Product Carbon Footprint

Secondary Polyamide 6.6

Result Summary

General Information

Client	Enneatech AG Schmiedestraße 34 26629 Großefehn Germany
Life Cycle Assessor	bregau olt GmbH Mary-Astell-Straße 10 28359 Bremen Germany
Report date	11. September 2020
Reference to standards	The study was conducted in accordance with the requirements of DIN EN ISO 14067:2019.
Disclaimer	Liability claims caused by the use or non-use of the information provided or by the use of incorrect or incomplete information are excluded as a matter of principle, unless there is evidence of wilful intent or gross negligence.

Declared Unit

The declared unit was 1000 kilograms of secondary polyamide (PA) 6.6.

Secondary Material Content

Please note that the raw material is a 100% secondary material and the end product, apart from the packaging material, therefore has a 100% recycled content.
Taking the packaging into account, the secondary material content is around 99%.

System Boundaries

The carbon footprint has the system boundary "cradle to factory gate". In accordance with DIN EN ISO 14040/44, this includes all raw material extraction processes and transport for both material and energy flows associated with the production of PA 6.6. It also includes the treatment of waste generated during production until the waste status is completely eliminated.

The model includes the following life cycle stages:

- Packaging material and delivery of raw materials
- Unloading and storage
- Pre-assembly
- Pre-shredding/silos
- Extrusion/granulation
- Granulate conveying
- Storage and loading

In addition, a formula has been developed that allows the user to calculate the carbon footprint of distribution transport by truck for a specific distance.

Result of the Impact Assessment

The table shows the total amount of greenhouse gas (GHG) emissions and summarized impacts on the carbon footprint by process. A detailed presentation in graphical form is given on the following page.

Process	kg CO_2-eq / 1000 kg PA 6.6
Packaging material of raw materials	22.84
Delivery	93.56
Unloading/storage	2.48
Pre-assembly	0.03
Pre-shredding/silos	7.30
Extrusion/granulation	35.59
Granulate conveying	0.40
Storage/loading	1.22
Secondary processes	1.12
Waste treatment[1]	-4.03
Total	**160.52**

For further information e.g. on the calculation methodology and emission factors used, please refer to the background report.

[1] In the thermal recycling of pallets, electricity and heat from conventional generation are substituted. In addition, the packaging material is recycled, which is why half the amount of primary plastic is credited for plastic waste.

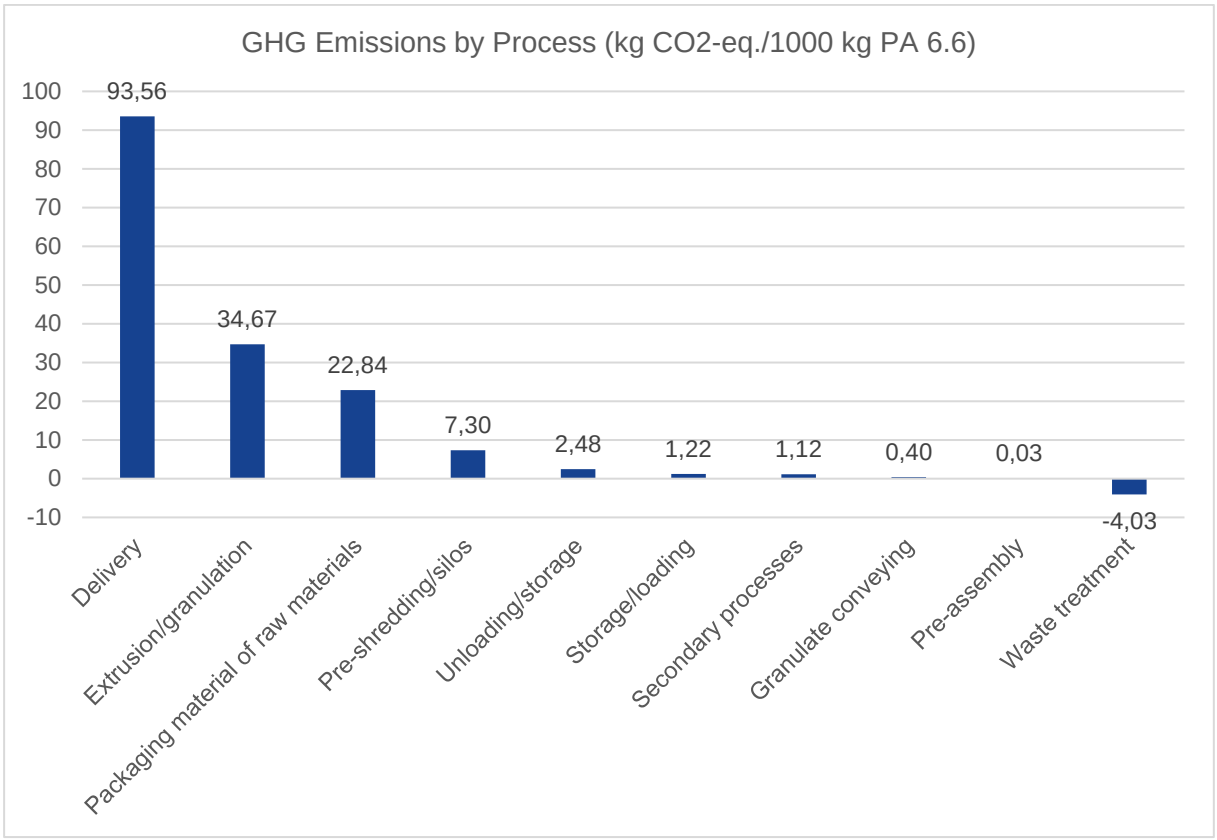

Figure 1: Absolute influences on the GWP by manufacturing process

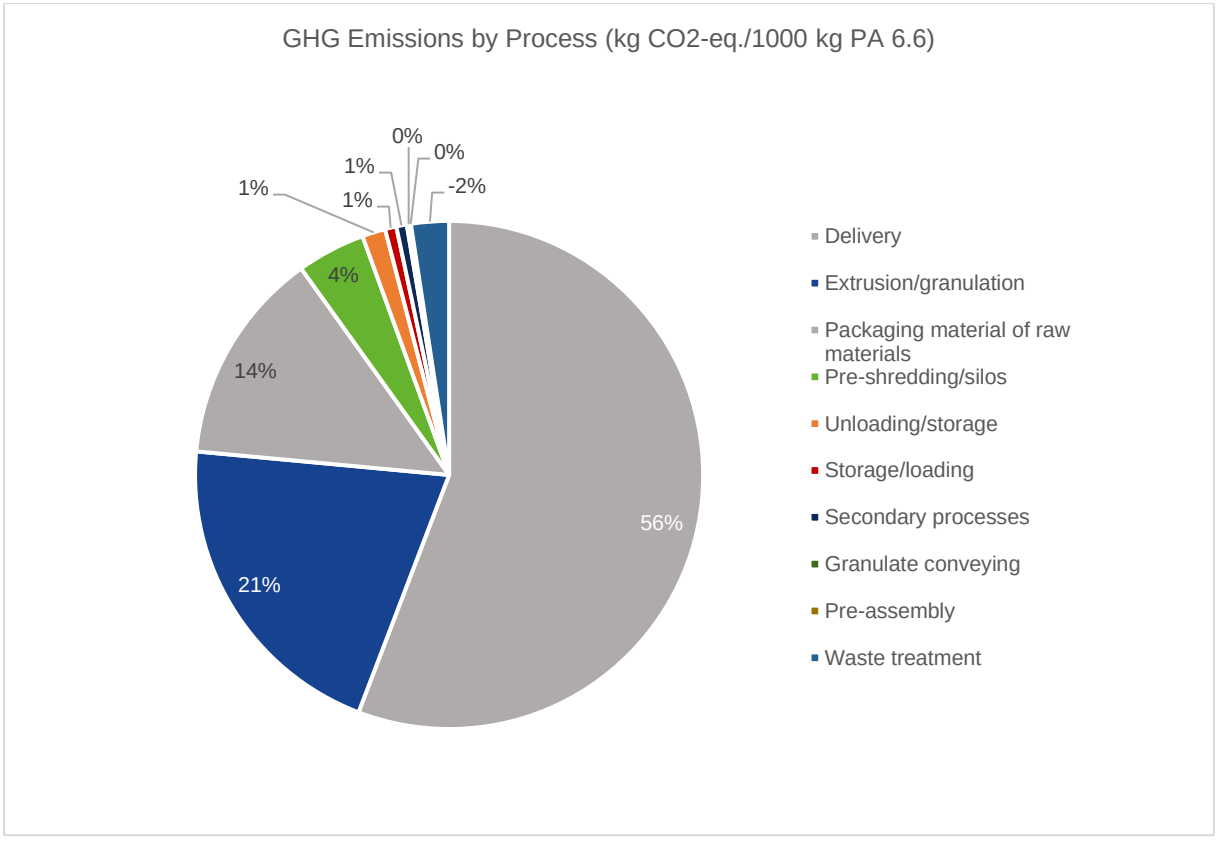

Figure 2: Relative shares of manufacturing processes on the GWP (processes at Enneatech highlighted)

Greenhouse Gas Emissions from Distribution Transports

Due to the fact that the secondary PA 6.6 is produced on the basis of a load-free raw material and a relatively low CO_2-emission electricity mix is used, the significance of other influences on the CO_2 footprint increases. This is especially true for distribution transports. Their influence on the GWP can be approximately determined by means of a simple formula using the ordered quantity and the delivery distance and can be added to the GWP from the production phase:

$$GWP_T = GWP_M + GWP_D$$

$$GWP_T = \frac{D * M * 100\%}{U} * \frac{0.0472}{1000}$$

GWP_T: Total global warming potential (kg CO_2-eq.)
GWP_M: Global warming potential from manufacturing phase (kg CO_2-eq.)
GWP_D: Global warming potential from distribution transports (kg CO_2-eq.)
D: Transport distance in km
M: Transported mass in kg
U: Truck utilisation in percent