

Unintentionally Released Primary Microplastics:

A Focus on Tyre Wear

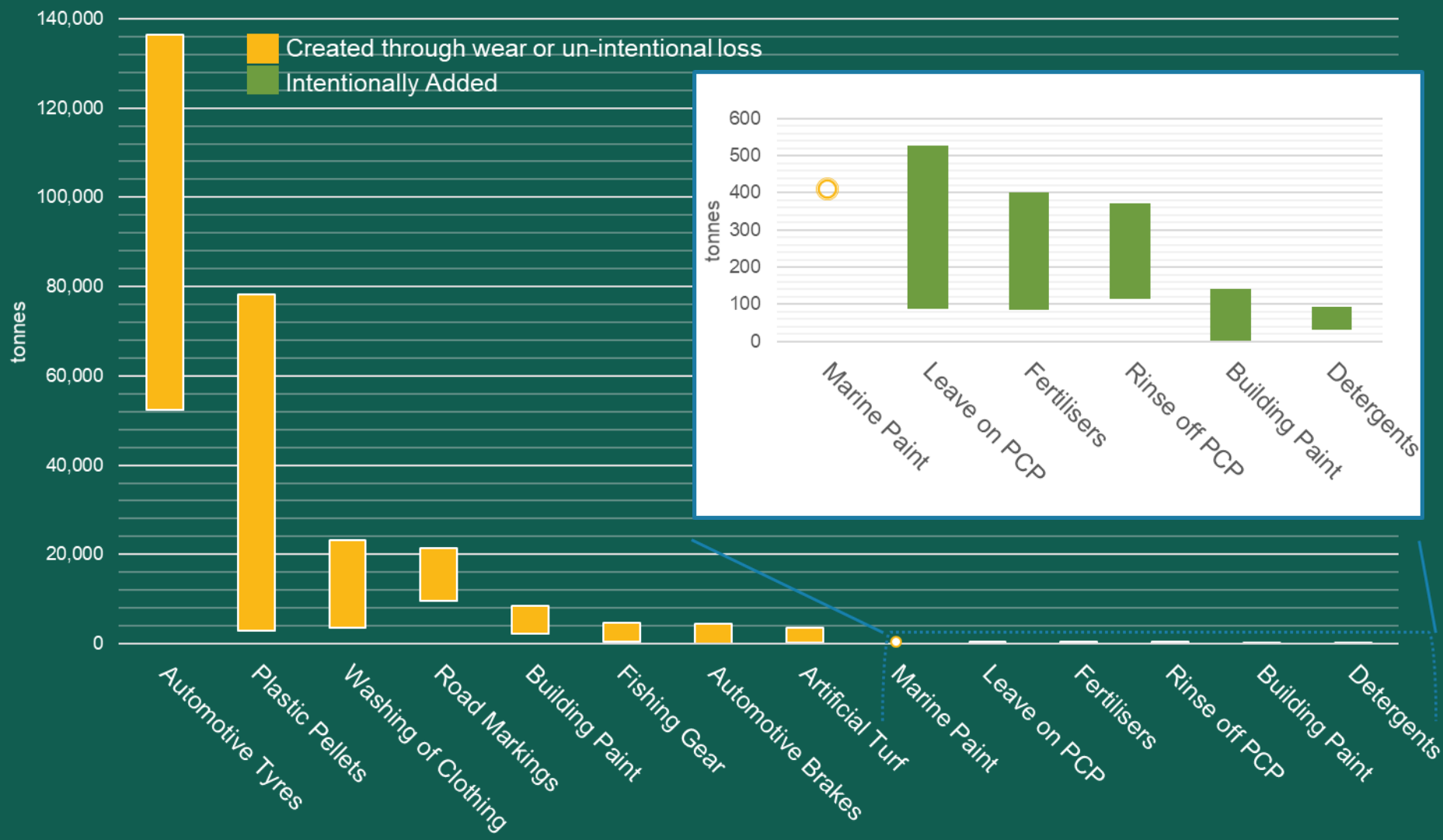


Lucy Eggleston, Senior Consultant

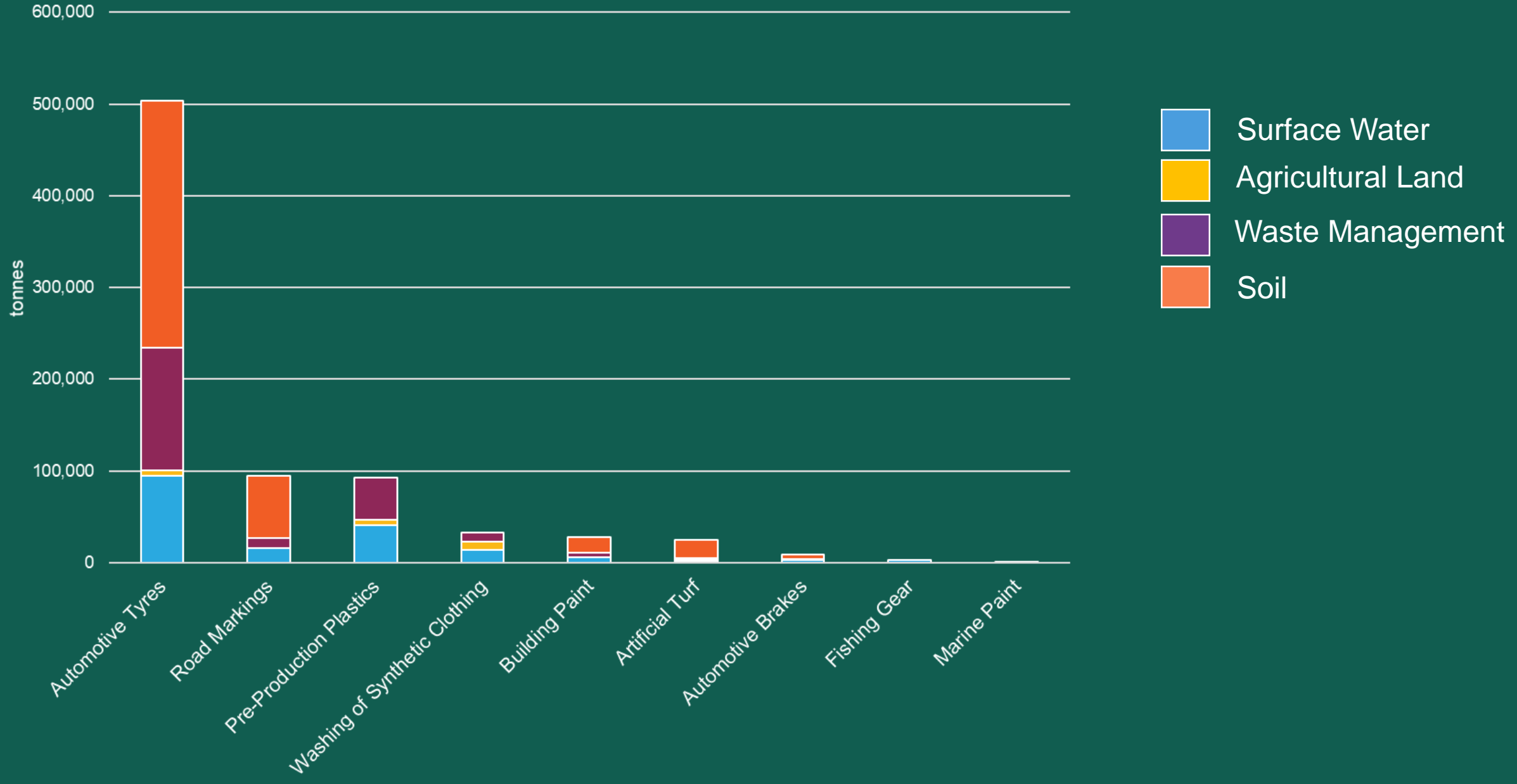
"Investigating options for reducing releases in the aquatic environment of microplastics emitted by (but not intentionally added in) products"



Microplastic Release to Surface Water



Microplastic Sinks ~ 0.8million tonnes per year



Vehicle Emissions



How do Tyres Generate Microplastics?

1.

Tyre wear during use produces micro-particles

2.

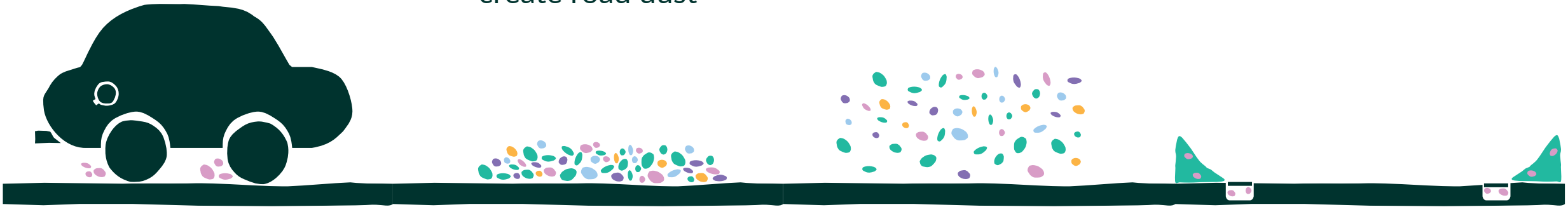
These combine with particles from asphalt, clutch wear, brake wear, and road particles to create road dust

3.

These particles become airborne and are resuspended

4.

They then collect in verges and in stormwater run off



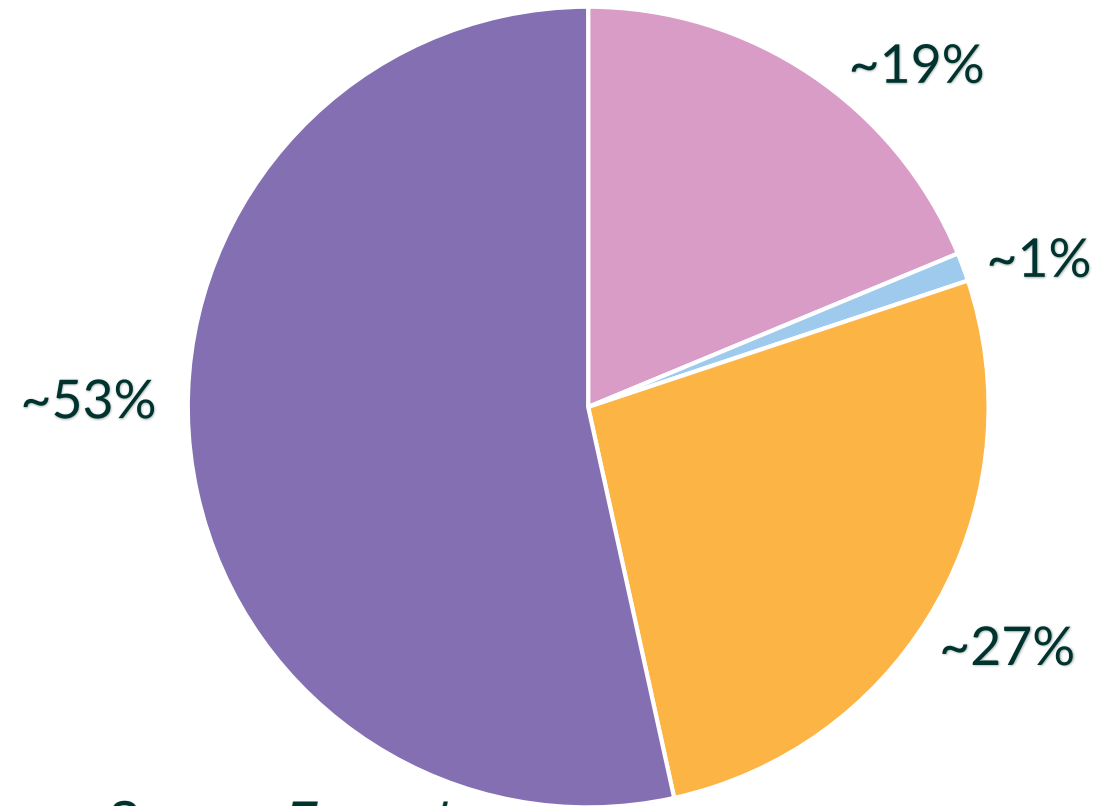
The Scale of the Problem

Global tyre microplastic emissions are estimated to be **0.81kg** per year per capita (1)



This equates to global annual tyre emissions of **6.16 million tonnes**

Which makes its way into **waterways**, **agricultural land**, **waste management systems**, and **soil**



Source: Eunomia

The Impact – Waterways



The impacts of deposition of tyre PM in waterways includes:

- Reduced feeding rates in fish
- Reduced ocean biodiversity (2)
- Implicated in killing oxygen producing phytoplankton (3)
- 6PPD, a chemical in tyres, has been proven toxic to spawning salmon (4)

The Impact – Land

Tiny particles from car brakes and tyres ‘darkening Arctic ice’

Ben Webster, Environment Editor

Wednesday July 15 2020, 12.00am,
The Times



Arctic pack ice has been retreating, leaving polar bears at greater risk as they need to cover large areas to hunt and mate
GETTY IMAGES

Simply applying the brakes on your car is contributing to the melting of the polar ice cap, according to a study.

Microplastic particles shed by tyres and brakes are swept by winds to remote areas including the Arctic where they darken the surface and hasten the melting of ice. About 48,000 tonnes of these particles end up in snow and ice-covered areas each year, scientists calculated.

Home » Environment » Tons of tire rubber is making its way to the Arctic each...

Environment News Science

Tons of tire rubber is making its way to the Arctic each year, study suggests

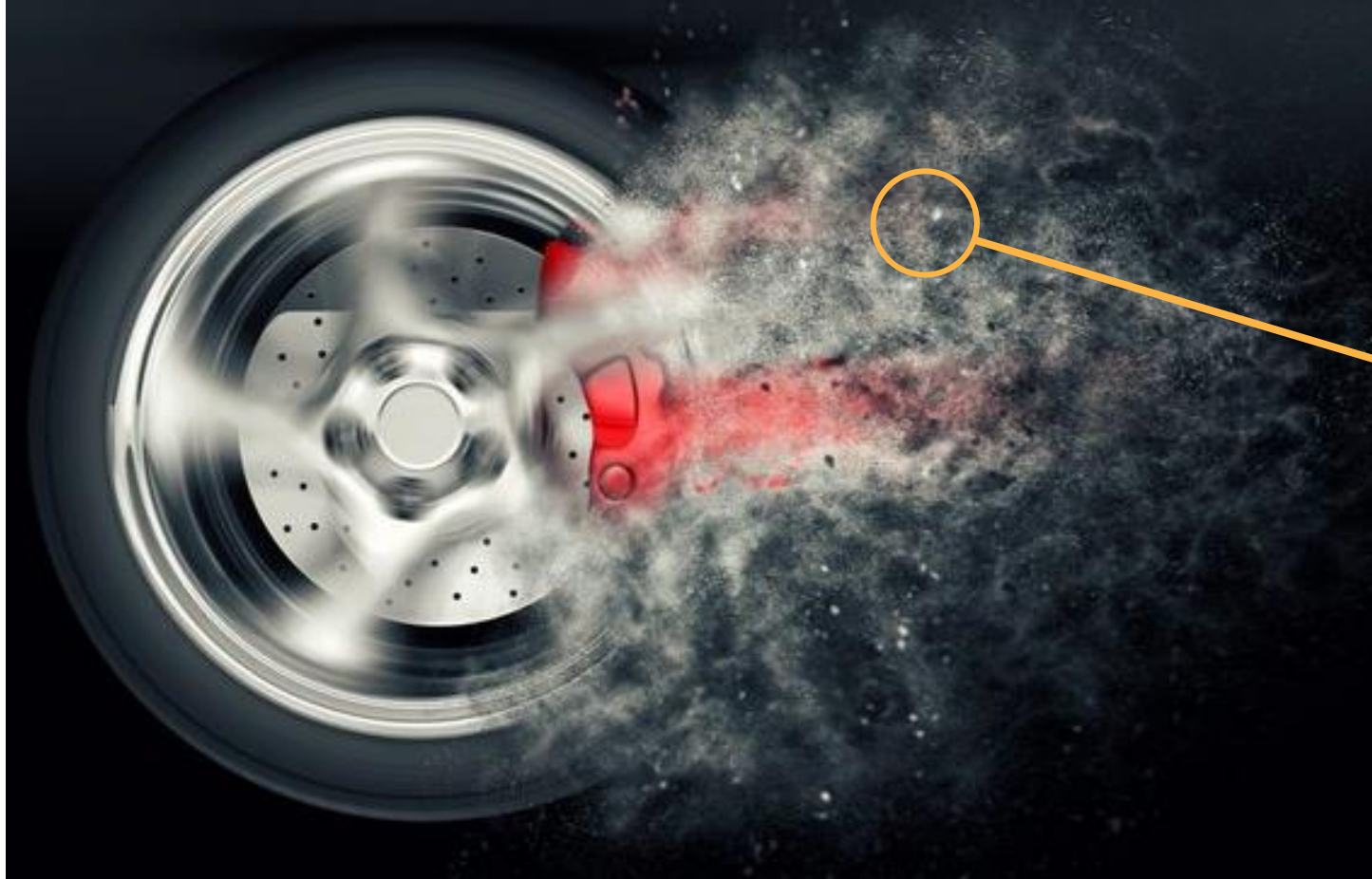
Scientists recently confirmed a hunch that microplastics from tires reach the Arctic by air as well as by sea.

By Kevin McGwin - July 21, 2020



AWI scientists collecting snow using metal, glass and porcelain to avoid contaminating samples. (Kajetan Deja / AWI)

Tyre Particulates



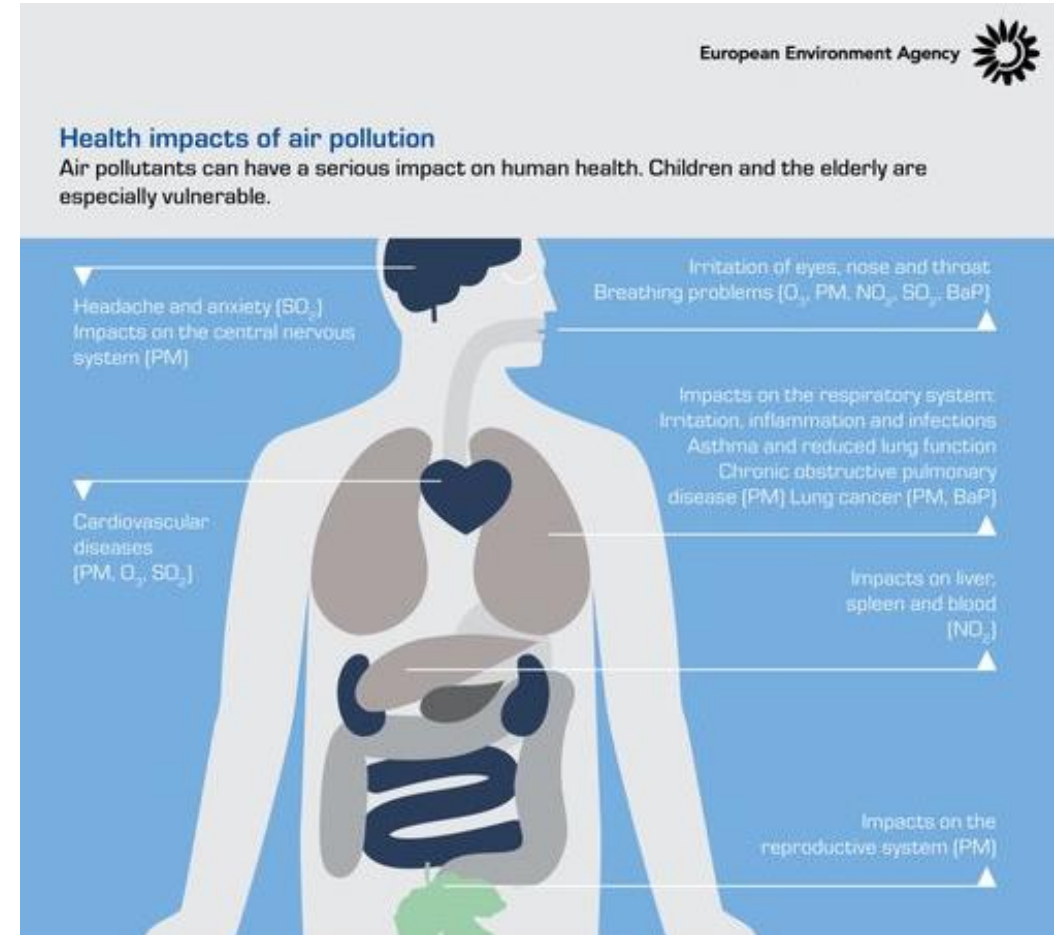
The Impact – Air

PM2.5 can penetrate the lungs and bloodstream. It can lead to:

- Reduced lung and respiratory system function
- Increased likelihood of chronic bronchitis, cardiac arrhythmias, heart attacks, and premature deaths

Exposure to PM10 is linked to:

- Respiratory and circulatory conditions
- Neurological diseases
- Endocrine disruption (birth defects, hormonal impacts)
- Premature deaths



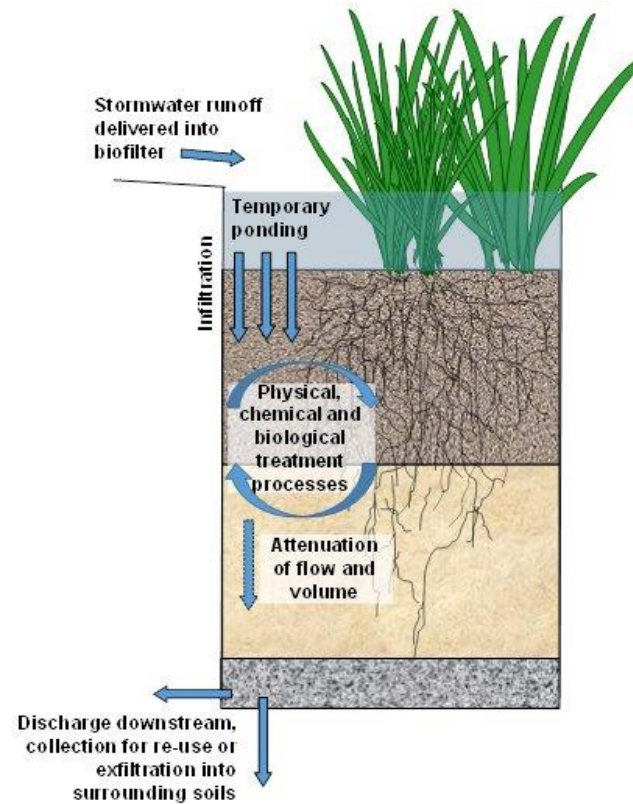
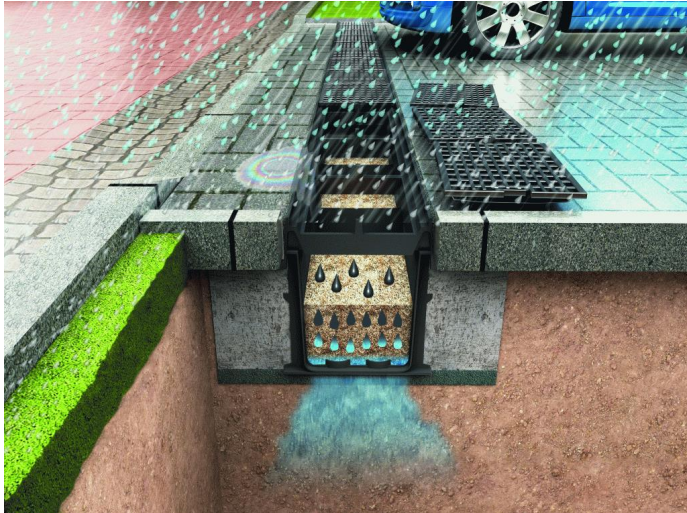
Addressing Tyre Microplastics - Policy



- Measures to address PM created by tyre wear is a topic of interest amongst the EU Commission
- This 2018 report explored measures for reducing unintentionally released microplastics in aquatic environments
- This included measures directly addressing tyre wear:
 1. TWP emissions limit value for abrasion (plus test method)
 2. TWP emission labelling integrated into the energy label (plus test method)
 3. EPR for tyre manufacturers, including fee modulation related to tyre wear abrasion

Addressing Tyre Microplastics - Technology

However, implementing these policy measures and reducing tyre abrasion won't eliminate emissions. Therefore water- and air-based capture is critical





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References

- (1) Kole, P. et al (2017) *Wear and Tear of Tyres: A Stealthy Source of Microplastics in the Environment*
- (2) D. S. Green (2016) *Effects of microplastics on European flat oysters*
- (3) Nature (2010) *Global phytoplankton decline over the past century*
- (4) The Guardian (2022) *Chemical from tyres linked to mass salmon deaths in US found in Australia for first time*
- (5) Boulter, P. G. (2006) *A review of emissions factors and models for road vehicle non-exhaust particulate matter*
- (6) Luhana, L. et al (2004) *Characterisation of Exhaust Particulate Emissions from Road Vehicles*