Federal Ministry of Education and Research

FONA Research for Sustainable Development BMBF

RAU – Reducing the Environmental Impact of Microplastics from Car Tires

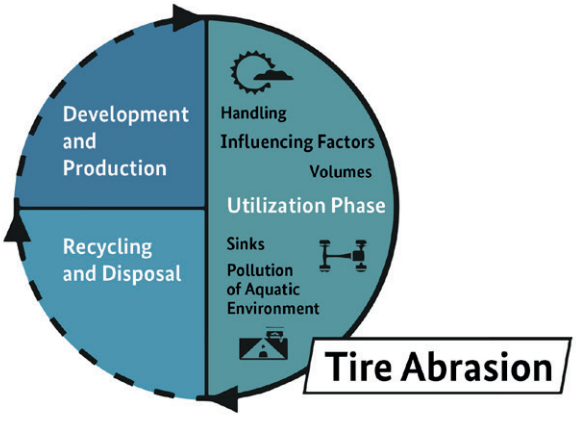
Plastics in the Environment – Sources · Sinks · Solutions

An underestimated source for microplastics in water bodies is the wear debris of vehicle tires: Worldwide, around 1.3 billion motor vehicles are on the roads whose tire debris can enter our rivers and seas through precipitation. But how and in which quantities do particles from tire abrasion get into inland waters? The joint research project RAU will investigate these questions as well as develop and evaluate strategies against these entries. The aim is to create a comprehensive understanding of the loss of tire particles throughout the entire product life cycle.

In Focus: How Much Debris is Generated by Tire Use?

In Germany alone, it is estimated that the total amount of tire wear caused by road traffic exceeds 100,000 tonnes per year. Presumably, most of it is discharged into surface waters via road drainage, usually untreated. The RAU project will focus mainly on tire particles released into the environment during tire use. Furthermore, the joint research project also investigates the entire life cycle.

In addition to use, this includes the development and production of tires as well as recycling and disposal. One of the specific tasks of the researchers is to determine, balance and evaluate the entry of tire material into street drains and from there into rivers and lakes. A major challenge in this regard is to determine the percentage of tire debris from an environmental sample both qualitatively and quantitatively. To date, no specific investigations have been carried out to determine to what extent rainwater treatment concepts are effective in removing tire particles from water.



The RAU joint research project looks at the entire life cycle of tires in order to obtain an accurate picture of tire debris from abrasion and its consequences.

Identifying Entry Paths and Quantities

Tire abrasion tests are carried out in the laboratory, on controlled test tracks and on various types of roads. In order to cover the entire product life cycle of the tire, the project participants first evaluate potential pathways of tire particles into the environment from existing literature and manufacturer data. Researchers investigate the actual amount of debris from tire use on test sites and by taking samples from road water runoffs in various areas with different types of roads. Samples can be collected directly from street drains using specially developed baskets and can then be analyzed. The researchers are developing special methods for the preparation and analysis of aqueous samples such as road runoff, solid samples such as road sweepings and air particles, adapting existing analytical methods to their needs. The analyses particularly focus on the volumes and entry points of tire particles into the environment, both, on the whole and as individual groups of substances. The project team is investigating the relationship between tire wear and driving dynamics on a test track in Wietze in Lower Saxony.

The measurement and analysis results are incorporated into pollution load simulation based on a catchment area allowing to model the entry of tire debris through street drains. Exemplary catchment areas for the simulation comprise a thoroughfare in a rural territory and main and secondary roads in an urban area.

The simulation also takes into account the extent to which selected measures – such as decentralized and centralized rainwater treatment systems or municipal street cleaning – could reduce the entry of tire debris into surface waters.

Measures for Various Locations

The researchers intend to develop an evaluation matrix based on the various contributing factors. This should enable planners, municipalities and street cleaning companies to derive suitable measures for different locations in order to reduce the entry of tire debris into the environment. It is also planned to incorporate the results into national and European standards and regulations.

Tire debris entering through street drains is one of the sources of microplastics in the environment.

Research Focus
Plastics in the Environment – Sources • Sinks • Solutions

Project Title
Tyre Wear in the Environment (RAU)

Grant Number
13NKE011A-E

Duration
August 1, 2017 – July 31, 2020

Funding Volume
EUR 650,009

Contact
Technische Universität Berlin,
Fachgebiet Siedlungswasserwirtschaft
Prof. Dr.-Ing. Matthias Barjenbruch
Gustav-Meyer-Allee 25
13355 Berlin
Phone: +49 (0) 30 314 72247
E-mail: matthias.barjenbruch@tu-berlin.de

Project Partners
Continental Reifen Deutschland GmbH, Hannover
GKD – Gebr. Kufferath AG, Düren
Ingenieurgesellschaft Prof. Dr. Sieker mbH, Hoppegarten
Technische Universität Berlin, FG Systemdynamik und Reibungsphysik, Berlin
WESSLING GmbH, Altenberge

Website
www.siwawi.tu-berlin.de/menue/forschung/rau/parameter/en/

Publisher
Federal Ministry of Education and Research (BMBF)
Department of Resources, Circular Economy; Geosciences,
53170 Bonn
Department of Systematic Mobility; City of the Future,
53170 Bonn

Editorial Work and Design
Project Management Agency Karlsruhe (PTKA)
VDI Technologiezentrum GmbH

Print
BMBF

Photo Credits
Front and back page: Daniel Venghaus,
Technische Universität Berlin

Version of
November 2018

www.bmbf.de