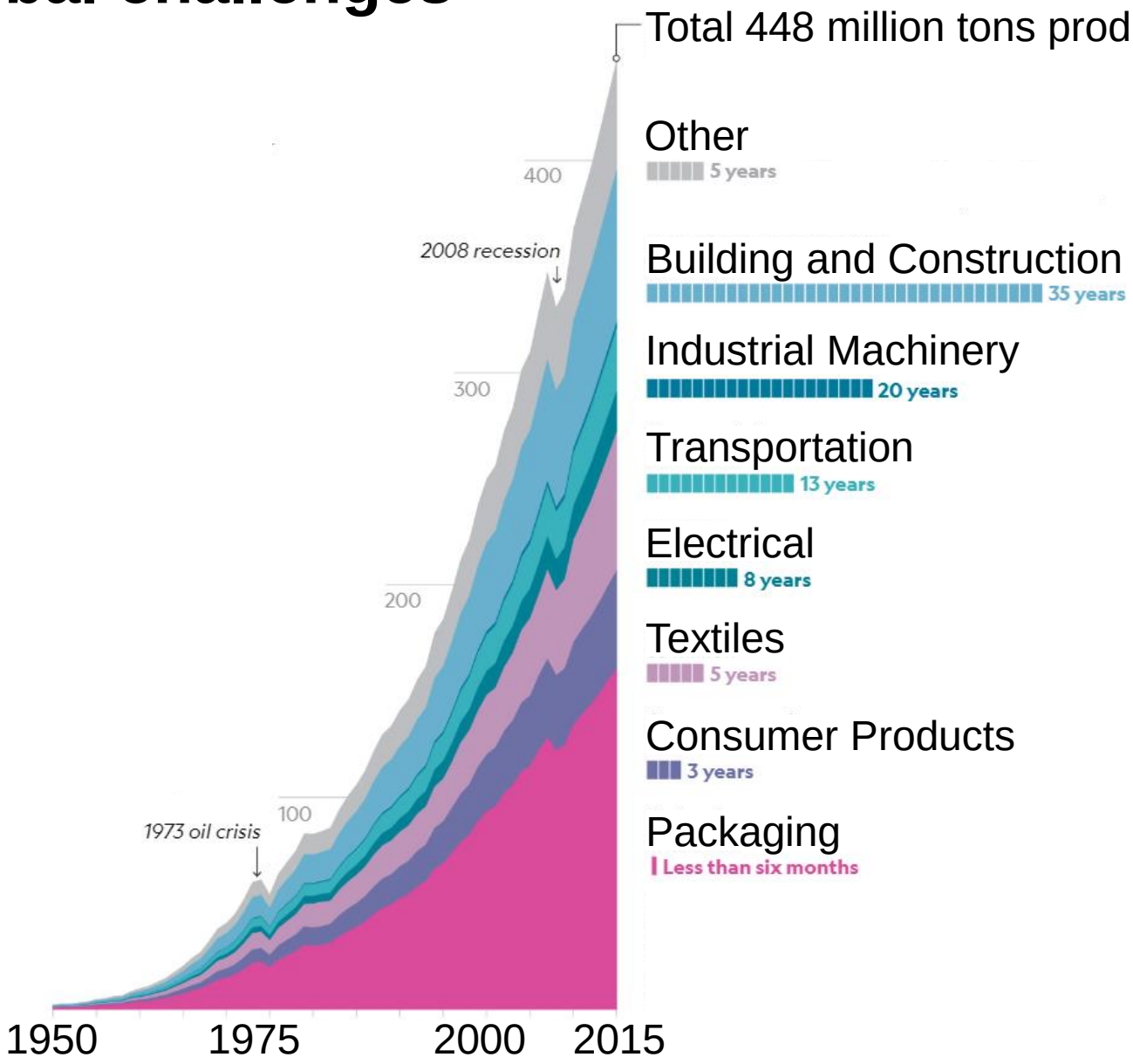
A focus on plastic?

Melanie Haupt and Stefanie Hellweg

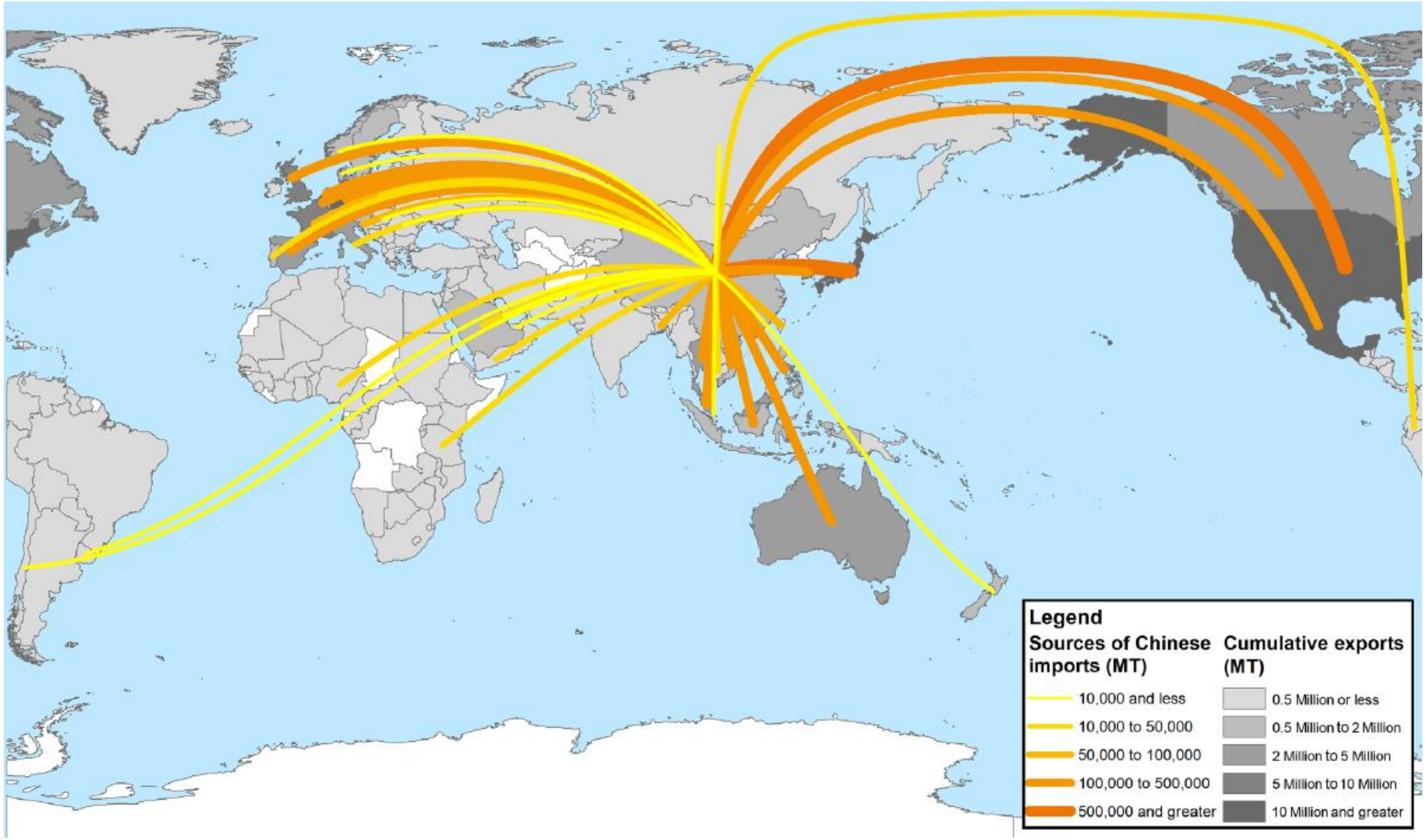
BRINGING THE ACTION PLAN TO LIFE: TOWARDS A FACT BASED CIRCULAR ECONOMY

Plastic – global challenges



Geyer, R., J.R. Jambeck, and K.L. Law. 2017. Production , use , and fate of all plastics ever made(July): 25–29. Graphics from National Geographics (Issue June 2018)

Plastic – global challenges

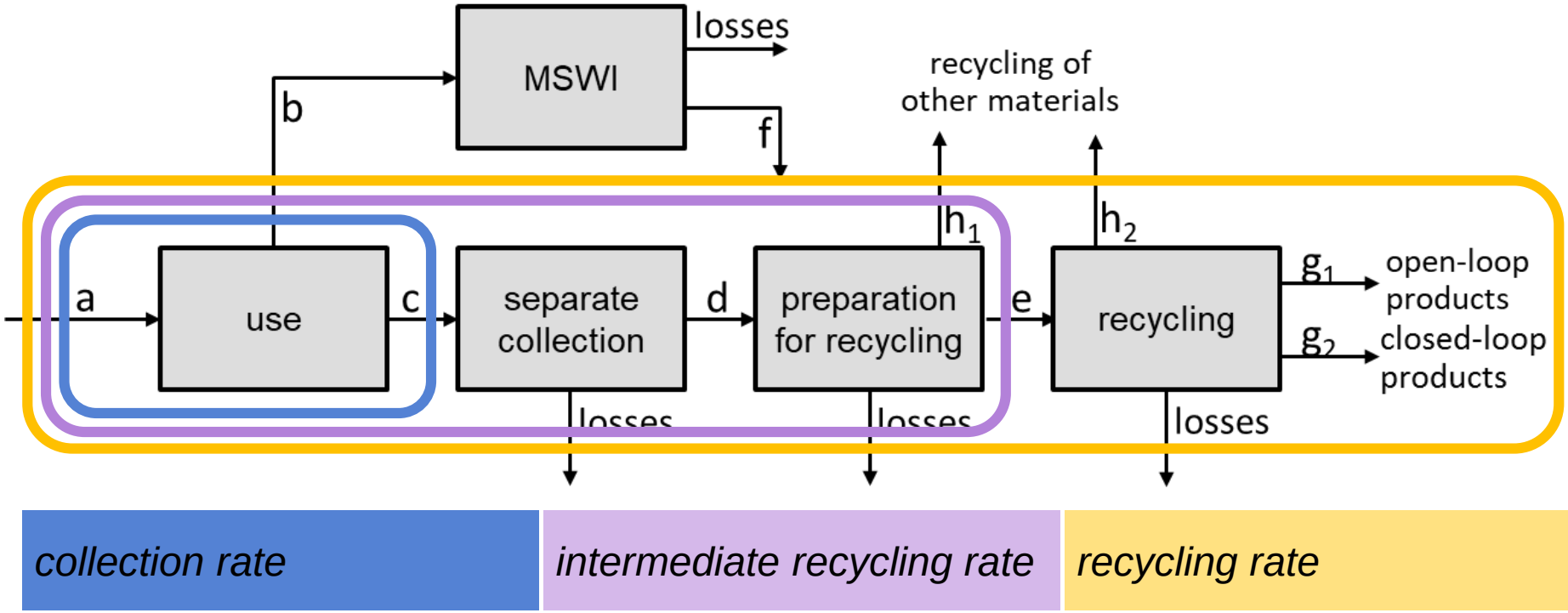


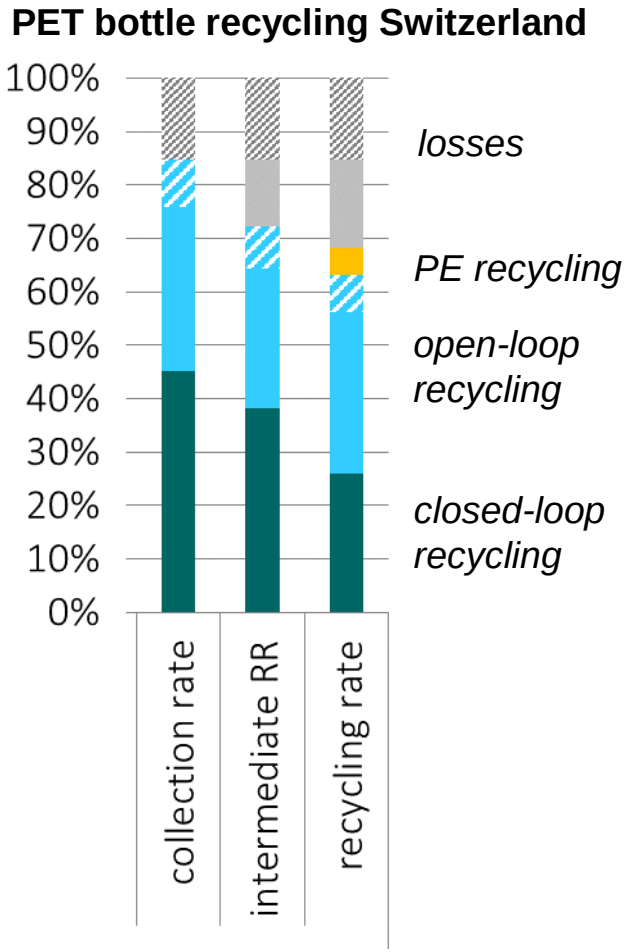
Brooks, A.L., S. Wang, and J.R. Jambeck. 2018. The Chinese import ban and its impact on global plastic waste trade. Science Advances 4 (2018).

Focus on plastic in European Legislation and targets

- Product design for durability, reuse and high-quality recycling
- Targets on separate collection and recycling (>50% in 2030)
- Increase of recycling capacity (including low-quality plastic)
- Phase-out of substances hampering recycling processes
- Increase market for secondary material

What do we know about plastic recycling?

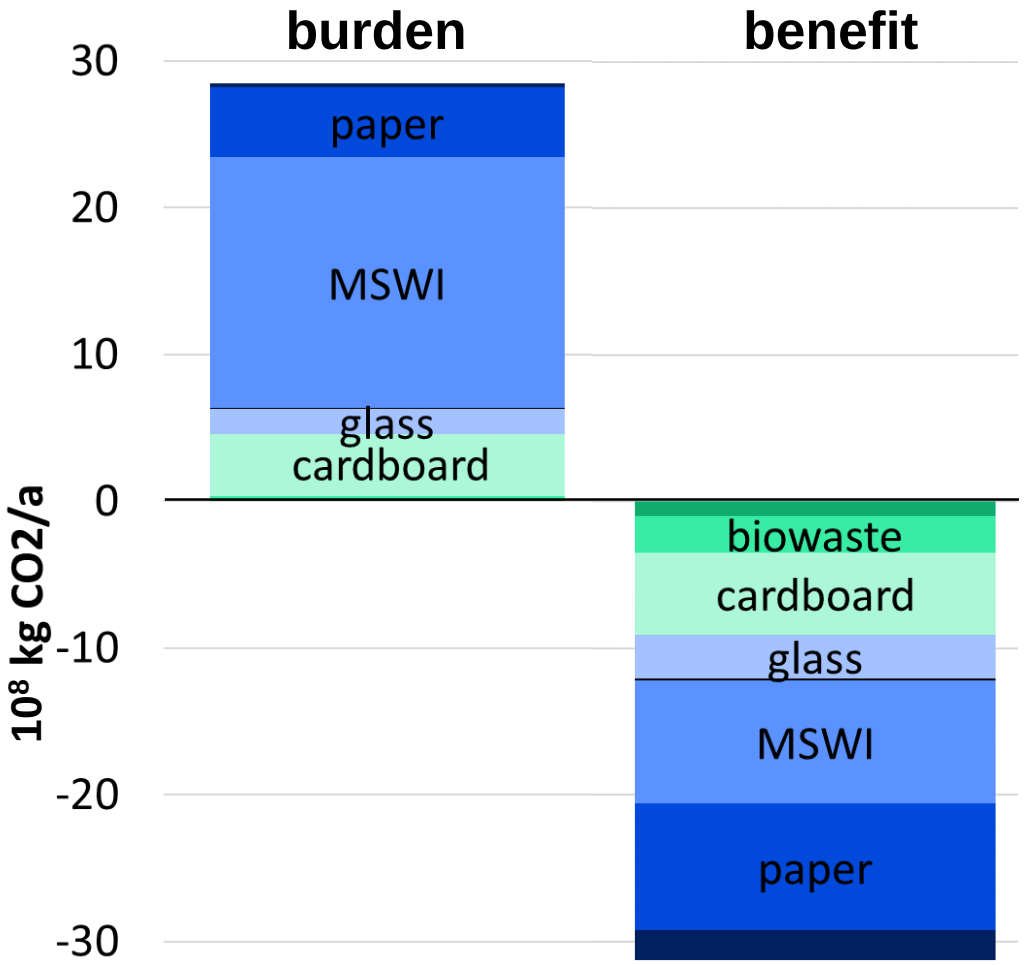




- Current recycling rates do not assess the fate of collected plastic waste

Haupt, M., C. Vadenbo, and S. Hellweg. 2017. Do We Have the Right Performance Indicators for the Circular Economy?: Insight into the Swiss Waste Management System. Journal of Industrial Ecology 21(3): 615–627.

Relevance of plastic recycling in Switzerland



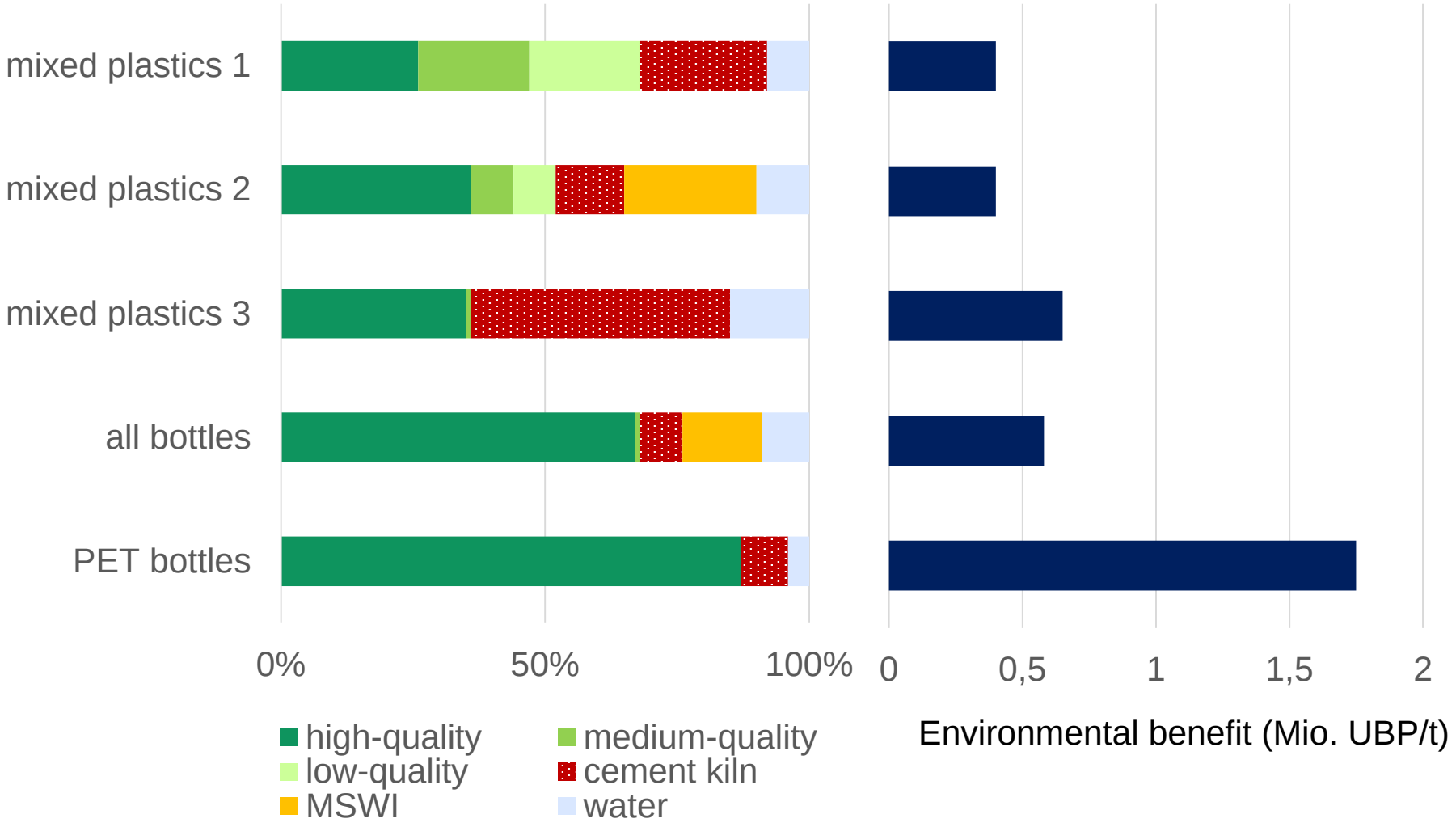
- Dominance of mass-wise important fractions: paper, cardboard, glass
- Impact of MSWI is largely related to thermal treatment of plastic or composites
- Overall, net environmental benefit of Swiss municipal waste management

➢ **Improvement potential: Less CO_2-emissions from thermal waste treatment (if mixed waste contains less plastic)**

ESD ecological systems design

Haupt, M., T. Kägi, and S. Hellweg. 2018. Modular life cycle assessment of municipal solid waste management. Waste Management. DOI: 10.1016/j.wasman.2018.03.035

Quality in recycling



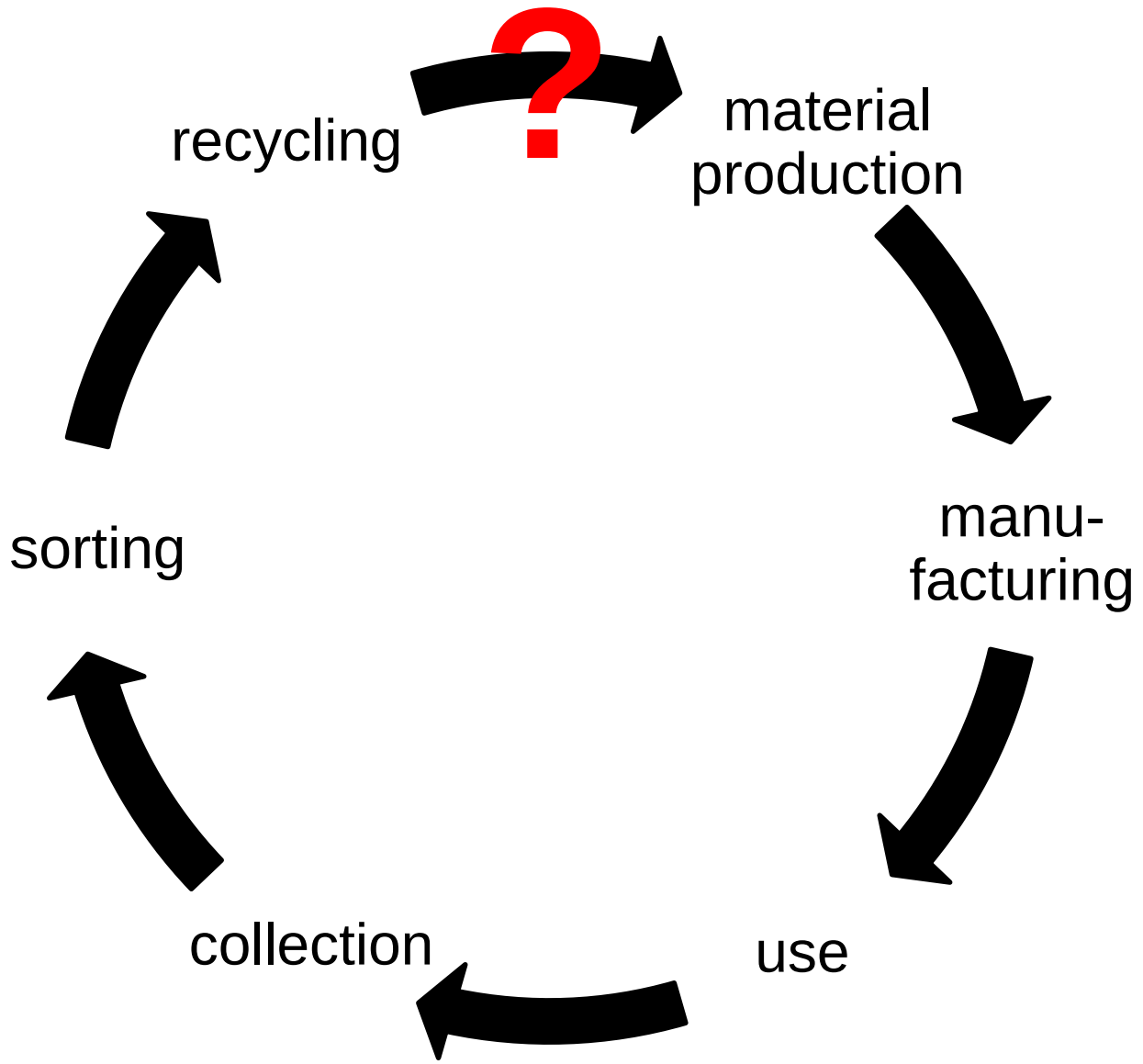
- Higher quality recycling gives higher environmental credits
- Utilization in cement plans are environmentally preferable to low-quality recycling (substitution of coal)

➢ **Improvement potential: Increased high-quality recycling and highly efficient thermal utilization**

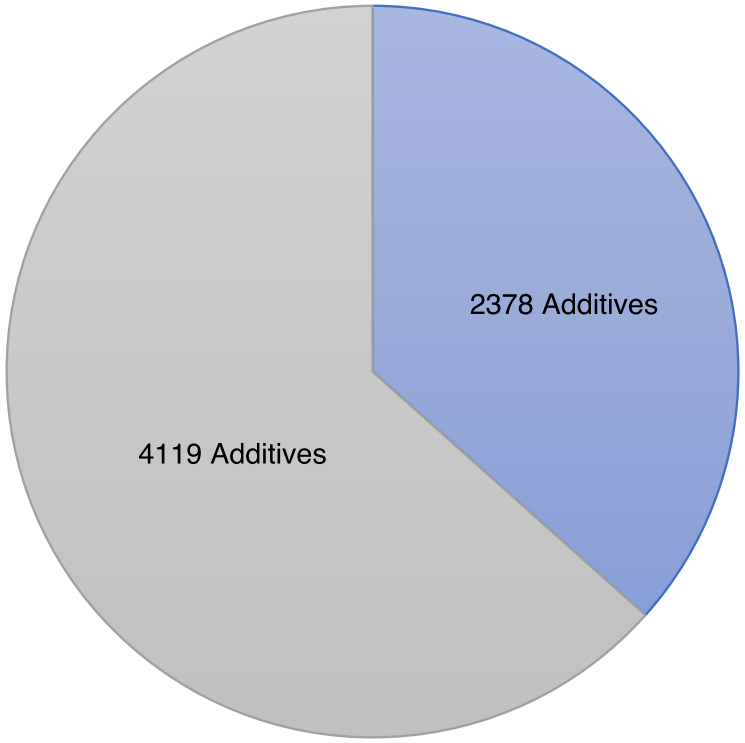
ESD ecological systems design

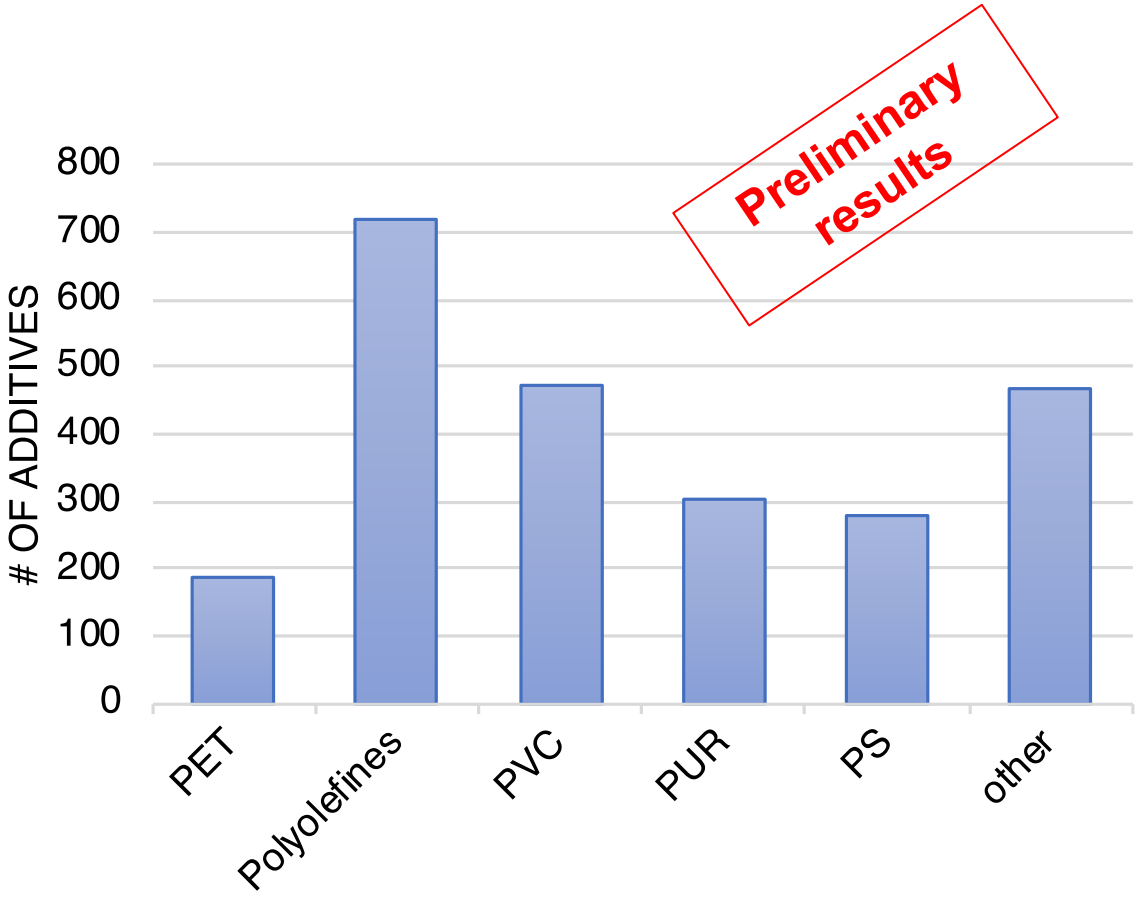
Dinkel, F., T. Kägi, R. Bunge, T. Pohl, and A. Stäubli. 2017. KuRVe (Kunststoff Recycling und Verwertung) [Plastic recycling and utilization]. Carbotech AG (Basel) and UMTEC (Rapperswil), Switzerland.

But…


?
material production
manu-facturing
use
collection
sorting
recycling

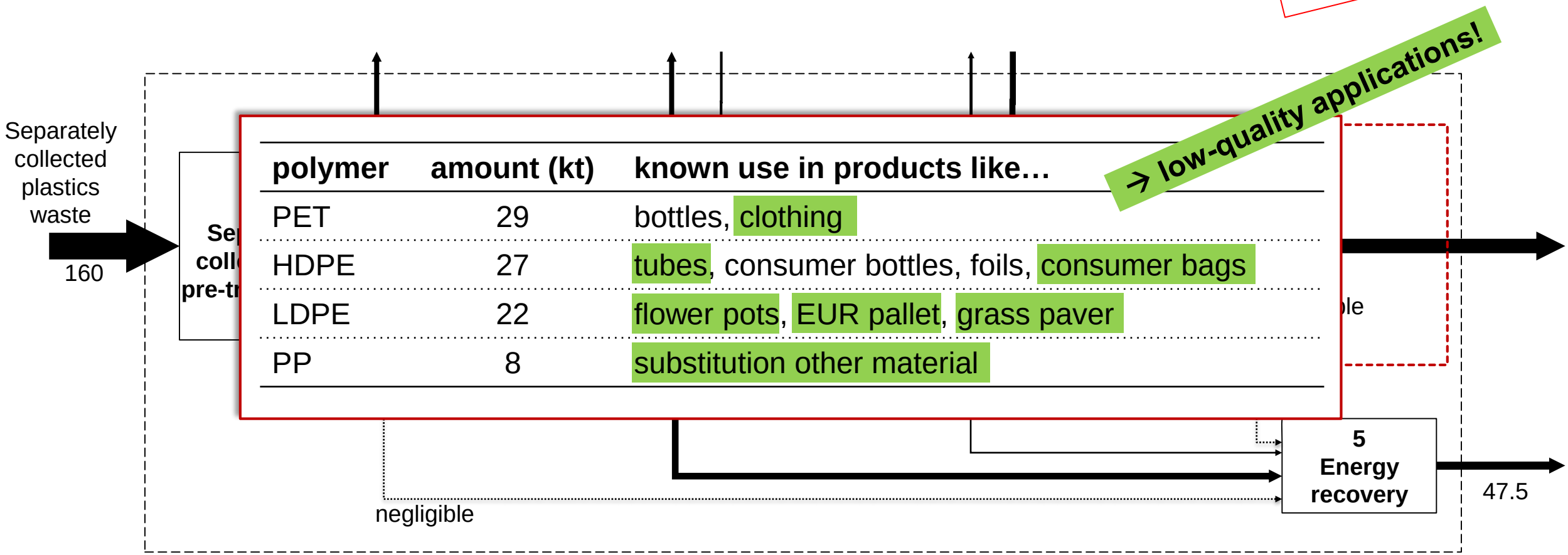
Plastics contain many additives: What about unintended human and ecosystem exposure when recycled into other products?





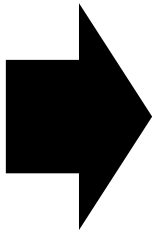
Pollutants are a barrier against high-quality recycling:
Household plastic flows in Switzerland (in kt)

Preliminary results



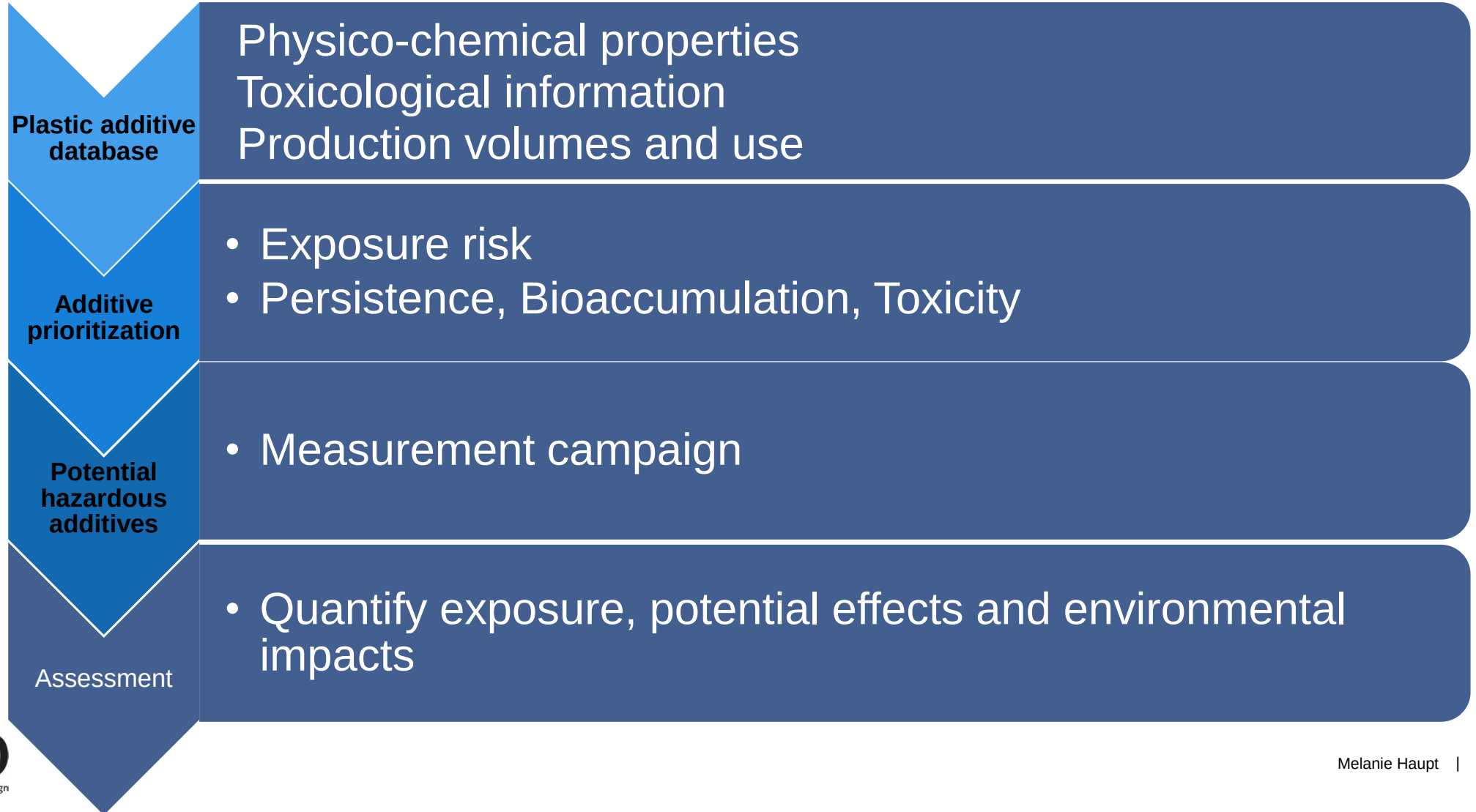
Policy-relevant questions

- Which ingredients and which plastic products may become a **human-exposure risk**?
- Which are the **main exposure pathways** and how can exposure be delimited?



- Which plastics should be recycled into which applications?
- Which plastics should be thermally treated?
- Which pollutants require monitoring and regulation?
- How would recycling-friendly design of plastics change the picture?

New project: Optimizing resource efficiency while preventing pollutant exposure through plastics recycling (“Clean Cycle”)



Summary - pros and cons of plastics recycling

- Pros:
  - Opportunity of environmental benefits
  - Avoid aquatic micro-plastic pollution (still many unknowns)

- Cons:
  - Potential human and ecosystem exposure
  - Low-quality plastics today sometimes exported to countries with deficient waste management infrastructure
  - Low-quality recycling not necessarily better than co-processing in cement kilns

Plastic strategy

- Product design for durability, reuse and high-quality recycling 
- Targets on separate collection and recycling (>50% in 2030)  … but qualities should be assessed and environmental consequences considered
- Increase of recycling capacity (including low quality plastic)  … but minimize contaminants in recycling; low-quality recycling not necessarily better than thermal utilization
- Phase-out of substances hampering recycling processes  … include phase out of hazardous chemicals in general
- Increase market for secondary material  … replace high emission alternatives

Thank you very much for your attention!

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