Carbon footprinting and Life Cycle Assessment of agricultural and food products

Opportunities and Challenges

May 4th 2022, Roline Broekema

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Carbon footprinting and Life Cycle Assessment

Carbon footprint:

Total amount of greenhouse gasses generated during the life cycle of a product or service.

Life Cycle Assessment (LCA):

The systematic analysis of the potential environmental impacts of products or services during their entire life cycle.

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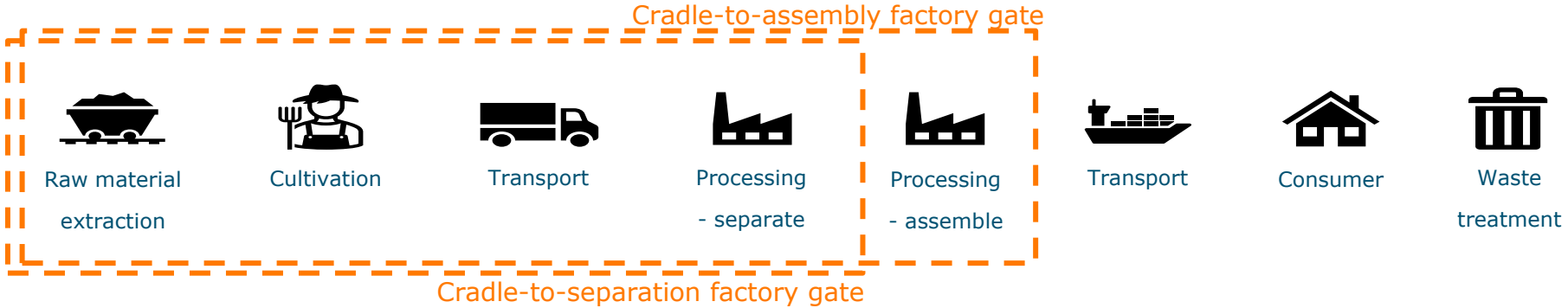
Carbon footprinting and Life Cycle Assessment

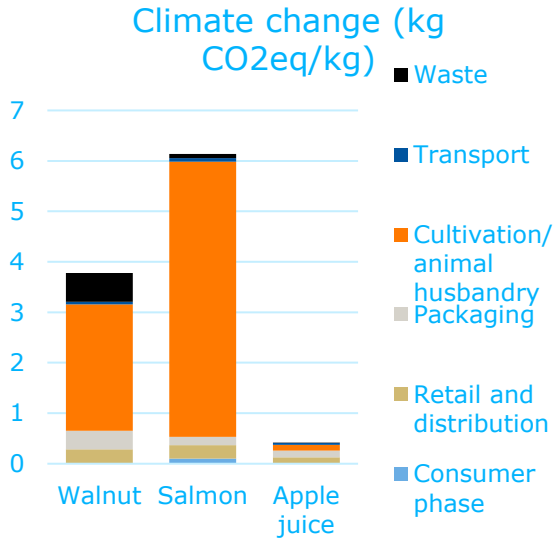
- Important terms in Life Cycle Assessment:
  - Functional unit – e.g. kg or kg protein
  - System Boundaries – e.g.:

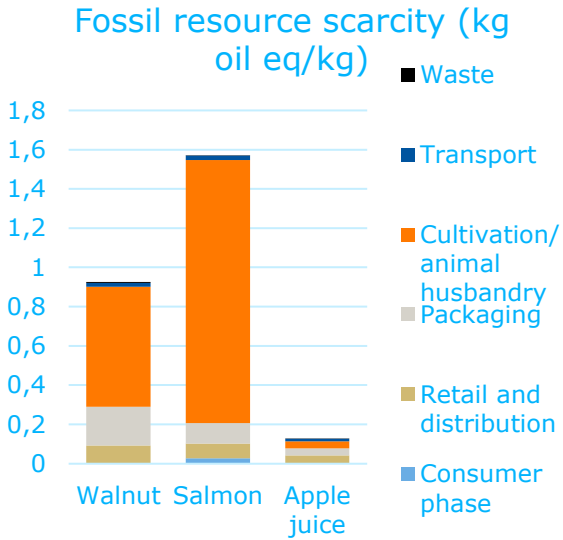


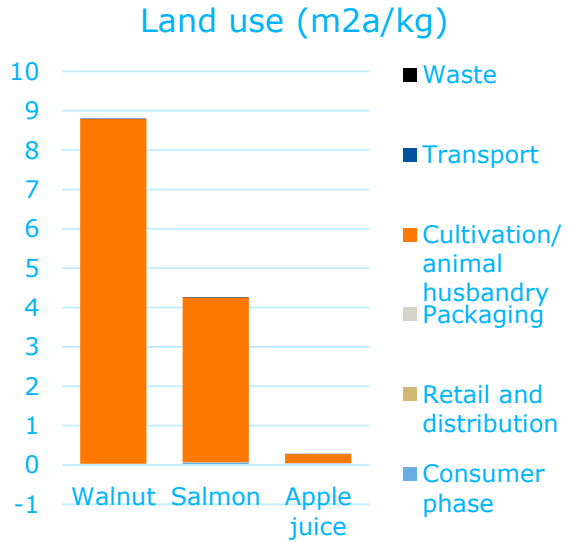
  - Allocation: divide the impact between co-products - e.g. economic allocation/ mass allocation/ energy allocation

Carbon footprinting and Life Cycle Assessment

- Multiple environmental indicators → prevent trade offs
- Hot-spot analysis → target mitigation efforts







Source: Agribalyse 3.0

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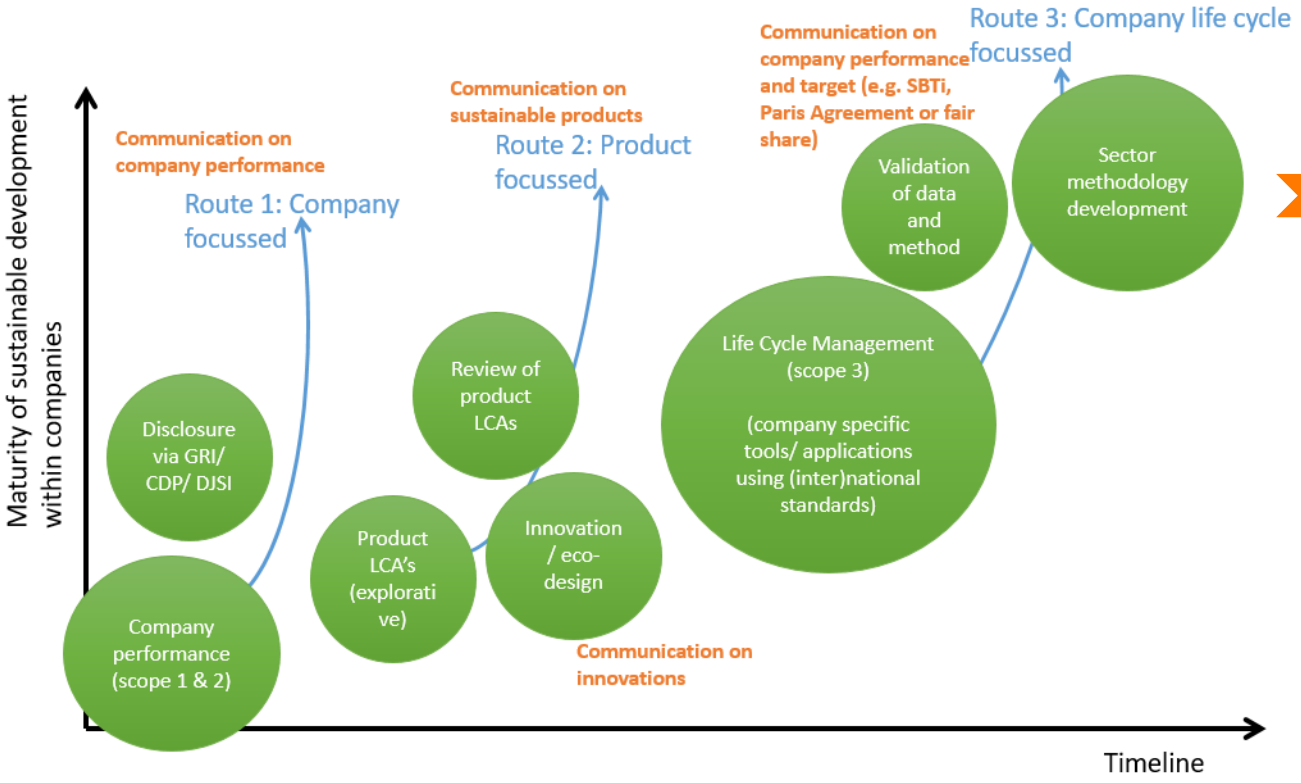
Carbon footprinting and Life Cycle Assessment

Bottlenecks and challenges:

- Can be complex and requires expertise
- Data availability and data quality are crucial
- Not all environmental indicators are covered sufficiently, e.g.:
    - Eco-toxicity, biodiversity, soil quality, marine resource depletion
- Methodological choices to be made by the practitioner
- Hard to interpret by non-experts and communicate (to consumers)

LCA – How companies tend to develop



This is where companies often seek alignment within the sector.

<u>Opportunity</u>: PEF

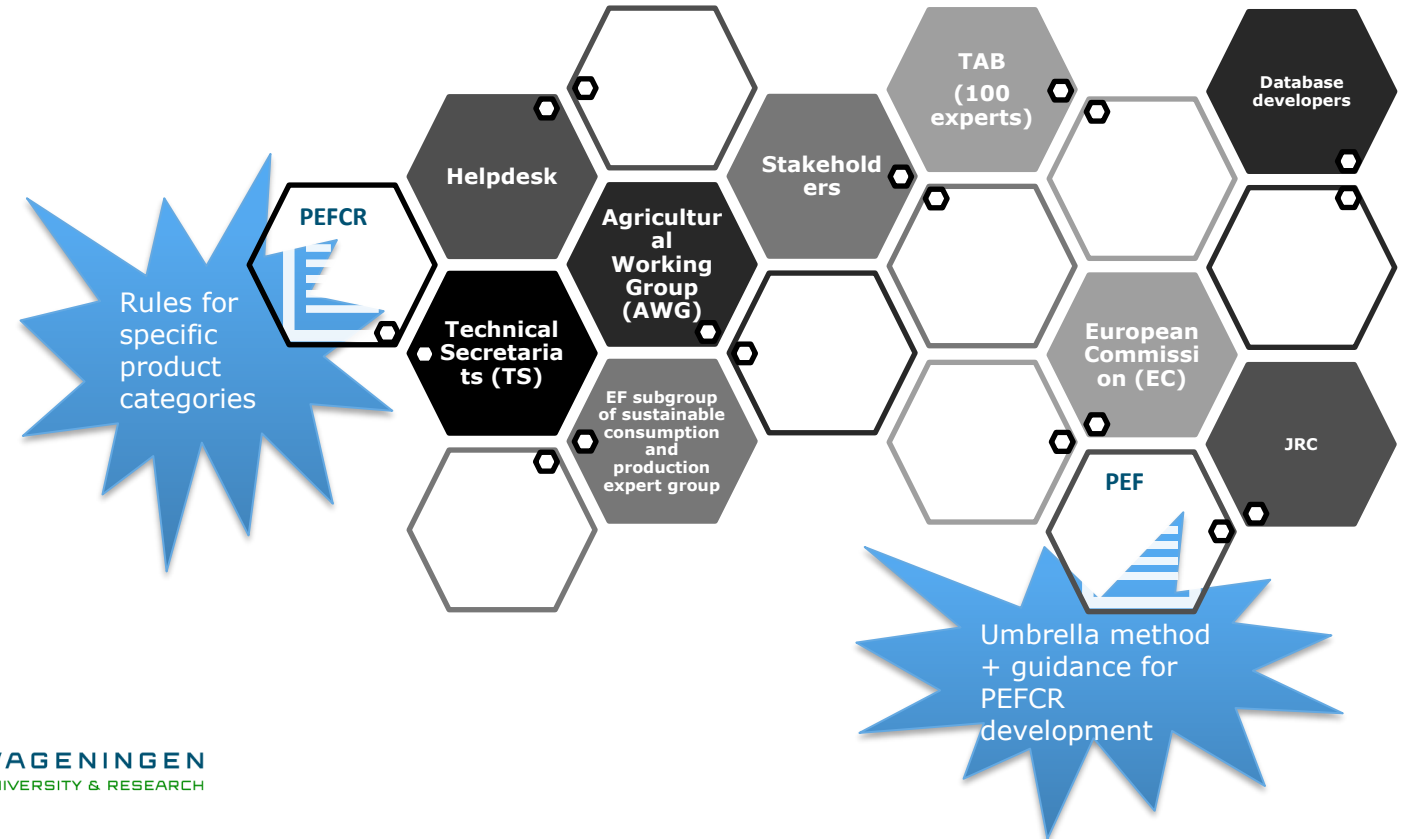
EC's Product Environmental Footprint method

Product Environmental Footprint (PEF):

- Pilot phase initiated by the European Commission in 2013 with the aim to achieve environmental information on products that is:

    1) Reproducible
    2) Comparable
    3) Verifiable

EC's Product Environmental Footprint method



EC's Product Environmental Footprint method

Harmonization of LCA methodology under PEF: emission models, background data, allocation methods, system boundaries, functional unit, company specific data requirements, default data, data quality rating, reporting

- 21 PEFCRs developed in pilot phase, food:
  - dairy, olive oil, packed water, beer, wine, pasta, (feed)
- 5 PEFCRs developed in transition phase, food:
  - marine fish, (floriculture)

EC’s Product Environmental Footprint method

Drawbacks of PEF:

1) PEFCRs have not yet been developed for all product categories
2) PEFCRs are not consistent between one another – no comparison between product categories
3) PEF does not directly lead to consumer communication/ labelling

EC's Product Environmental Footprint method

- ✓ Identifying the environmental footprint of single products
- ✓ Comparisons between products within one product category
- ✓ Identifying mitigation options in the life cycle of single products
- ? Comparisons across product categories
- ? Consumer labelling across product categories
- ? Investigating issues/ policy development around sustainable diets and/or protein transition

Sustainable food choices should not lead to diets with less nutritional quality

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EC's Product Environmental Footprint method

It looks like PEF is going to be used in future EU policies, for:

- Substantiating Green Claims;

within Circular Economy Action Plan of EU's Green Deal

- Sustainable Food Labelling;

within Farm to Fork of EU's Green Deal

So, considering the drawbacks of PEF; how can we consider PEF in the context of national climate policy development?

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Using PEF in national climate policy – Netherlands

1) Enable reduction of the environmental footprint of products, amongst others by providing a market conform benchmark.

2) Make it possible for consumers to make more sustainable choices, within and/or between product categories.

- ✓ We use PEF/ PEFCRs wherever available
- ✓ We provide an alternative when no PEFCRs are available
- ✓ We align with European developments
- ✓ We involve customers for the development of good communication systems and business models

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Using PEF in national climate policy – Netherlands

1 Stimulate (info and tools) and gain experience with environmental footprinting

2 Results of PEF studies, with PEFCRs

When no PEFCR, alternative!

New PEFCR development, keep up-to-date and develop PEFCR-based tools

3 National database, currently 265 products

Improve national database
- 3000+ products
- PEF-wise

Include company specific information

Benchmark database – generic and company specific data

A Use the expert groups in Europe to contribute to EU policy development and improving the PEF method

B Stimulate environmental footprinting, correct and appealing consumer communication systems amongst stakeholders

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Using PEF in national climate policy

There are also interesting developments in other countries:

- France – environmental food labelling for products in 2023 (link)
- UK – reduce GHG emissions by 50% in 2030 (link)
- Italy – supporting consumer decisions (link)

Thank you for listening!

Do you have any questions?

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Extra - List of data required – environmental perspective, for cultivation

Data collection for consumption mix of the country/ region of focus: e.g. soy from BR, AR and US for soy bean protein in NL.

- Yield (also for co-products) (kg/ha)
- Fertilizer application (kg N, kg P and kg K per ha and types)
- Manure application (kg/ha, type and origin)
- Fuel use (l diesel/ha, m3 natural gas/ha and kWh electricity/ha)
- Water use for irrigation (m3/ha)
- Crop protection (kg per active ingredient per ha)
- Land transformation (from forest, grassland, permanent crop, to annual crop)

Extra - List of data required – environmental perspective, for processing

- Mass balance (raw material in & co-products out, in mass)
- Energy consumption (l diesel, m3 natural gas/ steam and kWh electricity)
- Water consumption (m3)
- Auxiliary material consumption (kg)
- Financial revenue per co-product (€ or ratio between co-products)
- Waste (type and mass)

Extra - List of data required – environmental perspective, for assembly of composite products

- Recipe (ingredients and amounts per ingredient, per kg product)
- Energy consumption (l diesel, m3 natural gas/ steam and kWh electricity)
- Water consumption (m3)
- Auxiliary material consumption (kg)
- Packaging materials (ingredient packaging, kg)
- Packaging materials (consumer packaging, kg)
- Waste (type and mass)

Life cycle stages like distribution, retail, consumer phase and end-of-life can be modelled based on scenarios (e.g. with PEF default data).