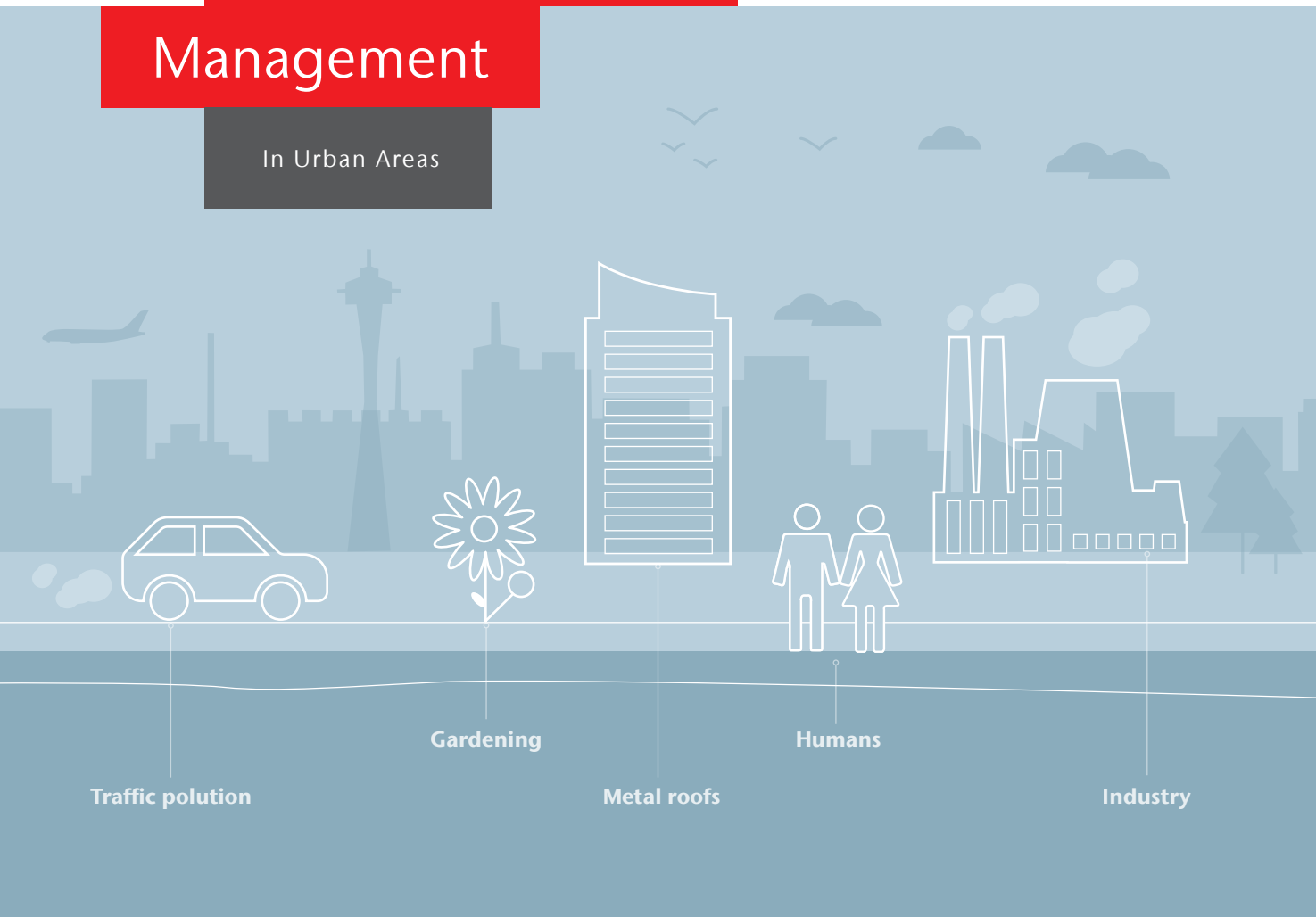
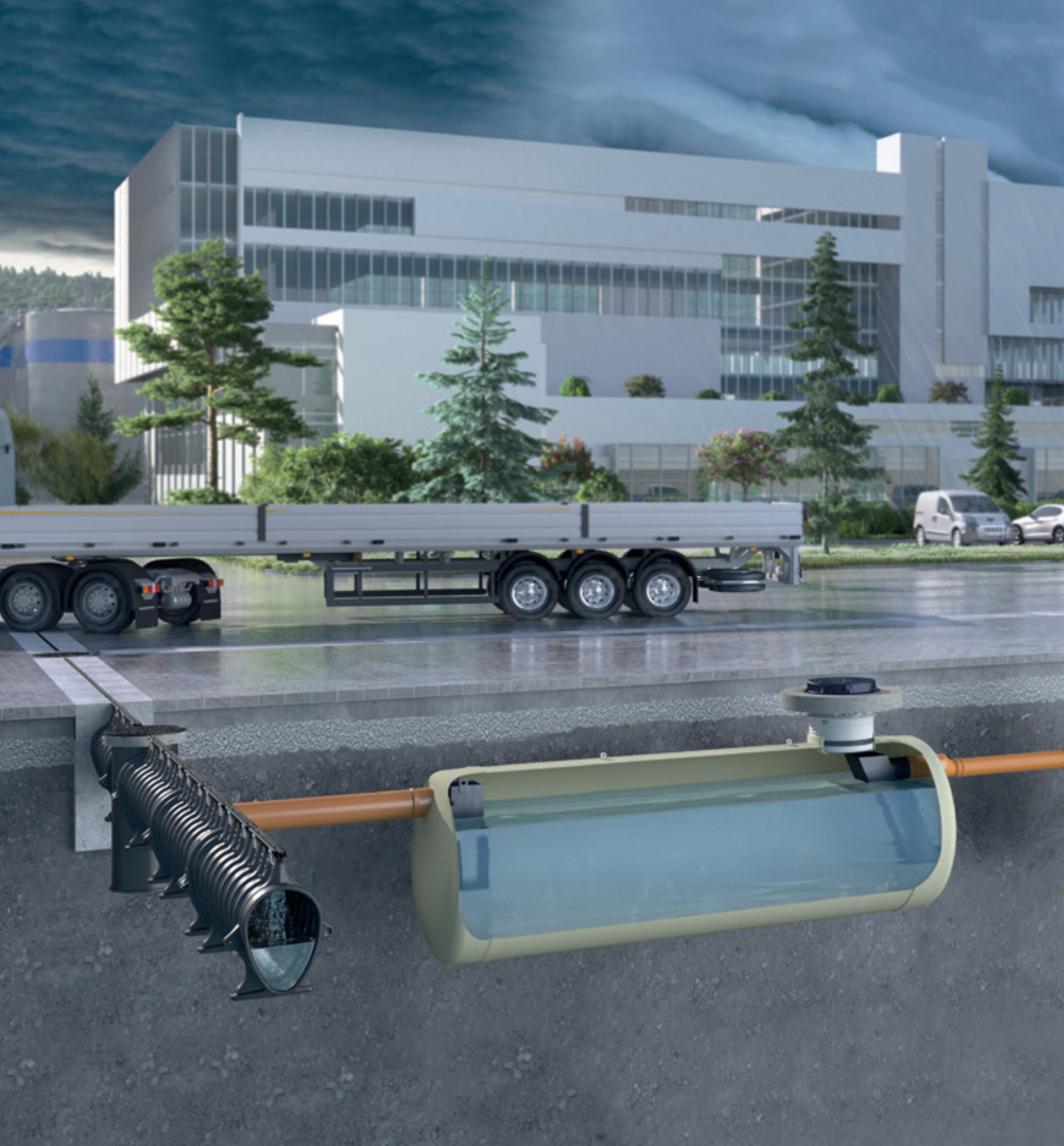
When advanced water treatment is required

ACO Stormwater Management

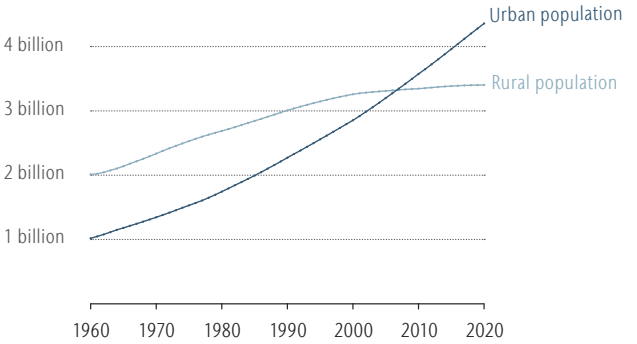
In Urban Areas





Stormwater management has become a challenge due to the rapid and unplanned growth of urban areas, removal of vegetation, reduced effectiveness of drainage infrastructure, and the impacts of climate change.

Number of people living in urban and rural areas, World*



Water is necessary for various human activities and purposes, but its availability is becoming scarce due to poor management rather than a lack of supply. As a result, there is an increasing need for water management, particularly in urban areas where water demand is significantly higher.

Stormwater is a valuable resource that is readily available from nature, and conserving it is crucial in urban environments. However, stormwater management poses various challenges at different stages of implementation, starting from the planning stage. Challenges include the expansion of urban areas, changes in soil permeability due to construction activities, a decrease in vegetation, climate change, changes in rainfall patterns, and subsequent runoff. Urgent attention is needed to address these challenges.

*Source: World Bank based on data from the UN Population Division
Note: Urban populations are defined based on the definition of urban areas by national statistical offices. **OurWorldInData.org/urbanization**

TRAFFIC POLUTION

METAL ROOFS

GARDENING

HUMANS

INDUSTRY

The sustainable development of any city

Urban stormwater reuse is one of the most effective methods to alleviate water resource scarcity. The need for stormwater reuse has become increasingly important with the rise in population, which has resulted in greater water stress.

Urban planning plays a crucial role in protecting urban water environments. Understanding and establishing thresholds between urbanization and water quality is key to driving urban stormwater quality management.

What is stormwater?

Stormwater is water that comes from precipitation, such as heavy rain or meltwater from hail and snow. It can also soak into the soil and become groundwater, be stored on depressed land surfaces in ponds and puddles, or evaporate back into the atmosphere. In addition, stormwater can contribute to surface runoff. Most runoff flows directly as surface water to nearby streams, rivers, or other large bodies of water without being treated.

What is stormwater runoff?

With less vegetation and more impervious surfaces such as parking lots, roads, buildings, and compacted soil, developed areas allow less rain to infiltrate into the ground, resulting in more runoff compared to undeveloped areas. The water then flows across paved surfaces in cities, picking up various pollutants such as suspended solids, nitrogen, phosphorus, bacteria, mineral oils, waste including plastics, pesticides, and heavy metals. All of these pollutants degrade water sources, which are essential to our lives.

COLLECT:
collect and remove

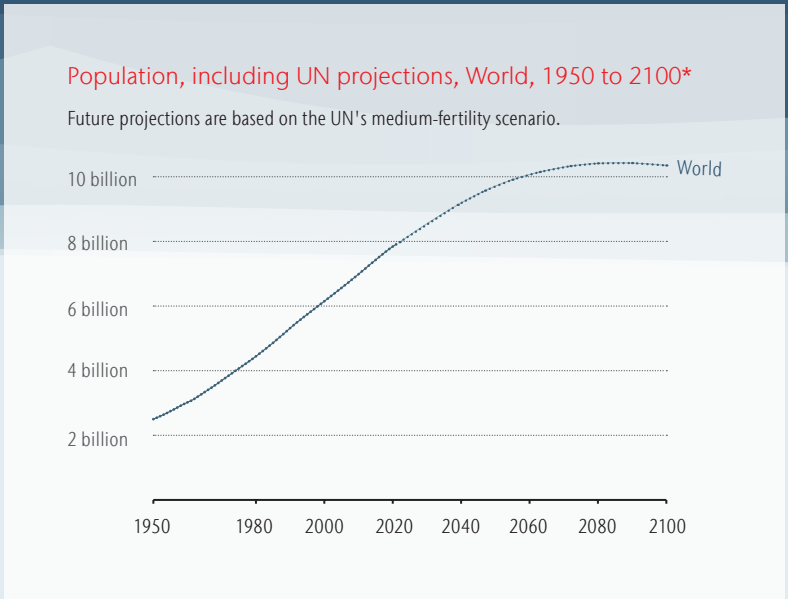
CLEAN:
pre-treat and process

HOLD:
protect and attenuate

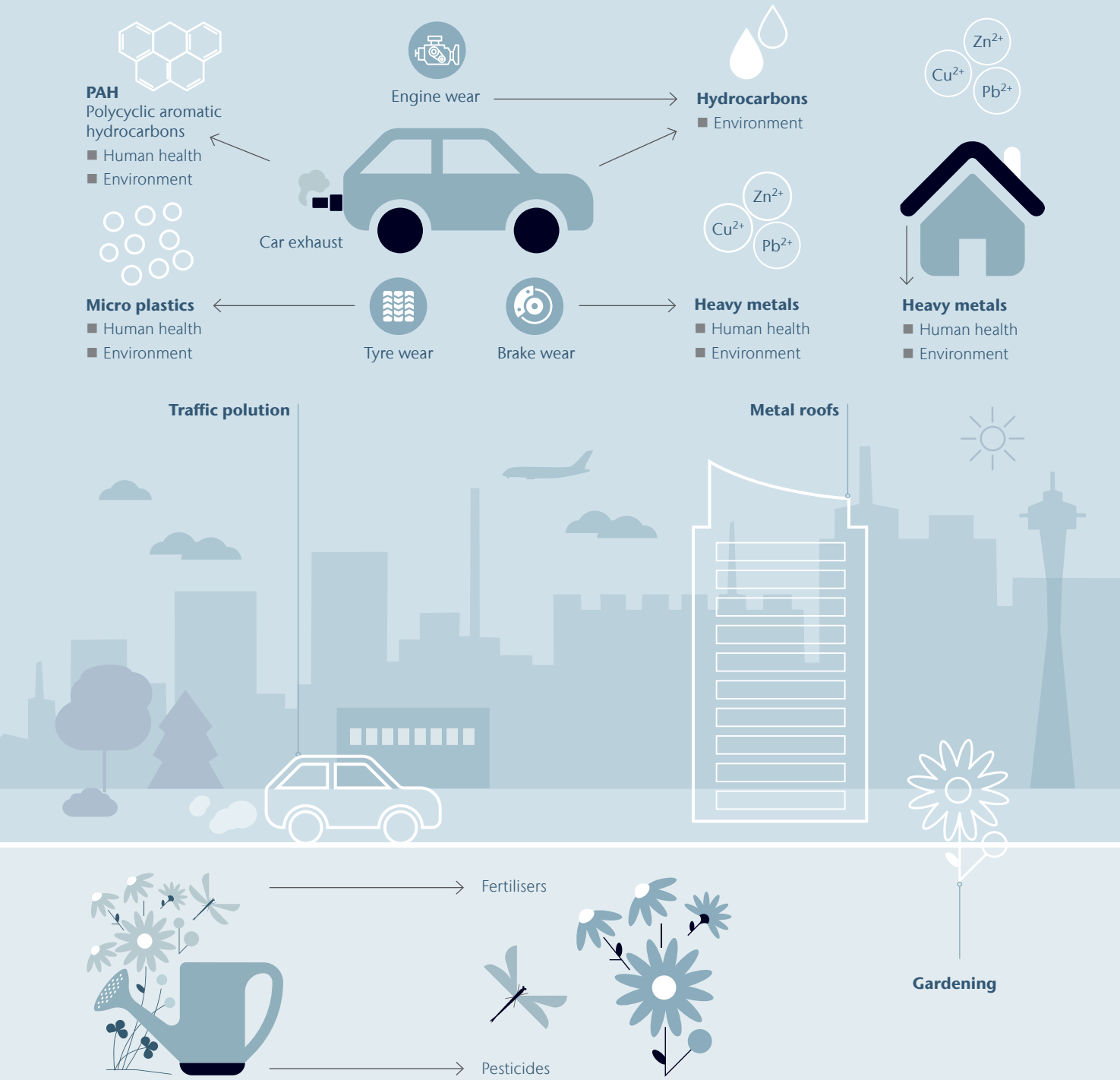
REUSE:
pump, discharge, ground-water infiltration and reuse

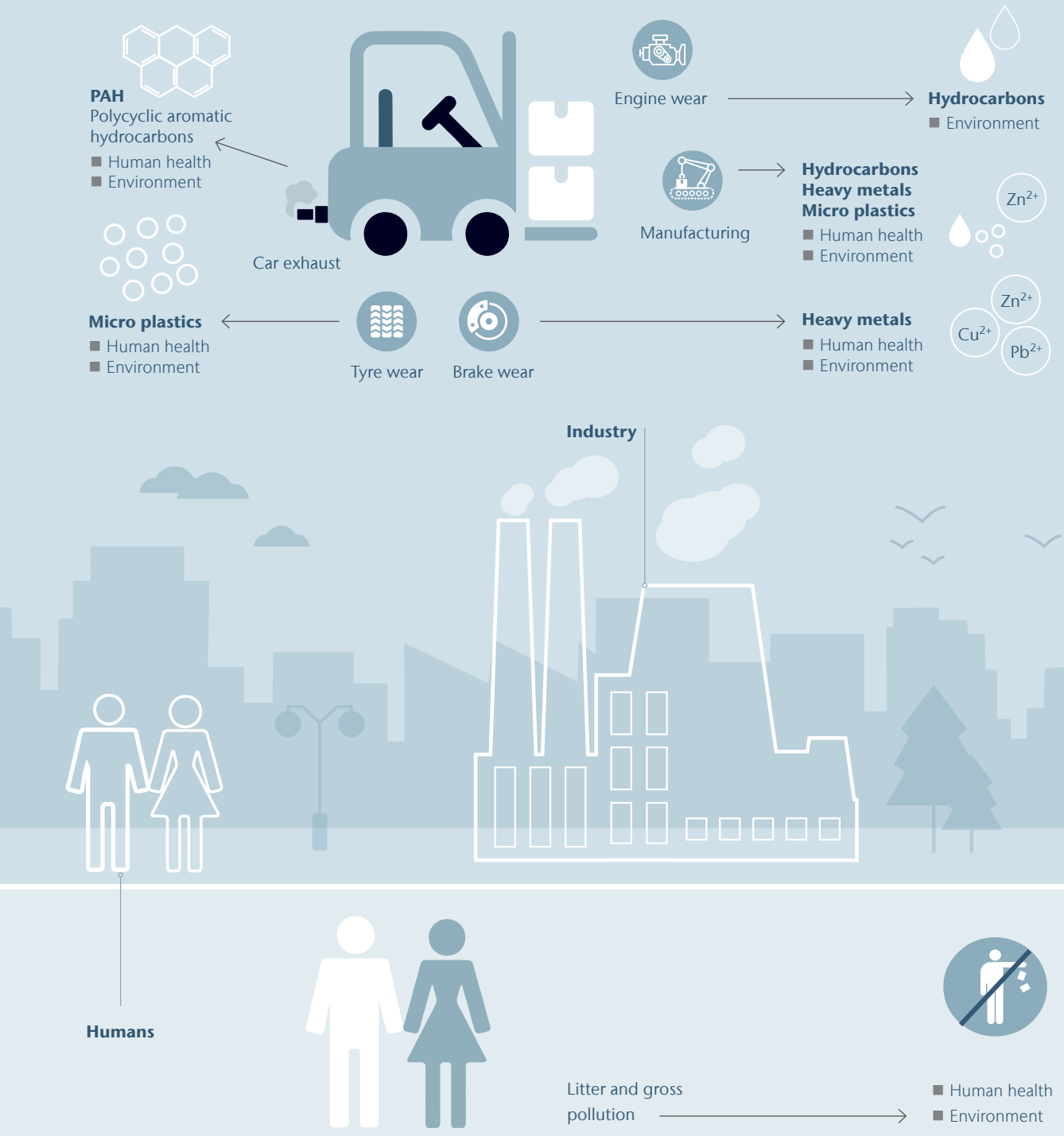
depends on its ability to manage water

The ACO WaterCycle supports you at every stage of stormwater management. With the increasing frequency of climate change-related changes, we are experiencing more dry weather periods followed by intense rains, which require the drainage of large amounts of precipitation. It is not only necessary to collect this water, but it also needs to be treated according to its pollution level to prevent harm to the environment and avoid drainage overflows or floods.



*Source: United Nations, World Population Prospects (2022). **OurWorldInData.org/world-population-growth**


PAH
Polycyclic aromatic hydrocarbons
Human health
Environment
Engine wear
Hydrocarbons
Environment
Zn2+
Cu2+
Pb2+
Car exhaust
Zn2+
Cu2+
Pb2+
Micro plastics
Human health
Environment
Tyre wear
Brake wear
Heavy metals
Human health
Environment
Heavy metals
Human health
Environment
Traffic polution
Metal roofs
Fertilisers
Pesticides
Gardening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Heavy metals
Human health
Environment
Industry
Humans
Litter and gross pollution
Human health
Environment

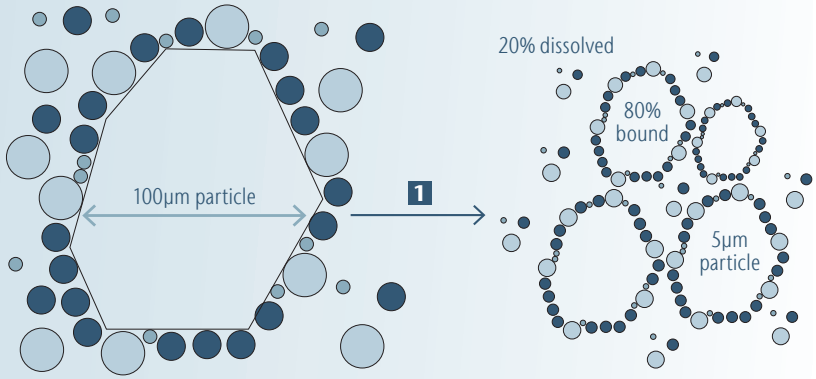
EU legislation and local regulations

The protection of water resources is coordinated at the EU level, through the creation of legislation. The EU has implemented various water protection directives. The key directive is the **Water Framework Directive (WFD)**, which establishes a protection framework. More targeted directives support the WFD. Together these directives provide member states with a framework on which to base their national water protection policies and laws.

The EU directives are regulated by setting deadlines to achieve their objectives. However, each EU member state has the freedom to choose their national approach to achieve those objectives. This means the quality of a member states water assets influences which activities are regulated, how activities are regulated, and what water quality targets are set. However, once the easy sources of pollution are treated, regulation should become stricter. As deadlines approach, all members should have stricter regulation.

The identification of key pollution sources, and the setting of appropriate water quality standards, relies on cooperation with the academic and professional communities. For ACOs activities in surface water treatment, the academic and professional communities have identified stormwater generated on busy roads, carparks, and industrial activities as key targets for treatment. These issues have been identified around the globe and much time has been dedicated to scientific research. The outcome of this research is that while land use will influence how much pollution is generated, there are a few common pollutants that should be treated. These include sediment, heavy metals, hydrocarbons, polycyclic aromatic hydrocarbons (from burning fossil fuels), pesticides and fertilizers. Of those pollutants, sediment is the most important. In stormwater, the majority of sediment is <300µm and carries up to 80% of the pollution load. This is because pollution binds to the surface of particles, and small particles have a high surface area. By removing sediment, many of the other pollutants can also be removed. This is the basis of standards such as the German DWA A-102, which stipulates sediment removal. Gravity can be used to remove bigger sediment; this is how sedimentation works. However, gravity can't remove small particles. In stormwater, 50% of the sediment is smaller than 63µm and must be removed using filtration. Filters work through a combination of filtration and chemical removal (chemisorption). Chemisorption can be used to remove the ≥20% of the pollution load that is dissolved. This is the basis of standards such as the German DIBt, which tests sediment and dissolved pollutant removal by a treatment device.

How much sediment must be removed, and if dissolved pollutions should also be removed, depends on where a country is on its journey toward protecting its water resources. However, it is clear when considering ACOs role as a protector of water resources, that sediment removal is the minimum we should be recommending. Hopefully as time passes, more countries will increase their regulation and allow a greater role for filtration, and ACO can offer even more protection!



1 The same volume of 5µm paricles has 20× the surface area!

Material approach

Modification flexibility How flexible is modify the product as a standard.	**1.G** **2.P** **3.C**
Weight Has an impact on transport and installation.	**1.P/G** **2.P/G** **3.C**
Load class How easy to work with without further installation required, like load distribution concrete slabs.	**1.C** **2.G** **3.P**
Anchoring Uplift depending on ground water table.	**1.C & G-V** **2.P** **3.G-H**
Installation depth Deep installation required when deep ground frost.	**1.C** **2.G** **3.P**
Refill material Cost factor if refill material needs to be brought in.	**1.C** **2.G** **3.P**
Installation compexity How many parts and equipment needed to install.	**1.P/G** **2.P/G** **3.C**
Ground Conditions Ground frost creating uplift and even load conditions on the tank.	**1.C** **2.G** **3.P**

1 – Best **2** – Better **3** – Good

C – Oil Sep **G** – Grease **P** – Grease

V – Vertical **H** – Horizontal

Looking back in time we can verify that the customer service level and lead times has a direct impact on sales.

Material recommedation

Load Class	Material	NS3	NS6	NS10	NS20	NS30	NS40	NS50	NS65	NS80	NS100	NS100+
A 15	Plastic	●	●	●								
	Concrete											
	GRP				●	●	●	●	●	●	●	●
B 125	Plastic	●	●	●								
	Concrete											
	GRP				●	●	●	●	●	●	●	●
D 400	Plastic											
	Concrete	●	●	●	●	●	●	●				
	GRP								●	●	●	●

PE - cost effective solution in small sizes, good ground conditions
Concrete - heavy ground conditions (sea level ect.), heavy traffic areas ≥ D 400
GRP – regular ground and traffic conditions (up to D 400)

ACO. we care for water

Every ACO product supports the ACO WaterCycle

- ACO stormwater management
- ACO pumping stations
- ACO oil separators
- ACO grease separators
- ACO hydrodynamic separators
- ACO stormwater filters
- ACO sedimentation tanks

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Edition 05/2023 – Subject to alterations