

# Waste flow analysis of nanoproducts

## - Cases: EU, Denmark and the UK

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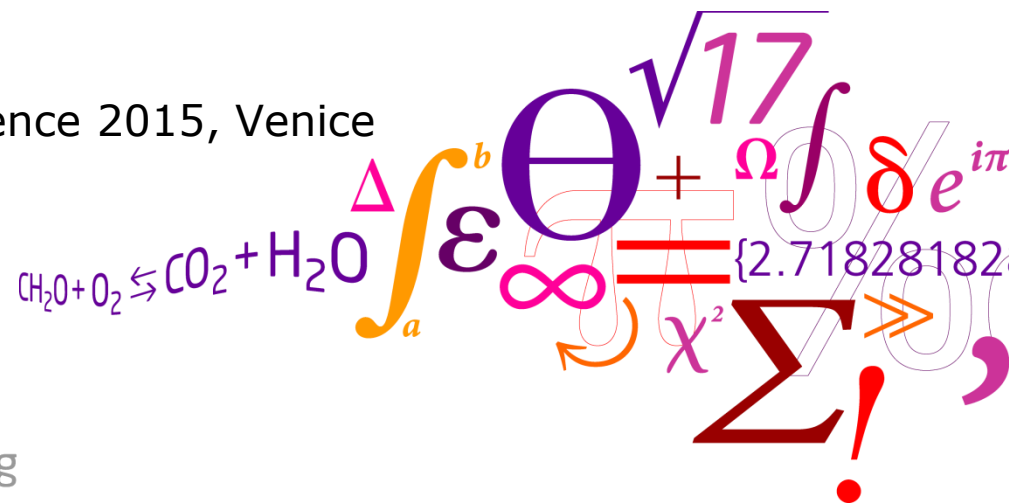
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Sustainable Nanotechnology Conference 2015, Venice



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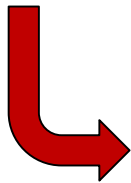
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# Outline

- Introduction
- Aims of study
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- Cases
  - Denmark, UK
- Perspectives

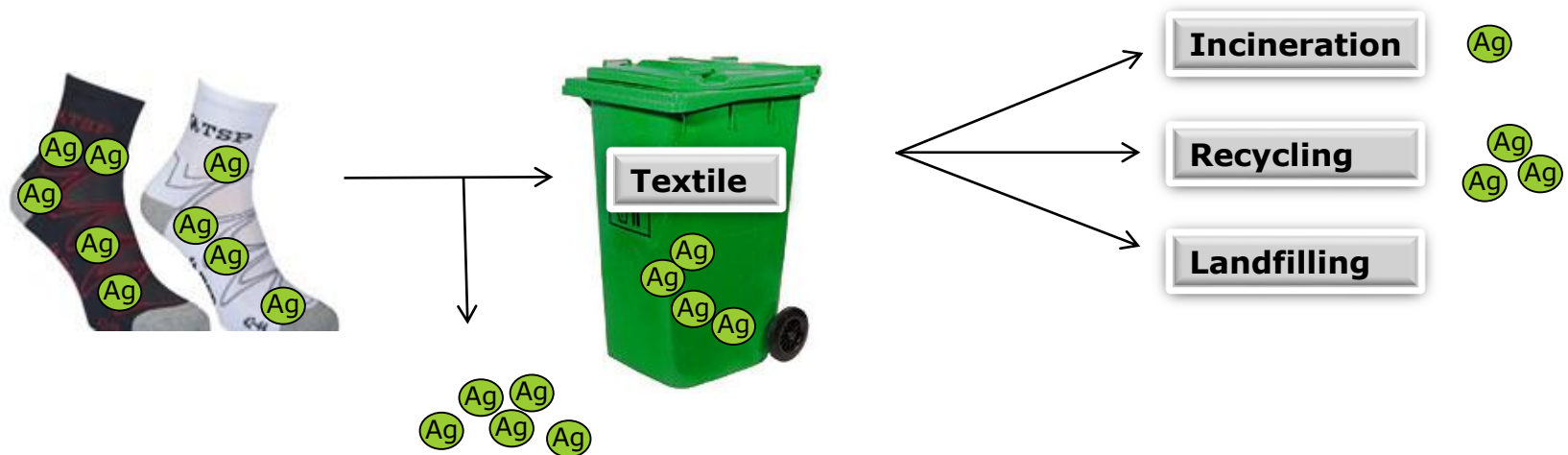
# Introduction

- Nanowaste is generated in increasing amounts
  - How much?
  - Where does it go?
  - What are the risks?
  - How should we manage it?
- Mapping flows of nanoproducts to waste treatment systems is needed
  - Help to prioritize research and waste management initiatives
  - Ensure safe and appropriate management



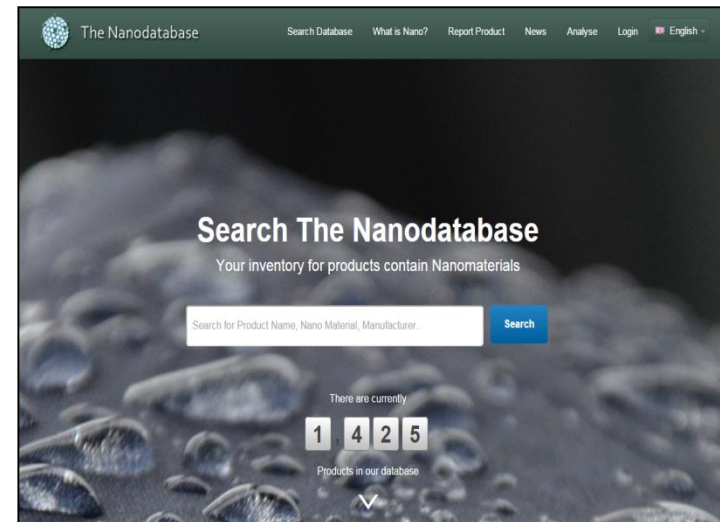
# Aim of this study

- Develop tools for the analysis of nanoproducts in waste flows
- Assess the relative importance of ENMs and treatment options

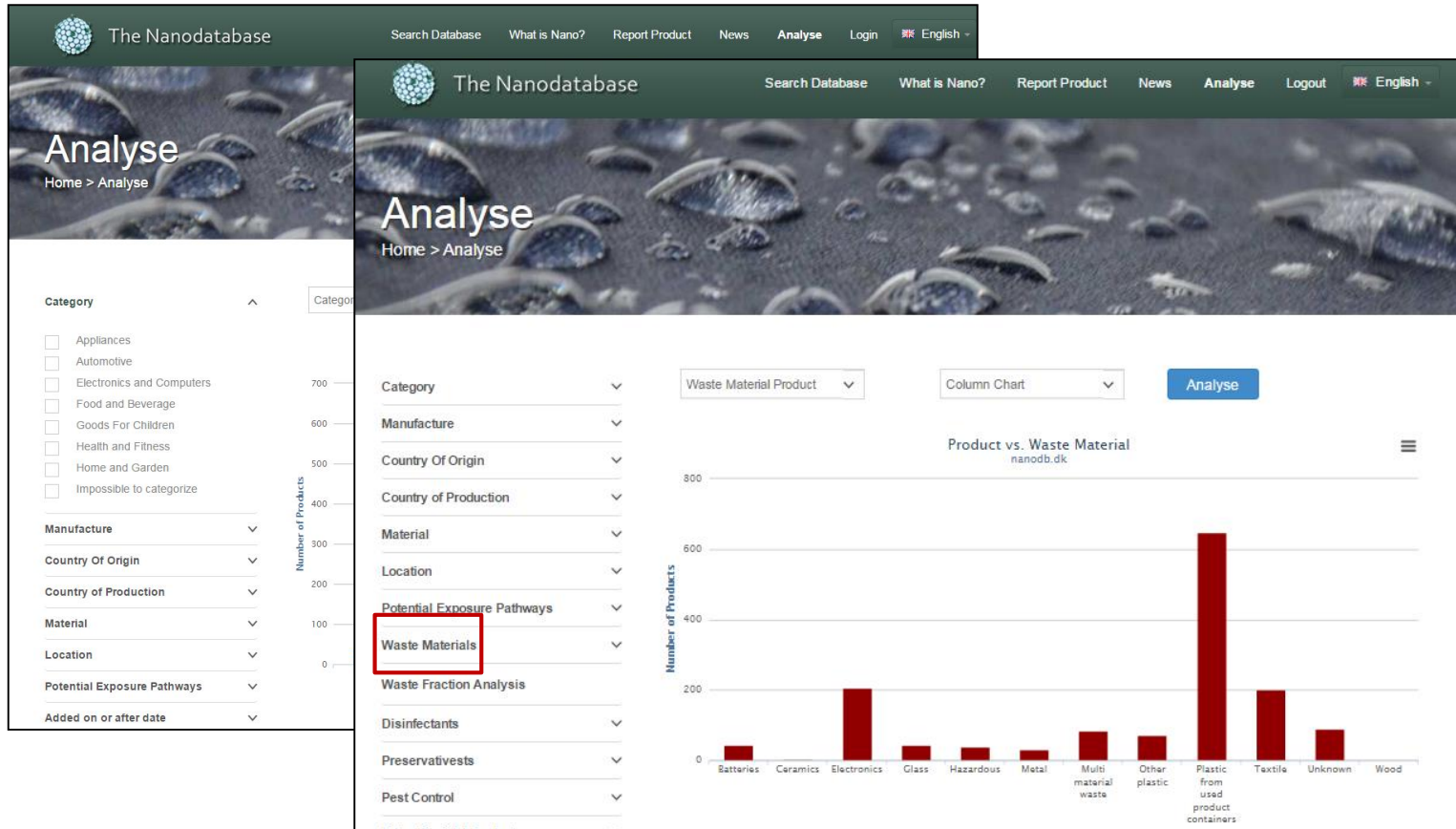


# Methodology

- Semi-quantitative analysis of solid waste flows containing ENM
- 4 steps:
  1. Categorize waste material fractions
  2. ID ENM types in waste material fractions
  3. ID region specific waste management of individual waste material fractions
  4. Combine steps 2 +3 to determine the distribution of ENM routed to specific waste management options

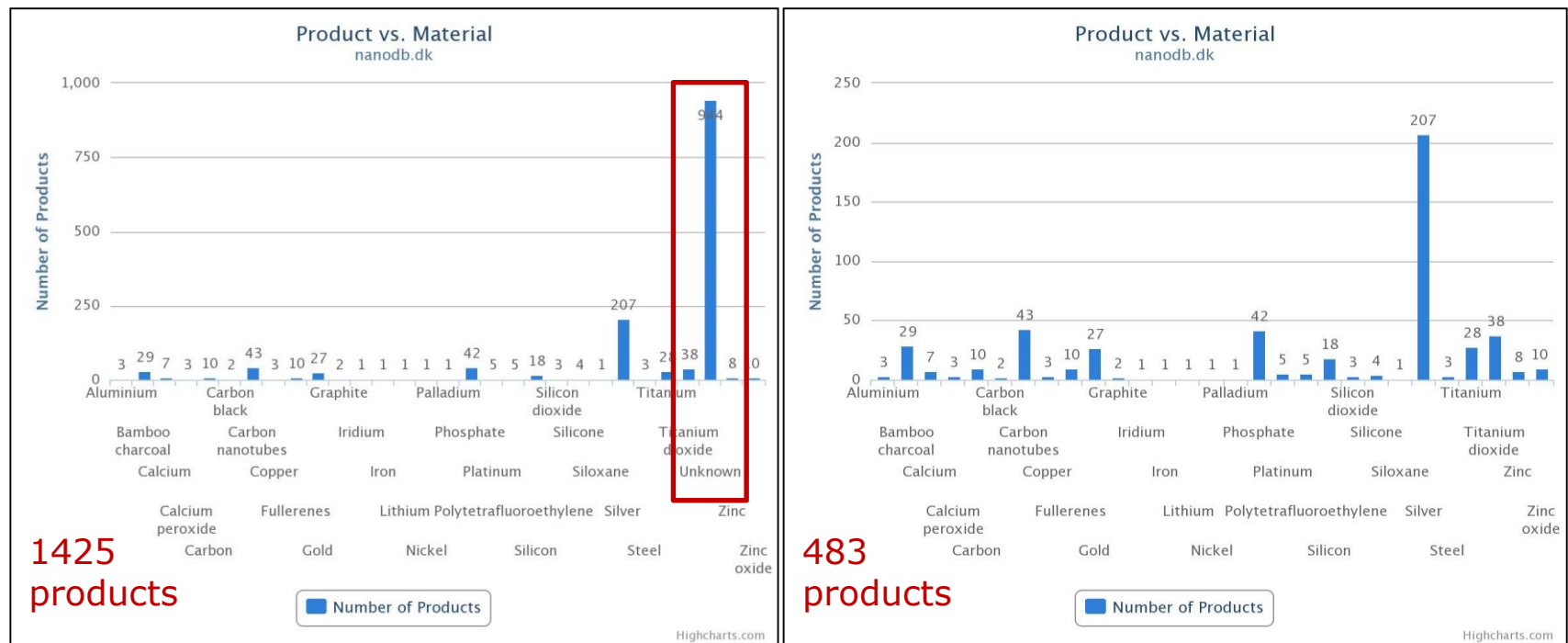


# www.nanodb.dk



# Unknown ENM vs. Known ENM

- Many manufacturers/retailers use a "nano-claim" but ENM is unknown

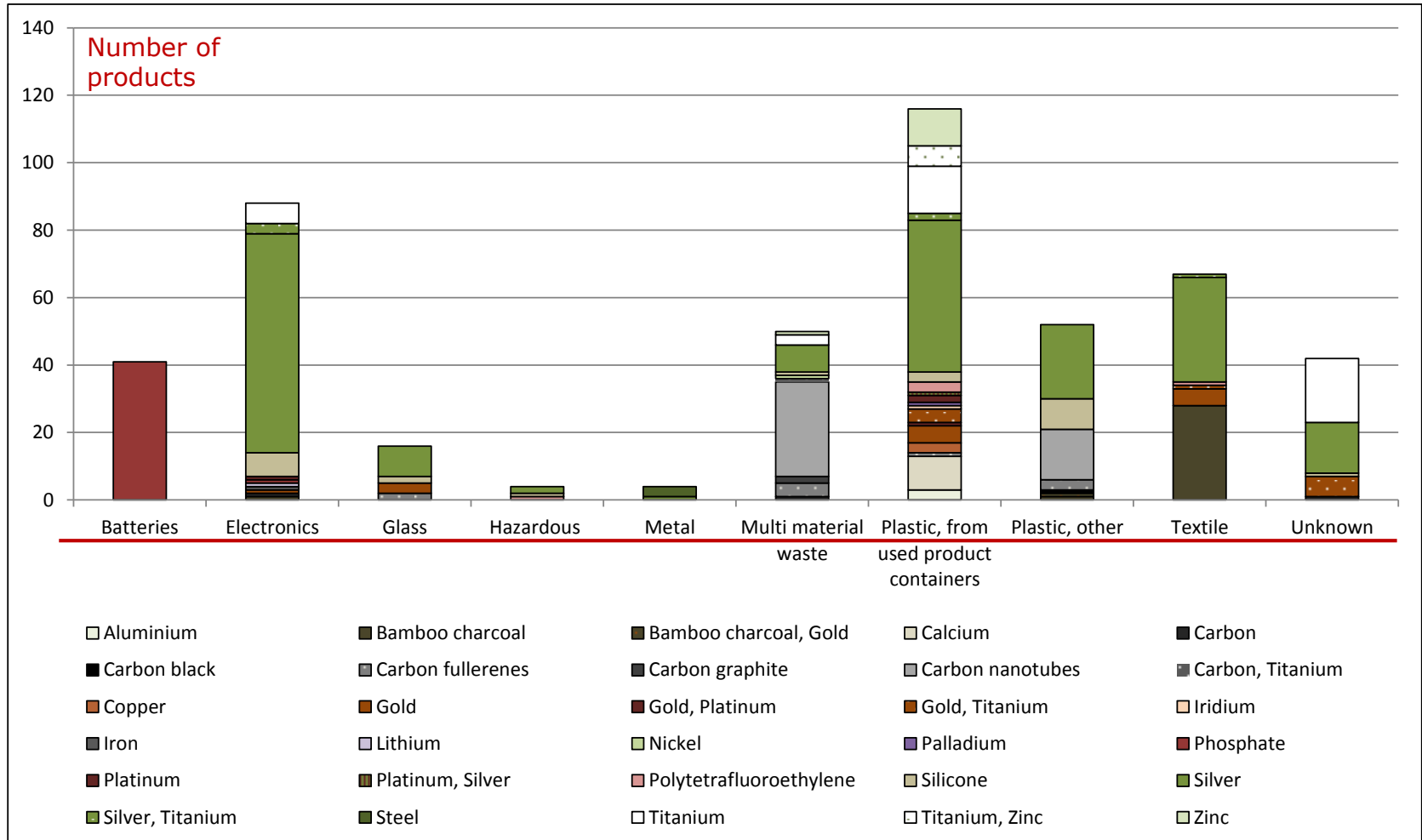


# Step 1: Categorization

Waste material fraction	Description and examples
<p><b>10 different waste material fractions</b></p>	<p><b>Based on online available photo or description</b></p> <ul style="list-style-type: none"> <li>• Categorized according to main matrix material</li> <li>• Easily categorized fractions e.g. WEEE and textile</li> <li>• <b>Not</b> easily categorized fractions, or products combining several not separable materials e.g. camera lenses and suitcases</li> <li>• Multimaterial waste</li> <li>• Unknown waste material (lacking suitable photo reference)</li> </ul>

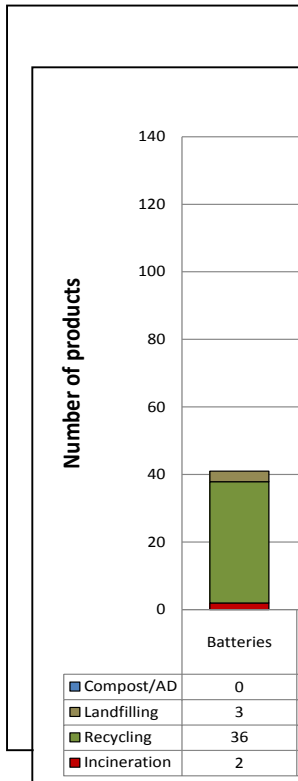
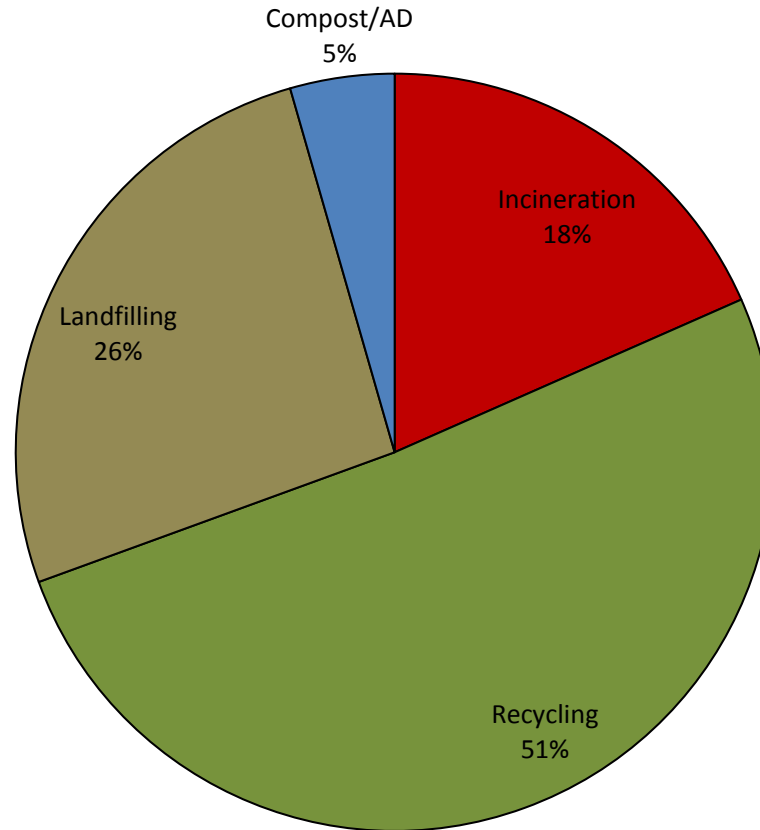


# Step 2: ENM types vs. waste material fraction



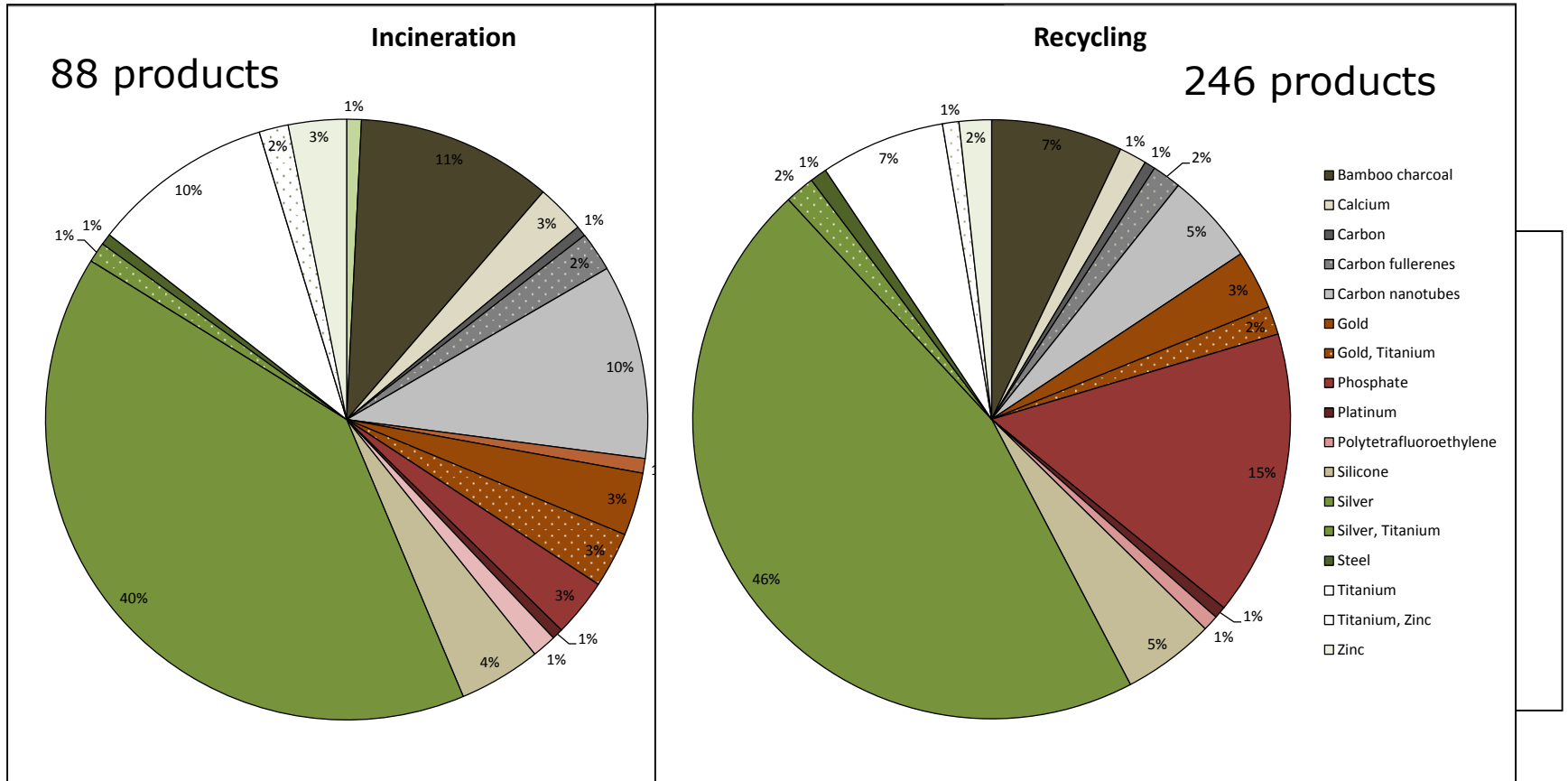
# Step 3: Waste management of waste material fraction

## Distribution of nanoproducts in EU27

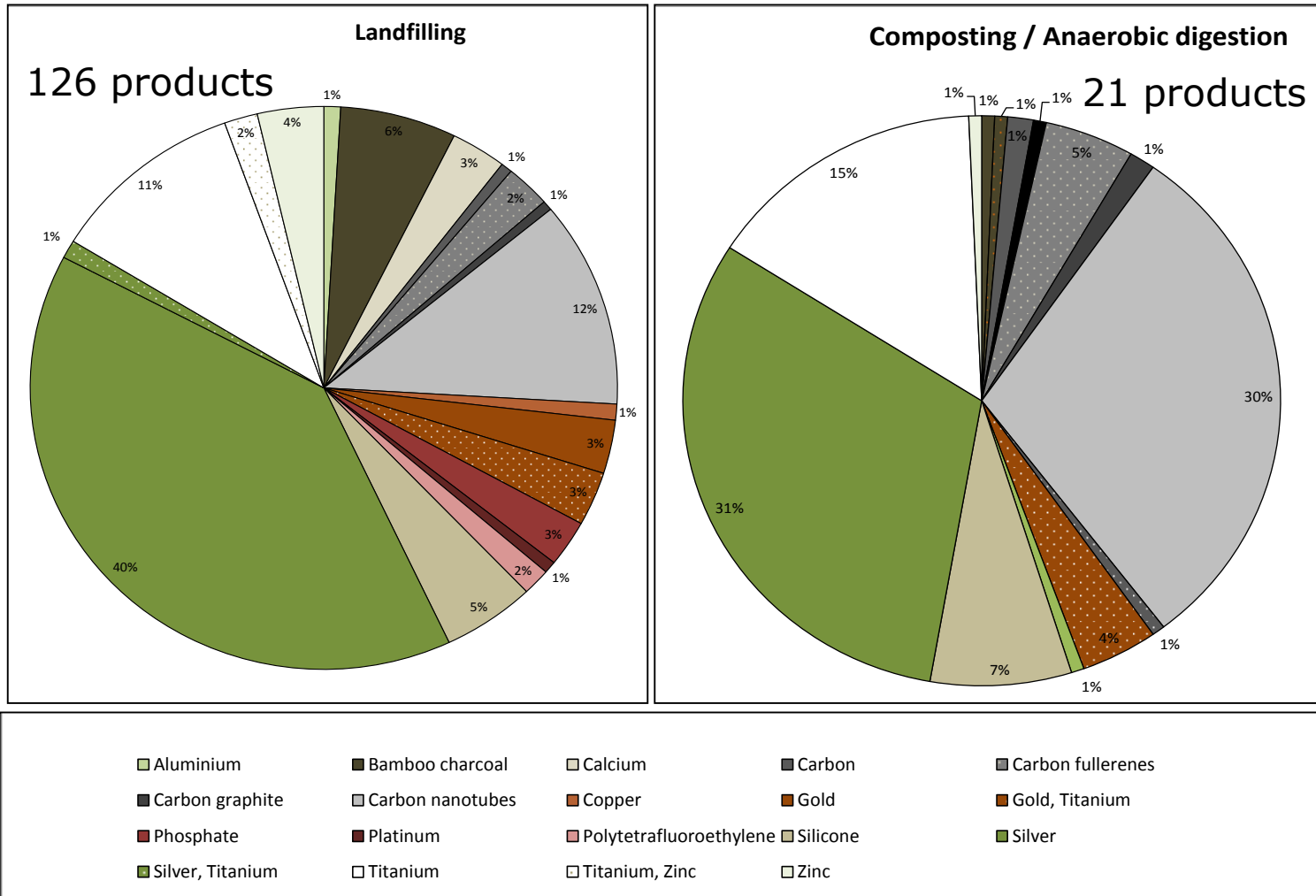


Ref: Eurostat

# Step 4: Combine steps 2. and 3.



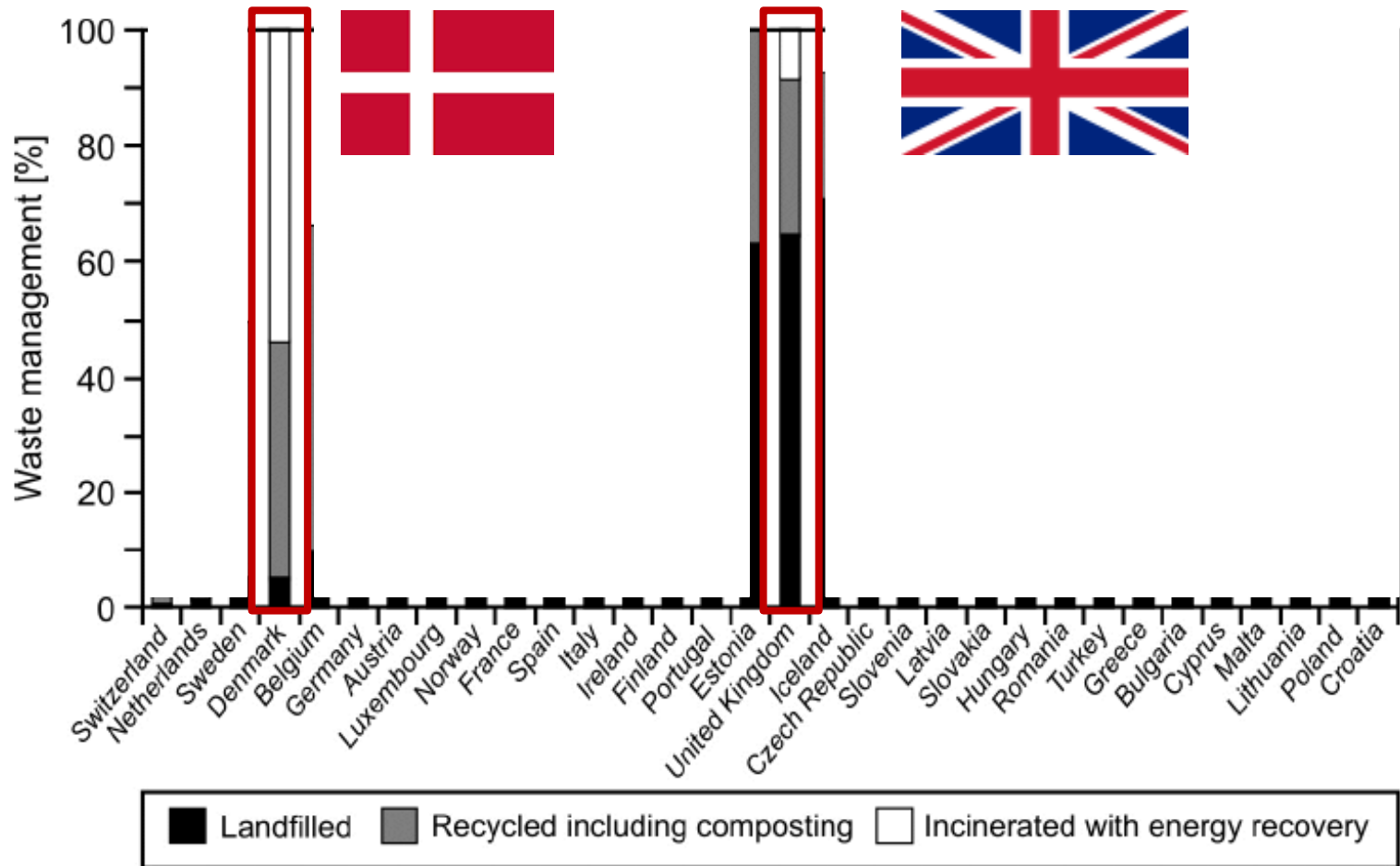
# Step 4. Continued



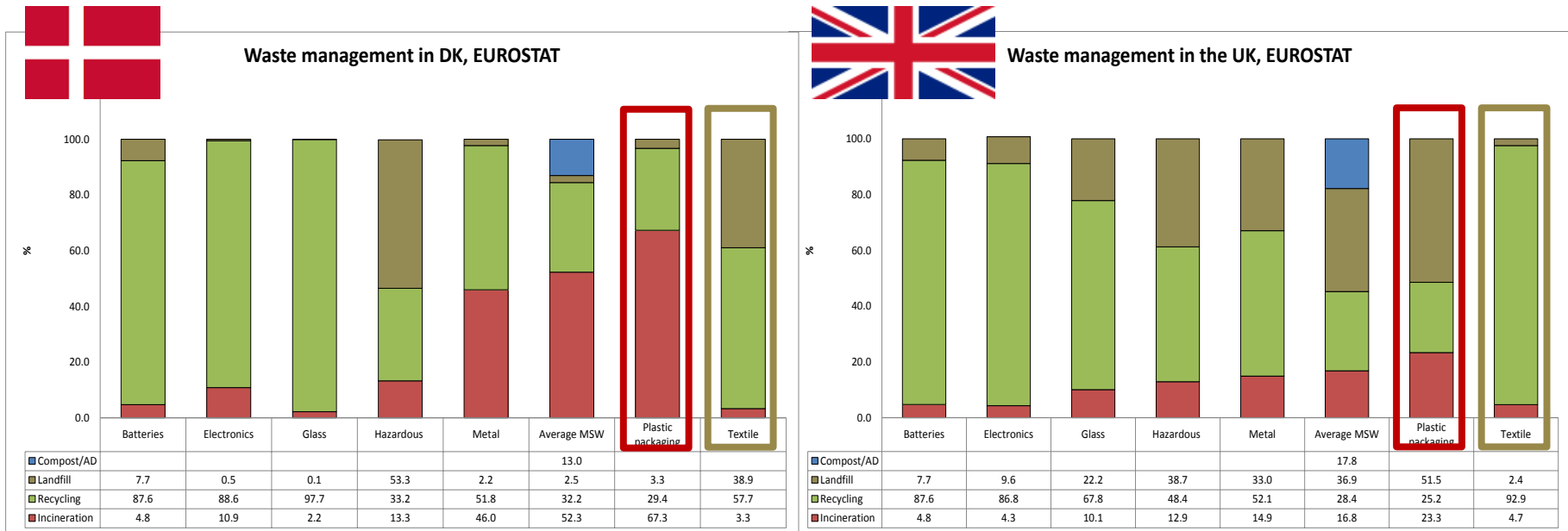
Case studies:

# **DENMARK & UNITED KINGDOM**

# Impact of different waste management systems



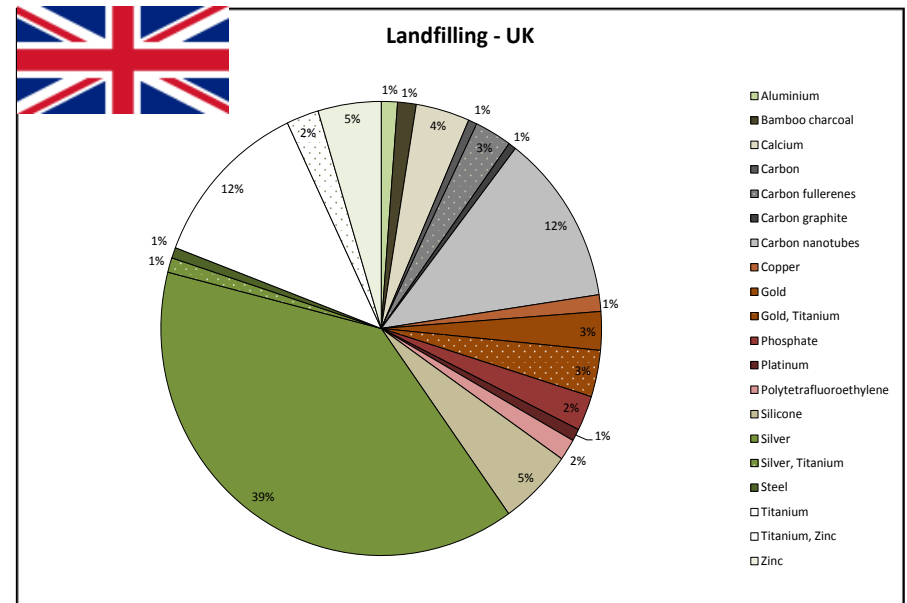
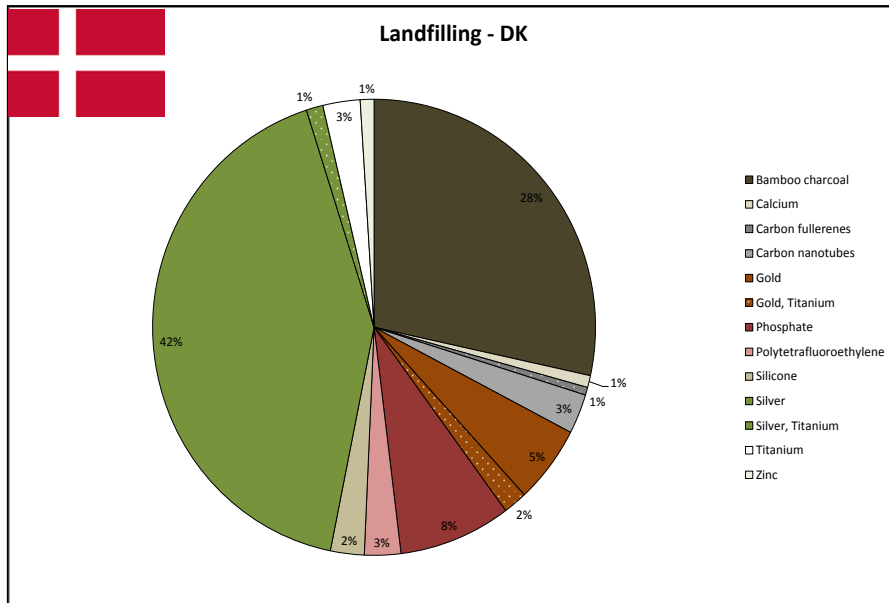
# Waste management statistics: DK and UK



Ref: Eurostat

# Different compositions of landfilled waste

- What causes the differences?
  - Different quantities of waste, Textile waste, Plastic waste





# Future aims

- Continue to update product inventory
- Consider mass or volume into the flow analysis
- Data generation e.g.
  - Investigate fate and behavior of ENM in simulated waste treatment scenarios (e.g. artificial leachate solution)
  - Perform standard waste characterization tests on nano-containing matrices (e.g. spiked waste matrix or matrix of nanoproducts)
  - Evaluate potential release of ENM from EOL consumer products

- Eval
- High



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 n fe... products

# THANK YOU FOR YOUR ATTENTION 😊



Sustainable Nanotechnologies Project

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