generic data from literature, scientific papers or grey sources

Increasing Data Quality

Relevance of Scope 3 Emissions

Sector	Ratio of supply chain to direct emissions
Retail	10.9
Hospitality	7.9
Manufacturing	6.5
Food, beverage & agriculture	5.9
Services	5.9
Biotech, health care & pharma	5.8
Average	5.5
Infrastructure	4.8
Transportation services	2.1
Apparel	2.1
Materials	1.3
Power generation	1.3
Fossil fuels	0.4

Data Quality and Result Quality

Scope 1

good result quality

EU+EFTA+UK: Cap, tin plated steel
Process plan Reference quantities

Quality good
Quality good

Scope 2
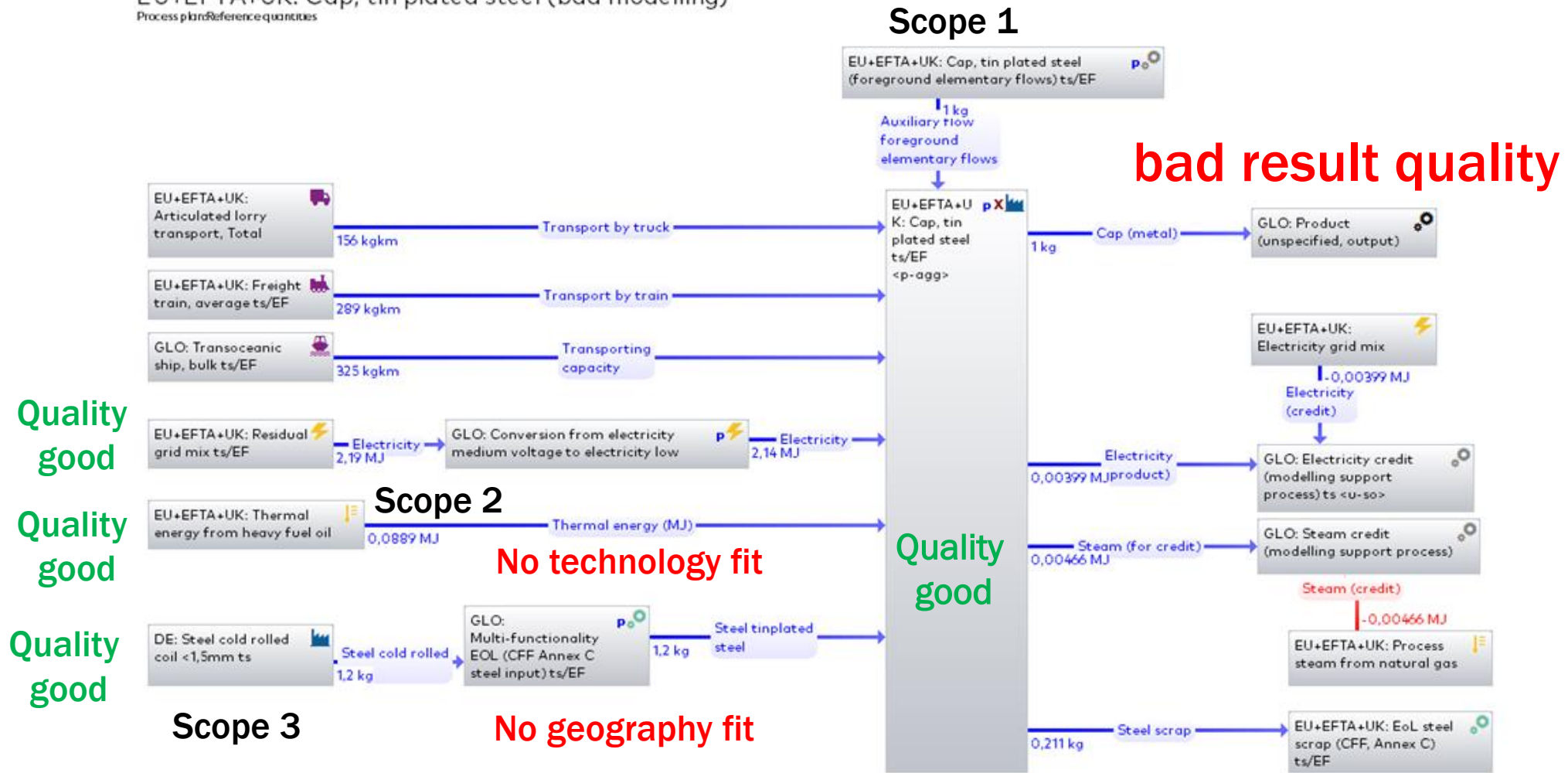
geography fit

Quality good
Quality good

Scope 3

technology fit

Quality good

Data Quality and Result Quality

EU+EFTA+UK: Cap, tin plated steel (bad modelling)
Process plant Reference quantities

Scope 1

bad result quality

Quality good

Quality good

Quality good

Scope 2

No technology fit

Scope 3

No geography fit

Quality good

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Data Management

Challenges to solve, traps to avoid, aspects to manage

- Data age (as up-to-date as possible, innovation cycles within processes vary; several month to decades)
- Consistency (mix of data with different data modeling approaches shall be avoided)

- **Recycled Content and EoL:** cut-off or avoided burden (different results, model consistently)
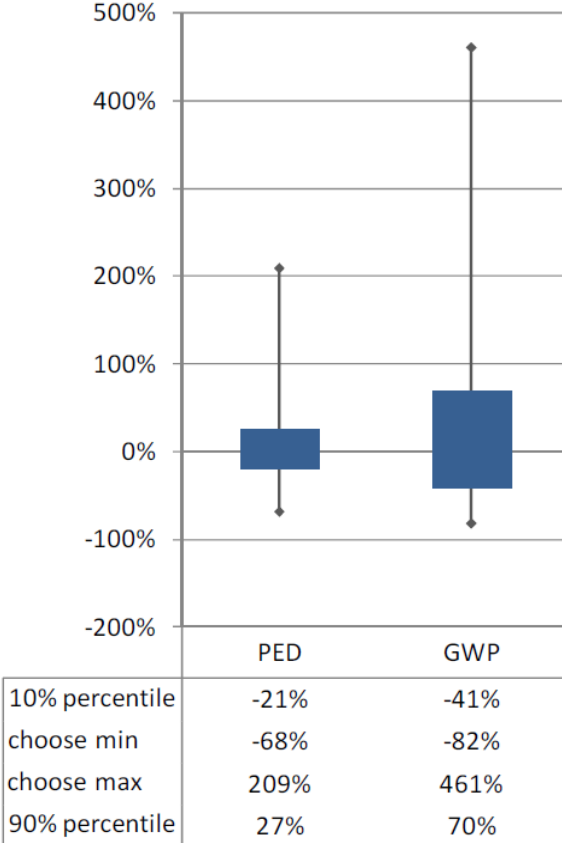- **System scope:** cradle to gate or cradle to grave/cradle

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- Accuracy vs precision (rather adequately accurate then precisely wrong)
- Uncertainty vs variance (see next slide)
- Regionalization
  - country-specific emissions (Classical example: national energy grid mixes)
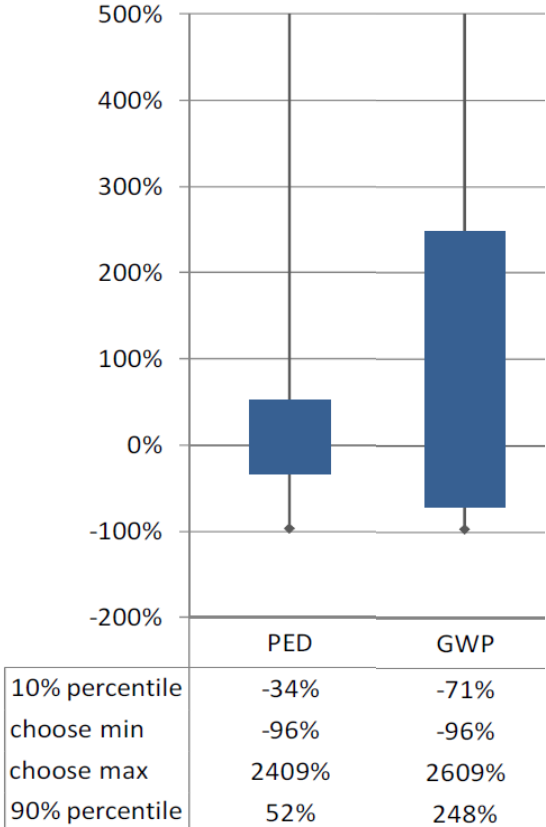 - different production technologies matter

A Sphera Product Sustainability (GaBi) Case Study & Whitepaper

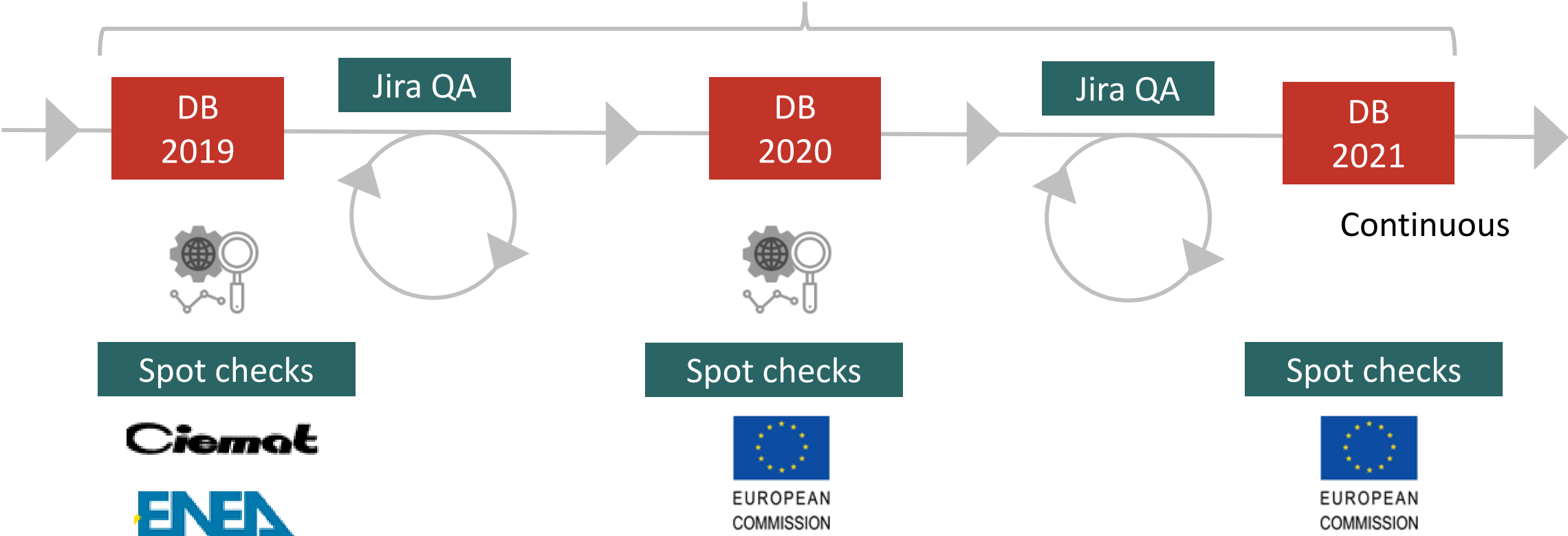Maximum relative errors regarding randomly chosen......

....geography

....technology

	PED	GWP
10% percentile	-21%	-41%
choose min	-68%	-82%
choose max	209%	461%
90% percentile	27%	70%

	PED	GWP
10% percentile	-34%	-71%
choose min	-96%	-96%
choose max	2409%	2609%
90% percentile	52%	248%

Technology know-how matters

Audited Improvement Process, Manifold Reviews

Continuous improvement through audited processes

DB 2019 — Jira QA — DB 2020 — Jira QA — DB 2021 — Continuous

Spot checks — Ciemat — ENEA

Spot checks — EUROPEAN COMMISSION

Spot checks — EUROPEAN COMMISSION

Relevant Formats, Relevant Functions, Relevant Data

Excel GaBi ILCD ecoSpold1

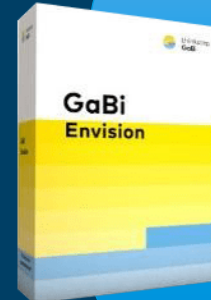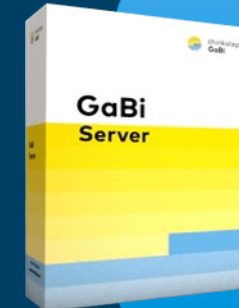|			
GaBi Professional	**GaBi DfX**	**GaBi Envision**	**GaBi Server**
Expert LCA Solution	PLM / ERP Integration Automated BOM-Import	Scenario analysis also for Non-LCA Experts	LCA Collaboration, Workflows, Quality Assurance

Industrial data | **Sphera Data** | **3rd Party Data**

worldsteel ASSOCIATION

EUROFER The European Steel Association

FEFCO European Federation of Corrugated Board Manufacturers

EUROPEAN ALUMINIUM

Authorized data from 50+

Associations & Companies

> 500 EPDs

- Professional Database

- 22 Extension Databases

- Data on Demand

~ 15.000 standard datasets

> 100.000 inventories

ecoinvent integrated

U.S. Life Cycle Inventory Database

Compulsory Data Quality - Take Home Messages

Message 1

Companies are responsible for primary data.

Dataset providers are responsible for secondary (upstream / background) data.

Users are responsible to combine primary and secondary data consistently.

Message 2

Adequate, consistent and representative data is a decisive factor and needs technological and methodological know-how.

Message 3

High data quality needs a QA process, time and is associated with costs.
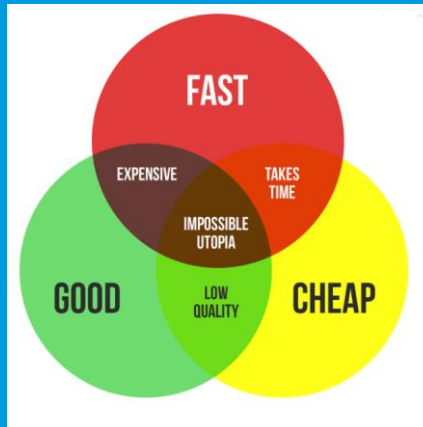
Message 4

Input-Output data (emission factors based on monetary units) can be risky and shall only be used for gap filling in product LCAs

Message 5

Technology can improve fast – Update data regularly - acknowledge supplier and upstream improvements.

A "quality LCA" is a sharp tool; like a scalpel

Put it into a doctor's hand and it does "good".

Put it into a criminal's hand and it does "bad".

Don't blame the tool....

Scalpel Tool Green - Free vector graphic on Pixabay
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