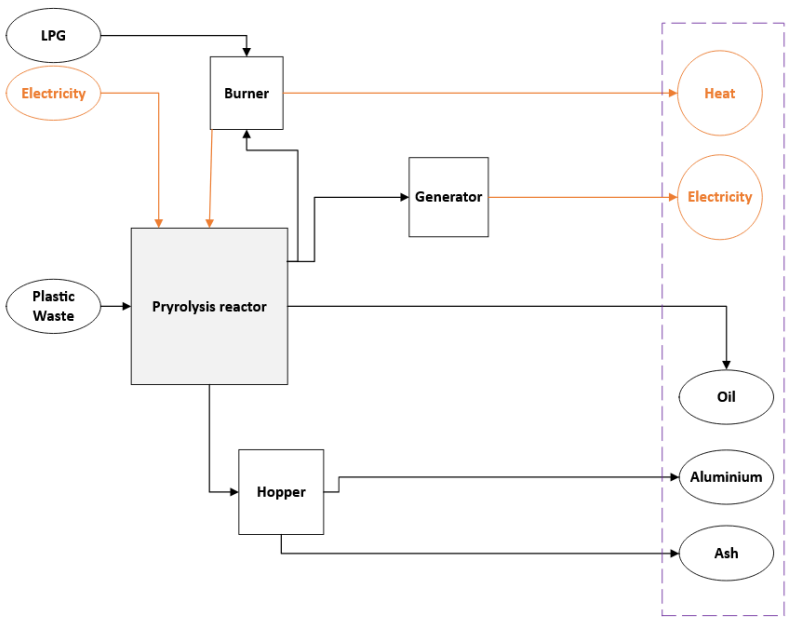
Environmental Impact Assessment of the treatment of waste plastic with pyrolysis

REASON/INTRODUCTION

Pyrolysis is the decomposition of organic substances due to heat in an anaerobic environment. It is a promising source of fuels and petrochemical substances and a more sustainable alternative for the disposal of waste plastics. The goal of the study was to assess the environmental impacts of pyrolyzing 4 different plastic residual streams and producing heavy fuel oil, pyrolysis gas, ashes and aluminum.

COMPONENT	1	2	3	4
Plastics	PE	PP	PE	PE, PP
Biomass	■	■	■	
Sand/ rocks	■	■		■
Aluminium			■	

The possibilities for crediting the products (oil, gas, ashes and aluminum) and the impact of these choices on the final environmental impact of the pyrolysis of each stream was the focus of this project.



RESULTS

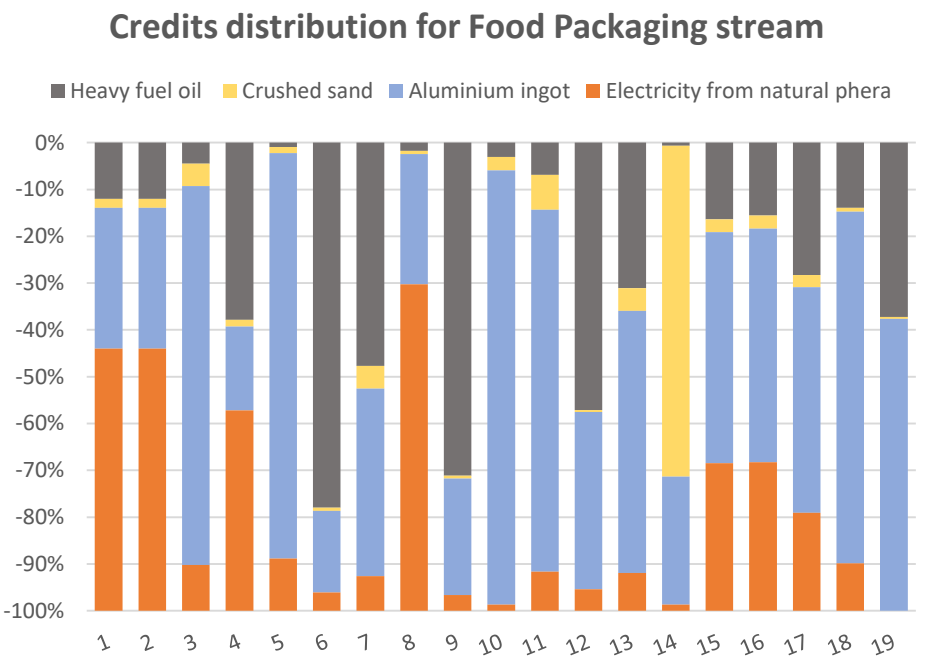
Considering the level of uncertainty still associated with this process and the variability in the waste plastic mixes, it was necessary to consider that all products are credited for an equivalent with equal or smaller market and environmental impact.

PRODUCT	Oil	Ash	Aluminium	Gas
PROCESS		Separation	Separation	Burning
CREDITED FOR	Heavy fuel oil	Crushed sand as inert filler	Aluminium ingot mix	Electricity from natural gas (Heat)

In most streams the oil is responsible for the biggest part of credits. For the streams 2 and 3 there will be extra electricity production from the gas, which was credited.

Stream 3, food packaging is composed of milk cartons (Tetra Pak) and coffee and crisp bags. In the food packaging stream, aluminium accounts for most of the total credits.

In this stream electricity is responsible for 56% of the credits for the midpoint Climate Change and aluminium is responsible for 86,6% of the credits for Particulate Matter Formation.



1. Climate change, default, excl biogenic carbon
2. Climate change, included biogenic carbon
3. Fine Particulate Matter Formation
4. Fossil Depletion
5. Freshwater Consumption
6. Freshwater ecotoxicity
7. Freshwater Eutrophication
8. Human toxicity, cancer
9. Human toxicity, non-cancer
10. Ionizing Radiation
11. Land Use
12. Marine ecotoxicity
13. Marine Eutrophication
14. Metal Depletion
15. Photochemical Ozone Formation, Ecosystems
16. Photochemical Ozone Formation, Human Health
17. Stratospheric Ozone Depletion
18. Terrestrial Acidification
19. Terrestrial Ecotoxicity

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For more results and bibliography, consult the complete report.