



Life Cycle Assessment of apple crop protection strategies

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FOOD
QUALITY
AND
SAFETY



Integrated Pest Management in Europe

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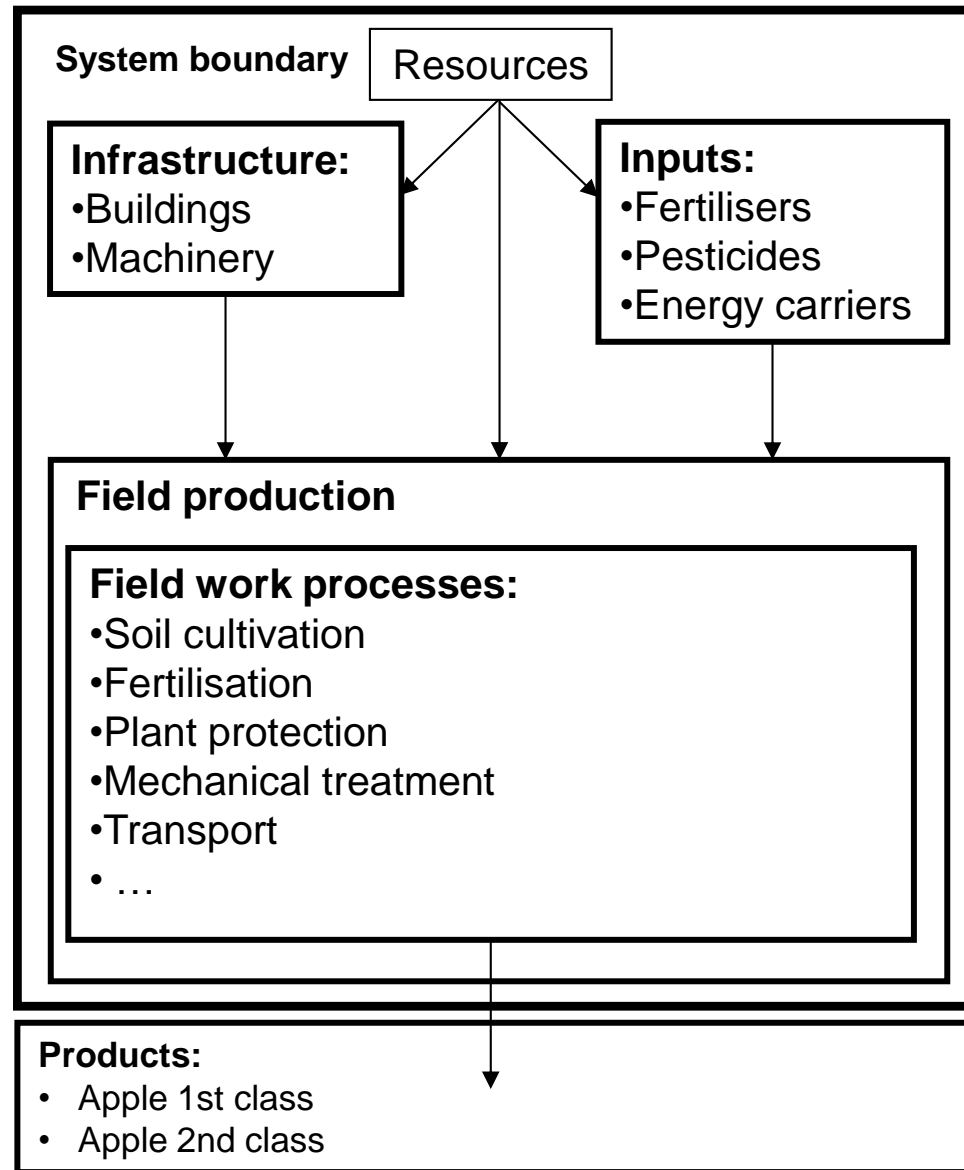
- Inventories
- Impact categories
- Results
 - Resource management
 - Pollutant management
- Summary

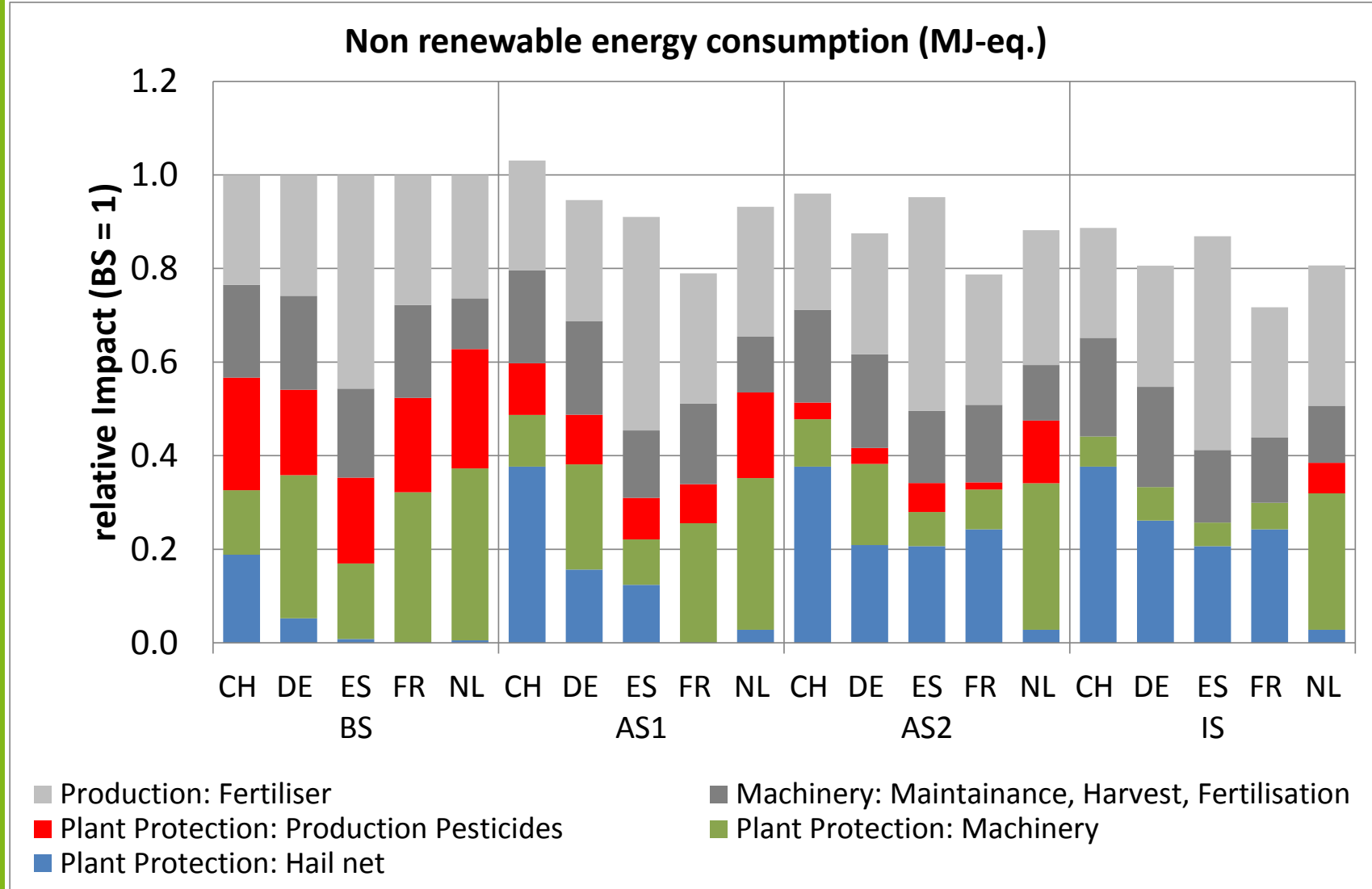
- Inventory data
 - Data from system description collected in Orchard System Case Study
 - other inventory data from ecoinvent Version 2.0 (Frischknecht et al. 2007)
 - SALCA-database (Nemecek et al. 2004).
- Assessment tool
 - Swiss Agricultural Life Cycle Assessment (SALCA) developed by Agroscope

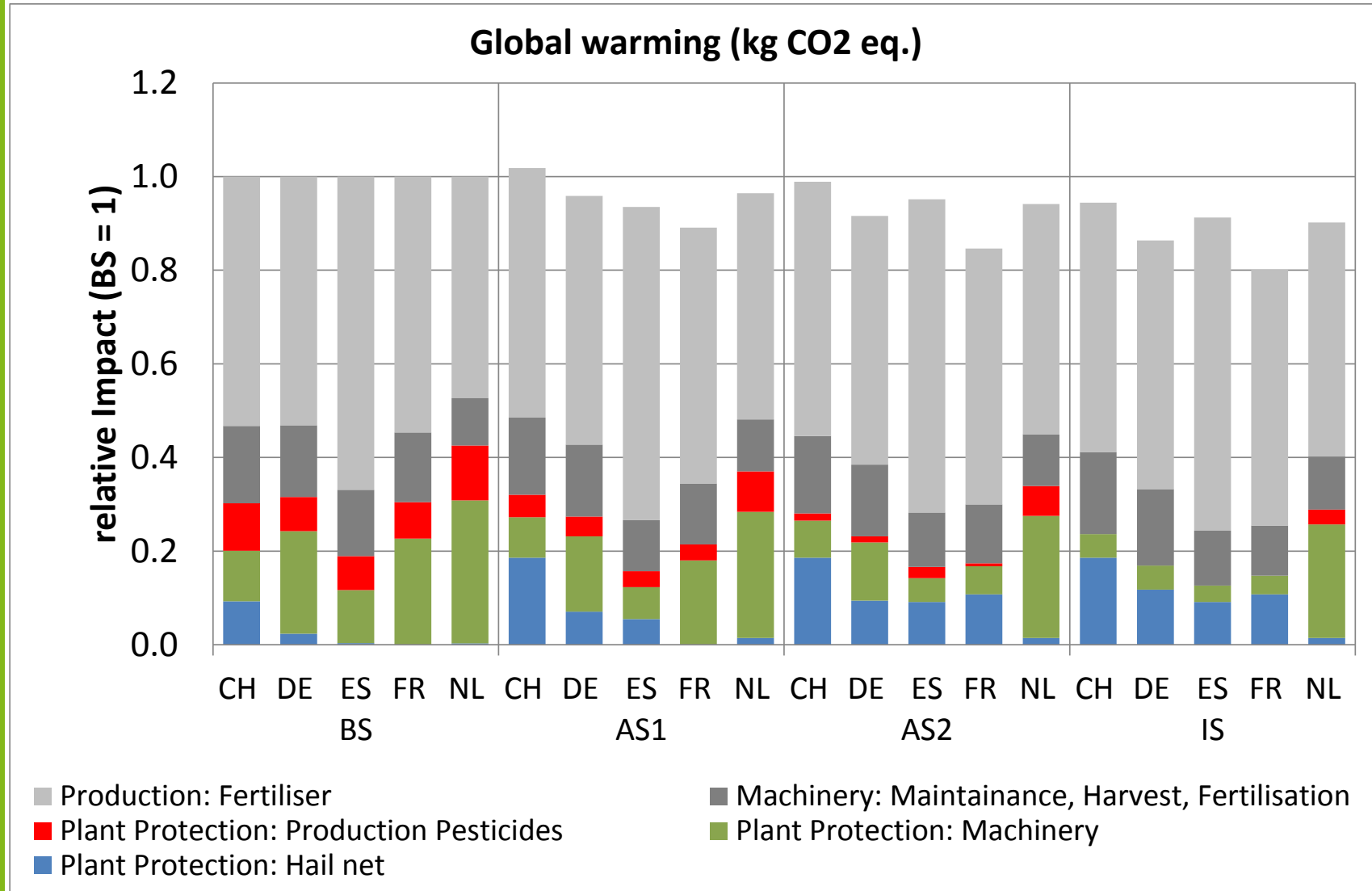
Impact categories

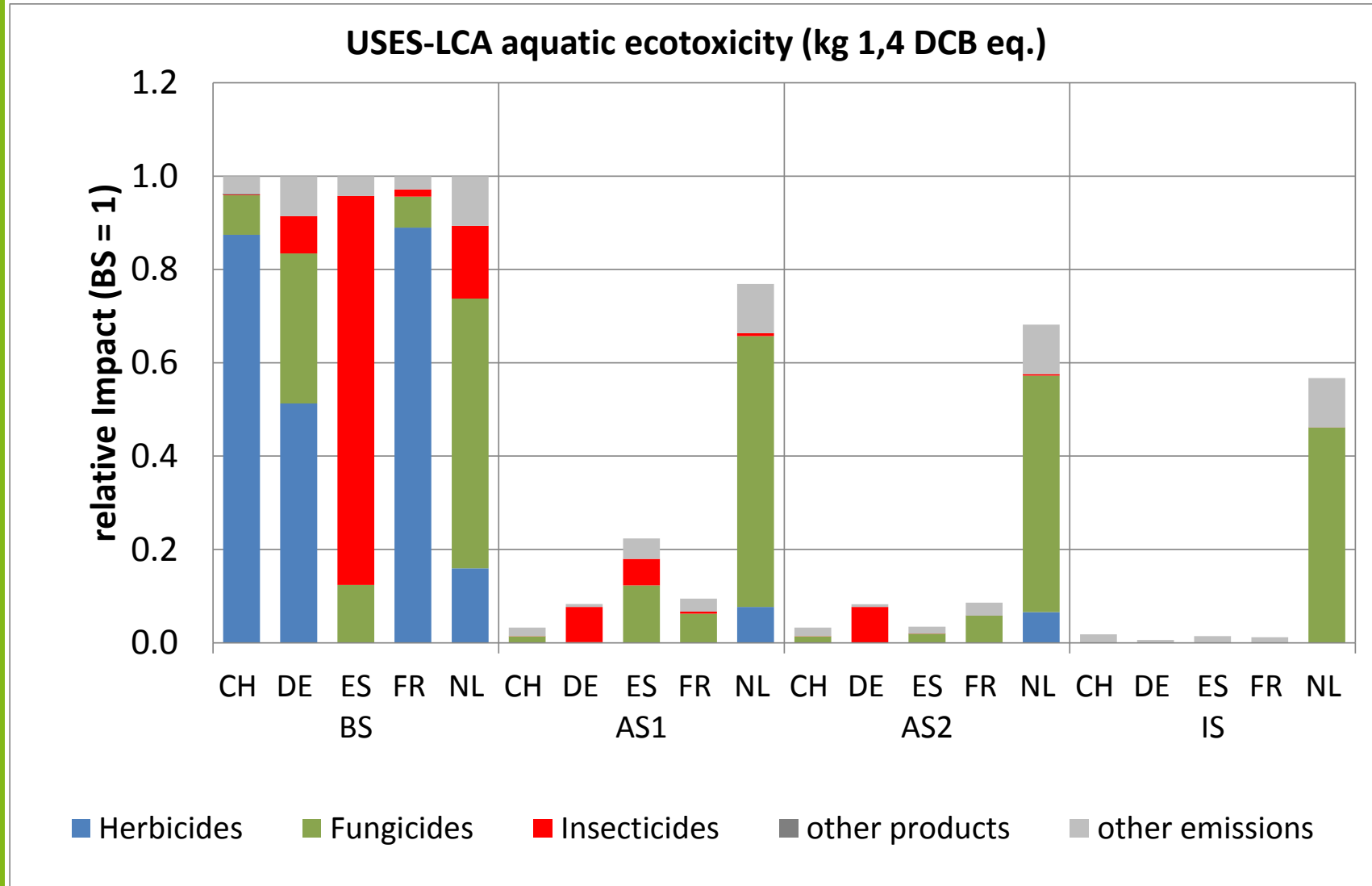
| Group | Abbr. | Impact Category | Method |
|----------------------------------|--------------|------------------------------------|-------------------------|
| Resource- Management | NRE | Non renewable energy demand | ecoinvent-method |
| | GWP | Global Warming Potential | IPCC |
| Nutrient- Management | EP | Eutrophication Potential | EDIP 97 |
| | AP | Acidification Potential | EDIP 97 |
| Pollutant- Management | TeE | Terrestrial ecotoxicity | USES-LCA |
| | AqE | Aquatic ecotoxicity | USES-LCA |
| | HT | Human toxicity | USES-LCA |

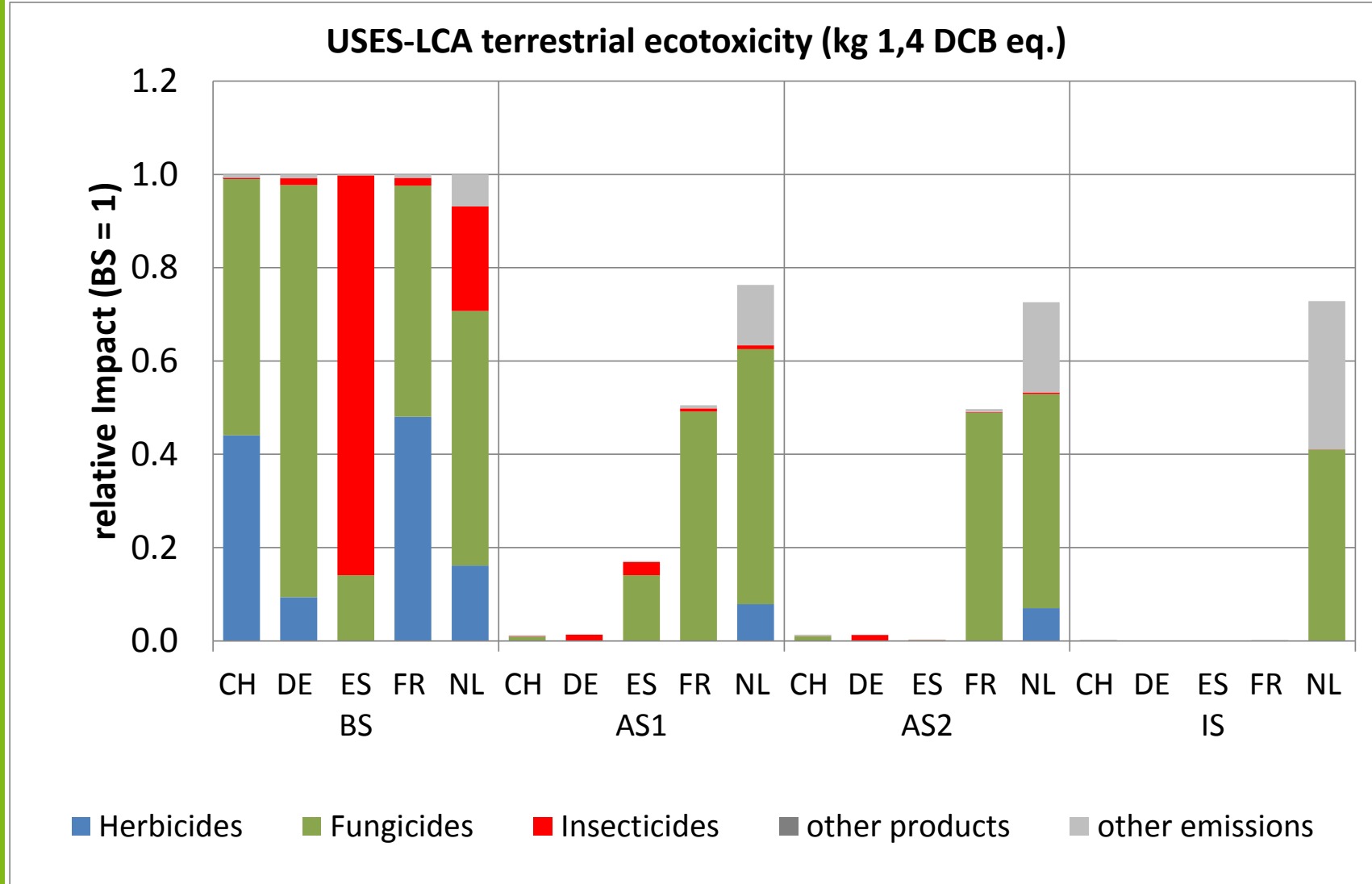
- Production of inputs
 - N-, P-, K-Fertilisers, Pesticides, Machinery
- Field operations
 - Fertiliser application
 - Application pesticides
 - Mulching
- Hail net
- Field emissions
 - Pesticides, N₂O, NO₃, NH₃ ...

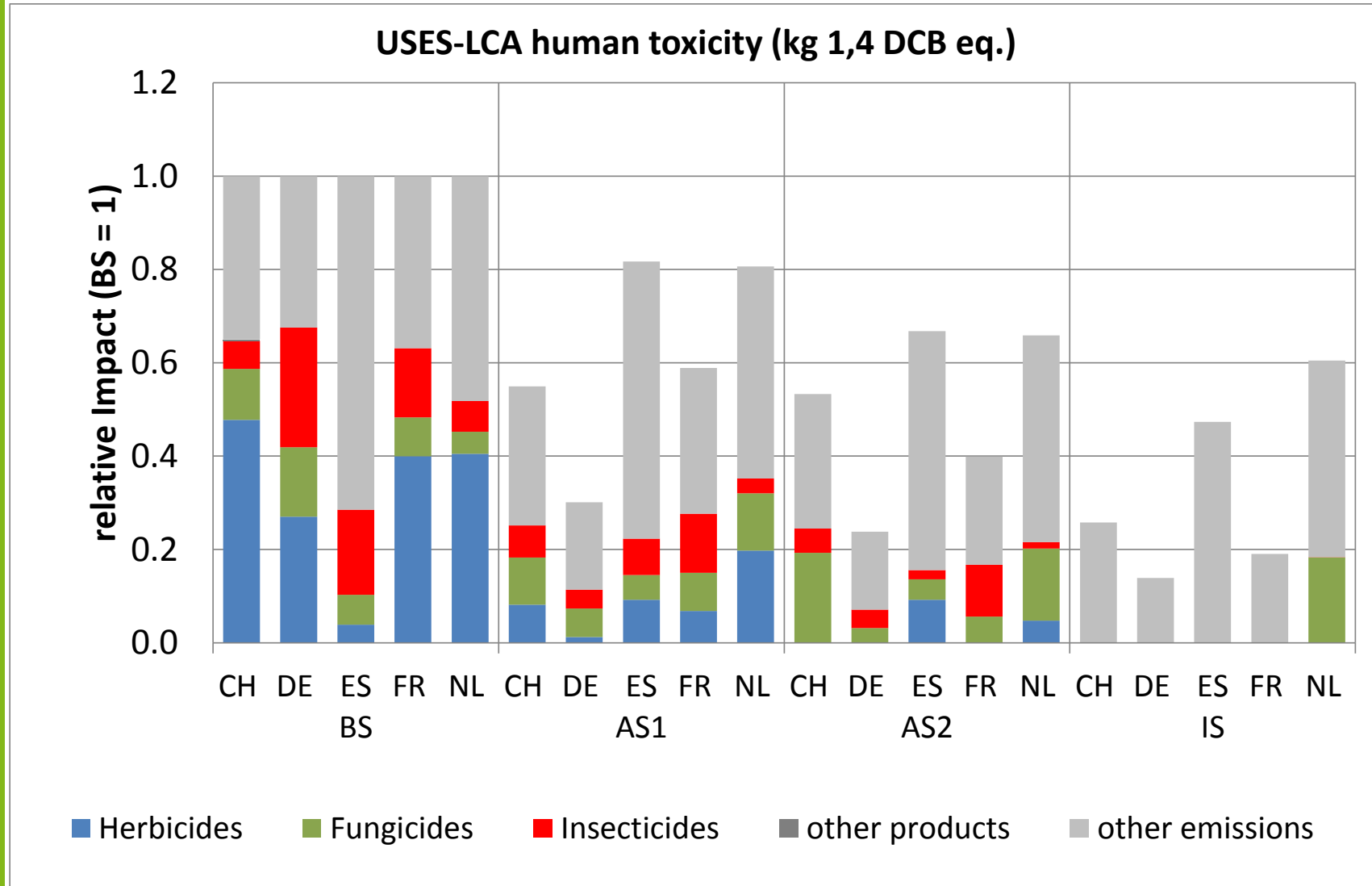












- NRE and GWP

- With the exception Switzerland the AS have a lower energy demand/GWP than the BS
 - o Less active ingredient applied
 - o Lower no. of passages
- These effects are partly counterbalanced by the higher percentage of area under hail nets
- IS comparable or lower NRE/GWP than the AS
 - o Less active ingredient applied
 - o Lower no. of passages

- Toxicity according to USES-LCA
 - AS and IS in all regions with lower impacts across categories
 - Ecotoxicity in BS dominated by single active ingredients e. g.
 - Fungicide: Copper fungicides
 - Herbicide: Diuron
 - Insecticide: Trichlorfon
 - the non-pesticide emissions play a more important role in the Human toxicity
 - Herbicides with a high impact: Diuron and Amitrol

Thank you for your attention!



Bart Heijne, Andreas Naef, Jesus Avilla, Joan Solé, Benoit Saupanor, Aude Alaphilippe, Andrea Patocchi, Jörg Samietz, Heinrich Höhn, Jörn Strassemer