



ACO Green City

Climate-resilient urban planning

Sponge city concepts for
healthy urban green spaces





Dear Readers,

the consequences of climate change – heavy rainfall events, heatwaves and droughts – pose major challenges for urban areas in particular, and require new urban adaptation measures. There is an urgent need for innovative greening concepts on the one hand, and integrated rainwater management on the other hand. Instead of draining rainwater through sewer systems, the valuable resource of water needs to be stored on site with the help of blue-green infrastructures, and fed back into the urban water cycle. Together with urban planners and landscaping experts, ACO develops and realises practical solutions for your sponge city. Be inspired by our innovative concepts.



Clemens Asmussen
Product Manager, ACO GmbH
Green City Solutions

An oasis in the city: the Holstenbrücke

In the heart of Kiel, a previously monofunctional road traffic area has been transformed into an attractive public space with lots of water and new green spaces.

Project partner:
Consortium bgmr Landschaftsarchitekten,
Ingenieurbüro Obermeyer,
Ingenieurbüro Masuch + Olbrich,
ifb Frohloff Staffa Kühl Ecker

ACO WaterCycle



For people and nature.
For many decades, ACO has been committed to emulating the natural water cycle: this is what the ‘ACO WaterCycle’ stands for. Each product fully plays its part in creating a seamless transition between water collection, cleaning, retention and reuse.

More about the
ACO WaterCycle



1	Sponge city concepts	6
	Public squares	8
	City streets	10
	Stockholm system	12
	Urban quarters	14
2	Green City	16
	Urban trees and their function	18
	Climate change and its effects	20
	Urban water cycle	22
3	Reference projects from practice	24
	High bunker St. Pauli Hamburg	26
	New Chancellor Square Bonn	28
	Gendarmenmarkt Square Berlin	30
	hi Harbach Klagenfurt	32
	City centre design Raalte	34
4	Sustainability and UNESCO	36
	ACO. we care for water	37
5	askACO Service	38



1

Sponge city concepts for climate-resilient cities

Away from grey - towards more green and blue

A forward-looking approach to protecting cities from heavy rainfall – as well as heat and drought – is the sponge city principle. A large proportion of the rainwater or surface water is absorbed on site and stored locally. As soon as sufficient water is available in the ground or in cisterns for the irrigation of urban greenery, urban trees can develop healthily, and fulfil their functions as shade providers and natural air conditioners. Through evaporation and infiltration, rainwater and snow meltwater is returned to nature and the water cycle is closed.

Raalte: a square blossoms

At the beginning of 2023, the Grote Markt in the centre of the Dutch municipality of Raalte was redesigned to be climate-friendly. Where the heat used to build up oppressively on hot days, residents now find a high quality and inviting green oasis.

Project partner: IAA Architecten

Liveable city centres

The ACO sponge city concepts for public squares



8

Rieks Hulst
Marketing and Product Management,
ACO Netherlands

„Green and liveable: water features cool on hot summer days, and urban trees provide shade.“



Applications:
Green City Public Squares



How it works

- Collecting rainwater from roofs and public squares
- Cleaning the rainwater within the sedimentation installation
- Storing the cleaned rainwater on site in the block retention tank
- Fully automatic irrigation of plants and trees with smart sensors and percolation of excess water for groundwater recharge

Urban habitats

The ACO sponge city concepts for city streets



10

Stephan Kehren
Key Account Manager GaLaBau
ACO GmbH / Landscape architect

„Urban trees should be able to develop healthily despite difficult soil and traffic conditions.“



Applications:
Green City City Streets



How it works

- Collecting heavily polluted rainwater from road surfaces
- Cleaning the polluted rainwater using substrate filter stages and sedimentation
- Heavy rainfall management through automatically controlled buffer tanks according to the rain forecast
- Fully automatic irrigation of plants and trees thanks to smart sensors

How it works

- Collect rainwater from different areas
- Separation of de-icing salts that are harmful to plants
- Storage of rainwater in the underground retention tank
- Availability of water for plants in the large-volume retention tank



More space

The ACO sponge city concepts based on the Stockholm system



Christopher Peiritsch, Mag. (FH)
Head of Product Management and
Application Technology Building Elements
ACO Austria

„As Confucius said: ‘Take care of the roots - then the branches and leaves can take care of themselves!’ “



Applications:
Green City Stockholmer System

How it works

- Collect rainwater from different surfaces
- Biological purification via the living soil zone
- Storage of rainwater on site
- Water extraction by municipal irrigation vehicles



New ideas

The ACO sponge city concepts for urban quarters



Andreas Bauer-Idel
Landscape architect AKNW
ACO Inotec GmbH

„Too much water during heavy rainfall, too little in dry periods - the solution lies in a water-sensitive sponge city.“



Applications:
Green City Urban Quarters

Cities have always attracted people from different backgrounds and cultures. This is where new ideas and trends are born. However, as centres of economic activity, cities also cause environmental pollution such as air pollution, noise and CO₂ emissions. The urban climate is often very different from the climate in rural regions.

Asphalted and concreted city centres heat up more when exposed to sunlight. Night-time temperatures in summer are up to 10 °C higher than in the surrounding countryside. Children, the elderly and sick people in particular, suffer as a result. Urban greenery reduces heat stress. Especially City trees in particular improve the urban microclimate.

Urban trees and their function

Stress reduction

Urban trees have a proven positive effect on human wellbeing. Greenery promotes the happiness of city dwellers and helps to reduce stress.



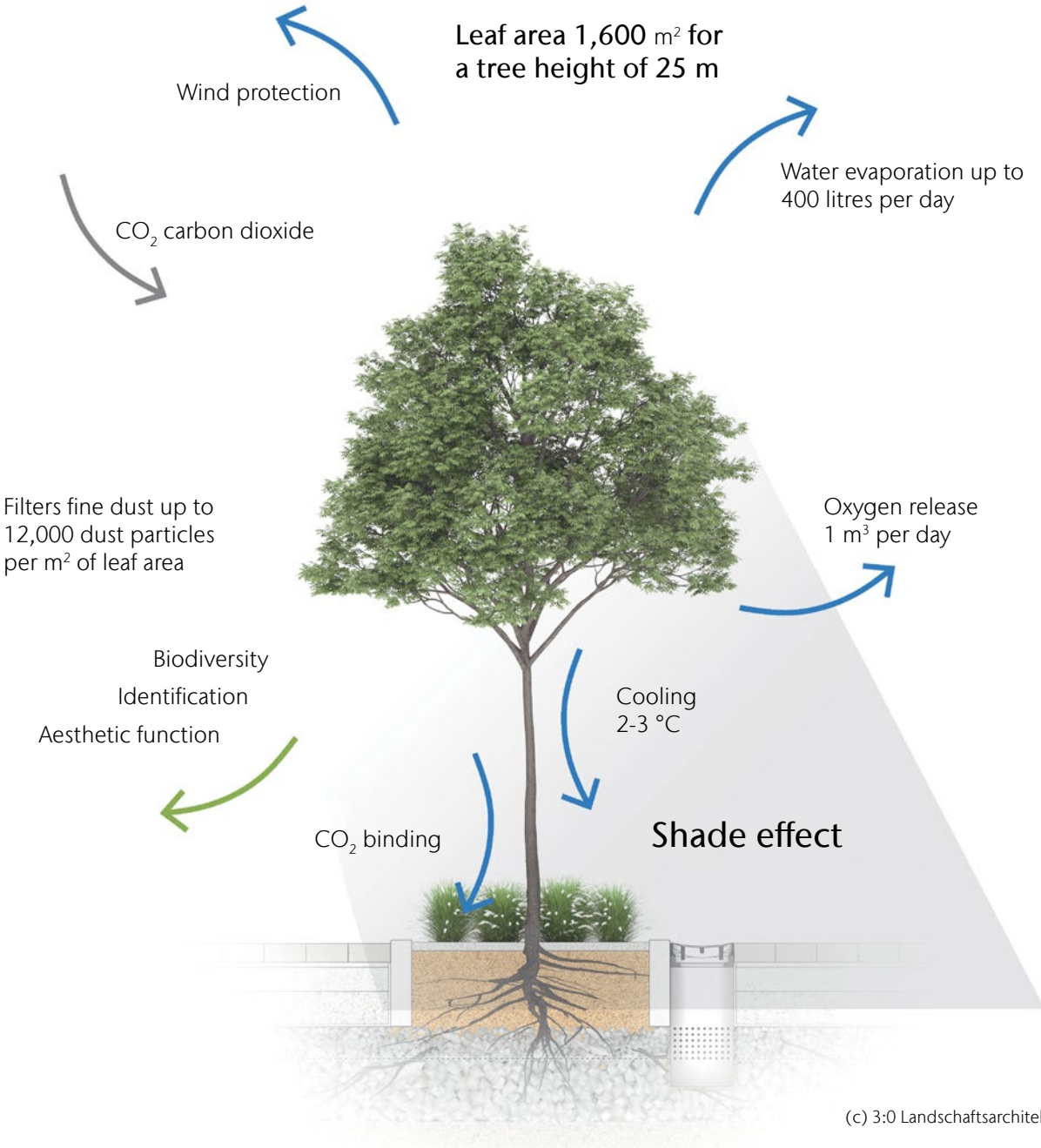
Biodiversity

Urban trees play a key role for biodiversity in urban areas. They are habitats and retreats, providing protection and food for animals and plants. At the same time, they ensure the genetic diversity of plant species by serving as corridors for pollen flow.



Cooling

Heat stress is measurably reduced by the shading effect of the tree canopy, and the cooling effect of water evaporation.



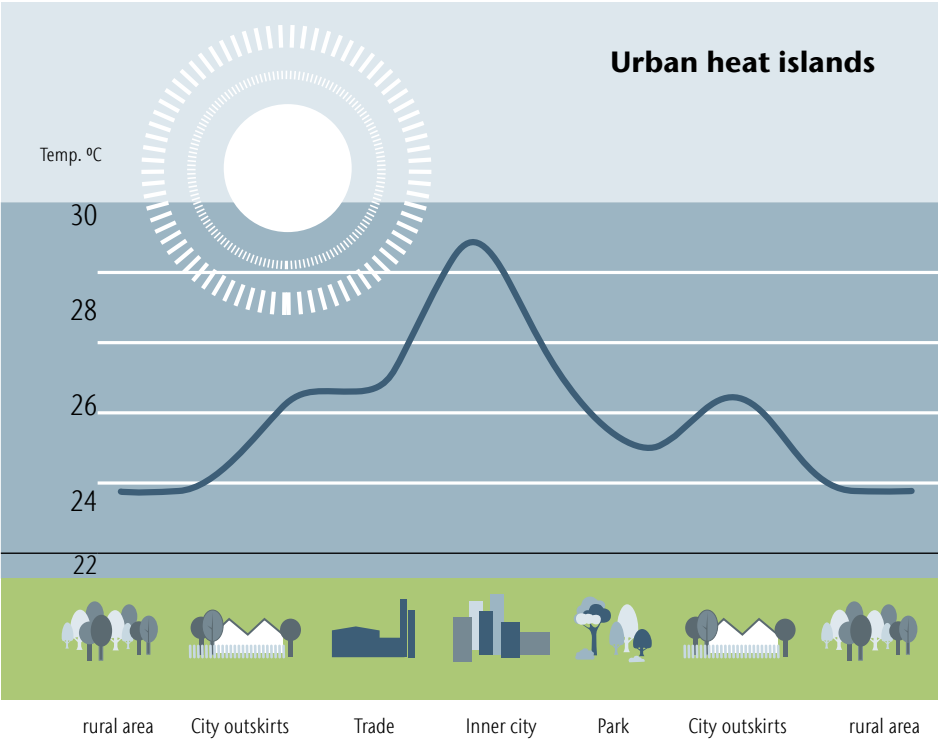
Climate change - effects on the urban ecosystem

As a consequence of global warming, urban trees are becoming increasingly important for sustainable adaptation strategies. Urban ecosystems – which are particularly hard hit by the effects of climate change – are experiencing above-average temperature rises, increased droughts and heavy rainfall

events as a result of the paving over of natural surfaces and high building densities. In densely built-up cities, the soil loses its biological functions, causing disruption to the water cycle. Increasing evaporation leads to extreme weather and flooding, while heat and drought stress the trees.



The heat island effect



„More greenery and more shade can make cities more pleasant to live in.“

Clemens Asmussen



According to the German Weather Service (DWD), the number of hot days with temperatures above 30 °C in Germany has tripled in recent decades. Places in city centres without trees are particularly affected, as asphalt and concrete store the heat and release it slowly. This is exacerbated by waste heat from engines and heating systems. In rural areas, it is up to ten degrees cooler.

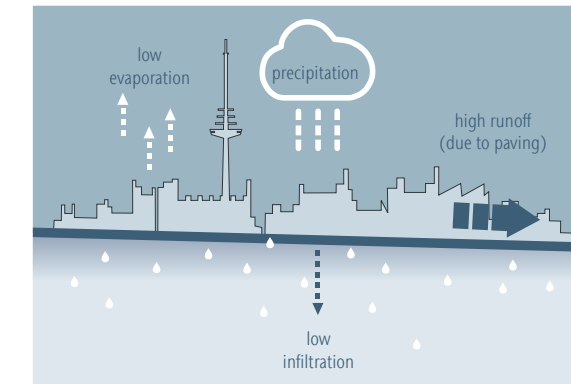
The urban water cycle

The urban water cycle encompasses the entire path of water in cities: from drinking water supply and consumption, to drainage and wastewater disposal. An extensive infrastructure is required, including water supply pipes, wastewater systems and sewage treatment plants. In Germany, over 70 per cent of drinking water comes from groundwater.

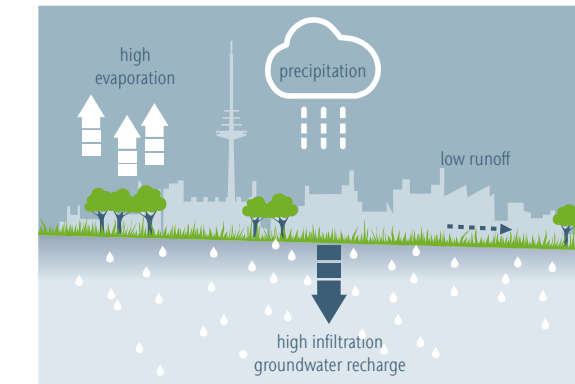


The urban tree in the urban water cycle

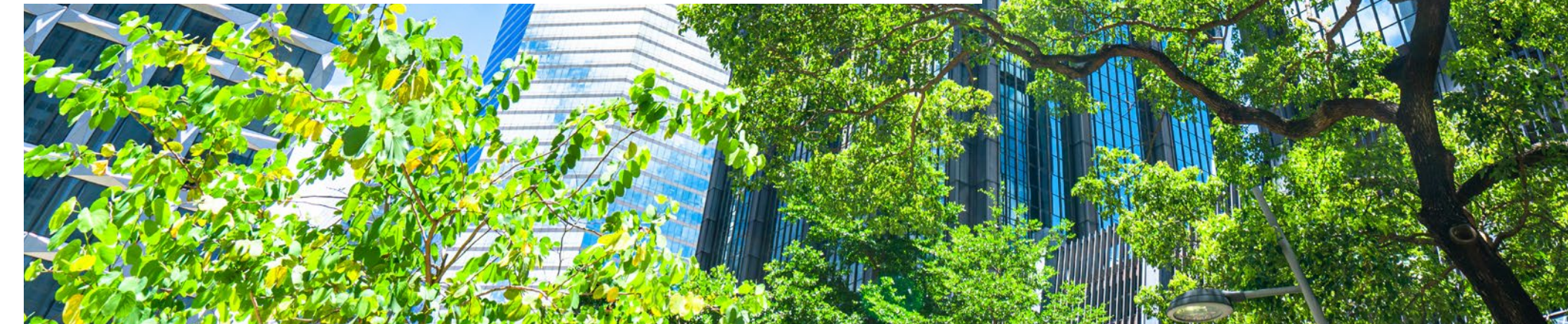
Urban trees are essential for the water cycle. They contribute to evaporation and need a lot of water themselves, which they absorb through their roots. In natural habitats, vegetation is watered via the water cycle. In cities, the conditions are more difficult: precipitation is often quickly drained away so that the water cannot seep away sufficiently and irrigate the urban greenery. Urban trees are often located in polluted environments where pollutants from street runoff impair water quality. Modern decentralised rainwater management imitates the natural water cycle, prevents harmful substance inputs and improves the urban climate.



Urban water cycle

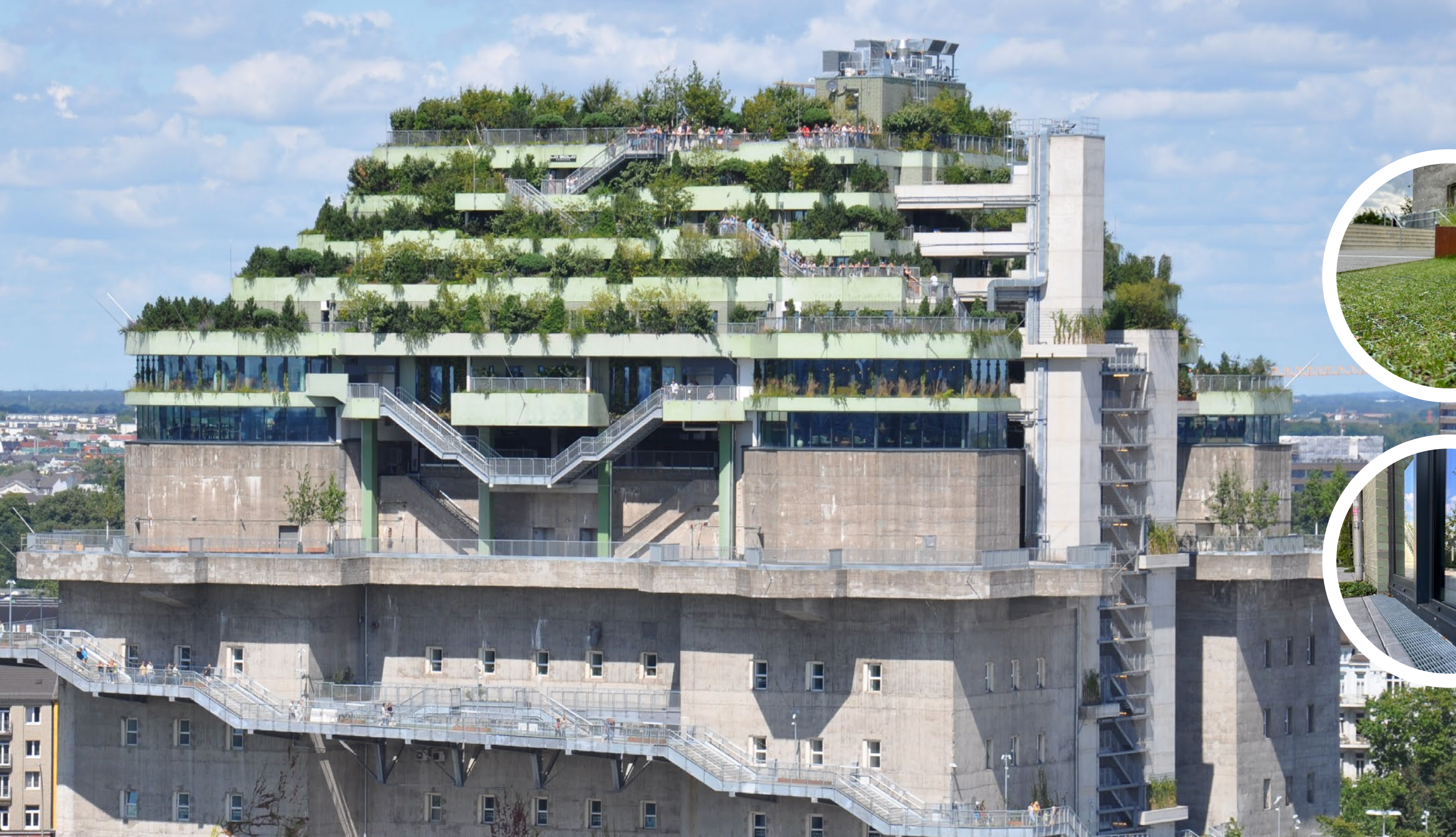


Natural water cycle



Reference projects from practice

Protecting water as a resource is our mission. The claim 'ACO. we care for water' is not just empty words: in the following chapter, we present reference projects in which the sponge city principle has been realised. Be inspired by the various possibilities and develop new ideas for bluer and greener urban areas. When redesigning our cities and landscapes, small measures are just as important as integrated solutions to ameliorate the consequences of climate change. Whatever the phase of the project, we are happy to support you with our decades of experience in rainwater management.



Vertical sponge city above Hamburg – the High Bunker von St. Pauli

With its intensively greened roof and façade areas, the extended High Bunker in Hamburg’s St. Pauli district, which now boasts five floors, is based on the principle of the sponge city.

Drainage ensures greenery

This vertical sponge city was made possible thanks to an innovative drainage concept that utilised ACO products.

On the roof terraces and on the façade around the barrier-free entrances, channels ensure effective rainwater absorption. On the approximately 560 metre-long green ‘mountain path’, ACO Self® turf honeycombs promote greening, accessibility and the elimination of paving.



Reference:
Vertical sponge city
above Hamburg

Intelligent drainage at New Chancellor Square, Bonn

A new office complex was built on an area of over 15,000 m² in Bonn's Gronau district. As almost the entire site is located on an underground car park, green spaces are rare. Together with ACO Technical Sales, RMP Stephan Lenzen Landschaftsarchitekten developed solutions for climate-resilient areas. Due to the risk of flooding in the city centre, complex special drainage solutions were required. Rainwater is stored, drained away in a controlled manner or reused for vegetation.



Reference:
New Chancellor Square
in Bonn





Berlin's Gendarmenmarkt Square designed to be climate-resilient

Climate-resilient, heritage-compliant, tourist-friendly: an innovative rainwater management system with ACO solutions is taking shape at Berlin's Gendarmenmarkt Square.

For the Berlin Senate, the redevelopment of the Gendarmenmarkt Square symbolises sustainable urban redevelopment that meets the challenges of climate change. Thanks to a comprehensive system rainwater is collected, cleaned and discharged in a controlled manner back into the water cycle.

The square, a tourist hotspot, is being modernised with new natural stone and underground infrastructure solutions, such as channel and infiltration systems. ACO supplied solutions specially tailored to the requirements of the square to prevent flooding and stabilise the groundwater level.



Reference:
Gendarmenmarkt Square
in Berlin

Sponge city quarter: hi Harbach in Klagenfurt, Austria

As part of the hi Harbach housing development project, a central park with an adjoining promenade will be created. In future, this open space will serve as a recreational area with a wide range of activities for all generations. The surface drainage is based on the ecological principle of reusing the collected water.

In the park area, all paths are drained into the green areas. Part of the promenade drains the surface water via the ACO DRAIN® Multiline drainage system, which is connected to the ACO Sponge City street drain, in the area of the promenade trees. The collected rainwater is cleaned to remove coarse particles and sediment and channel-

led via seepage pipes to the underground sponge city structure based on the Stockholm system – making it available to the tree roots. The rainwater seeps away naturally through the existing soil. During heavy rainfall events, several emergency overflows are provided in the sponge city neighbourhood, which flow into three soakaways. Rainwater contaminated by de-icing salt in winter is separated out using the integrated separator in the ACO Sponge City road drain, and also drained into connected soakaways, so that the surrounding trees are not damaged.

Reference:
hi Harbach
in Klagenfurth





Blue-green transformation in the city centre of Raalte, Netherlands

Increasing weather extremes pose challenges for cities. Sustainable rainwater management systems are necessary for a good quality of life and to minimise the consequences of climate change. Together with IAA Architecten and the municipality of Raalte, ACO has developed an intelligent irrigation system for trees, that uses sensors to irrigate as needed. Twelve tree-districts in the centre of Raalte have been equipped with this system. It collects rainwater, stores it and waters the trees automatically. Sensors determine the amount of water required, allowing the system to work efficiently and conserve resources.



Reference:
Smart irrigation
in Raalte



The Sustainable Development Goals (SDGs) are 17 global sustainability goals set by the United Nations (UN). They cover a broad spectrum of social, ecological and economic issues. The aim is for all UN member states to fulfil the desired changes by 2030.

ACO is an ambassador for Sustainable Development Goal 6

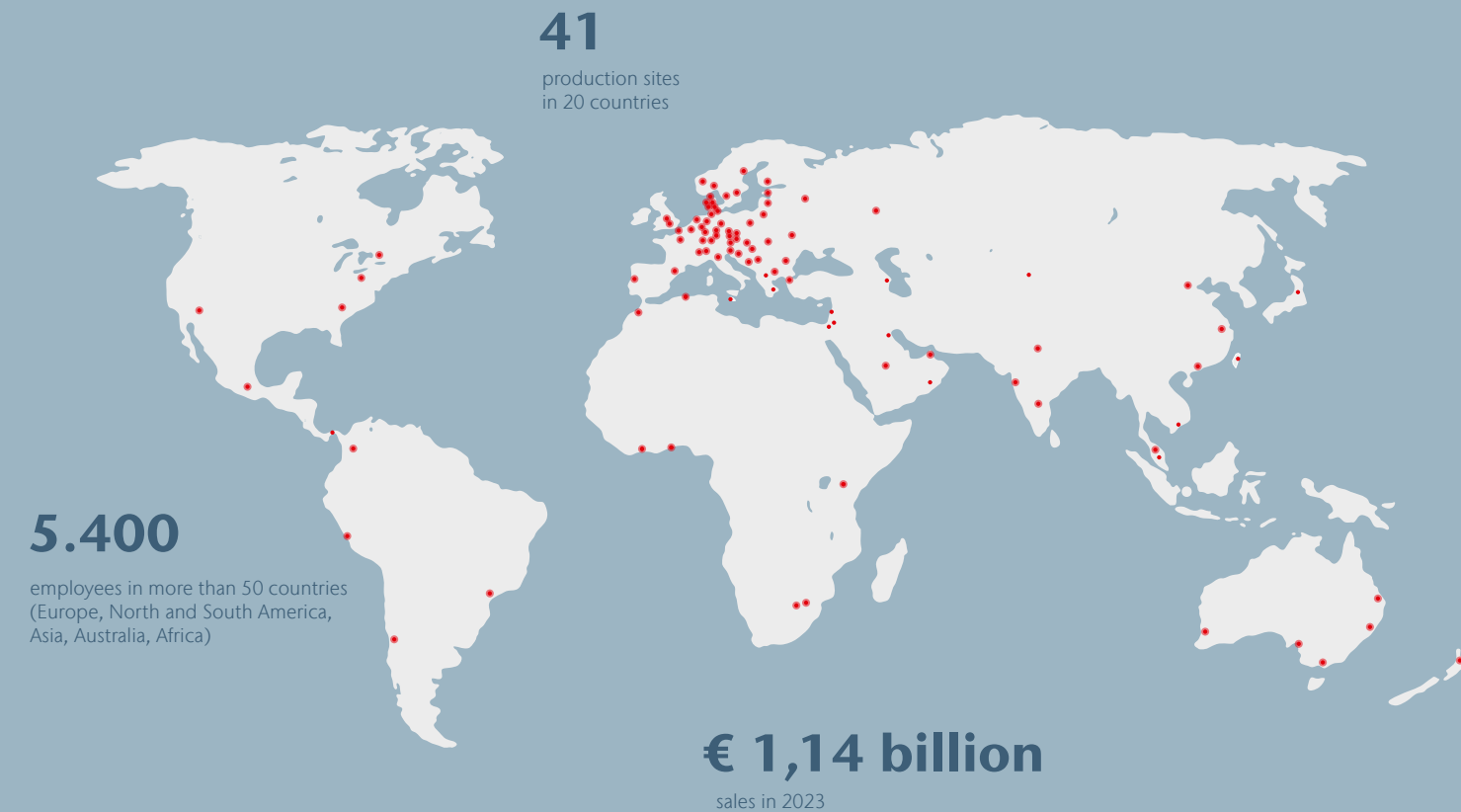
To mark UNESCO's 80th anniversary in 2025, and WFEO's upcoming World Engineering Day for Sustainable Development on 4 March 2025, we are proud ambassadors of the sixth UN Sustainable Development Goal 'Clean Water and Sanitation'. This cooperation underlines ACO's global commitment to make every project part of the ACO WaterCycle and thus itself an ambassador for sustainable water management.

Find out more about ACO's products and partnerships for clean water here:



ACO. we care for water

ACO is a WaterTech company that cares for water. Based on our global drainage expertise, which has been protecting people from water for many years, we increasingly see our mission as also protecting water from people.



Iver und Hans-Julius Ahlmann
run ACO as a family business



Head quarter in Rendsburg/Büdeltsdorf



ACO Academy

ACO. we care for water

