

Think Concrete, Go Precast

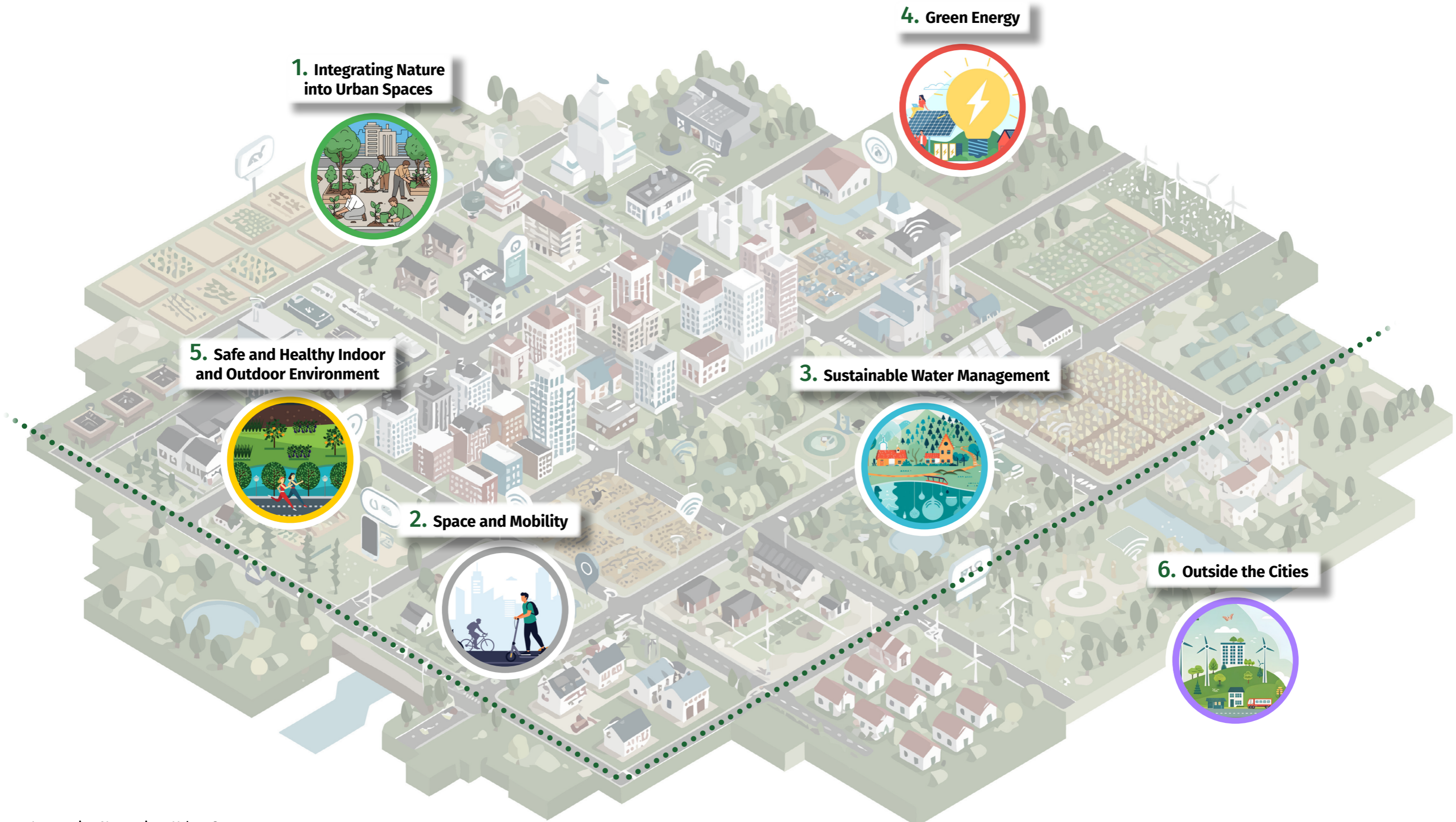


By BIBM – Federation of the European  
Precast Concrete Industry



# GREEN CITIES with PRECAST

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**1. Integrating Nature into Urban Spaces**



**4. Green Energy**



**5. Safe and Healthy Indoor and Outdoor Environment**



**3. Sustainable Water Management**



**2. Space and Mobility**



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**Green Cities with Precast** explores how precast concrete enhances urban development by improving buildings, infrastructure and public spaces. It supports the integration of nature, water management, transport and renewable energy solutions. As industry moves towards decarbonisation, precast continues to deliver environmental, social and economic benefits. With cities facing rapid urban growth and climate challenges, prioritising safety, resilience and human well-being is crucial. This booklet showcases how precast sector solutions optimise resources, maximise space and improve quality of life, contributing to more sustainable cities and more connected communities.

## WHAT ARE **GREEN CITIES**



**GREEN CITIES** are urban areas planned and managed to improve everyday life while reducing their impact on the planet. They make smart use of resources, cut emissions and support clean energy and transport. Nature is integrated into buildings and public spaces, while water and land are managed responsibly. These cities are designed to be safe, smart, resilient and people-centred - creating healthier communities and a more sustainable future.



01.

## Integrating Nature into Urban Spaces



As cities grow, integrating nature is essential for sustainability and well-being. Green spaces connect people to nature, reduce stress, and foster a sense of community. Precast concrete elements support nature-based solutions such as green roofs, living walls, and urban gardens. These features manage stormwater, improve air quality, reduce heat and noise, and enhance aesthetics.

### a. GREEN ROOFS

Green roofs enhance insulation, reduce energy consumption, and help mitigate the urban heat island effect. They lower temperatures, improve air quality, and manage stormwater by absorbing rainwater and filtering pollutants. Precast concrete slabs provide an ideal solution, supporting the significant weight of soil, vegetation, and water retention systems while ensuring structural stability.



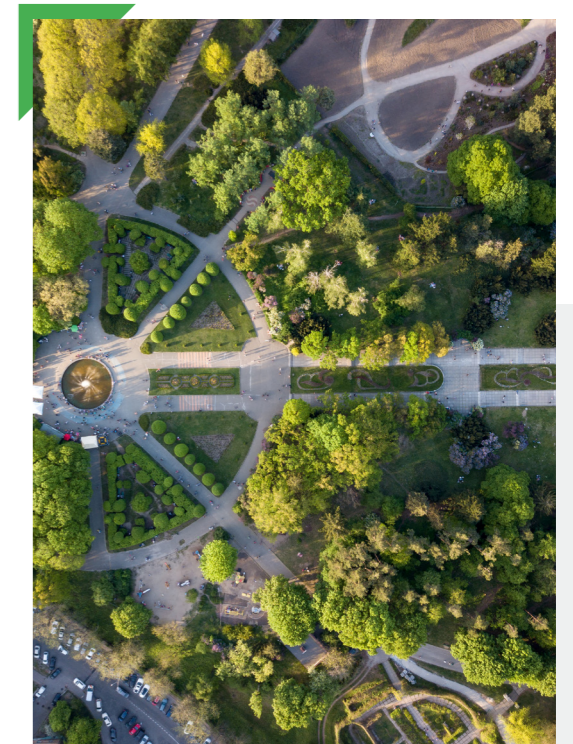
### b. GREEN WALLS

Similarly to roofs, green walls improve air quality, absorb pollutants, and release oxygen, making cities healthier. They insulate buildings, reducing heat gain in summer and heat loss in winter, cutting energy use. They also absorb noise, enhance urban aesthetics, and support biodiversity by creating habitats for insects and birds.

Precast concrete panels, façades, and retaining walls are the ideal solution. They provide the strength and stability needed to support soil, hydroponic, or modular green wall systems. Made from non-combustible concrete, they also enhance fire protection, creating a safer and more resilient built environment.

### c. URBAN GARDENS

Elevated urban gardens and community spaces enhance city living by improving air quality, regulating temperature, and fostering social interaction. They provide areas for recreation and urban greenery, as well as opportunities for gardening and food cultivation. Precast concrete elements, such as retaining walls and paving slabs, ensure durability and seamless integration into modern cityscapes, making these green spaces both functional and sustainable.





02.

## Space and Mobility



Space and mobility are key to modern cities. Taller precast buildings use vertical space efficiently. Underground precast solutions optimise subterranean areas, enhancing mobility and supporting sustainable development. Modular precast systems, paving slabs, and prefabricated tunnels transform unused areas into vibrant, community-focused spaces. These solutions improve accessibility, support eco-friendly transport, and reduce urban heat. Precast systems also create space for green areas, reducing urban sprawl.

### a. MOBILITY AND SUSTAINABLE TRANSPORT

Precast solutions enhance urban mobility and contribute to a more sustainable, connected future. Sustainable mobility is supported by infrastructure solutions like concrete block permeable paving, raised kerbs at transit stops, bike racks and cycling lanes. These precast concrete elements create safer, more accessible spaces for pedestrians and cyclists. They encourage greener modes of transport and improve connectivity. By promoting eco-friendly travel, they help reduce traffic congestion and lower CO<sub>2</sub> emissions. This leads to cleaner, more efficient cities.

### b. LIGHTER THAN ASPHALT

Lighter-coloured precast concrete surfaces reflect more sunlight and absorb less heat than darker materials like asphalt, enhancing the albedo effect and reducing the urban heat island effect. This helps cities stay cooler and improves microclimates. These surfaces also lower building cooling demands, boosting energy efficiency and mitigating climate change by reducing surface temperatures and cutting carbon dioxide emissions.



### c. SMOOTH, DURABLE SURFACES FOR RECREATION

Smooth, durable surfaces for recreation are an essential benefit of precast concrete. By combining functionality with sustainability, precast concrete encourages outdoor activity and social interaction, helping to create vibrant urban areas that promote health and well-being. Products like benches, walls, and stairs are perfect for activities such as parkour, biking, and skateboarding. These resilient surfaces support active lifestyles and integrate seamlessly with eco-friendly spaces like parks and public spaces.



### e. SOUND REDUCTION IN URBAN SPACES

Sound reduction is a key benefit of precast concrete in urban environments because the material blocks sound effectively. This reduction in noise improves the quality of life, making urban areas more pleasant to live, work, and socialise in. By minimising disruptive sounds, precast concrete helps creating quieter spaces and foster peaceful, more liveable cities.



### d. CREATING SPACE BY BUILDING HIGHER

Precast elements are highly versatile, allowing for the creation of efficient, high-rise buildings with minimal disruption. Building taller with precast concrete offers the advantage of quick erection, enabling faster construction and maximising the use of urban space. This approach optimises land use, providing more green areas and public amenities while promoting compact, sustainable urban forms and reducing sprawl. Lean elements reduce structural thickness, creating lighter structures that lower foundation loads and improve material efficiency.





03.

## Sustainable Water Management



Sustainable water management in urban areas can be enhanced with versatile precast concrete solutions. Precast systems align with sponge city concepts, allowing water to infiltrate the ground and minimise runoff. Permeable surfaces help manage stormwater, reducing flood risks and supporting sustainable water use. For water retention, precast's waterproof properties ensure reliable storage while preventing damage. These solutions also support wastewater management, enabling treatment and reuse of water, further boosting resilience. Additionally, stormwater can be reused for irrigation, reducing reliance on potable water. Precast elements, like rain gardens, help integrate water management with green spaces, combining function and aesthetics.

### a. INFILTRATION SOLUTIONS AND SPONGE CITIES



Sponge cities use systems that allow rainwater to infiltrate the ground, reducing runoff and alleviating flooding. Precast systems, such as permeable paving, stormwater storage units, pipes and manholes, capture and store rainwater. They help replenish groundwater and reduce surface runoff, supporting more resilient urban drainage. Rainwater harvesting and retention ponds enable stormwater reuse, while dual-purpose drainage channels separate wastewater and rainwater to improve efficiency and protect infrastructure.

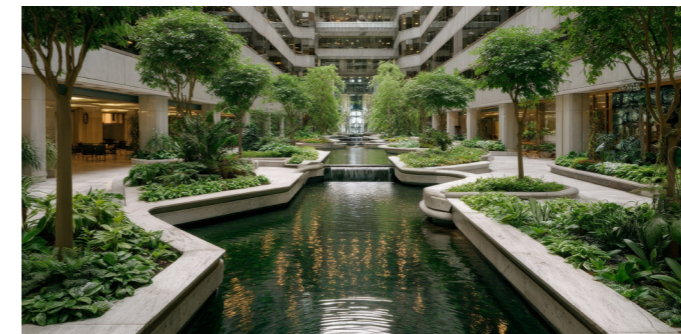


### b. WATERPROOF SOLUTIONS FOR STORAGE

Waterproof precast systems are essential for safe water storage, especially during extreme weather events. These systems prevent contamination and allow for the safe storage of rainwater for emergency use or harvesting. They also assist in wastewater management, easing the load on treatment facilities. Reusing treated water for non-potable purposes like irrigation conserves freshwater and supports sustainable urban development.



### c. VISIBLE WATER FEATURES FOR ECOLOGICAL AND AESTHETIC BENEFITS



Visible water features, such as rooftop gardens, pools, and water elements, enhance both the ecology and aesthetics of urban spaces. They promote biodiversity, reflect the surrounding landscape, and create soothing environments. These water elements help transform urban areas into blue-green oases, contributing to ecological health and adding beauty to otherwise grey spaces.

### d. HUMAN-CENTRED SPACES WITH SUDS DESIGN

Sustainable Urban Drainage Systems (SuDS) use modular precast elements like permeable paving, rain gardens, and attenuation tanks to manage stormwater efficiently. These systems not only reduce surface runoff and promote groundwater replenishment but also improve urban aesthetics and biodiversity. SuDS foster human-centred spaces, enhancing community well-being and supporting the development of sustainable, green cities.





04.



## Green Energy

Green energy is essential for decarbonising urban environments, and precast concrete plays a key role in supporting this transition. Precast elements can be used in the construction of infrastructure such as electric vehicle charging stations and car parks, providing a foundation for sustainable mobility. Precast concrete can also be designed to integrate with various green energy technologies, such as solar panels and geothermal systems, enhancing energy efficiency. Its thermal insulation properties further contribute to reducing energy consumption in buildings. These solutions support the integration of renewable energy technologies, helping cities move towards a cleaner, more sustainable future.



### a. INCORPORATION OF SOLAR PANELS

The incorporation of solar panels into buildings promotes renewable energy in urban environments. Precast concrete structures can be specifically designed to accommodate solar panels on rooftops or facades, or as solar benches that charge phones, combining functionality with public utility, enabling efficient energy generation. Precast elements, such as pre-designed mounts or frames, provide a sturdy and durable base for securely installing solar panels, ensuring long-term performance. This integration not only helps reduce reliance on non-renewable energy sources but also contributes to lowering a city's overall carbon footprint, while enhancing urban comfort and connectivity.



### b. GEOTHERMAL SOLUTIONS

Geothermal systems can be integrated into urban buildings using precast concrete elements like foundation walls and pipes. These systems leverage the earth's stable temperature for heating and cooling, reducing the need for traditional energy sources. This sustainable approach enhances energy efficiency and lowers carbon emissions, contributing to greener cities.



### c. GREEN ENERGY INFRASTRUCTURE

Electric vehicle charging stations and car parks benefit from the use of durable precast elements. These solutions provide the necessary support for sustainable mobility infrastructure while enhancing energy efficiency. By integrating such infrastructure, cities can advance their green energy goals, reduce reliance on fossil fuels, and promote eco-friendly urban development.



### d. THERMAL COMFORT

Thermal mass in precast concrete helps regulate indoor temperatures by absorbing heat during the day and releasing it at night. This reduces the need for extensive heating in winter and cooling in summer, lowering energy consumption and utility costs. The excellent thermal insulation properties of precast concrete further enhance energy efficiency, stabilising the internal climate and reducing the building's carbon footprint. This improves comfort and supports sustainability by minimising environmental impact.



### e. LOW CARBON FOOTPRINT

The production of precast concrete can be optimised to lower its carbon footprint through the use of sustainable materials, energy-efficient processes, and recycled or low-carbon materials. These practices help reduce emissions, making it a more sustainable choice. Additionally, the durability of precast concrete reduces maintenance needs, offering long-term environmental benefits. Faster construction on-site minimises pollution, disruption to adjacent structures, and supports the transition to eco-friendly, carbon-conscious urban development, aligning with green energy goals.





05.

## Safe and Healthy Indoor and Outdoor Environment



A healthy indoor and outdoor environment is crucial for well-being. Precast concrete prevents harmful substances like volatile organic compounds (VOCs) from entering the air. This reduces health risks, including respiratory issues. Its controlled production prevents harmful chemicals from leaching into surroundings, maintaining cleaner spaces. The material's high compaction resists moisture, preventing mould and mildew growth, and it enhances thermal and sound insulation for added comfort. Precast concrete also contributes to fire safety by being non-combustible, offering fire resistance and enhancing safety in buildings. These combined benefits create safer, healthier living and working environments.

### a. HEALTHY AIR, CLEAN SOIL WITH PRECAST CONCRETE

Precast concrete creates emission-free indoors, as it doesn't release harmful substances like VOCs and helps keep the air healthier to reduce problems like asthma and allergies. This makes living and working spaces safer for everyone. Its controlled production also means it is emission-free towards soil and groundwater, with no chemical leaks. As a result, precast helps protect the environment and supports long-term clean air, water, and soil.



### b. PREVENTION OF MILDEW AND MOULD

The high compaction of precast concrete prevents mildew and mould growth by resisting moisture. This creates a stable, dry environment that stops conditions that typically promote fungal growth and insect infestations. As a result, buildings remain healthier for occupants, with reduced risks of mould-related health issues. Additionally, precast concrete enhances durability, ensuring buildings last longer and require less maintenance.



### c. FIRE SAFETY

The non-combustible nature of precast concrete plays a crucial role in enhancing fire safety within green cities. Its ability to resist ignition and prevent the spread of fire makes it an ideal material for fire-resistant buildings and infrastructure. This property not only improves the safety of urban spaces but also contributes to the creation of resilient, sustainable environments where fire hazards are minimised.



### d. THERMAL AND SOUND COMFORT

With its superior thermal and sound insulation properties, precast concrete significantly boosts indoor comfort. It helps regulate temperatures, keeping buildings cooler in summer and warmer in winter, thus reducing the need for excessive heating or cooling. The material also minimises noise transmission, creating quieter, more peaceful environments. This combination of thermal and acoustic benefits improves the overall quality of life for occupants.



### e. SAFE MOBILITY

Precast concrete solutions make streets safer by providing durable pavements, curbs, and barriers that withstand heavy use and extreme weather without cracking or breaking. Their precision design improves visibility, traffic management, and pedestrian protection, reducing the risk of accidents. Well-designed streets also improve accessibility for people with impairments: precast tactile paving and guidance elements help blind and partially sighted pedestrians, making cities safer and more inclusive.





# 06.

## Outside the Cities

A green city isn't just defined by its urban core, but also by the infrastructure that surrounds it. Precast concrete plays an instrumental part in supporting sustainability beyond the city limits. It provides durable solutions for transportation, utilities, and public spaces. From wind turbines that generate clean energy to the construction of railways and bridges connecting urban areas, precast concrete helps build energy-efficient systems. It also reduces noise pollution with sound barriers and fosters biodiversity by integrating green elements. Its versatility ensures that its benefits extend beyond cities, contributing to a more sustainable and interconnected future.



### a. CONNECTING GREEN CITIES

Railway sleepers, bridges, and tunnels made from precast concrete are pivotal to creating efficient, sustainable transportation networks in green cities. Their durability ensures long-lasting infrastructure, reducing construction time and disruptions. These structures improve accessibility between urban areas, easing mobility and supporting economic growth. By enhancing connectivity, they help reduce traffic congestion and promote sustainable development, contributing to a more integrated and resilient urban environment.

### b. WIND TURBINES

Wind turbine foundations made with precast concrete offer strength, durability, and sustainability. Their modular design allows for faster installation, reducing both time and costs. With the ability to withstand extreme forces, these foundations ensure long-term stability. Additionally, the use of recycled materials in production lowers environmental impact. This approach makes wind energy infrastructure more sustainable, cost-effective, and reliable, supporting a cleaner energy future.



### c. ENHANCING URBAN SOUND SPACES

Sound barriers are essential for keeping noise out of the city, especially in green cities focused on reducing noise pollution. These barriers help create quieter, more peaceful environments by effectively blocking traffic noise. Precast concrete is ideal for this purpose due to its strong sound-reflecting qualities and durability. Additionally, these barriers can be designed with green elements, such as plants or wildlife habitats, improving both the aesthetics and biodiversity of urban spaces. This integration promotes a balance between nature and urban development, enriching the overall quality of life for residents.



### d. VERSATILITY BEYOND URBAN SPACES

Durability, efficiency and versatility make precast concrete an ideal material for a wide range of applications, from residential and commercial buildings to industrial spaces like factories, warehouses, and large-scale infrastructure projects. It provides long-lasting, cost-effective solutions that support sustainable construction practices. Whether in urban or non-urban environments, it enhances the functionality and longevity of structures. This adaptability ensures that precast concrete plays a vital role in shaping the future of diverse built environments.





## Conclusions

Precast concrete is a cornerstone of sustainable urban development, driving the transformation of cities into green, resilient environments. It supports the integration of nature, efficient mobility, and sustainable water and energy solutions, all while ensuring durability and reducing environmental impact. From residential and commercial buildings to infrastructure like transport networks and renewable energy systems, precast concrete provides versatile, long-lasting solutions that enhance both urban and surrounding spaces. As cities continue to expand, the widespread use of precast concrete will be vital in creating connected, healthy, and resource-efficient environments that contribute to a greener and more sustainable future.

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By **BIBM** -

Federation of the European Precast Concrete Industry

### About BIBM

BIBM – the Federation of the European Precast Concrete Industry – is the European voice of the precast concrete sector. Based in Brussels, it brings together national associations and the wider industry to advance sustainable, innovative construction. It provides technical and policy expertise to European policies and standards and supports research and innovation through its involvement in collaborative projects.

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