

NanoFASE Deliverable D4.1

Inventory of estimates of ENMs and nano-enabled products value chain

Contributors	Partner
J., Kuenen	TNO, Netherlands
V., Adam	EMPA, Switzerland
V., Pomar	LEITAT, Spain
F., Gottschalk	ETSS, Switzerland

Research Report Summary

Releases of engineered nanomaterials (ENMs) to the environment may have harmful effects on human health. To get an understanding of the fate of engineered nanomaterials in our environment, modelling tools are used which need information on the release patterns of ENMs as input. This study describes a first country-specific ENM release model for Europe. Releases are quantified for the different stages (production, manufacturing, consumption of ENMs), and also the ENM flows into waste management (e.g. landfilling, recycling, incineration) are improved.

A first step is to estimate production of ENMs, as well their incorporation into products (manufacturing) and consumption of these products. Available estimates of European production of different ENMs often show a wide variation, indicating the large uncertainties about the actual production rates. By comparing different estimates and discussion with experts we have selected the most likely values. For manufacturing and consumption, it is assumed that all ENMs produced in Europe are also manufactured and consumed in Europe (no net import/export from the EU) in the absence of any specific data on this. Also, the ENMs are broken down to various product categories where they are used. Then, the European production, manufacturing and consumption are broken down to country level by using proxy parameters, being production facilities, specific expenditure on products such as sunscreens, but also more generic proxies such as GDP or population. Finally, releases to the environmental compartments and end-of-life pathways are estimated.

Separately in this study, the releases of ENM waste compartments and end-of-life routes were better quantified and broken down to the country level. This led to an improved estimation of release factors and fate of the ENMs resulting from the production and use of them.

In the quantification of releases of ENM to the environment, significant uncertainties exist. This starts with the uncertainty in the amount of ENMs produced, in some cases multiple orders of magnitude. All the steps in the methodology to refine and detail the ENM production, manufacturing, consumption, end-of-life pathways and



environmental releases also have their associated uncertainties, therefore the results should be regarded as a first estimate. During the course of the NanoFASE project, these estimates will be further improved and refined.

A next step is to incorporate the updated release factors into the PMC model, which will be further spatially detailed to allow ENM releases to be used as input for ENM fate modellers looking at specific geographical areas.

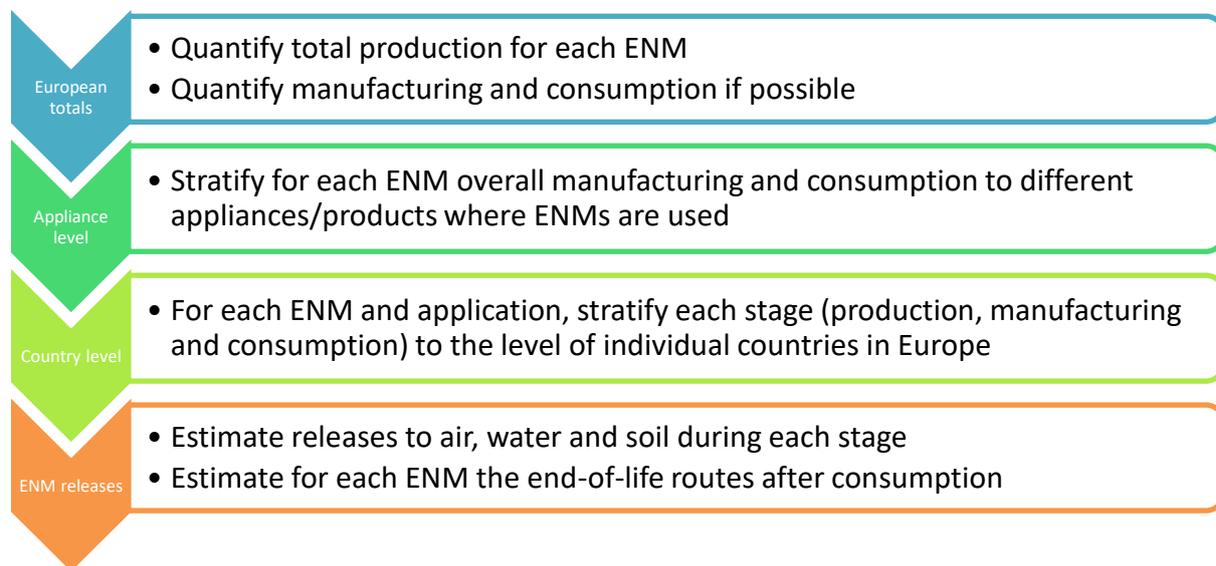


Figure 1 - Schematic illustration of the methodology to estimate specific ENM releases from production, manufacturing and consumption at country level

For more information you can contact:

Project office email: NanoFASE@ceh.ac.uk

Deliverable Authors: Jeroen Kuenen (jeroen.kuenen@tno.nl)

Foreseen publication date of the full deliverable: November 2017; waiting for data refinement.

Work Package Leader: Socorro Vazquez (svazquez@leitat.org)

Project Website: www.nanofase.eu

August 2017