STOPP – Environmental Impacts of Reusable Plastic Food Packaging

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Stopp

Strategies to prevent and reduce plastic packaging pollution from the food system

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Introduction

- STOPP - Strategies to prevent and reduce plastic packaging pollution from the food system
- Multiple pilot studies with Swiss partner reCIRCLE
- Kotipizza pilot - reusable pizza boxes vs single use

VS

Introduction

Goal

- Compare impacts of reusable vs single use pizza packaging
- Identify system that minimises cost and environmental impacts, maximises circularity

Scope

- Cradle to grave

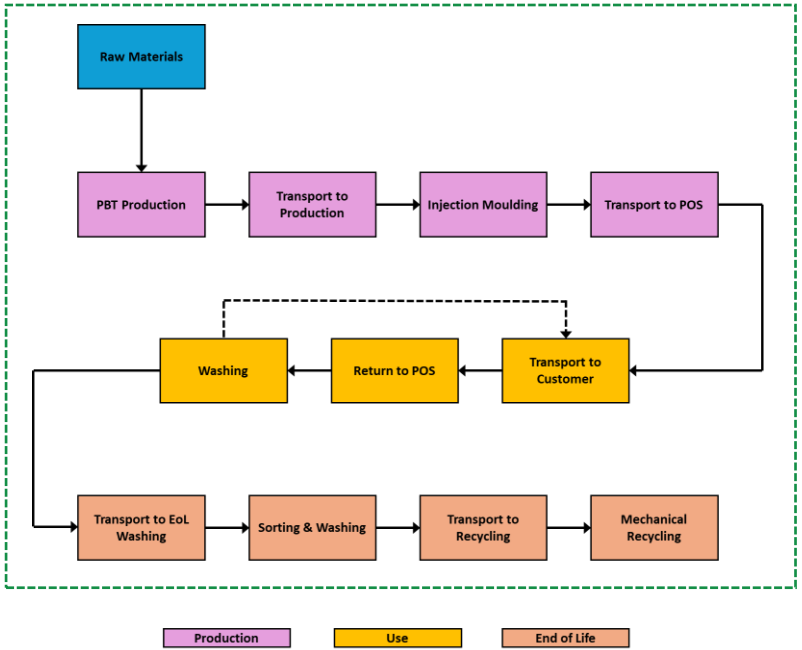
Functional Unit

- Protection and insulation of 100 pizzas during transport from a Kotipizza restaurant to a customer's home.

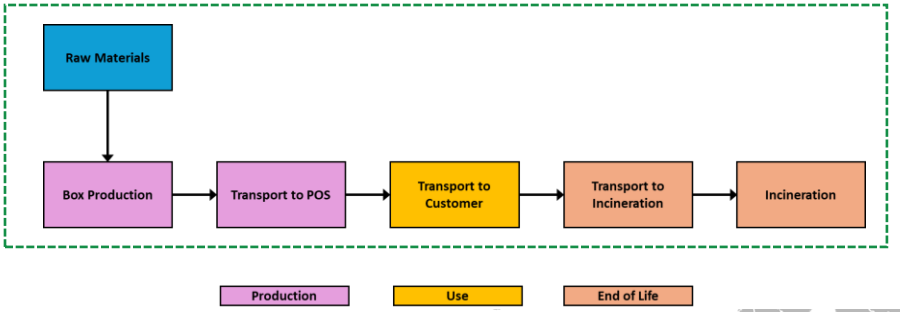
- EF 3.1 Method (adapted)
- Ecoinvent v3.12, Circularity Package v3

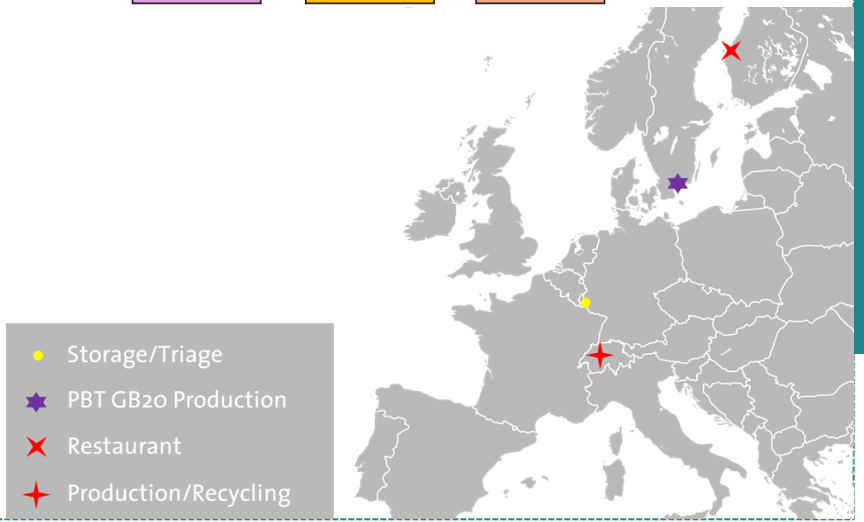
Introduction

reCIRCLE



Single use



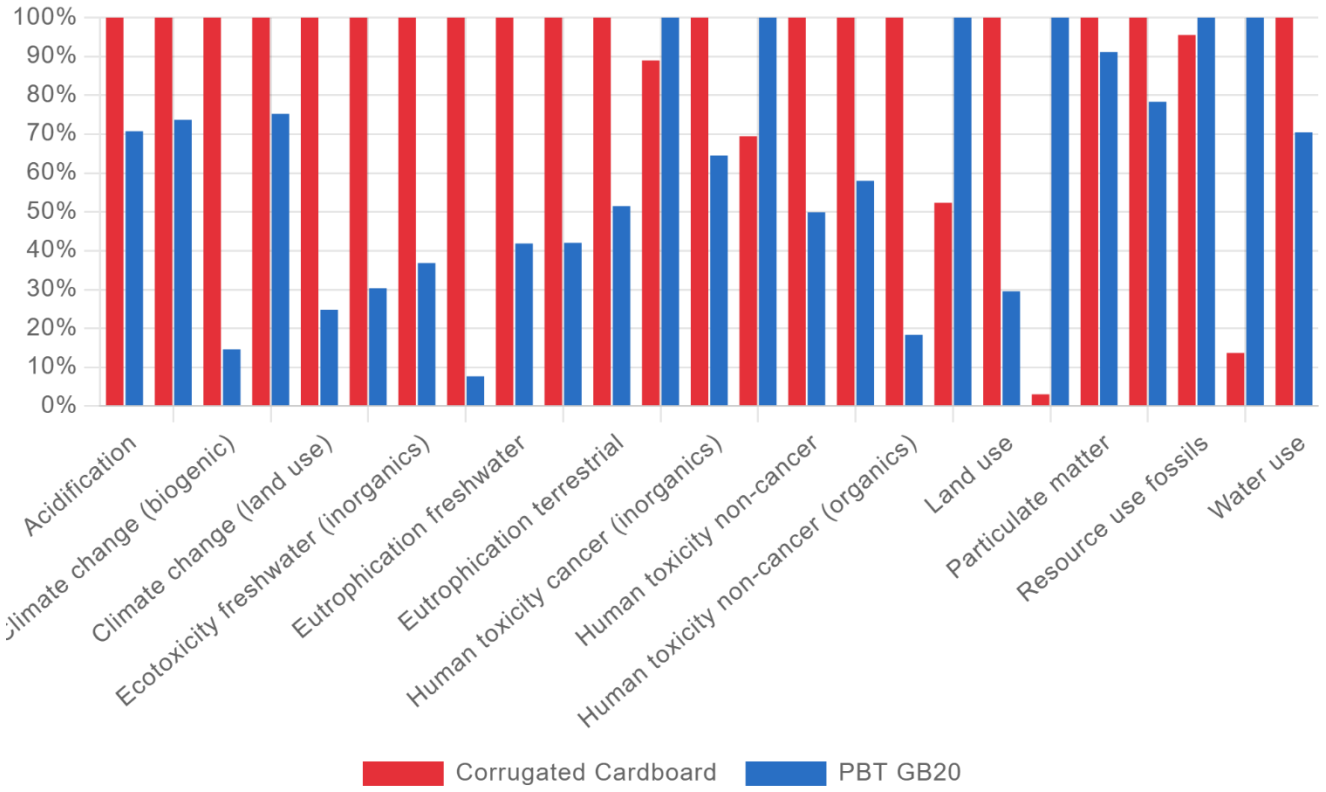


Key Assumptions

- Mass: 780 g
- Delivery by passenger car
- 100% mechanical recycling (100% efficiency)
- Cut-off after mechanical recycling, no credits for recycled material produced.
- LCC: spot analysis for 2023

- Mass: 95 g
- Average European dataset
- Delivery by passenger car
- 100% disposal via incineration
- LCC: spot analysis for 2023

Baseline Scenario – Environmental Impacts



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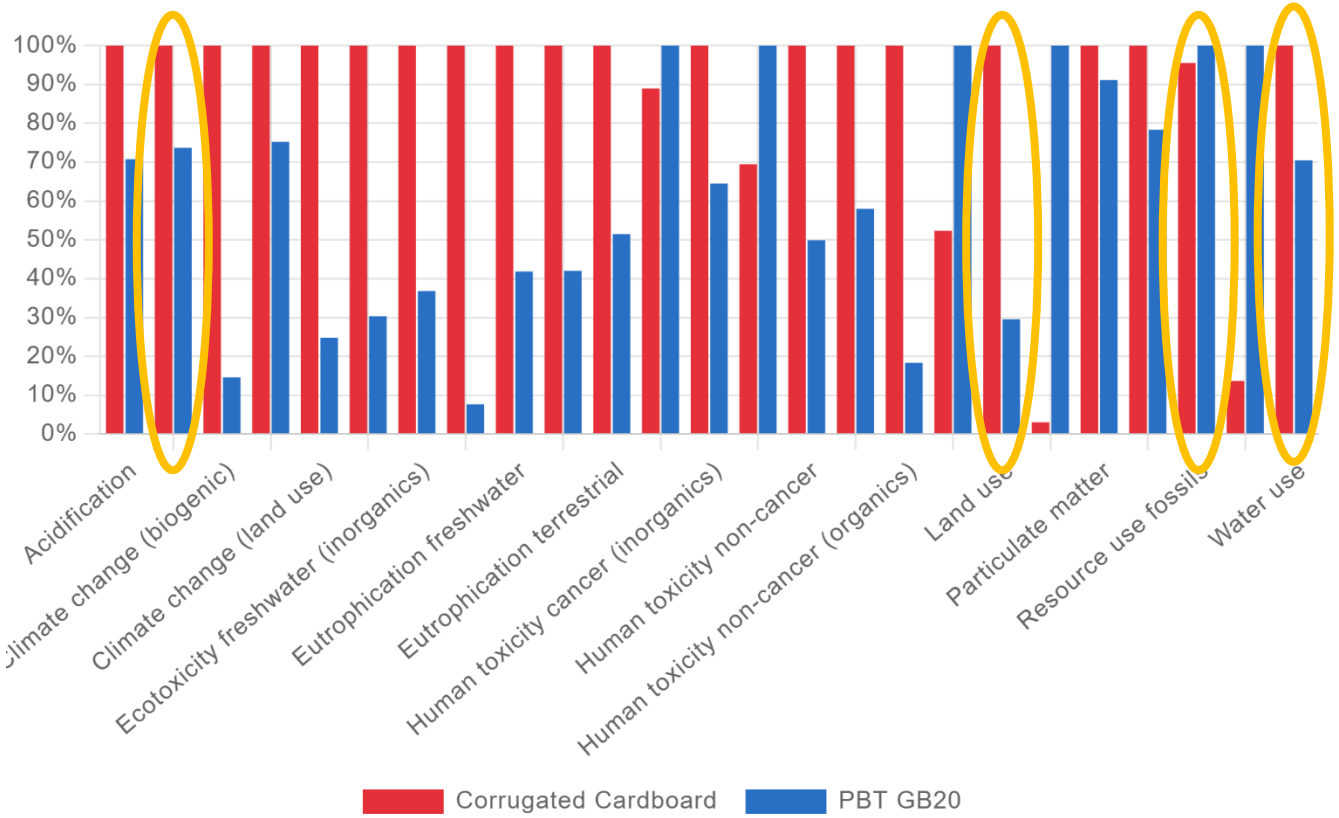
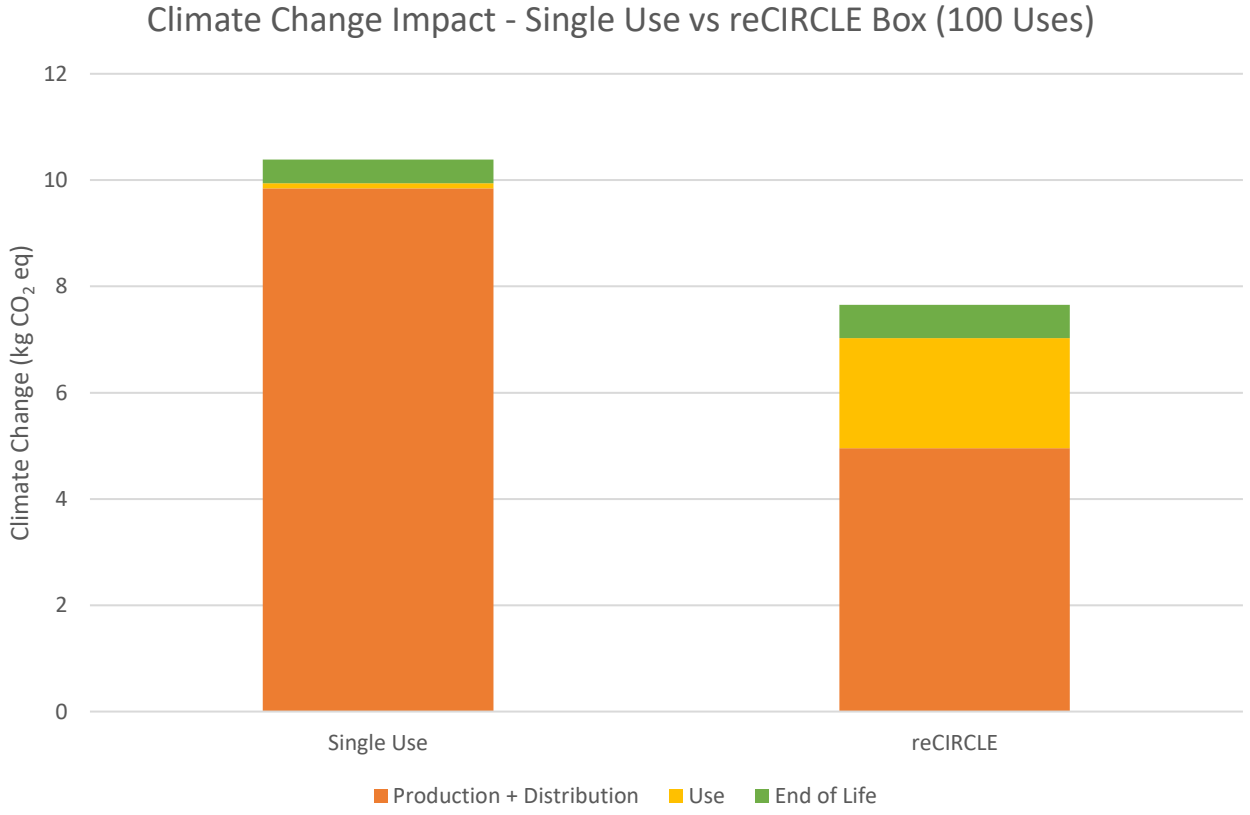


Baseline Scenario – Climate Change Impacts



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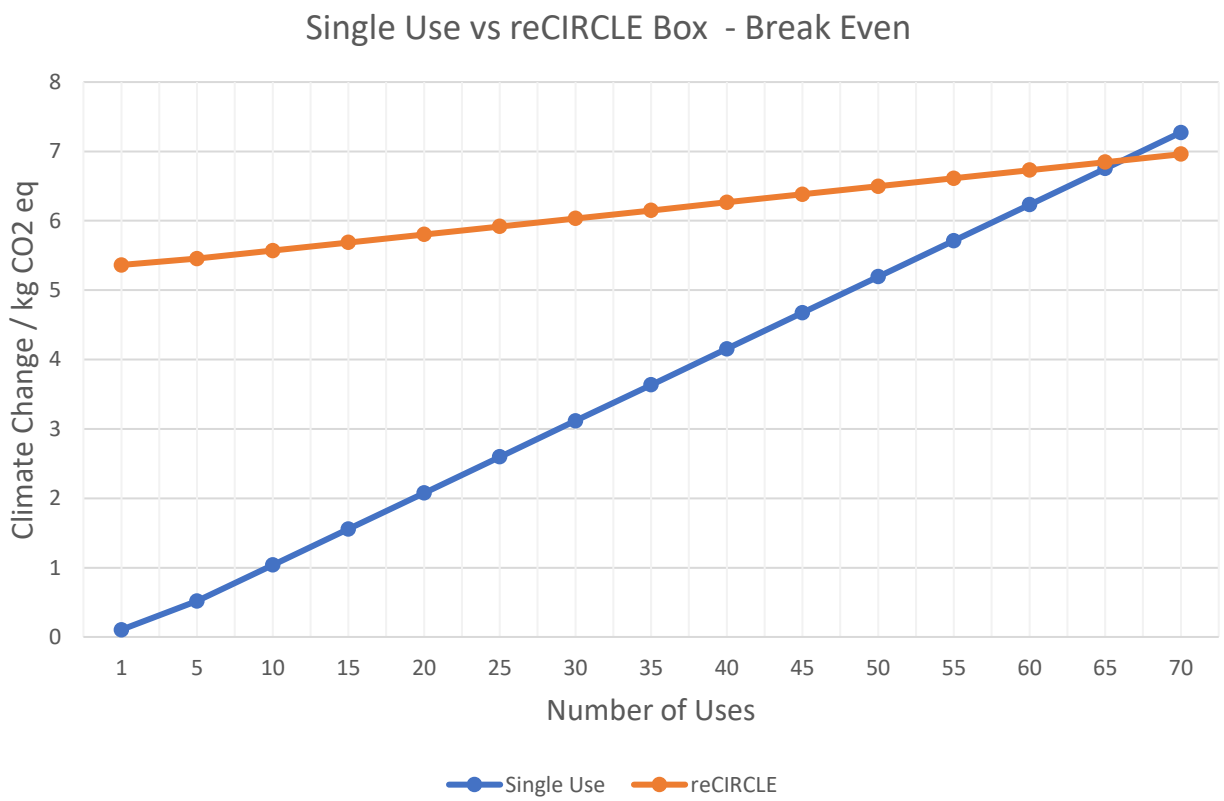

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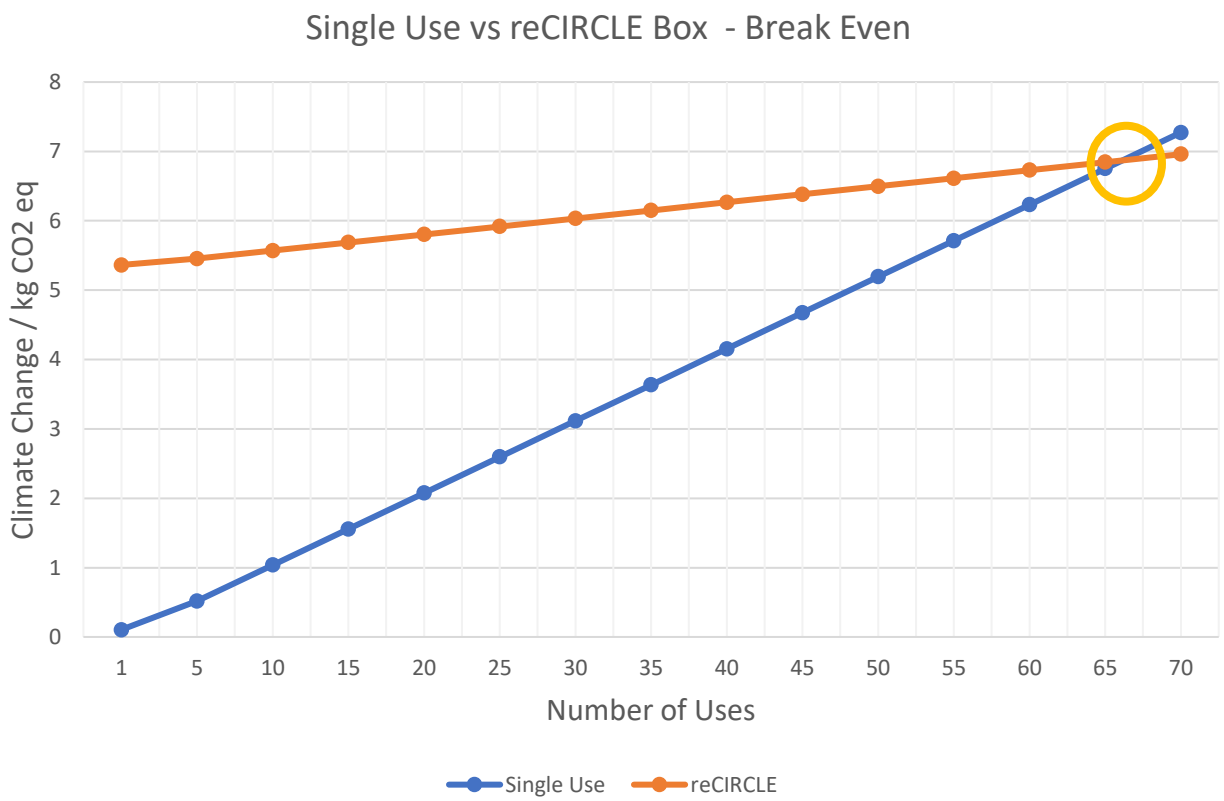


Climate Change Impacts - Key Conclusions

Production/Distribution

- 65%
- **Production of PBT GB20 is single biggest contributor**
- 95%
- Box production biggest contributor
- Minimal transport impacts

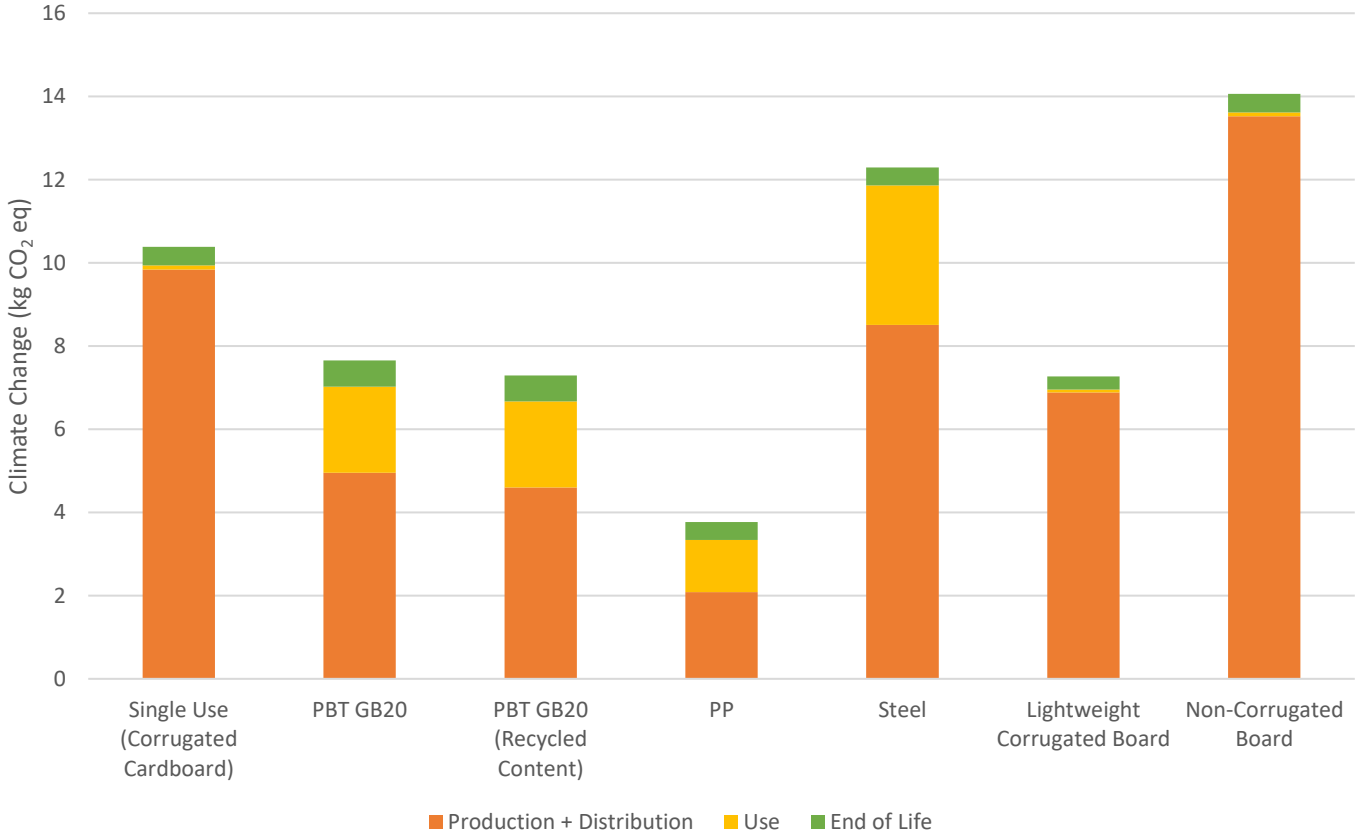
Use Phase

- 27%
- Transport is hotspot
- 3x higher contribution than washing
- 1%
- Very low contribution to overall impacts

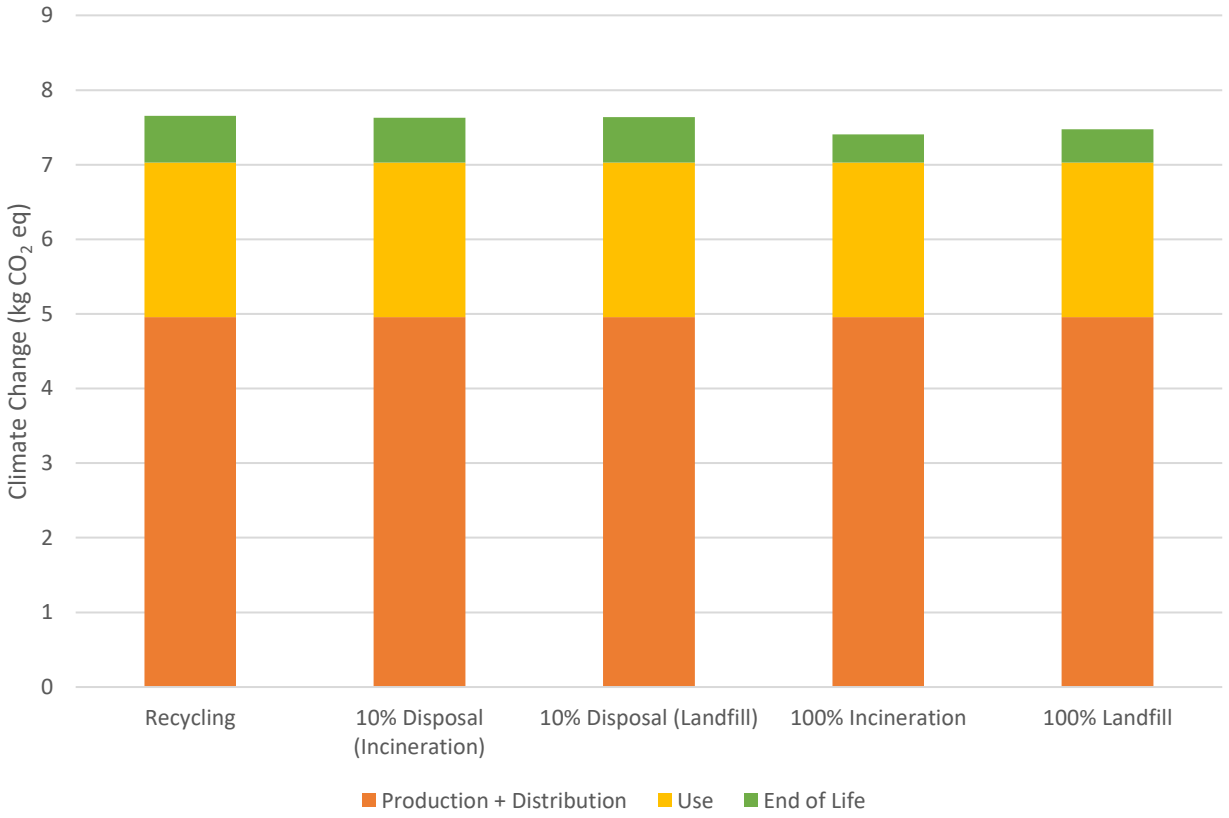
End of Life

- 8%
- EoL transport contributes more than recycling itself
- 4%
- Favour incineration

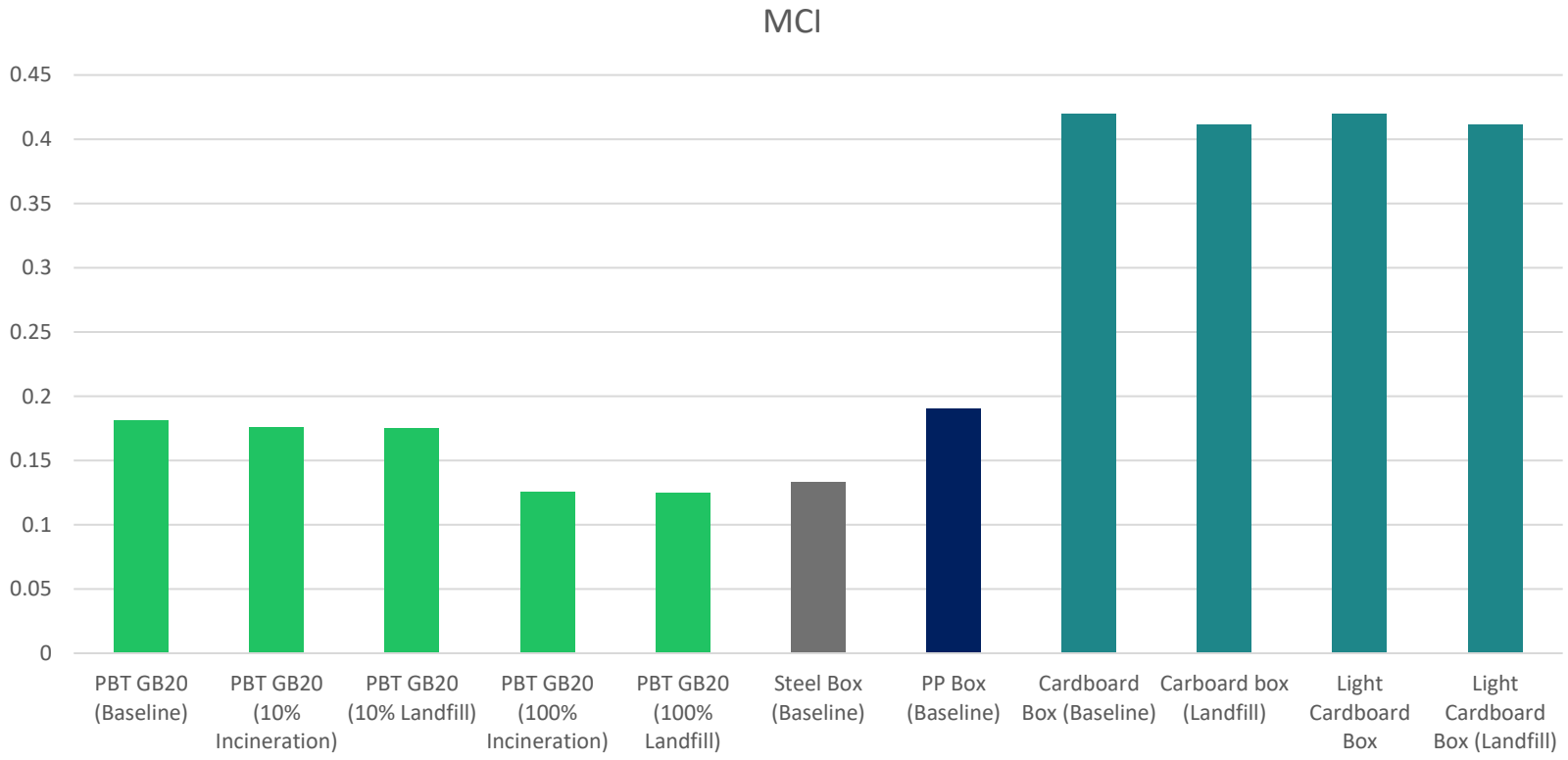
Sensitivity Analysis – Box Material



Sensitivity Analysis – End of Life (PBT Box)



Baseline Scenario – Circularity

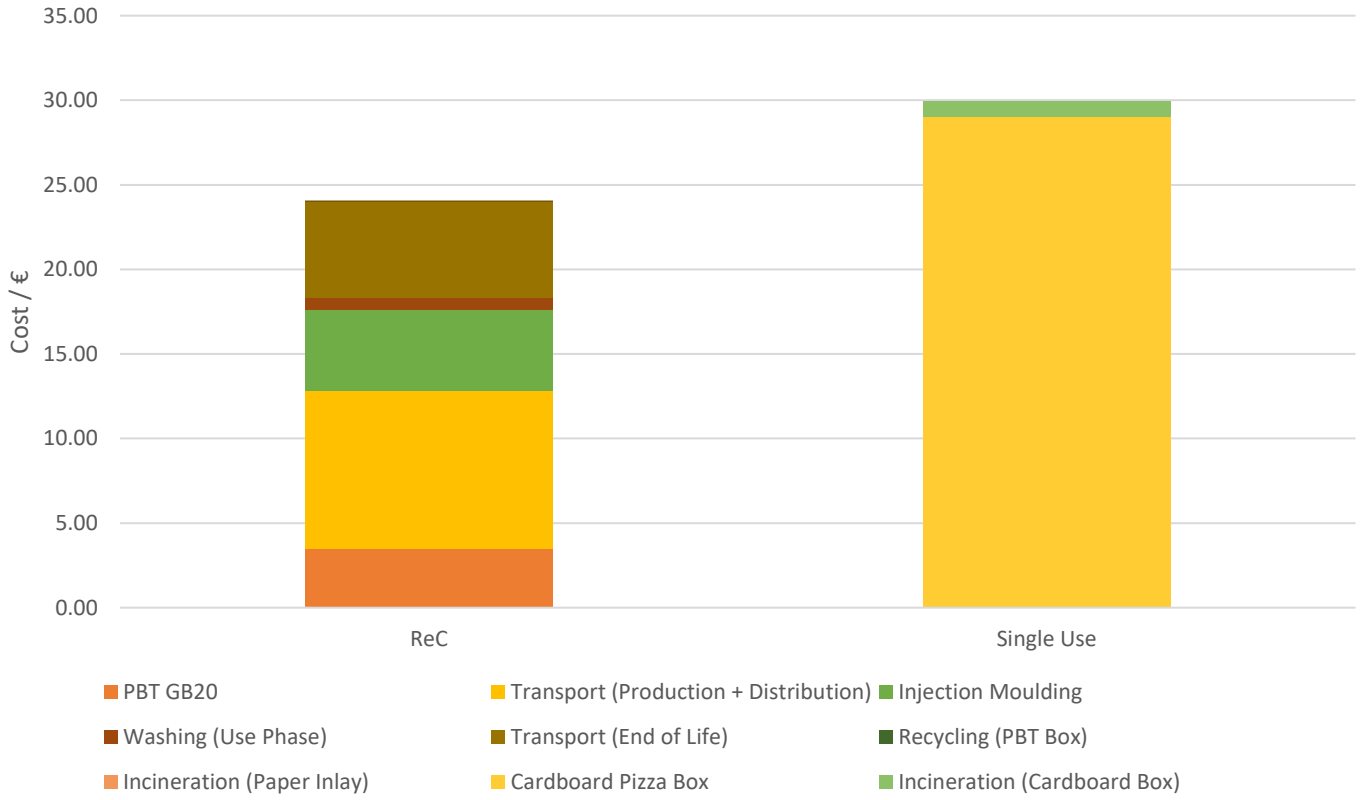


Circularity – Key Conclusions

- Lower total material usage
- Higher % virgin material usage
- Lower circularity than cardboard
- Using PP or introducing recycled content has modest impact on circularity (0.19 vs 0.18)

- **Single use pizza boxes outperform reusable boxes in MCI**
- Low primary production energy
- High circularity (0.42)
- Higher total waste (28 kg vs 6 kg)

Baseline Scenario – Life Cycle Costing



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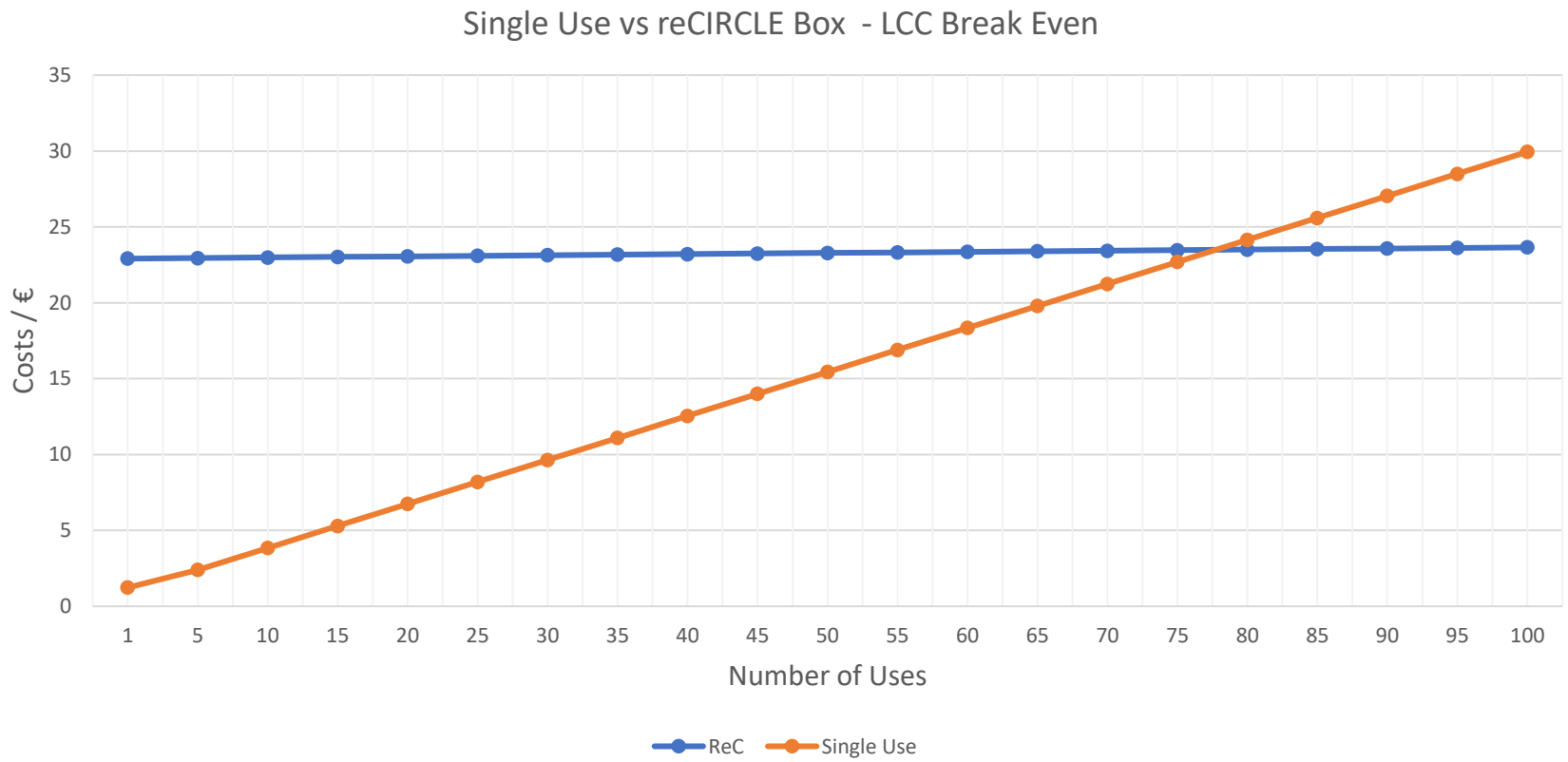

Life Cycle Costing – Key Conclusions

- 21% lower life cycle costs compared to single use over 100 uses
- Transport (excluding use phase) accounts for 65% of life cycle costs
- End-of-life has minimal contribution to costs
- 35% of costs come from PBTGB20 production and injection moulding

- **Single use pizza boxes outperform reusable boxes in MCI**
- Low primary production energy
- High circularity (0.42)
- Higher total waste (28 kg vs 6 kg)

Summary – Key Conclusions

- **Over 100 uses reusable PBT box outperforms single use in both CC impacts and life cycle costs**
- Focus on optimising production and distribution to minimise impacts and costs
- Consider PP instead of PBT GB20
- Low sensitivity to end of life routes for environmental impacts

- **Single use pizza boxes outperform reusable boxes in MCI**
- Reducing box mass is effective way to reduce impacts
- Low sensitivity to end of life routes for environmental impacts

What's Next?

- S-LCA
- System dynamics
- Plastic littering

VS

THANK YOU!

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