Understanding Microplastics - Synthetic Turf

Version 2.0

Sustainable Communities and Waste

National Environmental Science Program

Synthetic turf systems have evolved significantly, featuring key components such as synthetic grass fibres, infill materials and a backing system. These elements work together to replicate the look and feel of natural grass. Through the SCaW Hub, the IP2 researchers are gaining a deeper understanding of the characteristics of microplastics generated by synthetic turf systems, adding to our work in creating a protocol for analysing microplastics.

Natural grass

Soil

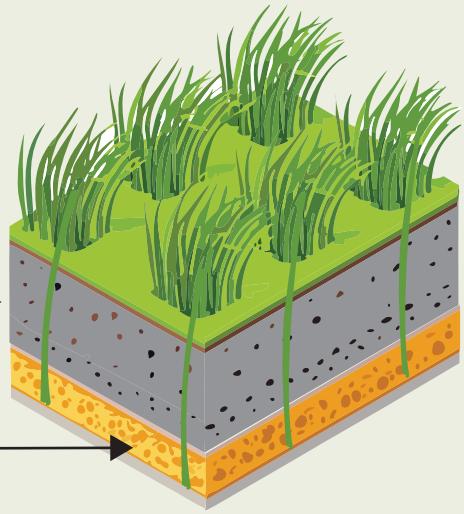
Natural grass

Synthetic turf

Synthetic turf (PP, PE, or Nylon)

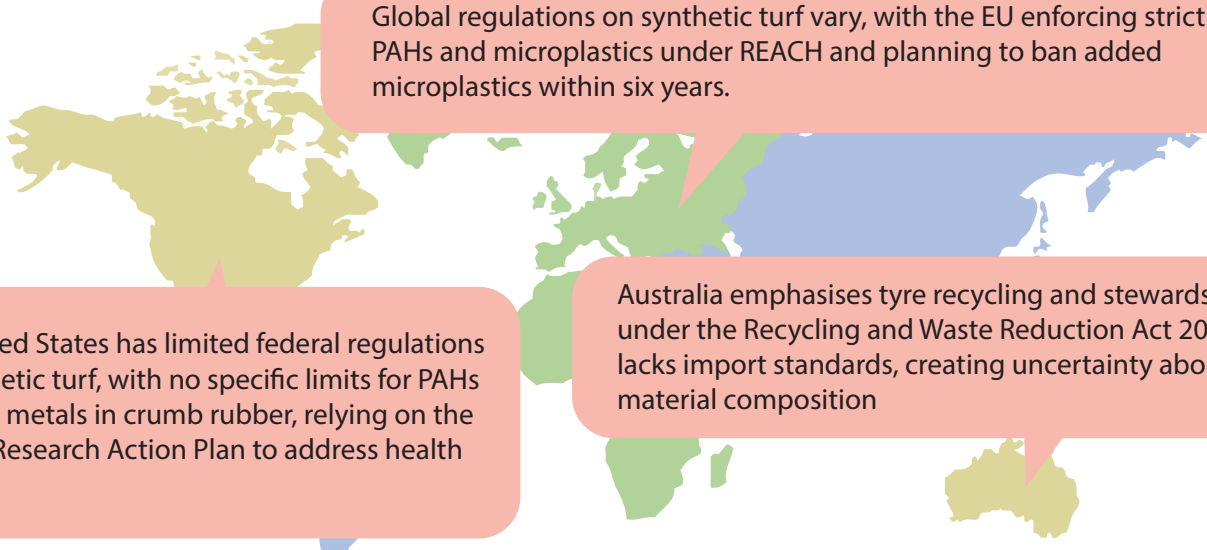
Infill (crumb rubber, silica sand, organic substances and thermoplastic) elastomers

Backing System



Current State of Regulations on Synthetic Turf

Global regulations on synthetic turf vary, with the EU enforcing strict rules on PAHs and microplastics under REACH and planning to ban added microplastics within six years.



The United States has limited federal regulations on synthetic turf, with no specific limits for PAHs or heavy metals in crumb rubber, relying on the Federal Research Action Plan to address health risks

Australia emphasises tyre recycling and stewardship under the Recycling and Waste Reduction Act 2020 but lacks import standards, creating uncertainty about material composition

Impact of Synthetic Turf on Environment & Humans

Air Quality and Carbon Footprint

Synthetic turf under certin conditions emits volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). These emissions can degrade air quality and exacerbate the urban heat island effect by raising local temperatures.
Synthetic turf production is energy-intensive, generating significant greenhouse gas emissions.
Disposal is problematic, as materials are non-biodegradable and often end up in landfills.

Water and Soil Contamination

Stormwater runoff from synthetic turf can carry leached chemicals like heavy metals and microplastics, polluting water bodies. Soil beneath turf can compact, reducing biodiversity and soil health, while contaminants harm ecosystems and plant growth.
The breakdown of synthetic turf fibres and infill materials releases microplastics into the environment. These accumulate in ecosystems, posing risks to aquatic and terrestrial wildlife.

Exposure and Health Risks

Crumb rubber infill can release toxic substances like heavy metals (zinc, lead), VOCs, and polycyclic aromatic hydrocarbons (PAHs). These can be inhaled, ingested, or absorbed through skin contact.
Prolonged exposure, especially among athletes and installers, raises concerns about potential health effects.
While typical risks are low, ongoing research is essential to understand the full impact.
Synthetic turf generates fine particles that may be inhaled, increasing respiratory risks, particularly in vulnerable populations like children.

Challenges

Developing eco-friendly infill materials, reducing microplastic emissions, and addressing contaminant leaching remain key challenges for synthetic turf systems.

Opportunities

Advancing lifecycle impact assessments, improving recyclability, and developing closed-loop systems for material recovery present significant opportunities to enhance synthetic turf sustainability.

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To view the full report, visit the project page for Impact Priority 2.
https://bit.ly/49sOyoS