in association with

Cost-benefit analysis of policy measures reducing unintentional release of microplastics

A study for the European Commission (DG Environment)

Second stakeholder workshop – 22 November 2021

Background note on Textiles

1. INTRODUCTION

The aim of this study is to provide environmental and techno-economic analysis and support to the Commission on possible actions to reduce the presence of unintentionally released microplastics in the environment, in particular from plastic pellets, synthetic textiles and automotive tyres.

A first stakeholder workshop was held on September 30th, 2021 and presented the scope methodology and initial analysis.

A second series of stakeholder workshops will be held as following:

- Textiles, on November 22nd, 2021
- Tyres, on November 24th, 2021
- Pellets, on November 25th, 2021

This background paper is intended to inform discussions at the stakeholder workshop for textiles. It provides a short summary of the problem definition and baseline assessment and an initial long list of possible measures for addressing microplastic emissions from textiles. Key points for discussion at the workshop are also presented.

The main aim of the workshop is to discuss and develop a list of measures that could be implemented to tackle the release of microplastics from textiles.

A tentative agenda of the workshop is as follows.

- Plenary - Introduction (10 minutes)
- Plenary - Presentation by the project team (30 minutes)
- Breakout sessions (the participants will be divided into four groups) (1h30)
- Plenary – reporting from the groups (40 minutes)
- Plenary – Next steps (10 minutes)

2. PROBLEM DEFINITION

The problem definition of the microplastics release is developed as per better regulation guidelines, starting from the overall problem to general and specific problem drivers. Figure 1 presents problem tree for microplastics release from textiles.

The most influential parameters influencing the microplastics release in the baseline scenario (i.e. Business as Usual) are

- Increase in the consumption of clothing (for production and end-of-life)
- Increase in the use of synthetic materials (for production, washing, drying and end-of-life)
- Change in washing habits with an increase in the frequency of washing (for washing).

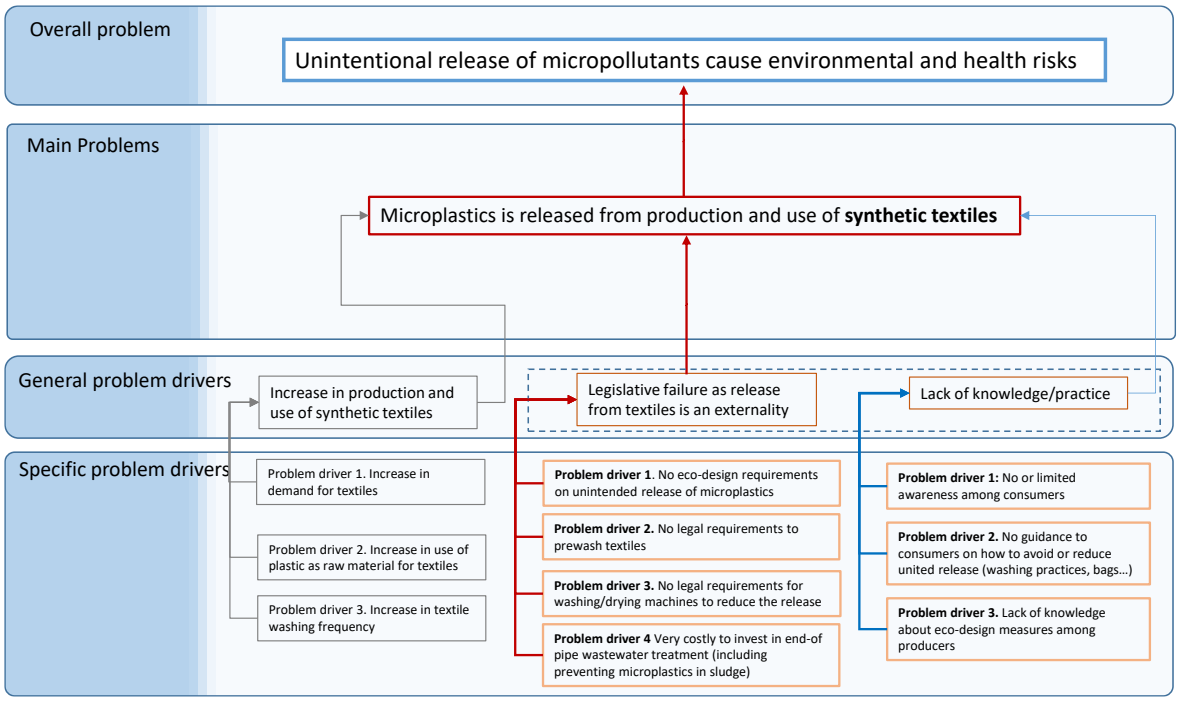

Figure 1: Problem definition tree

3. SCALE OF THE PROBLEM

This section aims at estimating amount of unintentional microplastics release from textile at the EU scale. A draft estimate was presented at the first stakeholder workshop and a revised based on feedback received and additional sources is presented here. The list of the factors influencing the release has been presented and the scale of microplastics release over the whole life cycle of textiles is estimated.

Figure 2 summarises our current estimate of microplastics emissions from synthetic textile in the EU.

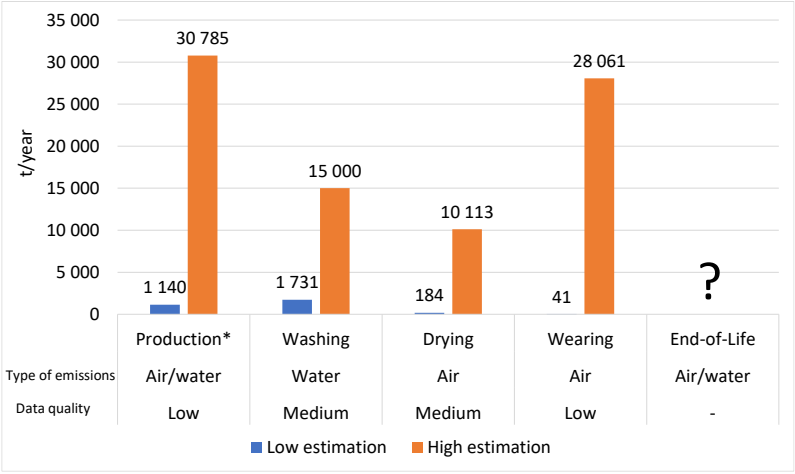

Figure 2: Microplastics emissions from synthetic textile in the EU[1]

* Of which 21 % happen in the EU

[1] Based on multiple sources and extrapolated to EU level.

The total microplastics emissions[2] from synthetic textiles in the EU is estimated to be between 3,100 and 84,000 t/year.

Following are the major influencing factors:

- Type of textile
  - the material, fabric structure (woven or knitted), the yarn twist, fibre type (staple or filament), the hairiness and type of textile influence the release during washing;
  - the surface treatment, edge treatment (scissor or laser cut), the fabric structure (woven or knitted) and the yarn spinning method influence abrasion at wearing step.
- Age of textile:
  - Pre-washing: high emission rate due to loose fibres resulting from the manufacturing process;
  - First washes: decreasing emission rate due to decrease in loose fibres from the manufacturing process;
  - Mid-life of the garment: stable emission rate;
  - Garment aging: increasing emission rate due to the degradation of the garment fibre structure.
  - washing conditions: the mechanical agitation, the ratio water/ fabric quantity in the machine load, the use of detergent, the temperature and the washing duration influence the emission during washing step.

The major sources of uncertainties are due to the lack of studies for some specific steps (most of the literature focusses on the washing related emissions) and the differences of methodologies used to assess the emissions.

Table 1 presents the main parameters used to define the baseline scenario and gives their evolution between the current situation and the foreseen situation in 2030.

[2] Excluding end-of-life.

Table 1: Evolution of the main parameters between the current situation and 2030 (parameters marked with an * are used directly in the emission calculations)

Parameter	Unit	Data considered in the state of the art (current value)	Baseline scenario (forecast data)	Comments
Market data				
Consumption of textile products *	million tonnes	7.4 [3]	9.0	Increase in textile production: +23% [4]
Proportion of man-made fibres in clothing sector	%	44.80%	50%	Assumption: 50% of man-made materials in 2030
Washing				
Average capacity of a washing machine	kg	6.5	7	Assumption based on (JRC, 2016) *This leads to an increase in the frequency of washing as the number of washes a week per household does not change.*
Machine load *	kg of textile washed per cycle	5.33	5.74	Calculation based on the average capacity of a washing machine and the relative load of one wash *No change concerning the relative load of one wash* ***Error! Bookmark not defined., Error! Bookmark not defined.***

Table 2 details the projected evolution of microplastic emissions broken down by lifecycle step between now and 2030 based on the evolution of the main parameters as presented in Table 1.

Table 2: Evolution of the quantities of microplastics emitted per year[5]

Emissions	Evolution	Parameters behind the evolution
Production in Europe (emissions to air and to water)	+ 37%	- increase in textile consumption - increase in the share of synthetic materials
Production outside Europe (emissions to air and to water)	+ 37%	
Use phase (emissions to air)	+ 0.4%	- population growth
Washing (emissions to water)	+ 22%	- increase in the share of synthetic materials - increase in machine load (consumer habits)

[3] Calculation based on the following data: 6.4 million tonnes of clothing consumed in the EU in 2015 (source: ECAP, Mapping clothing impacts in Europe: the environmental cost, December 2017) and "40 per cent growth in the amount of purchased clothes per person in the EU between 1996 and 2012", which means 2.5% growth per year (source: EEA, Textiles and the environment in a circular economy, November 2019)

[4] Calculation based on the following data: "40 per cent growth in the amount of purchased clothes per person in the EU between 1996 and 2012" (source: EEA, Textiles and the environment in a circular economy, November 2019)

[5] Based on multiple sources.

Emissions	Evolution	Parameters behind the evolution
Drying (emissions to air)	+ 12%	- increase in the share of synthetic materials - population growth
End-of-life (emissions to air and to water)	+ 37%	- increase in textile consumption - increase in the share of synthetic materials note: overestimation because all the production of a year is assumed to become a waste within the same year

In 2030, the total[6] microplastics emissions from synthetic textiles in the EU are estimated to be between 4,000 and 100,000 t/year.

4. POTENTIAL MEASURES

During the 2nd stakeholder workshop, we will work in groups to establish a list of potential measures to reduce the microplastics emissions from textiles.

Firstly, the participants will try to cover the different life cycle stages and to address the different types of possible measures:

- Research/investigation (e.g. research of quantification of MP emissions at production, wearing and end-of life steps)
- Standardization (e.g. standardization of a methodology to measure MP release in water or air)
- Fiscal measures
- Eco-design (e.g. list of eco-design actions for textile production)
- Regulatory actions concerning washing/drying machines (e.g. make additional filter on pre-washing / washing machines mandatory)
- Best available technologies (e.g. provide BAT at production steps to capture microplastics)
- Labelling (e.g. set criteria in a new or existing textile label to define the level of microplastic release)
- Communication (e.g. raise consumers awareness of behaviours that influence MP release)
- Subsidies (e.g. subsidy some equipment that capture microplastics at pre-washing/ washing step)
- Financial instruments (e.g. to pay for equipment and respective running costs equipment that capture microplastics at waste water treatment plants)
- Measures can either be prevention or mitigation measures.
- Prevention / mitigation at production stage
- Mitigation at use stage
- Mitigation at end of pipe/end-of-life

Secondly, stakeholders will provide feedback on the feasibility and effectiveness of potential measures in the reduction of microplastic emissions

[6] Excluding end-of-life.