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ALLOCATION APPROACHES TO DEAL WITH THE CASCADING USE OF RESOURCES ALONG A WATER TREATMENT CHAIN

THE CASE OF THE RESOURCE FOOTPRINT OF SEWAGE SLUDGE VALORISATION IN THE NETHERLANDS

Sophie Sfez, Steven De Meester, Siegfried Vlaeminck, Jo Dewulf

SETAC Europe 24th LCA Symposium

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OUTLINE

- Introduction
- A new approach towards wastewater treatment
- Application to a case
- Discussion & conclusions

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INTRODUCTION

Wastewater

Sludge

Sludge disposal

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INTRODUCTION

Wastewater

Sludge

Sludge processing

Biogas

Phosphorus

Bioplastics

Metals

etc…

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Wastewater

Sludge

Crude oil

P

NG

Sustainability?

Sludge processing

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etc…

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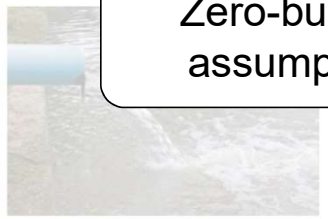

Zero-burden assumption

Crude oil

P

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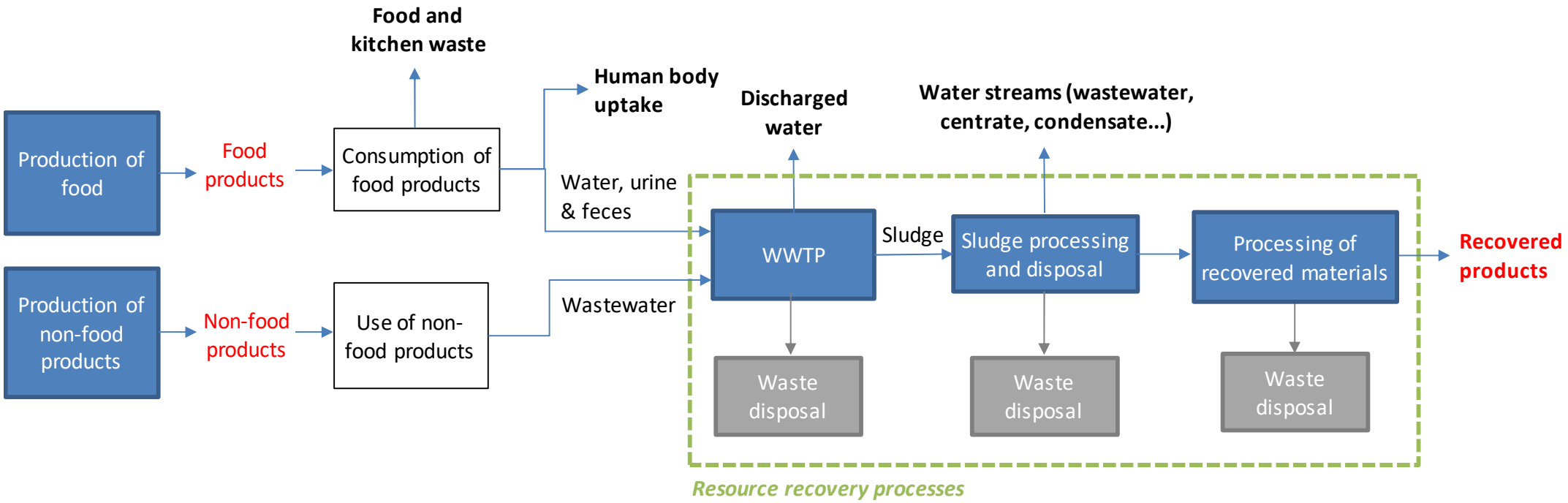
A NEW APPROACH TOWARDS WASTEWATER TREATMENT



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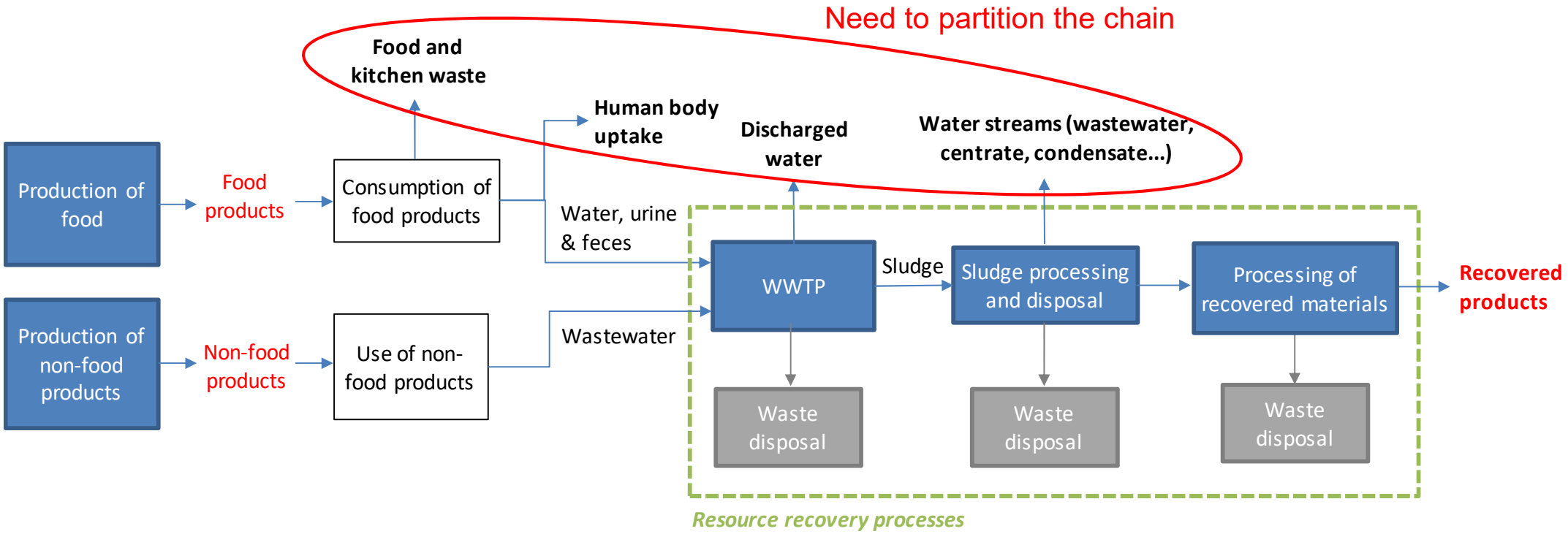

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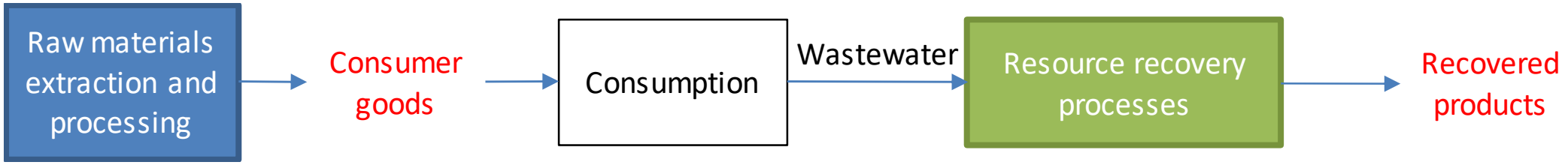

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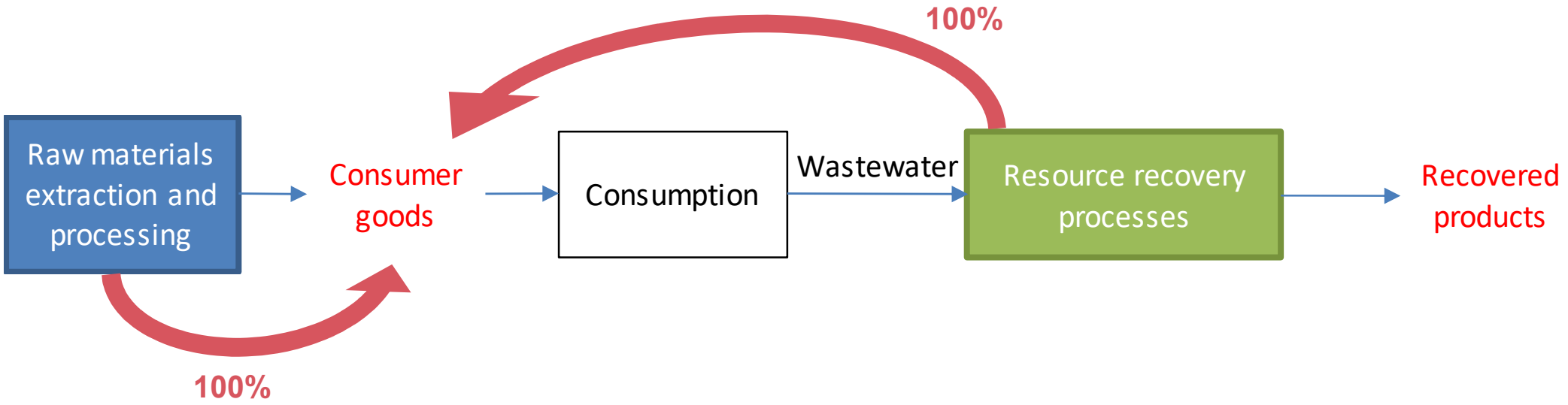
A NEW APPROACH TOWARDS WASTEWATER TREATMENT

Allacker et al. 2017: EoL formulas

0:100



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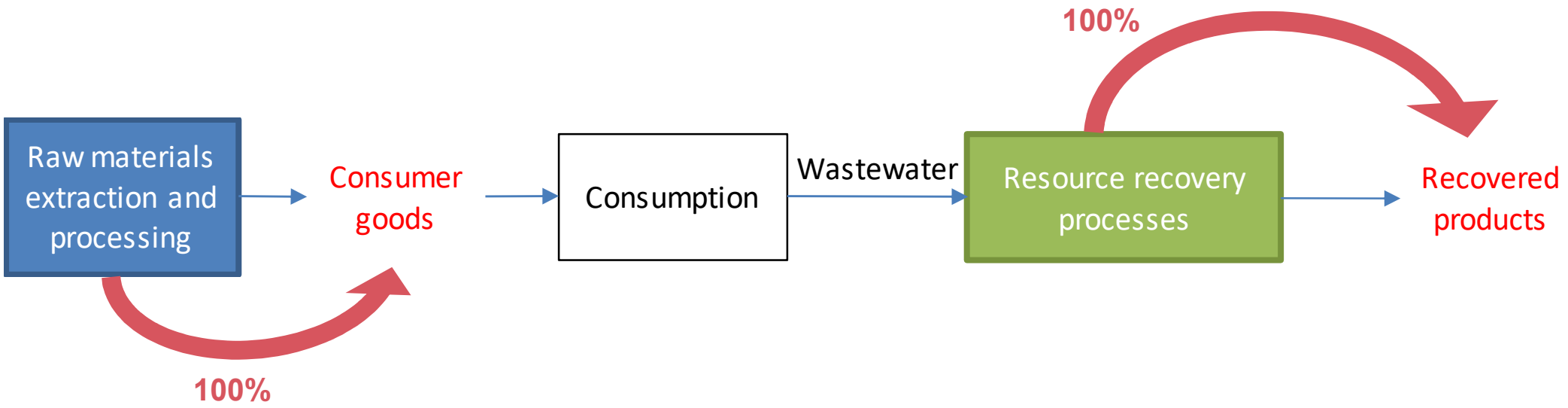

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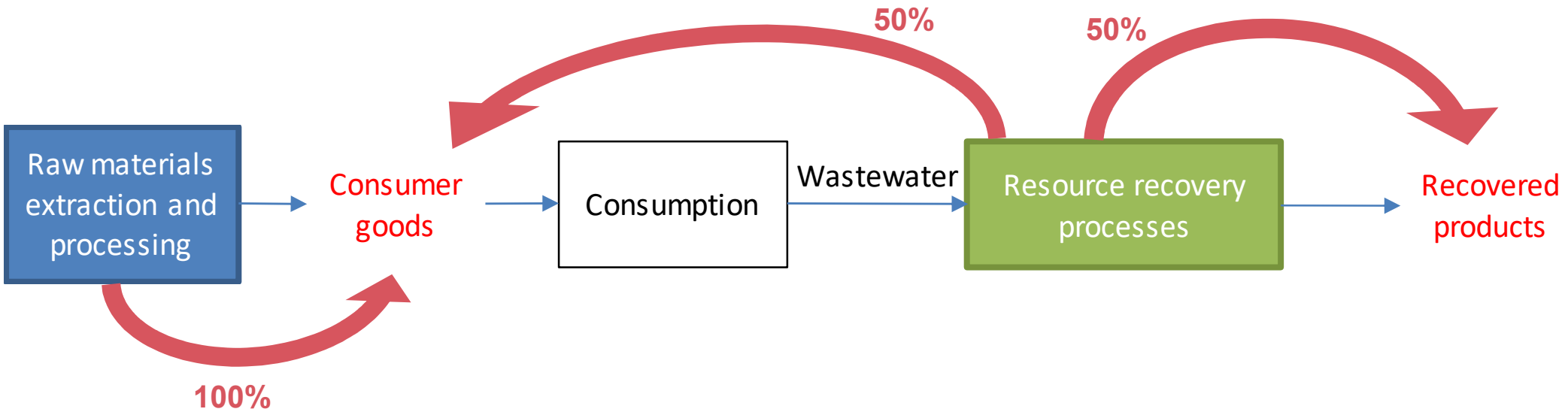
50:50



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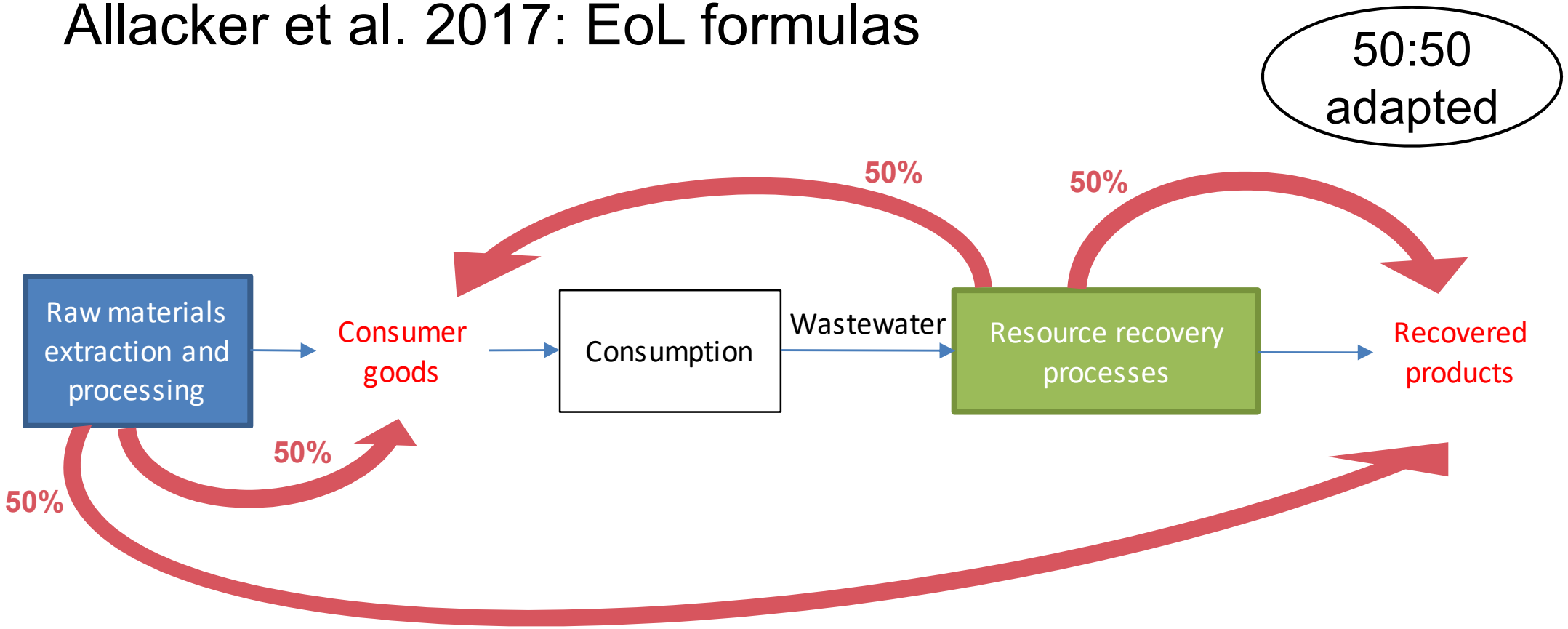

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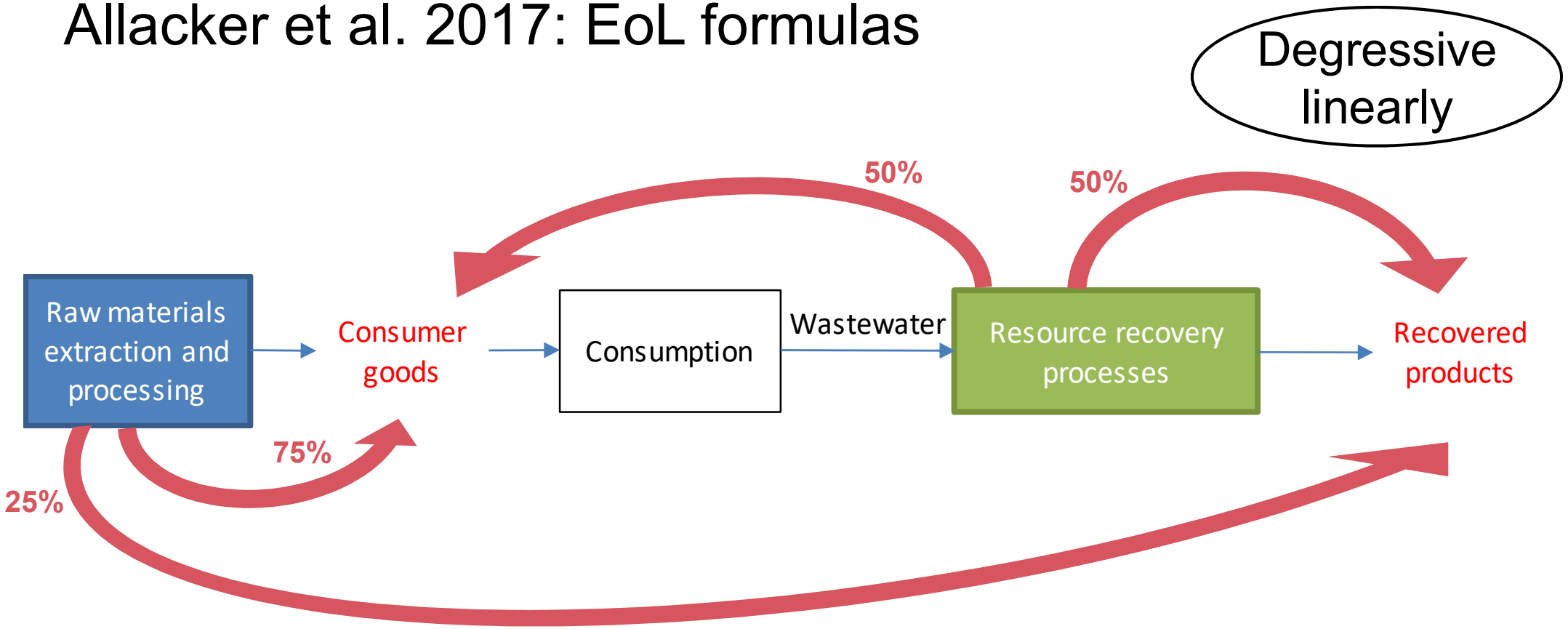

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APPLICATION TO A CASE

Wastewater treatment chain of Eindhoven - *680000 PE*

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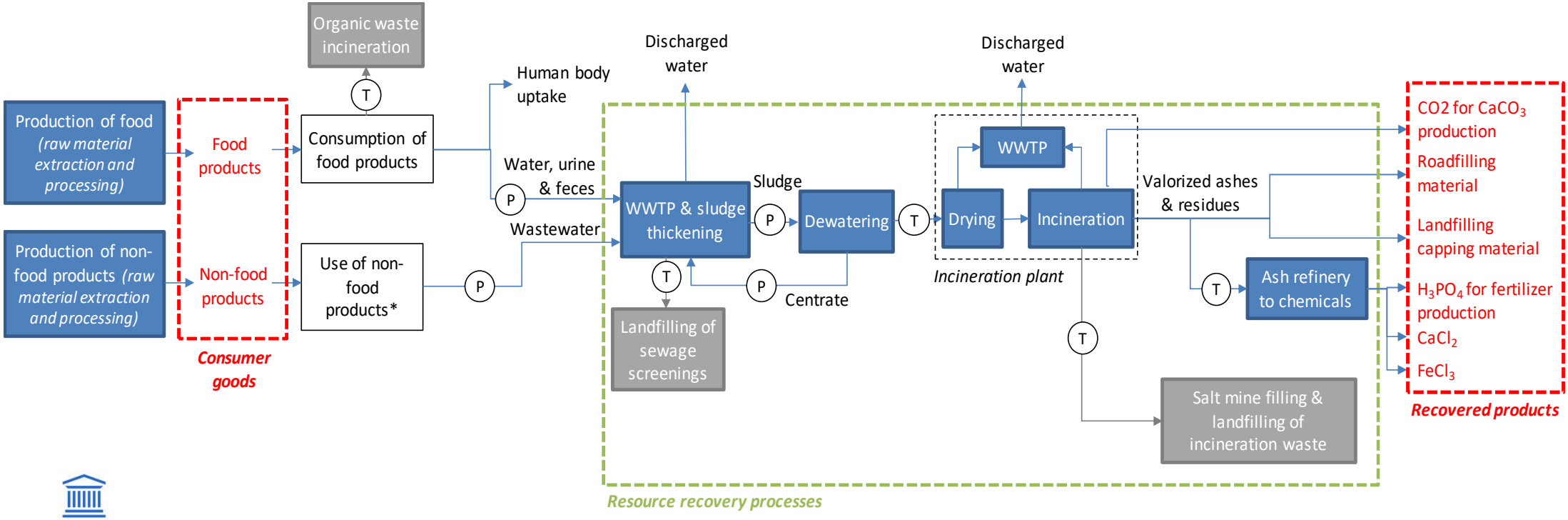
APPLICATION TO A CASE

Scenarios | Goal & Scope | Data inventory | Partitioning | Allocation | Impact assessment

Baseline scenario



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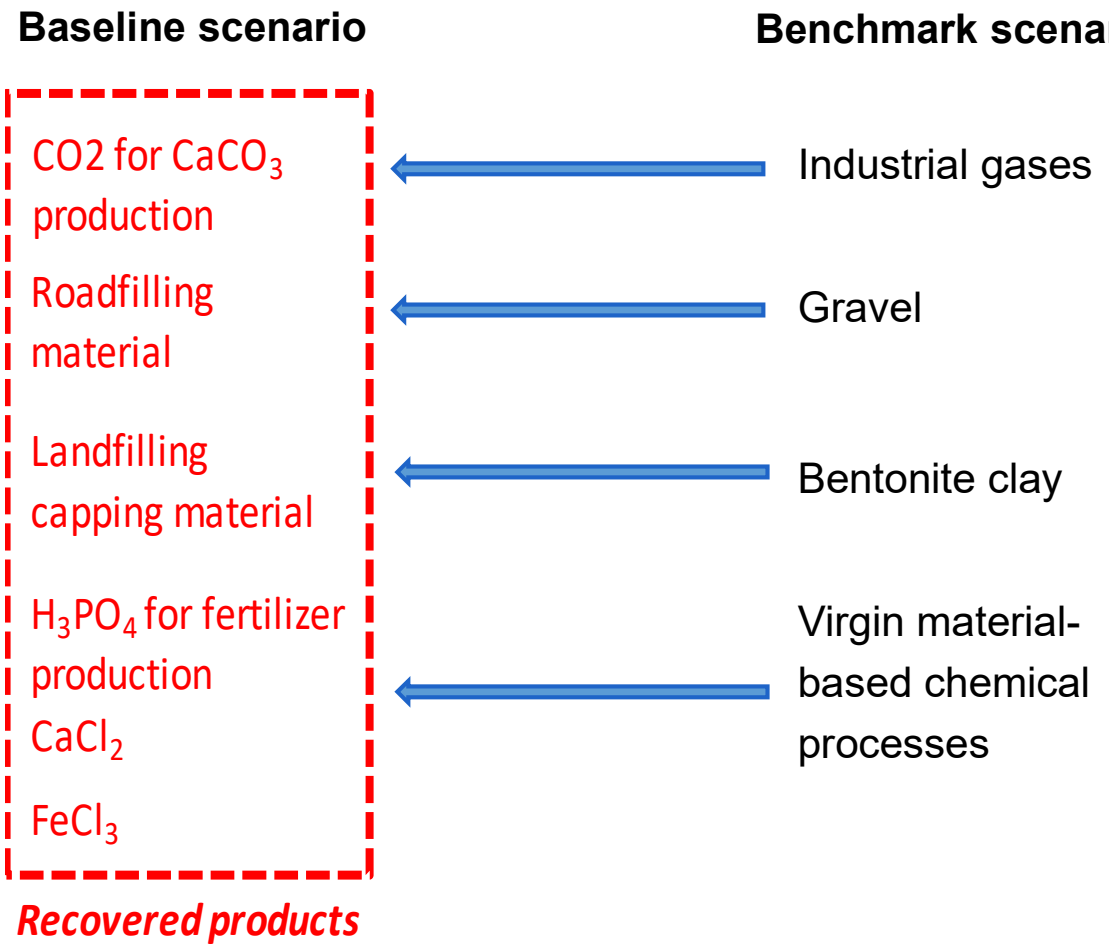

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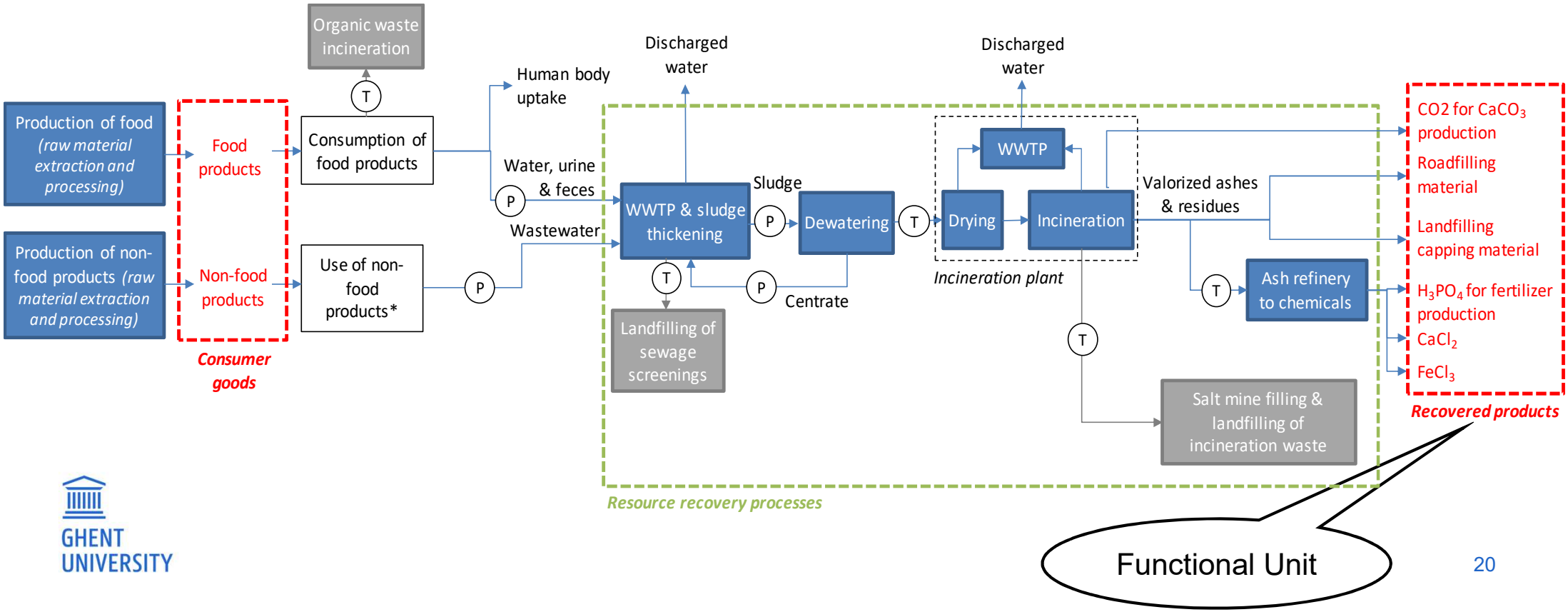

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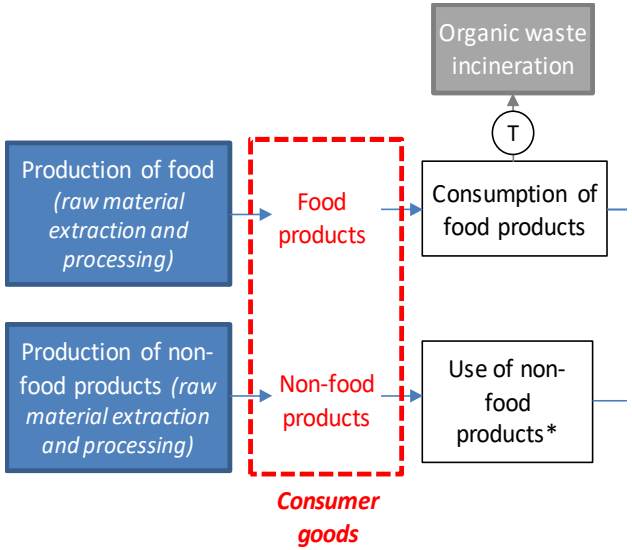

- Dutch National Consumption survey (2011)
- RIVM reports, PAN-European consumer survey on sustainability and washing habits
- Background processes: ecoinvent, Agri-footprint and Food-LCA databases

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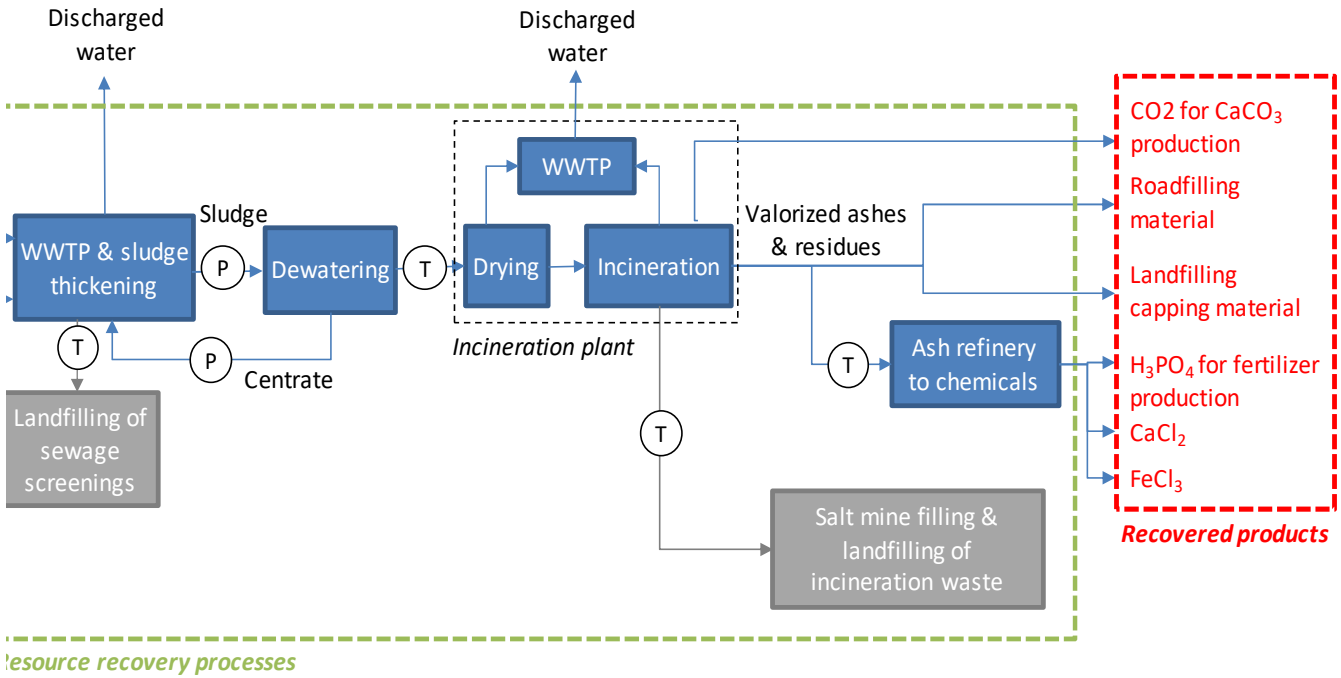
- Direct communications
- Sustainability report of Waterschap De Dommel and SNB
- EcoPhos process (P-Rex project)



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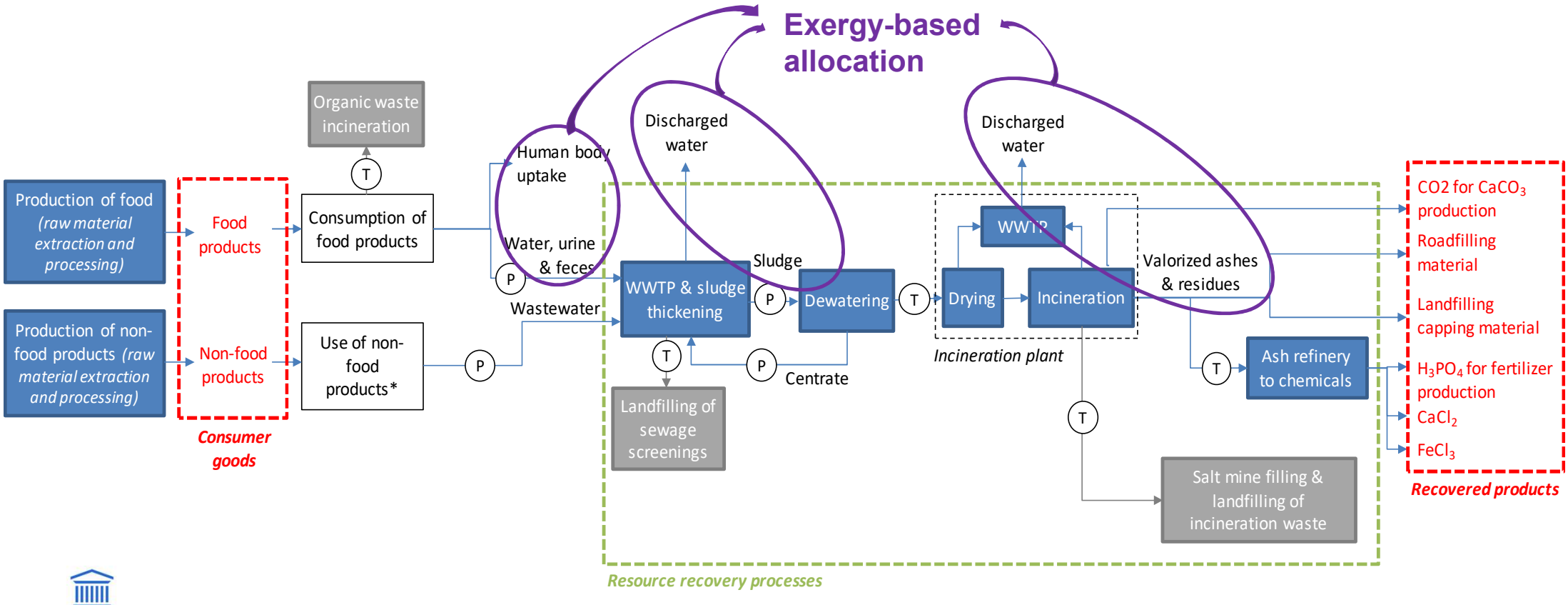

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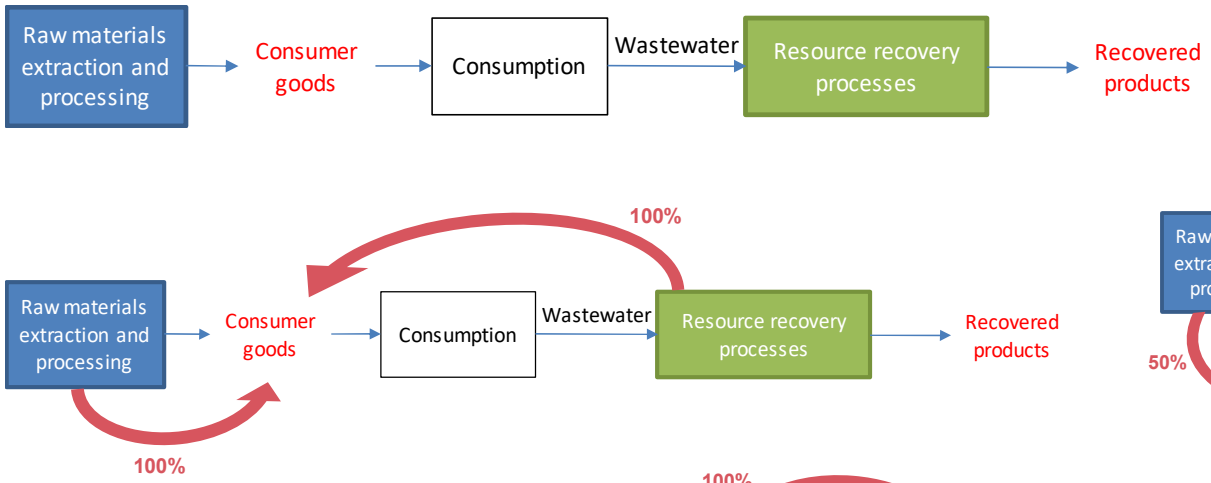

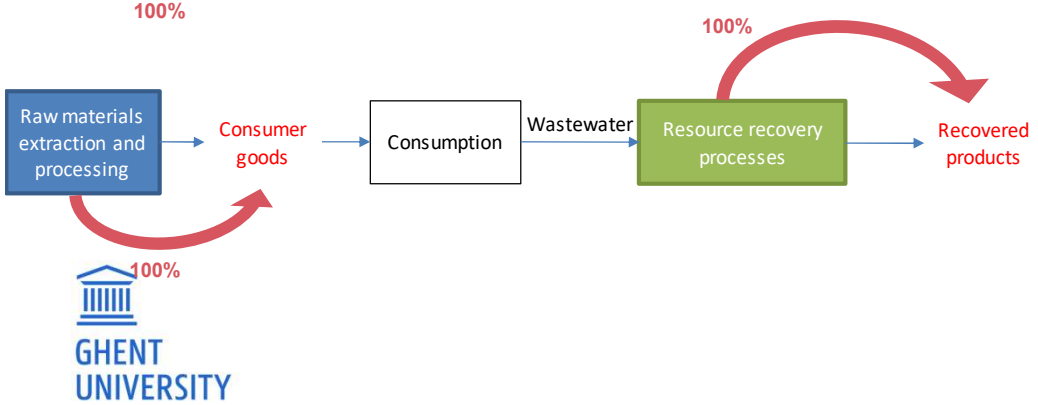

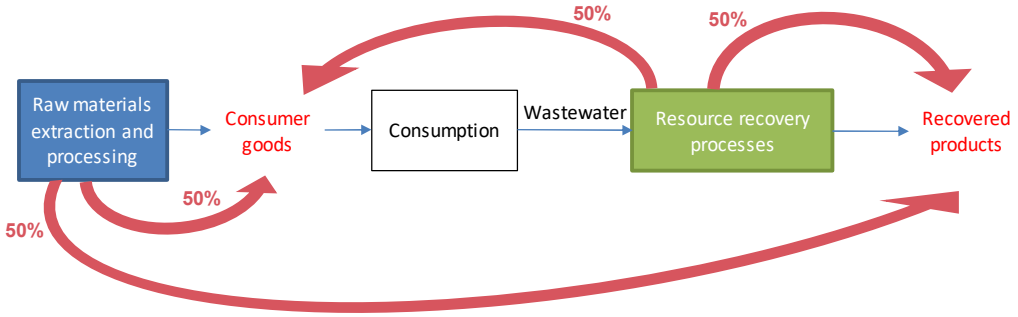

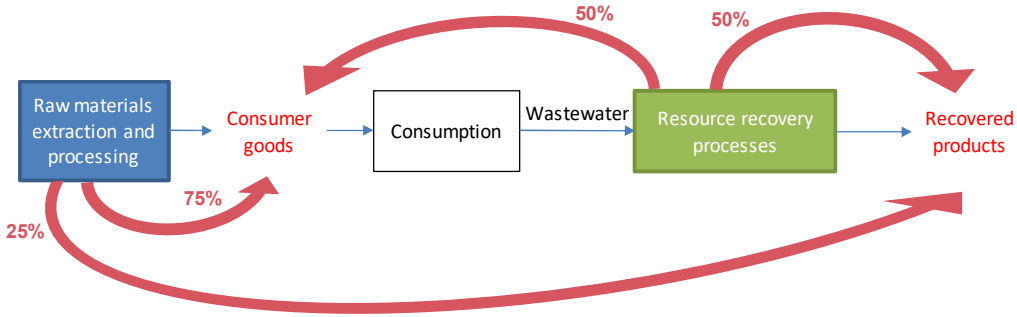

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Resource footprint

→ Cumulative Exergy Extraction from the Natural Environment (CEENE; *Dewulf et al. 2007*)

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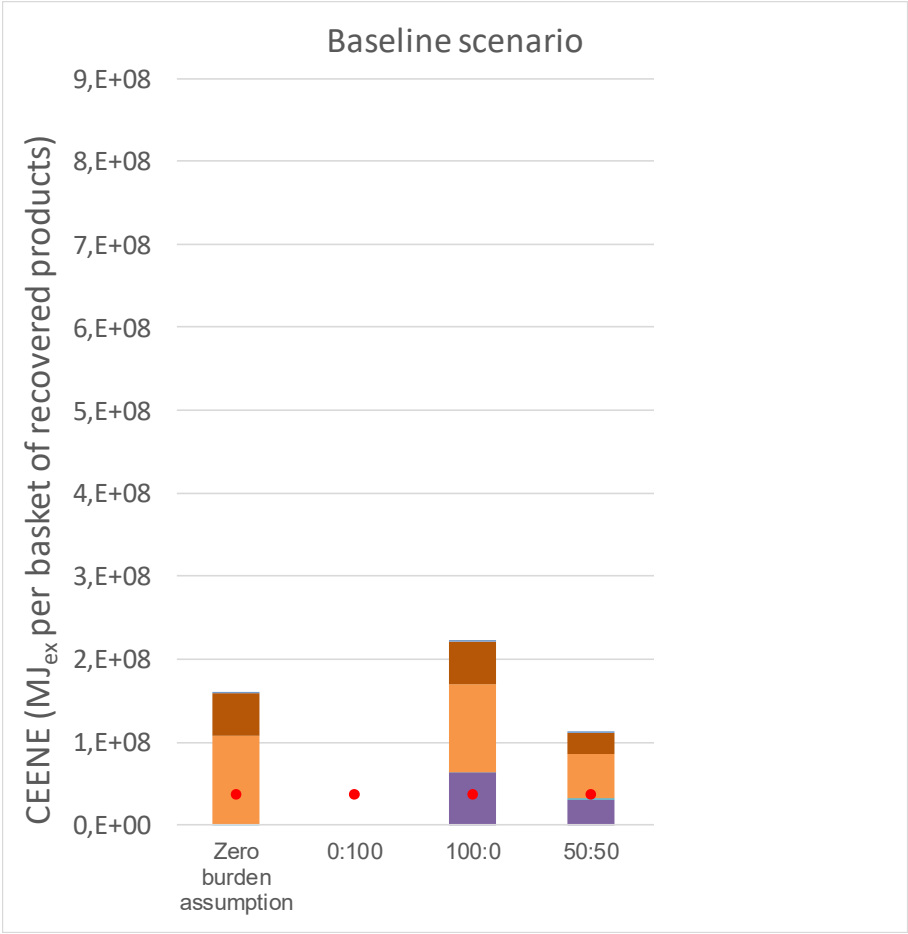
Results



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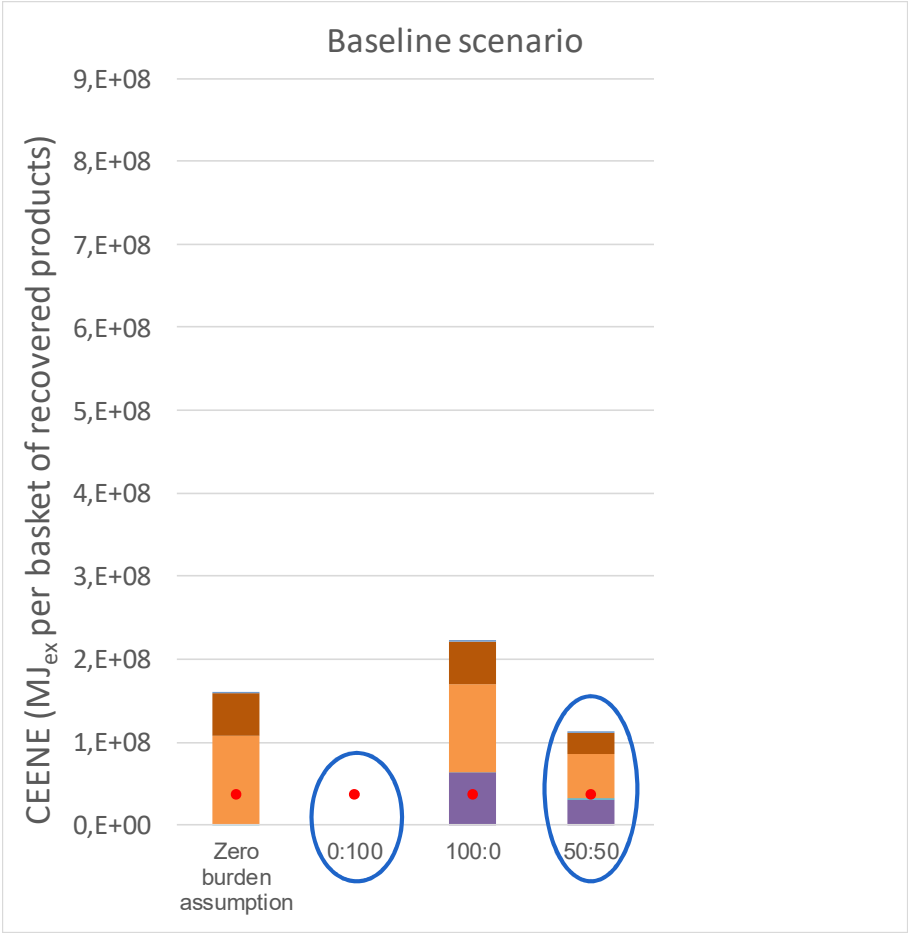

- Production of non-food products consumed by households
- Production of food products consumed by households
- Wastewater treatment
- Incineration
- Ash refinery to chemicals
- Benchmark products

- 0:100 & 50:50: lower footprint than zero-burden assumption

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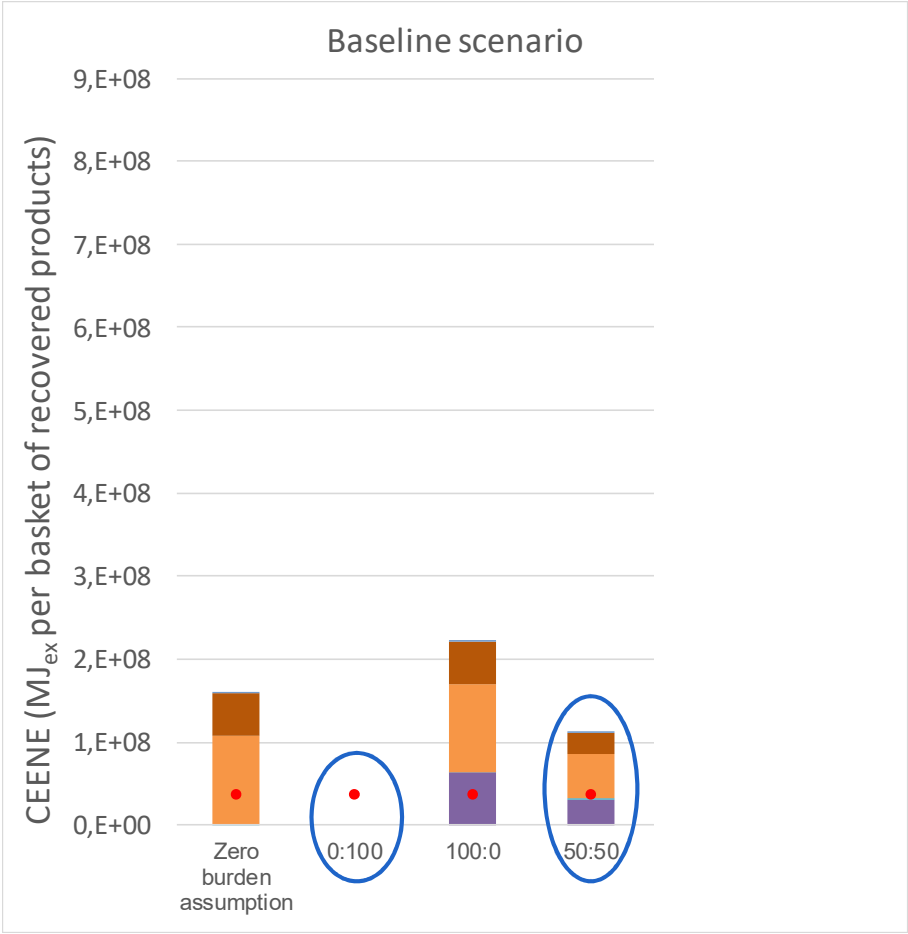

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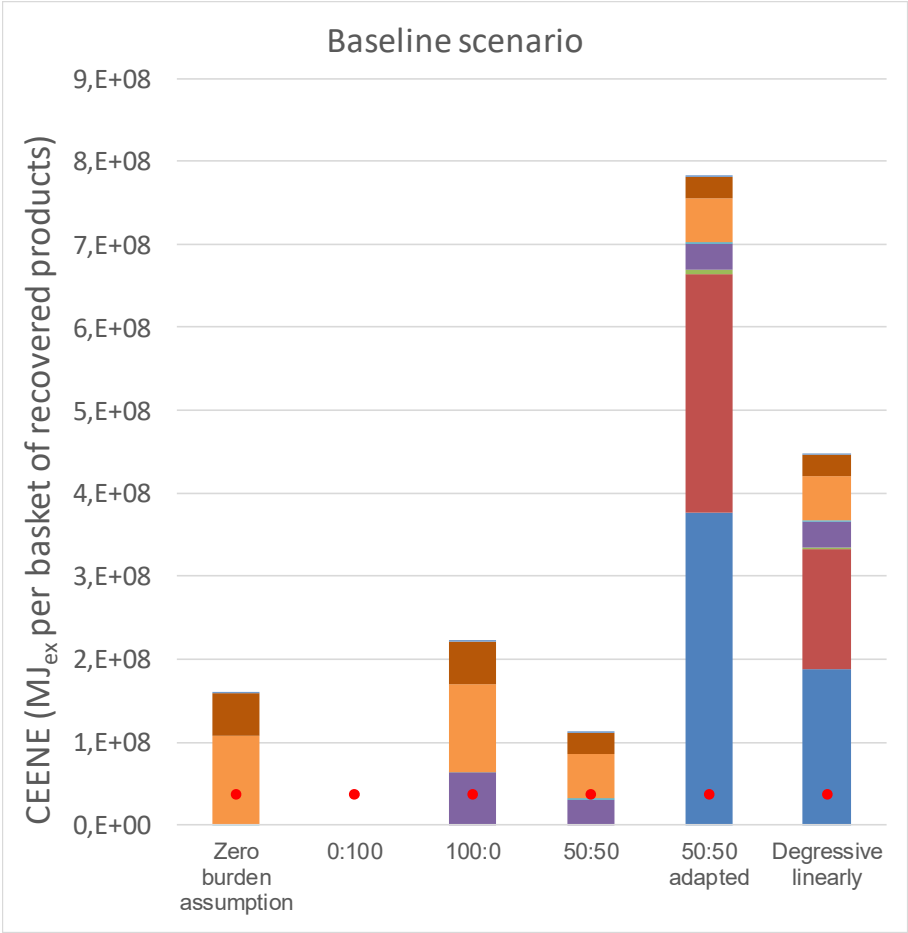

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- Consumer goods become first contributors

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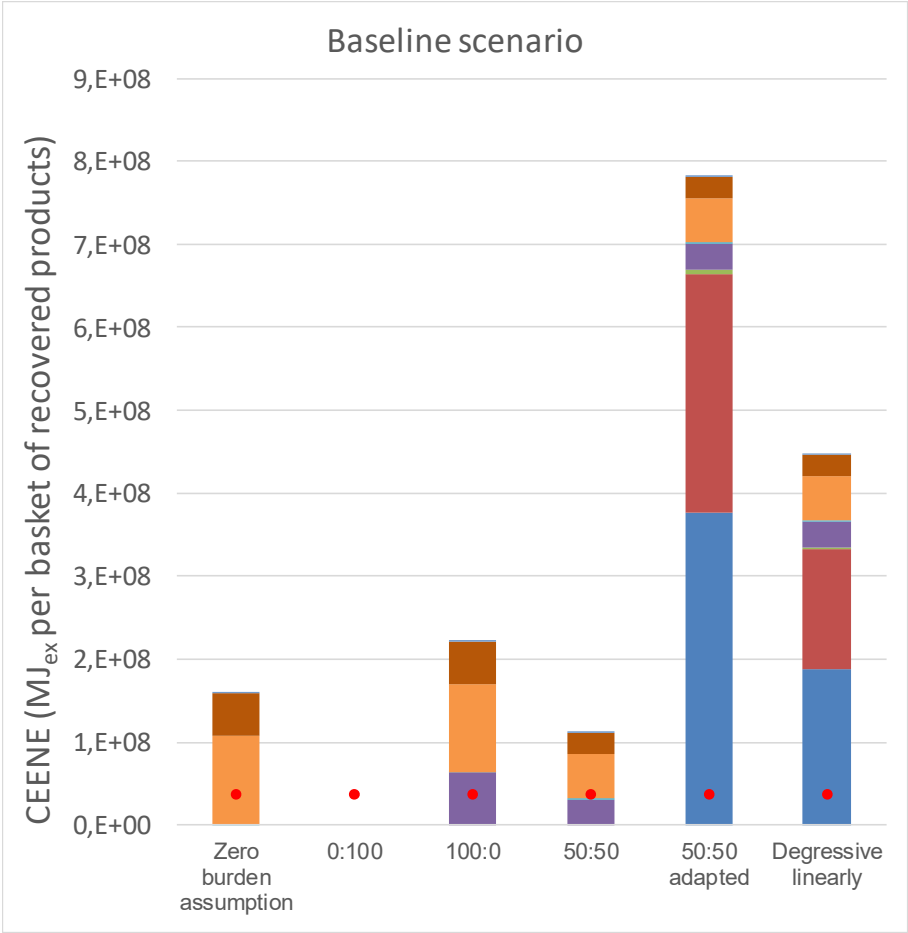

- 0:100 & 50:50: lower footprint than zero-burden assumption
- 1st contributor: incineration
- Consumer goods become first contributors
- Benchmark products (almost) always better

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DISCUSSION & CONCLUSIONS

- Practical challenges

  - ➢ Only applicable in the case of a comparison between recovered and benchmark products

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  - ➢ Same approach should be applied to organic waste if not incinerated
- The choice of the approach might be arbitrary but can be based on the principle of industrial ecology
  - ➢ Consumer goods and recovered products are dependent on each other
  - ➢ There is a “hierarchy of intent”: intended products & secondary resources

→ Degressive linearly

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→ Degressive linearly

The proposed approach is not favourable for recovered products
→ How to deal with it?

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Thank you !

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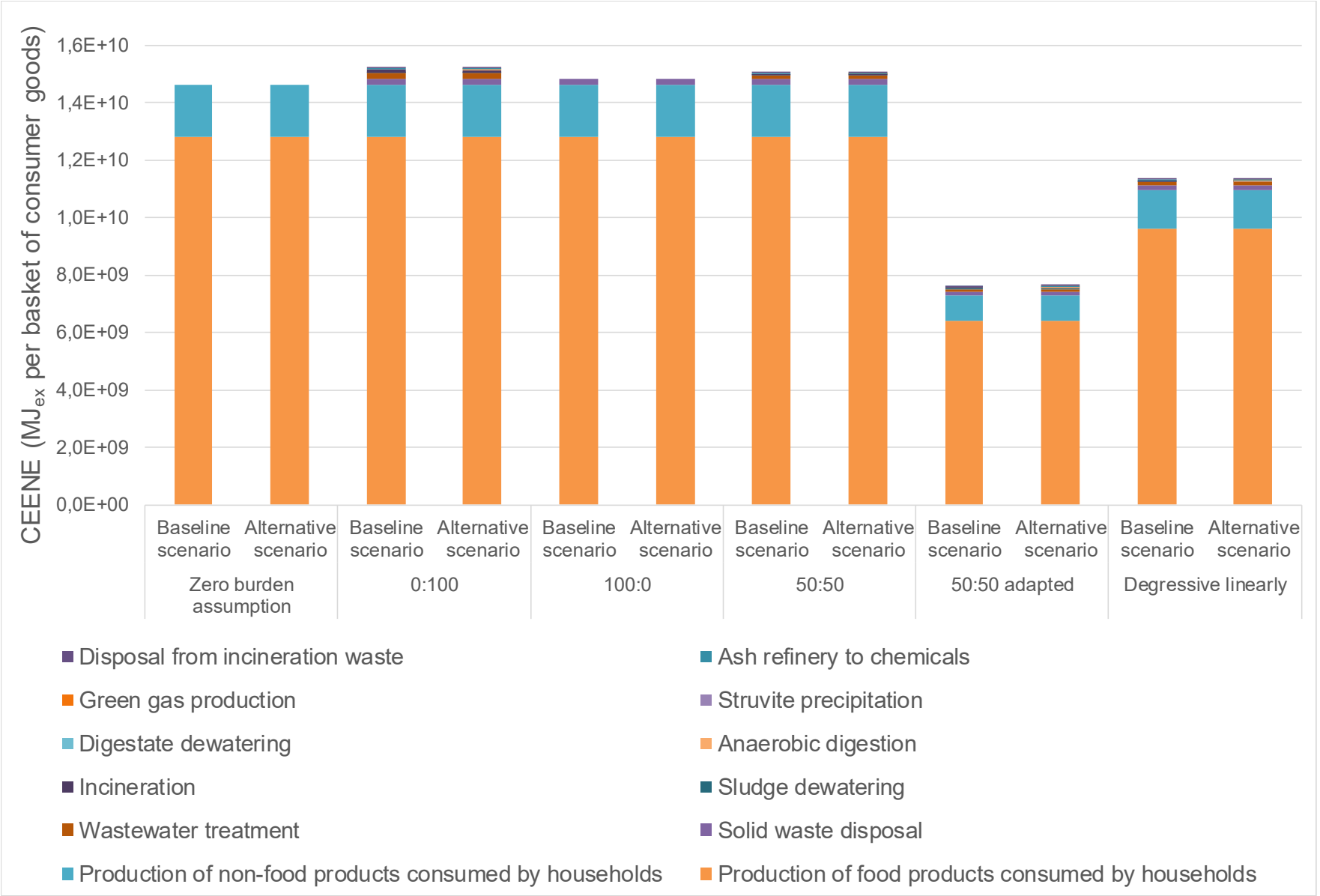

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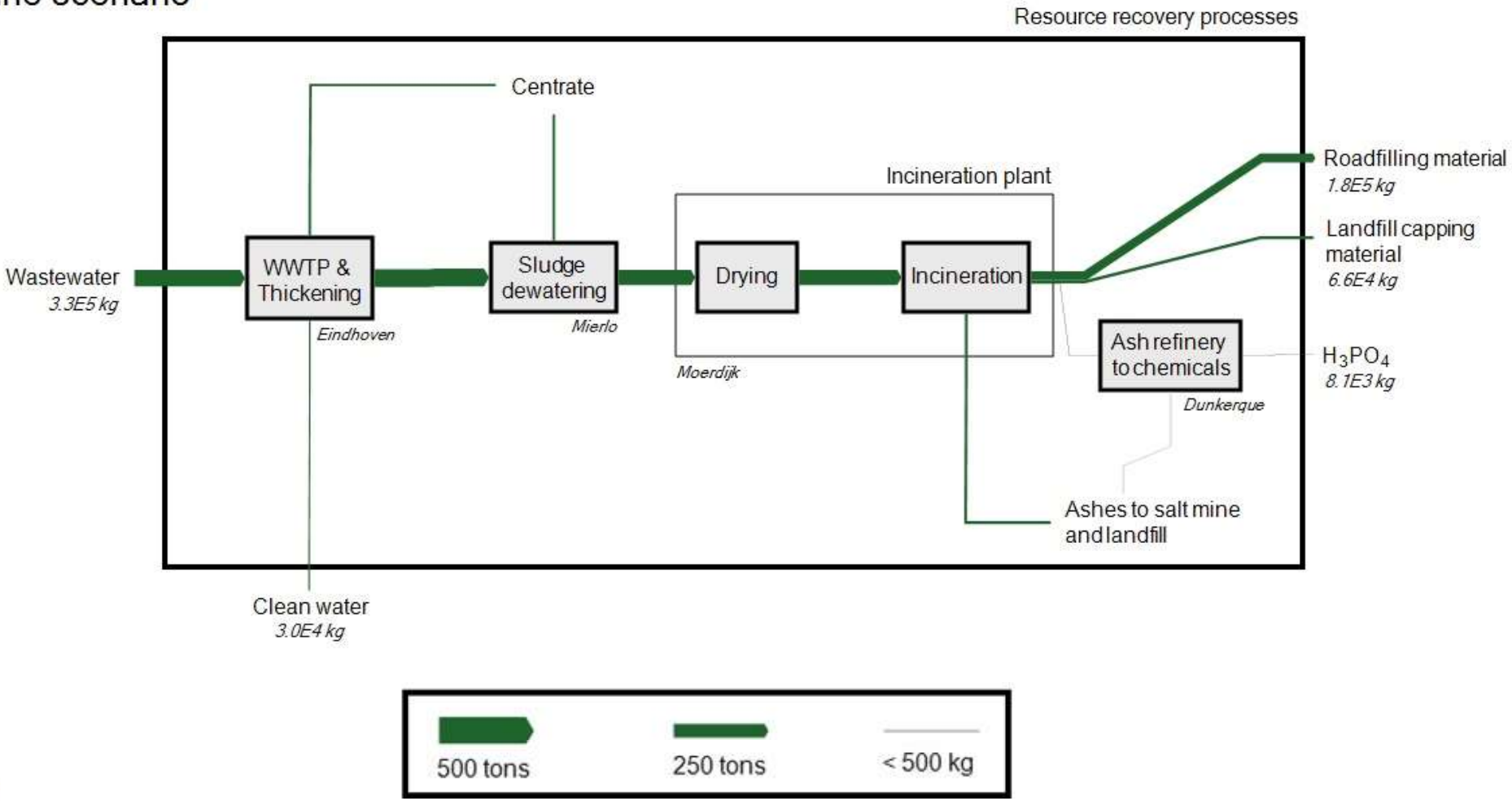

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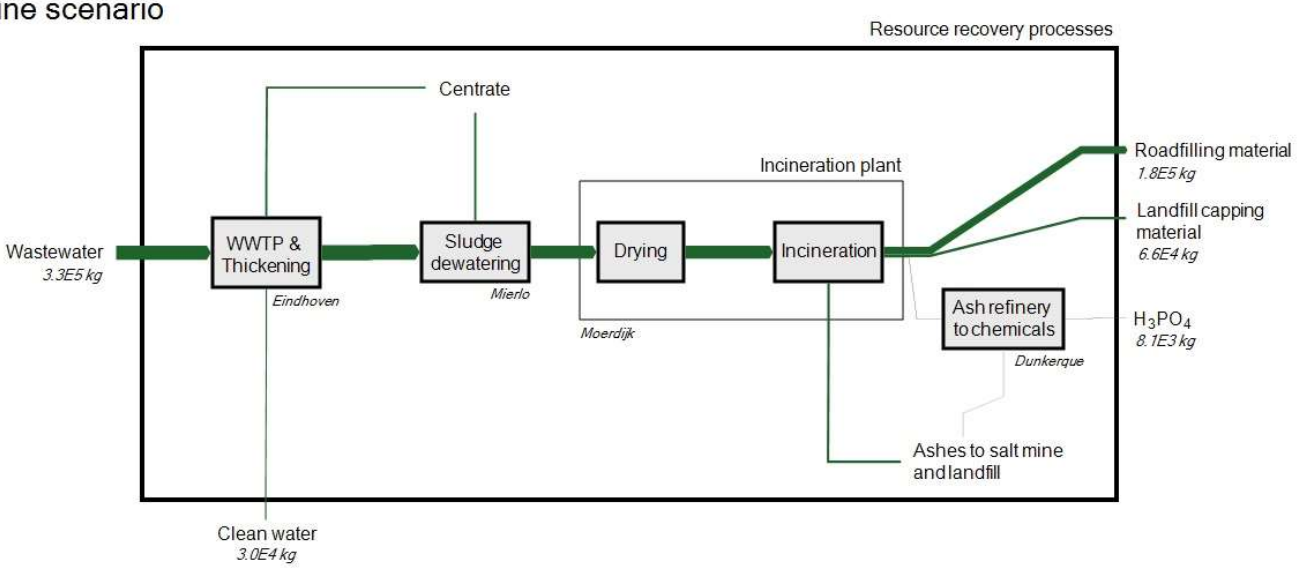
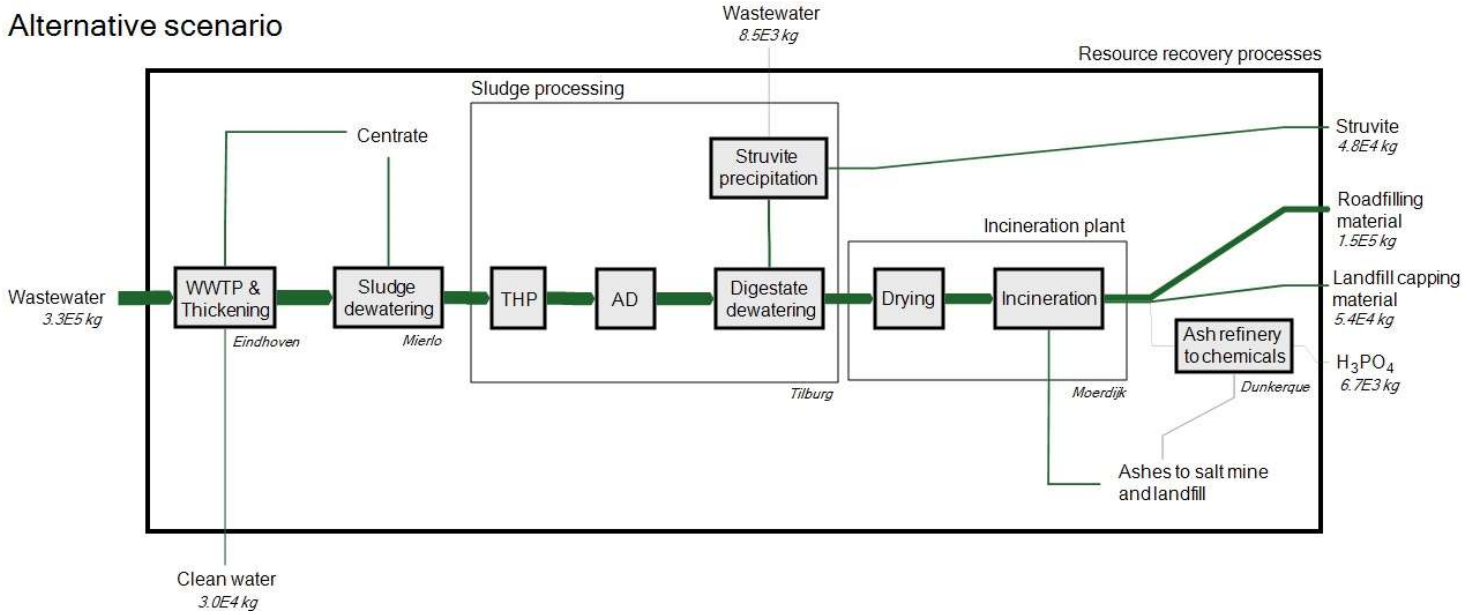


Alternative scenario



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