

# Sustainability Evaluation of Pyrolysis of Waste Mattresses: A Comparison with Alternative End of Life Treatments

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## THE ISSUE

In the Netherlands 1.5 million mattresses are discarded yearly (>60% is incinerated). Mechanical recycling of mattresses is presently hindered because 60% of the waste product (Polyurethane & latex) cannot be reused as recycate.

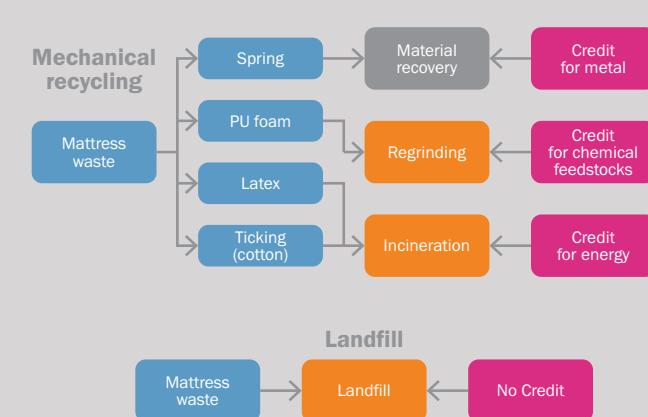
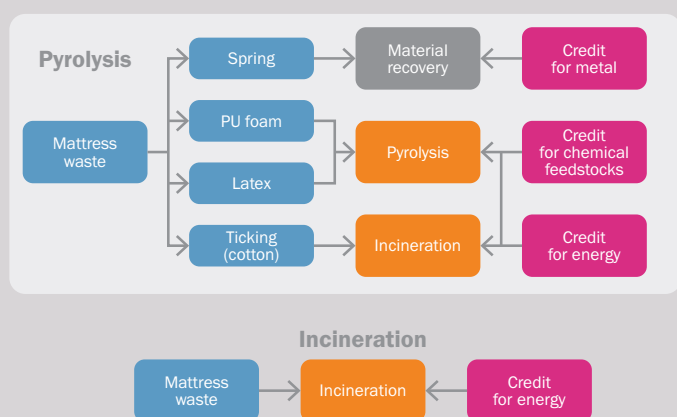
**Functional Unit: 1 ton of waste mattress sent for EoL treatment**

## PRIMA PROJECT OBJECTIVES

- Develop and optimize pyrolysis of waste mattresses with an experimental study by deploying two installations with a minimum capacity of 100 kg/hr.
- Quantify potential sustainability benefits.

**Geography: The Netherlands. Excluded: Mattress Manufacturing, Use & disassembly**

## SYSTEM BOUNDARY & EOL SCENARIOS

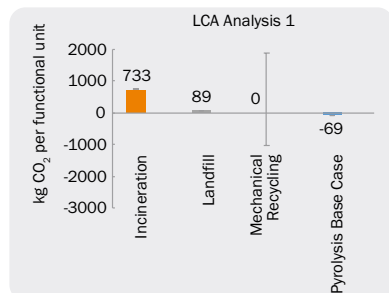


## RESULTS: TWO LCA ANALYSIS (PERSPECTIVES)

### LCA Analysis 1:

#### Fossil Carbon Accounting

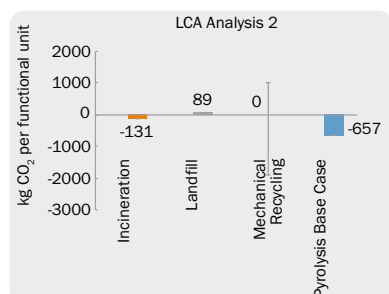
Mattress with only fossil carbon content (PU & synthetic latex). Ticking is also assumed to be of fossil origin.



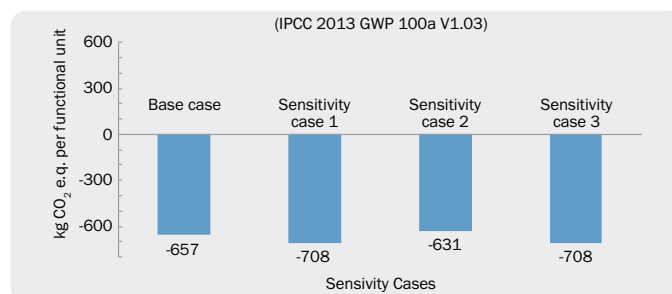
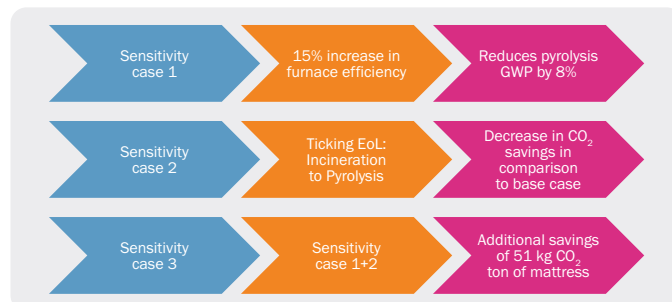
### LCA Analysis 2:

#### Fossil & Biogenic Carbon Accounting

Mattress with fossil carbon content (PU) and biogenic carbon content (natural latex and cotton ticking).



## SENSITIVITY STUDIES



## CONCLUSIONS

- Pyrolysis of waste mattress can save 526 kg CO<sub>2</sub> eq. per ton mattress compared to incineration.
- Mechanical recycling can be better or worse than pyrolysis depending on the processes and quality of recycled material.
- CO<sub>2</sub> savings are higher at 802 kg CO<sub>2</sub> eq. per ton mattress when organic components of the mattress are assumed to be 100% fossil based.
- We recommend further research & experimental pilot trails on
  1. Mechanical recycling
  2. EoL treatment of ticking to reduce data uncertainty and assumptions.

## PRIMA PROJECT PARTNERS

CBM, TNO, Dow, Waste4me, ENERP, Matras Recycling Europe

## REFERENCES

TNO Report  
# R12308, 2020

