Materials and hazardous additives : Calculating total health and environment external costs to inform recycling policies

An example to transpose to Precious Metals processes

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maîtriser le risque pour un développement durable

Conflict and Opportunity: Chemical Management, the Circular Economy and Precious Metals
5 December 2018, Brussels

Outline

The conflict / Why this study ?

Modelling and economic approach

Example : soft PVC and DEHP

The case of precious metals

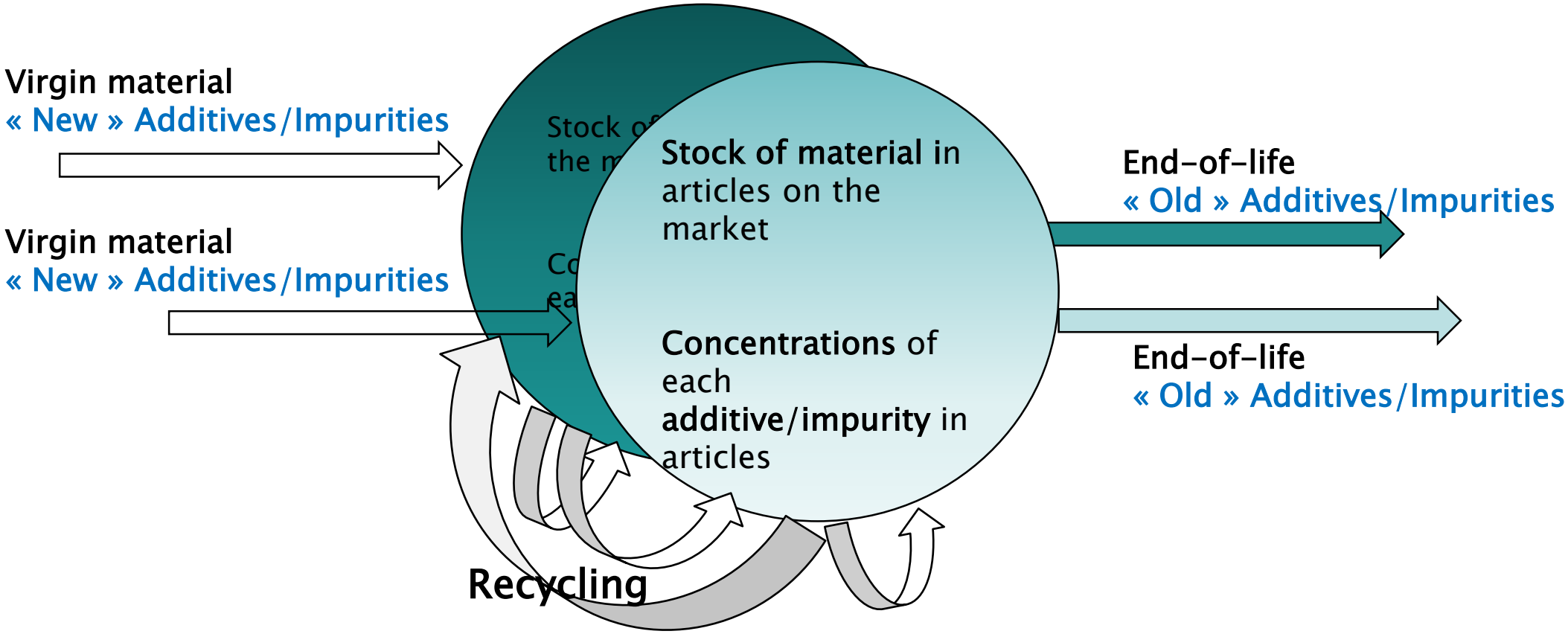
Context

Potential **conflict** between circular economy and risks of chemical additives of materials

Authorisations for recycling of materials in **REACH** (plastics containing hazardous additives)

Lack of adequate methodology to have **shared starting analytical results** to base decision on

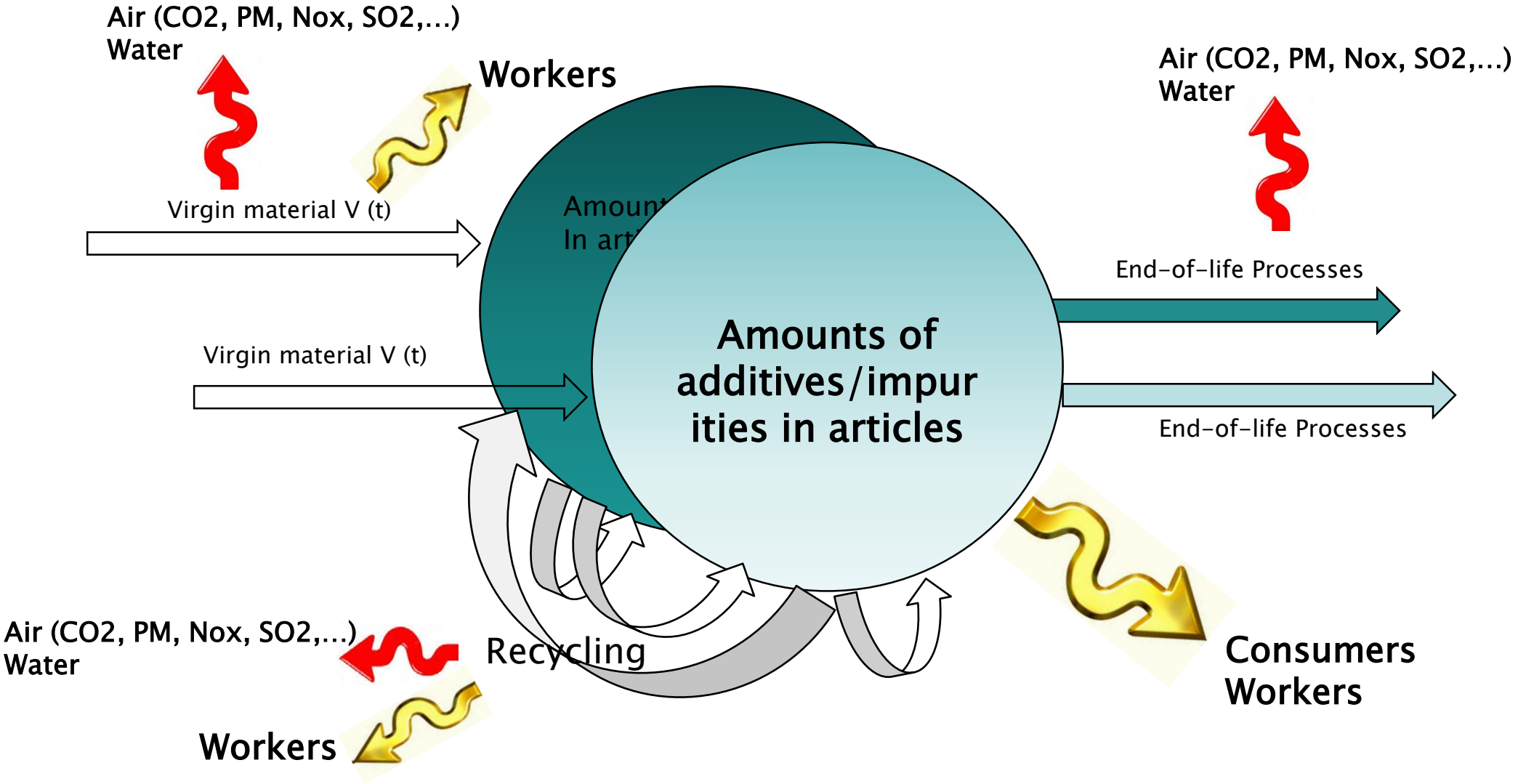
Dynamic Material and chemicals flows *(time)*



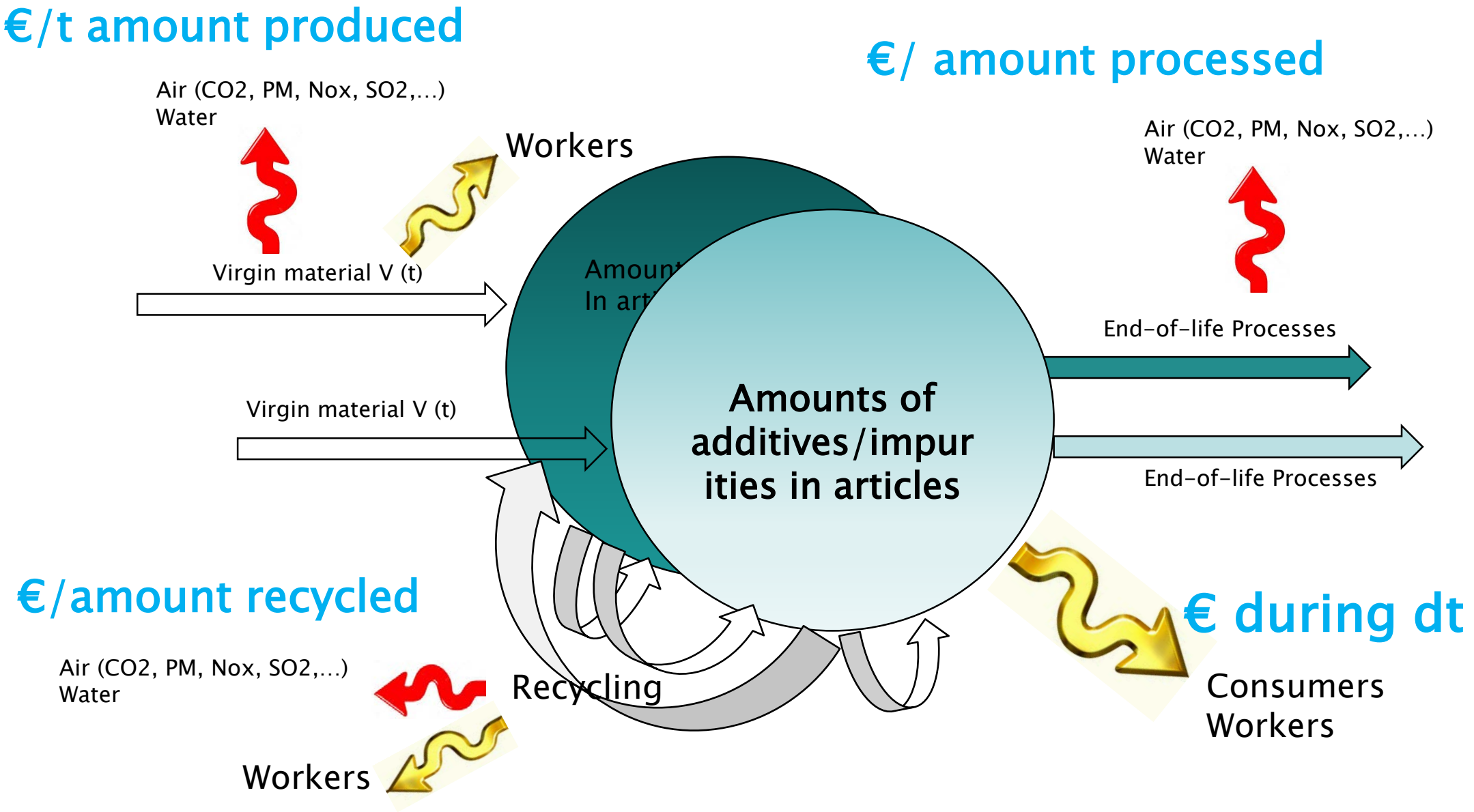
Life Cycle Emissions/Exposures

Processes
Articles/Processes

Emissions of pollutants
Exposures to additives



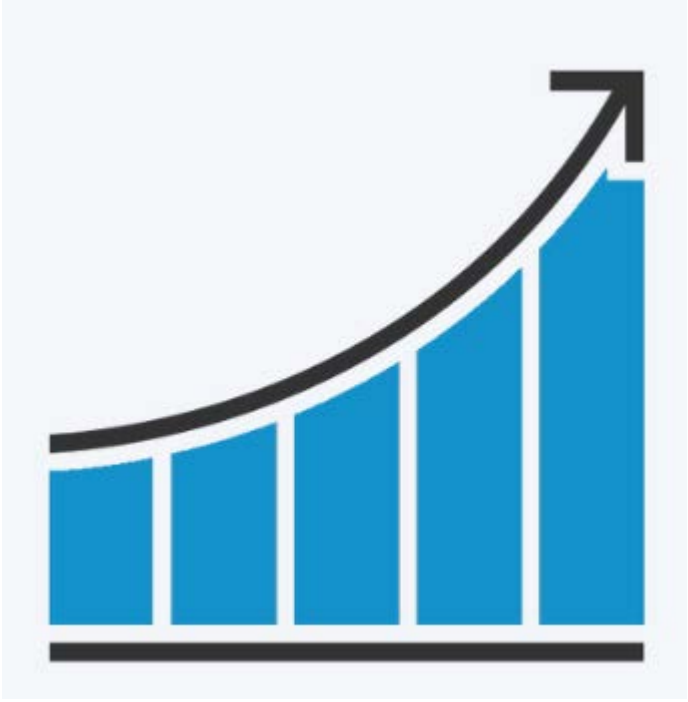
Life Cycle External Costs *Picture at t*



Total External Costs of supply

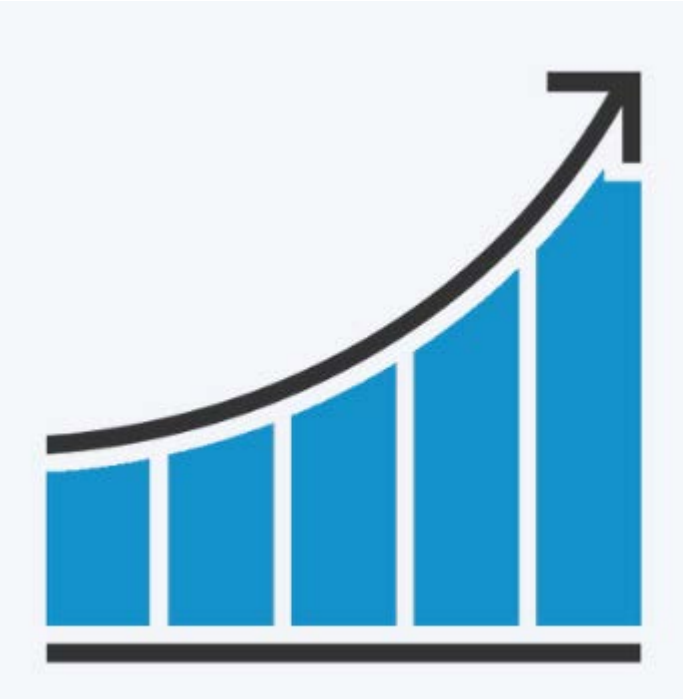
External cost of market supply up to T=

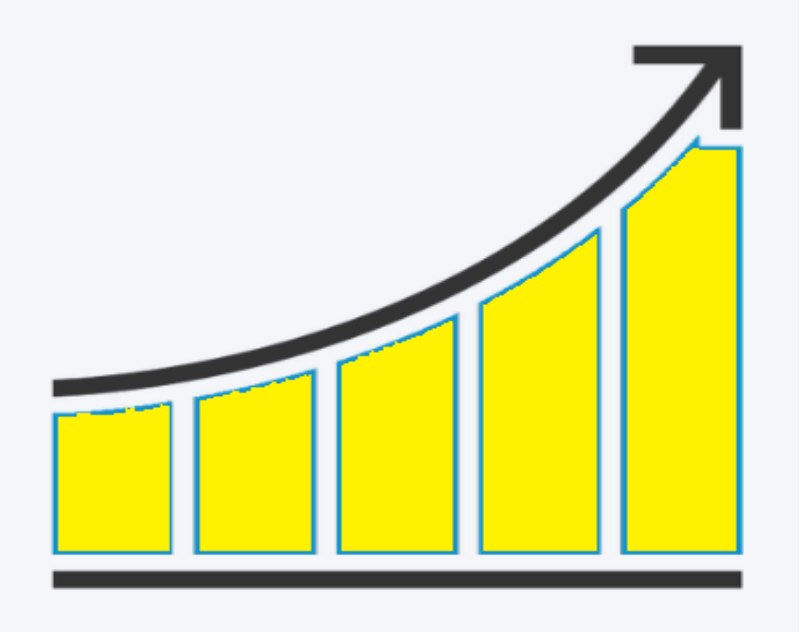
$$\int_0^T (External\ costs\ of\ Processes\ and\ Exposures)(t).dt$$



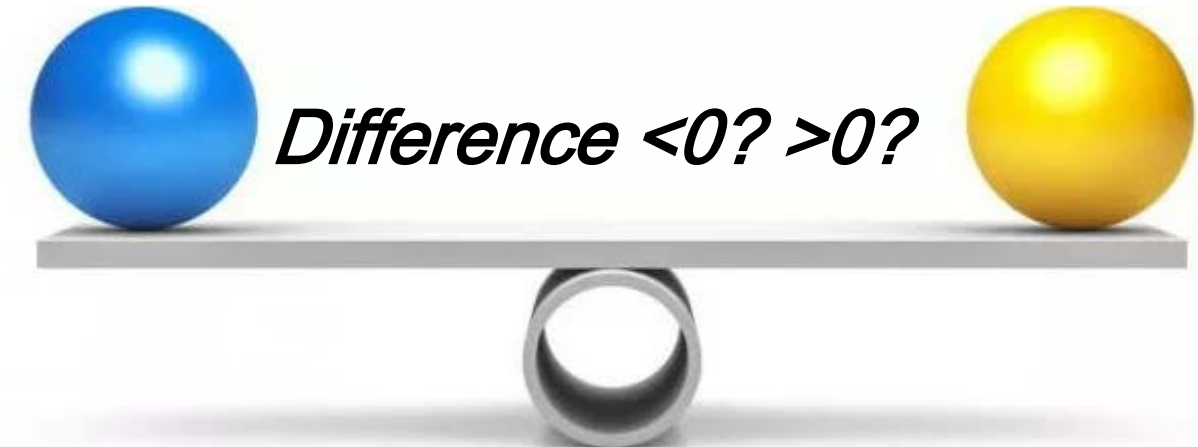
0 T

Policy Sustainability Analysis

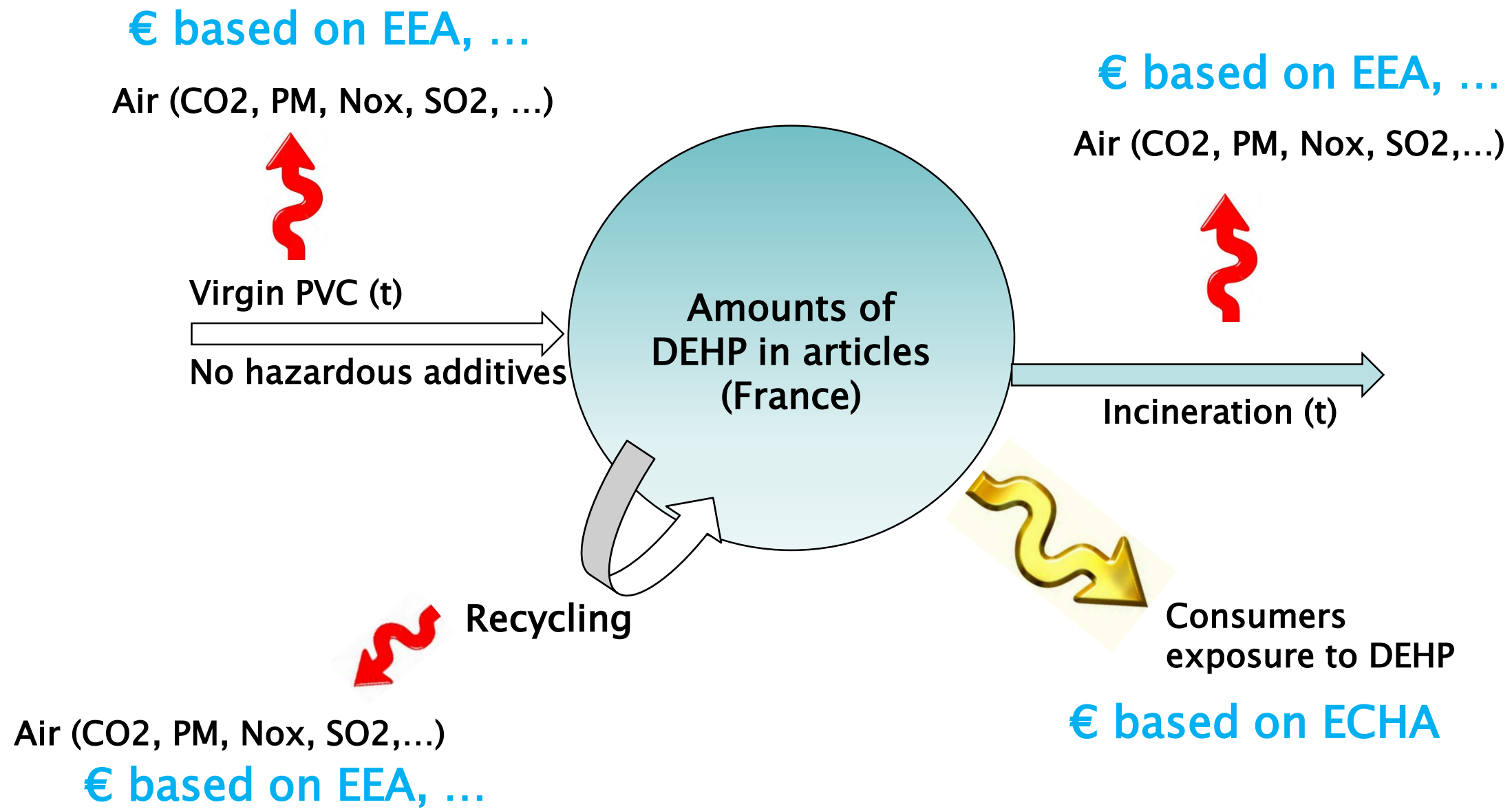




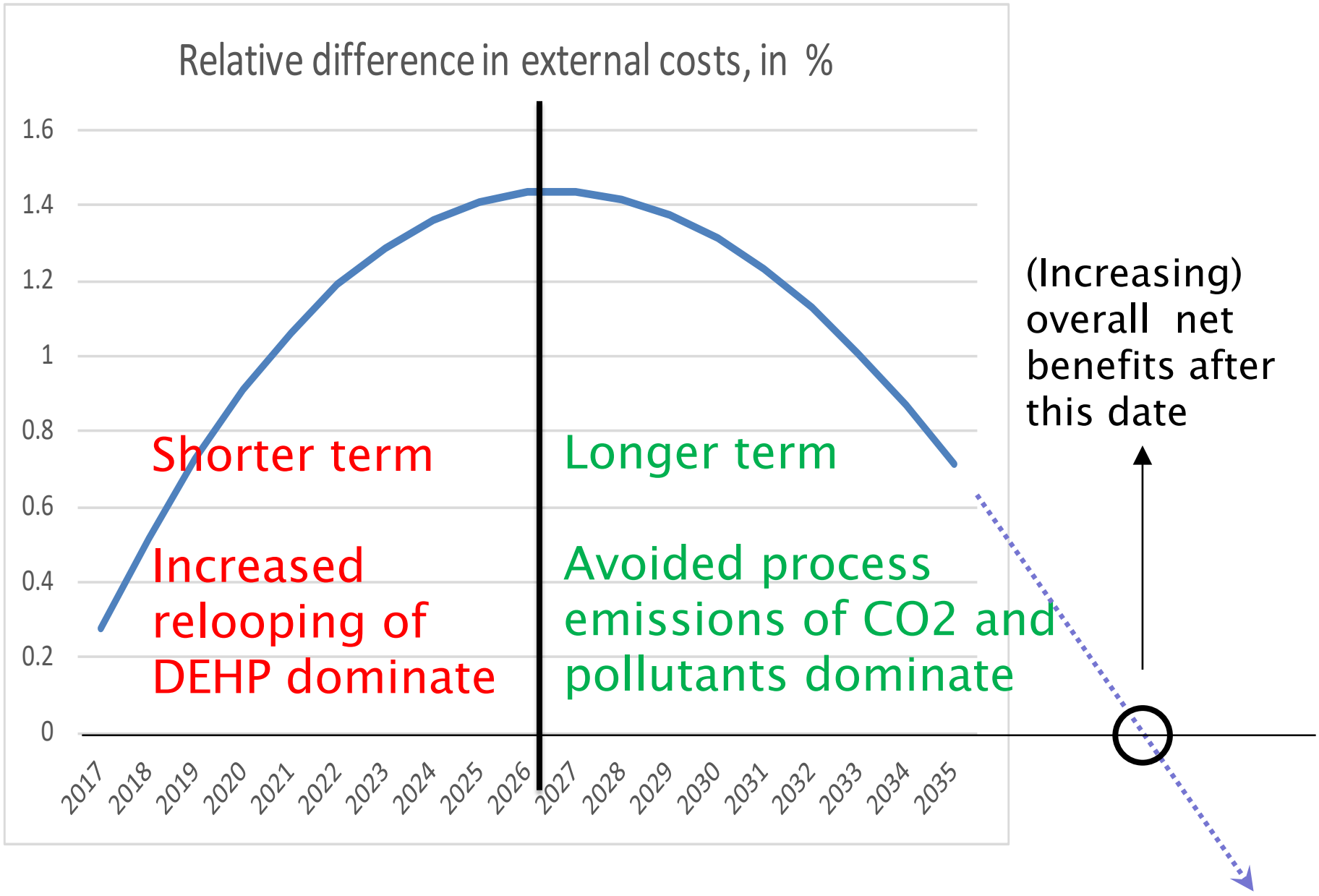
Recycling Policy A ⟺ Same demand ⟺ Recycling Policy B



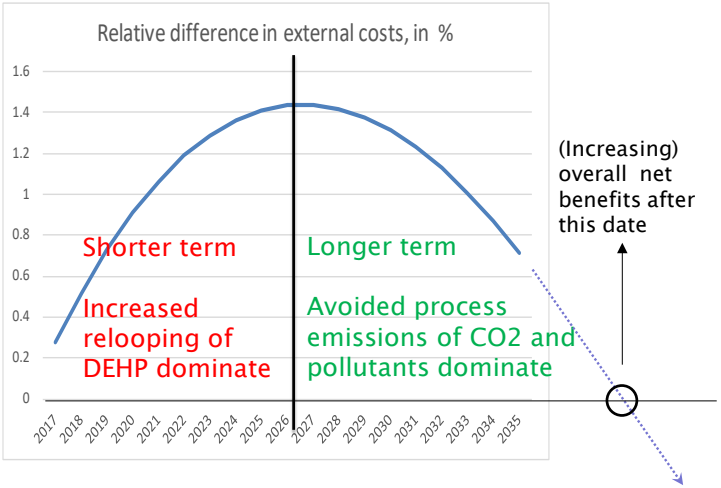
Illustrative example : soft PVC and DEHP



Increased recycling (vs. Baseline scenario)



Increased recycling (vs. Baseline scenario)



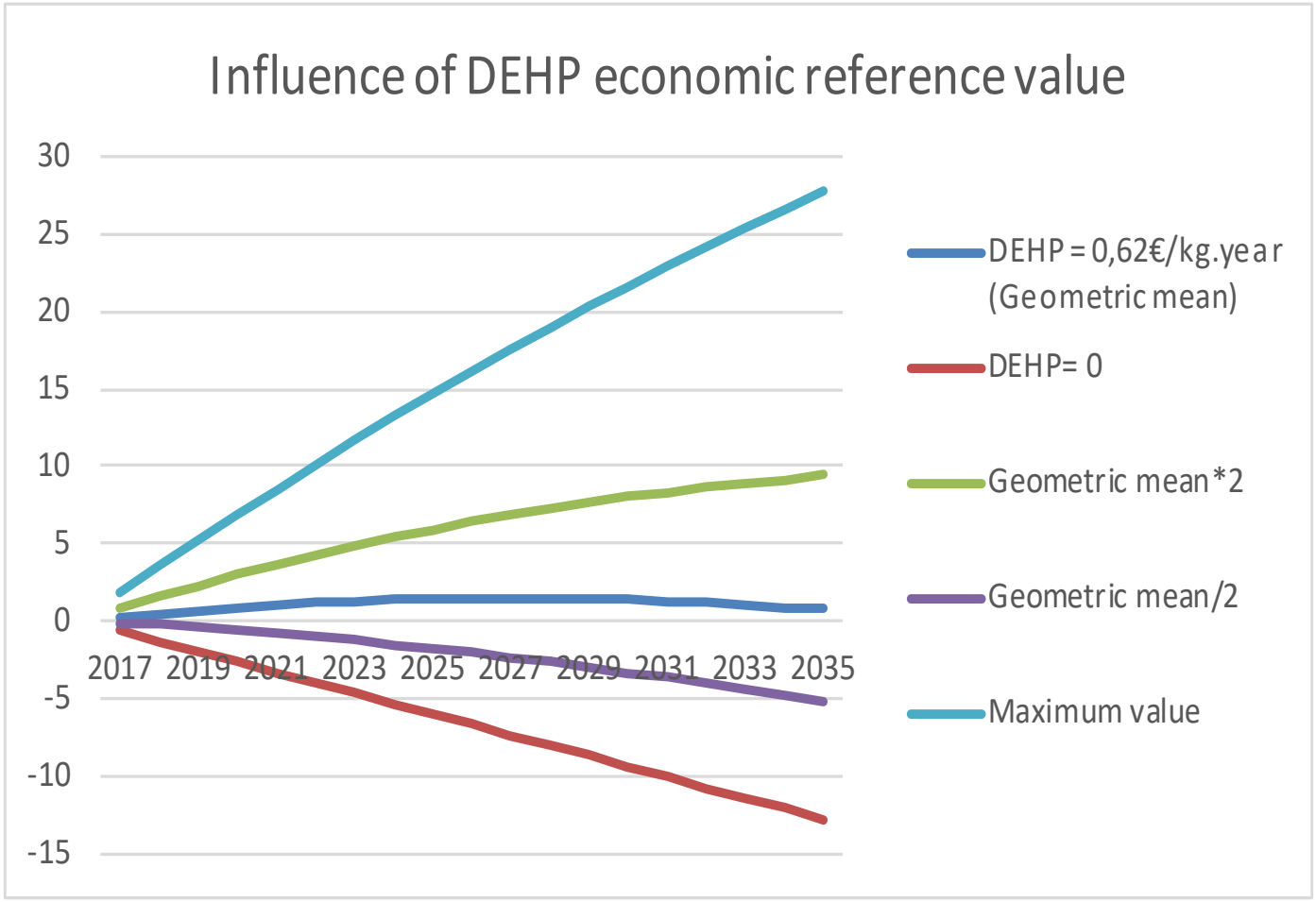
Long term benefit (increasing with T)

But

Acceptability of transient impacts of additional additives recycled ?

What is your patience to wait for overall benefit (curve crossing x-axis) ?

Uncertainties



Can be reduced to acceptable level (?)

Focus on well defined articles and cycles / data acquisition

The case of metal industry

Hazardous impurities (Ni0, Co,…) in recycled metals

Use of slags with hazardous impurities

Issue of scarcity to include in economic assessment ?

Complexity :

- multiple impurities
- multiple loops

} Big Data challenge ?
LCAs / emission data ?

- Persistence/Bioaccumulation/Toxicity might add complexity in some cases

> *But more tractable than case of plastics ?*

The case of metal industry

Scenarios to compare :

Different use patterns for recycled products

Different impurities removal processes / objectives

(financial cost considerations can be added to exernal cost of supply)

Use versus non-use of metallic materials

(complexity added by « other » material)

Thank you for your attention!

… and questions/feedback

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