



NBS 5

Green Roofs on private garages

FC ZENICA

Project indicative: Z5.2

Project type: simple investments

Project starting point: 0-5 y

Project ending point: 0-5 y

Estimated costs: 35-50K EUR

Description of Study Area

The coverage of the Regulatory Plan "*Alija Izetbegović Square*" is in the city centre (8.40 ha). 1.955 inhabitants live in the area. It is densely populated with 233 inhabitants/ha, stemming from collective high-rise housing development within the study area.

The total area of greenery is 17,753 m² (1.77 ha), of which the park (recreational greenery) of a large residential complex occupies about 10,430 m² (1.04 ha), accounting for 9sqm/capita green space. An underground garage with green roof is planned there. Existing green areas need improvement by planting additional vegetation, integrating greener pedestrian paths, and adequate lighting and urban furniture. Given current planning of new facilities and increasing population, existing greenery will not meet necessary standards per inhabitant.

Relevant Legislation

No local framework or urbanistic regulations for green roofs exists as green roofs have not been used yet in Zenica. Reconstruction of existing garages does not require construction permits. However, establishing green roofs require consent from owners.

Site challenges

Ownership, maintenance, vandalism, lack of awareness regarding NBS5 impact.





Source: Mirza Skirić



Vision

Scenarios

Do-it-all (best-case)

Extensive green roofs are integrated into the draft Regulation Plan for the City Centre and a new Green Roofs Policy on existing buildings will be elaborated, including an incentive scheme and strategy for maintenance to ensure long-term sustainability.

A survey among owners of garages is to assess interest and obtain consent. The project documentation will be elaborated with a team of experts.

Financing will be secured through public-private investments. Participative processes will be advanced in parallel, engaging local communities in defining requirements for future green spaces. Co-management plans will be elaborated with shared responsibilities for maintenance of the green roofs among Municipality and interested stakeholders (local residents or environment oriented NGOs).

Do-something-meaningful

Installing green roofs on top of public and private garages has been already integrated into the draft of the Regulatory Plan of the city centre.

Incentives will be granted to private investors. Strong awareness raising campaigns accompanying the initiative may support the process.

NBS intervention specificities

Typology of NBS5

Green walls and roofs

- Green roofs on private garages (Extensive green roofs)

Green roofs rely on nature to generate environmental (conservation of biodiversity, climate change adaptation, etc.), economic (property valuation, potential job creation) and social (water drainage, aesthetical values, etc.) benefits.



Source: Harrison Architects | Green roof garage

Operational Objectives

Operational objectives for implementation

1. Local communities will be engaged throughout participative co-creation processes including co-design and co-management of the NBS project.
2. Generating positive environmental effects (*mitigate effects of urbanisation and strengthen the urban ecosystem to be more resilient to the challenges of climate change, contributing to transitioning to a low-carbon economy and circular urban metabolism*)
3. Contributing to converting mono-functional areas to multifunctional spaces using nature-based solutions with the support of pre-existing infrastructure.

Buildings will shift from static to dynamic and interactive with its surroundings and citizens.

Targets

Focusing on quantitative and qualitative indicators:

Qualitative analysis:

- Impact assessment of adequacy of green space provision based on local community perception.
- Perception of health status by local communities (safety status according to respondents, health perception before/after the intervention)

Quantitative analysis:

- Develop extensive green roofs on 25 garages.
- Extend the existing green spaces in the area by 3 %
- reduced CO₂ emissions, remove pollutants from the air - NO_x and VOC levels (before and after)

Implementation steps

1. Explore in detail local barriers:
 - expect potential price increase in design, construction, and maintenance phases.
 - mitigate lack of government incentive towards real estate developers and owners, and private companies that can use the intervention for advertising.
 - technical difficulties through design and construction phases.
 - age of existing building structures and potential poor structural loading capacity.
2. Develop solutions specific to the local climate and context.
3. Leverage organisations delivering NBS services, organise international contests for solutions, develop private investment plan.
4. Promote awareness, facilitate dissemination, and invest in education: deliver trust and knowledge about green roof technology – provide information about benefits and impact on end-users. Showcasing the benefits to the larger community

Partners/Stakeholders

Beneficiaries: Municipality, Organisations (NGOs) able to coordinate and deliver the implementation, residents.

Additional Investors/Shareholders: environmental and nature-oriented companies/organizations, that (i) use nature as a core element of their product/service offering for the planting, delivery and/or stewardship of NBS and engage in economic activity' or (ii) aims to create a brand that revolves around community, participation, environment.

Users: local communities, persons transiting the area

Example of public-private partnership of greening initiatives. Cluj-Napoca municipality is appealing to private companies for landscape and management of green areas:

The project "Adopt a Green Space!" was launched in September 2012, based on the intention of Cluj-Napoca municipality to collaborate with various economic agents and institutions in Cluj to ensure that green spaces within the city limits of Cluj-Napoca meet European urban landscaping standards. The project essentially involves "adopting" a green space located on public land within the city limits of Cluj-Napoca, for a minimum period of 3 years, with the possibility of extension.

This model avoids maintenance cost of the green spaces for the municipality while private companies benefit from advertisement in highly frequented areas, associating them as pro-environment companies. The model can be transferred to Zenica for implementing green roofs on private garages, at the current site, and other relevant areas in the city.



The photo is an example of community-driven green space transformation. This is a segment of "Adopt a Green Space" initiative, originating from local residents, facilitated by the manager of the Clinical Institute of Urology and Renal Transplantation Cluj.

Accessibility

- Ensure easy accessibility to the green roof for maintenance works (for pedestrian accessibility for leisure purposes – expertise of the building structural resistance must be elaborated)
- Ensure connections with pedestrian routes and green elements in the proximity (using synergetic effects between different green spaces), and establish circular relationships.

Aesthetics/Ambiance

Creating the right ambiance on green roofs is crucial to enhance their appeal and contribute to area's landscape regeneration.

- Consider the suitable plant selection: Choose a diverse range of plants, including native species, that thrive in the local climate. Consider flowering plants for visual appeal and to attract pollinators.
- Texture and Form: Mix plants with different textures and forms. Combining tall grasses, ground covers, and shrubs can add depth and interest to the visual ambiance of the green roof.

Landscaping

- Vegetation should be locally adapted: natural roof vegetation must include plants adapt to the roof area and climate.
- Heavier materials such as shrubs can be placed on higher weight bearing areas, such as columns or roof perimeters.
- Use biological resources aiming for energy and material recycling to determine the sustainability of the system.
- Diversity: a polyculture and diversity of beneficial species will sustain an ecological green roof. Rather than focusing on several different elements within the system, try focusing on their functional connections (for instance: plants that are in synergic connections, such as sage and lavender, chamomile)
- Vegetation whose growing season corresponds to the wet season is preferred.
- Irrigation will be required.

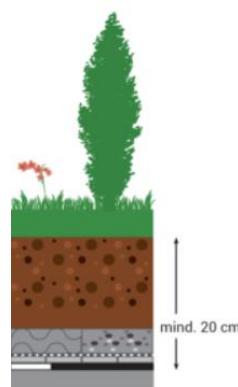
Security

Evaluate structural and physical suitability of green roof considering:

- Roof structure of garages and covering typologies
- Available space
- Structural loading bearing capacity
- Waterproofing membranes and insulation
- Drainage
- Green roof access
- Determine the type of green roof best suited for the private garages.
- Access and maintenance

Infrastructure works (if needed)

- Green roof system planting layer should be sufficiently deep to provide capacity within the pore space of the planting layer to capture majority of the average annual runoff.
- Components of the green roof:



- Regular maintenance required
- Build-up height depending on plant selection vary between 300-1000 mm
- Weight >150 kg/m² up to 2000 kg/m²
- Ornamental lawn, summer flowers, demanding shrubs, bushes and trees
- Higher contribution to urban climate and biodiversity

Environmental considerations (benefits)

- Improved biodiversity.
- Better air quality and improved health of residents.
- Reduce/mitigate the effects of urban heat islands.
- Provide a more aesthetically pleasing environment.

