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M100 Mirror Mission Cities Hub Romania

Continuous Professional Development Curriculum

Towards climate-neutral cities and
a sustainable built environment

Solutions inspired by nature
Design tools for architects in the M100 conceptual framework

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The Romanian Order of Architects

Continuous Professional Development Curriculum

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Continuous Professional Development Curriculum

1 Introduction

As cities evolve within a complex global network, the pressing challenges of urban development, architecture, and environmental sustainability demand integrated solutions that bridge disciplines and address social, economic, and ecological dynamics.

The core mission of the **Professional Development (CPD) department** within the **Romanian Order of Architects (OAR)** is to develop relevant teaching, training activities targeted at all the organization's members, with the scope of enhancing the overall quality of the practice of architecture within Romania. The present curriculum follows this general mission, drawing from the **M100 program guidelines** to structure its core teaching modules. These modules explore critical themes in the context of the M100 initiative, where ten selected cities—**Alba Iulia, Bistrița, Brașov, București, Buzău, Constanța, Iași, Oradea, Reșița, and Timișoara**—are actively working toward climate neutrality. The architects and planners active in one of these ten cities should not be considered as the main or even sole beneficiaries of the proposed curriculum, as it is open to all professionals looking to apply within their practice the principles of sustainable design that are leading us towards climate neutral cities.

Designed for professionals interested in equipping themselves with the expertise to implement impactful environmental strategies, the curriculum and proposed modules directly contribute to the transition towards climate neutral cities.

Architects' involvement in achieving climate neutrality in today's cities

Defining Climate-Neutrality

Climate neutrality is a process that aims to reduce carbon emissions and compensate for the remaining emissions to achieve a net-zero impact on the planet. The process is a way in which professionals can make sure that the solutions proposed for the built environment, for example, take into consideration future generations, the health of the public, and the planet.

Defining climate-neutral cities

Climate-neutral cities actively work towards reducing or offsetting their greenhouse gas emissions, using a holistic approach that integrates architecture, energy systems, mobility, resource management, and a very specific set of sustainable urban strategies.

In Romania, cities are dealing with a very present issue: rapid urbanization, outdated infrastructure, and inefficient energy use, especially in the existing building stock. Focusing on climate neutrality thus becomes a goal to be achieved, as it involves embedding sustainability into architectural and urban planning initiatives, prioritizing low-carbon materials, energy-efficient buildings, and nature-based solutions.

To achieve well-designed, climate-neutral cities, authorities and professionals have to rethink urban mobility by investing in public transportation, pedestrian infrastructure strategies, as well as low-emission transport alternatives.

Why is climate neutrality important in architecture and urban planning?

This challenge is particularly significant in Romania and other middle-income Eastern European countries, where the construction sector has expanded rapidly in a geographically uneven, poorly regulated, and often speculative manner. As observed in the latest **sector studies** conducted by the Architects' Council of Europe (ACE), while the Romanian market has made notable progress, it continues to prioritize rapid, cost-efficient solutions that frequently bypass or superficially simulate sustainable design practices.

At the European level, **46% of architects frequently design low-energy buildings**, but fewer consistently apply other sustainable design principles:

— 16% apply **Nearly Zero Energy Building (nZEB)** standards frequently.
— 12% practice **Circular Design** regularly.
— Only 9% frequently design **Plus Energy Buildings**.

This suggests a need for stronger professional training and policy incentives to promote sustainability beyond just l**ow-energy buildings**. Given these realities, achieving climate neutrality in Romanian architecture and urban planning requires a shift toward truly integrated sustainable practices, moving beyond regulatory compliance towards a built environment that is both resilient and actively contributes to global sustainability goals.

Achieving climate neutrality requires an **interdisciplinary and integrated approach**, connecting architecture with urbanism, energy, mobility, and public policies. In this respect, the CPD proposed curriculum closely follows the principles of the M100 program, fostering a strong connection between the requirements of professional practice for architects and the general themes and key actions of the future climate-neutral agendas that will be implemented by ten of the most important Romanian cities.

This curriculum aligns with European sustainability frameworks, including the **European Green Deal**, the **2018 Davos Declaration for**

High Quality BAUKULTUR, and the **New European Bauhaus**, reinforcing the architect's central role in this sustainable transformation.

How do architects become key actors in climate policy, design, and implementation?

To play a decisive role in shaping climate policy and sustainable urban development, architects must move beyond conventional design practices and adopt a multidisciplinary approach that integrates social, economic, and environmental factors. Their expertise extends beyond aesthetics and functionality, requiring leadership in sustainability, policy engagement, and innovative material strategies.

According to the **ACE Report: The Value Chain of Construction**, architects take on five critical roles in expanding their impact on the construction sector and policymaking. First, as **Sustainable Building Experts**, they lead the design of energy-efficient buildings that not only meet environmental standards but also hold cultural and social value. Their work aligns with frameworks such as BREEAM, LEED, WELL, and the EU Taxonomy, ensuring that urban development prioritizes resilience and sustainability. In public procurement and governance, architects also serve as key advisors, embedding sustainability from the earliest project stages.

Beyond building design, architects act as **Social and Urban Sustainability Consultants**, shaping cities through inclusive and equitable planning. They work as intermediaries between public authorities, private investors, and communities, ensuring that urban policies and development projects address long-term societal goals. Their influence extends to zoning laws and urban frameworks, where they advocate for eco-districts, nature-based solutions, and adaptive urban strategies that enhance climate resilience.

The financial dimension of sustainable architecture is another area where architects play a crucial role. As **Green Finance Experts**, they guide municipalities and developers in securing climate financing through mechanisms such as green bonds, ESG investments, and EU Renovation Wave funding. Their expertise in life-cycle carbon analysis helps ensure that sustainability efforts are backed by sound financial planning.

In material innovation, architects take on the role of **Low-Carbon & Material Innovation Consultants**, embedding circularity principles, digital fabrication, and carbon footprint reduction into construction processes. The use of bio-based materials, modular building systems, and adaptive reuse strategies contributes to reducing environmental impact and promoting long-term sustainability.

Finally, as **Circular Economy & Resource Efficiency Strategists**, architects drive the shift toward regenerative design and material life-cycle optimization. They lead efforts in adaptive reuse, refurbishment, and deconstruction strategies, ensuring that urban developments maximize resource efficiency. Their collaboration with policymakers, waste management sectors, and developers helps integrate circular economy principles into urban planning, reducing waste and enhancing sustainability at every stage of a building's lifecycle.

Course Objectives and Expected Outcomes

a. **General Objective** (According to the chosen module)
To equip Romanian architects with the knowledge, tools, and interdisciplinary approach needed to integrate **climate-neutral strategies** into architectural and urban projects, ensuring they actively contribute to the development of **sustainable cities** while fostering **low-carbon built environments**.

b. **General Competencies** (According to the chosen module)
- Understanding the **principles of climate neutrality** and their role in achieving sustainable architectural solutions.
- Ability to **design energy-efficient and low-carbon buildings**.
- Knowledge of **circular economy and sustainable resource management** in construction.
- Capacity to **collaborate and co-design with the participation of other specialists** with expertise in the fields of urban planning, engineering, and policy sectors but not only limited to these.

c. **Specific Objectives** (According to the chosen module)
- To increase the awareness of architects on issues related to **climate change** and the **impact that construction sector plays** in this matter.
- To encourage architects to become problem seekers and to function as initiators as well as advocates of briefs that favor climate neutral solutions,
- To equip architects with the knowledge, skills and competences needed to integrate **sustainability and circular economy principles** into their projects.
- To further encourage **interdisciplinary and collaborative thinking** among architects, urban planners, engineers, and policymakers.
- To develop the ability to **assess and measure the climate impact of built projects**.
- To enhance architects' knowledge on **European sustainability policies** and the role architects play in their implementation.

d. **Competencies Acquired** (According to the chosen module)
- **Fundamental knowledge** about climate neutrality and architecture's environmental impact.
- **Ability to use urban analysis tools** to evaluate project sustainability.
- **Interdisciplinary approach** for integrating architecture, urban planning, energy, and mobility into sustainable strategies.
- **Collaboration skills** with stakeholders from the public, private, academic, and civic sectors for climate solutions.
- **Understanding of European sustainability regulations** and their application in professional practice.
- **Ability to implement nature-based solutions** and green infrastructure in urban projects.
- **Knowledge and ability to develop a conceptual framework** for describing and promoting climate-neutral cities.

e. **Course Content and Teaching Methods**
All sessions will be based on a dynamic combination of lectures and a practical approach, integrated into workshops focused on the specific topic addressed.
To provide a well-rounded learning experience, the course is structured around three fundamental perspectives :
- **Theoretical** – Exploring principles and legislative frameworks related to climate neutrality and sustainability.
- **Exploratory** – Investigating case studies, best practices, and implementation challenges in different contexts.

— **Practical** – Applying concepts and methodologies in real-world projects, providing architects with the tools to be key actors in this transition.

Developed by the Romanian Order of Architects, the course aims to support Romanian architects in **understanding and integrating climate neutrality principles** into their architectural design and urban planning solutions and procedures. Through an **interdisciplinary approach**, it will equip the targeted learners with the tools and methodologies that will allow them to become **key agents in the transition towards climate-neutral, sustainable cities**. Equipped with this new set of skills, competences and general knowledge, we hope that the targeted learners will be better able to **expand their impact** in the construction sector as well as within policy-making or administrative branches of the profession, thus contributing to the **reduction of the general carbon footprint of construction sector, while creating a more resilient and energy-efficient built environment**.

Connections with Other Curriculum Components

Each module in this curriculum is designed to complement broader sustainability efforts in architecture and urban planning. Depending on the selected topic, the course will explore how architects can assume different professional roles, engage in interdisciplinary collaborations across public, private, academic, and civic sectors, and assess the impact of climate-neutral strategies.

Background & Current Status

The Romanian Order of Architects has previously addressed topics related to sustainability, including energy efficiency and circular economy principles, through professional training and policy discussions. Building on this foundation, the next step is to focus on integrating these principles into practical tools for architects, advocating for clear regulatory frameworks, and initiating real-world pilot projects to drive sustainable urban transformation.

Framework & Curriculum Structure

The Romanian Order of Architects' **Framework & Curriculum Structure** is designed to provide architects with targeted, practice-oriented training that aligns with industry needs and evolving regulatory standards, integrating real-world case studies and multidisciplinary collaboration.

Stakeholders

The Romanian Order of Architects' **stakeholder engagement** focuses on ensuring that the curriculum is tailored specifically for architects and urban planners, who will be the primary participants in these courses. While the training is designed for their professional development, the program involves a diverse range of experts as lecturers, including engineers, sustainability specialists, policymakers, and industry professionals.

2 How trainers and learners should use this curriculum

Curriculum Structure

The curriculum is designed as a series of teaching modules, targeted at architects, but not only, each dedicated to one of the core areas of action defined in the M100 guide. These key areas of action that will thus inform this curriculum's teaching modules are dealing with the themes of mobility, **built environment and sustainable architectural solutions, energy systems, green infrastructure and nature-based solutions, waste management, and circular economy**.

The modules offered are:

M01. Sustainable Mobility and Urban Transport,
M02. The Built Environment and Climate Responsive Architecture,
M03. Energy Systems and Renewable Integration,
M04. Nature-Based Solutions and Green Infrastructure,
M05. Circular Economy and Zero-Waste Strategies,
M06. Policy, Governance, and Community Development

Each can be completed as a stand-alone module. However, these modules can also be completed as a series, as they provide a multidisciplinary launching pad for further understanding the interdependence and collective impact these areas have on the urban environments.

Each of these core areas of learning (modules) will be delivered by the selected trainers using a **combination of theoretical lectures, case studies, and practical workshops**, offering an **integrative learning experience**. The methodology emphasizes professional reflection, encouraging learners, both learners as well as trainers, to **apply the discussed principles to their projects**.

Each module will thus include a specific set of teaching/ training activities comprised of

— **Frontal Exposition and demonstration of core ideas and principles**
— **Presentation of case studies**
— **Interactive debates**
— **Participatory design exercises**
— **Collaborative feedback sessions** to ensure **a deep understanding and practical application of concepts**

Who are the Trainers?

Trainers include **architects, urban planners, and experts from related fields**, with experience in i**mplementing sustainability and climate neutrality principles.** They may also include professionals specializing in:

— **Sustainable design**
— **Green finance**
— **Urban planning**
— **Material innovation**

The role of the trainers is to **facilitate learning, guide learners through case studies, and encourage practical application** of concepts in real projects. Trainers will also create a **collaborative space** for **knowledge exchange and best practices**.

Trainers will be either selected through special dedicated calls based on the teaching training objectives of each module or will be invited by the CPD department of the Romanian Order of Architects, based on their reputation and expertise on a particular subject of relevance to the curriculum.

Who are the Learners (Target Groups)?

As stated in the opening remarks of this document, the curriculum targets architects and urbanists in Romania interested in developing a methodology of practice that is in tune with the latest epistemic knowledge, policies, and procedures, emphasizing the transition towards climate-neutral environments.

Construction of Teaching Materials

The curriculum includes an ideal structure of the teaching modules that will be developed throughout the next two years, as part of the CPD department's regular activities. Furthermore, it will be used as the starting point for an action plan that the department will use for future calls for lecturers with expertise in delivering the main modules. Based on certain priorities set by the directorial board of the Romanian Order of Architects, these calls will allow the department to gradually develop, in step-by-step manner, all the proposed teaching/ training modules.

These included, but are not limited to the following:

— **Trainer's Manual**: A detailed guide with theoretical information, best practice examples, and proposed workshop activities, needed to ensure the long-term sustainability of the teaching training activity,

— **Learners Manual**: A support brochure that captures the essence of the delivered lecture, highlighting the key concepts, conclusions from the presented case study and a bibliography of materials for further reading including references to relevant normative legislation.

— **Case Studies**: Documents illustrating **successful projects** in **sustainable architecture and climate-neutral cities**. International as well as national (local) case studies will pe presented and compared in equal measures. The international projects highlighted should ideally focus on problems and responses that, to a certain extent, favor parallels to specific Romanian conditions.

— **Extended Bibliography**: A selection of additional resources, including academic articles, reports, and publications.

— **Digital Learning Platform (optional)**: Access to **digital materials, presentations, videos, and interactive tools** for collaborative learning. Excerpts from each developed module will be disseminated by the Romanian Order of Architects towards its members using the EDU.OAR online CPD platform.

Module Type
Online Theoretical Course + Online/In-Person Workshop – Guided Tour

Course Format and Teaching Methods
— **Format:** Lecture + Open discussion or Workshop
— **Teaching Methods:** Lecture, case study analysis, collaborative exercises, participatory design / guided tour

Duration
— **60-minute lecture** – Theoretical framework, ecological principles, case studies
— **10-minute break**
— **30-minute lecture** – Theoretical framework, ecological principles, case studies
— **Q&A or Workshop:** minimum of 30 minutes and a maximum of 4-hour practical design exercise on one of the modules

Evaluation Methods
If considered needed, learners will be assessed based on their activities and results, considering:
1. **Overall quality of the final project or proposal** – Structure, clarity, and adherence to sustainability principles.
2. **Synthesis ability** – Organizing and presenting complex information logically.
3. **Empirical quality** – Using collected data effectively to support design and hypotheses.
4. **Design hypotheses** – Originality and relevance of design proposals concerning course objectives.
5. **Process and connection to professional practice** – Integration of course concepts into learners' work.

Assessment methods include:
— **Direct observation**
— **Self-evaluation**
— **Peer and trainer feedback**
— **Continuous assessment throughout theoretical and practical sessions to support constant skill improvement**

3 Course content

M01. Sustainable Mobility & Urban Transport Module

Trainers:
Mobility planners, urban designers, transport engineers

M01.01 Argument

The Sustainable Mobility & Urban Transport module comes as an applicable solution, strategically designed to empower architects and urbanists with essential knowledge and skills to understand, design, advocate, and just as importantly, to be able to implement sustainable transportation systems that align with the realistic needs of a city attempting to achieve climate-neutral goals. Romania's rapid economic growth since its admission into the European Union has come with an almost uncontrollable impetus for its cities to absorb population from the countryside or even form smaller, economically less viable cities. This new level of mobility, which can be described by two main typologies of movement, migration and commuting, has been expertly addressed by the World Bank-ordered study, Magnetic Cities- Migration and Commuting in Romania. According to its findings, economic, cultural, and livability magnetism play a crucial role in encouraging the migration of people towards certain attractive urban areas. As a consequence of this influx of population, these magnetic urban areas tend to sprawl outwards, toward their peri-urban areas, thus generating even more traffic, disrupting the flows of local transportation. A second factor adding pressure on these flows is the ever-increasing influx of commuters absorbed from the hinterland of these economic power centers. This is an unsustainable long-term model that needs to be addressed urgently within a new design mindset.

M01.02 Module's objective

The primary purpose of this module is to educate Romanian architects and urban planners on the critical role of sustainable mobility in helping officials in their challenge of transitioning their cities towards climate-neutrality goals.

M01.03 Key concepts, strategies, and tools included in the Sustainable Mobility & Urban Transport Module

To better showcase the relevance of the module into the practice of architects and urban planners, we have listed key elements such as concepts, strategies, and tools integrated into the module and in the general curriculum.

Key concepts:

— **Climate-neutral urban planning** - understanding the role of urban transport in achieving a city's climate goals, including the reduction of greenhouse gas emissions and enhancement of urban air quality;
— **Sustainable transportation systems** - exploration of various modes of sustainable transport, such as cycling, walking, public transit, and electric vehicles;
— **Urban resilience and adaptability** - studying how cities can adapt their transportation systems to be resilient against climate change and urban growth pressures.

Strategies:

— **Integrated transport planning** - techniques for designing comprehensive transport strategies that align with broader urban development and sustainability goals;

— **Public participation and stakeholder engagement** - methods for involving diverse community stakeholders in the planning process to ensure that transport solutions meet the needs of all users, particularly vulnerable populations;
— **Policy development and advocacy** - strategies for influencing local and regional transport policies, including the development of incentives for sustainable transport options and regulations that prioritize non-motorized transport;
— **Green infrastructure integration** - incorporating elements like green corridors, parklets, and urban greenery into transport planning to enhance environmental benefits.

Tools:
— **Transport modeling software** - utilizing geographic information systems (GIS) and other modeling tools to analyze transport data, predict traffic patterns, and visualize the impact of proposed transport systems;
— **Sustainable mobility metrics and indicators** - tools for measuring the sustainability of transport systems, including metrics for carbon emissions, user satisfaction, and economic viability;
— **Design and simulation tools** - advanced software for simulating pedestrian flow, cycling pathways, and public transit systems to optimize design and functionality;
— **Collaborative platforms** - online platforms and tools that facilitate collaboration among urban planners, transport engineers, policymakers, and the community to foster multi-stakeholder involvement;
— **Financial planning and analysis tools** - applications for assessing the economic impacts and financial sustainability of transport projects, including cost-benefit analysis and funding strategy development.

M01.04 Topics and structure of the module

The Module explores a variety of key themes designed to advance learner's knowledge on sustainable mobility and urban transport strategies and practices. Below are listed the Module's proposed learning activities:

LEARNING ACTIVITY 1: Fundamentals of Sustainable Mobility and Public Transport Electrification
— Introduction to Sustainable Mobility (30 minutes):
  — Defining the concept of sustainable mobility and its importance in the contemporary urban context.
  — Presentation of European and national policies on green transition and their impact on Romanian cities.
  — The role of architects in promoting sustainable mobility.
— Public Transport Electrification (60 minutes):
  — Global and local trends in public transport electrification: general impact on the street grid;
  — Modernization of public transport fleets: electric buses, trams, trolleybuses - spatial infrastructure needs;
  — Expansion of electric charging networks: types of charging stations, location, integration into the urban landscape;
  — Case studies and examples of best practices from European cities.
— Q&A and Discussion Session (30 minutes).

LEARNING ACTIVITY 2: Infrastructure for Alternative Transport and Shared Mobility
— Infrastructure for Alternative Transport (60 minutes):
  — Creation of networks for bicycles and scooters: dedicated lanes, shared lanes, parking systems;

- Pedestrian-friendly routes: street pedestrianization, public space development, accessibility;
- Integration of alternative transport infrastructure into architectural and urban planning projects;
- Innovative materials and technologies for pedestrian and bicycle infrastructure.

— Shared Mobility Systems (30 minutes):
- Car sharing, bike sharing, and other intermodal system solutions.
- Integration of shared mobility stations into public transport hubs and public spaces.
- Benefits and challenges of implementing shared mobility systems.

— Q&A and Discussion Session (30 minutes).

LEARNING ACTIVITY 3: Intelligent Traffic Management and Polluting Transport Regulation

— Intelligent Traffic Management and Congestion Reduction (60 minutes):
- AI-based traffic optimization: intelligent traffic light systems, video monitoring, navigation applications.
- The impact of parking policies on sustainable mobility: differentiated tariffs, Park&Ride parking, restricted access zones;
- Examples of successful traffic management projects.

— Polluting Transport Regulation (30 minutes):
- Introduction of low-emission zones and exclusively pedestrian streets;
- Incentives for adopting eco-friendly vehicles: subsidies, tax exemptions, preferential access;
- The role of architects and urban planners in low emission zone design;

— Q&A and Discussion Session (30 minutes).

M01.05 Abilities, knowledge and skills

What will architects and urban planners gain from this module?

Learners will gain a comprehensive toolkit of knowledge and skills that are essential for contributing to the development of sustainable and climate-neutral cities; by completing this module, architects and urban planners will be better prepared to lead consultations with municipalities representatives aiming to become climate-neutral. Moreover, the module is constructed so that learners will gain the necessary expertise to develop strategic plans that align with environmental goals, facilitate effective stakeholder engagement, and implement sustainable mobility solutions that are integral in the transformation of a city aiming to become climate-neutral.

What are the skills learners will be able to add to their portfolio of professional skills?

Using case studies and hands-on tools, learners will be able to explore how they can use innovative transport strategies, implement AI-driven traffic systems, and plan charging infrastructure for electric transport in their projects. The module aims to equip learners with the expertise and resources to create efficient, inclusive, and future-proof urban mobility systems.

M02. The Built Environment and Climate Responsive Architecture Module

Trainers:
sustainability architects, BREEAM/LEED specialists, energy engineers, urban planners

M02.01 Argument

The Built Environment and Climate-Responsive Architecture module is a strategic learning experience designed to equip architects and urban planners with the necessary knowledge and skills to design, advocate for, and implement sustainable building solutions that align with global climate goals. These initiatives are not only a responsive to climate challenges but also an opportunity for architects and urban planners to lead innovative projects that redefine sustainability in the built environment. By integrating passive design principles, energy-efficient materials, and renewable energy systems, learners will be able to create projects that contribute to reducing carbon emissions while improving the quality and resilience of the built environment.

M02.02 Module's objective

The primary aim of the module is to empower learners in mastering the integration of sustainable and climate-responsive strategies for cities looking to reach climate-neutrality. The module's objective is to provide a comprehensive learning experience – both theoretical and practical - that prepares learners to be able to address challenges of current cities with clarity and efficient strategies, as well as building the skills to be able to anticipate future developments in the cities of tomorrow. This approach enhances the learner's abilities to innovate in their field.

M02.03 Key concepts, strategies and toolkits included in the built environment and climate-responsive architecture module

Key concepts:

— **Sustainable design principles** - emphasizing designing buildings that minimize environmental impacts by efficiently using resources and incorporation sustainable materials;
— **Climate resilience approach** – familiarizing with concepts of creating buildings capable of withstanding climate-related challenges, adaptable to the local environmental conditions;
— **Energy efficiency measures** – advocating in both planning and designing stages for reducing energy consumption through intelligent design and technology, aligning with the EU's target for an intelligent design and technology, aligning with the EU's target to achieve a minimum of 42.5% of its total energy consumption from renewable sources by 2030, with an aspirational goal of reaching 45%.

Strategies:

— **Integrated design process** – engaging all stakeholders in the design process to ensure sustainability goals are integrated from the start, enhancing the buildings' overall performance;
— **Level(s) framework** – integrating key tools provided by EU, such as the Level(s) framework that provides a common language for sustainability performance, supporting the design and operation of buildings' entire life cycle;

— **Circular construction practices** – integrating reuse and recycle building material strategies, as well as designing for disassembly, in order to minimize waste and extend material usage.

Tools:

— **Building Information Modeling (BIM)** - used for creating digital models, which facilitates efficient design and management of building data, supporting sustainability goals throughout a building's lifecycle;
— **Energy modeling software** – tools such as Design Builder and EnergyPlus, used for simulating a building's energy performance, are helpful in assessing the energy consumption with the use of various scenarios to achieve optimal energy efficiency solutions;
— **Life Cycle Assessment (LCA) software** - used to quantify environmental impacts associated with all the stages of a building's lifecycle; it helps in making informed decisions that minimize environmental impacts.
— **Digital Twin technology** – software used for planning and managing the built environment by creating real-time virtual models of physical assets, including cities, to monitor performance, optimizing resource use, and integrating predictive analysis in urban planning;
— **GIS (Geographic Information Systems)** - used for planning and managing the built environment by analyzing geographic and spatial data; it helps with assessing environmental impacts, planning resource allocation, and integrating environmental considerations in urban planning.

M02.04 Topics and structure of the module

The Module explores a variety of key themes designed to advance the learner's knowledge on sustainable architectural practices and energy-efficient building technologies.

The Module's proposed learning activities:

LEARNING ACTIVITY 1: Energy Efficient Buildings, part 1

— High-Performance Glazing and Thermal Insulation (60 minutes):
  — Understanding the principles of thermal performance in buildings. (binding EU and Romanian legislation on the matter)
  — Types of high-performance glazing: low-E coatings, double and triple glazing.
  — Advanced thermal insulation materials and techniques
  — Calculating U-values and thermal bridging to optimize building envelope performance of existing buildings (focus on housing stock and public buildings.
  — Case studies of energy-efficient buildings with innovative glazing and insulation.
— Q&A and Discussion Session (30 minutes):
— Quick demonstration and application of software: (60 minutes)

LEARNING ACTIVITY 2: Energy Efficient Buildings, part 2

— Modernized HVAC Systems to Reduce Energy Consumption (60 minutes):
  — Overview of energy-efficient HVAC technologies: heat pumps, radiant heating/cooling, demand-controlled ventilation.
  — Integration of smart building management systems for optimized HVAC performance.
  — Strategies for reducing energy consumption in existing HVAC systems.
— Q&A and Discussion Session (30 minutes).

— Quick demonstration and application of software: (60 minutes)

LEARNING ACTIVITY 3: Green Construction & Renewable Integration and Sustainability of Historical Buildings, part 1

— Green Construction & Renewable Integration (90 minutes):
  — Passive cooling strategies: natural ventilation, shading, thermal mass;
  — Use of low-carbon materials: bio-based composites, recycled materials, sustainably sourced timber;
  — Life cycle assessment (LCA) of building materials and construction processes;
  — Case studies of buildings that use green construction and renewable integration.
— Q&A and Discussion Session (30 minutes).
— Quick demonstration and application of software: (60 minutes).

LEARNING ACTIVITY 4: Green Construction & Renewable Integration and Sustainability of Historical Buildings, part 2

— Sustainability of Historical Buildings and Adaptive Reuse (90 minutes):
  — Principles of sustainable renovation and adaptive reuse.
  — Balancing conservation efforts with energy efficiency upgrades in historical buildings.
  — Repurposing existing buildings to reduce embodied carbon emissions.
  — Methods to upgrade historical buildings to modern energy efficiency standards.
— Q&A and Discussion Session (30 minutes):

LEARNING ACTIVITY 5: Urban Green Spaces & Regeneration

— Creating Urban Forests, Community Gardens, and Sustainable Landscapes (60 minutes):
  — Benefits of urban green spaces: reduced heat island effect, improved air quality, enhanced biodiversity;
  — Strategies for creating urban forests and community gardens in dense urban environments;
  — Sustainable landscape design principles: native plant selection, rainwater harvesting, permeable paving;
  — How to involve the community in creating and maintaining urban green spaces.
— Integrating Green Walls and Permeable Surfaces to Combat Heat Islands (30 minutes):
  — Types of green walls and their benefits: vertical gardens, living facades.
  — Use of permeable surfaces to reduce stormwater runoff and mitigate heat island effect;
  — Design considerations for integrating green walls and permeable surfaces into building and urban design.
— QQ&A and Discussion Session (30 minutes).

M02.05 Abilities, knowledge and skills

What will architects and urban planners gain from this Module?

Learners will gain in-depth knowledge and practical skills necessary for integrating modern sustainability concepts into their projects.

Learners will learn about the importance of climate resilience in architecture, enabling them to design buildings that are adaptable to local environmental conditions and capable of withstanding various climate-related challenges. The module will cover integrated design processes that involve engaging stakeholders early in the design phase to ensure sustainability goals are embedded from the outset, enhancing the overall performance and sustainability of the buildings. This approach not only improves the practical outcomes of projects but also bolsters the

architects' and urban planners' roles as leaders in sustainable development within their communities.

What are the skills learners will be able to add to their portfolio of professional skills?

By completing this module, learners will not only enrich their technical, theoretical knowledge and valuable advocacy skills on the topic, but also champion sustainable practices and policies in the communities they design for. This comprehensive educational experience will prepare learners to meet the demands of modern architecture and urban planning, driving the development of more sustainable, efficient, and resilient built environments.

M03. Energy Systems and Renewable Integration Module

Trainers:
Energy managers, smart grid engineers, nZEB specialists

M03.01 Argument

The Energy Systems and Renewable Integration Module is designed to equip architects and urban planners with the expertise to integrate sustainable energy solutions in the process of helping cities reach climate neutrality. As urban areas strive for climate neutrality, architects and urban planners must adeptly design and implement energy systems that reduce fossil fuel dependence while enhancing efficiency and resilience. In the European context, the EU Grean Deal and the Renewable Energy Directive set ambitious targets for increasing renewable energy usage and improving energy efficiency; notably, the revised directive aims for a minimum binding target of 42.5% renewable energy in the EU's energy mix by 2030, with an aspirational goal of 45%. Additionally, there is a sector-specific sub-target of at least a 49% renewable energy share in buildings by 2030. In Romania, the transition to renewable energy and smarter grids is advancing, propelled by commitments to EU climate policies and the necessity to modernize aging infrastructure. The country has made significant strides in expanding its renewable energy capacity, particularly in wind and solar power. However, urban areas face challenges in effectively integrating these sources; many cities rely on inefficient district heating systems, and energy consumption in buildings remains high due to outdated construction practices and insufficient retrofitting efforts. Romania's National Energy and Climate Plan (NECP) outlines ambitious targets for enhancing energy efficiency and adopting renewable energy. Key measures include promoting nearly zero-energy buildings (nZEB) and modernizing district heating networks. This module offers a strategic framework for learners to navigate the evolving energy landscape, providing insights into regulatory requirements, technological innovations, and best practices for integrating renewable energy into urban developments.

M03.02 Module's objective

This course aims to provide learners with a comprehensive understanding of renewable energy systems and smart grids, enabling them to contribute effectively to the sustainable development of Romanian cities. Architects and urban planners will explore the fundamental principles of renewable energy systems and smart grids, gaining insight into how these technologies can transform energy consumption and production. The course will cover innovative technologies and practical solutions for decarbonizing

heating and cooling, with a focus on integrating energy-efficient systems into buildings.

Learners will develop the skills necessary to design integrated energy systems tailored to the needs of buildings and communities. They will learn to think strategically, make informed decisions, and implement solutions that reduce environmental impact.

The course will also examine energy efficiency strategies and behavioral change initiatives, understanding how to educate and engage communities in adopting sustainable practices.

Upon completion of this course, learners will be prepared to align with Romania's green transition policies, actively contributing to the creation of cleaner, more efficient, and environmentally friendly cities.

M03.03 Key concepts, strategies and tools included in the energy systems and renewable integration module

To better showcase the relevance of this module for architects and urban planners, here are outlined key elements, including concepts, strategies, and tools, aiming to offer an extensive understanding of topics addresses.

Key concepts:

— **Renewable energy integration** – focusing on the design and implementation of renewable energy systems, including solar, wind, and geothermal energy, to reduce dependency on non-renewable sources and decrease carbon emissions;

— **Energy transition** - familiarizing with concepts surrounding the shift from fossil-based energy systems to renewable and sustainable energy solutions, aligning with EU targets for decarbonizing the energy sector;

— **Smart grid technology** - integrating digital communication tools with power grids to enhance the efficiency, reliability, and sustainability of energy distribution, enabling the effective use of renewable energy sources.

Strategies:

— **Decentralized energy systems** - encouraging the adoption of local, decentralized energy production, such as small-scale renewable installations, to promote energy autonomy, flexibility, and sustainability at the community level;

— **Integrated urban energy planning** - engaging stakeholders from different sectors in designing energy systems that incorporate renewable energy, energy efficiency, and urban planning, promoting sustainable cities that contribute to meeting the EU's climate goals;

— **Demand response and energy storage** - implementing strategies that balance energy supply and demand, optimizing renewable energy use by utilizing energy storage solutions and real-life response systems.

Tools:

— **HOMER Energy** - software used for optimizing hybrid energy systems that integrate renewable resources like solar, wind, and energy storage, designed to evaluate the cost-effective and sustainable use of renewable energy systems in Europe;

— **PVsyst** – a leading Swiss-developed software for simulating and designing photovoltaic systems, crucial for optimizing solar energy production, widely used by European architects;

— **European Commission Energy Tools** - various EU-provided tools and frameworks, including monitoring and performance assessment resources, to support the integration of renewable energy and improve energy efficiency across Europe.

M03.04 Topics and structure of the module

The Module's proposed learning activities:

LEARNING ACTIVITY 1: Developing Renewable Energy Solutions

- Urban Renewable Energy Solutions (60 minutes):
  - Urban wind turbines: types, location, integration into the urban landscape;
  - Photovoltaic integration: roof systems, solar facades, urban solar parks;
  - Biomass utilization: cogeneration systems, biomass heating plants;
  - Case studies and best practice examples from European cities.
- Large-Scale District Energy Systems (30 minutes):
  - The concept of district heating/cooling systems;
  - Implementing renewable-based district energy systems;
  - Benefits and challenges of implementing district energy systems.
- Q&A and Discussion Session (30 minutes):
  - Module 2: Energy Storage & Smart Grids.

LEARNING ACTIVITY 2: Energy Storage for Decentralized Renewable Energy (60 minutes)

- Energy storage technologies: batteries, thermal storage, hydrogen;
- Energy storage systems for buildings and communities;
- Integration of energy storage systems into electrical grids.
- Integrating Buildings into Intelligent Energy Networks (30 minutes):
  - The concept of smart grids;
  - The role of buildings in smart networks: net-zero energy buildings, prosumer buildings;
  - Communication and control technologies for smart grids.
- Q&A and Discussion Session (30 minutes).

LEARNING ACTIVITY 3: Decarbonizing Heating & Cooling and Energy Efficiency

- Implementing Geothermal and Hybrid Low-Emission HVAC Systems (60 minutes):
  - Geothermal heating and cooling systems: geothermal heat pumps, underground thermal storage systems;
  - Hybrid HVAC systems: combinations of renewable sources and conventional technologies;
  - Retrofitting buildings to improve energy performance.
- Energy Efficiency & Behavioral Change (30 minutes):
  - Public awareness campaigns for energy conservation;
  - Financial incentives for energy-efficiency renovation projects;
  - The architect's role in public education.
- Q&A and Discussion Session (30 minutes).

M03.05 Abilities, knowledge and skills

What will architects and urban planners gain from this Module?

This third module aims to help architects and urban planners to design sustainable, resilient cities by providing a deep understanding of current trends in renewable energy systems, smart grids, and energy-efficient building practices. Learners will have a better understanding of how, in Romania's case, the great socialist housing stock can be retrofitted and upgraded to meet current energy consumption requirements. Consequently, the curriculum addresses the critical role that energy management plays in urban planning strategies capable of fostering sustainable cities.

What are the skills learners will be able to add to their portfolio of professional skills?

Learners will learn to incorporate energy considerations into various types of urban developments, designing spaces that promote energy efficiency, while reducing carbon emissions, and enhancing community well-being. Learners will also acquire the skills needed for community engagement, and an understanding on how to educate and inspire residents to adopt sustainable practices and contribute to a collective vision of a greener future.

M04. Nature-Based Solutions and Green Infrastructure Module

Trainers:
landscape architects, hydrologists, geographers and biologists

M04.01 Argument

The Nature-Based Solutions and Green Infrastructure module is aimed at embedding ecological principles and nature-based solutions deeply into urban planning to catalyze the transformation of cityscapes into sustainable, climate-neutral habitats. As Romanian urban areas continue to expand mostly on the speculative terms and agendas of housing and retail developers, new urban developments are faced by escalating challenges posed by climate change, overheating, flooding, dust storms. This module therefore presents vital strategies for integrating and safeguarding existing green infrastructure features that can mitigate the causes and effects of these climate-related hazards. However, the showcased strategies and tactical approaches while essential for mitigating the adverse environmental impacts associated with urbanization are also to be employed with the purpose of enhancing urban resilience and, most importantly, for promoting biodiversity. The curriculum bridges the gap between traditional urban planning and innovative ecological applications, ensuring that learners are equipped to lead the creation of greener, more sustainable urban spaces.

M04.02 Module's objective

The primary goal of this module is to provide learners with a robust framework and actionable tools to effectively implement nature-based solutions in urban settings. The emphasis is put on architect's and urban planner's role in transforming urban areas into models of sustainability that are aligned with the goals of climate neutrality. Learners will learn to design urban spaces that do more than meet environmental sustainability criteria—they will also enhance the livability and functionality of these spaces, reduce the ecological footprints of cities, and actively contribute to global climate action initiatives.

M04.03 Key concepts, strategies and tools included in the Nature-Based Solutions and Green Infrastructure Module

Key concepts:

— **Ecological Connectivity:** Focuses on creating networks of natural habitats to facilitate species movement and ecological processes across urban landscapes, which is essential for maintaining biodiversity and ecological health.

— **Biophilic Design Principles:** Emphasizes the incorporation of natural elements into urban design to improve human well-being, enhance aesthetic values, and increase ecological functionality in built environments.

— **Resilience and Adaptation**: Centers on designing urban spaces that can adapt to and withstand the impacts of climate change, such as increased precipitation, higher temperatures, and extreme weather events, using nature-based solutions

Strategies:

— **Green Infrastructure Planning**: Involves strategic placement of green spaces to maximize ecological, social, and economic benefits, such as enhancing water filtration, providing recreational spaces, and improving air quality.
— **Community Engagement and Co-Design**: Engages local communities in the planning and design process to ensure that green infrastructure meets the needs of all stakeholders and fosters a sense of ownership and responsibility.
— **Policy Integration and Advocacy**: Develops and promotes policies that support the implementation and maintenance of green infrastructure, including incentives for private green developments and regulations that require or encourage nature-based solutions.

Tools:

— **GIS and Spatial Analysis Tools**: Utilizes Geographic Information Systems (GIS) to analyze spatial data, model ecological networks, and plan urban green infrastructure with precision and efficiency.
— **Environmental Assessment Tools**: Includes tools for assessing the environmental impact of urban development projects, such as ecosystem services valuation tools and biodiversity assessment frameworks.
— **Design and Simulation Software**: Employs advanced software to simulate water flow, vegetation growth, and microclimate conditions, helping planners and designers optimize the functionality and placement of green infrastructure components.
— **Participatory Planning Platforms**: Uses digital platforms that facilitate community involvement in the planning process, allowing for feedback and collaboration from a broad range of stakeholders during the design phases of green infrastructure projects.

M04.04 Topics and structure of the module

The Module explores a variety of key themes designed to advance learner's knowledge on sustainable nature-based solutions and green infrastructure implementation. Learners will gain in-depth knowledge and practical skills necessary for integrating modern sustainability concepts into their projects, focusing on these following areas:

LEARNING ACTIVITY 1: Ecology Resilience and Urban Biodiversity part 1

— Restoring Urban Ecosystems with Native Plant Species (60 minutes):
  — Importance of urban biodiversity and ecological resilience.
  — Identifying and selecting native plant species for urban environments.
  — Strategies for reintroducing native flora in parks, gardens, and green spaces.
  — Benefits of native plants for local ecosystems and human well-being.
  — Case studies of successful urban ecosystem restoration projects.
  — Binding EU legislation and guiding documents
— Connecting Habitats Through Urban Green Corridors (30 minutes):
  — Concept and benefits of urban green corridors.

- Designing and implementing green corridors to connect fragmented habitats.
- Integrating green corridors into urban planning and infrastructure development.
- Practical examples.

— Q&A and Discussion Session (30 minutes)

LEARNING ACTIVITY 2: Climate Adaptation Strategies and Water Retention

— Rainwater Harvesting and Permeable Pavements (60 minutes):
- Importance of water retention in urban environments.
- Techniques for rainwater harvesting green roofs, rain gardens, cisterns.
- Types and benefits of permeable pavements for stormwater management.
- Integrating rainwater harvesting and permeable pavements into building and urban design.
- Regulations regarding water retention.

— Q&A and Discussion Session (30 minutes):

LEARNING ACTIVITY 3: Climate Adaptation Strategies and Water Retention

— Blue-Green Infrastructure for Urban Flood Risk Management (60 minutes):
- Concept and benefits of blue-green infrastructure.
- Using natural systems (wetlands, bioswales) to manage urban flood risks.
- Integrating blue-green infrastructure into urban planning and development.
- How to calculate water flow, and storage capacity.

— Q&A and Discussion Session (30 minutes)

LEARNING ACTIVITY 4: Reducing Urban Heat Island Effect and Sustainable Urbanism

— Expanding Green Roofs, Facades, and Tree-Lined Streets (60 minutes):
- Understanding the urban heat island effect and its impacts.
- Benefits and types of green roofs and facades.
- Strategies for expanding tree-lined streets and urban forests.
- Designing microclimates in public spaces for thermal comfort.
- How to calculate the reduction of the heat island effect.

— Sustainable Urbanism Through Nature-Based Solutions (30 minutes):
- Concept and principles of nature-based solutions.
- Designing recreational and productive landscapes (community gardens, urban farms).
- Using natural systems (wetlands) for water filtration and infrastructure.
- Examples of successful nature based solutions.

— Q&A and Discussion Session (30 minutes)

M04.05 Abilities, knowledge & skills

What will architects and urbanists gain from this module?

Participating in the Nature-Based Solutions and Green Infrastructure Module will enable architects and urbanists to enhance their expertise in designing urban environments that align with climate neutrality goals. They will gain a nuanced understanding of how to embed natural systems into urban frameworks to increase biodiversity, manage water and air quality, and improve the resilience of cities against climate impacts.

This module will equip them with the skills to transform urban areas by integrating green roofs, parks, and interconnected green spaces that contribute to reducing the carbon footprint of cities. Through this training, they will be able to create designs that not only serve aesthetic

and functional purposes but also play a crucial role in making cities sustainable and adaptable to changing environmental conditions.

What are the skills you will be able to add to your portfolio of professional skills?

Technical Skills: This module emphasizes the planning, design, and maintenance of green infrastructure like urban forests, parks, and bio-swales, which are essential for enhancing urban biodiversity and managing environmental challenges.

Theoretical Skills: Learners will explore ecological design principles and learn how to integrate these into urban planning to address issues like stormwater management and heat island effects.

Templates & Case Studies: The module offers case studies of successful green infrastructure projects and templates for ecological site assessment and landscape design, providing practical tools for implementation.

Societal & Community-Building Skills: Green infrastructure projects spearheaded by professionals will not only contribute to environmental health but also enhance the quality of urban life, providing community recreational spaces and improving overall urban air and water quality.

M05. Circular Economy and Zero-Waste Strategies Module

Trainers:
Circular economy specialists, material engineers, waste management experts

M05.01 Argument

The Circular Economy and Zero-Waste Strategies Module emerges as a critical educational initiative designed to address the pressing environmental challenges of our time—namely, waste management and resource utilization. In the face of global environmental degradation exacerbated by linear consumption models, this module advocates for a transformative shift towards a circular economy.

The production of cement, steel and plastic is responsible for 29% of the greenhouse effect.

Implementing circular strategies in architecture and urban development plays a key role in reducing carbon footprints, preserving natural resources, and fostering climate-neutral cities. Architects and urban planners are central to this transformation, as they can influence the entire lifecycle of buildings and materials—from sustainable design and material selection to deconstruction and reuse, also preserving existing buildings and giving them new functions.

Exploring zero-waste strategies within this module will demonstrate how aligning with the European Union's **Circular Economy Action Plan** and the **European Green Deal** approaches can substantially decrease environmental footprints, promote sustainability, and foster economic opportunities through innovative business models.

M05.02 Module's objective

The objective of this module is to provide learners with a comprehensive understanding of circular economy principles and zero-waste strategies and how they can be applied to the built environment. Through theoretical insights and practical applications, learners will explore innovative

strategies to minimize waste, extend the lifespan of materials, and promote sustainable design solutions.

M05.03 Key concepts, strategies and tools included in the Circular Economy and Zero-Waster Strategies Module

Key Concepts:

— **Cleaner Production**: focuses on understanding the importance of minimizing resource input and waste generation across the construction sector.
— **Cradle-to-Cradle Design**: Emphasizes architectural solutions that allows for continuous reuse of building materials in a closed loop, thereby reducing waste.
— **Regenerative Design**: Exploring planning systems that enhance natural capital, turning waste outputs into inputs for other processes.

Strategies:

— **Waste Minimization Techniques**: Implementing practices that reduce waste generation through better materials management and specific architectural solutions.
— **Industrial Symbiosis**: Encouraging different industries to cooperate, whereby waste or byproducts of one process serve as the raw materials for another.
— **Policy Advocacy and Implementation**: Developing and promoting policies that facilitate circular economic activities and zero-waste communities.

Tools:

— **Material Flow Analysis (MFA)**: Analyzing the flow of materials through industrial systems (with focus on the construction sector) to identify opportunities for minimizing waste and improving resource efficiency.
— **Life Cycle Assessment (LCA)**: Evaluating the environmental impacts associated with all the stages of a buildings life from cradle to grave.
— **Circularity Indicators**: Tools to measure the effectiveness of circular economy strategies in reducing the environmental impact of production and consumption.

M05.04 Topics and structure of the module

The Module explores a variety of key themes designed to advance learner's knowledge on sustainable circular economy and zero-waste strategies. Learners will gain in-depth knowledge and practical skills necessary for integrating modern sustainability concepts into their projects, focusing on these following areas:

LEARNING ACTIVITY 1: Reducing Construction & Demolition Waste

— Demolition Waste and Reduction of New Constructions (60 minutes):
  — Understanding the environmental impact of construction and demolition waste.
  — Strategies for reducing demolition waste through selective demolition and deconstruction.
  — Exploring alternatives to new construction, such as adaptive reuse and building renovation.
  — Relevant legislation and regulations. (binding EU or national regulations)
  — Case studies of successful demolition waste reduction projects.
— Reusing and Recycling Building Materials (30 minutes):
  — Identifying and sorting reusable and recyclable building materials.

  - Techniques for processing and repurposing salvaged materials.
  - Exploring markets and opportunities for recycled building materials.
  - Material banks and digital inventories.
- Q&A and Discussion Session (30 minutes)

LEARNING ACTIVITY 2: Composting & Organic Waste Reduction and Innovative Waste Management Technologies

- Composting & Organic Waste Reduction (60 minutes):
  - Implementing urban composting facilities.
  - Supporting food waste reduction strategies.
  - Techniques for composting and bio-digestion.
  - Examining how new technologies can support waste reduction and resource recovery.
  - Implementing composting systems into building design.
- Innovative Waste Management Technologies (30 minutes):
  - Waste-to-energy conversion for municipal sustainability.
  - Digitization of material tracking for improved resource efficiency.
  - Examples of inovative waste management technologies.
- Q&A and Discussion Session (30 minutes)

LEARNING ACTIVITY 3: Adaptive Reuse & Circular Construction

- Socially Sustainable Housing (60 minutes):
  - Principles of socially sustainable housing: accessibility, affordability, and community resilience.
  - Strategies for integrating social equity into housing projects.
  - Case studies of successful social housing models.
  - Designing flexible, adaptable spaces that can evolve with community needs.
- Adaptive Reuse for Circularity (30 minutes):
  - Reusing existing buildings to reduce carbon footprint and material waste.
  - Strategies for repurposing underutilized spaces (industrial buildings, offices, malls, etc.).
  - How adaptive reuse balances heritage preservation with energy efficiency.
  - Case studies of transformative reuse projects in urban environments.
- Q&A and Discussion Session (30 minutes)

M05.05 Abilities, knowledge & skills

What will architects and urbanists gain from this module?

The module equips architects with the knowledge and tools necessary to be able to adopt and advocate for circular economy and zero-waster principles in their architecture and urban planning projects – thus contributing towards climate-neutral cities.

Learners will learn to apply strategies such as designing for disassembly and closed-loop systems in urban development and architectural projects, ensuring these initiatives not only minimize environmental impact but also support economic and social sustainability.

Moreover, the module emphasizes community and stakeholder engagement, preparing learners to lead projects that are inclusive and supported by the communities they affect.

What are the skills learners will be able to add to their portfolio of professional skills?

Technical Skills: Architects will learn about waste reduction, material life-cycle assessment, and strategies to implement circular economy principles in the built environment.

Theoretical Skills: The curriculum covers the fundamentals of circular economy and zero-waste strategies.

Templates & Case Studies: Learners will have access to templates and case studies that demonstrate the application of circular economy principles in various sectors, plus learn about materials lives.

Societal & Community-Building Skills: Gaining a sense of belonging and connection in the community that will conclude in collective responsibility for sustainability.

M06. Policy, Governance and Community Development Module

Trainers:
Urban planners, legal advisors, participatory design specialists

M06.01 Argument

Cities across the globe are aiming for climate neutrality, a goal that requires a transformative approach to how cities are designed, built, and managed.

The essence of this module lies in its comprehensive exploration of how policy-making can be leveraged to foster sustainable urban environments.

A key component of this module is its focus on community-driven development strategies. It emphasizes the importance of engaging local communities in the planning process, ensuring that development projects are not only designed with technical and environmental considerations in mind but are also shaped by the people who live and work in these spaces. This approach helps to ensure that urban transformations contribute positively to the quality of life, enhance public spaces, and promote social cohesion.

M06.02 Module's objective

The objective of the module is to develop advanced policy and advocacy skills by providing learners with essential knowledge and tools. This training will enable them to effectively advocate for robust environmental policies that promote sustainable development, ensuring they are well-prepared to influence and shape policy decisions that support ecological sustainability and responsible resource management. This goal is achieved through a comprehensive curriculum that emphasizes practical skills in policy analysis, stakeholder engagement, and strategic communication.

The module offers learners a robust foundation in the strategic aspects of policy formulation and execution. This includes gaining insights into how urban policies are developed, enacted, and revised in response to evolving environmental, social, and economic needs. Professionals will learn to apply this knowledge to ensure that their urban development projects not only comply with current regulations but also anticipate future legislative changes, positioning their projects as resilient and forward-thinking.

M06.03 Key concepts, strategies and toolkits included in the built environment and climate responsive architecture module

Key concepts:

— **Governance and policy frameworks**: explores how robust governance structures can facilitate the effective implementation of policies that support sustainable urban growth and enhance community well-being.
— **Enhancing decision-making capabilities** - critical thinking skills developing the ability to make informed decisions that balance architecture practice, sustainable materials and strategies, environments, social and economic factors.
— **Fostering leadership in sustainability** - aimed at developing leaders who can drive change within their practices and communities, by choosing to build and promote sustainable architecture principles, building a culture of resilience of cities.
— **Community-centered development** - emphasizes the role of community involvement in shaping policies that affect urban spaces. This ensures that development initiatives are inclusive and bring tangible benefits to all societal segments, fostering a sense of ownership and active participation among residents.

Strategies:

— **Integrated transport planning**: Techniques for designing comprehensive transport strategies that align with broader urban development and sustainability goals.
— **Policy formulation and implementation**: Methods to develop, enact, and monitor urban policies that support sustainable development and community engagement. This involves legislative drafting, stakeholder analysis, and continuous policy evaluation to ensure effectiveness and adaptability.
— **Public participation enhancement**: Strategies to improve community involvement in the urban planning process.

Tools:

— **Policy analysis frameworks** - tools to assess the effectiveness of urban policies and their alignment with sustainability objectives. These frameworks help policymakers and urban planners evaluate the impacts of their initiatives and make informed adjustments to enhance outcomes.
— **Community engagement platforms** - digital and physical platforms that facilitate active participation of community members in urban planning and policy-making processes. These tools are designed to enhance transparency, increase public input, and foster stronger community relations.
— **Stakeholder mapping tools** - techniques and software that help identify and categorize key stakeholders within urban development projects.

M06.04 Topics and structure of the module

The Module explores a variety of key themes designed to advance learner's knowledge on policy, governance and community development strategies. Enrollees will gain in-depth knowledge and practical skills necessary for integrating modern sustainability concepts into their projects, focusing on these following areas:

Learnig Activity 1: Sustainable Urban Policy & Planning

— Architects and City-Level Climate Policies (60 minutes):
  — Understanding the role of architects in shaping sustainable urban policies.
  — Analyzing existing city-level climate policies and identifying opportunities for improvement.
  — Developing strategies for architects to advocate for and contribute to policy development.

- Examples of architects who influenced local policies.
- Aligning Local Planning Regulations with EU Climate Goals (30 minutes):
  - Overview of EU climate goals and directives.
  - Translating EU goals into practical local planning regulations.
  - Identifying and addressing potential conflicts between local and EU regulations.
  - How to implement the European green deal in local projects.
- Q&A and Discussion Session (30 minutes)

LEARNING ACTIVITY 2: Green Procurement & Public-Private Partnerships

- Embedding Sustainability Criteria in Public Tenders (60 minutes):
  - Understanding the principles of green procurement.
  - Developing sustainability criteria for public tenders in the construction and urban planning sectors.
  - Implementing strategies for monitoring and evaluating sustainability performance.
  - Examples of good green procurement.
- Encouraging Private Sector Investments in Sustainable Urban Projects (30 minutes):
  - Exploring opportunities for public-private partnerships in sustainable urban development.
  - Developing strategies for attracting private sector investments in green projects.
  - Understanding the financial and regulatory aspects of public-private partnerships.
  - Financial tools that can be used.
- Q&A and Discussion Session (30 minutes)

Module 3: Community-Led Climate Action & Metropolitan Coordination

- Community-Led Climate Action (60 minutes):
  - Engaging citizens through participatory planning and Local Action Groups (LAGs).
  - Raising awareness through education, exhibitions, and interactive urban labs.
  - Strategies for empowering communities to take ownership of climate action initiatives.
  - How to create and facilitate public consultations.
- Metropolitan Coordination & Governance Tools (30 minutes):
  - Enhancing regional collaboration in climate adaptation planning.
  - Supporting integrated urban development strategies.
  - Exploring governance tools for effective metropolitan coordination.
  - Examples of metropolitan coordination.
- Q&A and Discussion Session (30 minutes)

M06.05 Abilities, knowledge & skills

What will architects and urbanists gain from this module?

Participating in the Policy, Governance, and Community Development module will profoundly equip architects and urbanists with the skills necessary to understand and leverage European Union policies alongside national regulations that guide sustainable urban development.
It's equally important for architects and urbanists to stay informed about the local and national context but also resonate with local community needs. In addition to understanding the broader European framework, learners in this module will also delve into the specific legislative environment of Romania. This focus is critical, as Romania has its unique set of challenges and policies related to urban development and climate change. By familiarizing themselves with Romania's specific regulations

and development strategies, architects and urbanists can more effectively contribute to the country's sustainability goals.

Romania is actively enhancing its legislative framework to support sustainable urban development and align with EU climate objectives.

What are the skills you will be able to add to your portfolio of professional skills?

Technical Skills: Skills developed include policy analysis, legislative drafting, and community engagement techniques

Theoretical Skills: The module provides a deep understanding of the mechanisms of policy development, governance structures, and the role of community engagement in shaping sustainable urban environments.

Templates & Case Studies: Templates for policy development and governance strategies are included, alongside case studies showcasing successful community development and participatory governance models.

Societal & Community Skills: Professionals will learn to design and implement policies that not only address urban challenges but also foster community participation.

4 Evaluation, Implementation, and Future Perspectives

Measuring Impact & Performance Indicators

The effectiveness of the training will be measured through pre- and post-course assessments, participant feedback, and case studies demonstrating the implementation of learned principles. Performance indicators will include the ability to integrate sustainability and adaptive reuse into design projects, problem-solving skills applied in real-world scenarios, and the professional growth of participants.

Methodology: How Learning Will Be Delivered

It will focus on a blended learning approach that combines interactive lectures, case studies, and hands-on workshops. The curriculum will be delivered through a mix of in-person sessions, online modules, and collaborative discussions to ensure flexibility and accessibility for participants. Practical application will be emphasized through real-world project analyses, site visits, and multidisciplinary teamwork. Additionally, expert-led panel discussions and mentorship opportunities will provide valuable industry insights.

Cross-Cutting Themes & Related Domains

The Romanian Order of Architects will ensure that the curriculum integrates key interdisciplinary topics that enhance the relevance and applicability of training for architects and urban planners. Core themes will include sustainability and circular economy principles, climate resilience, social equity in urban development, and digital innovation in architecture. Additionally, related domains such as policymaking, environmental psychology, and participatory urban planning will be addressed to provide a holistic understanding of the built environment.

Future Outlook & Sustainability of the Program

The Romanian Order of Architects will focus on ensuring the long-term relevance and continuous improvement of the curriculum. The program will be regularly updated based on participant feedback, industry advancements, and evolving regulatory frameworks.

Policy Recommendations & Strategic Directions

The Romanian Order of Architects will focus on aligning architectural education and professional training with national and European sustainability goals. Key recommendations will include integrating circular economy principles and climate resilience into urban planning regulations. Through collaboration with policymakers and industry stakeholders, the Romanian Order of Architects aims to influence regulatory frameworks that support sustainable and high-quality built environments.

The relevance of the modules in Romania

Romania is grounded in the specific challenges and opportunities of the local built environment. The curriculum addresses urgent issues such as inefficient building stock, the need for adaptive reuse to prevent unnecessary demolition, and the integration of circular economy principles in construction. Additionally, the modules respond to Romania's commitments to EU climate targets, emphasizing energy efficiency, resilience to climate change, and sustainable urban development. By providing architects and urban planners with practical tools tailored to the national regulatory framework and socio-economic context, the program ensures that sustainability is both achievable and scalable within Romania's architectural practice.

Collectively, these modules provide a robust educational framework that equips architects and urbanists to support the sustainable transformation of European cities.

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Solutions inspired by nature

Design tools for architects in the M100 conceptual framework

Definition of green / blue-green infrastructure. Concepts

Green / blue-green infrastructure refers to areas that combine green spaces with areas that are permanently or temporarily covered by water. They are either integrated into the built-up areas to improve resilience as well as the quality of life and the environment, or they are located in the extra-urban - peri-urban / natural environment as reminiscences of the undisturbed natural landscape or the anthropized natural landscape.

Green-blue infrastructure therefore includes all the natural elements that contribute to urban resilience, biodiversity, pollution reduction and opportunities for recreation, leisure and relaxation. In this context, nature-inspired solutions are an essential toolbox with the environmental, social and economic benefits they offer.

The result is urban and territorial structures that emphasize natural processes, subject to systemic processes that, once initiated unfold with limited need for intervention along the way and thus become resource efficient.

Green and green-blue areas: the Behela River in Timișoara. Source: Green-Blue Timișoara.

Key concepts for understanding these are:

— Nature-based solutions (NBS), solutions inspired by nature
Actions that ensure sustainable management of the environment through ecosystem restoration, protection and enhancement actions, applied at the scale of natural landscapes and aiming at maximizing ecosystem services. The range of solutions starts from the plot level up to the territorial scale.

— Resilience
Principle applied to infrastructures, institutions, economy or society, corroborating approaches reference to spatial planning and ecosystem management, whereby the inclusion of natural elements in the planning process can reduce economic losses. This reduces disaster risk by managing watersheds, green-blue infrastructures, ecological barriers and ensures a coherent urban landscape design. The range of solutions starts from the plot level up to the territorial scale.

— Permeable cities / sponge cities
Planning designs that use natural systems to capture and store rainwater, ensuring the highest possible protection from flooding and other adverse climate impacts. In essence, the concept refers to the use of as many permeable surfaces as possible, which absorb water during rainfall and ensure its gradual release to the atmosphere during periods when it is needed in the urban environment. The measures are applicable from plot scale to landscape scale, from solutions such as rain

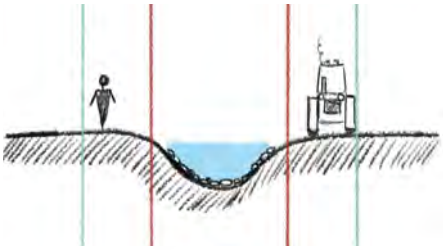
gardens, green roofs or green facades, thus managing rainwater and reducing the effects of urban heat islands.

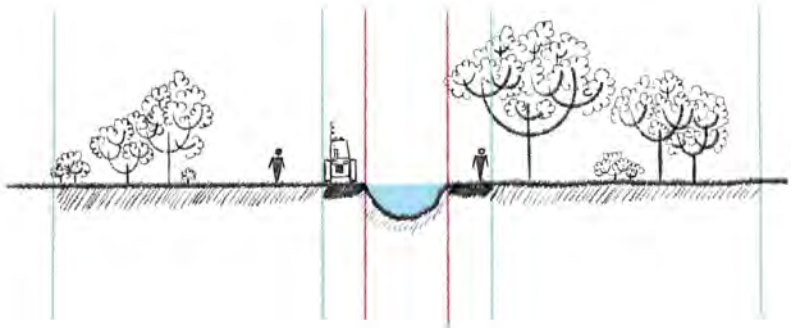
— Green infrastructure
Networked natural and semi-natural areas that contribute to ecosystem health and resilience. They contain networks of natural and semi-natural spaces and other ecological elements. Their design and management provide multiple ecosystem services. They include all commonly recognized categories of green spaces that contribute to enhancing the quality of urban life. To implement them, strategically planned actions are carried out, aiming at biodiversity conservation1. The measures are applicable from the punctual level (e.g. through the greening of discontinuous areas) to the territorial scale, through regulations that ensure continuity up to the regional level (e.g. extensive wooded areas over large areas).

— Eco-corridors
Green infrastructure, in different sizes, shapes and topographies, ranging from narrow urban corridors to Eco-ducts and wider. Measures for these corridors can be qualitative (increasing the level of biodiversity or improving the quality of public space) or quantitative (increasing the number of green areas planted with native species).

— Blue-green corridors
A subcomponent of ecological infrastructures, which in their composition consist of watercourses and their protection zone. Thus, a watershed or water retention area is formed and the area from which water is drained into the retention area. In fact, any green infrastructure becomes blue-green and any green corridor becomes blue-green with the presence and need for water management.

addendum:





Design and planning of buffer zones along watercourses, ranging from drainage channels to large rivers. Source: Ghiroda Commune General Urban Plan (PUG), Subcontrol SRL, processed by Anastasia Stolearenco, Non-Formal Spatial Planning Studio Timișoara.

Conceptele sunt relevante pentru arhitecți, indiferent de statutul acesThe concepts are relevant to architects, regardless of their status or mode practice, and are part of the specific toolkit of keywords used to substantiate, argue and describe interventions in green and blue-green corridors. The document therefore aims to inform all architects, from those practicing the profession on a self-employed basis to those working in public administration or in multidisciplinary teams, and all categories of application, from small-scale developments (a house or a square) to spatial planning. The spectrum is that achieving the goal of climate neutrality, an objective that needs to be achieved through quantitative measures, following the specific methodological indicators that will be presented below.

To start the dialog on concrete measures it is necessary to introduce the main categories of infrastructures / blue-greens for which the architect is invited apply nature-inspired solutions. These are distributed on

1

Institutul European pentru Politici de Mediu, Institute for European Environmental Policy, 2011verde-albastră

3 scales of intervention, from territorial to human. For each category of infrastructures (which will be described in more detail below) there are some relevant planning tools that it can draw on, with specific measures applicable according to the scale of intervention.

Planning tools	Green / blue-green infrastructure category	Applicable measures
Tools applicable at the wider territorial scale - macro landscape *Example:* *- Relevant public policies at national level* *- Spatial Development Plans* *- Territorial Development Strategies* *- Technical and economic documentation, S.P.F.*	Components of green areas connected to road and technical infrastructure Green areas near water surfaces	Measures including nature-inspired solutions cover connecting habitats as well as creating extensive ecological networks. *Random examples:* *- renaturation of rivers and wetlands.* *- creating and maintaining ecological corridors connecting protected natural areas.*
Tools applicable to the scale of the locality / landform unit - mezzo landscape *Example:* *- Relevant public policies at local level* *- Urban development plans, P.U.G. and P.U.Z.* *- Technical-economic documentation, S.P.F., S.F. / D.A.L.I., D.T.A.C. / P.T.*	Green components of green areas connected to road and technical infrastructure Green components related to agricultural infrastructure Green components of natural, semi-natural and man-made areas within the boundaries of municipalities, which have a forestry function Green components near water surfaces	Measures include nature-inspired solutions for planning at the scale of urban or rural localities. *Random examples:* *- parks and gardens, creating carbon sinks through dense vegetation.* *- Protective zones along major traffic infrastructures, such as networks of green belts and green squares with water retention areas.*
Human scale tools - micro landscape, architectural object or public space *Example:* *- Urban development plans: P.U.Z., P.U.D.* *- Technical and economic documentation, D.T.A.C. / P.T.*	Components of green areas connected to road and technical and public infrastructure Components of green areas attached to social infrastructure Components of green areas attached to buildings	The measures include nature-inspired solutions for point and community-based interventions *Random examples:* *- creating community gardens for the residents of a condominium.* *- landscaping private backyards, including rain gardens and climate-resilient plants.*

Green infrastructure categories / green-blue (macro to micro)

The categorization of infrastructures follows the main planning tools, in which the role of architects is described as follows[2] [3] [4]:

1. At the larger scale of the territory (macro-landscape), implemented through:

— Relevant national environmental public policies
They are relevant for architects employed in public institutions at national level or involved working groups at this level, who can through public policies contribute to the protection, conservation and development of green blue corridors through legislative measures, implementing rules or tools of an informative and advisory nature (e.g. guidebook).

— Spatial Development Plans:
  — Spatial Zoning Plan, P.A.T.Z.R.
  — County (Regional) Zoning Plan, P.A.T.J.

They are relevant to architects involved in multidisciplinary teams for the elaboration of P.A.T., as project leader or coordinators for areas influencing blue green corridors. As drafters for spatial planning documents, they can issue proposals of a guiding nature, setting out the main strategies and directions for the development of a territory and can contain measures in the specialized sections water, protected areas, natural and technological risk areas.

— Territorial development strategies:
  — Peri-urban/metropolitan territorial development strategy or metropolitan master plan

They are relevant for architects involved multidisciplinary teams drafting Spatial Development Strategies, as project leaders or coordinators for areas influencing the green-blue corridors. By participating in the elaboration of strategies, architects can develop objectives and measures that can be implemented by public authorities, including possibility of financing interventions from different sources.

addendum:

Planning a metropolitan area by prioritizing flood-prone zones (in red), watercourses (in blue), and green infrastructure forming continuous corridors. Source: TREDJE NATUR, Copenhagen Climate Adaptation Plan. Diagram adapted by Anastasia Stolearenco, Non-Formal Spatial Planning Studio Timișoara.

2

Methodological Norms of February 26, 2016 for the application of Law no. 350/2001 on spatial planning and urbanism and for the elaboration and updating of urban planning documents, https://legislatie.just.ro/Public/DetaliiDocument/228239

3

Law no. 350 of June 6, 2001 on spatial planning and urbanism, https://legislatie.just.ro/Public/DetaliiDocument/29453

4

Decision No 907 of November 29, 2016 on the stages of elaboration and the framework content of the technical and legal economic aspects of investment objectives/projects financed from public funds, https://legislatie.just.ro/public/detaliidocument/185166

— Technical and economic documentation
  — Pre-feasibility study for infrastructures with territorial impact

These are relevant for architects involved multidisciplinary teams preparing pre-feasibility studies for projects on a territorial scale, such as the renaturation of watercourses or the development of corridors over large lengths and areas, with applications in the field.

2. At the scale of the locality / landform unit - landscape, implemented through:

— Relevant local public policies in the field of environmental protection

They are relevant to architects employed in public institutions at local level or involved in working groups at this level, who can through public policies contribute to the protection, preservation and development of blue-green infrastructures through local legislative measures (council decisions) or information and advisory tools (e.g. guide).

— Urban development plans:
  — General Urban Development Plan, P.U.G. and its local regulation or Urban Masterplan
  — The zonal urban plan, P.U.Z. and its local regulation or Masterplan, with local impact

They are relevant for architects involved multidisciplinary teams preparing P.U.G. / P.U.Z., as project managers or coordinators for areas influencing blue green corridors. As drafters of urban planning documents, they may issue proposals of a directive and strategic nature, as well as of a regulatory nature. The plans are main operational planning instruments, constituting the legal basis for the implementation of development programs and actions, and contain measures for determining use of land within the urban area, including in terms of blue-green infrastructure.

addendum:

Neighborhood-scale planning prioritizing green corridors (in green) that connect major green landscape elements, over major transportation routes (in red). Source: diagram adapted by Anastasia Stolearenco, Non-Formal Spatial Planning Studio Timișoara.

— Technical and economic documentation
  — The pre-feasibility study, for infrastructures with impact at local scale
  — The feasibility study or the documentation for the approval of works for infrastructures with an impact at local scale
  — Technical Documentation for the Authorization for the Execution of Construction Works, hereinafter referred to as T.D.T.A.C. and Technical Execution Design, for infrastructures with impact at the local scale

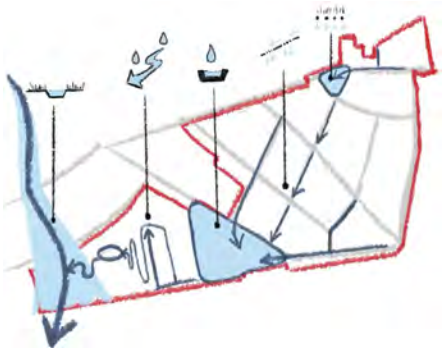
They are relevant for architects involved in design phases of relevant investment at the local scale, including in terms of blue-green infrastructures.

3. Human scale: micro landscape, object or public space, implemented by:

— Urban development plans:
  — Zonal Urban Plan, P.U.Z. with impact on public space
  — Detailed urban plan, P.U.D.

They are relevant for architects involved in multidisciplinary teams preparing P.U.Z. / P.U.D., as project manager or coordinators for areas influencing blue green corridors. As drafters of urban planning documents, they may issue regulatory proposals. Although of a derogatory nature, they can constitute coherent spatial planning instruments, including in areas with application to blue-green infrastructure.

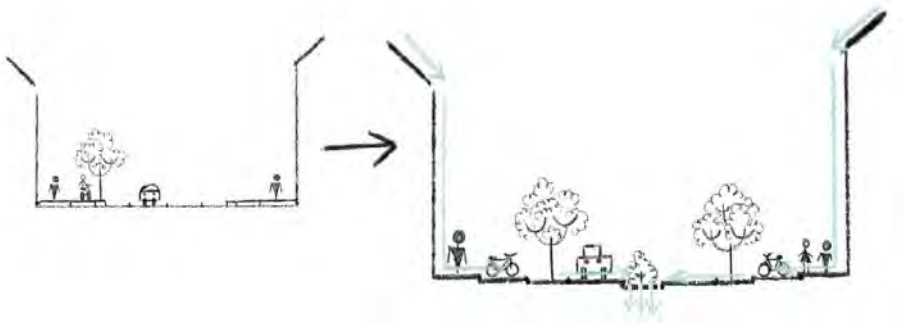
addendum:



Planning from the neighborhood scale to the public space scale by prioritizing water management (in blue, collected and directed toward the outfall), in close collaboration with stormwater management experts. Source: Rainproof Ringsted, DE URBANISTEN, adapted by Anastasia Stolearenco, Non-Formal Spatial Planning Studio Timișoara.

Planning the neighborhood's green network based on the framework of water drainage zones, in close collaboration with landscape architects and biologists. Source: Rainproof Ringsted, DE URBANISTEN, adapted by Anastasia Stolearenco, Non-Formal Spatial Planning Studio Timișoara.

Planning green boulevards, with planted alignments (in green) developed along water drainage zones (in blue), in close collaboration with communication experts and landscape architects. Source: Rainproof Ringsted, DE URBANISTEN, adapted by Anastasia Stolearenco, Non-Formal Spatial Planning Studio Timișoara.



Planning for resilience and efficient stormwater collection (in blue, draining into retention areas), in close collaboration with water management experts. Source: Rainproof Ringsted, DE URBANISTEN, adapted by Anastasia Stolearenco, Non-Formal Spatial Planning Studio Timișoara.

Planning for resilience and efficient stormwater collection (in blue, draining into retention areas), even in public transport station zones or high-traffic areas, in close collaboration with water management experts. Source: Rainproof Ringsted, DE URBANISTEN, adapted by Anastasia Stolearenco, Non-Formal Spatial Planning Studio Timișoara.

— Technical and economic documentation
  — The feasibility study or the documentation for the authorization of the works for infrastructures with an impact on the scale of the public space
  — Technical documentation for the authorization of the execution of construction works, hereinafter referred to as T.T.A.C.D. and Technical Execution Design, for infrastructures with an impact on the scale of the public space

They are relevant for architects involved in design stages of relevant investment at the object or public space scale, including in terms of blue-green infrastructures.

The analysis of relevant infrastructures at different scales uses the types proposed in the Good Practice Guide for Green Spaces| Romanian Association of Landscape Architects - AsoP[5], taking into account its integrative character and the perspective of those who plan in field of green spaces: landscape planners. The category indicators correspond to the indicators in the Guide.

Infrastructures relevant at territorial scale – macro-landscape

There are the following categories of infrastructures:
— Infrastructures in Category 2: Components of green areas connected to infrastructures roads and technical and civil engineering

5

AsoP - Romanian Association of Landscape Architects, Good Practice Guide for the Management of Green Spaces, Swiss-Romanian Cooperation Program, https://asop.org.ro/publicatii/#flipbook-df_7310/7/ , https://romehome.ro/ghid-de-buna-practica-practice-for-the-management-of-green-spaces/

Types of infrastructures	Green component	Blue component
Green pavement for road infrastructure According to Law no. 24/2007, protection corridors in relation to technical infrastructure - plantations along traffic routes or around installations with high pollution potential, in order to improve the environmental quality and protect the related infrastructure. *attached to the road structure*	construction generally made of earth and/or mineral material landscaped with vegetation;	local rainwater, mixed with hydrocarbons or conventionally cleaned
Rail transport infrastructure safety zone According to the Law no. 24/2007, protection corridors in relation to technical infrastructure - plantations along traffic routes or around installations with high pollution potential, in order to improve the environmental quality and protect the related infrastructure. *located on either side of the rail axis*	strips of land incorporating vegetation	local rainwater, mixed with hydrocarbons or conventionally cleaned

— Category 6 infrastructures: green components located in the proximity of water surfaces which have a mixed function and will be managed by local public authorities, the development works being carried out with the approval of the competent structure of RN "Apele Române" and which will be included in the Green Register and will be taken into account in the development of the strategy for the conservation and development of the green network.

Types of infrastructures	Green component	Blue component
Dry trees *depression of land formed by flowing water, usually dry* *used for recreation*	depression of land formed by flowing water, usually dry can have rich biodiversity	periodic water flow
Green Mal According to Law 24/2007, planted strip - planting for aesthetic purposes and to improve the climate and air quality, along traffic routes or ; *land located near water surfaces*	incorporates planted or spontaneous vegetation	natural or artificial water surfaces
Protection zone adjacent to land improvement infrastructure *land adjacent to irrigation and/or drainage canals*	incorporates vegetation	irrigation and/or drainage canals
Marine coastal zone *land with coastal characteristics is in contact with the sea*	land with coastal characteristics is in contact with the sea	tide
Waterfront *a collection of natural and artificial surfaces arranged in a linear pattern along a watercourse*	natural and artificial surfaces incorporates planted and/or spontaneous vegetation	watercourse

There are the following categories of infrastructure:

— Infrastructures in Category 2: Components of green areas connected to infrastructures roads and technical and civil engineering

Types of infrastructures	Green component	Blue component
Green street *point or linear permeable surfaces, adjacent to pedestrian or road surfaces*	local rainwater, mixed with hydrocarbons or	local rainwater, mixed with hydrocarbons or conventionally clean

— Category 4 infrastructure: green components related to agricultural infrastructure to be included as a priority in the category of green areas once their agricultural role can no longer be fulfilled due to soil degradation

Types of infrastructures	Green component	Blue component
Meadow *agricultural area for fodder production, harvested by mowing*	Herbaceous plants predominate	local, conventionally clean stormwater
Pasture *agricultural area intended for the production of fodder used for grazing animals*	Herbaceous plants predominate	local, conventionally clean stormwater
Fruit plantation According to the Law no. 24/2007, nursery - land on which herbaceous and woody plants are cultivated and propagated until transplantation for permanent planting; According to Law no. 24/2007, greenhouses - land covered by light constructions intended for the cultivation of plants. *arrangement strawberry plantations, nurseries, greenhouses*	fruit trees and/or bushes land for fallow or land in preparation for planting	local, conventionally clean stormwater
Arable land land for agroforestry *area of cultivated or uncultivated land intended for crop production maintained in good agricultural and environmental condition; intended for the production of biomass and other products*	area of land under vegetation	local, conventionally clean stormwater

— Category 5 infrastructure: green components of natural, semi-natural and man-made areas within the boundaries of settlements, which have a forestry function and will be managed according to specific legislation, but which will be included in the green register and will be taken into account in the development of the strategy for the conservation and development of the green network

Types of infrastructures	Green component	Blue component
Urban forest According to Law no. 24/2007, recreational forest - a forest or wooded area in which various works are carried out to create a suitable setting for leisure. *land located within the urban area of at least 0.25 ha in surface area fulfills several special functions of protection, production and/or recreation*	covered with trees which must reach a minimum height of 5 meters at maturity	local, conventionally clean stormwater
Forest shelterbelt *formation located at a certain distance from each other or from an objective formation with the aim of protecting an objective against the effects of harmful factors formation with the aim of climatic, economic and aesthetic improvement of the land;*	formation with forest vegetation	local, conventionally clean stormwater
Forest cordon *connect forest bodies or networks of protective forest shelterbelts up to 10 km apart* *The forestry corridors can be up to 30 m wide and are located on the edge of cultivated agricultural fields, along existing roads, dikes and embankments or around settlements.* *the forest corridors themselves constitute the protective forest buffer strips and take over their protective functions;*	formation of forest trees and shrubs	local, conventionally clean stormwater
Ecological conversion structure *land that was intended for the extraction/ exploitation of mineral resources and is currently being rehabilitated with tree, shrub and herbaceous plantations with a role in environmental protection;*	tree, shrub and herbaceous plantations with an environmental protection role	local, conventionally clean stormwater
Abandoned land *area of vacant land to which no person claims ownership*	herbaceous and/ or shrub and/or tree vegetation of spontaneous character	
Wetlands, swamps, marshes, puddles, bogs	flora and fauna	areas of land with soil permanently or periodically saturated with water

— Category 6 infrastructures: green components located in the vicinity of water surfaces which have a mixed function and will be managed by local public authorities, the development works being carried out with the approval of the competent structure of the RN "Romanian Waters" and which will be included in the green register and will be taken into account in the elaboration of the strategy for the conservation and development of the green areas network

Types of infrastructures	Green component	Blue component
Dry trees *depression of land formed by flowing water, usually dry* *used for recreation*	depression of land formed by flowing water, usually dry can have rich biodiversity	periodic water flow
Green Mal According to Law no. 24/2007, green spaces for the protection of watercourses and lakes - plantations along watercourses or around lakes, whose main role is to protect them. *land located near water surfaces*	incorporates planted or spontaneous vegetation	natural or artificial water surfaces
Protection zone adjacent to land improvement infrastructure *land adjacent to irrigation and/or drainage canals*	incorporates vegetation	irrigation and/or drainage canals
Marine coastal zone *land with coastal characteristics is in contact with the sea*	sandy beaches, cliffs, coastal/coastal dunes, cliffs	tide
Waterfront *a linear arrangement of natural and artificial surfaces along a watercourse*	natural and artificial surfaces incorporates planted and/or spontaneous vegetation.	watercourse

Relevant infrastructures on a human scale: the micro-landscape, object or public space

There are the following infrastructure categories:

— Infrastructures in Category 2: Components of green areas connected to road and technical and public infrastructure

Types of infrastructures	Green component	Blue component
Bioretention system *punctual or longitudinal cavities in the ground (pits, ditches, gullies)* *constitute infiltration media*	composed of vegetation to which other organic or mineral materials may be added	local rainwater, mixed with hydrocarbons or conventionally cleaned
Green street *point or linear permeable surfaces adjacent to pedestrian or road surfaces*	incorporates vegetation, predominantly trees	local rainwater, mixed with hydrocarbons or conventionally cleaned

— Infrastructure in Category 3: Components of green areas attached to social infrastructure publicly or privately owned by the State or administrative territorial units

Types of infrastructures	Green component	Blue component
Green sports or leisure green According to Law no. 24/2007, sports base or sports park for the practice of performance sports - a complex consisting of a green area and built areas, specially designed and equipped for the practice of various sports (complex of sports facilities). According to Law no. 24/2007, sports base or sports park for the practice of performance sport - as defined above. *park-type structure* *public or private property of the State or territorial administrative units* *built-up area*	areas specially designed, equipped and equipped for various sports (complex of sports facilities) and recreation;	local, conventionally clean stormwater
Green cemetery According to Law no. 24/2007, green spaces related to public facilities. *garden structure* *public or private property of the State or territorial administrative units* *structure designed for funeral practices*	areas where vegetation and/ or green areas are given priority over mineral elements for burial constructions;	local, conventionally clean stormwater
Garden According to Law 24/2007, garden - land cultivated with flowers, trees and ornamental shrubs that is used for recreation and leisure and is open to the public. According to Law 24/2007, botanical garden - a garden in which collections of living plants cultivated under natural or greenhouse conditions are presented for study or just for the curiosity they present. *public or private property of the State or territorial administrative units* *may or may not be attached a building accessible to the general public or may or may not have various specializations* *it may contain fixtures, fittings, equipment and other structures which may be aggregated in landscaping having a predominantly aesthetic or specialized role*	predominantly vegetation for recreation, education and/or research purposes	local, conventionally clean stormwater
Community garden *in the public or private ownership of the State or territorial administrative units*	garden landscaping for non-commercial horticultural production and/or recreation	local, conventionally clean stormwater
Garden condominium According to Law 24/2007, green spaces related to condominiums - green spaces consisting of a green frame, located adjacent to blocks of condominiums, with an aesthetic and protective role, improving the climate and air quality. *located in residential areas* *in the public or private ownership of the State or territorial administrative unit*	structure incorporating vegetation	local, conventionally clean stormwater
Institutional garden According to the Law no. 24/2007, open-air museum - an institution that has an open green space, specially designed for the exhibition and study of art objects, relics, historical and scientific documents and public education; According to Law no. 24/2007, exhibition park - green space specially designed for public information and events promotion. *structure attached to buildings of state institutions or territorial administrative units of public or private character*	incorporates vegetation as well as various facilities, equipment and/or other constructions, which may be aggregated in mainly aesthetic or specialized landscaping	local rainwater, mixed with hydrocarbons or conventionally cleaned

Zoo According to Law 24/2007, zoo - any collection of live animals, maintained on a managed site and open to the public, for the purpose of promoting the conservation of biodiversity and to provide a means of education, information and leisure in relation to the presentation and conservation of wildlife. *park type structure* *public or private property of the State or territorial administrative units* *keeping animals in captivity for the purpose of showing them to the public*	permeable surfaces and vegetation predominate	local, conventionally clean stormwater
Park According to Law 24/2007, a green space, with a surface area of at least one hectare, consisting of a specific vegetation and built areas, including facilities and equipment for cultural-educational, sporting or recreational activities for the population. *independent structure* *public or private property of the State or territorial administrative units* *accessible to the general public* *facilities and/or equipment for a wide range of leisure activities for a wide range of users* *may have different specializations*	vegetation predominates (usually trees)	local, conventionally clean stormwater

Historic Park or historic garden *park or garden-type structure that is declared by law as a historical monument;*	vegetation predominates (usually trees)	local, conventionally clean stormwater
Scuar (pocket park) According to Law 24/2007, green space, with an area of less than one hectare, located within housing estates, around public facilities, on the premises of economic, social-cultural, educational, sports, recreational facilities for children and youth or in other locations. *small park-like structure inserted into the urban fabric which may be fitted with various fittings and/or equipment* *is intended to provide short-term rest users, to facilitate pedestrian traffic and to provide recreational areas*	incorporates permeable surfaces and predominantly tree vegetation	local, conventionally clean stormwater
Camping area *park structure for camping*	incorporates permeable surfaces and predominantly tree vegetation	local rainwater, mixed with hydrocarbons or conventionally cleaned

Included in the Guide are infrastructures mentioned in Category 1, Green space components attached to publicly or privately owned buildings owned by the state or administrative territorial units, such as green roof, atrium, green balcony or green wall. They do not contain the blue component, so they are not relevant for the study of blue-green infrastructures, but they are relevant from the perspective of approaching nature-inspired solutions

Solutions inspired by nature

Green / green infrastructure and the possibility of implementing nature-inspired solutions through current legislation and policies

Knowledge of the legal framework, established on levels of applicability from the international to the local level, is important for architects as it contributes to an implicit knowledge of operating principles and the tools available to them. Thus, given that spatial planning is a process approached hierarchically and correlated at the managerial and regulatory level since the supra-territorial scale, it is important to understand these principles in order to formulate coherent, contemporary and applied responses on the specific parameters of each context.

International policies, policy papers and position papers

Regulation of the European Parliament of the Council of 2024 on nature restoration[6]

The policy document sets EU-wide rules on ecosystem restoration, thus ensuring the recovery of the resilience and biodiversity of nature across the EU. The Union's objectives of climate change mitigation and adaptation are therefore met through ecosystem restoration. The Regulation builds on the European Green Deal as well as the EU Biodiversity Strategy 2030 - Bringing nature back into our lives. The Regulation also contributes to restoring biodiversity and ecosystem resilience, climate change mitigation, adaptation and land degradation neutrality, as well as to increasing food security.

Restoration is a broader process by which an ecosystem is subject to actions aimed at improving its structure and functions. The main objective is to improve habitat area, re-establish a favorable baseline area and improve the habitat of a species to a sufficient level of quality and quantity recognized and quantified by regulation. Thus, through its application, restoration measures are put in place which are necessary to bring areas of habitat types in less good condition to good condition.

The regulation establishes that by 2030 the neutral level in terms of the minimum green areas required in cities is reached, and from 2031 onwards this area will increase annually until it reaches the parameters specified in European legislation. The cities must also initiate a procedure to inventory all man-made barriers to the natural flow of water, and the necessary measures to improve the natural functions of the associated floodplains must be implemented. Such measures shall also apply to the restoration of forest, beekeeping or agricultural ecosystems. All this is achieved following the implementation of a National Restoration Plan, which sets concrete measures and targets. Finally, the Regulation mentions the application to all types of terrestrial, coastal and freshwater habitats, including habitats, grasslands, meadows, wetlands, peatlands, peat bogs, forests. It also sets out lists of indicators on ecosystem restoration, including examples such as the extension of urban green spaces with ecological features, and the conversion of brownfield sites, former industrial sites and quarries into nature sites.

New European Bauhaus| European Commission[7]

The benefits of the New European Bauhaus provisions on blue green infrastructure are structured around the principles that make up this set of policies: sustainability, aesthetics and inclusiveness. Thus, from a sustainability perspective, the most important aspect is energy efficiency manifested through the use and reuse of renewable resources, thus ensuring the widest possible reduction in energy consumption and alignment with the objectives of transition to climate neutrality. Promoting biodiversity is also important, integrating natural elements, including blue-green infrastructures, thus contributing to a healthier environment for both people and the habitats that depend on them. Another important aspect is water management, ensuring the implementation of solutions such as rain gardens and green roofs and thus ensuring effective storm water control.

6

Regulation of the European Parliament and of the Council of June 24, 2024 on nature restoration and amending Regulation (EU) 2022/869, https://data.consilium.europa.eu/doc/document/PE-74-2023-REV-1/ro/pdf , https://www.consilium.europa.eu/ro/press/press-releases/2024/06/17/nature-restoration-law-council-gives-final-green- light/

7

New European Bauhaus: https://new-european-bauhaus.europa.eu/index_en

Another important role is played by aesthetics, translated from the perspective of blue-green infrastructures as spaces that are attractive to all, visually pleasing in character and tick as many of the quality criteria of a generic public space as possible. An important role in this is played by the integration of natural elements, creating harmony between the built and natural environment. In this way, this principle also contributes greater well-being for residents. Last but not least, the third principle is inclusion, thus providing access to these infrastructures for all categories of people, regardless of their social category or intrinsic limitations. It is also crucial to involve the community in the planning process to create a sense of belonging and social cohesion, which will then contribute to low-cost maintenance and increased civic involvement.

New Leipzig Charter| Council of the European Union[8]

This general policy document, drawn up and adopted by the ministers responsible for urban development in the Member States of the European Union, is important because it sets the level of importance for blue-green infrastructure, considering the integrated nature that integrated urban development must have. Through these measures, the fight against climate change is as broad as possible, ensuring higher air quality in cities, more coherent and resilience-oriented water management (especially stormwater), as well as promoting biodiversity and accessibility to recreational spaces for all. These measures thus contribute to the overall well-being of both inhabitants and habitats.

In addition to the above, the Charta places significant emphasis on a participatory, trans-disciplinary and multi-level territorial approach, with collaboration between all key actors, both governmental and non-governmental, being essential, thus supporting urban development and transformation for the benefit of people and the environment. From a procedural point of view, it is necessary to involve residents in the decision-making process, thereby ensuring that infrastructure responds to their specific needs and preferences, thus contributing to the Charter's core principles of inclusion, resilience and sustainability.

ECTP -CEU, SPECIAL guide (Spatial Planning and Energy for Communities and Landscapes)[9]

The document is an outcome of a project that involved a collaboration between eight associations of urban planners in Europe, with application to a wider network of planners through the European Council of City Planners (ECTP-CEU). The project was set up to provide tools for planners in the context of achieving the EU's climate change objectives. The result is a practical guide to spatial planning for energy efficiency

An important component is blue-green infrastructure, for which the document sets out objectives and recommendations as follows:

— Objectives
protecting and managing natural resources in urban areas, including habitats and species, regulating the urban microclimate and reducing energy consumption.

— Recommendations
avoiding sealing areas to reduce urban heat islands, protecting polder or water retention areas, adjusting community development to existing water resources, promoting blue-green networks as a primary means of regional and urban strategic planning, promoting programs afforestation, encouraging urban gardening and inserting green corridors along all technical infrastructure.

8

New Leipzig Charter: https://ec.europa.eu/regional_policy/whats-new/newsroom/12-08-2020-new-leipzig-charter-the-transformative-power-of-cities-for-the-common-good_en

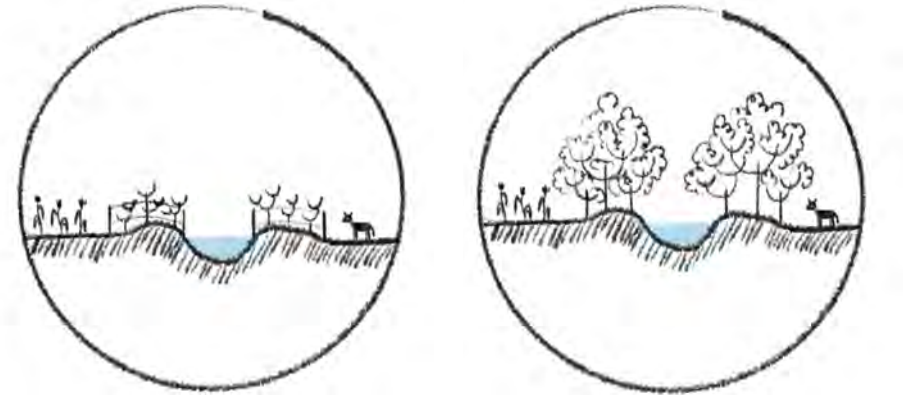
9

ECTP-CEU, SPECIAL Guide (Spatial Planning and Energy for Communities in All Landscapes): https://archive.ectp- ceu.eu/ectp-ceu.eu/images/stories/PDF-docs/SPECIAL%20Pan-European%20Guide.pdf

IFLA Europe, the role of landscapers in promoting biodiversity[10]

IFLA Europe's position paper sets out strategic steps to achieve the required level of biodiversity globally, with applicable measures for each project or planning process. Landscape planning thus involves going through a series of stages, from concept, to a shared vision, leading to implementation, design, procurement, construction and finally to the living landscape and its maintenance. The result of integrating biodiversity and ecosystem principles creates multifunctional landscapes, ensuring resilience and protecting natural capital - water and air quality, soils and more. It therefore becomes essential to be involved in all stages of the process, from masterplan and overall concept to the implementation of projects, paying due attention to the details of execution.

addendum:



The gradual development of biodiversity corridors, starting from minimal interventions protected from potential disturbances (left), which evolve independently over time and lay the groundwork for various types of habitats. Source: Georg Hermannsdorfer, Restoration of Running Waters. Practical Handbook for Natural Construction Methods, 2023, adapted by Anastasia Stolearenco, Non-Formal Spatial Planning Studio Timișoara.

10

IFLA Europe, The role of Landscape Architects in promoting Biodiversity, 2023, https://iflaeurope.eu/index.php/site/general/green-infrastructure

DBQS, Davos Baukultur[11]

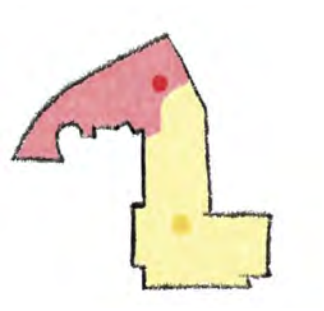
The Davos Quality System involves the adoption of the Davos Declaration "Towards a High Quality Baukultur for Europe" in 2018 by Europe's Ministers of Culture. The Davos Declaration emphasizes the central role of culture for the quality of the built environment. Baukultur encompasses all activities with spatial impact, from craft details to large-scale urban planning and landscape development.

The scheme shows references to green (and blue-green) spaces in the following criteria:

— Functionality
the existence of open and green spaces;
— Environment
compact and dense settlements with quality green spaces, reducing emissions and supporting biodiversity to form rich natural and cultural landscapes that are properly and coherently managed;
— Economy
making places more attractive through high quality green spaces;
— Diversity
green spaces that provide unlimited opportunities for all, non-discriminatory, non-discriminatory, easily accessible and improve the quality of everyone's interaction with the environment

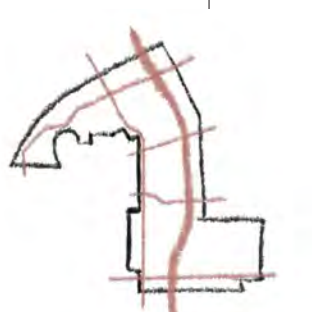
11

The Davos Baukultur Quality System. Eight criteria for a high-quality Baukultur: https://www.davosalliance.org/home and https://oar.archi/wp-content/uploads/2021/12/DBQS-en.pdf
12 Law no. 24 of January 15, 2007 (**republished**) on the regulation



Step 1
Brief data: functional, architectural / urban planning program

Step 2
Ecological component: geographical and environmental requirements

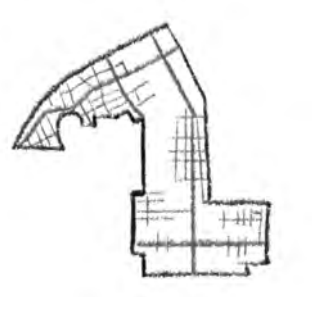


Step 3
Understanding and integrating communication and mobility needs

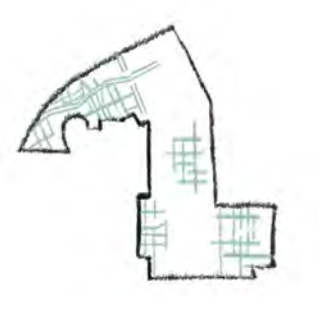
Step 4
Understanding and integrating the stormwater management system

Step 5
Proposals for improving environmental conditions: afforestation, water surfaces

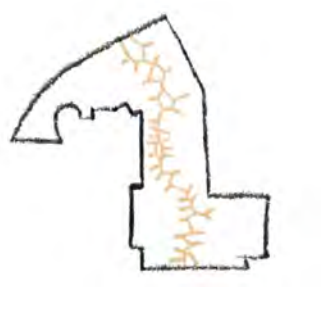
Step 6
Treating green areas as support structures for various types of attractors



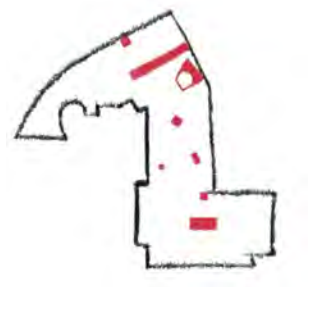
Step 7
Hierarchizing public spaces to assess surface use needs



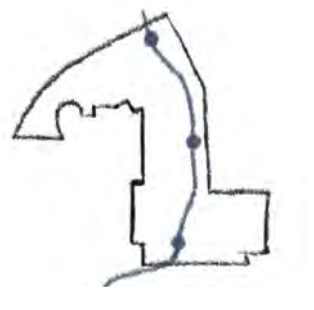
Step 8
Planning secondary streets as green streets, complementary to the main green corridor



Step 9
Secondary circulation network, prioritizing non-motorized mobility



Step 10
Placement of main attractors – built anchors: major public and private buildings



Step 11
Defining and designing the public transport corridor

Step 12
Establishing functional reconversion or consolidation measures, as appropriate

Legislation at national level

The legislation is focused around Law no. 24 of January 15, 2007, on the regulation and management of green spaces within the boundaries of municipalities, in addition to which there is in force a series of legislative documents that complement and particularize the different contexts in which they are located.

Law No 24 of January 15, 2007, with subsequent additions and amendments[12]

The law regulates the management of green spaces within the municipalities in order to ensure the quality of the environment and the health of the population. Through this law, the State recognizes the right of every person to a healthy environment, ensuring free access to public green spaces for recreation, as well as the right to contribute to their development and to the planting of trees and shrubs, in accordance with the legal provisions in force. Thus, in order to implement these desires and to facilitate the regulation and management of green spaces within the boundaries of municipalities, the law establishes that green spaces consist of several types of land within the boundaries of municipalities. However, the application is restrictive and creates multiple interpretations by establishing measures and situations that are inconsistently coordinated with other legislative provisions or other articles of the same law.

An important aspect for architects is the strictness regarding the non-removable character of green spaces, as well as the regulation of the types of constructions that can be carried out in green spaces, as well as their surfaces. Thus, according to the law, it is forbidden to change the use, reduce the surface area or relocate green areas as defined by this law. However, by way of exception, the following may be placed on a green space: pedestrian walkways, urban furniture, facilities for sport, play and recreation, buildings for exhibitions and cultural activities, temporary light buildings for commercial and activities, sanitary facilities, maintenance facilities, but only on the basis of a town planning document for the entire surface area of the green space and with the obligation that the combined surface area of these objectives does not exceed 10% of the total surface area of the green space in question. Updating Law 24/2007 on the management of urban green spaces, the term "green bank" has been introduced for land next to water surfaces, whether natural or artificial, which include planted or spontaneous vegetation. They are included in the local green spaces register and are taken into account in the strategy for the conservation and development of the green spaces network.

Emergency Ordinance no. 57 of June 20, 2007, on the regime of protected natural areas, conservation of natural habitats and of wild flora and fauna[13]

The Ordinance complement Law no. 24/2007 in areas where it cannot act effectively, particularly in natural areas with protected status. Thus, the Ordinance aims ensure biological diversity, conserving natural habitats, wild flora and fauna on the territory of Romania, while maintaining or restoring in favorable state of conservation natural habitats and species of wild flora and fauna, as well as identifying natural heritage assets that require a special protection regime for their conservation and sustainable use. Priority natural habitat types are also established as those natural habitat types which are found to be in danger of extinction and for which the European Community has a particular responsibility for their conservation, primarily in view of the proportion of their natural . This law regulates Natura 2000 protected areas and defines the ecological corridor as the natural or managed area, ensuring the movement, reproduction and refuge requirements for certain terrestrial and aquatic wild species, delimited for the purpose of applying specific protection and conservation measures.

12

Law no. 24 of January 15, 2007 (**republished**) on the regulation and management of green areas within the boundaries of municipalities*), https://legislatie.just.ro/public/detaliidocument/78673

13

Emergency Ordinance No 57 of June 20, 2007 on the regime of protected natural areas, conservation of natural habitats, wild flora and fauna, https://legislatie.just.ro/Public/DetaliiDocumentAfis/214315

The same ordinance establishes several categories of protected natural areas, according to their importance:

— of national interest: scientific reserves, national parks, nature monuments, nature reserves, nature parks.
— of international interest: natural World Natural Heritage sites, geoparks, wetlands of international importance, biosphere reserves.
— Sites of Community interest or Natura 2000 sites: sites of Community importance, special areas of conservation, special protection areas for bird species
— of county or local interest: established only on the public/private domain of the administrative-territorial units, as appropriate.

The Importance establishes the management regime, but also the stringency of the protective measures applicable to each of the above.

Other legislation

Other provisions have immediate effects on blue-green infrastructure management, such as:

— GEO 195/2005 on environmental protection, updated, which specifies the obligation of local public administration authorities and natural and legal persons to provide in the planning, urban and spatial planning documents, measures for maintaining and improving the natural and anthropogenic landscape of each area and locality.

— Law no. 138/2004 on land improvement, which regulates technical infrastructure for land improvement, such as drainage and facilities, aimed at preventing and removing excess moisture from the land surface and soil, to ensure favorable conditions for land use.

— Order no. 227/2006 on the location and dimensions of protection zones adjacent to land improvement infrastructure, which provides for protection zones of 2 - 2.5 m along irrigation and drainage canals, depending on their category and importance.

— Water Law No. 107/1996, updated on July 17, 2015, stipulates the widths of the protection zones around water surfaces such as natural lakes, reservoirs, as well as along, dams, canals, channels, dams and other hydro-technical works. According to the kegea, for watercourses with a width of 10-50 meters, the protection zone is 15 meters wide, and for watercourses with a width of less than 10 meters, the required protection zone is at least 5 meters, depending on whether the watercourse is dammed or not.

— Order No. 636/2002 on the approval of forestry technical guidelines for the establishment, care and management of forest vegetation in forest protection forest buffers supports the formation of ecological corridors by proposing forest buffers by limiting the area of agricultural areas to 50 ha. This establishes a well-defined network of protection plantations on the perimeter.

— The Emergency Ordinance no. 114/2007 on environmental protection establishes the need to ensure an area of at least 26 square meters/inhabitant for Local Public Administrations, starting from 2014.

— At county and local level, by County / Local Council Decisions, as well as by Spatial Development Plans, priority measures and actions are established, including minimum areas and protection zones that must be provided in addition to the legal minimum, derived from the particularities of each context.

Green / green infrastructures - blue in the context of the transition to climate neutrality

Given that most of the emissions are generated in areas that have direct applicability through spatial planning, the role of the architect is intrinsically one of involvement in the desires that communities set themselves. Thus, as communities formulate priorities for the transition to climate neutrality, they need practitioners to put these principles into practice as innovators, not just professionals who comply with a minimal legal framework and template. Thus, it is essential to understand the role that architects play in planning green-blue infrastructure so as to help reduce emissions and support the transition to climate neutrality.

From the perspective of the transition to climate neutrality, green / blue-green infrastructures are relevant for the urban and metropolitan scales, as they can significantly contribute to reducing CO2 emissions. They can also be relevant through projects implemented at the scale of the public space and object, both in terms of reduced emissions through the development of such infrastructures and in the process of their maintenance.

Methodology in the field

The estimation of emissions for green / green-blue infrastructure follows a sector-specific approach to assessment. For the Green Infrastructure and NBS (nature-based solutions) Sector, (including AFOLU - Agriculture, Forestry and Other Land Use), greenhouse gas emission levels from AFOLU are monitored. To balance carbon sequestration, negative emissions through natural sinks are used. Examples of data used for this purpose are green space areas and tree canopy footprints according to data held by Local Public Authorities or the Environmental Protection Agency.

References to blue-green infrastructure can also be found in the AFOLU (Agriculture, forestry and other land use) sector, under the category Energy needed for maintenance of public parks[14]. Also relevant is the reference in the Transport sector, under the categories Estimated distance of trips as well as Average fuel consumption - this may be relevant in terms of the opportunities for walking and cycling that blue-green infrastructure offers. Also relevant may be the Waste sector, under the category Electricity required for composting - this may be relevant in terms of the process obtaining compost from the plant mass resulting from maintenance of blue-green infrastructures. Therefore, in conclusion, from the perspective of the transition to climate neutrality, blue-green infrastructures are relevant for the urban and metropolitan scales by:

— reducing operating emissions by adopting design solutions that include the development of bicycle and pedestrian corridors that facilitate travel and reduce reliance on transportation of various types. Therefore, integrated planning at network level, interconnection with public transport, provision of comfort conditions (including well-lit and non-slip surfaces) and bicycle parking facilities are needed.

— reducing emissions for maintenance, which means adopting design solutions for landscaping that require as little maintenance as possible, thus avoiding maintenance consumption, and judicious reuse of plant mass through composting. This requires the use of native plants that require less water and maintenance, the use of durable and weather-resistant materials and water reuse systems. The design of on-site composting facilities is also encouraged, as is the use of compost to improve soil and reduce the need for chemical fertilizers

14

https://www.mdpicom/2071-1050/15/21/15262

In addition to the above, the methodology on reducing emissions refers to and provides resources on:

— non-motorized mobility and its impact in reducing emissions, with the Paris case study as an example, applicable to the supporting role that blue-green infrastructure can provide for pedestrian and cycling trips.
— the positive effect of dense vegetation on the quality of experience for non-motorized trips, supporting their use and thus contributing to reduced emissions.
— the potential to reduce the surfaces that create the preconditions for urban heat islands, transforming them into green and permeable surfaces - the core of all urban regeneration procedures.
— the critical role that green corridors play in reducing the negative impacts of urbanization and industrialization on nature, helping to create sustainable transport networks and urbanization processes, reducing pollution and improving air quality.
— significant role of acting as a NOx-absorbing device, with design having a significant influence in this respect.
— the role of blue-green corridors in reducing urban noise, due to the sound absorption characteristics of plant masses.
— the distribution of green spaces, essential for carbon sequestration through photosynthesis while reducing carbon emissions by mitigating the urban heat island effect.

So, in conclusion, indicators on emission reduction through green-blue infrastructures can refer to the following:

Percentage of protected natural areas	Percentage of tree cover in the city	Negative emissions through natural absorption	Green spaces	Quality of public spaces
To increase the percentage of protected natural areas, architects can contribute by participating in projects to substantiate and recognize protected areas of local or national interest;	To help increase the percentage of tree cover in urban areas, architects can contribute by establishing measures to cover as many areas as possible with trees, both in urban planning and in architectural or landscape design projects	In this case, architects can help by setting up measures to create negative emission zones.	In this case, architects can help by establishing measures to create as much green space possible, especially in the area of watercourses, beyond the minimum legal requirements	To increase the quality of spaces, architects can use specific sets of indicators, proven by examples and case studies that demonstrate applicability. For example, according to Gehl Architects, these can be: protection, comfort, enjoyment, accessibility and sustainability.

Urban Heat Island Effect (UHI)	Average daily maximum temperature (TXX)	Average daily minimum temperature (TNN)	Modal share of green and public transport	Improved citizens' participation
To help reduce the urban heat-island effect, architects can establish measures to cover as much area as possible with trees, both in urban planning and architectural or landscape design projects	To help reduce the average daily maximum temperature, architects can set up measures to cover as much area as possible more significant trees, both in urban, architectural and landscape design projects	To help reduce the average daily minimum temperature, architects can set up measures to cover as much area as more significant trees, both in urban, architectural and landscape design projects	Quality of public space and interaction with the transport system contribute to the choice of transportation. Thus, through architectural, urban planning and landscape design, architects can strengthen blue-green corridors to support non-motorized travel	The quality of public space contributes to the presence of citizens in the public space, contributing to public participation. Thus, through architectural, urban planning and Landscape architects can extend the time that citizens spend in public spaces, encouraging social interaction and opportunities engagement and participation

The roles of green / green infrastructures - blue: ecosystem services

https://www.nationalacademies.org/news/2024/07/reviving-the-los-angeles-river-engineering-alongside-nature-and-society

Cultural and educational events through sports on the Morii Canal in Reghin, recently redeveloped for the benefit of residents. Source: Canalul Morii Verde, https://www.facebook.com/canalulmoriiverde.

It is important to understand the roles that blue-green infrastructures play so that they can be integrated into designs to contribute to sustainable and resilient cities that respond to climate and environmental challenges. It is also important for architects to recognize these roles to ensure the interconnectivity of green and blue spaces, to promote biodiversity and create habitats for local flora and fauna. These measures thus generate so-called ecosystem services, improving air and water quality, reducing carbon emissions and providing recreational spaces for communities, thus contributing to the quality of urban life.

The main ecosystem services[15] provided by blue-green infrastructures are briefly described below. They represent the accumulation of benefits that human society derives from the various ecosystems with which it interacts. Thus, an example of such services is:

— Supply Services
They are represented by certain products that are obtained from ecosystems, such as energy (biomass, hydropower), biomedical products (various medicinal plants or beekeeping products developed in blue-green infrastructures) and natural transportation pathways.

— Regulatory services
They are represented by the regulation of ecosystem processes, including the possibility of flood prevention by regulating water flows, climate (in terms of temperature, humidity, air quality), erosion control by natural vegetation, pest and pathogen control. This maintains trophic balance and ensures aerobic and anaerobic decomposition.

— Cultural services
They are represented by various non-material benefits, such as places for socializing and community cohesion in high quality spaces, as well as cultural and sporting events. According to climate resilience assessment grid, the community interaction generated in such spaces ensures awareness of environmental issues. In addition, the infrastructures can become study points for biology, support for various non-motorized trails, as well as for ecotourism trails and for the recognition of the historical heritage of certain water courses that form the backbone of these infrastructures.

— Support services
They represent the possibility of maintaining biodiversity by preserving trophic balance as well as natural processes, including nutrient recycling (e.g. soil formation) and primary productivity, provided by photosynthesis and chemosynthesis.

15

Francesc Molné, Giulia F.A. Donati, Janine Bolliger, Manuel Fischer, Max Maurer, Peter M. Bach, Supporting the planning of urban blue-green infrastructure for biodiversity: A multi-scale prioritization framework, Journal of Environmental Management, Volume 342, 2023, 118069, ISSN 0301-4797, https://doi.org/10.1016/j.jenvman.2023.118069.

addendum:

Principles of flood protection through the construction of a protective wall. Source: Georg Hermannsdorfer, Restoration of Running Waters. Practical Handbook for Natural Construction Methods, 2023, adapted by Anastasia Stolearenco, Non-Formal Spatial Planning Studio Timișoara.

Principles of flood protection through the construction of protective dikes. Source: Georg Hermannsdorfer, Restoration of Running Waters. Practical Handbook for Natural Construction Methods, 2023, adapted by Anastasia Stolearenco, Non-Formal Spatial Planning Studio Timișoara.

Planning principles

Understanding these principles of conserving, planning, maintaining and developing blue-green corridors is in the core palette for architects, helping to create urban spaces that are sustainable and resilient in character. Integrating multiple ecological services including stormwater management, the recovery and use of native species, and the creation of quality public spaces, architects are the primary coordinators for the means that provide an improvement in quality of life and environmental protection. Compliance with legislation, use of local materials and community involvement in the design process are the main elements to be balanced, as they ensure the sustainability and success of projects, responding coherently to climate challenges while providing long-term benefits for residents and nature.

The main planning principles are described below:

— Integrating multiple environmental services
Creating quality public spaces, recovering and incorporating native species, stormwater management, and providing recreational and educational services.

— Environmental and social awareness
Recognize the vital role and impact of blue green corridors for the environment and the community.

— Renaturation of water courses
Implementation of non-invasive landscaping, avoiding concreting, soil sealing and mechanical irrigation, which have negative effects both in terms of cost and energy consumption.

— Connecting green - blue areas with urban green spaces
Interconnection helps to provide a sustainable and non-fragmented habitat for flora, fauna and human communities, with benefits for all of the above.

— Ecological stormwater management
Collecting, filtering and efficiently directing stormwater to ensure a "sponge city" or permeable character for the communities for which the architects are designing

— Compliance with the law
Knowledge of and compliance with all applicable legal regulations, ensuring that beyond the minimum set out therein, the specific needs of the communities in which the planning approach is undertaken are met

— Use of local materials
Inventory and capitalize on local resources, ensuring short and efficient cycles, supporting the local economy and ensuring specific character for the built and/or man-made natural environment.

— Harmonizing architectural interventions
The harmonious integration of architectural elements into the landscape, both from an aesthetic point of view and especially in terms of respecting the principles of environmental and landscape protection.

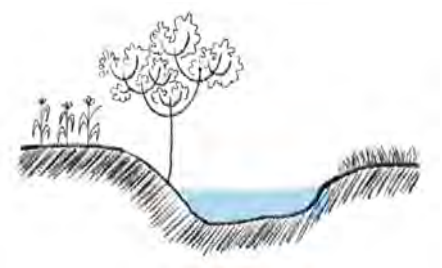
— Organic landscape transformation
Addressing landscape change in a phased and holistic way so as to provide opportunities for coherent manifestation over time and with long-term effects.

— Reducing maintenance actions
Minimize the need for maintenance to conserve resources, reduce emissions and ensure much lower maintenance costs.

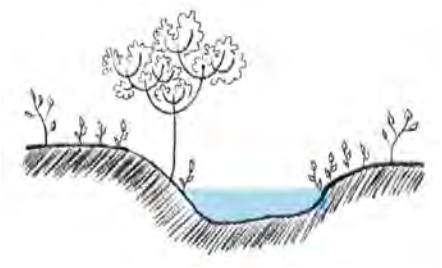
— Participatory design

— *Involvement of local community members in the process of developing solutions for green corridors, especially those who use these infrastructures most.*

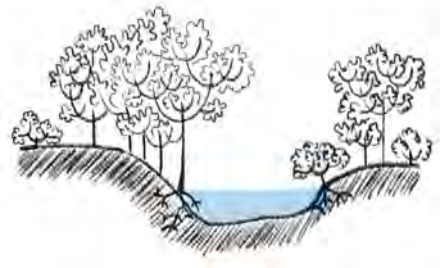
— Involving local communities
Increased sustainability for projects through the active participation communities in the vicinity of blue-green infrastructures, contributing their good management through direct maintenance and ensuring basic maintenance needs.



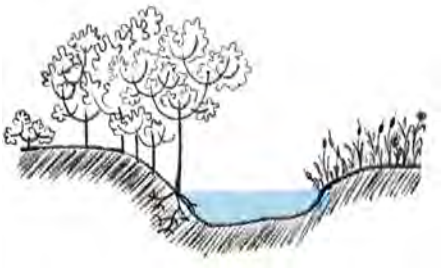
1. Initial situation



2. Creation of a buffer zone through successive plantings



3. A minor riverbed is formed



4. The banks are protected with reeds and bulrushes on both sides

Environmental and landscape protection principles applicable to a watercourse. Source: Georg Hermannsdorfer, Restoration of Running Waters. Practical Handbook for Natural Construction Methods, 2023, adapted by Anastasia Stolearenco, Non-Formal Spatial Planning Studio Timișoara.

Principles and measures applicable at the wider landscape scale (macro landscape)

The principles set out above are applied by architects in their practice through measures for the above categories of infrastructure as follows:

- Category 2: Components of green areas connected to road and technical-building infrastructures:
  - Green road infrastructure terracing: the design and regulation of green areas adjacent to roadways by planting trees and shrubs to reduce soil erosion, absorb air pollutants and create green corridors to support local biodiversity.
  - Rail Infrastructure Safety Zone: design and regulate areas along rail lines, introducing buffers of native vegetation to reduce noise, trap dust and provide wildlife habitat.

Designing buffer zones along major transport routes, as part of a road infrastructure project. Example: A3 Motorway, Regensburg. Source: https://www.autobahn.de/planen-bauen/projekt/a3-regensburg

— Category 6: Green components in the vicinity of water bodies that have a mixed function and will be managed by local public authorities and will be considered in the development of the strategy for the conservation and development of the green network
  — Dry riverbeds: design and regulate the development of dry riverbeds, facilitating infiltration of stormwater to reduce flood risk and create habitats for aquatic and terrestrial species using wetland-specific vegetation.
  — Green bank: the design and regulation of river bank management prevent erosion, improve water quality and create habitats for various plant and animal species using native vegetation;

Territorial-scale riverbank design. Source: Sanlihe Corridor, Turenscape Landscape Architecture, https://landezine.com/ecological-coridor-landscape-architecture/

— Protection zones adjacent to land improvement infrastructure: design and regulation of forest buffers and artificial wetlands to protect agricultural land from erosion, improve water quality and support biodiversity;

Forest windbreaks bordering agricultural lands in Romsdalen, Norway. Source: https://www.britannica.com/topic/windbreak.

— Marine coastal zone: rregulating and restoring sand-covered areas and coastal wetlands to protect against erosion, mitigate wave impacts and create habitats for marine and terrestrial species.
— Riverbank: regulation and enhancement of river banks, carried out with the aim of preventing erosion, improving water quality and creating green spaces for recreation and biodiversity, using native vegetation and natural structures.

Extension of the Bondi–Bronte Promenade. Source: ASPECT Studios, https://landezine.com/bondi-to-bronte-coastal-walk-extension-by-aspect-studios/

Principles and measures applicable at the scale of the locality / landscape unit

The principles set out above are applied by architects in their practice through measures for the above categories of infrastructure as follows:

— Category 2: Components of green areas connected to road and technical-building infrastructures
  — Green streets: the design and regulation of streets including the planting of trees and shrubs along street to create shaded alleyways, reduce the urban heat island effect and improve air quality.

Design of a green boulevard. Source: 'El Firal' Boulevard, Bach Arquitectes, https://landezine.com/el-firal-boulevard-by-bach/

— Category 4: Green components related to agricultural infrastructure to be introduced as a priority in the category of green areas once their agricultural role can no longer be fulfilled due to soil degradation
  — Lawns: architects have a secondary role, but can consider regulations and landscaping to maintain and enhance biodiversity through regular mowing and the use of organic fertilizers to support local flora and fauna;
  — Grazing: architects have a secondary role, but can consider regulations and layouts that allow the implementation of rotational grazing to prevent overgrazing and maintain soil and vegetation health;

Pasture. Source: https://eos.com/blog/pasture-management/

- Orchard planting: : architects have a secondary role, but may consider regulations and landscaping to allow the use of agro-forestry techniques, such as planting cover crops between rows of trees to improve soil fertility and reduce erosion;
- Arable land land for agroforestry: architects have a secondary role, but can consider regulations and layouts that allow the integration of trees and shrubs into agricultural land to create agroforestry systems that enhance biodiversity and protect the soil;

Agroforestry. Source: https://drawdown.org/solutions/multistrata-agroforestry

- Category 5: Green components of natural, semi-natural and man-made areas within the built-up areas of localities, which have a forestry function and will be managed according to specific legislation, but which will be included in the green register and will be taken into account in the development of the strategy for the conservation and development of the green network
  - Urban forest: design and regulate urban forest management to provide green spaces for recreation, improve air quality and reduce the urban heat island effect;
  - Protective forest buffer: the design and regulation of forest buffers along roads and farmland to reduce soil erosion and protect crops from strong winds;

Urban forest, park. Source: Passerelle de la Troche by Bassinet Turquin Paysage, https://landezine.com/passerelle-de-la-troche-by-btp/

- Forest corridors: : the design and regulation of forest corridors connecting existing forests and ecological corridors to support species migration and improve habitat connectivity;
- Ecological conversion structure: design and regulate the transformation of degraded land into green spaces by planting native vegetation and creating habitats for wildlife;

Forest corridor developed over a highway. Source: https://handbookwildlifetraffic.info/ch-7-solutions-to-reduce-transport-infrastructure-impacts-on-wildlife/7-2-reducing-wildlife-mortality/

- Derelict land: regulating and rehabilitating derelict land by planting native vegetation and creating community green spaces for recreation biodiversity.
- Wetlands, swamps, marshes, ponds, mudflats: rregulating, restoring and protecting wetlands to improve water quality, reducing flood risk and creating habitats for aquatic species

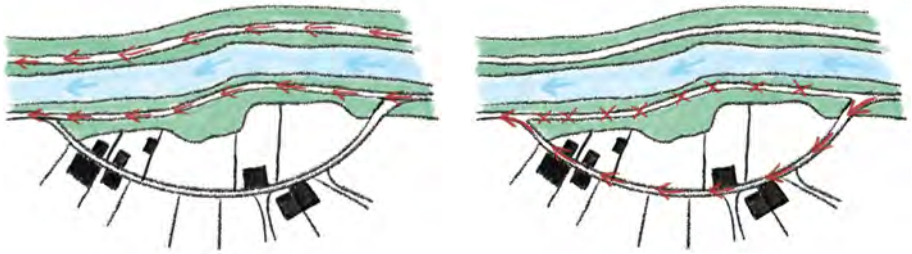
Design of a wetland area. Source: Wet meadow and source of the River Norges, Agence Territoires, https://landezine.com/wet-meadow-and-source-of-the-river-norges-by-territoires/

— Category 6: Category 6: Green components in the vicinity of water surfaces with mixed functions, which will be included in the Green Register and will be considered in the development of the strategy for the conservation and development of the green network
  — Dry streamban: regulation and design of dry streambanks with wetland-specific vegetation to facilitate stormwater infiltration and create habitat for aquatic and terrestrial species.
  — Green bank: regulating and designing riverbank stabilization by planting native vegetation to prevent erosion and improve water quality;

Design of a green riverbank at the urban scale. Source: Hatsinanpuisto, Loci: https://landezine.com/hatsinanpuisto-by-loci/

  — Protection zones adjacent to land improvement infrastructure: regulation and design of forest buffers and artificial wetlands to protect agricultural land and support biodiversity.

Buffer zone along an irrigation or drainage canal. Source: https://farmwildlife.info/how-to-do-it-5/field-boundaries/ditches/



Principles for relocating circulation routes to support biodiversity conservation and development. Source: Georg Hermannsdorfer, Restoration of Running Waters. Practical Handbook for Natural Construction Methods, 2023, adapted by Anastasia Stolearenco, Non-Formal Spatial Planning Studio Timișoara.

- Marine coastal zone: regulating and restoring sand dunes and coastal wetlands to protect against erosion and create habitats for marine and terrestrial species.
- River bank: regulate and design the strengthening of river banks with native vegetation and natural structures to prevent erosion and create green spaces for recreation and biodiversity.

Riverbank design along a major river. Source: The embankments of the Îles de Nantes by BASE Landscape Architecture, https://landezine.com/the-embankments-of-the-iles-de-nantes-by-base/

Principles and measures applicable at the human scale - microscape

The principles set out above are applied by architects in their practice through measures for the above categories of infrastructure as follows:

- Category 2: Components of green areas connected to road and technical-building infrastructures
  - Bioretention system: designing rain gardens and retention basins to capture and filter rainwater, reducing the risk of flooding and improving water quality.
  - Green streets: design alignments of trees and shrubs along streets to create shaded alleyways, reduce the urban heat island effect and improve air quality.

Design of a green pedestrian street. Source: De Laat, Alkmaar, Bureau B+B, https://landezine.com/de-laat-alkmaar-by-bureau-bb/

— Category 3: Components of green areas attached to social infrastructure publicly or privately owned by the State or territorial administrative units
  — Green sports or recreational facilities: designing sports fields with permeable surfaces and native vegetation to reduce stormwater runoff and create a pleasant environment for recreational activities.
  — Green cemetery: design by using biodegradable materials for burial sites and planting native vegetation to create a peaceful and environmentally friendly space for commemoration.

Design of a large-scale sports park. Source: Forest Sports Park Guang Ming, LOLA Landscape Architects, https://landezine.com/forest-sports-park-guang-ming-by-lola/

  — Garden: designing gardens with native plants and efficient irrigation systems to reduce water consumption and support local biodiversity.

— Community garden: designing community gardens where residents can grow vegetables and herbs, promoting social cohesion and environmental education.

Kloster Kappel: landscaped garden space by bbz landschaftsarchitekten

— Condominium garden: designing common green spaces in residential complexes with native plants and seating areas to improve the quality of life of residents.
— Institutional gardens: designing gardens around public institutions such schools and hospitals to provide green spaces for recreation and environmental education.

Garden design for a residential complex.. Source: “In Gärten” residential complex, Neuland ArchitekturLandschaft /, https://landezine.com/residential-complex-in-garten-by-neuland-architekturlandschaft/

— Zoo: designing animal habitats with native vegetation and natural structures to create an environment as close to nature as possible.

— Parks: designing urban parks with playgrounds, running tracks and green spaces for recreation and relaxation, promoting community health and well-being.

Landscape design for a themed zoo area. Source: Lewa Savanne, Zurich Zoo, vetschpartner,/, https://landezine.com/lewa-savanne-zoo-zurich-by-vetschpartner/

— Historic park or garden: design the restoration and maintenance of historic parks and gardens to preserve cultural heritage and provide green spaces for recreation.

Design of a historic park. Source: Historic Hofgarten & Cappelaue Landscape Park, Öhringen, Baden-Württemberg, RMP Stephan Lenzen Landschaftsarchitekten,/, https://landezine.com/historic-hofgarten-cappelaue-landscape-park-by-rmp-stephan-lenzen-landschaftsarchitekten/

— Scuar (pocket park): the design of small parks in dense urban areas to provide places for residents to relax and socialize, as well as for temporary stormwater retention.

— Campgrounds: design campgrounds with native vegetation, permeable surfaces, and green amenities to provide sustainable camping experience.

Pocket park design. Source: Roche Pocket Park designed by Bryum,/, https://landezine.com/roche-pocket-park-by-bryum/

— Category 1, Components of green areas attached to buildings owned in public or private ownership by the State or administrative territorial units:
  — Installing systems such as green roof, atrium, green balcony or green wall: designing green roofs, atria, green balconies and green walls to improve thermal insulation, reduce the urban heat island effect and create additional green spaces in the urban environment.

Green roof design. Source: Rooftop landscaping with sauna and wild greenery, Umbrio https://landezine.com/rooftop-garden-with-sauna-and-wild-nature/

Examples of good practice

The examples of good practice demonstrate that these principles are not just ideas, but concrete means of operation that require spatial designers and planners (whether architects, urban planners, landscape architects or engineers) to understand and apply them in a specific way, tailored to the contexts in which they operate. Therefore, beyond recognizing the quality of examples of good practice, the role of architects is to understand them, to grasp the principles, to determine the determinants relevant to the contexts in which they operate and to apply them.

Good practice from a public policy and spatial planning perspective

Green Network Hamburg[16]

The project involves the planning of an ensemble of extensive, open green spaces, providing a coherent link between the rural-natural environment and the urban area. Near the central area the corridors become narrower, fragmenting step by step and setting as a planning objective the re-establishment of green connections in the interrupted areas. Through this project an example of good practice is set to integrate green-blue corridors into urban planning with the aim of creating a more sustainable and resilient city. The planning of these corridors considers the need to link parks, rivers and other natural spaces with dense urban areas facilitate non-motorized travel, thus contributing to reducing carbon emissions and promoting a healthy lifestyle.

Hamburg's green infrastructure network. Source: https://tagderstadtnaturhamburg.de/start/archiv/2020-spezial/projekt-nat%C3%BCrlich-hamburg!/

Implementation example. Source: https://stadtundgruen.de/artikel/das-gruene-netz-hamburg-als-gruene-infrastruktur-8166

For their development, native plants are used, along with wetland areas for water retention. This approach enhances biodiversity while ensuring efficient stormwater management—particularly in extreme weather conditions.

Furthermore, through careful planning, green-blue corridors help mitigate the urban heat island effect and increase the city's attractiveness for both residents and tourists. At the same time, they demonstrate how nature-based solutions can transform cities into greener, more livable spaces for everyone.

Green Belt in England[17]

Given the large area of England used for development (9%), and its ratio to the area considered as greenfield (11%), it is necessary to establish buffer zones to limit urban sprawl and create conditions for the protection of communities and habitats. Over 37% of England's land area has been designated as green belts around major cities. These 'protected

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GruenesNetzHamburg, https://www.hamburg.com/resource/blob/18990/5f83955d1a05d997e6f1424c9aad071b/flyer- green-network-data.pdf

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Greening local authority green belts in England: report for 2022-2023, https://www.gov.uk/government/statistics/local-authority-green-belt-statistics-for-england-2022-to-2023/local-authority- green-belt-england-2022-23-statistical-release

areas' include land designated as Green Zones and other protected areas and land designations identified nationally by the Joint Nature Conservation Committee

Green belt planning in England. Source: https://www.gov.uk/government/statistics/local-authority-green-belt-statistics-for-england-2020-to-2021/local-authority-green-belt-statistics-for-england-2020-21-statistical-release

Peri-urban green belt in England. Source: https://www.pbctoday.co.uk/news/planning-construction-news/green-belt-reform-why-review-long-overdue/131249/

The main aim of green belt policy is to prevent uncontrolled urban sprawl by keeping land permanently open, thus establishing essential characteristics: openness and permanence. The main purposes served by green belts are

— limiting the uncontrolled expansion of large built-up areas
— preventing the merging of neighboring cities
— protecting the countryside from urbanization
— preserving the setting and special character of historic towns
— supporting urban regeneration by encouraging the recycling of brownfield and other urban land.

Once these have been defined, local planning authorities have been invited to plan ways in which green belts can be put to beneficial use, through measures such as providing access, opportunities for sport and recreation, preserving and enhancing landscapes, visual amenity and biodiversity, or improving damaged land and abandoned. Changes to the boundaries of these green belts shall only be made in exceptional, well justified, substantiated and documented circumstances.

The Leça River Green Corridor, Ma ia, Porto Metropolitan Area[18]

The project in Maia, Metropolitan Area of Porto, transforms the banks of the Leça river into a green space with a predominantly vibrant and accessible character for the whole community in the immediate area of interest in the metropolitan area. The landscaping includes pedestrian and cycle paths, recreational areas and green spaces connecting different urban areas, integrating natural elements and green infrastructure, thus promoting sustainable mobility and providing residents with a pleasant environment for outdoor activities.

Design of a green corridor at the metropolitan scale Source: Coridorul verde al râului Leça, LRC | Arquitectura Paisagista, https://landezine-award.com/leca-river-green-corridor/

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Leça River Green Corridor, designed by LRC| Arquitectura Paisagista, https://landezine-award.com/leca-river- green-corridor/

In addition to the recreational benefits it generates, this blue-green corridor contributes to improved biodiversity and effective stormwater management along its entire length, thus providing necessary ecosystem services to communities. Vegetation planted along the river helps filter pollutants and reduce flood risk, while green spaces provide habitats for local wildlife. The project therefore exemplifies a coherent way in which urban planning can create multifunctional spaces that improve quality of life and protect the environment, including interconnected blue-green corridor-type infrastructures.

Good practice in awareness raising, community involvement, advocacy

Blue-Green Solutions: A systems approach for sustainable urban development, wresilient and cost-effective| Climate-KIC[19]

The documentation presents a handy palette of interventions for professionals working in spatial planning. It illustrates the main pressures urban areas are under in their quest to be resilient and environmentally friendly. An overview of the types of solutions that have been tackled over time in relation to water in cities is provided, as well as a listing of the main nature-inspired solutions that represent a contemporary palette of intervention. Relevant case studies are also listed, as well as the main barriers to implementation, starting from the public policy approaches and the pre-determined legislation in which a given context operates.

Good practice guide for the management of green spaces | Asoc ia ția Pe is agiștilor din România - AsoP [20]

The Guide refers green spaces as a whole, which is relevant also because it proposes a new approach in categorizing and classifying them by typology. It introduces the definition of green space by its main characteristics, the scope of intervention being extended far beyond what is regulated by national legislation. The functions, role and benefits of green spaces and the relevant actors involved in their management are presented. For each of the relevant entities, roles and responsibilities are set out. The tools used to manage green spaces and the main measures for vegetation management are also presented.

Through a comprehensive description of Law no. 24/2007 on the regulation and management of green spaces within the municipalities, the legal framework is made known, together with useful bibliographical resources.

The document is relevant in that it presents the landscape architects' perspective on the field of green spaces, as well as proposals for improvement. The categories listed are also presented in the same form in this document and form the basis for the analysis of green infrastructure typologies, which also become the basis for the different types of blue infrastructure.

Good practice guide for the development of green corridors in the Growth Pole | Timișoara Green Blue[21]

The Green-Blue Timisoara approach aims to promote the principle that water courses can become the skeleton of a network of inter-connected ecological corridors that bring nature into the locality. The result of this project and the most important means of raising awareness is the Good Practice Guide for the development of ecological corridors in the Timisoara Growth Pole, developed in 2018 and updated in 2019.

The validity of the approach has been confirmed by referring to its provisions in the comments established by the Chief Architect Institution of Timis County Council for the General Urban Plans prepared for the localities in the Timisoara Metropolitan Area. The provisions

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Climate-KIC, Blue-Green Solutions: A systems approach for sustainable, resilient and cost-effective urban development, https://www.climate-kic.org/wp-content/uploads/2017/10/BGD-Guide.compressed.pdf

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AsoP - Romanian Association of Landscape Architects, Good Practice Guide for Green Spaces Management, Program for Swiss-Romanian cooperation, https://asop.org.ro/publicatii/#flipbook-df_7310/7/ , https://romehome.ro/ghid-de-buna-practice-for-green-space-administration/

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Timișoara Verde-Albastră, Guide of good practices for the development of ecological corridors in the Timișoara Growth Pole: https://timisoaraverdealbastra.ro/resurse/ghid-de-bune-practici-pentru-amenajarea-coridoarelor-ecologice/

are correlated and applied with the General Urban Plans of Timișoara Municipality and the Municipalities of Ghiroda and Dumbrăvița.

The guide builds on the analysis and understanding of the historical evolution of Timișoara to understand the current situation and the value of today's blue-green infrastructure in conserving biodiversity and ensuring environmental balance. Desalination canals are highlighted as elements of anthropized heritage, marking the beginning of land improvements in the current territory of Romania, as well key elements of the regional landscape identity. The main challenges posed by the intensive urbanization of the 20th century, which puts intense pressures on agricultural crops and negates the role of irrigation canals and drainage canals as infrastructures for land improvement, are noted.

Good practice in landscaping

Făget Forest Park - The green lungs of Cluj[22]

For this project, the principles and tools are aimed at small-scale, minimal interventions that aim to improve the visitor experience so that the ecosystem is protected. The main interventions involved the signposting of velo trails and themed footpaths, the erection of information panels about the local fauna and flora, and small-scale constructions such as the installation of resting benches, an amphitheatre, an educational platform, a geological observation point and a refuge. The underlying principle was to preserve the natural character of the site.

In terms of materials used, natural and environmentally friendly materials have been introduced. The local community was also involved in the planning process, after a preliminary study was carried out by a multidisciplinary team and the project was publicly debated to ensure transparency and public trust. In addition to these elements, the strengths are the modular and reversible approach and the possibility to adjust the amount of equipment in close relation to the favorable or negative response of users. A balance is therefore ensured between biodiversity, education and quality of life in the Cluj Metropolitan Area.

Pavilions that enhance the natural surroundingshttps://visitcluj.ro/tourist_spot/fagetul-clujului/

Educational activities in a non-intrusively designed space. Source:: https://visitcluj.ro/tourist_spot/fagetul-clujului/

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Făget Forest-Park - The green lung of Cluj, among the winners of the New European Bauhaus Awards 2024, https://romania.representation.ec.europa.eu/news/padurea-parc-faget-plamanul-verde-al-clujului-printre-castigatorii- premiilor-new-european-bauhaus-2024-04-16_en and https://www.clujmet.ro/padurea-parfaget-misiune-indeplinita/

Magneten Sensory Garden in Frederiksberg[23]

Design objectives of this project include the need to create a green space that denotes safety and recreation for people with physical and mental disabilities. The design theme included the needs of the users, resulting from a consultation process with the beneficiaries and staff of the development.

There are 3 distinct areas: vegetable garden, flower garden and garden. Each of the three areas offers distinct therapeutic experiences and stimulates different senses and are designed to provide a controlled and tranquil environment for treatment. Essential is the integration of biodiversity principles, as well as the collection, retention and reuse of rainwater,

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Sensory Garden in Frederiksberg by MASU Planning Wins Green Roof Award, https://landezine.com/sensory-garden-in-frederiksberg-by-masu-planning-wins-green-roof-award/

which is then used to irrigate the plants and flowers. Another innovative aspect is the use of the green roof, as well as the possibility to provide a year-round green oasis, while ensuring a coherent and inclusive response to the needs of users and therapists.

Green roof. https://landezine.com/magneten-sensory-garden-by-masu-planning/

Sensory garden, designed for universal access.https://landezine.com/magneten-sensory-garden-by-masu-planning/

Grønningen-Bispeparken[24]

Adaptation to climate change is a fundamental principle in this park, using solutions inspired by nature. A currently degraded grassed area is therefore transformed into a park of about 2 ha inside the city, combining vegetation, biodiversity and various artistic components. Altogether there are 18 water retention gardens, which contribute to the collection and infiltration of about 3000 cubic meters of rainwater, thus supporting flood prevention and providing places for various activities for the residents of the neighborhood. There are five types of zones, with an individual character, designed for informal and flexible socializing.

The design process involved the local community of anthropologists and geographers, working with local residents and other stakeholders to ensure community ownership and understanding of the principles according to which the park was designed and developed. Local materials are also used to introduce the park to the site-specific theme, ensuring the possibility of artistic intervention to add an extra touch to make the park a living and poetic space, ready for exploration and adverse weather conditions.

Permeable surfaces in Grønningen-Bispeparken. Source:: https://www.archdaily.com/1026192/gronningen-bispeparken-climate-park-sla

Native vegetation and appropriate installations inGrønningen-Bispeparken. Source:: https://www.archdaily.com/1026192/gronningen-bispeparken-climate-park-sla

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Grønningen-Bispeparken, https://landezine.com/gronningen-bispeparken-by-sla/

Debates, topics of interest

While the topic of the transition to climate neutrality is not new, nor is the use of nature-inspired solutions or blue-green infrastructure planning, there are several challenges in their application that need to be overcome. Some of them, the most common in current practice, are listed below and remain topics of interest and debate, both at conceptual-identical, as well as at the pragmatic level of application in various urban planning, landscaping or architectural projects.

The main topics of interest discussed on the role and possibility of implementing green-blue corridors in an architect's field of operation are the following:

— the topicality of the knowledge acquired in the relevant subjects taught at university level, both in the field of architecture and urban planning and in the related fields of geography, landscape, biology, environmental engineering or plant engineering; the relevance of the information presented in these subjects and its relevance to contemporary principles is questionable.

— the levers that an architect has in order to impose more drastic solutions in terms of minimum indicators that must be respected in order to increase the surfaces occupied by blue-green infrastructures, as long as urban plans often only take up indicators that are not very restrictive from the General Urban Planning Regulation.

— legislative inconsistency, which establishes on the one hand that green spaces can also be in private property, but prohibits the regulation of green spaces on private land except in situations where they are subject to expropriation for reasons of public utility[25] or urban regeneration procedures[26].

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Sensory Garden in Frederiksberg by MASU Planning Wins Green Roof Award, https://landezine.com/sensory-garden-in-frederiksberg-by-masu-planning-wins-green-roof-award/

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Grønningen-Bispeparken, https://landezine.com/gronningen-bispeparken-by-sla/

Resources

The resources presented are a list of those referenced throughout this document, public policy documents to legislation and examples of good practice.

Regulation of the European Parliament and of the Council of June 24, 2024 on nature restoration and amending Regulation (EU) 2022/869, https://data.consilium.europa.eu/doc/document/PE-74-2023-REV-1/ro/pdf, https://www.consilium.europa.eu/ro/press/press-releases/2024/06/17/nature-restoration- law-council-gives-final-green-light/, https://www.consilium.europa.eu/ro/policies/nature- restoration/

The new European Bauhaus: https://new-european-bauhaus.europa.eu/index_en

The New Leipzig Charter: https://ec.europa.eu/regional_policy/whats-new/newsroom/12-08-2020-new-leipzig-charter-the-transformative-power-of-cities-for-the-common-good_en

ECTP-CEU, SPECIAL guide (Spatial Planning and Energy for Communities in All Landscapes): https://archive.ectp-ceu.eu/ectp-ceu.eu/images/stories/PDF- docs/SPECIAL%20Pan-European%20Guide.pdf

IFLA Europe, The role of Landscape Architects in promoting Biodiversity, 2023, https://iflaeurope.eu/index.php/site/general/green-infrastructure

The Davos Baukultur Quality System. Eight criteria for a high-quality Baukultur: https://www.davosalliance.org/home and https://oar.archi/wp- content/uploads/2021/12/DBQS-en.pdf

AsoP - Romanian Association of Landscape Architects, Good Practice Guide for the Management of Green Spaces, Swiss-Romanian Cooperation Program, https://asop.org.ro/publicatii/#flipbook-df_7310/7/ , https://romehome.ro/ghid-de-buna- practica-practice-for-the-management-of-green-spaces/

Timisoara Green-Blue Timisoara, Good Practice Guide for the development of green corridors in the Timisoara Growth Pole: https://timisoaraverdealbastra.ro/resurse/ghid-de-bune- good-practice-guide-for-the-development-of-green-corridors/

Law no. 350 of June 6, 2001 on spatial planning and urbanism, https://legislatie.just.ro/Public/DetaliiDocument/29453

Law no. 24 of January 15, 2007 (**republished**) on the regulation and management of green spaces within the boundaries of municipalities*), https://legislatie.just.ro/public/detaliidocument/78673

Emergency Ordinance no. 57 of June 20, 2007 on the regime of protected natural areas, conservation of natural habitats, wild flora and fauna, https://legislatie.just.ro/Public/DetaliiDocumentAfis/214315

Methodological Norms of February 26, 2016 for the application of Law no. 350/2001 on spatial planning and urbanism and for the elaboration and updating of urban planning documents, https://legislatie.just.ro/Public/DetaliiDocument/228239

Decision No 907 of November 29, 2016 on the stages of elaboration and the framework content of technical-economic documents related to investment objectives/projects financed from public funds, https://legislatie.just.ro/public/detaliidocument/185166

Emergency Ordinance no. 183 of December 28, 2022 on establishing measures for financing urban regeneration projects, https://legislatie.just.ro/Public/DetaliiDocumentAfis/267782

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