# Calculating the carbon footprint of a rechargeable battery based on a PEFCR

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## WHAT IS PEF

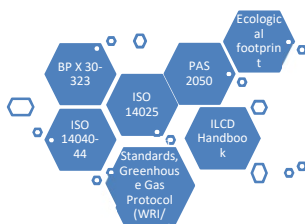This makes impossible the systematic use of LCA in policy making

BUT

**Same product** — **Different results**

We need information that is **reproducible**, **comparable**, and **verifiable**

Ecological footprint

BP X 30-323

PAS 2050

ISO 14025

ISO 14040-44

ILCD Handbook

Standards, Greenhouse Gas Protocol (WRI/

JRC TECHNICAL REPORTS

Suggestions for updating the Product Environmental Footprint (PEF) method

2011-2013

2013-2018

## WHAT IS A PEFCR

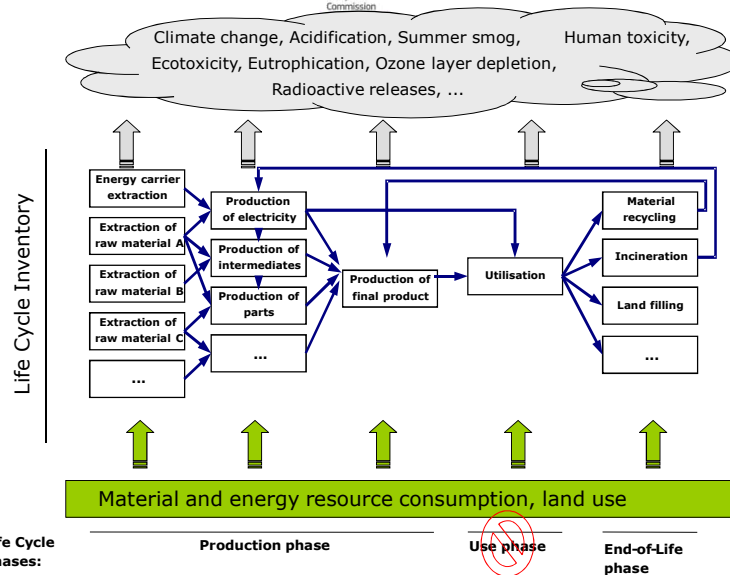**PEFCR** stands for **P**roduct **E**nvironmental **F**ootprint **C**ategory **R**ules

- Developed by industry (at least 51% of the EU market on a consumption base)

- Consulted with Member States, NGOs, and all interested stakeholders (at least 2 rounds of consultations, full transparency guaranteed)

It includes:

- ➢ Clear definition of products in scope
- ➢ Single Set of modelling rules for each life cycle stage
- ➢ Identification of the most relevant impact categories, life cycle stage, processes and elementary flows
- ➢ List of mandatory "company specific" data to be provided
- ➢ List of secondary datasets and activity data to be used for modelling purposes
- ➢ Environmental performance of the representative product

The features in red are those relevant for the carbon footprint calculations

## LIFE CYCLE STAGES IN SCOPE



Climate change, Acidification, Summer smog, Ecotoxicity, Eutrophication, Ozone layer depletion, Radioactive releases, ...   Human toxicity,

Life Cycle Inventory

| Energy carrier extraction | Production of electricity | | Material recycling |
| Extraction of raw material A | Production of intermediates | | Incineration |
| Extraction of raw material B | Production of parts | Production of final product / Utilisation | Land filling |
| Extraction of raw material C | ... | | ... |

Material and energy resource consumption, land use

**Life Cycle Phases:**   **Production phase**   **Use phase**   **End-of-Life phase**

## CALCULATION LOGIC

Impact

Activity data = amount of […]

Secondary dataset= list of inputs and outputs (resources, emissions, etc) related to a specific process

Impact = Activity data * Secondary dataset
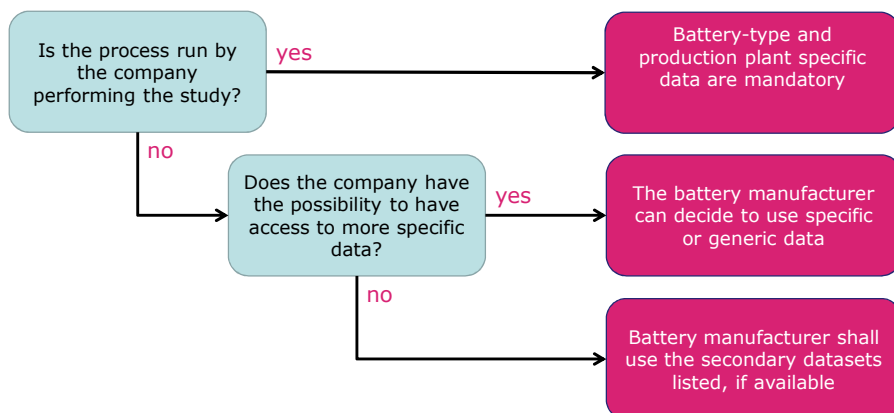
**Bill of Materials**

X MJ electricity
Y m3 water
Z m3 natural gas
A kg metal 1
B kg metal 2
C kg plastic 1
D kg emission 1

…

Quantities in red… **are activity data**

Materials and resources in blu **are secondary datasets**

Elementary flows in brown **are emissions**

## LEVEL OF INFLUENCE

Is the process run by the company performing the study?

yes → Battery-type and production plant specific data are mandatory

no

Does the company have the possibility to have access to more specific data?

yes → The battery manufacturer can decide to use specific or generic data

no → Battery manufacturer shall use the secondary datasets listed, if available
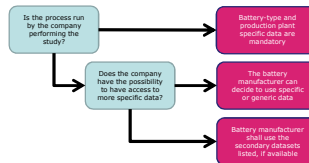
## COMPANY SPECIFIC DATA

European Commission

Company specific data:

➢ Cell (anode, cathode, electrolyte, separator, cell casing)

➢ Battery casing

➢ Battery Control Unit

➢ Battery Management Unit

➢ Passive cooling system

➢ Safety Management Unit

➢ Heat Management system

➢ Electricty, water, auxiliary materials

Is the process run by the company performing the study? → Battery-type and production plant specific data are mandatory

Does the company have the possibility to have access to more specific data? → The battery manufacturer can decide to use specific or generic data

→ Battery manufacturer shall use the secondary datasets listed, if available

Activity data and emissions* related to these processes **shall** always be battery- and plant- specific

Secondary datasets can either be company-specific or those provided as default (see next slide)

* Only those listed as relevant
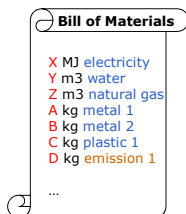
## MISSING INFO

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The existing PEFCR on rechargeable batteries includes the following battery applications:

- **e-mobility** (e.g., e-bikes, EV, PHEV, cars, bus/trucks)
- **ICT** (e.g., tablets and phones, computers, cameras, games)
- **Cordless power tools** (e.g., drills, electric screwdrivers)

As far as e-mobility is concerned, the following chemistries are already covered:

- **Battery technology:** Li-Ion and NiMH
- **Battery chemistry for Li-ion technology :** LCO (LiCoO2),NMC (LiNixMnyCozO2), LiMn (LiMnO2) and LFP ( LiFePO4)

**Bill of Materials**

X MJ electricity
Y m3 water
Z m3 natural gas
A kg metal 1
B kg metal 2
C kg plastic 1
D kg emission 1
...

The more info we gather **now** about different chemistries and production processes, the more datasets the EC will be able to make available for free.

## WHICH DATASETS TO USE

In case the production and/or assembly of a battery involves processes not included in the list provided, then the manufacturer shall include these additional process using battery-model specific activity data and suitable EF-compliant datasets.

Whenever a dataset needed to calculate the carbon footprint is not among those listed, the manufacturer shall choose between the following options (in hierarchical order):

1. Use an EF-compliant dataset available on one of the following nodes:
   http://eplca.jrc.ec.europa.eu/EF-node
   http://lcdn.blonkconsultants.nl
   http://ecoinvent.lca-data.com
   http://lcdn-cepe.org
   http://lcdn.quantis-software.com/PEF/
   http://lcdn.thinkstep.com/Node

   Access granted « for free » by the Commission

2. Use an EF-compliant dataset available in a free or commercial source;
3. Use another EF-compliant dataset considered to be a good proxy;
4. Use an ILCD-entry level-compliant dataset. A maximum of 10% of the total carbon footprint may be derived from ILCD-EL compliant datasets (calculate cumulatively from lowest to largest contribution to the total carbon footprint).

## CF CALCULATOR

The availability of a carbon footprint calculator would:

- standardise the calculation,
- reduce the costs of performing the carbon footprint study and verifying it,
- make it easier market surveillance

Possible features:

- Preload of all secondary datasets available and all default activity data for processes not under the control of the battery manufacturer (e.g. EoL)
- Introduction only of the company specific data
- Possibility to upload new EF-compliant datasets
- Possibility to produce a CF verification report with the list of all changes introduced
- Possibility to export the CF profile in a machine-readable format

The calculator would **NOT** be:

⊠ An LCA software
⊠ An ecodesign software
⊠ A tool that allow to modify the secondary datasets available or the EF method modelling requirements