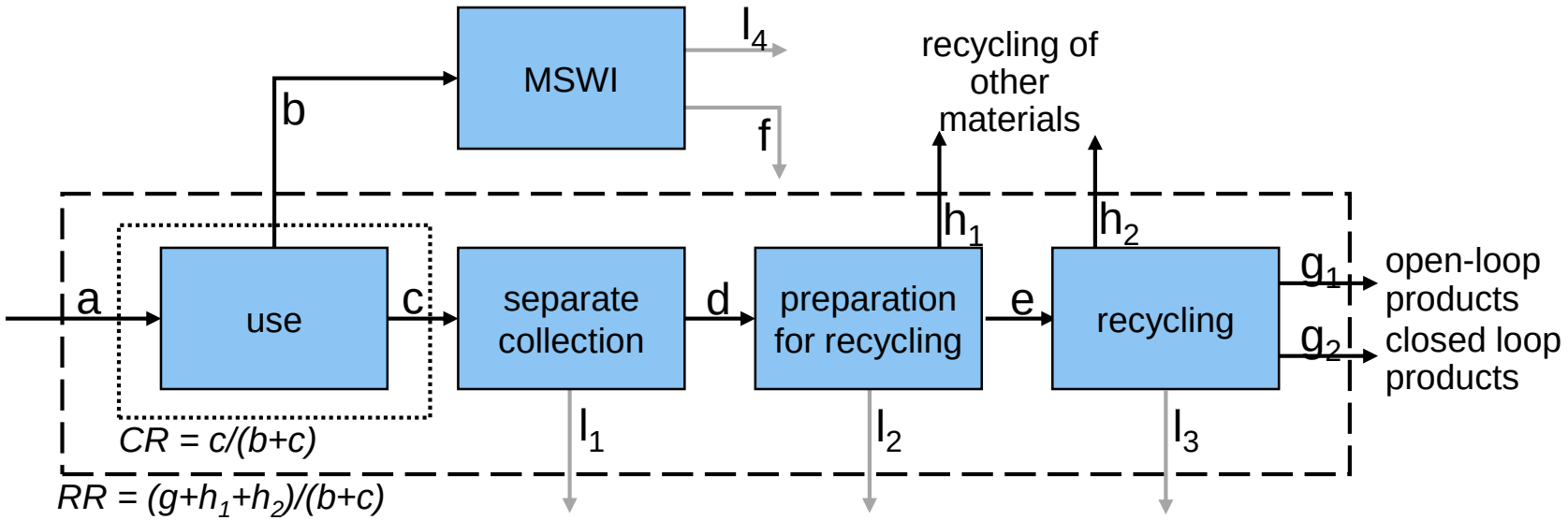
Measuring the environmental sustainability of a Circular Economy

Dr. Melanie Haupt

European Resource Forum 2020

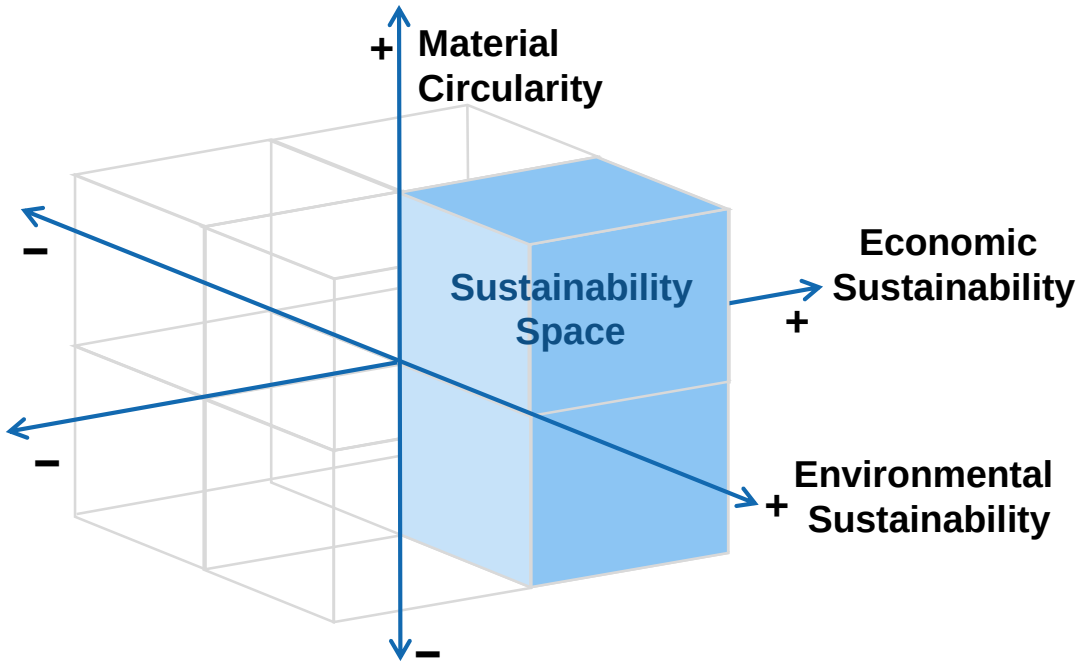
Current quantitative «Circular Economy» performance indicators…

… are often waste disposal indicators
… rarely address longevity, value change and implications on the use phase
… are mostly mere mass-based indicators.



Haupt, M., C. Vadenbo, and S. Hellweg. 2016. Do we have the right performance indicators for the circular economy? Insight into the Swiss waste management system. Journal of Industrial Ecology. DOI: 10.1111/jiec.12506

Why are mere mass-based indicator a problem?



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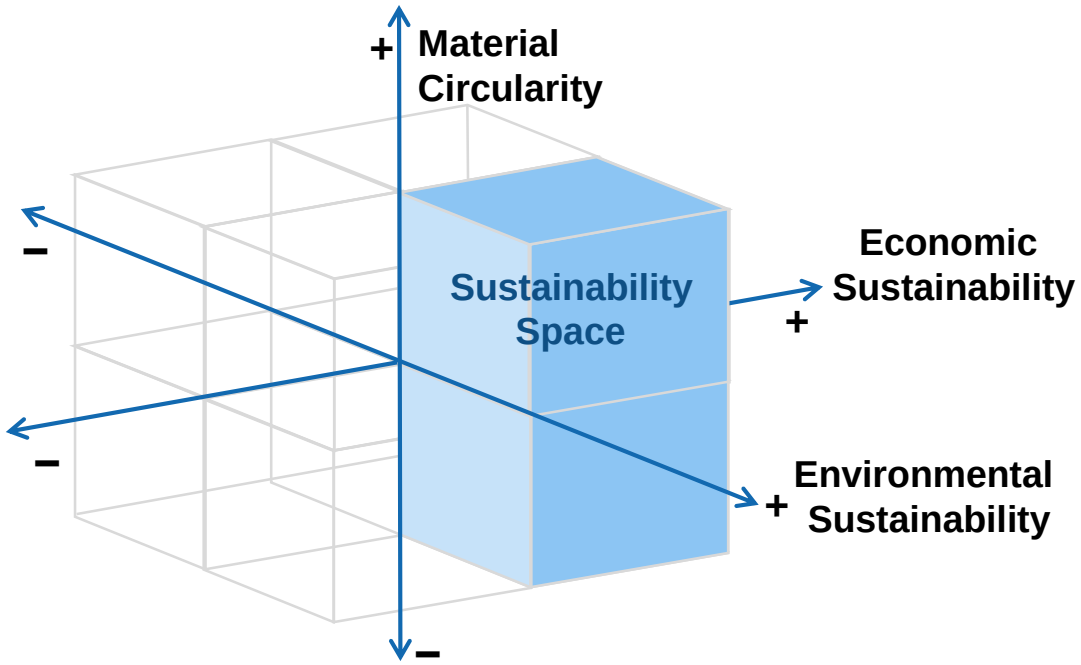

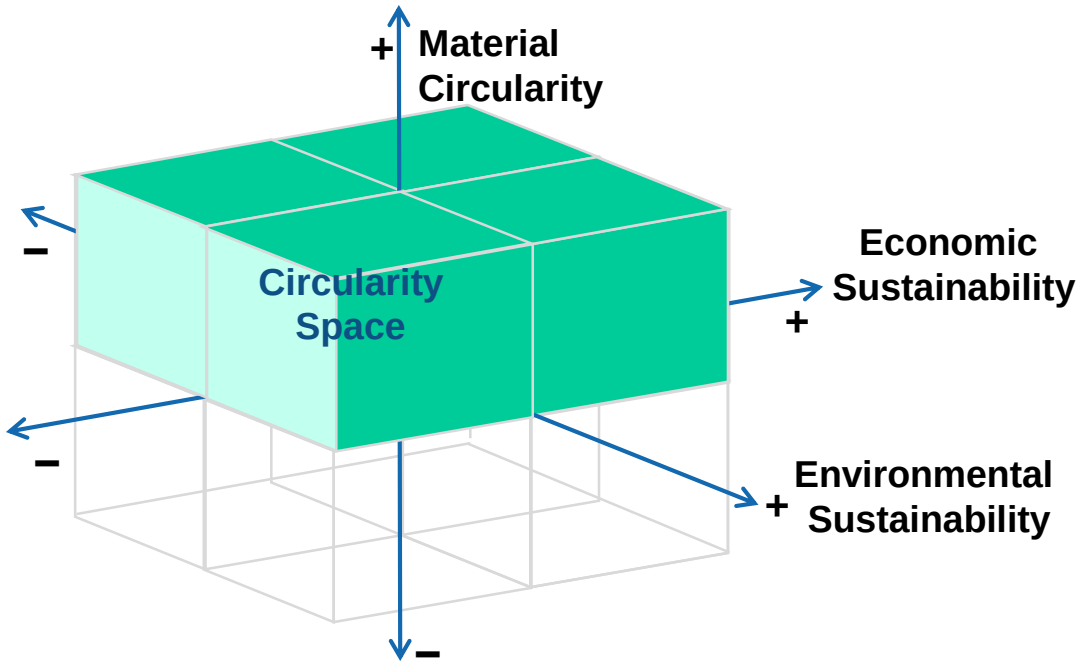

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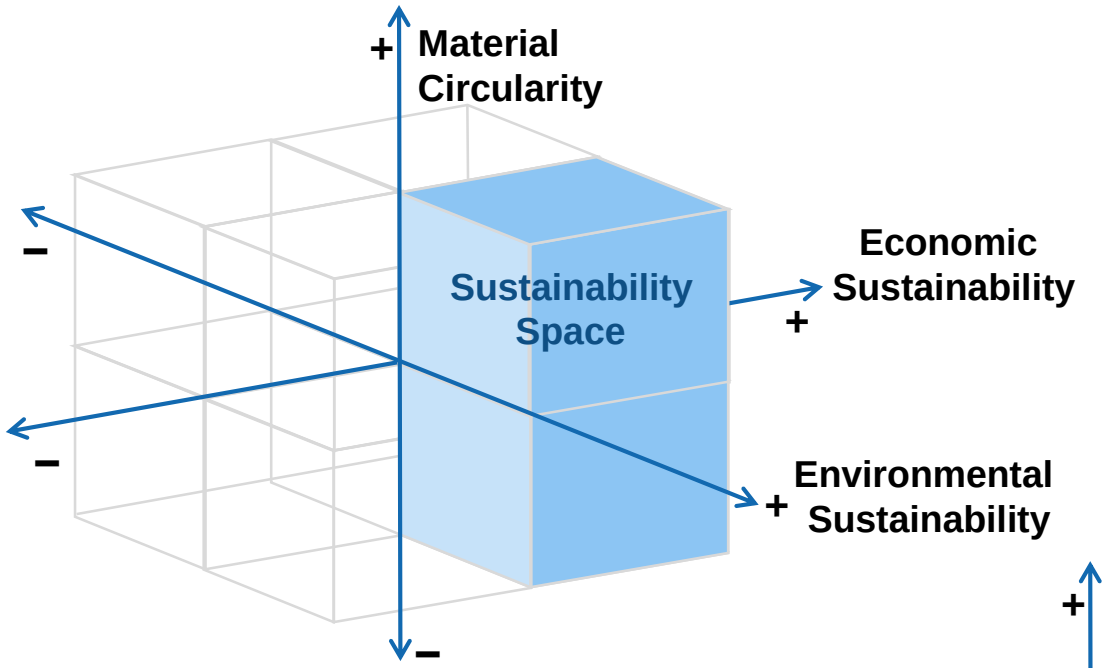

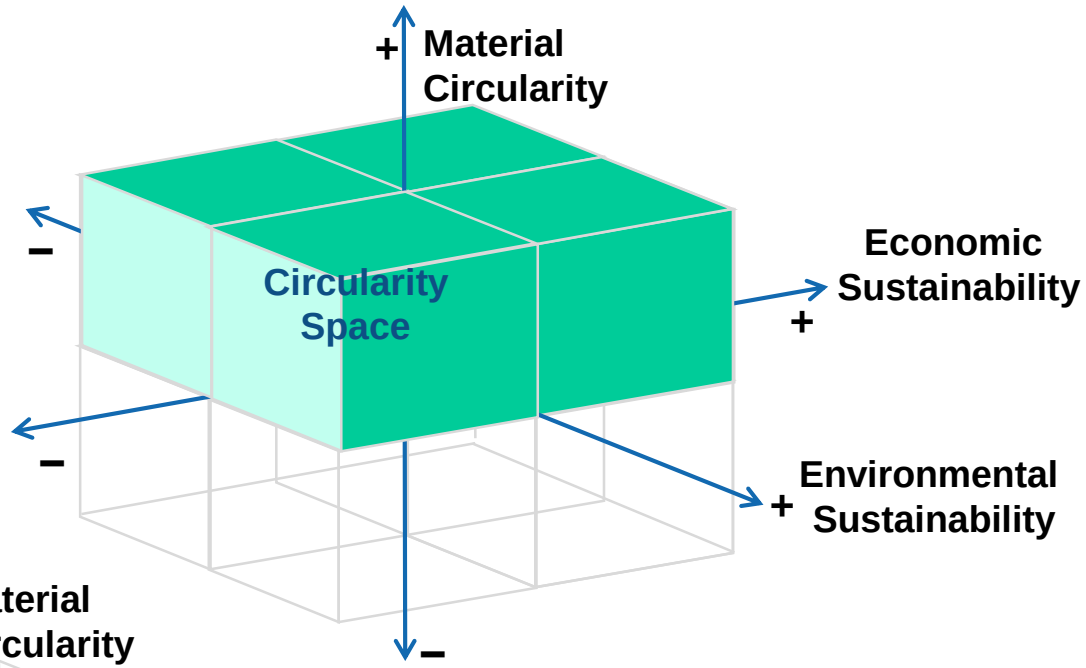

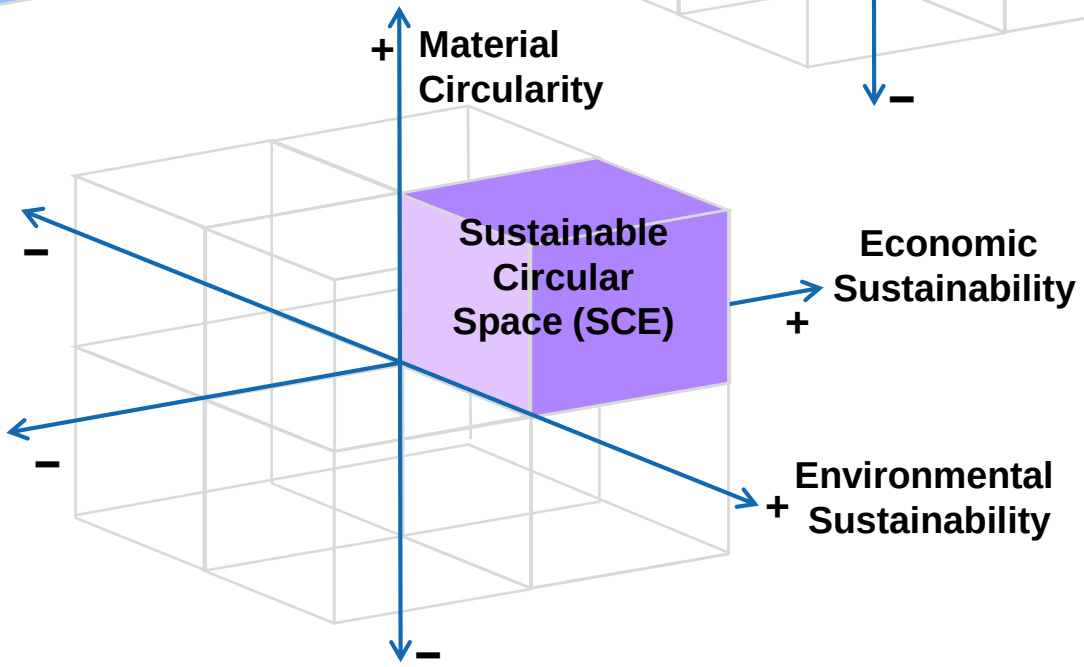

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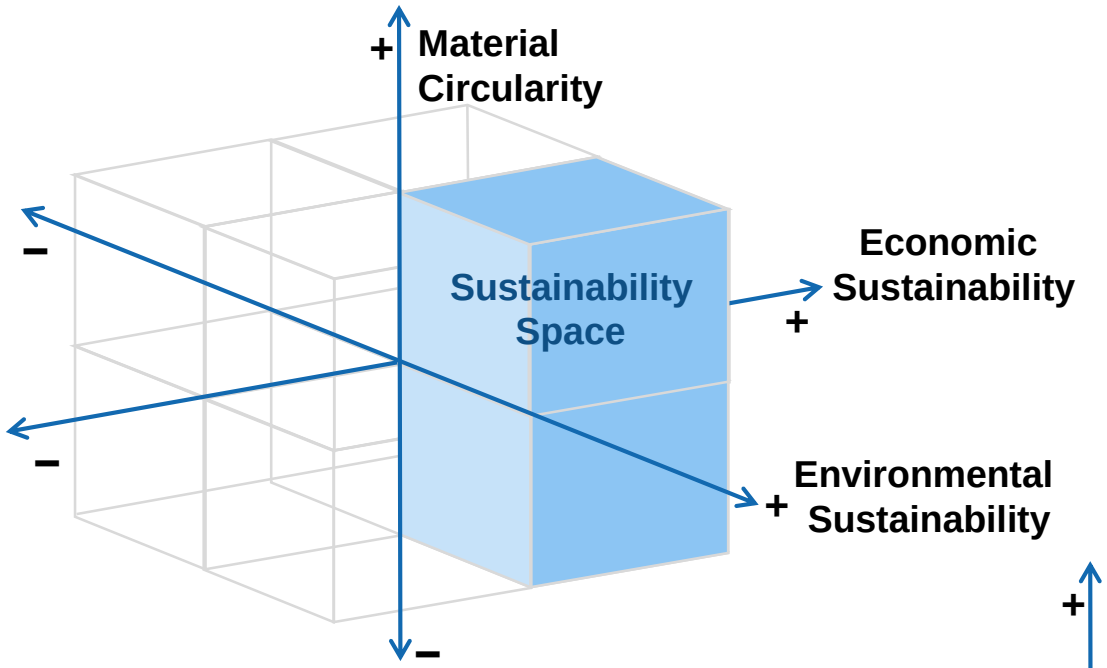

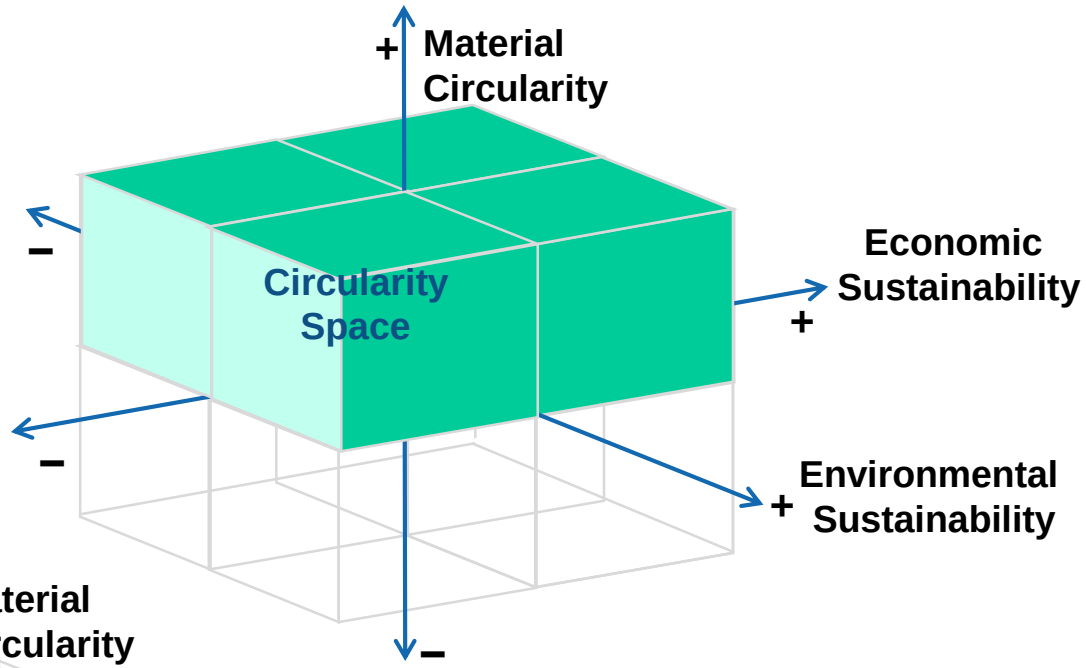

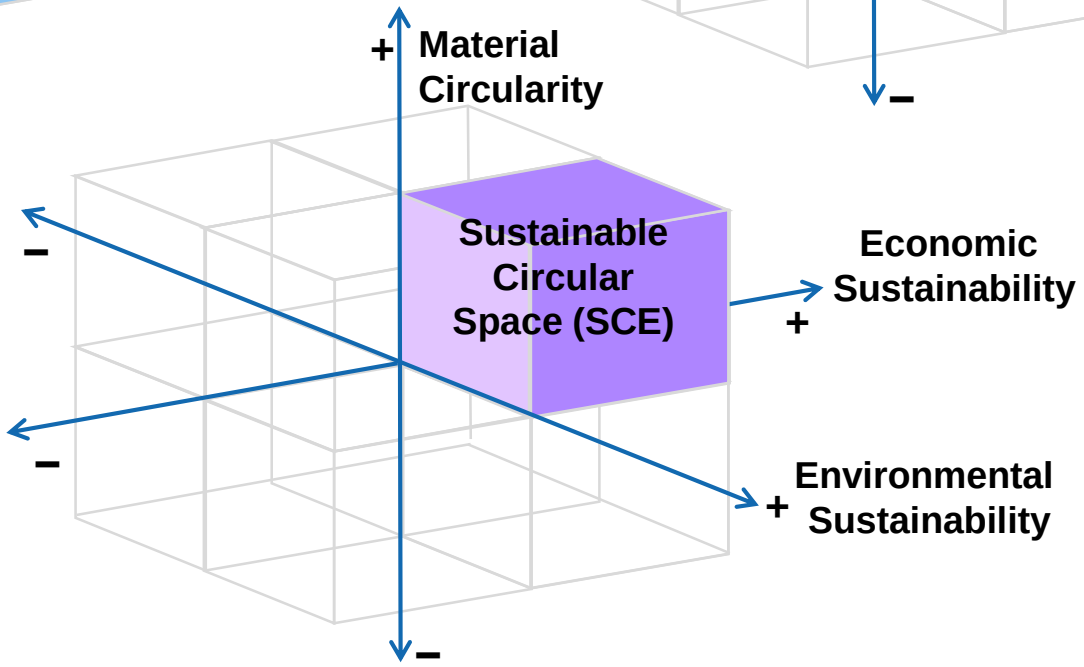

We need to aim at creating a **S**ustainable **C**ircular **E**conomy (SCE)!

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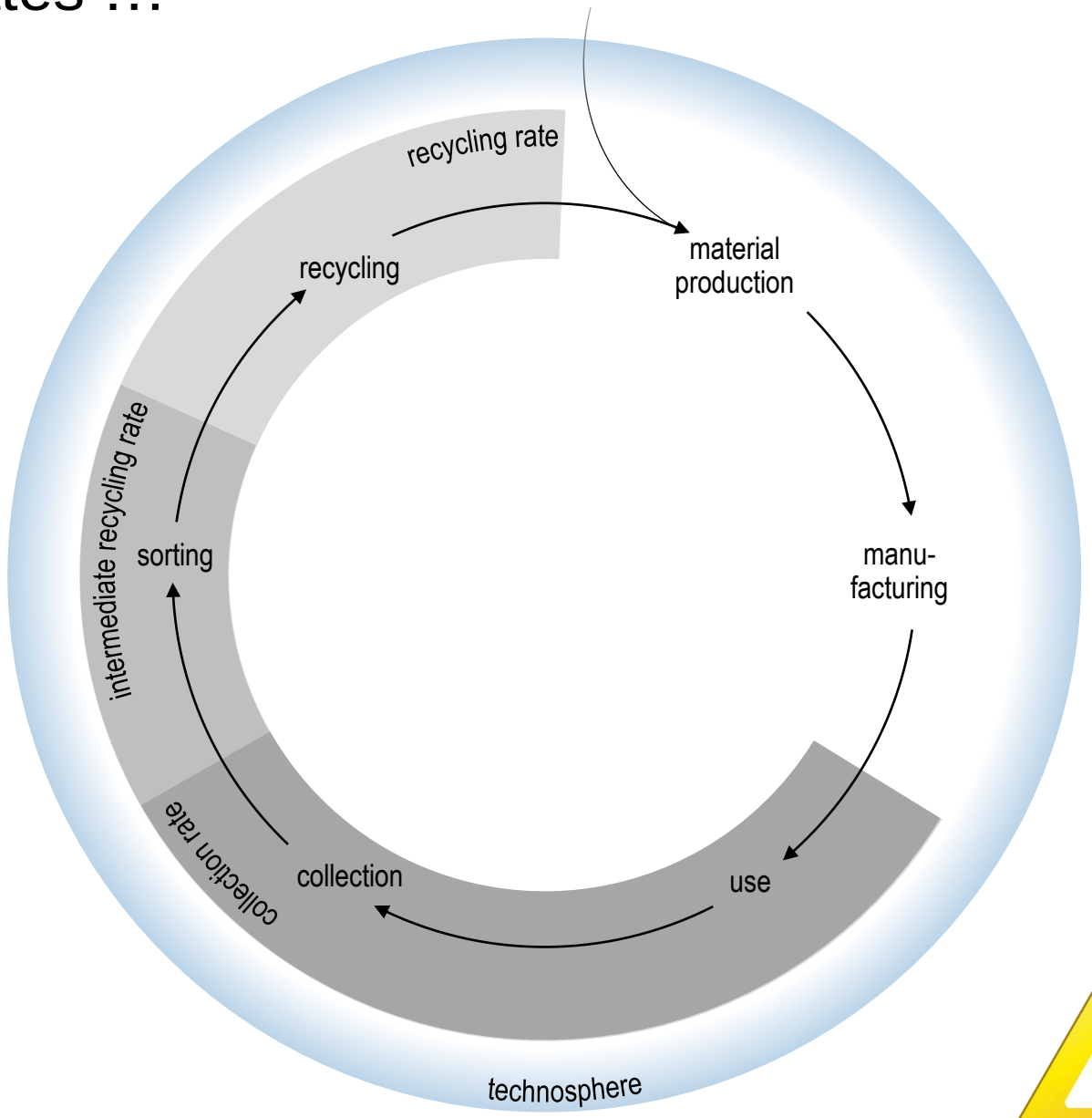
From recycling rates …



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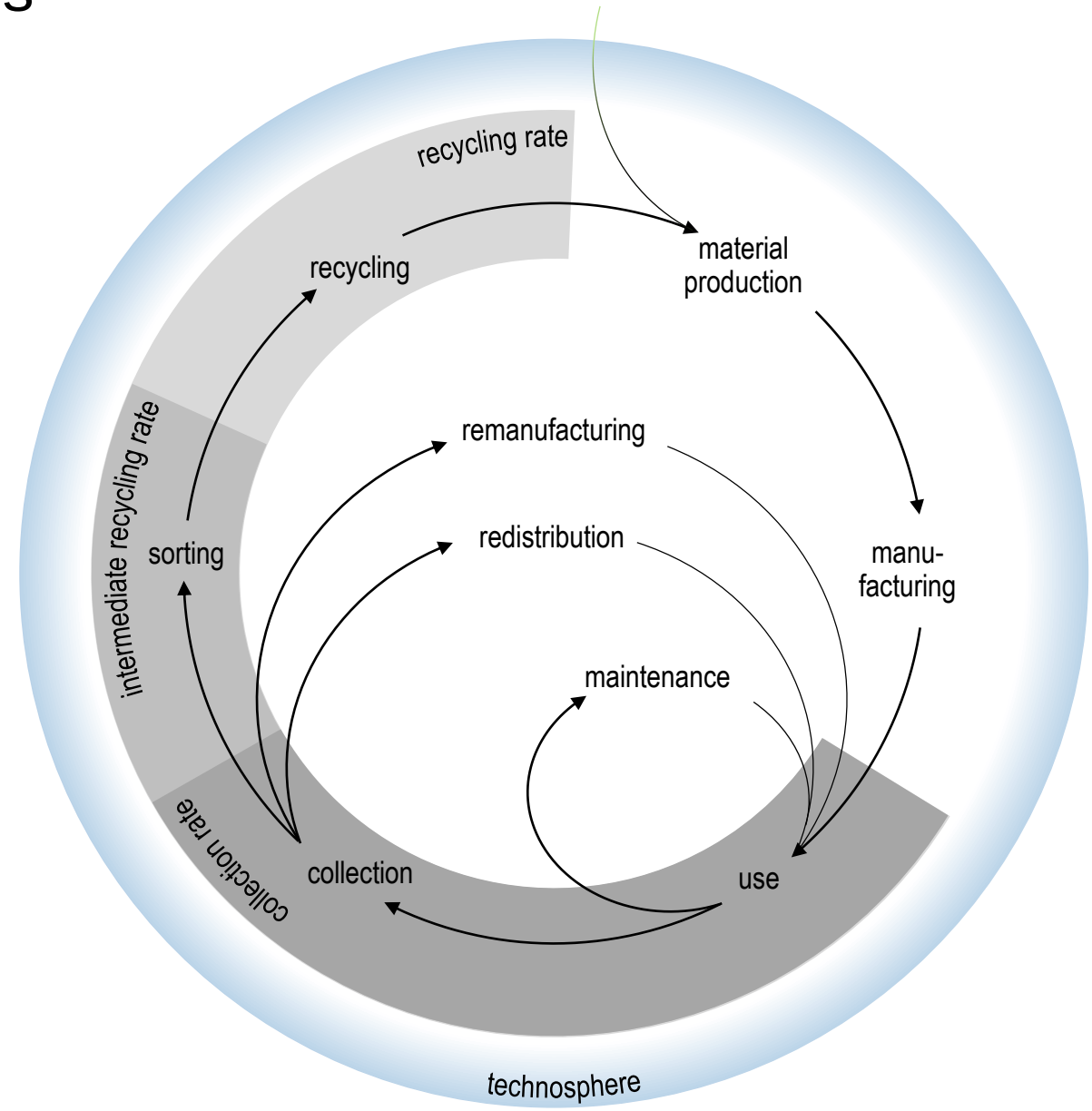
MFA based!

…to CE indicators



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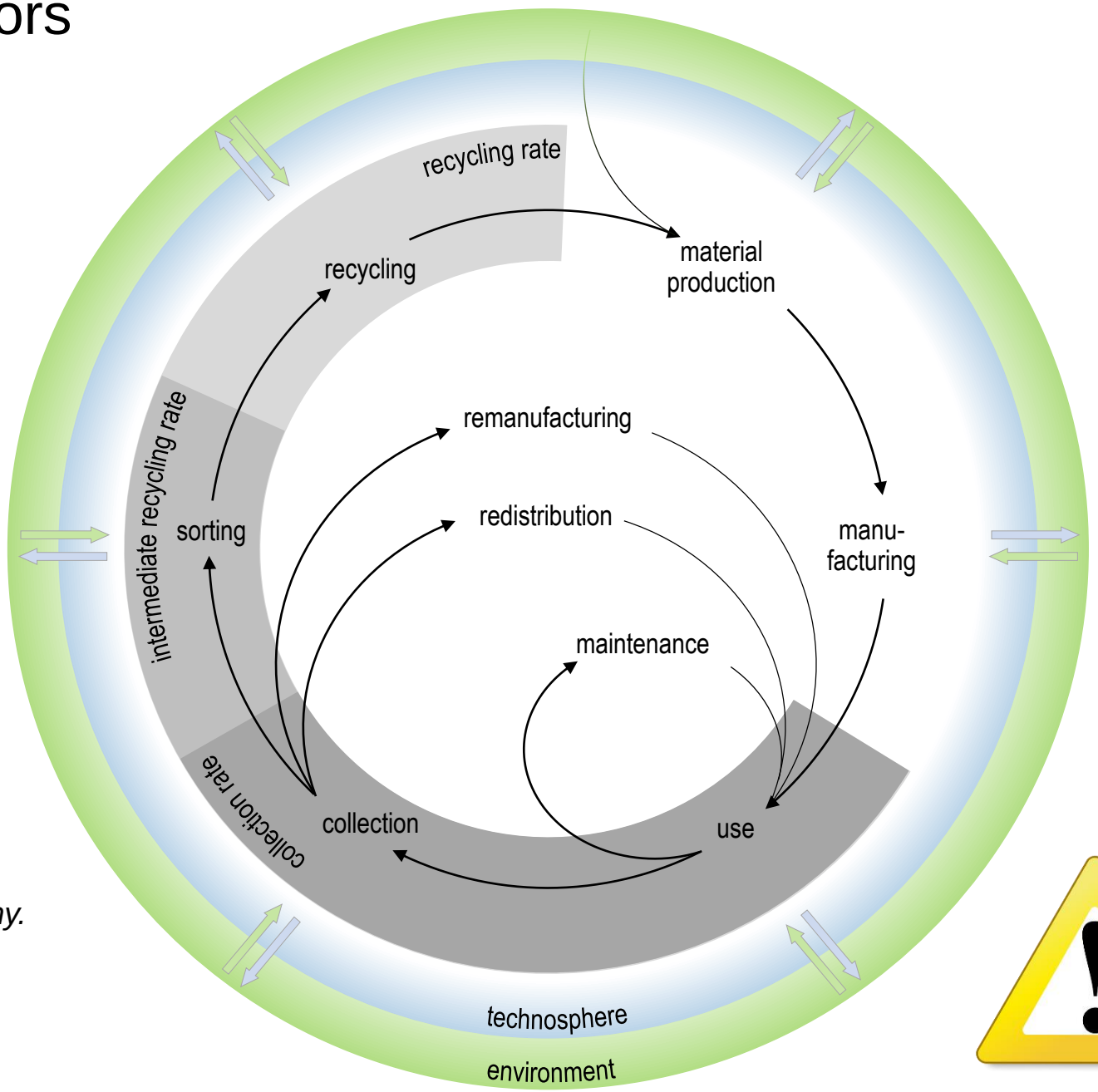

→ To warrant that the circular economy is sustainable, indicators should capture **environ-mental impacts** of a circular solution with a **systems view**.

MFA and LCA based!

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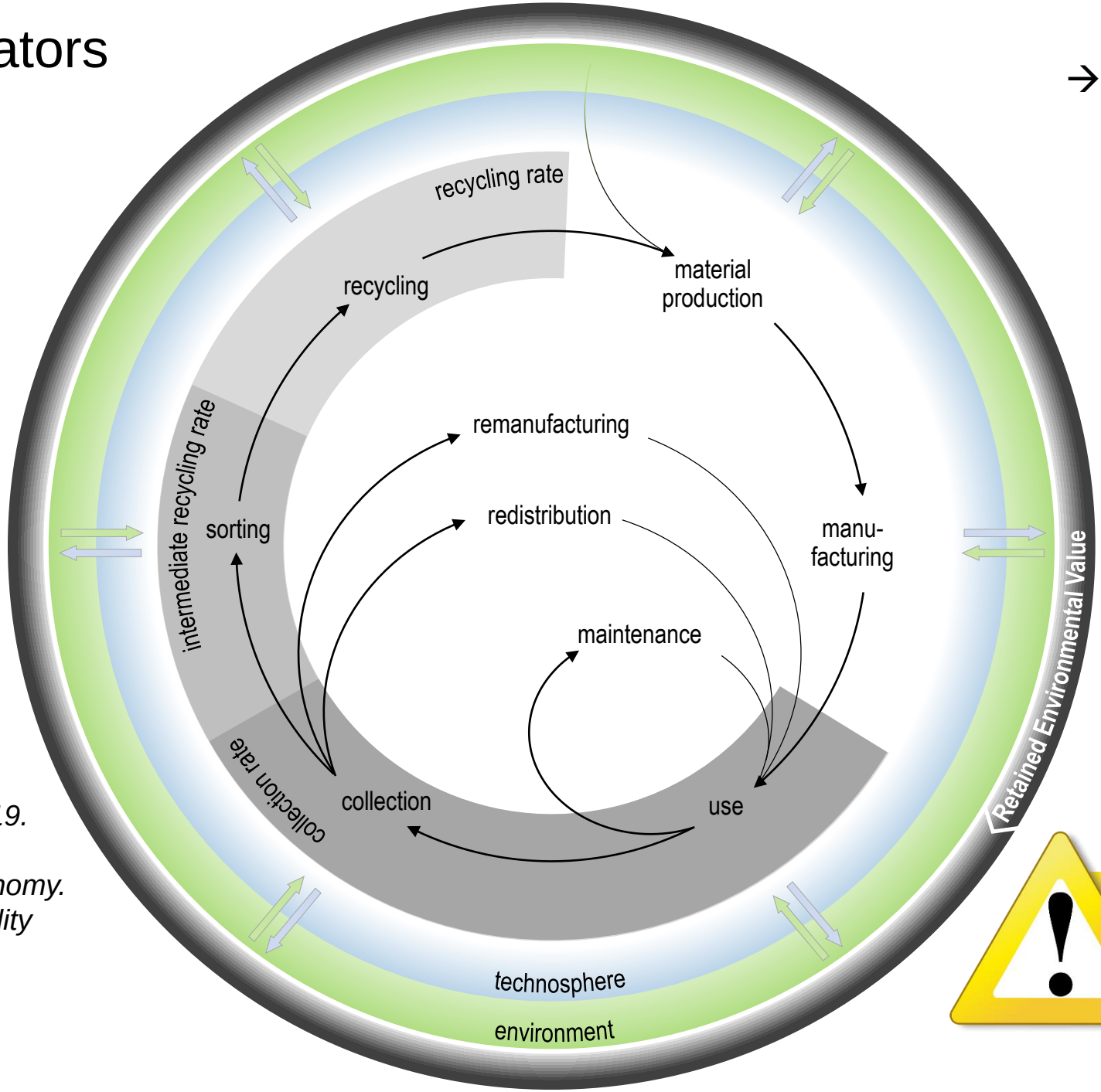

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Retained environmental value (REV) indicator

The REV quantifies the share of the original environmental impact that can be retained through value retention processes

$$REV = \frac{\sum_{j=1}^{n}(EI_{disp,j} - EI_{vrp,j}) - EI_{surplus}}{\sum_{i=1}^{n}(EI_{original,i})}$$

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EI = environmental impact
REV can be implemented with any environmental impact category (using LCA methodology)

i and j: number of different materials in a product

original = original production system (material / product)

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disp = displaced system

vrp = value retention process

surplus = implications on later life-cycle phases

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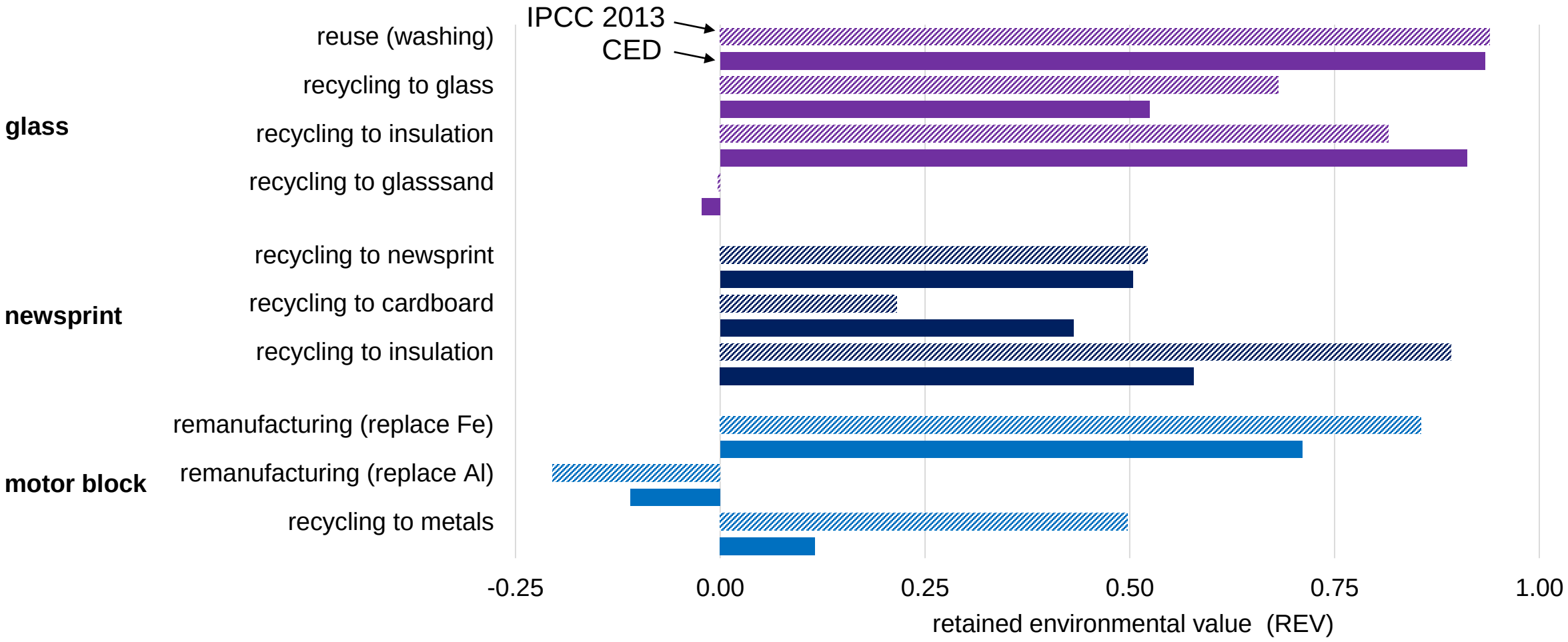
Retained environmental value (REV) applied to value retention processes



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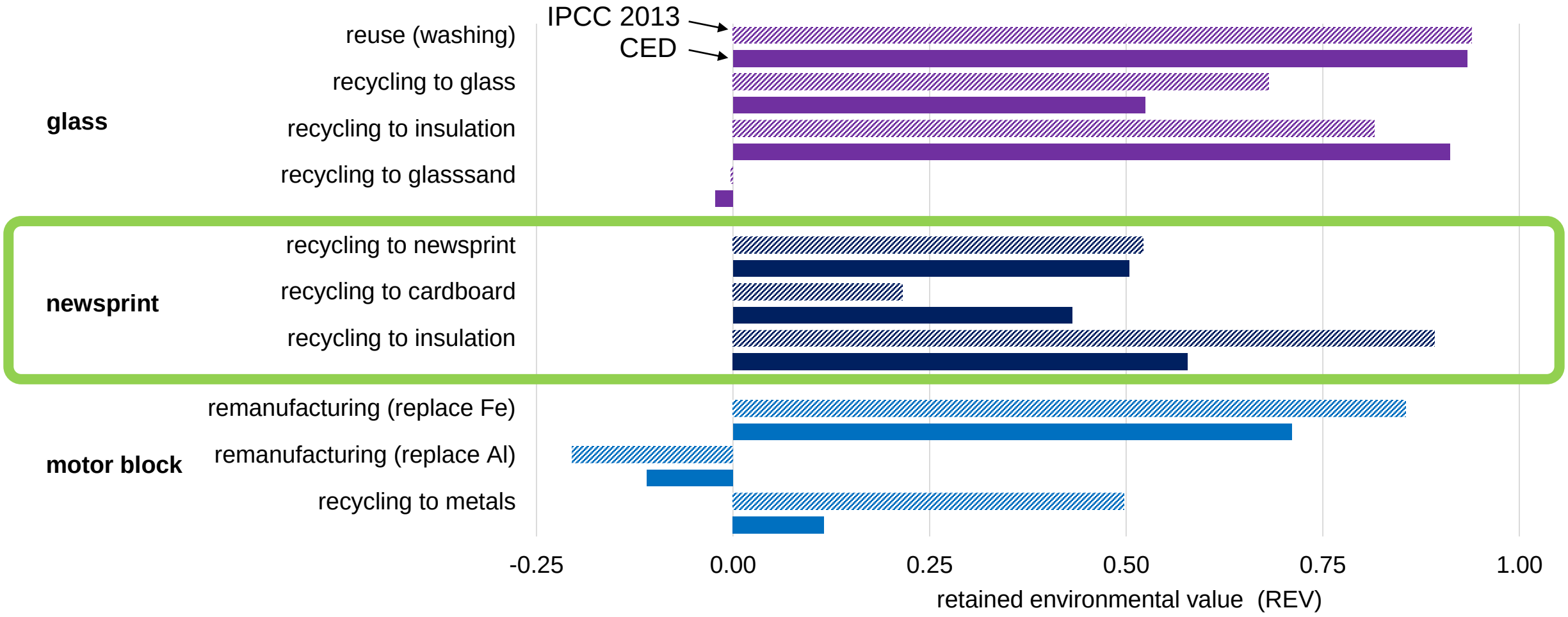

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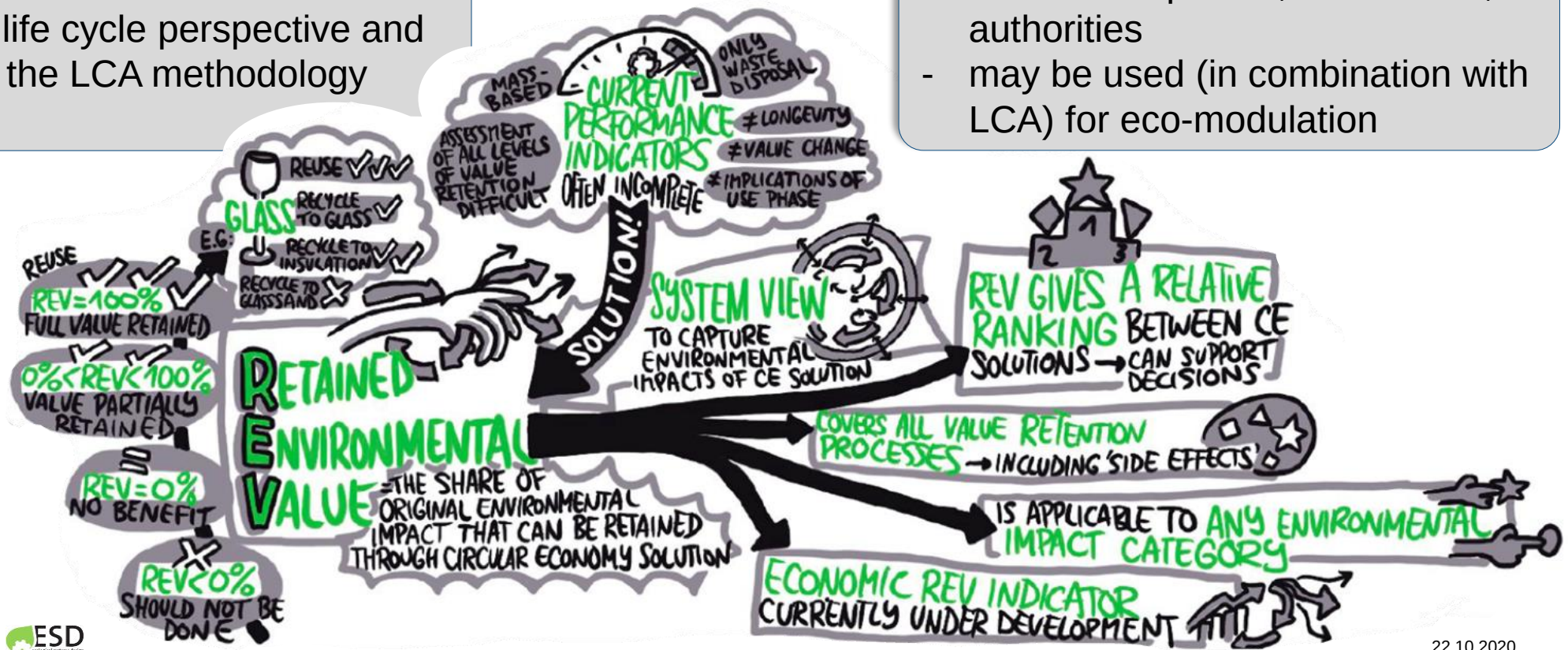
Conclusions

Methodologically, the REV
- covers all value retention processes i.e. circular strategies
- considers “side effects”, e.g. when the technology is not yet mature
- uses a life cycle perspective and follows the LCA methodology

Applied, the REV indicator
- gives relative ranking between value retention processes for products / scenarios
- can serve as decision support tool for companies, consumers, authorities
- may be used (in combination with LCA) for eco-modulation



Application of REV and national target setting

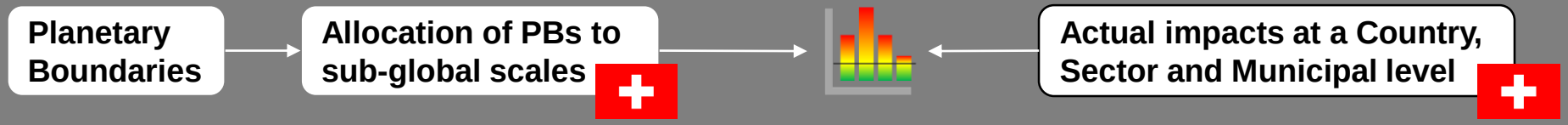
Indicator and target system 2030 by Swiss Recycling → using REV in monitoring and target setting for waste management system

Call for action: "**REV for dummies**" for industry and policy, enable its use for various actors, incl. authorities and companies

Postulate by green party to **test REV for nation wide application** (on different levels) and add to, or substitute, previous indicators

National target setting:

- For Swiss Recycling systems based on previous studies and improvement potentials
- For environmental performance overall, ongoing project with Swiss Federal Office of Environment to define science based targets and evaluate current performance.



ETH zürich

Thank you for your attention!

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