Comparing IMPACT World+ with other LCIA methodologies at end-point level using the Stepwise weighting factors

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Materials and methods

IMPACT World+, Ecoinvent99 (H), Stepwise2006 and ReCiPe2008 (H) are put in perspective with respect to the relative and absolute importance that they assign to the different midpoint impact categories.

The Stepwise weighting factors are used in order to put endpoint results on a comparable scale (in euros): 74,000 Euro/DALY for human health, 0.14 Euro per PDF-m²-yr for ecosystem quality.

Those values were applied on the normalization values (correspond to the global emissions per person per year) of all the impact category indicators characterized at the endpoint level with the four LCIA methodologies.

The result corresponds to the total monetarised impact in the world per person and per year predicted by each of the methodologies, which may allow putting in perspective LCA results with individual revenues which is a good interpretation tool.

Results

The total value are:

- 1650 Euro/pers yr for Ecoinvent99 (H),
- 1773 Euro/pers yr for Stepwise2006,
- 11088 Euro/pers yr for ReCiPe2008(H)
- 4374 Euro/pers yr for IMPACT World+ short term impacts, +1220 Euro/pers yr for long term impacts.

Main learnings:

- The overall tendency is respected between impact assessment methodologies;
- Different behaviors of the methodologies for some impact categories need to be better understood to evaluate weather this is due to an improved assessment or to a modelling bias;
- In particular, Water impact on humans dominate in IMPACT World+, highlighting a need for further investigation;
- Improved respiratory inorganics modelling in IMPACT World+ is now better in line with other methods.

Acknowledgement

IMPACT World+ gives a higher importance to toxicity, eutrophication and acidification impact categories than other methodologies.

Good agreement about the relative importance of climate change, respiratory inorganics and land use impacts (1 order of magnitude higher for ReCiPe).

IMPACT World+ considers additional impact categories such as marine acidification and water use impacts on human health which seem important.

All methods agree on the relatively low importance of ionizing radiation, ecotoxicity, ozone depletion and respiratory organics (less than 10 Euros per person and per year).

Water use impacts on ecosystems from IMPACT World+ also seem relatively low.

Euros

0.01 0.1 1 10 100 1000 10000

Land use impacts, total
Water use impacts - human health
Global warming 0-100 yrs - human health
Global warming 100-500 yrs - human health
Global warming 0-100 yrs - ecosystems
Global warming 100-500 yrs - ecosystems
Marine acidification
Respiratory inorganics / Particulate matter

Human toxicity, non-carc.
Human toxicity, carcinogens
Eutrophication/Acidification, total

Fossil depletion**
Metal depletion*
Photochemical ozone, impact on vegetation

Ozone depletion
Ecotoxicity, terrestrial*
Ecotoxicity, aquatic, total
Respiratory organics
Water use impacts - ecosystems
Ionising radiation

* Not yet available for IMPACT World+
** Interim value

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