Rubberised Asphalt Mixtures (RAM) are widely recognised as an optimal solution to enhance road pavement performance and its durability but also to tackle the environmental impact by reusing end of life tyres (ELTs).

Nevertheless, road authorities preserve environmental concerns regarding the potential release of microplastics (MPs) due to the abrasion and degradation of RAM. Although the environmental impact of MPs has not yet been entirely understood, MPs are known to cause pollution by entering natural ecosystems.

What is RUBBERFREE??

RUBBERFREE is a cooperation project between the University of Palermo (UNIPA), University of Milan (UNIMI), Waste & Chemicals, and Ecopneus scpa, Italian non-profit company for the tracking, collection, processing, and final destination of end-of-life tyres.

The project aims to assess whenever or not Rubberised Aphalt Mixtures release microplastics in the surrounding environment and its toxicity.

RUBBER FREE

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Investigating the potential release and toxicity of microplastics from Rubberised Asphalt Mixtures

STAGE 1

Identification of RAM technologies
- Wet process
- Dry process
- Neat bitumen (control)

Identification of RAM mix grading types
- Gap graded
- Dense graded
- Open graded

RAMs acquisition from local/national suppliers

Mix Design compliance with Italian requirements
- Bitumen & Aggregates characterisation
- Void content
- ITS
- ITSR

Laboratory long-term aging simulation

In-situ RAM coring

RAMs Microplastic Testing

STAGE 2

Equipment adaptation
- Adapting the Wet Track Abrasion to produce realistic samples

Abrasion Procedure
- Abrasion test under controlled conditions

Extraction Procedure
- Collection of abraded residues
- Bitumen dissolution
- Density separation of microplastics and aggregates
- Size fractioning of microplastics

Validation procedure
- Fluorescence microscopy

IS IT POSSIBLE TO ASSESS IF RUBBERISED ASPHALT MIXES REALESE MICROPLASTICS?

To achieve that, first a multidisciplinary experimental programme involving the engineering characterisation of RAM produced in-plant will be performed, then the analysis of microplastics released from different RAMs will be carried out. RubberFree will provide the results of tests conducted both on lab-produced and in-situ cored specimens for different asphalt rubber and mix grading technologies from a microplastics perspective.

THE NOVELTIES OFFERED BY THIS STUDY ARE:

- Adapting the Wet Track Abrasion to produce realistic samples
- Developing a procedure to isolate microplastics from the bitumen and aggregates released through abrasion
- Validating the developed procedure by fluorescence microscopy.
- Evaluating the ecotoxicological effects of TRWPs from conventional and rubberized asphalts on a freshwater biological model

RUBBERFREE IS DEVELOPED BY

ECOPNEUS

SMARTI lab
Smart solutions for sustainable transport infrastructure

Waste and chemicals

UNIVERSITÀ DEGLI STUDI DI MILANO

WITH THE COLLABORATION OF

RMIT UNIVERSITY