EUROPEAN
URBAN
INITIATIVE

Blue4Green Bruges (B4G)

Transfer ID Card

BLUE4GREEN

Prepared by Ruxandra Aelenei, EUI Transfer Expert

Co-funded by
the European Union

Région
Hauts-de-France

List of contents

1. THE INNOVATIVE SOLUTION IN A NUTSHELL

Bruges is a UNESCO World Heritage city where water has always played a significant role. The inner city canals, known as the Reien, not only shaped the city centre and provided its water supply in medieval times, but they are also vital in making the inner city climate change resilient today. The City of Bruges is also particularly vulnerable to water risks and calls for a holistic and preventive approach that optimises the green-blue strategic management. Blue4Green focuses on hydrating the city by combining heritage with natural and high-tech solutions for green-blue challenges.

Process innovation is threefold, and the elements are interconnected:

1) improving water availability – the now manually operated in- and outlet system will be automated, allowing for the reintegration of the historic water as a water buffer. Heritage is not treated as a risk or burden, but as an asset.

2) improving water quality – developing biotechnological and nature-based solutions for purifying the water, developing solutions for predicting and preventing the formation of blue-green algae.

3) connecting data and people - a new policy dashboard will be developed, integrating green-blue data, used for steering policy decisions and co-creation processes with stakeholders and citizens. Further, an innovative water balance model will be designed to allow for preventative measures to be taken on water supply and buffering (strongly linked with (1).

Figure 1 Typical canals in the city centre of Bruges. Credits: Ruxandra Aelenei

2. BRUGES VISION OF THE INNOVATIVE SOLUTION AND UNDERLYING MOTIVATION

Local Challenges

Climate change creates increasing challenges in the city centre, related to its blue and green infrastructure:

- A lack of water buffer capacity, combined with limited space in the historic centre, complicates the installation of new facilities to increase water buffer capacity. This means that in periods of water shortage, the city must tap into other available water sources.
- Unstable water quality in the Reien not only threatens fauna and flora but also limits recreational use, such as swimming and other sports events. A blue-green algae problem adds further pressure to water quality.
- Lack of predictive data on water availability - key indicators such as water levels, overflows, water quality, and green stress are not yet systematically monitored. The result is a reactive system where decisions are made only after an event has occurred and the fluctuation has already taken place.

Desired Impact

- Enhance climate resilience in Bruges by developing a smart, sustainable water management system that supports the city's greening policy and addresses water scarcity, quality, and flooding risks.
- Enhance collective responsibility and awareness of the importance of water – fostering a new urban water culture.
- Repurpose the historic water system (of wells and pipes) and integrate it into the modern water management system.

Enhance cross-departmental collaboration at the city level, bridging the gap between green and blue management, which involves different internal departments, various policy documents, and distinct focus areas.

3. CONTEXT

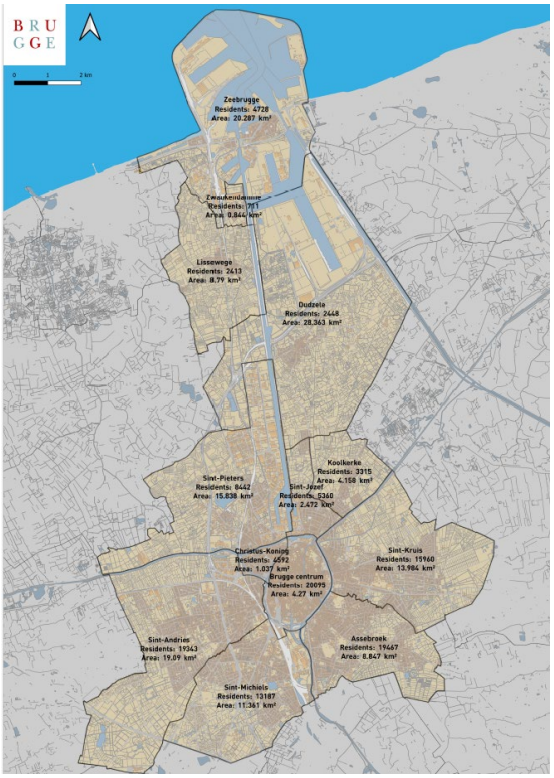
The project is located in the historic city centre of Bruges. Bruges is a city in flux. It's home to 120,000 people, the third-largest city centre in Flanders, and a world-renowned destination. But above all, Bruges is a city with a unique character. Like water finding its way, Bruges continually finds the balance between tradition and innovation, between peace and dynamism, between local roots and international appeal.

The Bruges canals are approximately 5km long and have a total surface area of 80,000m².

The Ghent-Ostend Canal forms the Bruges egg and the fortified moats (De Vlaamse Waterweg manages the inner and outer ramparts). For centuries, Bruges' canals have connected the city to the sea, a guarantee of prosperity and wealth. International merchants built Bruges into one of the largest Hanseatic cities. In the 15th century, the city experienced unprecedented growth. The authentic medieval urban fabric was preserved, and large parts of the historical heritage remained virtually intact. It is therefore only natural that UNESCO recognised the entire city centre as a World Heritage Site (since 2000).


Figure 2 Blue and green infrastructure in Bruges city centre (Spinolarei and Koningin Astridpark). Credits: Ruxandra Aelenei

Water in Bruges continues to shape the city's appearance today. It flows between the streets and houses of Bruges' city centre, giving it its unique appearance and character. Water isn't just for pleasure; it's also essential for the city's green spaces. Moreover, a significant amount of water is required to maintain the city's public infrastructure.



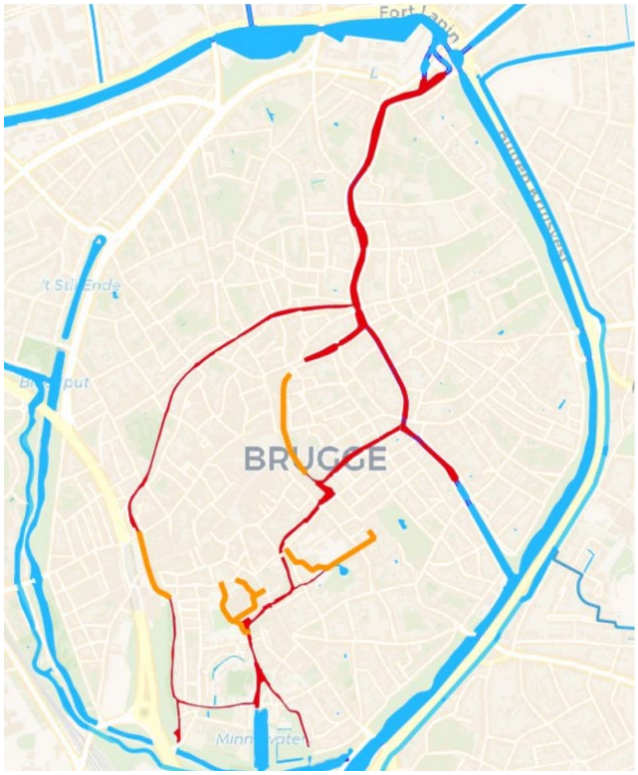


Figure 3 Areas/neighbourhoods of Bruges (left) and the watr system in the centre of Bruges, with open reien (red) and underground reien (orange) Credits: City of Bruges

4. POLITICAL LEADERSHIP AT THE MUA

Blue4Green already has political support, being integrated into wider climate and spatial strategies and ambitions. The political environment in Bruges is relatively stable; furthermore, policies and strategies are developed for the long term, generally exceeding political terms and cycles, with continuation in mind. Blue4Green is embedded in and a continuation of several politically approved

strategic documents in the field of climate adaptation, spatial development, greening, and water management.
There are no significant political changes anticipated, with elections scheduled to take place after the Blue4Green implementation lifespan (in 2030).

5. STAKEHOLDERS ECOSYSTEM

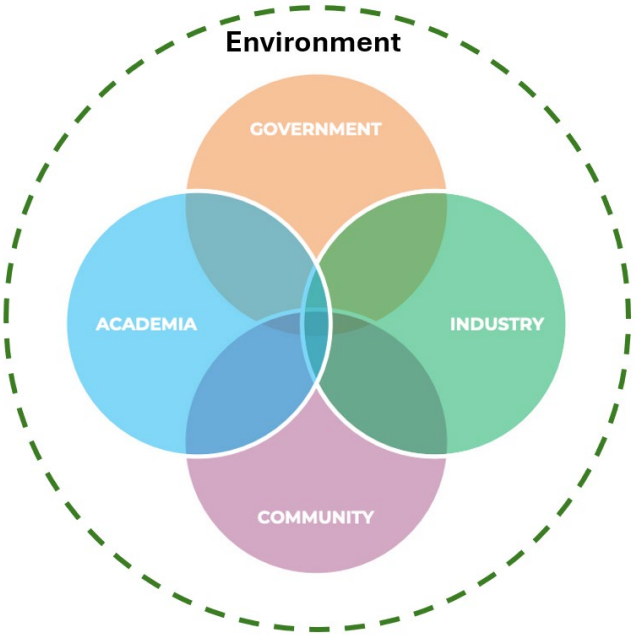


Figure 4 The 5-helix stakeholders model.

BLUE4GREEN collaborates with a diverse range of stakeholders, utilising a 5-Helix Model.

Government

The City of Bruges is leading this project, having an extensive team of experts involved in the activities. One innovative aspect at the local level is the close cooperation between various departments (Strategic Department, Department of public domain, Department of climate, environment and animal welfare, IT department, Department of culture, Department of communication and city marketing to ensure an integrated approach. Other public bodies involved include De Vlaamse Waterweg, the owner of the water outlet system and manager of part of the Reien, and Farys, which is linked to the city through an intermunicipal partnership in the form of a mandated association responsible for managing all activities related to purification, drinking water supply, and management of sports infrastructure. The project has local political support from the Local Council.

Civil Society

The inhabitants are a crucial stakeholder, being involved in every step of the project through co-creation activities, surveys, and information sessions, among other initiatives. This ensures the democratisation of the decision-making process, while also providing local support and accountability. Furthermore, the civil society is represented in the project by Waterland, a not-for-profit partner that contributes expertise in creative communication and co-creation with citizens.

Academia

Ghent University (through the Environment and Plants & Crops Departments, and the Centre for Microbial Ecology & Technology and Aquatic Ecology Research Unit represents academia, providing specialised knowledge and support in topics such as green stress and water quality.

Industry

The industry is primarily represented by companies providing expertise on water technology, modelling tools, hydraulic infrastructure, data collection and interpretation, and water system monitoring networks (Sumaqua, Kytos BV, iFLUX).

6. DIGITAL, GREEN AND JUST ASPECTS OF THE IA

Blue4Green focuses on green and digital solutions to advance climate adaptability and resilience, and to improve the quality of the public realm through better blue-green infrastructure, improved planning and implementation processes, and digital monitoring systems. Social justice aspects encompass inclusion and participatory decision-making.

Figure 5 Green pockets in the city centre and small green interventions made together with inhabitants in front of their home. Credits: Ruxandra Aelenei

Green aspects

Blue4Green proposes solutions for a range of environmental challenges, including heat stress, biodiversity loss, water scarcity, and water quality degradation, to effectively design climate adaptation solutions. Interventions refer to ensuring the quality and (necessary) quantity of water in the historical canals in the city centre, greening the public space, and providing a sustainable management of both blue and green infrastructure.

Digital aspects

Blue4Green proposes the realisation of a digital twin (dashboard) to gain better insights into water availability and demand, as well as the water needs of green infrastructure. The innovation lies in the fact that the dashboard will not only be used as a visualisation tool, but will also integrate forecast models and intelligent control. This will ensure that the dashboard will become a policy tool, making data-driven decision-making in water and green management the logical approach.

Just aspects

Blue4Green aims to directly involve citizens in the planning and decision-making process, targeting various groups, including city centre residents, schools, and sports and recreational clubs. Inhabitants of the area will directly benefit from the project through improved quality of life and health, better access to water and green spaces, improved recreational facilities, and involvement in policy-making through co-creation and participation. Participation and co-creation tools will be adapted to the different target groups.

7. REGULATORY FRAMEWORKS

Compliance is necessary with the existing local land use, zoning, building, and environmental regulations.

Policy frame

In 2022, the city adopted its Climate Plan with the ambitious goal of becoming climate-resilient and climate-neutral by 2050, cutting CO2 emissions in half by 2030. One of its pillars, 'Bruges as a climate robust city', forms the foundation for Blue4Green. Furthermore, the city has elaborated its 'Rainwater & Drought Plan', proposing directions for various topics tackled by Blue4Green, such as increasing rainwater capture and storage areas, and stormwater management.

Overview of Bruges policy plans linked with Blue4Green (all documents to be found here: Policy plans):

- Sumaqua, 2020. 'Climate adaptation plan of historical city centre in Bruges' (part of Interreg project Water Resilient Cities)
- Stad Brugge, 2021. 'Climate adaptation plan Bruges'
- Stad Brugge, 2021. 'Risk and vulnerability analysis of the City of Bruges due to climate change'
- Stad Brugge, 2023. 'Spatial policy plan Bruges'
- Stad Brugge, 2024. 'Rainwater and drought plan'
- Stad Brugge, 2025. 'Bruges policy programme 2025-2030'.

Land Use and Zoning

The Blue4Green project is embedded in the Spatial Policy Plan of Bruges, adopted in 2023. This spatial strategic document states that the protection and improvement of the green-blue network are among the strategic goals for the city until 2035. Other topics central to Blue4Green come together in this plan, such as heritage protection (with a story to tell), creating spaces for people to meet, and respecting public space.

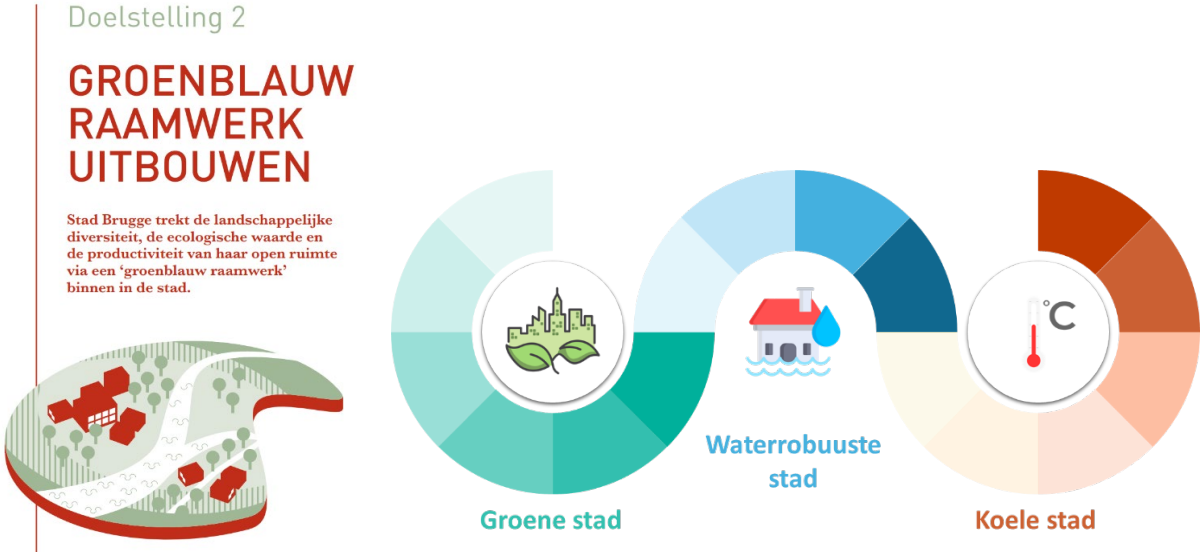


Figure 6 Climate goals, blue and green infrastructure come together in Bruges' policy framework. Credits: City of Bruges

Planning and Building Permits
For the realisation of the inlet and outlet of the water system, a permitting dossier is needed (the process is ongoing). De Vlaamse Waterweg is requesting a permit for the outlet, while Farys will do that for the inlet.

Environmental Impact Assessments (EIA)
Not necessary.

Data and privacy
Modelling, data and research form an essential part of the work; therefore, special attention needs to be given to data management and privacy (GDPR).

By taking into consideration these regulatory and policy requirements, the project ensures a compliant and scalable model for its innovative technical and social interventions.

8. MANAGEMENT AND GOVERNANCE OF THE INNOVATIVE SOLUTION

Blue4Green adopts a mixed management and governance model that combines strong municipal leadership with broad-based partner collaboration. MUA ensures the coordination and is directly involved in various work packages, with specific tasks (and work packages) delegated to project partners and stakeholders to exploit their specialised expertise.

Strategic decision-making will be conducted through a Steering Group that includes all delivery partners. For day-to-day management, a core team (project management group), including partners with responsibility for thematic work packages, will oversee the coordination of activities and ensure good quality outputs and deliverables.

In terms of governance, Blue4Green employs an innovative approach, including a co-creation and co-design mechanism in cooperation with relevant stakeholders.

This governance structure ensures that the project achieves its goals effectively while fostering collaboration and accountability among all stakeholders.

9. RESOURCES AVAILABLE

Blue4Green is supported by a strong, complementary consortium of partners who bring expertise in water and green management, health, participatory processes and human-centred urban planning and design. This is complemented by functional capabilities in project management, communications, stakeholders' management, and community development.

- Financial resources – the total project budget is EUR 6.23 million, of which 80% (EUR 4.98 million) is from the European Regional Development Fund, with the remaining 20% coming from local public and private sources. If costs exceed this amount, the MUA can compensate for the difference from various other local funds available.
- Human resources: The core project staff comprises municipal employees from various departments, external consultants, and researchers.
- Technical and digital resources: The project utilises digital technology for both management and deployment.

Finally, the Transfer Partners of Aveiro (PT), Pisek (CZ) and Utrecht (NL) represent valuable assets for mutual learning and for testing the feasibility of replicating the innovative aspects of Blue4Green in other urban contexts.

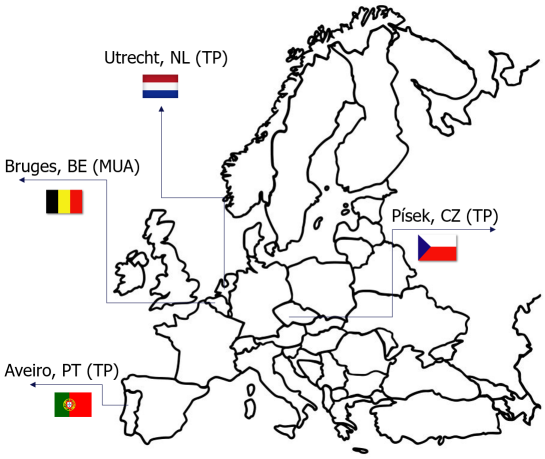


Figure 7 Group picture of the Blue4Green project team on Day 1 of the OSV. Credits: Ruxandra Aelenei

10. SUSTAINABILITY OF THE INNOVATIVE SOLUTION AT THE MUA

The outputs, tools, and results of the project (such as the dashboard, the water balance model, or the new automated closing-opening system) will remain in use and in operation for the City of Bruges after the Blue4Green project's lifetime. Staff members from the city will be trained in using and maintaining them, ensuring long-term increased knowledge and skills of personnel. In terms of financial continuity, the City of Bruges will explore allocating funds (from local, regional, or European sources) to maintain and potentially improve the implemented systems, as needed.

The project is an investment for many partners. They aim to learn from this project, gain more experience, and enhance or develop their knowledge and working methods. The hope is to use this project as a leverage for future projects, to be involved in more of these neighbourhoods as specialists for similar projects. They will also learn to work with new partners.

11. RISKS

Risks at the strategic level

- External conditions can impact the operability of real-time sensors, especially in water. Monitoring the quality of the data is foreseen; however, the reliability of the data can become an obstacle to setting up a fully automated control system on the Reien.
- The reconnection of the historic network, as the exact locations of wells and water pipes, and their state, are unknown. If the selected area does not represent workable infrastructure, we may need to reconsider the type of work or relocate to a different location within the inner city.

Risks at the project management level

- Delays in the delivery of project activities may occur due to various reasons, including personnel issues and unexpected local conditions. The MUA will closely follow the timely delivery of works to intervene promptly if necessary, by adapting activities based on the experience of partners and the network, adjusting partners' methods, and exchanging best practices with other cities.
- Costs might exceed available funds due to uncertainty related to the project's scope, planned solutions (given the innovative nature of the project), and inflation of material costs. During the design process, extra attention will be given to defining affordable solutions. The design will be constantly monitored in terms of time and finances. In the event of additional costs, the MUA will cover these from alternative sources to ensure the continuation of the project.
- A shortage or change of specialised staff (both at MUA and DP levels) can occur. The MUA will promote the project within the organisation to make it attractive to experienced and committed experts, and clear agreements will be made with all parties involved.
- Working in and with water is complex and requires extra coordination with utility asset owners. MUA intends to foster an intensive collaboration with these stakeholders and align Blue4Green goals with other ongoing works on site.

There are no major political drawbacks expected, as the project aligns with the city's long-term strategies for climate resilience and is integrated into existing procedures and projects. Internally, at the municipality level, there is also a wide support and interest in participating in the project. Furthermore, the intensive information of and co-creation with different internal departments will ensure that this support is maintained.

BLUE4GREEN

Transfer ID Card

BLUE4GREEN