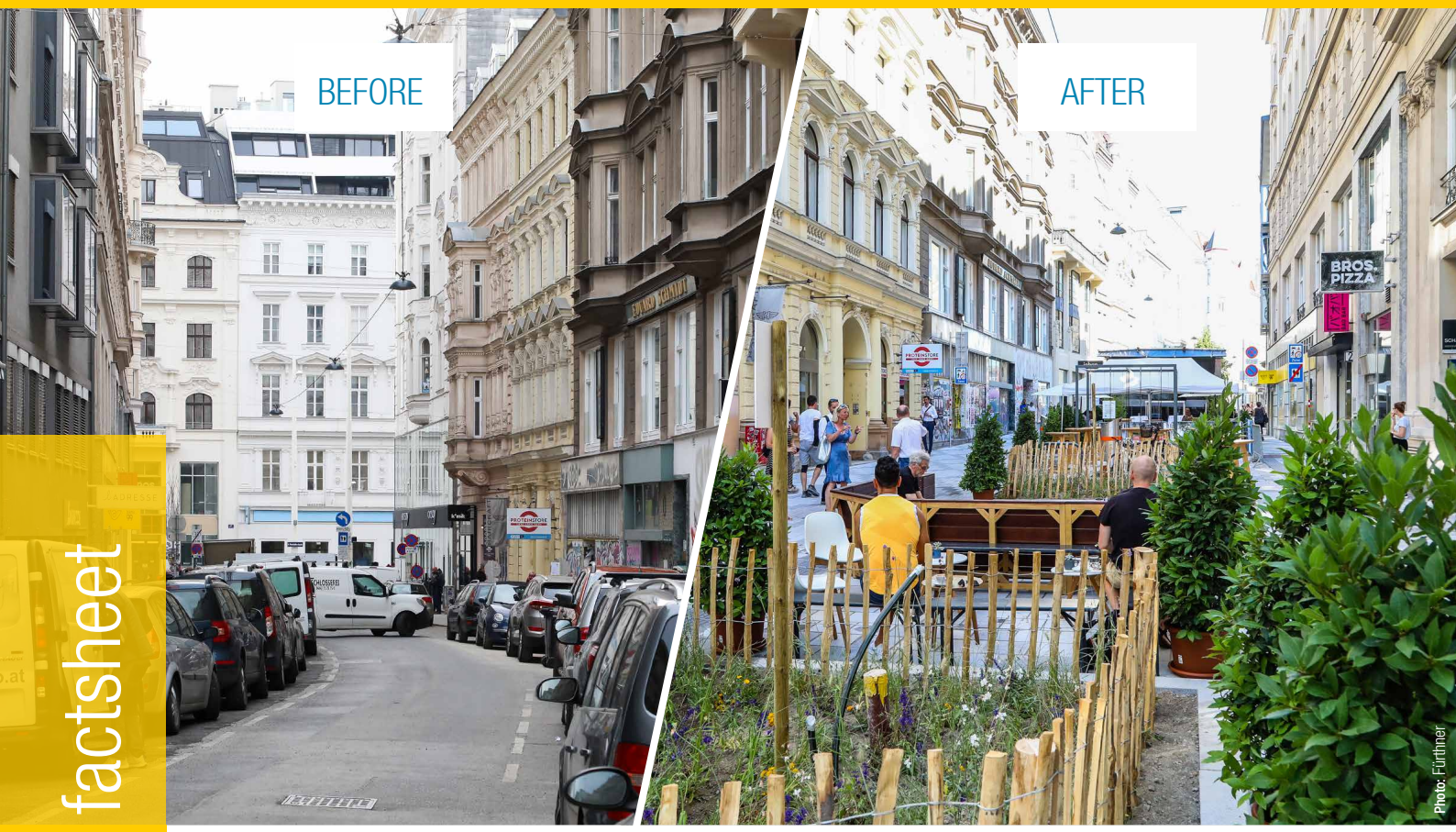
VCÖ
MOBILITÄT MIT ZUKUNFT



VCÖ factsheet

Increased Climate Change Adaption Needed in Cities

Cities are particularly affected by climate change. More hot days and heavy rain events are a challenge, also for the infrastructure. Unsealing the street space and more green spaces and water features help to cushion the effects of global warming. At the same time such measures increase the quality of life in the city.

In the past ten years, in Austria, between four to 13.5 square kilometers of land were used annually for roads.[1] The heat build-up effect in cities due to dense construction and sealing leads to nighttime air temperature differences of up to ten degrees Celsius compared to surrounding areas.[2] Especially in urban areas, high sealing and insufficient green spaces result in heat islands. To counteract these effects and maintain the population's quality of life, increased implementation of green and blue infrastructure is crucial.

Promoting green and blue infrastructures

Der Climate change not only brings an average temperature increase of 1.5 to 4.0 degrees Celsius in the coming decades but also increased extreme weather events such as heatwaves, heavy rainfall, and storms.[3] Urban planning and street design can make a crucial contribution to climate-resilient cities. Two goals can be combined here: shading, greening, and unsealing the street space firstly help increase climate resilience in the city. Secondly, it enhances quality of life.

Across Austria, transportation accounts for 43 percent of sealed surfaces; in the state capitals, the proportion is lower, ranging from 28 percent in Graz to 40 percent in St. Pölten. Eisenstadt and St. Pölten have the highest sealed transportation area per capita, each with more than 100 square meters per capita, while Vienna has the lowest at around 25 square meters per capita.[4] Particularly in residential areas, sealed surfaces exacerbate heat stress on hot days. Conversely, during heavy rainfall, the risk of flooding increases.[5]

Heat days are increasing significantly

Days with temperatures of 30 degrees Celsius or higher are increasing particularly in cities due to global warming and high levels of sealing. In Vienna, there were an average of 15 heat days per year between 1981 and 2010, while from 2011 to 2021, the average rose to nearly 28, almost double. In Linz and Graz, the number of heat days has more than doubled from ten each to 22 each per year. Even more pronounced is the increase in tropical nights: in Graz from an average of 0.6 to 5.7, and in Linz from 0.2 to five. In Vienna, the average number rose from about three per year from 1981 to 2010 to nine annually between 2011 and 2021, with a peak of 42 in 2015.[6]

Parking areas heat up until the night

Parking lots are mostly paved with asphalt, preventing rain from seeping into the ground. The asphalt heats up to as much as 60 degrees Celsius due to sunlight.[7] Among the parked cars, a heat cushion forms, further warming the surroundings during the night. At night, one in five people in Austria is already physically affected by the heat, and in Vienna, it's one in four.[8]

Implementing intelligent parking lot unsealing

Unsealing parking lots and making them capable of absorbing water is an important measure for adapting to climate change. When the ground can absorb and retain water, it reduces the risk of flooding, and evaporation helps cool the street space on hot days.

For example, paving stones can be laid with widened joints so that rainwater is directed through the joints into the ground. Porous stones allow water to permeate directly through the stones. However, they are less durable than, for example, natural stone pavement, whose joint spaces also provide a habitat for microfauna. Grass grid stones are another option, offering more slip resistance than natural stone.[9]

Introducing climate-resilient bicycle and pedestrian paths

Different mixtures of permeable, unsealed ground coverings are available for bicycle and pedestrian paths. Natural path surfaces can consist of various water-bound mineral mixtures made from natural stone materials.[10] It is especially important on heavily frequented pedestrian paths to consider the permeability of the ground cover, as well as shading and accessibility. To ensure that these paths can be easily navigated with wheelchairs and strollers, solid paths are necessary, but they can also be designed to have good drainage capabilities.

Photo: DD Landschaftsplanung ZT KG

From parking lot to gathering place in Tulln

The Nibelungenplatz in the city center of Tulln was previously a parking lot. In 2021, the city council decided to redesign the space into a green, inviting meeting point. After extensive citizen participation and detailed planning, starting from 2024, the area will no longer be a parking lot but a place to linger. In total, parking spaces will be reduced from 211 to 54. The area will be 71 percent open to infiltration, with an additional 23 percent designed to be permeable – achieved through numerous green spaces, gravel, and paving stones.[17] This allows the new trees to access sufficient stored water to provide shade with their large canopies. A misting system and irrigation of green areas will be digitally controlled to minimize water consumption.[18]

Reducing heat stress on roadways

Lighter-coloured road surfaces can reduce heat. Concrete temperature differences were measured in a pilot project in Paris. Newly developed asphalt mixtures were laid in three streets. A lighter colour and porous surface lead to less heat buildup, allowing water to evaporate. The air temperature in these renovated streets is reduced by about one degree.[11] For a reduction in perceived temperature during the day, a combination of measures is necessary. An evaluation of design options for Kirchengasse in Wien-Neubau shows that heat stress for pedestrians can be reduced by up to 15 degrees using trees, green spaces, and lighter ground coverings in this street.[12]

Greening for improved quality of life

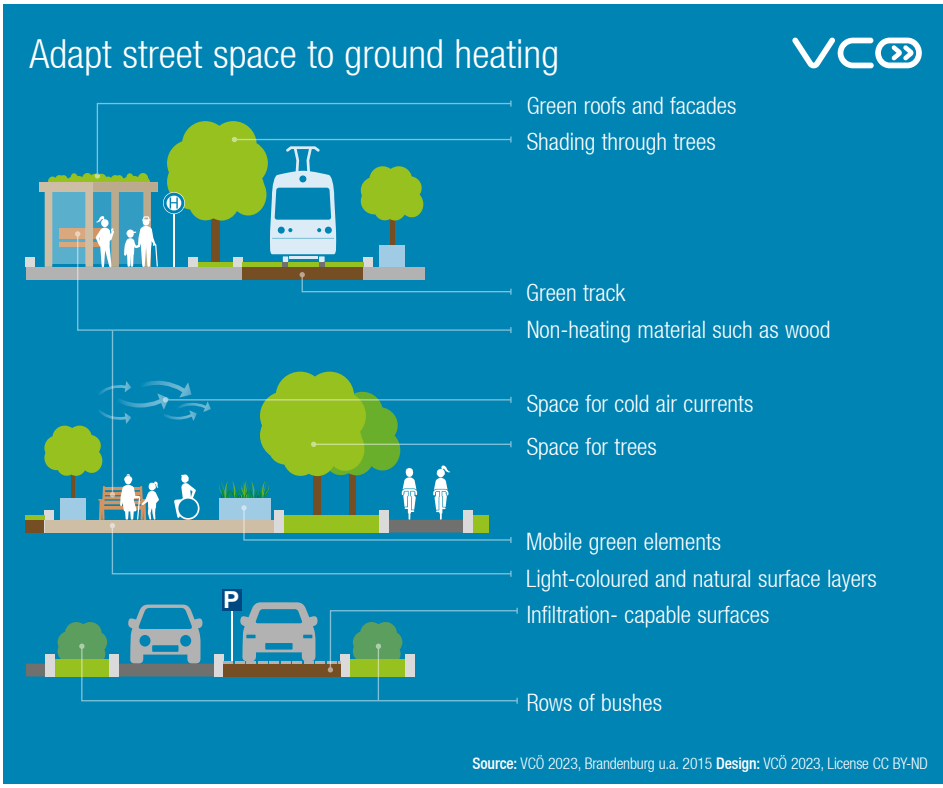
The cooling effect of plants can be utilized through various greening measures of infrastructure and buildings, with diverse positive effects on people and the environment. In the transportation system, these effects can be particularly utilized through greening facades, roofs, and infrastructure. If all facades in a section of road were greened, heat stress could be reduced by almost ten percent.[13]

Public transit stops can be equipped with climbing plants or green roofs. Many European cities have had good experiences with green tracks. For instance, in Lyon, Barcelona, Freiburg, and Budapest, newer sections of tram lines are executed with grass tracks. In Linz, Austria, nearly 18 kilometers are green tracks. In Vienna, eight kilometers have been implemented so far.[14]

Water cools the city

Water plays a central role in adapting cities to climate change. It helps mitigate heat stress by lowering ambient temperatures through evaporation and cooling. For example, in Esterházypark in Wien-Mariahilf, the perceived ambient temperature is reduced by up to six degrees through unsealing, greening, and misting systems.[15]

Water bodies also have measurable cooling effects. In urban areas, ponds, lakes, and rivers can lower ambient temperatures by up to 2.5 degrees during the day.[16] Integrating water into green infrastructure, such as rainwater basins and natural river systems, enhances the natural resilience of cities while simultaneously increasing their ecological value.



Creating space for trees

Trees significantly contribute to cooling the environment, mainly through shading and evaporation. However, trees often suffer from insufficient root space and water storage capacity due to urban conditions. Consequently, the lifespan of newly planted street trees in cities is often only 10 to 20 years. The sponge city principle provides roots with sufficient space for growth, respiration, and nutrition by combining coarse and fine substrates. Examples of sponge city projects have so far been implemented in places such as Eggenberger Allee in Graz, Johann-Nepomuk-Vogl-Platz in Vienna, Praterstern in Vienna, Ing. Etzel-Straße in Innsbruck, and the main square in Lanzenkirchen.

Diverse locally adapted measures contribute to less heat, better water infiltration, and improved quality of stay.

Implementing green and blue infastructure

The possibilities for cooling and unsealing in cities are diverse and necessary not only with regard to the consequences of climate change. They also enhance the living environment for an increasing number of people who live and work in urban areas. There is a need for more space dedicated to greening and water areas for a pleasant urban climate. Numerous implementation examples prove that unsealed and greened street spaces additionally contribute to higher quality of stay and improve the resilience of cities. Local temperature can be reduced, fine dust is bound, noise is reduced, and the risk of flooding is lowered.

Redesigning traffic areas

Cities can improve their resilience to the consequences of climate change and reduce heat by implementing various measures adapted to local requirements. This includes unsealing traffic areas and especially parking lots, expanding green infrastructure such as parks and urban gardens, and adjusting urban planning to promote natural ventilation and shading. The use of cooling surface materials for roads, roofs, and facades, as well as improved water management, can also help.

Sources online under:
www.vcoe.at/publikationen/vcoe-factsheets

VCÖ-Recommendations

Implementing green and blue infrastructure for a climate-resilient city:

- Strengthen the resilience of cities against heat, noise, and floods by implementing green and blue infrastructure.
- Create space within the existing infrastructure to redistribute street space in favor of green spaces, trees, additional shading, and water areas that benefit the urban climate and society as a whole.
- Reduce and unseal traffic areas and parking lots to improve soil permeability.
- Use infiltration-capable surfaces for pedestrian and bicycle paths to reduce local heat and flood risks.
- Promote greening of suitable areas in urban spaces such as roofs, facades, and railway areas, and consider retention cascades.
- Apply the sponge city principle when planting trees to develop long-lasting, healthy trees.
- Implement comprehensive and sustainable water management to make cities more resilient to the impacts of climate change.

Katharina Jaschinsky
VCÖ - Mobilität mit Zukunft:
„Blue and green infrastructures not only help to alleviate the strain on cities by reducing heat days and floods, but also enhance the overall quality of life."

tumi
Transformative Urban Mobility Initiative

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Through TUMI, the German Federal Ministry for Economic Cooperation and Development (BMZ) is supporting climate-friendly, inclusive, safe and affordable mobility in cities globally.

Learn more:
https://transformative-mobility.org/

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