

The product life cycle and environmental labelling schemes

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Overview

- Intro to life cycle assessment (LCA)
- Common errors in LCA
- The impact of commercial print – what do we know?
- Non-intuitive results are what we learn from
- Environmental labelling schemes

Introduction to life cycle assessment (LCA)

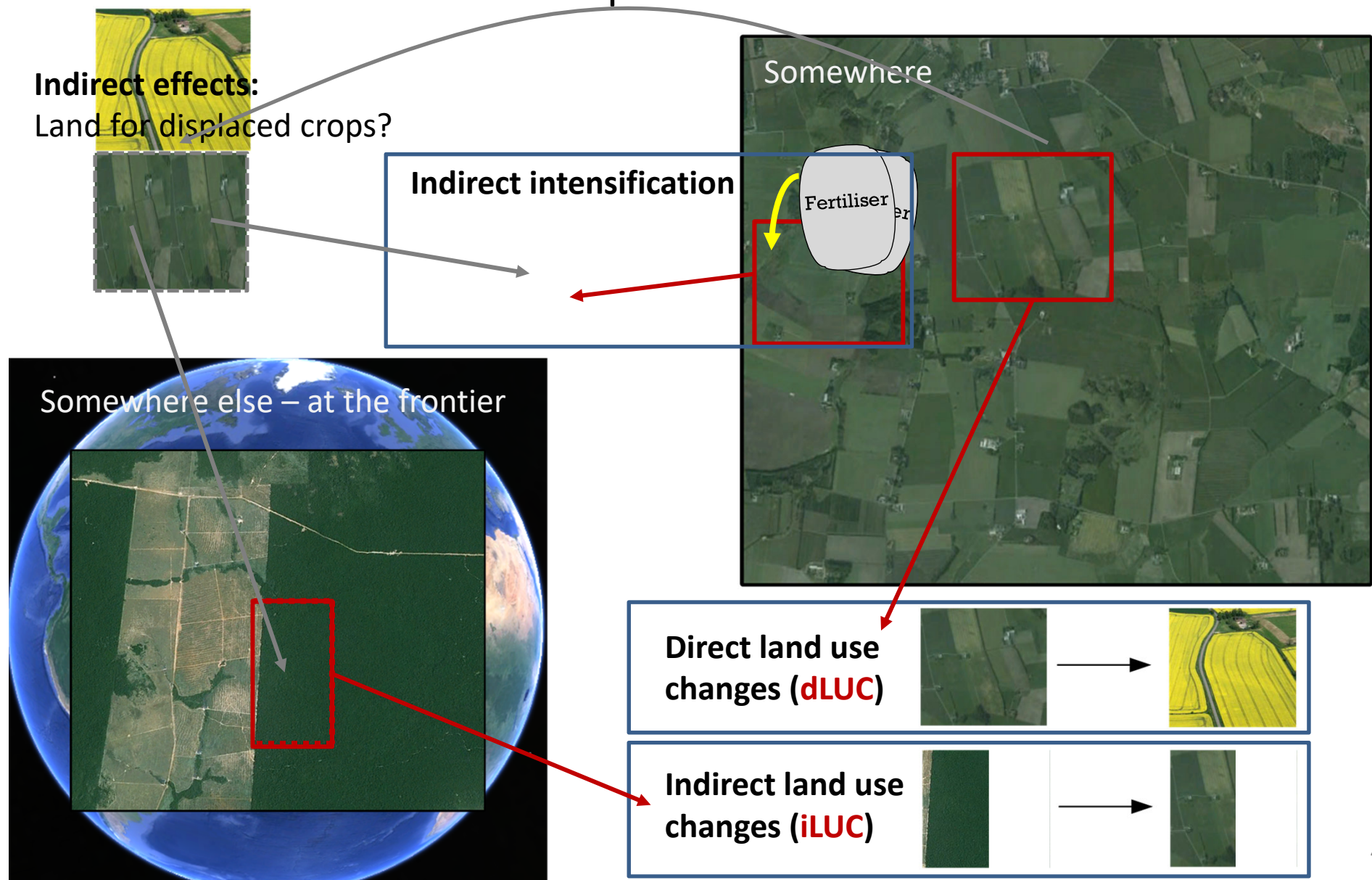
- Assessment of consequences of a decision
- Comparison of products with same function
- Based on cause-effect relationships
- Includes entire life cycle
 - Supply-chains are typically global
 - All activities in a product's life cycle are included:
 1. Economic flows are tracked until last cent is used
 2. Material flows are tracked until equilibrium in nature

A → B



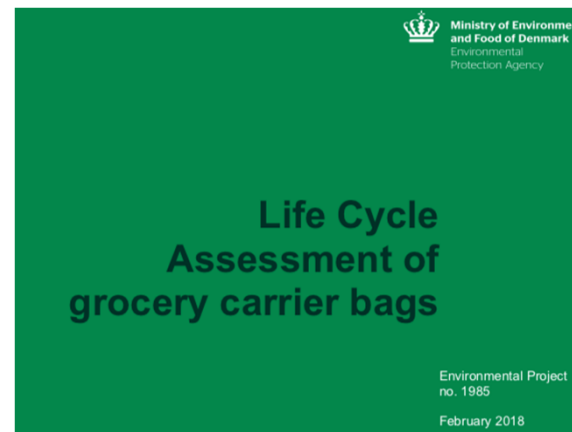
Example: Direct and indirect Land-Use Changes

- Effect of 1 ha additional rapeseed field somewhere?



Common errors in LCA

- Modelling of a product's history rather than the consequences of its production and consumption
 - Historical average instead of the next produced unit
 - Allocation instead of cause-effect relationships
- Cut-off part of the life cycle
 - By-products and their consequences
 - General cut-off criteria (e.g. iLUC, services, a share % of inputs)
- Unrealistic comparisons
 - Beef and softdrinks
 - **one** 22 ltr plastics bag vs **two** 20 ltr cotton bags



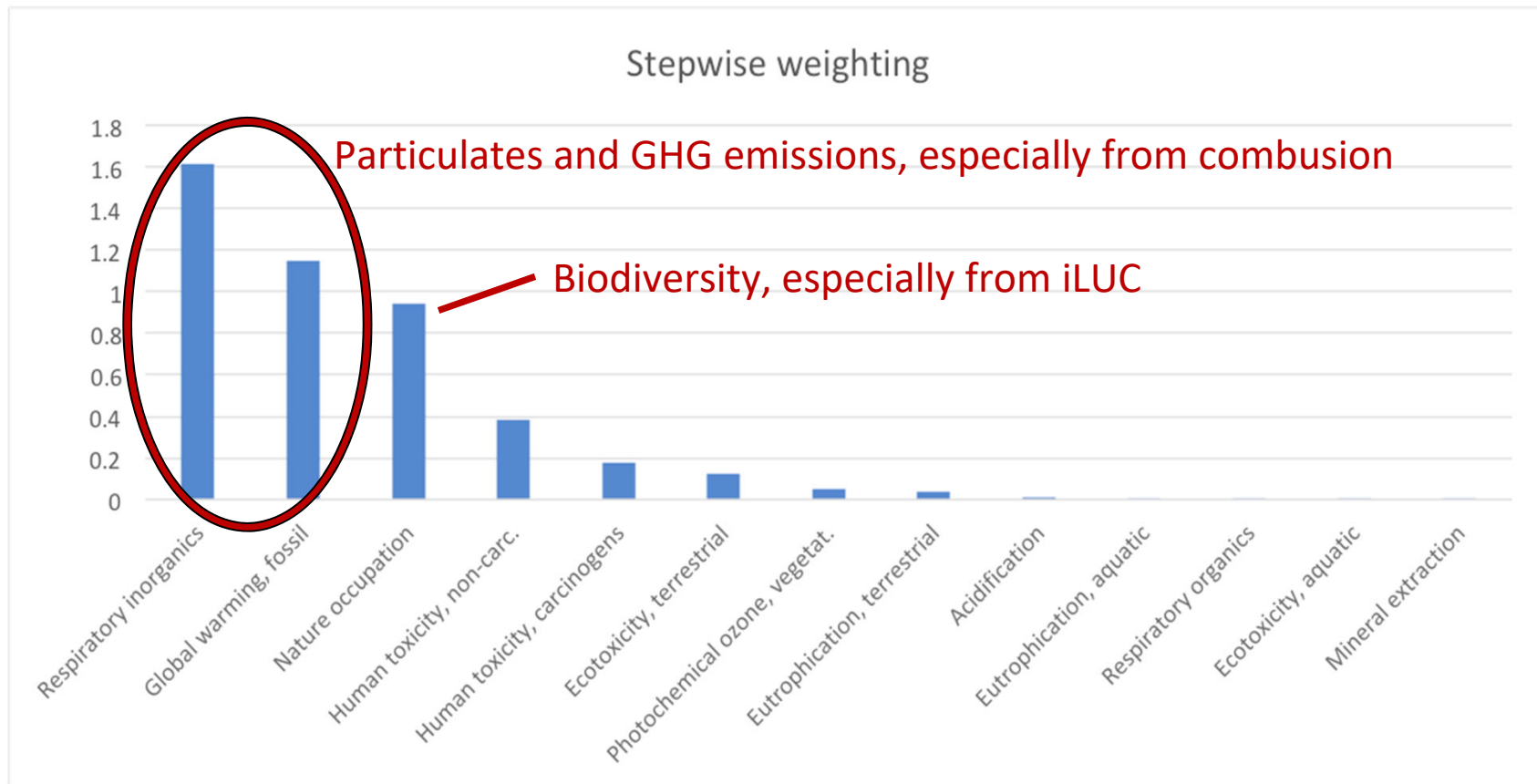
Aarhus Universitet trækker ko oksekødsrapport tilbage



The impact of commercial print

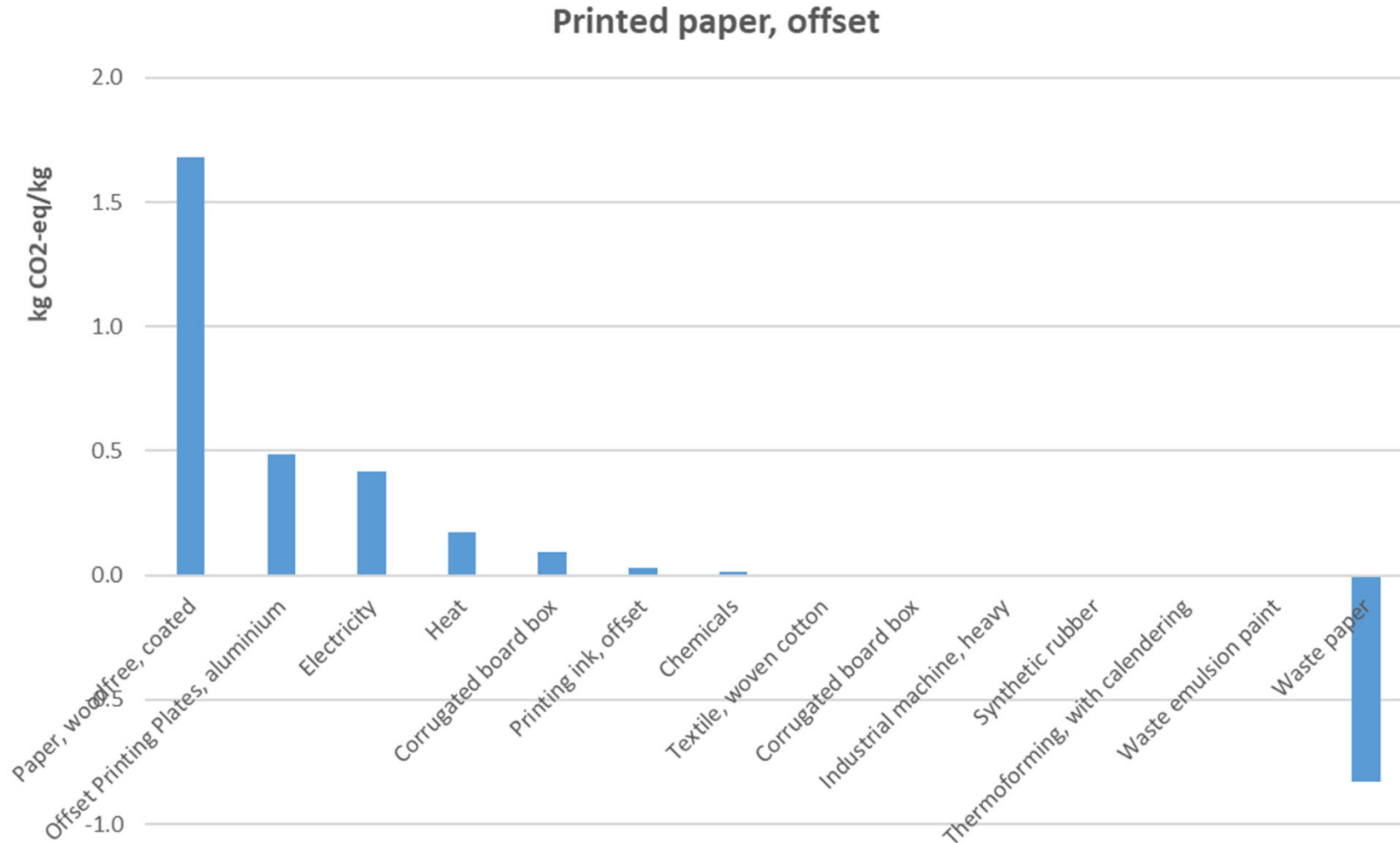
- What do we know?

- Most important environmental impacts from commercial print



Monetarised impacts (EUR) from 1 kg product from the sector "Publishing, printing and reproduction of recorded media" from Exiobase v.3.3.13b2, using LCIA method: Stepwise2006 v1.06

Which activities gives the largest impact?



GHG emissions from 1 kg "Printed paper, offset {RoW}| offset printing, per kg printed paper | Conseq, U" from ecoinvent 3.5.

Non-intuitive results

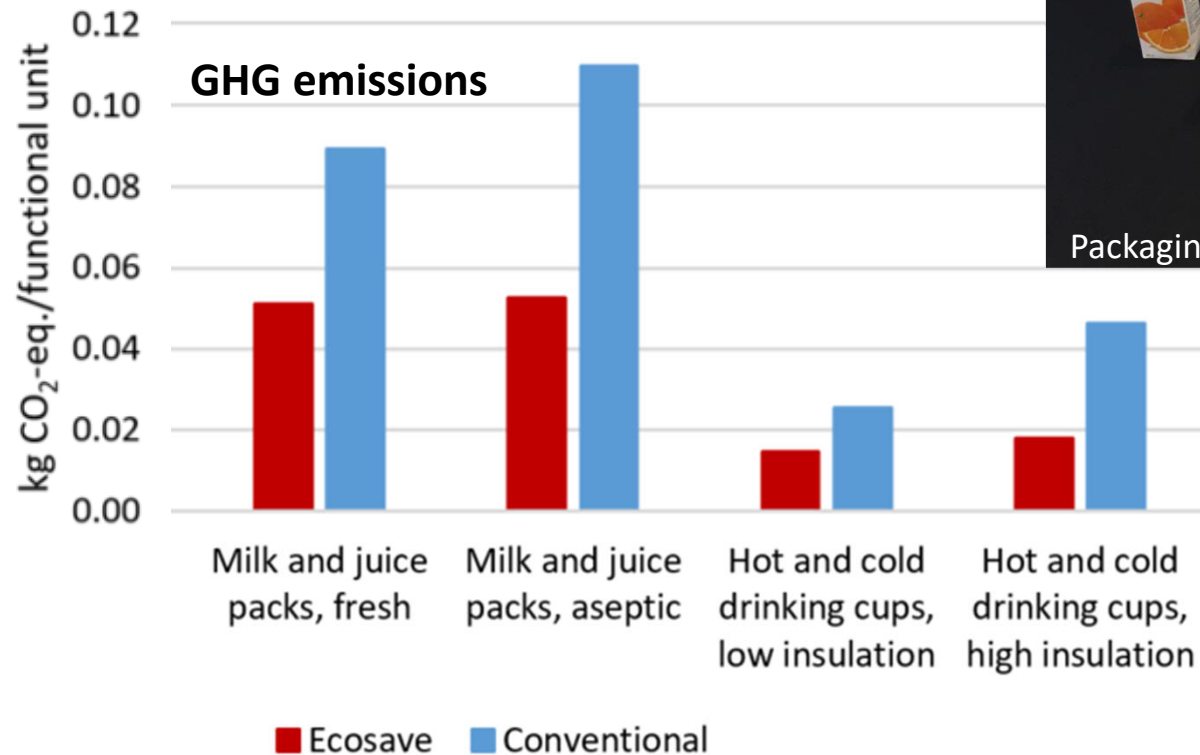
- This is what we learn from...

- Plastics better than paper?
- Biodegradable plastics does not reduce impacts?
- Incineration better than composting?
- Certified forestry harms biodiversity?
- No effect of choosing recycled paper?

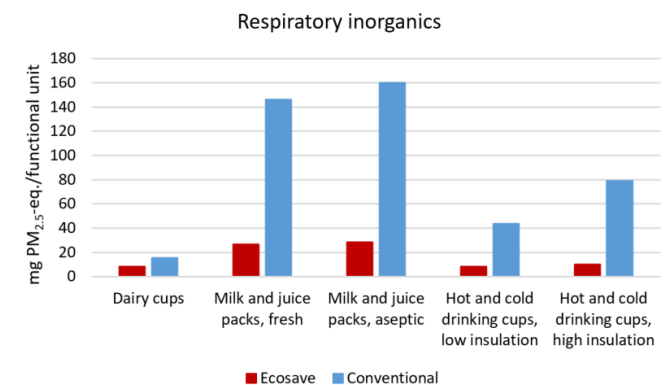


Non-intuitive

– Plastics better than paper

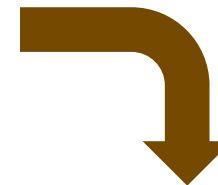
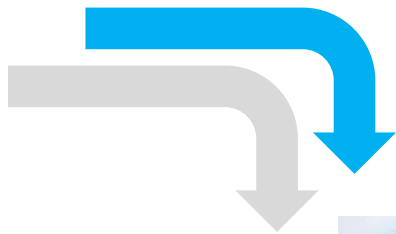


- **Intuitively right** when we understand that forestry is not CO₂-neutral and that iLUC is significant for forest plantations



Non-intuitive?

- Biodegradable plastics does not reduce impacts
- Intuitively right when we understand that biodegradable plastics may effect recyclability



Non-intuitive?

- **Incineration better than composting**
- **Intuitively right** when we understand that recovered heat and electricity from incineration substitutes alternative energy sources and that composting emits methane



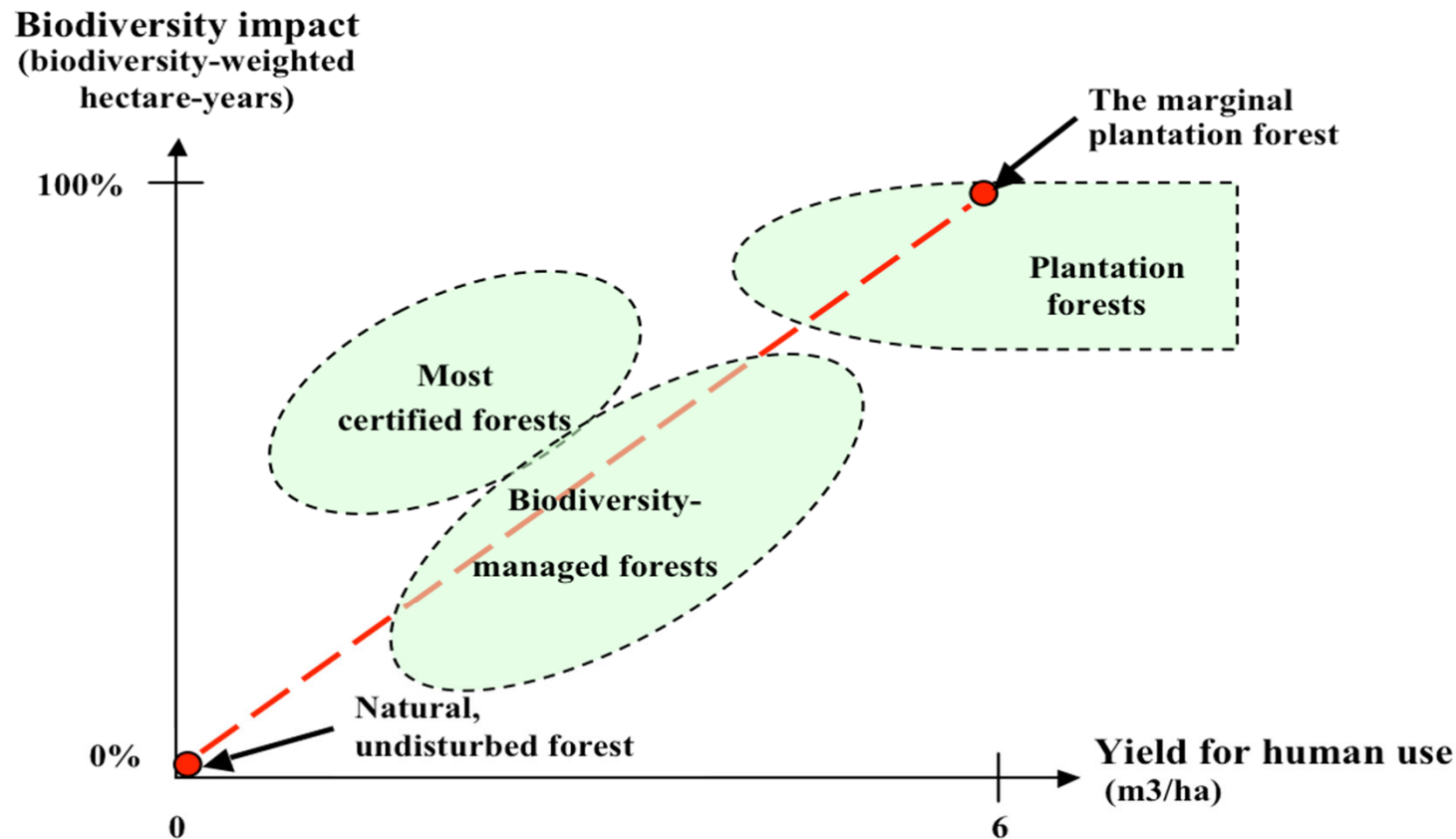
↓
Substitutes
alternative energy



↑
Emits methane

Non-intuitive?

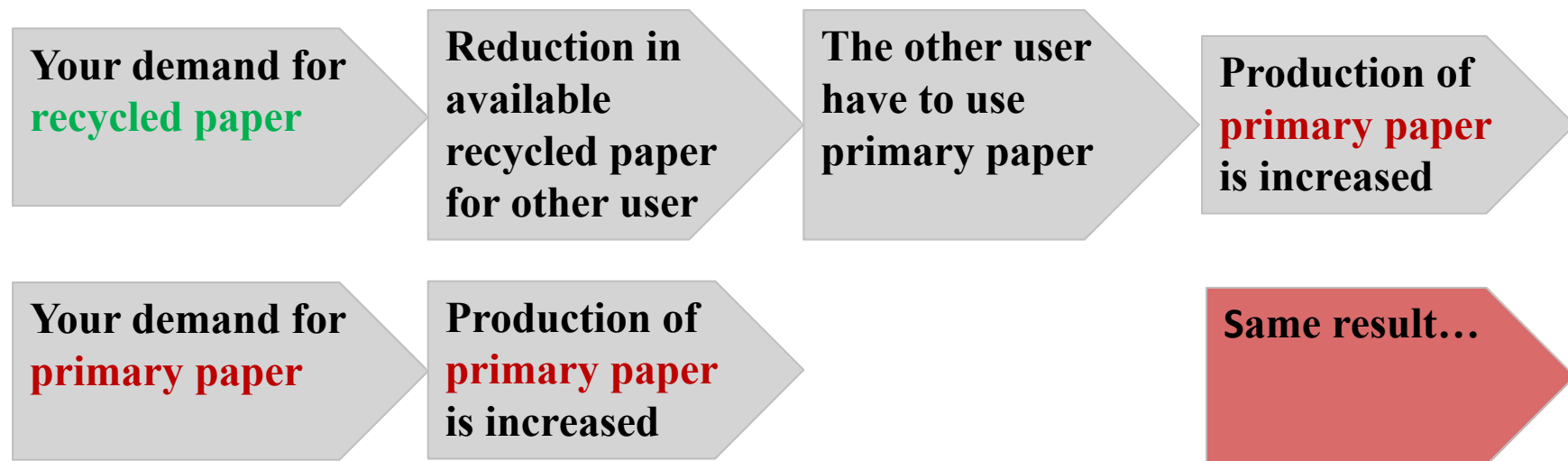
- Certified forestry harms biodiversity
- Intuitively right when we understand that certification does not target biodiversity impact per produced m³ wood



20 **Figure 1:** The place of different forest management systems (green dashed ovals) relative to the iso-biodiversity line (— — —), its determining extremes (●).

Non-intuitive?

- No effect of choosing recycled paper
- Intuitively right when we understand that demand from a constrained market just change the users of the same recycled paper
- 70-75% paper waste is sorted and recycled in the EU
- Increased demand for recycled paper does not increase the collection rate



Environmental labelling schemes for print

- Nordic Swan
- EU Flower
- Cradle-to-cradle



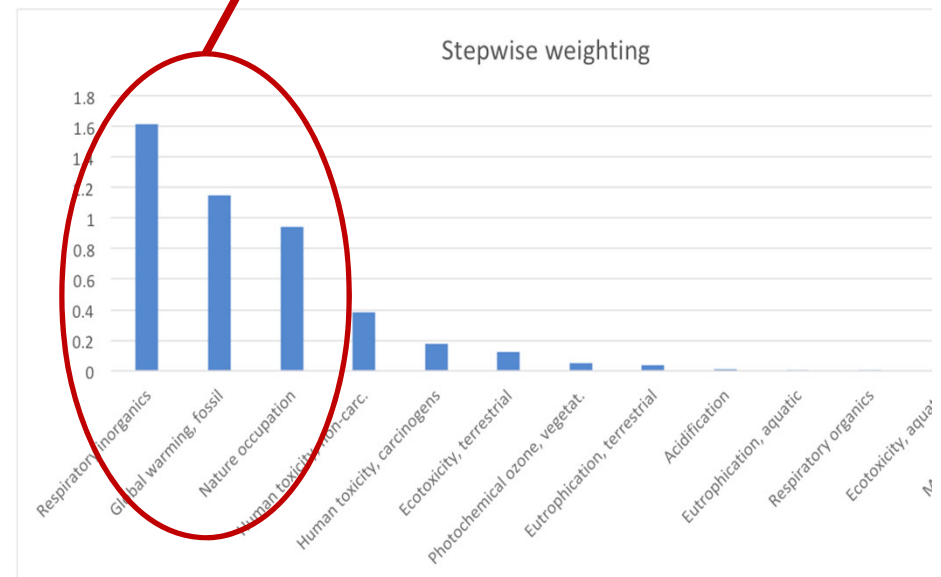
Environmental labelling schemes

■ We have identified and evaluated labelling criteria for

- Biodiversity impacts
- Life cycle efficiency
- Genetically modified material
- Water stewardship
- Energy stewardship and GHG emissions
- Other emissions
- Labour and social impacts

Slide 6:

- Resp. inorganics
- GHG emissions
- Biodiversity



Environmental labelling schemes

- **Biodiversity**

- Main criteria: Use certified wood
- Effect: Does not target biodiversity impact per m³ wood

- **Life cycle efficiency**

- Main criteria: Low loss, recycled and recyclability
- Effect: Loss and recyclability reduces impact; recycled has no effect

- **GHG emissions**

- Main criteria: Limiting elec and fossil fuels
- Effect: Reduction of GHG and particulate, non-fossil fuels are assumed good (which is only sometimes true)

- **Comparison of labelling schemes**

- General good coverage but often lack of life cycle perspective
- None of the schemes stand out as better

20 – Consistent use of LCA could significantly improve schemes

Recommendations

- Important consider life cycle systems
- Remember:
 - Consider trade-offs – risk of sub-optimization?
 - When waste is recycled – what is substituted?
 - Recycling best when it substitutes similar materials
 - Biofuels/bio-materials are not CO₂-neutral
- Be critical – think in cause-effect relationships!
- Sometimes further studies are needed



Thank you



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