

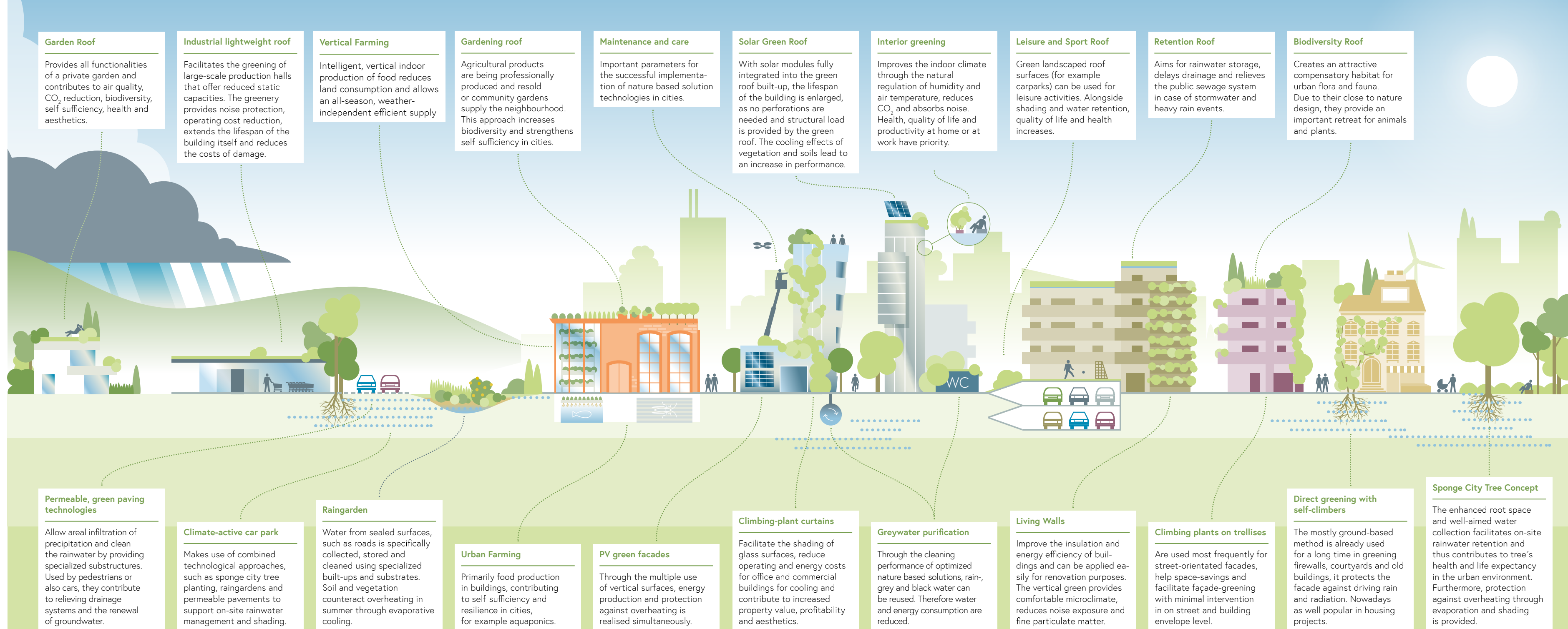
Green-Blue technology innovation for the climate-neutral city of the future

With “City of Tomorrow”, the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) supports the implementation of innovation initiatives for a liveable and climate-neutral city of the future through applied research, new technologies and technological system combinations and innovative services.

Intensive construction, sealing of soils and fewer, deteriorating green spaces are great challenges in spotlight of progressing climate change. The brochure presents various possibilities, for how innovative “nature based solutions” contribute to climate change adaptation in cities.

Innovative “nature based solution” technologies:

- ... provide evaporative cooling and reduce the urban heat island
- ... store water, enable controlled rainwater management and reduce the danger of stormwater
- ... offer possibilities for greywater-usage
- ... provide insulating effects and reduce the need and energy demand for cooling and heating of buildings
- ... offer synergies for energy-saving measures
- ... facilitate sustainable energy management
- ... reduce fine particulate matter and noise pollution
- ... increase quality of life, biodiversity and wellbeing in cities



Garden Roof
Provides all functionalities of a private garden and contributes to air quality, CO₂ reduction, biodiversity, self sufficiency, health and aesthetics.

Industrial lightweight roof
Facilitates the greening of large-scale production halls that offer reduced static capacities. The greenery provides noise protection, operating cost reduction, extends the lifespan of the building itself and reduces the costs of damage.

Vertical Farming
Intelligent, vertical indoor production of food reduces land consumption and allows an all-season, weather-independent efficient supply

Gardening roof
Agricultural products are being professionally produced and resold or community gardens supply the neighbourhood. This approach increases biodiversity and strengthens self sufficiency in cities.

Maintenance and care
Important parameters for the successful implementation of nature based solution technologies in cities.

Solar Green Roof
With solar modules fully integrated into the green roof built-up, the lifespan of the building is enlarged, as no perforations are needed and structural load is provided by the green roof. The cooling effects of vegetation and soils lead to an increase in performance.

Interior greening
Improves the indoor climate through the natural regulation of humidity and air temperature, reduces CO₂ and absorbs noise. Health, quality of life and productivity at home or at work have priority.

Leisure and Sport Roof
Green landscaped roof surfaces (for example carparks) can be used for leisure activities. Alongside shading and water retention, quality of life and health increases.

Retention Roof
Aims for rainwater storage, delays drainage and relieves the public sewage system in case of stormwater and heavy rain events.

Biodiversity Roof
Creates an attractive compensatory habitat for urban flora and fauna. Due to their close to nature design, they provide an important retreat for animals and plants.

Permeable, green paving technologies
Allow areal infiltration of precipitation and clean the rainwater by providing specialized substructures. Used by pedestrians or also cars, they contribute to relieving drainage systems and the renewal of groundwater.

Climate-active car park
Makes use of combined technological approaches, such as sponge city tree planting, raingardens and permeable pavements to support on-site rainwater management and shading.

Raingarden
Water from sealed surfaces, such as roads is specifically collected, stored and cleaned using specialized built-ups and substrates. Soil and vegetation counteract overheating in summer through evaporative cooling.

Urban Farming
Primarily food production in buildings, contributing to self sufficiency and resilience in cities, for example aquaponics.

PV green facades
Through the multiple use of vertical surfaces, energy production and protection against overheating is realised simultaneously.

Climbing-plant curtains
Facilitate the shading of glass surfaces, reduce operating and energy costs for office and commercial buildings for cooling and contribute to increased property value, profitability and aesthetics.

Greywater purification
Through the cleaning performance of optimized nature based solutions, rain-, grey and black water can be reused. Therefore water and energy consumption are reduced.

Living Walls
Improve the insulation and energy efficiency of buildings and can be applied easily for renovation purposes. The vertical green provides comfortable microclimate, reduces noise exposure and fine particulate matter.

Climbing plants on trellises
Are used most frequently for street-orientated facades, help space-savings and facilitate façade-greening with minimal intervention in on street and building envelope level.

Direct greening with self-climbers
The mostly ground-based method is already used for a long time in greening firewalls, courtyards and old buildings, it protects the facade against driving rain and radiation. Nowadays as well popular in housing projects.

Sponge City Tree Concept
The enhanced root space and well-aimed water collection facilitates on-site rainwater retention and thus contributes to tree's health and life expectancy in the urban environment. Furthermore, protection against overheating through evaporation and shading is provided.

Federal Ministry
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Climate Action, Environment,
Energy, Mobility,
Innovation and Technology

Innovative nature based solutions for greening cities

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