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A LIFE PROJECT

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COMUNIDADE INTERMUNICIPAL DO ALENTEJO CENTRAL

LIFE my building is green

LIFE17 ENV/EN/000088

Application of Nature-Based Solutions for local adaptation of educational and social buildings to Climate Change

Jornadas Técnicas no Alentejo Central

18 e 19 de fevereiro de 2019.

REAL JARDÍN BOTÁNICO
Instituto de Ciencias de la Construcción EDUARDO TORROJA
CARTIF
DIPUTACIÓN DE BADAJOZ
cimac
Porto.

On February 18 and 19, CIMAC, together with the Life myBUILDINGisGREEN Project Coordinator (Life17 CCA/ES/000088) - Salustiano Torre Casado - carried out technical conferences in Central Alentejo in order to present the project to several institutions. In this context, several events were held, about which a summary is described below:

- An internal meeting with the coordinator where an overview of the entire project was conducted, which also led to the clarification of doubts and administrative procedures of the project.

- Meeting with the Direção Geral dos Estabelecimentos Escolares (DGesTE) and the Agência Portuguesa do Ambiente (APA).

    - The main lines of action of the project were presented, clarifying the issues raised. At the same time, both entities were asked to collaborate in their respective areas of action. Both entities showed high commitment to the implementation of the project's objectives, showing their full availability.

- Visit to the basic schools of Horta de Figueiras (Évora) and EB D. João IV (in Vila Viçosa).

    - The above mentioned schools, which had already received a previous visit from CIMAC, were visited. A brief meeting was held with the directors of both schools, being that at the EB of Horta das Figueiras there were also members of the Associação de Pais.

In these teaching establishments, the high level of commitment to the project was demonstrated.

- Realization of the "Open Conference on the Application of Nature-Based Solutions for the Adaptation of Public Buildings to Climate Change" (Conferência Aberta sobre a Aplicação de Soluções Baseadas na Natureza para a Adaptação de Edifícios Públicos às Alterações Climáticas).

  - The Aberta conference had as main objective to make known the project together with the academic community of the University of Évora. This action was strongly participated - see page of presentions in appendix - with researchers, professors e university students, as well as technicians from other institutions. The conference began with a presentation by the UAD Coordinator - Teresa Batista - outlining CIMAC's strategy on the issue of climate change, which is the subject of the myBUILDINGisGREEN project. Afterwards, the project coordinator explained the project, presenting the main objectives and the respective situation point. The representative of the Diputación de Badajoz - Miguel Angel Gamero - and of the Instituto Torroja - Fernando Consuegra - also spoke. Subsequently, several questions were posed by the audience,

leading to an in-depth discussion on the implementation of the project in Central Alentejo.

- Formal presentation of the project to the elected officials and technicians of the municipalities in a session prior to the Intermunicipal Council.

  - A specific presentation was made to the elected officials and municipal technicians of the 14 municipalities that make up CIMAC. The meeting was very well attended, with more than two dozen interlocutors. Initially, the coordinator of the Environment and Development Unit - Teresa Batista - explained an outline of all the projects related to climate change in Central Alentejo, in order to integrate the Life myBUILDINGisGREEN project. Subsequently, the project coordinator presented the project, especially with regard to its objectives, methodology and the various phases that integrate it. Several questions were posed by the participants, who were very interested in the NBS solutions provided by the project.

Launching Meeting of the LIFE Project in the City of Oporto

Almost six months after the kick-off of the LIFE My Building is Green Project, and already with several tasks in progress, the Municipality of Porto considered it appropriate to hold a formal meeting for the presentation and dissemination of the project to various internal and external stakeholders in the Municipality, in order to bring together the departments of the municipality more directly related to the project and to create synergies between different external entities whose activity could enrich and contribute to the development of the project.

With these two main objectives in mind, the program for this meeting was designed in collaboration with the coordinator of the LIFE Project, Salustiano Torre Casado, European project manager of the *Real Jardín Botanico de Madrid, Consejo Superior de Investigaciones Científicas,* who was present at the different working moments of the meeting, as well as Beatriz Arranz, researcher at the *Instituto de Ciencias de la Construcción Eduardo Torroja, Consejo Superior de Investigaciones Científicas*. The Municipality of Porto was represented at various levels and in the accompaniment of the CSIC team. The meeting took place on February 25th in different locations of the city of Porto.

In order to better comply with the purpose of disseminating the project and involving partner entities, 4 different moments were defined:

I. Agenda for the meeting

II. Technical Meeting

III. Visit to the pilot building - EB1 Falcão

IV. Presentation of the LIFE project to local partners

V. Meeting with the Pelouro de Inovação e Ambiente's Vereador

I. Agenda for the meeting

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APPLICATION OF NATURE-BASED SOLUTIONS FOR LOCAL ADAPTATION OF EDUCATIONAL AND SOCIAL BUILDINGS TO CLIMATE CHANGE

LIFE17 CCA/EN/000088

MEETING TO LAUNCH THE PROJECT IN THE CITY

REAL JARDÍN BOTÁNICO

Instituto de Ciencias de la Construcción EDUARDO TORROJA

CARTIF

DIPUTACIÓN DE BADAJOZ

cimac

Porto.

Dear Ladies and
Gentlemen

The Pelouro da Inovação e Ambiente invites you to attend the presentation of the project *"LIFE-myBUILDINGisGREEN - Application of Nature-Based Solutions for local adaptation of educational and social buildings to Climate Change"*, co-financed by the measure LIFE17CCA/ES/000088 next **February 25th, at 14:30 (until 16:00),** in the room of the Municipal Assembly - 5th floor.

The project brings together 5 Iberian partners, one of which is the Municipality of Porto, under the guidance of the Municipal Department of Planning and Environmental Management. This work is being carried out under the coordination of CSIC-RJB Centro Superior de Investigação Científica - Real Jardim Botânico de Madrid, for the implementation of NBS in school buildings to improve the bioclimatic comfort of students and users.

Being a project aligned with the vision and mission of the municipality with special focus on the adaptation to climate change, this project is useful for meeting to involve the various stakeholders of the Municipality in the process of evolution of the respective project.

In this sense, we hereby invite you to be present at the referred meeting, according to the attached work program. We request the confirmation of presence, as soon as possible, until February 21 for the contact: vicepresidencia@cm-porto.pt.

O Vice-President,

EMAIL INVITATION TYPE

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WORK PROGRAM

This document summarizes the main objectives proposed for the presentation meeting of the project *"LIFE-myBUILDINGisGREEN - Application of Nature-Based Solutions for local adaptation of educational and social buildings to Climate Change",* with the elements of the stakeholders of the Municipality:

1. Enquadramento session (CMP responsible):
    i. Adaptation to CA in the Municipality of Porto (brief presentation of Adaptation to CA and actions in progress);
    ii. Relationship of the NBS in the city with the LIFE project
2. Project Management Aspects (CMP responsible):
    i. Clarification of the articulation between coordinator and Municipality
    ii. Articulation and involvement with the municipal company responsible for the execution of the work (GO Porto, EM)
    iii. Calendar to feed order book
3. Visit to the pilot and model buildings, based on the matrix and selection criteria (Responsible CMP)
4. Project dissemination (responsible CSIC-JRB)
    i. Presentation to stakeholders by the coordinator
    ii. Space for debate
5. Meeting with Vice-president to discuss future partnerships

The meeting will serve to present the work developed, collect contributions and involve the different stakeholders in the development of the project.

Visit to Porto do project coordinator LIFE-myBUILDINGisGREEN

CSIC-RJB

Presentation of the LIFE project to the stakeholders of the Municipality

25 e 26 de FEVEREIRO

25 Fevereiro

Time: 9:00 a.m.
Location: Parque da Cidade do Porto

Framing of the project with the initiatives of adaptation to CA and NBS do Porto

Time: 11:00 a.m.
Location: Campanhã

Visit to the selected buildings: pilot and espelho

Pausa almoço

13:00-14:15

Time: 14:30
Premises: Paços do Concelho 5th floor assembly room

Dissemination of the project to the stakeholders of the Municipality

4th floor vice-presidency room

Meeting with the

26 Fevereiro

Time: 10:00 a.m.
Premises: Edifício Porto Ambiente

Meeting with the Empresa Municipal de Ambiente do Porto (Porto Municipal Environment Company)

Agenda - visit to Porto

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Accompaniment by the communication office of the CMP

Enquadramento session

. A adaptação às AC no Município do Porto (brief presentation of Adaptation to CA and actions in progress).

. Relationship between the NBS in the city and the project.

Responsible: CMP

Participation: CMP + GeoA + CSIC-RJB

Visit to selected buildings

. EB1 do Falcão (score in selection matrix);

. EB1 das Flores (potential building espelho)

Responsible: CMP

Participation: Directorate EB1Falcão + CMP + GeoA + CSIC-RJB

Vice-presidency Meeting

. Alignment of partnership in future projects and applications.

Responsible: CMP + VP

Parque da Cidade do Porto

09:00 - 09:45

09:45 - 10:30

11:00-12:30

14:30-16:00

16:00-17:00

Vice-Presidency Room
4th floor Paços do Concelho

Municipal Assembly Hall
5th floor Paços do Concelho

Project Management Aspects

. Clarification of the articulation between coordinator and municipality.

. Articulation and involvement with the municipal company responsible for the execution of the work (GO Porto, EM).

. Calendar to feed the order book

Responsible: CMP

Participation: CMP + GeoA + CSIC-RJB

Project disclosure

. Presentation to the stakeholders by the coordinator.

. Espaço de debate

Responsável: CSIC-RJB

External Stakeholders: Direção EB1 Falcão | Agência de Energia do Porto | Associação Nacional de Coberturas Verdes | CIBIO - Centro de Investigação em Biodiversidade | CEGOT - Centro de Estudos de Estudos de Geografia e Ordenamento do Território | CCDR-n - Comissão de Coordenação de Desenvolvimento Regional do Norte

Internal Stakeholders: Department of Education | Department of Green Spaces | Domus Social, municipal company responsible for the management and maintenance of the buildings | GO Porto, company responsible for the execution of the work | Águas do Porto, municipal company responsible for the management of the urban water cycle

ACTIVITIES MAP - 25 FEVEREIRO

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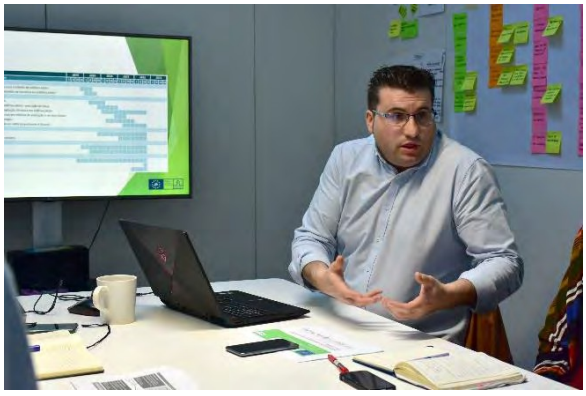
II. Technical meeting

This meeting served to address some practical and technical issues of management of the project process, especially at the level of the particularities of the LIFE program. In this meeting participated the CSIC elements, and the local team of the Municipality of Porto formed by collaborators of the municipality and by elements of Geoatributo, who provide specialized consultancy in the scope of the project. The team of the Municipality is composed by a vast group of collaborators in the most differentiated areas of formation with interest for the project, so that in this technical meeting were present 4 elements more directly involved in certain processual questions, of management and development of the project.

From this meeting, a list of attendees was prepared, attached to this document, Annex I, which shows how the meeting was held and the representatives of each entity and organization present.



In the meeting, questions about the implementation of the NBS in the coverage were also addressed, especially about the use of participated entities of the Municipality, as well as the respective duration of the bidding process for the implementation of the solutions and execution of the work.

III. Visit to the pilot building - EB1 Falcão

To better understand the specificities of the building, a visit was made to the Basic School of the 1st Cycle of Falcão to get to know the elements of the management and to get to know the reality of the school, its problems, its buildings, and to be able to articulate with elements of support in the school for the dissemination of the project and collaborative participation.

Below are some photographs of the visit.





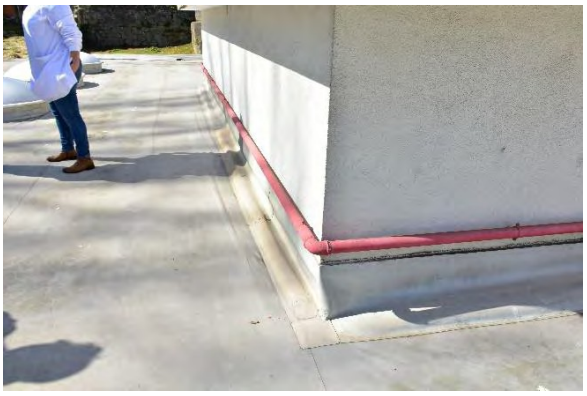



















IV. Presentation of the LIFE project to local partners

In this launching meeting of the Project in the city of Porto, a group of local partners relevant to the project were also invited, namely some of the organizational units and municipal departments with clear participation in the development and implementation of the actions, such as the financial department and management of European funds, the department of education, which manages and coordinates the educational action in the school, Domus Social, the municipal company in charge of the maintenance and conservation of the building, the department of green structure, which manages and maintains the school's educational action, Domus Social, the municipal company in charge of the maintenance and conservation of the building, the department of green structure, which manages and maintains the school's green structure, and Domus Social, the municipal company in charge of the maintenance and conservation of the building, which manages and coordinates the educational action in the school, Domus Social, a municipal company in charge of the maintenance and conservation of the building, the department of green structure, which manages and maintains the green spaces inside and outside the school, especially the Horta da Oliveira, adjacent to the building of EB1 Falcão and with an important role in the educational action and the apprenticeships in the perspective of sustainable production and consumption.

In addition to local partners, other partners outside the municipality, but with an important role in municipal climate action, were also involved, such as the National Association of Green Roofs and the University of Porto, in the areas of Landscape Architecture and Climatology, and the Energy Agency of Porto.

Below are some photographs of the meeting, which included a general presentation of the project by the Coordinator followed by an intervention by the person responsible for the project in the municipality. At the end there was an opportunity for intervention by those present.


Life


Life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Life

V. Meeting with the Pelouro de Inovação e Ambiente's Vereador

This meeting ended with a meeting of the project coordinator with the Vereador do Pelouro da Inovação e Ambiente for a more formal contact between the municipality and the LIFE-myBuildingisGReen project, for a formal closing, and with the expectation of great success in the development of the project in the city of Porto.

Below are some photographs that record this moment.






LIFE-myBUILDINGisGREEN

LIFE17 CCA/EN/000088

July 2019

Round Table - Synthesis of Results

Application of Nature-Based Solutions for Local Adaptation of Educational and Social Buildings to Climate Change.

Porto.

Technical Data Sheet of the Document

Title:	LIFE-myBUILDINGisGREEN: Roundtable - Synthesis of Results
Description:	Report elaborated within the scope of the "*Acquisition of technical consultancy services for the financial and administrative management and implementation of the LIFE project - myBUILDINGisGREEN*", associated to the implementation works of PHASE II - Execution Phase of the Project. The present document deals with the balance of the main recommendations, indications and results resulting from the round table session held in Porto, on 10-07-2019.
Production date:	11/07/2019
Date of last update:	13/09/2019
Versão:	Version 01
Development and production:	Município do Porto e GeoAtributo, C.I.P.O.T., Lda.
Technical equipment:	Pedro Pombeiro Marta Pinto Nuno Morais Sara Velho Ricardo Almendra Elisa Bairrinho Liliana Sousa
Consultants:	José Martins

LIFE-myBUILDINGisGREEN - LIFE17 CCA/EN/00088

Round Table 01 - Synthesis of Results

Apr/2019 - Jun/2019

Project Data

Location of the Project:	Extremadura (Spain), Norte (Portugal) e Alentejo (Portugal)
Project start date:	01/09/2018
Project completion date:	31/08/2022
Total order:	2.854.102 €
EU contribution:	1.697.369 €
(%) of eligible costs:	59,99 %

Beneficiary Data

Beneficiary's name:	Municipality of Porto
Pessoa de contacto:	Pedro Pombeiro
Morada:	Municipal Environmental Management Division Estrada Interior da Circunvalação, 15443
Telephone:	+351 225 320 080
E-mail:	pedropombeiro@cm-porto.pt
Project website:	www.mybuildingisgreen.eu

INDEX

INTRODUCTION

It was the understanding of the members of the consortium to hold a round table in Porto to involve the National Green Cover Associations of Portugal and Spain for joint discussion of the project and the NBS. However, and after the comments of the LIFE Program Monitor, Iñigo Ortiz de Urbina, made at the working session of May 7th in Badajoz, which reinforced the need for the members of the LIFE-myBUILDINGisGREEN project consortium to design and provide the NBS prototypes to be implemented in the 3 pilot buildings, the round table was held in order to open the discussion to the green roofs sector, especially to the associated companies of the two associations, as specialists to identify and provide the best and innovative solutions to be implemented in the 3 pilot buildings to improve the bioclimatic comfort of the respective users. In fact, the guidelines issued by the monitor introduced new requirements in the process of developing the technical solution to be adopted for the prototype, implying an increased attention to the innovative character by which it should be guided. It was then necessary to trigger a demanding process of technical discussion of the prototype solution.

As the Municipality of Porto is in charge of coordinating Action 2 for the production of a database of NBS and the development of projects, it was the understanding of the Municipality that this round table fulfills this main objective of hearing the NBS sector, represented by national associations and research groups, consisting in the discussion of applicable NBS proposals and in the joint development of the prototypes to be implemented in the 3 pilot buildings.

The roundtable session took place on July 10, 2019, at the *Porto Innovation Hub*.

METHODOLOGICAL ASPECTS OF THE ROUND TABLE SESSION

In order to better contextualize and describe the round table session held, this chapter presents the general methodology and the program that guided its dynamization.

Objectives

- Involve national green cover associations and partners with LIFE-myBUILDINGisGREEN;
- Discuss NBS proposals to be implemented in 3 pilot buildings;
- Reinforce the innovation factor in the solutions of the prototypes;

General methodology

The round table was structured for a duration of approximately 3 hours, being exclusive for the members of the consortium, the national associations of green roofs (ANCV and ASESCUVE), and respective guests, defined in coordination between the consortium and the associations.

The methodology that guided and oriented the session was based on the fundamental premise of focusing on concrete and innovative solutions, not being, therefore, open to the public, so that the dissemination of the same proceeded through internal channels to the project and partners, being directed to target audiences.

The event was reported on the channels of the project and of the various members of the consortium and during the round table images were collected, as well as video and sound for future memory and recording of the session and analysis of the results.

Once sensitive topics such as the development of prototypes and innovative proposals were discussed, it was considered convenient to ensure that the contents of the round table were kept confidential by those present and of restricted use until the development of the project, in order to safeguard the innovative character and comply with the requirement of the LIFE Monitor, referring to the concept of prototype, which among other things presupposes something not yet available on the market.

Session program

The session program, in coherence and effect of the application of the methodology described above, was based on two main and sequential moments: the first, centered on the confrontation of the potential solutions designed by the partnership in the scope of the project with the barriers and reservations regarding the expected performance and with the expectations of the cities; and a second focused on the innovation factor, on the innovation barriers, contributions and solutions of the companies.

The following is the detailed program, with the points listed in each of the two parts mentioned above.


15:00
Abertura
5'
Boas-vindas e acolhimento aos participantes pelo Vice-presidente do Município do Porto e pelo Coordenador do Projeto
Formular o problema
5'
Apresentação da metodologia da sessão e expectativas. Identificação dos constrangimentos identificados e metas a atingir com a sessão (Porto)
Enquadramento mBig
3'
Breve resumo do projeto aos participantes para enquadramento (CSIC – Salustiano Torre Casado)
Caracterizar o protótipo
5'
Apresentação dos protótipos selecionados para os edifícios e características técnicas (CARTIF / ICCET)
Barreiras
4'
Identificação das reservas pela ANCV quanto ao desempenho esperado pelos protótipos para o edifício piloto do Porto (ANCV)
4'
Comentário da associação nacional de Espanha às reservas da ANCV e sobre os protótipos (ASESCUVE)
4'
Comentário às reservas das Associações (CARTIF / ICCET)
Perspetiva das Cidades
4'
Comentários das cidades aos protótipos propostos (Porto)
4'
Évora (CIMAC)
4'
Badajoz
Desempenho bioclimático
4'
Necessidade de cumprimento dos benefícios e impactos esperados pelo projeto (CARTIF)
Reunir consensos
5'
Fazer resumo e ponto de situação dos comentários e posições dos parceiros (Geoatributo – consultor Porto)


Definir próximos passos
5'
Comentários e contributos do coordenador do projeto e definir compromisso com o desempenho bioclimático esperado (CSIC – Salustiano Torre Casado)
10'
Coffee-break
Voltar à equação
3'
Abordar a obrigatoriedade de incorporar a inovação no protótipo (Porto)
4'
A barreira da inovação
Fazer eco das reservas do monitor LIFE quanto ao carácter inovador do protótipo a apresentar (Porto)
Associações
4'
As Associações Nacionais apresentam as empresas por si convidadas (ANCV e ASESCUVE)
4'
45'
Pitch das empresas
As empresas apresentam os seus contributos para o projeto e trazem a inovação para a discussão. Cada empresa dispõem de 3min
As soluções
10'
Síntese das soluções apresentadas pelas empresas (Geoatributo – consultor Porto)
5'
Recomendações
Síntese da sessão (Porto)
18:00
Encerramento
3'
Fecho da sessão e despedidas (CSIC – Salustiano Torre Casado)

Register of presences

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LIFE 17 CCA / ES / 000088

Porto 10.07.2019

Registo presenças

Todo o encontro será alvo de gravação de som e vídeo. Todos os participantes têm conhecimento de tal facto e expressaram a sua autorização para recolha de imagens, som e vídeo produzidos no âmbito do encontro e sobre a sua concordância com a publicação dos mesmos nos vários canais do projeto LIFE-myBUILDINGisGREEN (mBiG).

Nome / Entidade	Autorizo a recolha de imagem, som e vídeo durante a sessão e a publicação nos canais mBiG	Contacto	Assinatura
NUNO MORAIS / CM PORTO	SIM	NUNO MORAIS@CM-PORTO.PT	
Liliana Sousa / GeoAtributo	SIM	liliana.sousa@geoatributo.com	
Beatriz Caiuby Labate / NEOTURE	S	beatriz@neoture.pt	
Margarida Gonçalves / LANDLAB	SIM	margarida@landlab.pt	
Rui Ramos / LECA PORTUGAL, S.A	SIM	RUI.RAMOS@LECA.PT	
MIGUEL Á. ANTÓN GAMERO / DIPBA	SÍ	maanton@dip-badajoz.es	
Jéssica Simões Fogeiro / ANEV	Sim	fogeiro4@gmail.com	
PAULO PALMA / ANEV	Sim	presidencia@greenvp.pt	

REAL JARDÍN BOTÁNICO

Instituto de Ciencias de la Construcción EDUARDO TORROJA

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Nome / Entidade	Autorizo a recolha de imagem, som e vídeo durante a sessão e a publicação nos canais mBiG	Contacto	Assinatura
Rui Ramos / Lega Portugal SA	SIM	RuiRamos@LEGA.PT	
Pedro Costa / C.M. Évora	SIM	Pedro.costa@cm-evora.pt	
Teresa Batista / CIMAC	SIM	tbatista@cimac.pt	
Ricardo Barros / CIMAC	SIM	RICARDO.BARROS@CIMAC.PT	
João Arania / CIMAC	SIM	joao.arania@cimac.pt	
Ana [illegible]	SIM	ana.llopis@projargroup.com	
Dani Lacueva	SIM	babilon@babilon.cat	
SARA VELHO / CM PORTO	SIM	saravelho@cm-porto.pt	

REAL JARDÍN BOTÁNICO
Instituto de Ciencias de la Construcción EDUARDO TORROJA
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Nome / Entidade	Autorizo a recolha de imagem, som e vídeo durante a sessão e a publicação nos canais mBiG	Contacto	Assinatura
BORJA FRUTOS / IETCC - CSIC	SIM	BORJAFV@IETCC.CSIC.ES	
GUADALUPE GOMEZ / IETCC - CSIC	SIM	GUADALUPE.GOMEZ@IETCC.CSIC.ES	
MARTA PINTO / CMP	SIM	martapinto@cm-porto.pt	
JAIME FUENTES / PIPBA	SIM	jfuentesv@dip-badajoz.es	

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ASPECTS-CHAVE

This chapter summarizes the main key aspects of the round table session, systematized and grouped in coherence with the main moments of this session, ranging from the proposal of the prototype, to the reserves and barriers identified by the Portuguese and Spanish green cover associations, to the expectations of the cities where the pilot sites to be intervened are located and, finally, to the innovative solutions presented by the companies.

Prototype Proposal

As a way to start the discussion and present the central object of the session, the partnership began by proceeding to a brief outline of the LIFE-myBUILDINGisGREEN project, followed by the presentation of the possible solutions that had been designed in relation to the prototype for the pilot buildings, both in terms of coverage, facade and exterior spaces. In total, a set of 8 alternative and/or complementary solutions were presented, of which 3 were for the roof, 3 for the façade and 2 for the space outside the buildings:

- Prototype solutions at the coverage level:
  - mBiGWTray;
  - mBiGBox;
  - mBiGCUVE.
- Prototype solutions for the facade:
  - mBiGFAVE;
  - mBiGToldo;
  - mBiGColgantes.
- Prototype solutions for outdoor spaces:
  - mBiGPAVE Draining Pavements;
  - mBiGPlayGround.

The solutions were designed based on the climatic indicators referring to the cities to intervene and, roughly speaking, they present as dominant characteristics:

- Modular and adaptable nature;
- Possibility of active involvement of the school community;
- imple and economical maintenance.

Annexed to this report is the presentation that supported the project framework (see Annex 1), as well as the launching of the prototype under discussion (see Annex 2).

CONSIDERATIONS ON THE PRESENTED PROTOTYPES

Perspetiva das Associações Nacionais (ANCV e ASESCUVE)

Having presented the prototype solutions designed by the consortium and having them been placed for discussion and appreciation by the Portuguese and Spanish associations in this field, namely the National Association of Green Roofs (ANCV) and the Spanish Association of Green Roofs and Vertical Landscaping (ASESCUVE), some reservations were identified, of which the following stand out:

- Absence of continuity of coverage, with repercussions at the level of potential ecosystem services;
- Excess of inert component (*e.g.* gravel), with consequences on heat conductivity;
- Low substrate thickness, with implications for water retention potential, vegetation survival and bioclimatic performance of the solution;
- Uncertainty in terms of warranties and cost-benefit ratio of modular solutions in terms of maintenance, sustainability and viability;
- Absence of an integrated vision of the prototype solution (*i.e.* the prototype should be seen as a global solution for the entire pilot building);
- Incertitude in complying with the concept of "prototype" required by the LIFE Program and in considering the state of the art.

In general terms, the reservations identified were mainly related to the solutions proposed at the coverage level. Regarding the facades, the associations placed less objections to the proposed solutions, specifically assuming two different considerations, the first one on the use of native species, with the possibility of going to deciduous plants, which allows a greater thermal comfort in winter (drying by means of the incidence of solar rays), and the second one on the basis of the substrate, relying on suspended solutions, in which the vegetative species would be planted in vessels or other modular solutions. This type of solution entails a greater effort in terms of maintenance, both at the level of substrate replenishment (to ensure the conditions / properties of the soil, ideal for the good development of the plants), and in terms of watering requirements. In this sense, the associations preferably recommend the use of the soil as a support base for the plantation, perspetivating "bottom-up" type systems, assuming the same purpose, plant development around a vertical structure that allows the shading of facades oriented to the south or with great solar exposure. The solution of using the solo as a substrate base will always be more advantageous than compartmentalizing the substrate in vessels, suspended or not.

As far as the Municipality of Porto is concerned, in particular, the ANCV highlighted a set of fundamental assumptions that should guide the action on the issue of NBS, as the cornerstones of the strategy to be assumed by the Municipality, namely: the water retention capacity of the rainwater, essential both for the improvement of the management of the urban rainwater network, and for the utilization of the fifty-fifty waters for various purposes (in particular for the watering of the community vegetable garden connected to the school); the contribution to the reduction of noise; the increase of air quality; the promotion of biodiversity; the reduction of the heat wave effect; the increase of green areas; and the improvement of energy efficiency of buildings by reducing energy costs. These will constitute requirements of technical exigency, assumed by the Municipality of Porto in collaboration with the ANCV in the definition of a strategy for the promotion of the services provided by the green roofs in the city.

In addition to the above-mentioned constraints, the ANCV also expressed the need for more detailed information on the project, the proposed solutions and the pilot sites to be involved, in order to be able to give a more informed opinion on the development of the prototype.

However, the associations recognized the existence of some factors that constitute conditioning factors to the development of the solutions, the following being highlighted:

- Budget available for the implementation and maintenance of the prototypes by the beneficiaries of the limited LIFE- myBUILDINGisGREEN;

Construction characteristics differentiated by two pilot buildings;

- Different climatic characteristics of the locations to be intervened.

However, based on the information available and the prototype models presented, the associations consider that:

It is of great importance to involve and sensitize the school community to the NBS issue and, specifically, to the interventions carried out in the pilot buildings. However, they also noted that the main driver of the The success of the prototype to be implemented will depend on the involvement and awareness potential of the project, regardless of the type of concrete solution to be selected;

- the selected solutions should not take over the compartmentalization of the substrate, because it inhibits the correct root development of the species constituting the green cover, at the same time that the discontinuity and segmentation of the substrate raises doubts about the thermal inertia that can be developed with modular coverings;

It will be more advantageous to opt for thicker substrates than those initially proposed, preferably between 12 and 15 cm and with an adequate load distribution and that assume a natural continuity of the substrate for the optimization of the root system and the physical-chemical characteristics of the substrate;

- ther specifications should also be taken into account, such as a solar study to better adapt the awning or façade solutions, as well as considering the selection of flora species adapted to the climate. of the place but also to guarantee the adequacy of its characteristics to the substrate and specific function;

- finally, for a better appreciation of the proposed solutions, they consider it fundamental to know the schools and their construction projects in order to adapt the NBS to the effective needs of each pilot building.

City Prospects

After exposing some reservations resulting from a preliminary analysis of the prototype solutions by the national green cover associations (ANCV and ASESCUVE), there followed a moment of sharing the expectations of the cities regarding both the proposed prototypes and the comments of the associations.

The following are the main comments/concerns raised by each of the partners (cities) where the 3 pilot buildings will be intervened.

Municipality of Porto

- oncern with the bioclimatic performance of the prototype, considering the state of the art of the Municipality in this matter, especially in view of the results of previous projects;
- High expectation for ecosystem services to be provided by green cover;
- Uncertainty in meeting the desired level of technical requirements of the prototype, especially with regard to ecosystem services;
- oncern in guaranteeing a balanced relationship between the degree of innovation of the prototype and the corresponding degree of uncertainty in terms of performance, maintenance and sustainability;
- oncern in meeting the LIFE-myBUILDINGisGREEN project assumptions, guaranteeing the success of the prototype;
- Receio de uma possível incompatibilidade temporal entre o período necessário para estabilização do protótipo, elaboração dos cadernos de encargos e lançamento do procedimento para implementação das solutions in the pilot building and the need for this intervention to be articulated with the general requalification operation to which the selected school will be subjected. In case this incompatibility should come to

If the school is confirmed in the future and the requalification of the school advances before the conclusion of the remaining process, it will be up to the Municipality of Porto to select a new pilot building, with all the respective implications in terms of work program.

Intermunicipal Community of Central Alentejo (CIMAC)

- Concerns identical to those raised by the associations, particularly in terms of bioclimatic performance of the proposed solutions;
- Difficulty in accessing the coverage of the selected pilot building in Evora was a concern;
- Concern with the excess of plastic associated with solutions of modular nature, capable of jeopardizing the ecological principles that should be the basis of any NBS;
- Concern with the selection of plant species to be considered in the prototypes, emphasizing the importance of using native species, adapted to the climatic conditions of the region, in particular the scarcity of water and dry periods;
- Concern with the sustainability/feasibility of the prototype, particularly with regard to the potential for rainwater harvesting, considering the climatic characteristics of the Alentejo region, where the period of The dry season is extensive and the occurrence of precipitation frequently assumes torrential characteristics. The water levels potentially collected in the winter months will be unviable for the maintenance of plants in the dry season, so it will be necessary to develop sustainable alternatives for irrigation and to select the species carefully;
- Educational community highly motivated for the project, with some difficulty in calibrating expectations, given the range of uncertainties associated with the prototype;
- Hypothesis of allying the implementation of more conventional NBS solutions (state of the art) with prototype solutions developed within the scope of the project, supporting a possible comparative analysis;
- Concerns with the material of the fabric of the pilot school in Évora, with the fabric in fibrocement and already encapsulated, which creates a complementary challenge in the implementation of the green cover to avoid the interference with or vandalism of the material that has already been reprocessed;
- Concern with the uncertainty at the level of the effectiveness and success of the project in order to clarify the entity that owns the building, the Câmara Municipal de Évora, and thus obtain authorization for implementation of the project.

Badajoz Provincial Council

- Incertitude in complying with the concept of prototype required by the LIFE Program;
- Certainty at the performance level and compliance with the objectives, indicators and targets of the LIFE-myBUILDINGisGREEN project (*e.g.* 50% reduction in building reefing costs, 20% reduction in emissions of CO_2, collection of 2,700 m^3 of precipitation);
- Uncertainty regarding the feasibility of implementing the prototypes within the planned schedule, especially due to the coexistence of conditions associated with the time required for the procedure. The project is based on the need to intervene in the pilot buildings during the school holiday period and also on the technical requirements of the solutions.

Solutions and Innovation Factors

Having discussed the prototype proposals and collected the perceptions of the participants, and considering the innovation assumption that should guide such solutions, the participating companies had the opportunity to present their contributions to the project, bringing the innovation factor to the discussion.

The main aspects of the participation of each of the 3 participating companies (LandLab, Neoturf and Leca) are listed in the following points, focusing on the main value of each of the proposals, that is, the respective differentiating / innovative factor.

LandLab

► Solução / differentiating element 1:

- ZinCo green roofing systems.

▶ Main characteristics and benefits:

- Multi-call system with recognized performance;
- Water retention system (*stormwater management roof*), with innovation at the level of the layers that separated the base of the cover from the remaining solution;
- Inclusion of slow water release elements that increase retention capacity and delay the arrival of water to the urban drainage system;
- Average system height ≈ 20 cm;

Weight: 182 kg/m²;
Water retention capacity: 98 L/m2;

- Inclination: 2 to 5 graus.

► Solução / differentiating element 2:

- Modular vertical garden system, made of recycled maritime plastic (removed from the sea).

▶ Main characteristics and benefits:

Easy and quick installation and maintenance (individual plant replacement facilitated);

- Automatic irrigation system individually for each plant (higher efficiency and lower water expenditure);

Free structural configuration of the system (modular system);

- Mais-valia ecológica (reutilização de plásticos retirados do mar);
- Use of medium to large size plants (maximization of the potential in terms of ecosystem services);
- Module depth: 20 cm;

Dimensions: 68 cm (length) x 21.85 cm (height).

Annexed to this report is the presentation that supported the presentation made by LandLab, which contains the technical details of the solution presented, as well as illustrative images of the same (Annex 3).

Neoturf

► Solution / differentiating element:

- *Cork Green Roof System* - green roof and facade system structured in expanded cork agglomerate.

▶ Main characteristics and benefits:

- Produced from cortisol extraction residues;
- Applicable both to coverings and facades;
- Prototype solution (not yet commercialized, only applied to pilot cases);
- Incorporation of renewable and recyclable materials, solving one of the problems associated with most conventional solutions (excessive use of plastics);
- High degree of architectural freedom and flexibility in terms of pre-fabrication (possibility to work different molds and cuts in the sheet - geometric customization);

- Comparative analysis with ZinCo system reveals positive results in terms of acoustic performance, plant compatibility, drainage and water retention and thermal performance) - profile environmental and energetic superior to those of conventional solutions;
- Maximum thickness ≈ 60 cm.

Attached to this report is the presentation that supported the presentation made by Neoturf, which contains the technical details of the solution presented, as well as illustrative images of the same (Annex 4).

Leca

► Solution / differentiating element:

- Leca expanded clay as an integral substrate for two green cover systems.

► Main characteristics and benefits:

- Light aggregate (cheapness between 275 kg/m3 and 455 kg/m3), setting at less than 1/3 of the cheapness values of common substrates, such as sand or gravel;
- Totally inert, natural and recyclable material;
- Non-hygroscopic material (does not absorb air humidity, not varying its dimensions and shape);
- Unalterable over time, imputrescible;
- ptimized volume mass/resistance ratio (light and resistant);

Porous structure, with pores to function as mini water reservoirs;
Optimized water retention, combining water retention in the pores of the granules with retention in the empty spaces between the granules;

- Retain water and nutrients, gradually releasing them over time;

It acts as an insulator in the substrate matrix and substantially reduces compaction;

- Depending on the granulometry, the substrate will be able to perform a more draining or more retaining function.

Attached to this report is the presentation that supported the presentation made by Leca, which contains the technical details of the solution presented, as well as illustrative images of the same (Annex 5).

RECOMMENDATIONS AND NEXT STEPS

Based on the objectives underlying the organization of the roundtable, it is understood that the session fulfilled its core purposes in terms of providing an opportunity for the involvement of national green roof associations, of integrative discussion of the NBS proposals for the 3 pilot buildings and of reinforcement of the innovation factor, for which the presence of the associations ANCV and ASESCUVE and the companies LandLab, Neoturf and Leca contributed very significantly, in addition to the presence of the multidisciplinary team that constituted the partnership of LIFE-myBUILDINGisGREEN.

More than a session aimed at gathering consensus, a purpose that ended up not being objectively achieved, the round table turned out to be a privileged opportunity to exchange recommendations and best practices among the participants, resulting in a set of contents and guidelines that should be taken into account in the development of the prototype.

In general terms, the main recommendations gathered in the session can be identified as follows:

- Nenhuma das soluções protótipos propostas na sessão oferecem garantias do cumprimento de um desempenho climático mínimo para ser aprovado pelos Municípios do Porto e Évora; De salientar que o Município do Porto.
  privileges bioclimatic performance and the thermal comfort of the surrounding population, assuming that it will opt for the level of performance to the detriment of innovation, that is, it assumes to be willing to opt for proven solutions that guarantee the improvement of the expected climatic comfort even though such a situation entails the loss of financing from the LIFE Program;
- The solutions for green facades should contemplate "top-down" type proposals, ensuring the use of the soil as a substrate for the development of vegetation species, without resorting to any kind of of confinement in a vessel or modular solution, suspended or supported on the ground;
- For reasons of sustainability and the use of local and natural resources, the potential of using cork as a base material for mulching should be addressed, similar to the systems proposed during a sessão;
- The substrate to be used in the cover, must guarantee a minimum thickness between 12 to 15 cm in order to provide a "solo" layer adequate to the good development of the vegetation species to be used;
- The selected solutions should assume substrate continuity models, to the detriment of modular solutions;

Even if the solution foresees satisfactory levels of water retention, □□ must guarantee the existence of an alternative irrigation solution, previously installed, for resources in exceptional conditions;

- The selected plants must be autochthonous, given the adaptation to the climatic conditions of each of the regions to be intervened, privileging those that present greater potential in terms of services.
  two borrowed ecosystems.

In addition to the main key points that have been highlighted as critical for the development and improvement of the project's prototype solutions (*i.e.* continuity of the solution, substrate thickness, water retention and plant species), considering the innovation factors presented by the private sector, the integration, even if partial, of some of these solutions at the level of the prototype could now be equated. For this purpose, a more active involvement of the associations (ANCV and ASESCUVE) in the development of the project's prototype could be revealing, having the referred entities manifested their availability and interest in this involvement, including through the realization of a visit to the pilot buildings to intervene.

It is also worth mentioning, in relation to the next steps, the relevance of this session for the development of the deliverables foreseen for Action 2, in particular for the production of the NBS database and for the development of the intervention projects in pilot buildings. Following the round table, the technical team of the LIFE-myBUILDINGisGREEN project should critically discuss the 8 prototype proposals presented, in order to introduce the necessary improvement factors and reinforce the innovation component, thus seeking to ensure a harmonious relationship between the bioclimatic performance of the solutions to be implemented and their sustainability and maintenance in the medium and long term.

ANNEXES

Annex 1 - Framework of the LIFE-myBUILDINGisGREEN Project

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LIFE17 CCA/EN/000088. LIFE-myBUILDINGisGREEN

Climate adaptation of schools and social buildings through the implementation of *Nature Based Solutions*

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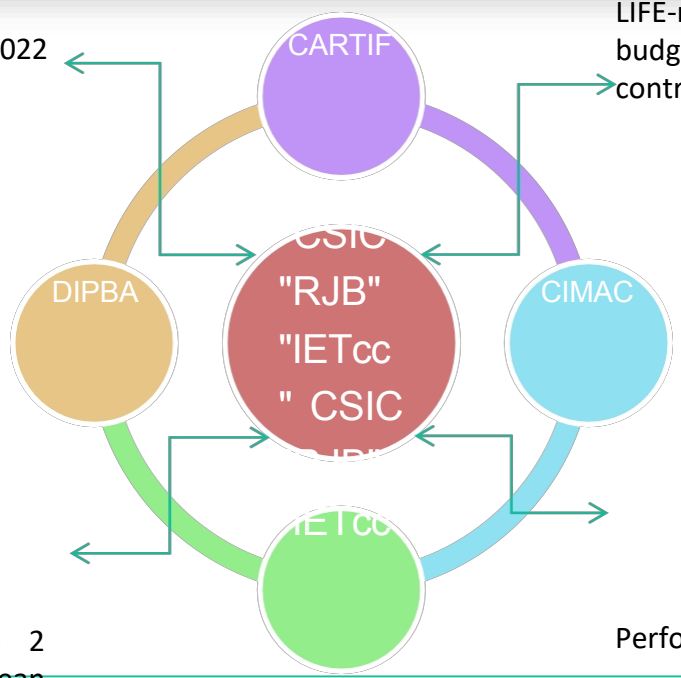
PROJECT ORGANIZATION CHART

The project has a duration of 4 years. 01/09/2018 to 31/08/2022

LIFE-myBUILDINGisGREEN has a total budget of 2.854.102 € and an EU contribution of 60%.



The proposal is located in 2 member states of the European Union "Spain and Portugal"

Performance in 3 pilot buildings

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ENVIRONMENTAL and CLIMATE PROBLEMS

1. Buildings constructed prior to the basic building regulations NBE-CT-79, on thermal conditions of buildings. buildings.
2. Buildings insufficiently insulated in terms of thermal conditions.
3. Buildings with little or no solar protection in window openings. Overheating in rooms
4. Rooms in buildings with temperatures above 32º C during the months of May through October
5. Surface area of openings in south-facing facades greater than 70%.
6. Increase in Heat Waves. Southern European regions.
7. No forced ventilation
8. CO2 concentration above 1000 ppm
9. No rainwater harvesting or reuse
10. Waterproofing of a very deteriorated roof
11. Low investment for maintenance and rehabilitation of buildings

Extreme maximum temperature. Solana de los Barros

Number of warm days. Solana de los Barros

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Social Impact

PROJECT OBJECTIVES

The LIFE-myBUILDINGisGREEN proposal is committed to the implementation of NBS, as proposed by the EC, "to *help society address environmental, economic and social challenges in a sustainable way*".

ayudar a la sociedad a afrontar retos, ambientales, económicos y sociales de una manera sostenible

Principal

Increase **climate resilience in education and social services buildings** in Spain and Portugal by implementing *Nature Based Solutions* as climate adaptation tools**.**

Secondary

- Improve building-level awareness of NBS
- Analyze the cost-benefit of NBS as climate adaptation tools.
- Fostering governance actions
- Transferring and replicating NBS prototypes
- Monitor the energy performance of the building.
- Regulating the flow of rain by collecting it
- Mitigating the urban heat island effect
- Availability of green spaces and their ecosystem services.
- Improving air quality

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EXPECTED RESULTS OF THE PROJECT

- Climate adaptation of 3 pilot buildings
- Improved well-being for 2,000 people
- Decrease of 4ºC inside the building
- Reduction of 27 tons of CO_2 /year and 144 kg of Nox/year.
- Collection of 2700 m^3 of rainfall from each building.
- 50% reduction in irrigation water consumption (4.5 m^3 /year/year/building)
- 50% reduction in cooling energy costs
- Signing of 15 governmental agreements
- Replication of 15 projects in Europe

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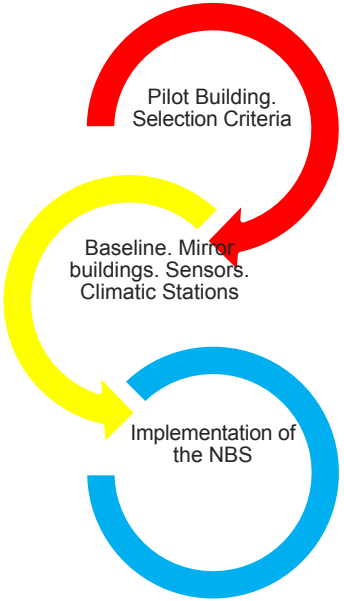
MONITORING AND EVALUATION OF INDICATORS

1. Elaboration and drafting of the Baseline of the
the pilot buildings

- IMPACTS evaluation scheme
- EKLIPSE project methodology basis. Report for the evaluation of indicators of NBS
- Pre-established impact assessment methodologies for for LIFE-myBUILDINGisGREEN
- Connection to LEVEL methodology

2. Monitoring and Evaluation of NBS as climate adaptation measures. LIFE Indicators



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GOVERNANCE and BIOCLIMATE CONTEXT

- Meeting the EU's 2020 emissions reduction target
- EU Climate Strategy 2050.
- European EPBD requires new NZEB buildings by the end of 2020. ISO52000 energy calculation methodology

1. CHARACTERIZATION OF THE RESPONSIBLE ADMINISTRATIONS. IDENTIFICATION OF KEY PLAYERS
2. ELABORATION FROM TOOLS FROM GOVERNANCE
3. INTEGRATION OF THE NBS IN POLICIES AND REGULATIONS OF APPLICATION

Municipal management of urban sewage rates. Investment in NBS- Rate reductions. Tax incentives

Elaboration of NBS Technical Quality Standards.

Level(s). SUSTAINABLE CONSTRUCTION

¿Qué es Level(s)?

- Lenguaje común
- Ahorro de recursos
- Economía circular

Level(s)
Building sustainability performance
#BuildCircular

El objetivo de Level(s) es mejorar la eficiencia en el uso de recursos en el sector de la edificación incorporando a los edificios al concepto de economía circular; esto es, un sistema económico regenerativo en el que se minimiza el consumo de recursos materiales y energéticos.
Level(s) vincula el comportamiento ambiental de los edificios con las prioridades el ahorro de recursos a nivel europeo.

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LIFE-myBUILDINGisGREEN - Level(s)

Las prioridades de Level

- Huella de carbono en el ciclo de vida
- Uso eficiente de recursos naturales
- Uso y gestión eficiente del agua
- Espacios saludables y confortables
- Adaptación al cambio climático
- Coste de ciclo de vida y valor

WHAT ABOUT NATURE-BASED SOLUTIONS?

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Thank you

storre@rjb.csic.es

@buildingisgreen

www.life-mybuildingisgreen.eu

Annex 2 - Presentation of the Prototype Proposals

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Application of Nature-Based Solutions for local adaptation of educational and social buildings to Climate Change

Prototypes

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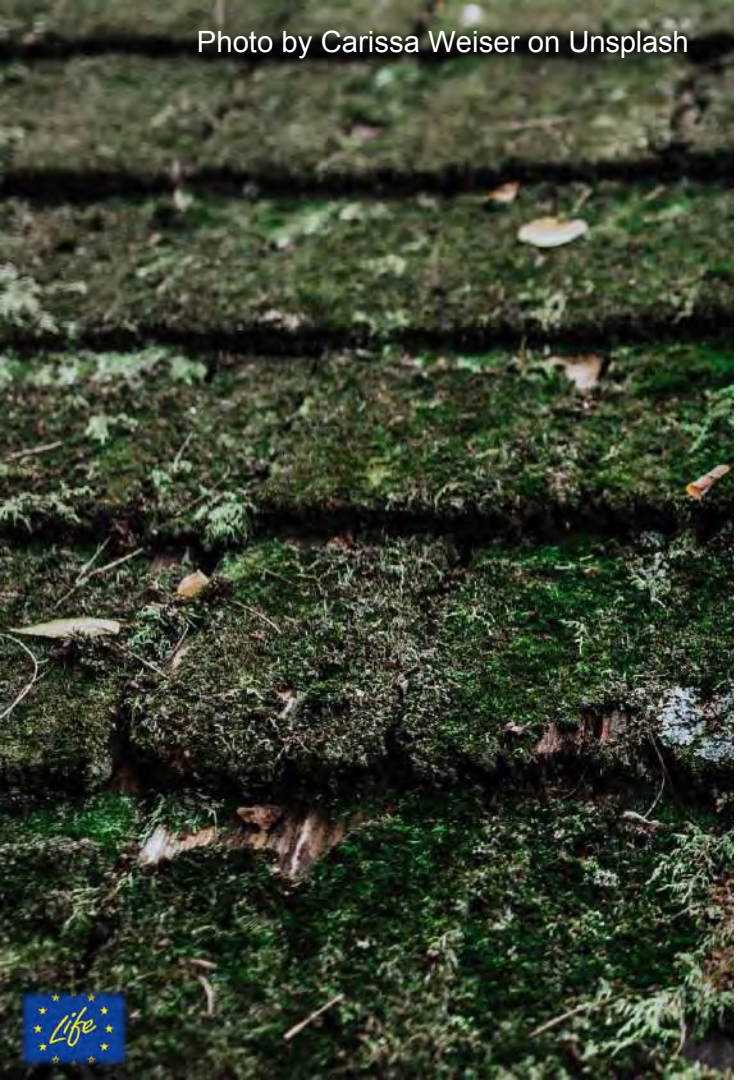
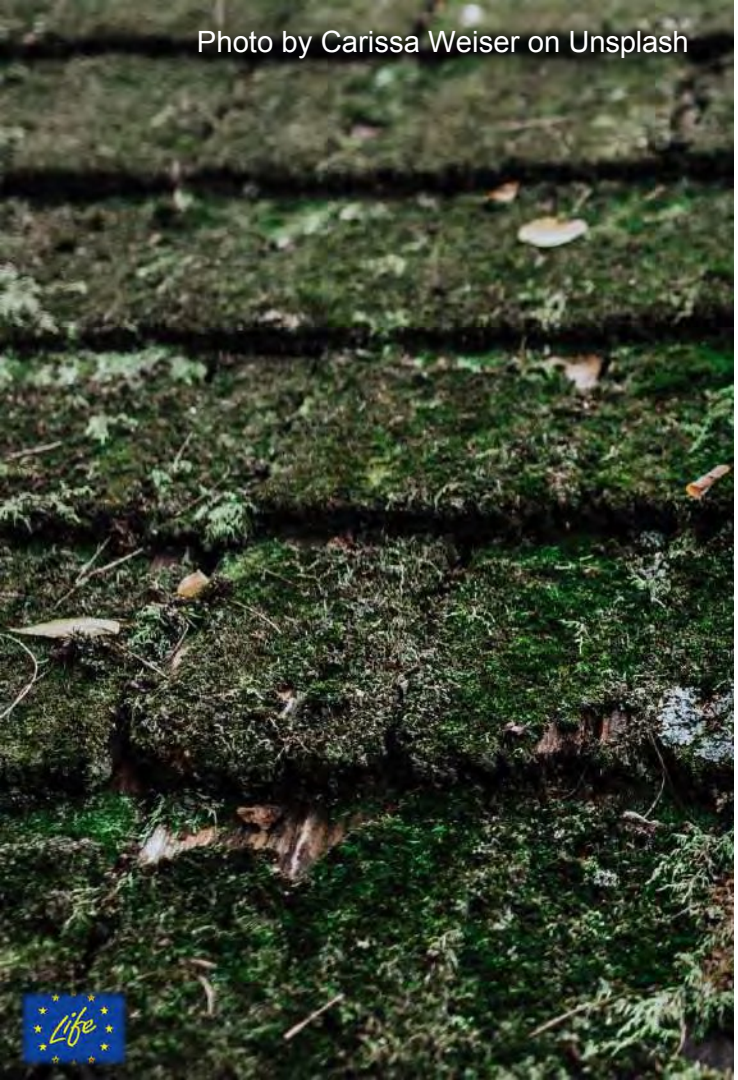


LIFE myBUILDINGisGREEN

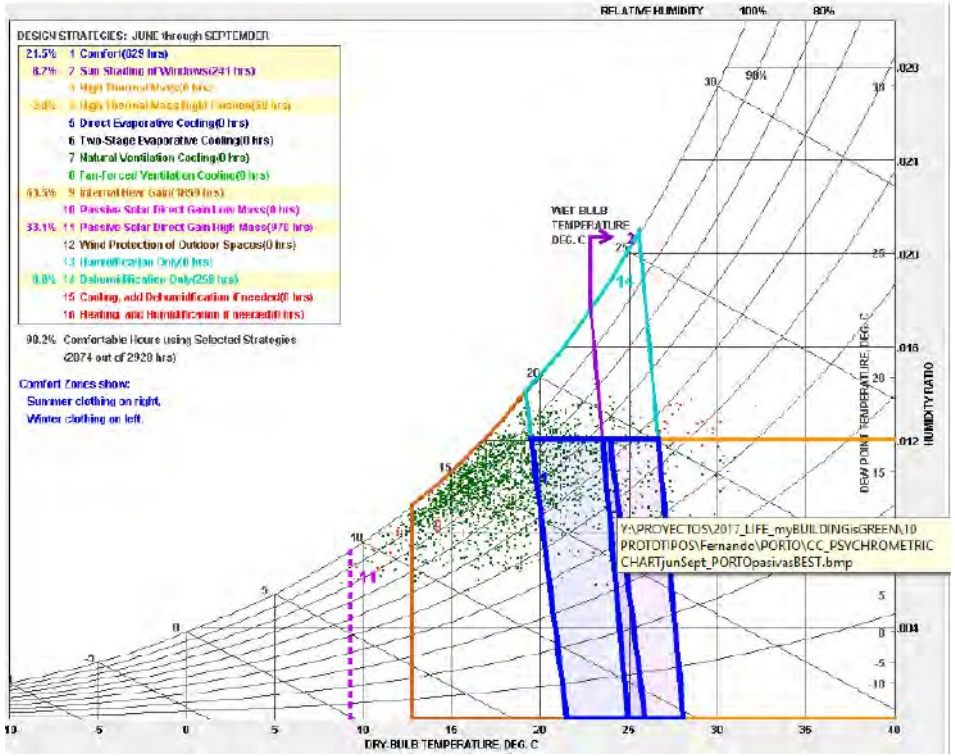
Nature-based Solutions to modify existing schools:

- Green roofs
- Shading structures for facades
- Green pavements
- Criteria for vegetation selection
  adaptive
- Creation of natural ventilation measures



LIFE myBUILDINGisGREEN

Justification of the bioclimatic strategy



PORTO Psychometric Abacus

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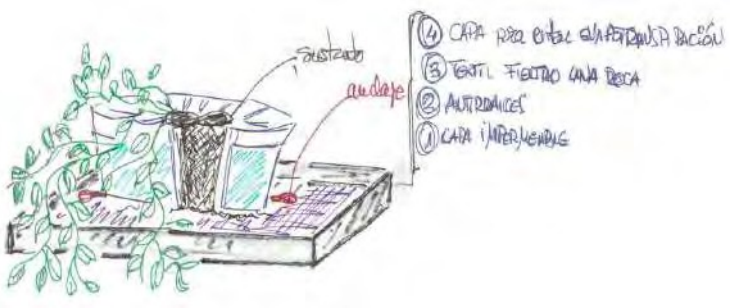
Green cover

mBiGBox.



Integrated solution for flat roofs with or without gravel (expanded clay or similar could be added). System without irrigation.

- Waterboxx® Container
- Substrate and species selection.
- Multilayer bottom tray:
- Membrane waterproofing and root barrier.
- Light inert substrate such as sheep wool, mineral wool or textile felt.

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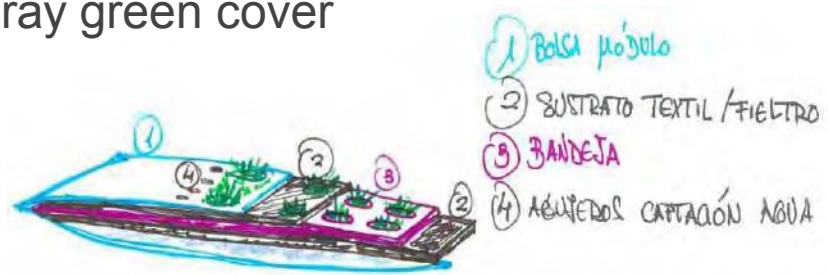
Green cover. mBiGBox

LIFE myBUILDINGisGREEN

mBiGWTray green cover



Integrated solution for roofs with low load-bearing capacity. System without irrigation.

- Extensive green roof system.
- Substrate and species selection.
- White cladding material and board.

LIFE myBUILDINGisGREEN

Green cover. mBiGWTray

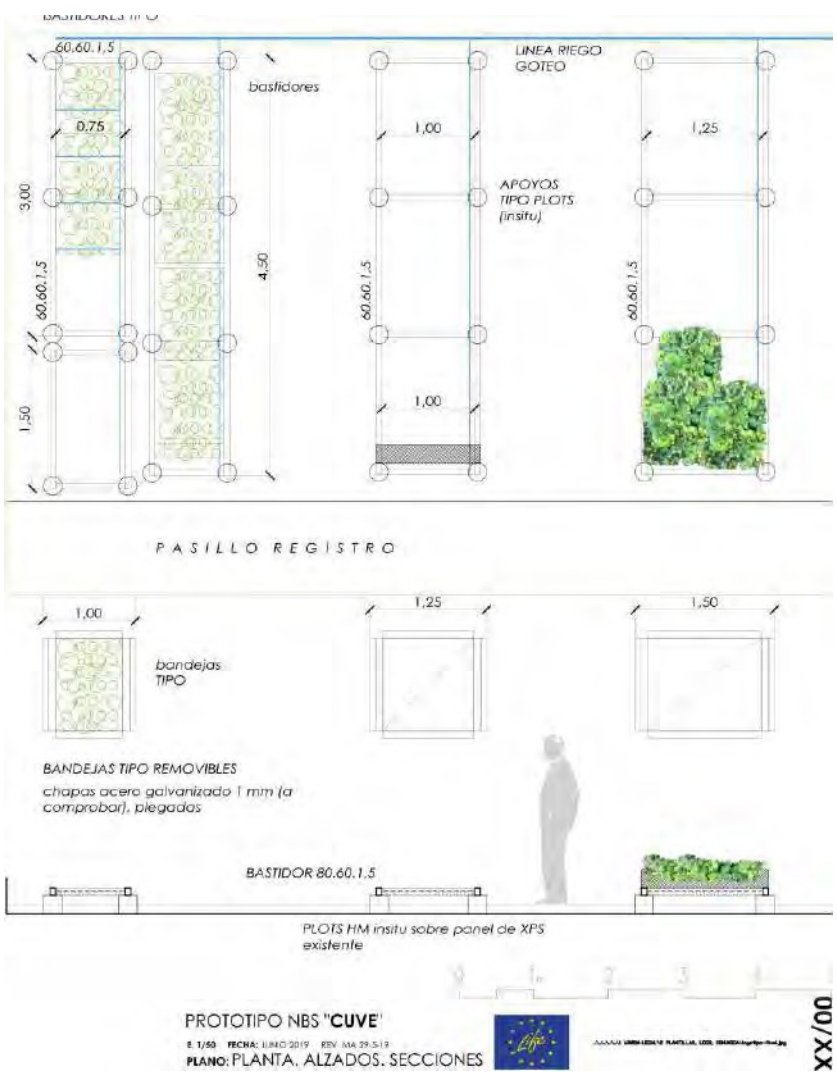
LIFE myBUILDINGisGREEN

Vegetation cover mBiGCUVE

Green roof mBiG CUVE

Horizontal metal frames elevated on existing flat gravel roofs to support low modular trays: 2 cm of drainage and 4 cm of substrate.

- Substrate and selection of species.



LIFE myBUILDINGisGREEN

Green shade structures for façades. mBiGFAVE

Vertical structures for facade shading, allowing adequate light filtering. The structure allows for proper maintenance operations in addition to supporting the shading systems.

- Low-cost modular system compatible with south, east and west facades.

Photo by Steven Pecoraro on Unsplash

LIFE myBUILDINGisGREEN

Modular green façade mBiGFAVE

PROTOTIPO NBS "FAVE"

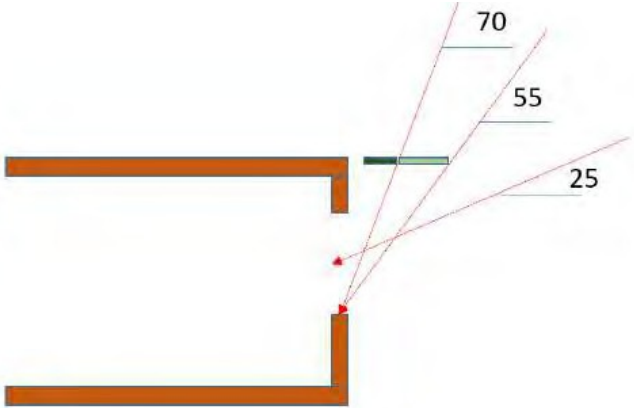
PLANO: PLANTA, ALZADOS, SECCIONES

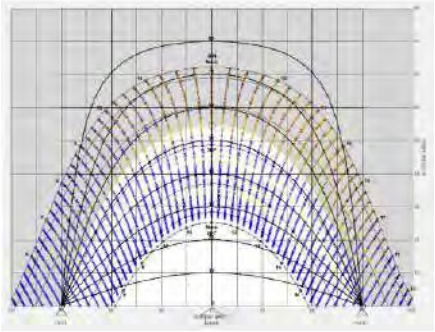
XX/00

LIFE myBUILDINGisGREEN

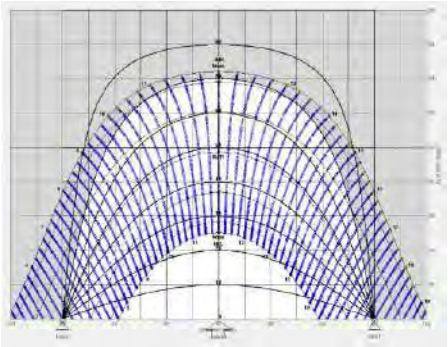
How to Dimension mBiGFAVE

Solar ray paths





Summer conditions. 55º



Permanet. 70º

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How to Dimension mBiGFAVE

Examples with vertical protections:

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Green façade

mBiGToldo

Integral low-thickness solution to create shaded areas, both horizontally and vertically. Hydroponic irrigation system.

- Includes zipper and waterproof holder.
- Nonwoven felt or inert substrate for root fixation.
- Mixture of substrate and seed applied by spraying.
- Irrigation by drip irrigation from from section upper section y system at

recovery of excess water.

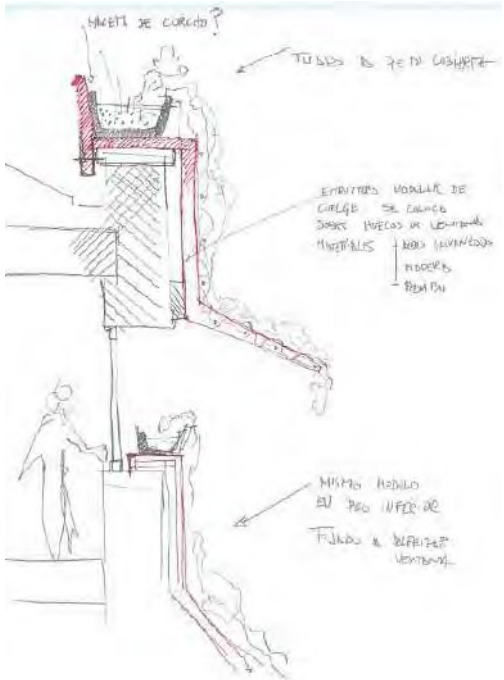
LIFE myBUILDINGisGREEN

Green façade. mBiGToldo

Photo by Steven Pecoraro on Unsplash

LIFE myBUILDINGisGREEN

Green facade mBiGColgantes



LIFE myBUILDINGisGREEN

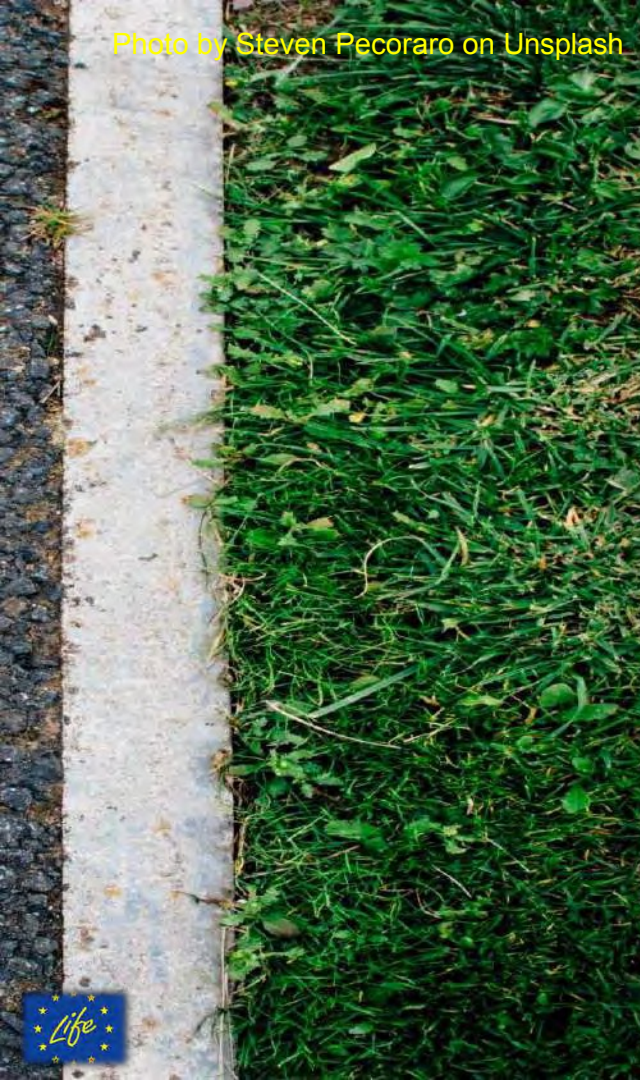
Green facade mBiGColgantes

Examples of covering.

LIFE myBUILDINGisGREEN

Green facade mBiGColgantes

Examples of covering.



LIFE myBUILDINGisGREEN

Drainage pavements

Currently, a prototype is being designed for dredging pavement that includes a green part so that additional functionality can also be incorporated on a case-by-case basis: increased resistance, photocatalytic properties, water harvesting ...

Photo by Mladen Scekic on Unsplash

LIFE myBUILDINGisGREEN

Outdoor shade. mBiGPlayGround

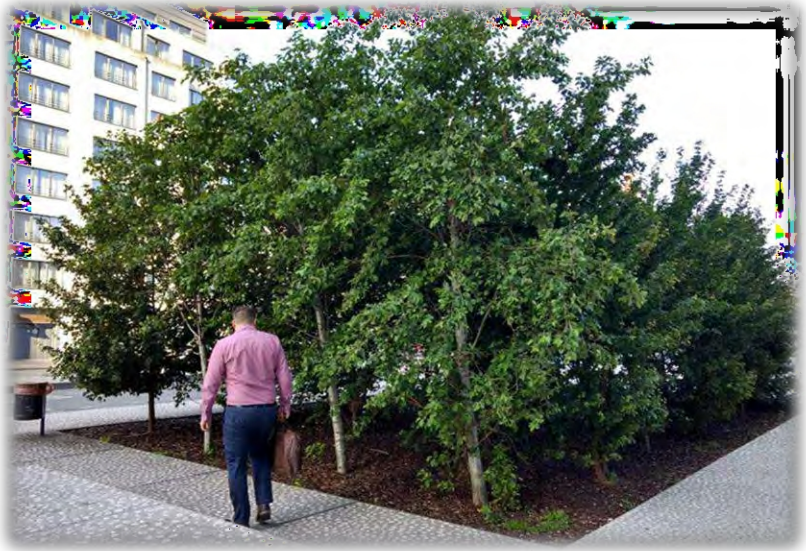
NBS based on the school forest concept to create shaded areas in playgrounds.

- High-density planting to create shade from the principle.
- Soil materials such as sand, tree bark waste, cork, wood chips, etc.
- Natural parks.

Photo by Mladen Scekic on Unsplash

LIFE myBUILDINGisGREEN

Outdoor shadowing. mBiGPlayGround



Acknowledgements

The **mBiG** project team wishes to acknowledge the trust and financial support of the EU ***LIFE*** financial instrument through the funding of the LIFE-myBUILDINGisGREEN project.

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Instituto de Ciencias de la Construcción EDUARDO TORROJA

CARTIF

DIPUTACIÓN DE BADAJOZ

cimac

Porto.

My school is green!
My school is green!
My school is green!

my building is green
A LIFE PROJECT

LIFE17 CCA/EN/00088

Contact

- @lifemybuildingisgreen
- https://life-mybuildingisgreen.eu

Sign this petition:

#NBSMANIFESTO https://platform.think-nature.eu/nbs-manifesto

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Porto.

Annex 3 - Presentation of LandLab's Support for Intervention

LANDLAB

LANDLAB

Landlab was founded in 2008, as a result of worldwide research, projects and works of several technicians linked to sustainable construction, green spaces, architecture and landscape architecture.

The objective of Landlab is to make available to other technicians and companies in the areas of construction and green spaces, systems and products that, demonstrably, solve project and site situations.

It is a Portuguese company and exporter, with **three levels of shareholding:**

1) Presentation and development of unique and dedicated solutions for green spaces and sustainable construction;

2) To provide technical support for all the systems and products it commercializes. Not being an installation company, it develops a network of certified installers;

3) Organization of training courses in the areas it develops, in order to provide technicians and installation companies with the most current knowledge in each area.

LANDLAB

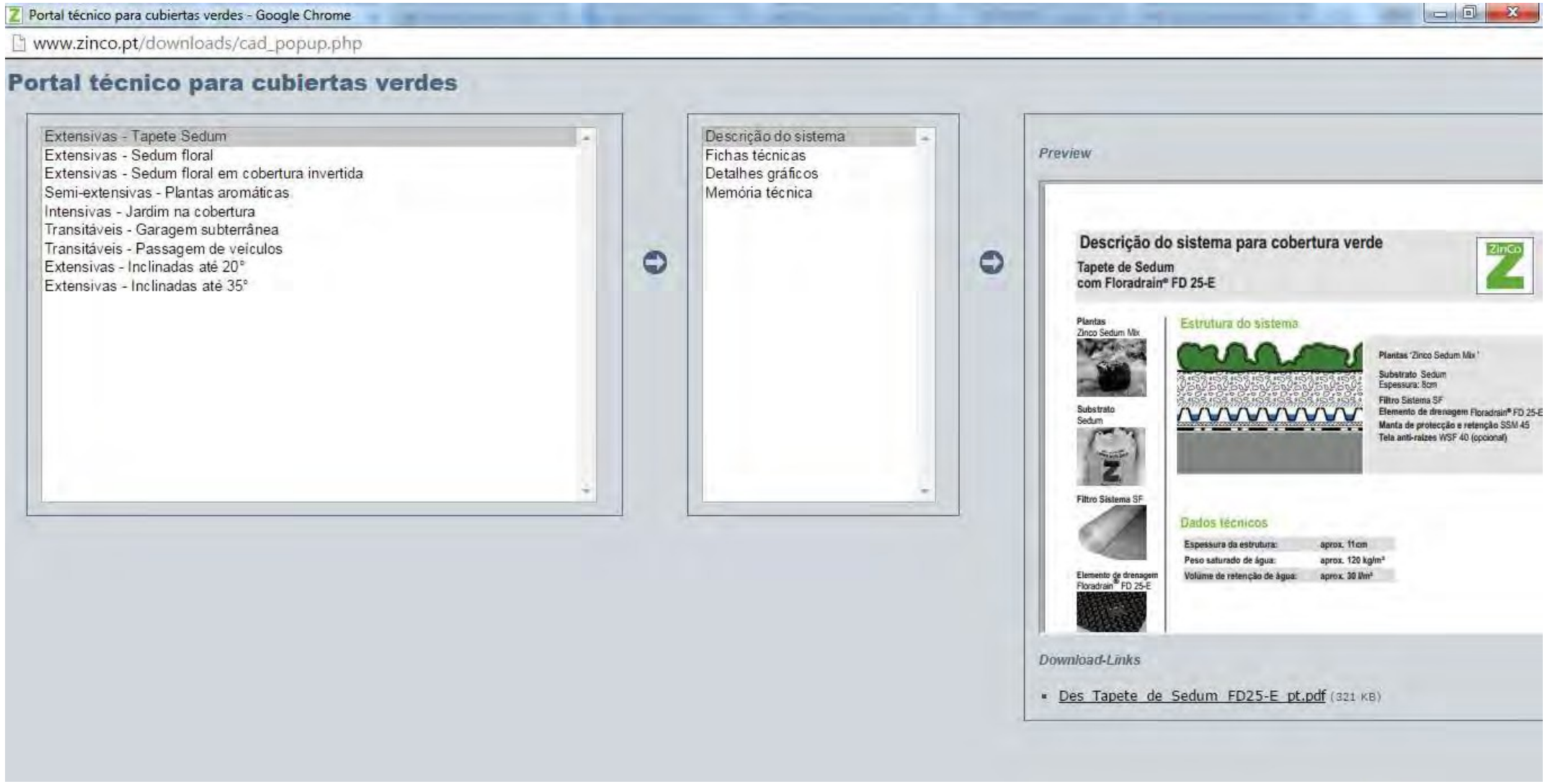
GREEN ROOFS, VERTICAL

GARDENS AND GREEN WALLS

DRAINAGE AND WATER MANAGEMENT SYSTEMS

ACOUSTIC BARRIERS

ZinCo green roof systems

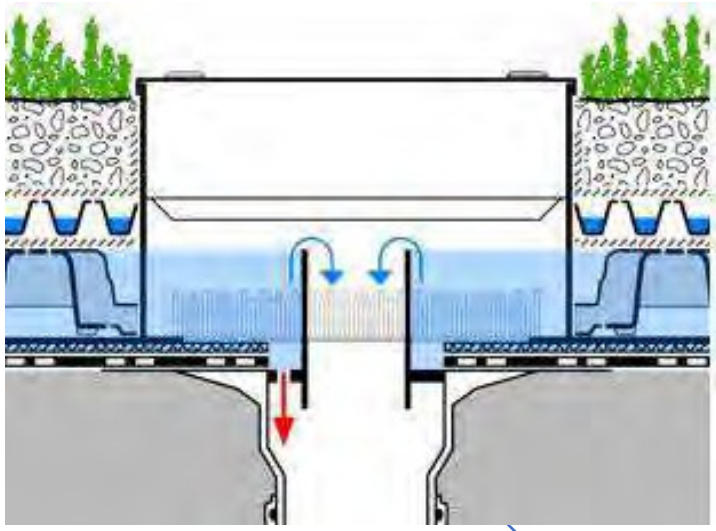


Water Retention System - *"Stormwater management roof".*

Increased water retention in green coverage ⟶ Delayed water arrival to urban drainage system

LANDLAB

Characteristics of the water retention system - *"Stormwater management roof"*.



Vegetation

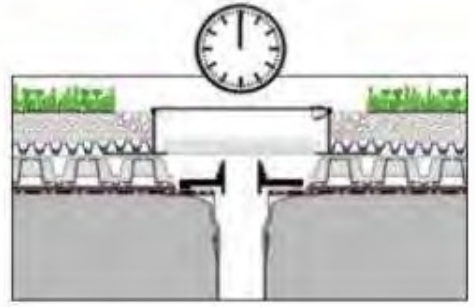
Technical substrate

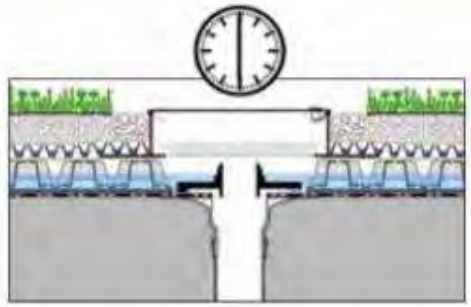
SF Filter, ZinCo
FD25, ZinCo PV
Filter, ZinCo

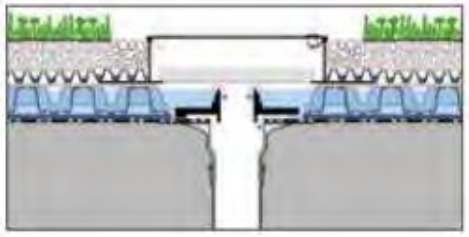
RS60, ZinCo PV
Filter, ZinCo
Anti-root fabric WSF40, ZinCo

Laje waterproofed

Slow Release Drainage Element RD28,
ZinCo + Inspection Box KS10, ZinCo







System characteristics:

- **System height:** 200 mm approx.
  (variable depending on substrate thickness)
- **Weight** (max. saturation): 182 kg/m²
- **Water retention capacity:** 98 L/m2
- **Inclination:** 2 to 5 graus

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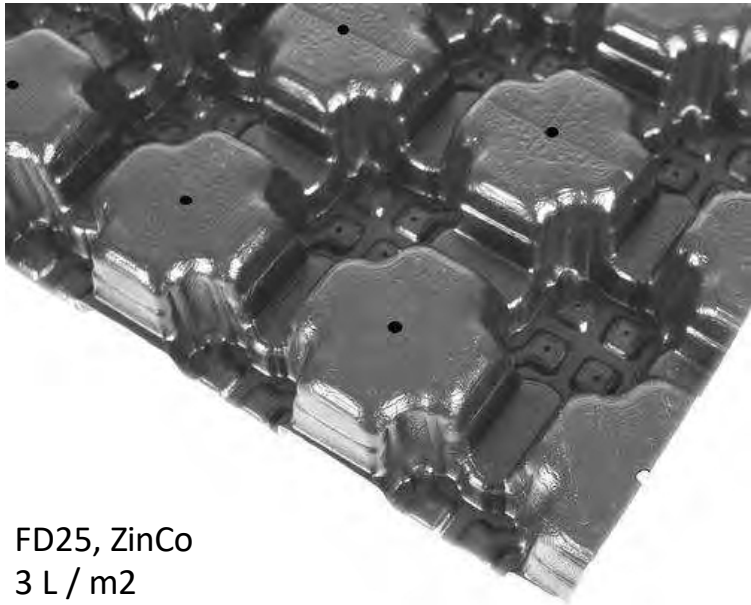
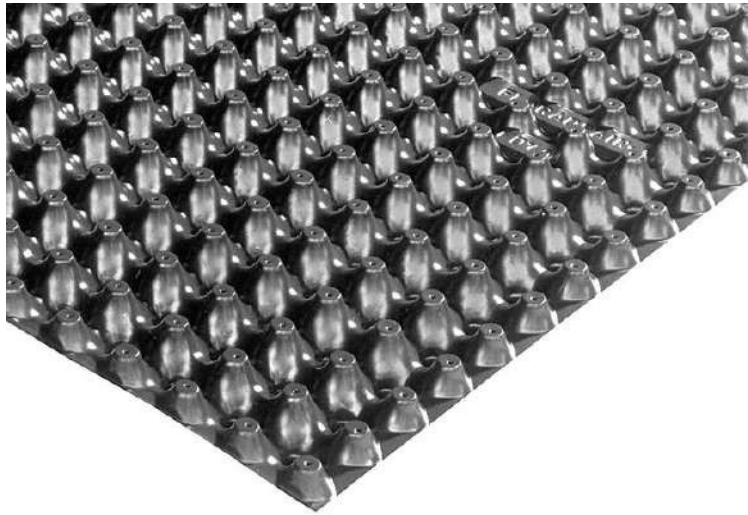
Water Retention System - *"Stormwater management roof".*

Drainage element of
slow release RD28, ZinCo + KS10, ZinCo

RS60, ZinCo
80 L / m2



FD25, ZinCo
3 L / m2



WALLGREEN

LANDLAB

LANDLAB

Presentation:

- Modular vertical garden system, made of recycled maritime plastic (removed from the sea) of easy installation and maintenance and with automatic and individual irrigation system for each plant.

Characteristics:

- **Easy and fast maintenance:** The system allows individual plant substitution in a very fast way.

- Automatic irrigation and fertigation system, individually for each plant, allowing greater et and lower water consumption.

- **Free structural configuration of the system**: Modular system allows the dimensioning of the intended compliant system.

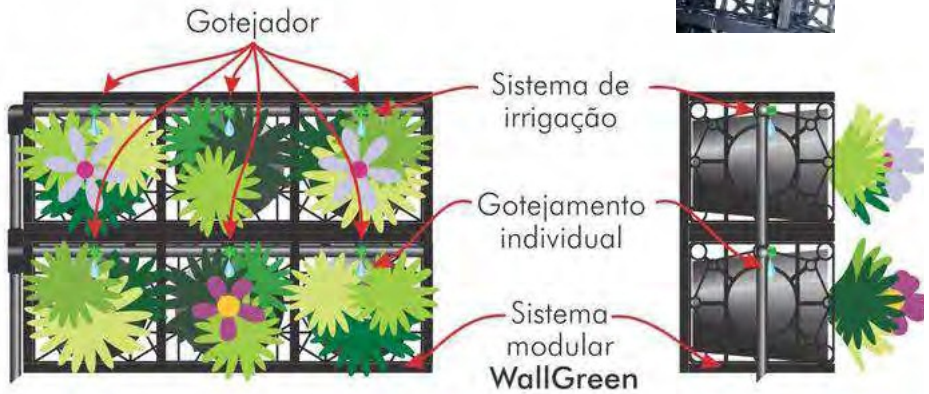
- **Use of medium to large size plants** providing a much more interesting final result of the work.

Restaurant "louprestaurante" - Wallgreen, São Paulo, Brazil

STRUCTURAL SYSTEM

Wallgreen Module - 3 niches

Tumbler Bag



Examples - Gardens in exterior space:

Local:
São Paulo, Brazil

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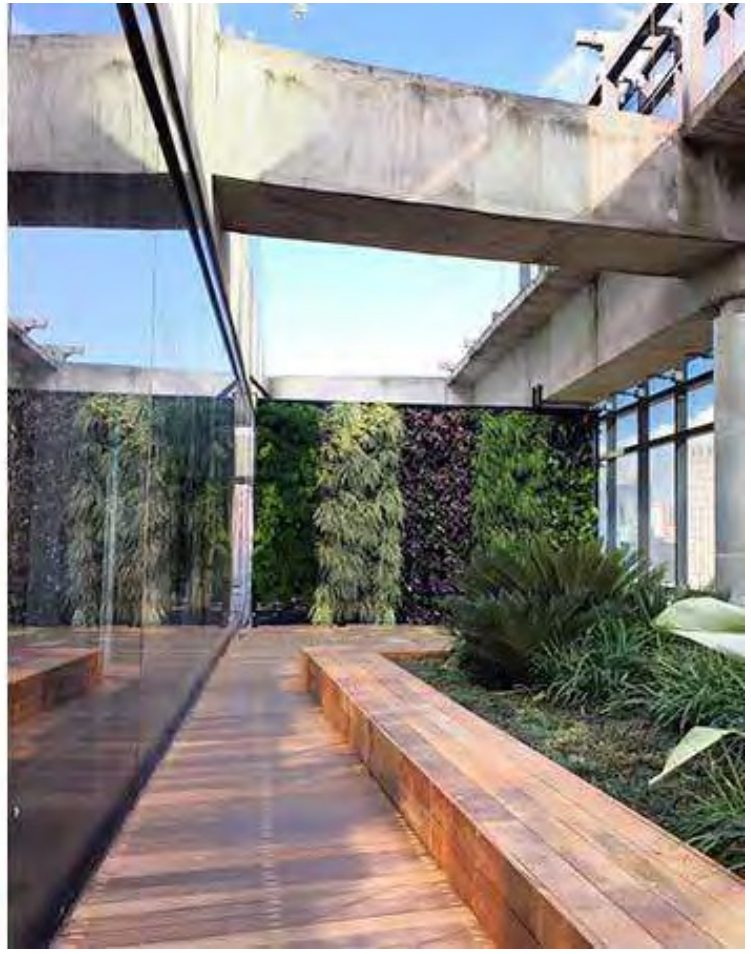
Local:
Manaus, Amazonas, Brazil

Local:
São Paulo, Brazil



Local:
São Paulo, Brazil

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Local:
São Paulo, Brazil






Examples - Gardens in interior space:

Local:
S. Paulo, Brazil

Local:
São Paulo, Brazil

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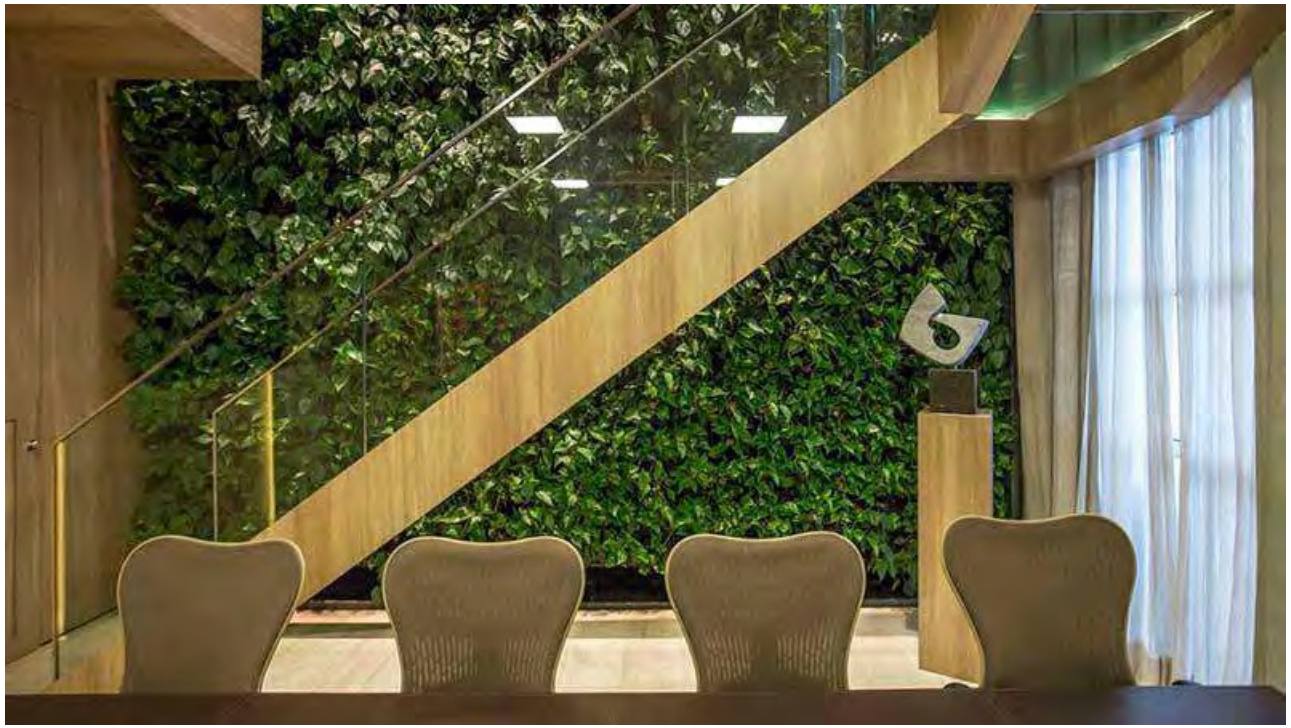
Local:
São Paulo, Brazil



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Local:
Porto




LANDLAB

Margarida Gonçalves | margarida@Landlab.pt | +351 932468118

Annex 4 - Presentation of Support for Neoturf Intervention

GREEN URBAB

- CORK GREEN ROOF SYSTEM -

AMORIM ISOLAMENTOS

NEOTURF

ITeCons

ANQIP

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New system

- Cork Green Roof System -

No. of tests performed:  itecons

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Novos sistemas de cobertura e fachada verdes estruturados em aglomerado de cortiça expandida — ICB, produzido a partir de resíduos da extração da cortiça.

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Attributes

– Ecological design with incorporation of renewable and recyclable materials.

– It explores the self-denying and autonomous water recycling capacity of expanded clay agglomerate.

– The lower energy and environmental impact is superior to that of conventional solutions.

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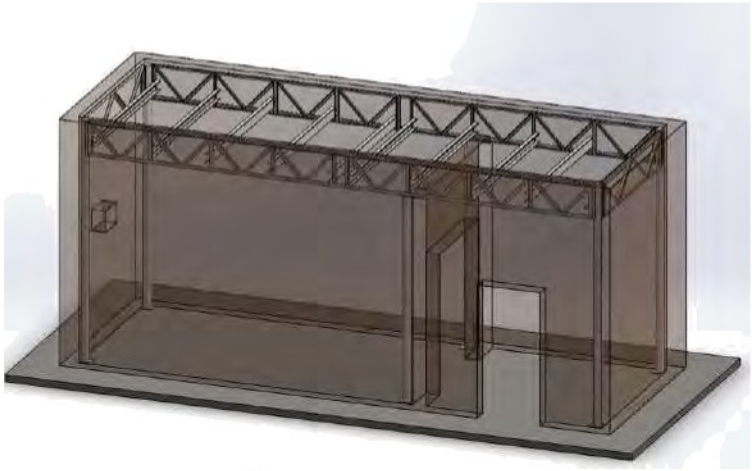
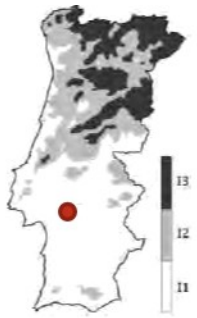
Attributes

- Greater architectural freedom and flexibility in terms of pre-fabrication - explores the ability to ;:::".°.c ... ! ü êc ą-.ontśt sea da cortişa, recorrendo a tecnologias de corte e fresagem robotizadas.

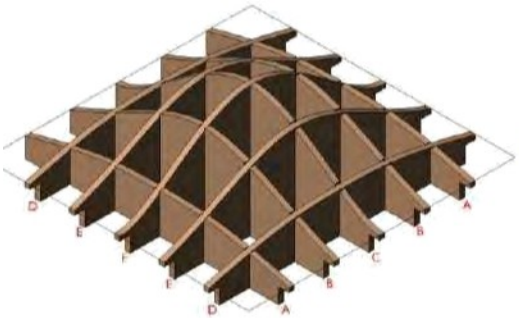
Demonstrator

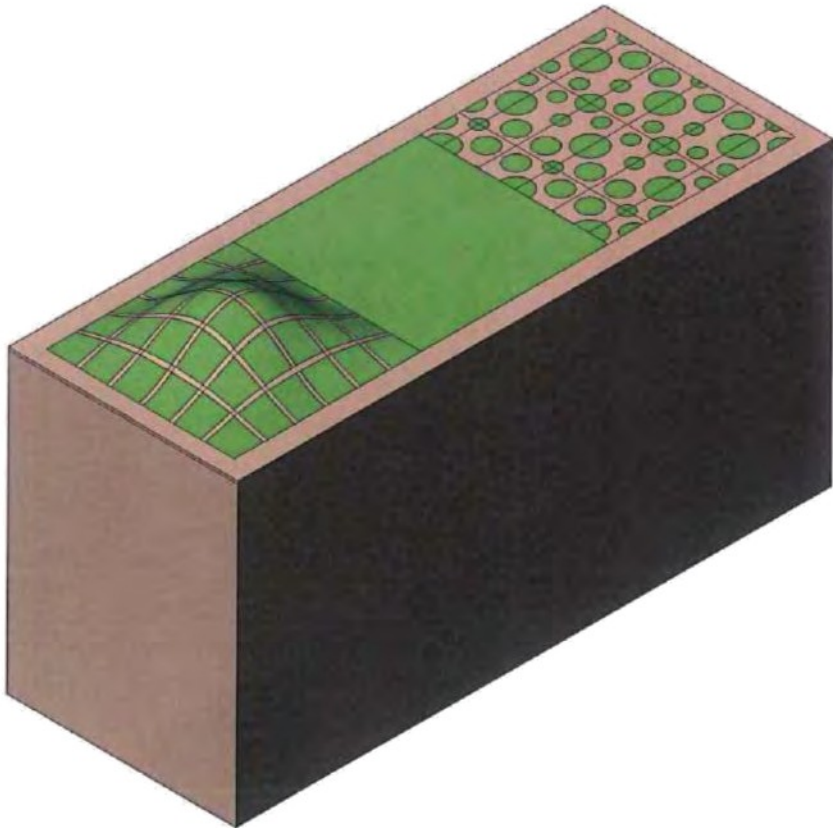
OREEN URBAN LIVING





Vendas Novas





during...

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OREEN URBAN LIVING

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...to follow...

Performance of the New System

- Evaluation of vegetation compatibility
- Drainage and retention
- Acoustic performance
- Thermal behavior

António Tadeu, Julieta António, M. Kanoun-Boulé,

***Nuno Simões**, Ricardo Almeida*

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Performance of the new system
-Compatibilidade Vegetação/Cortiça-.

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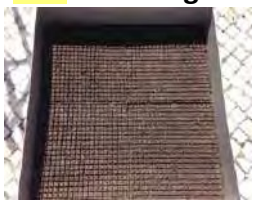
Vegetation - Cortiça Compatibility Assessment

Conducting growth studies

ICB

G1 - ICB Standard grooved



ICB Standard
10 cm thickness

G2 - ICB MD grooved

Tabuleiro Crescimento
1m x 1m

ICB MD
10 cm thickness

Filter

Substrate
10 cm thickness

Vegetation

Conventional

G3 - FD-25E Commercial System

FD-25 E

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Vegetation - Cortiça Compatibility Assessment

Conducting growth studies

Monitoring of vegetation development

1st Group	2nd Group	3rd Group
ICB Standard	ICB MD	FD-25E
3m2 Mistura de gramíneas	3m2 Mistura de gramíneas	3m2 Mistura de gramíneas
+	+	+
3m2 Mistura of species	3m2 Mistura of species	3m2 Mistura de espécies
H+S+G	H+S+G	H+S+G

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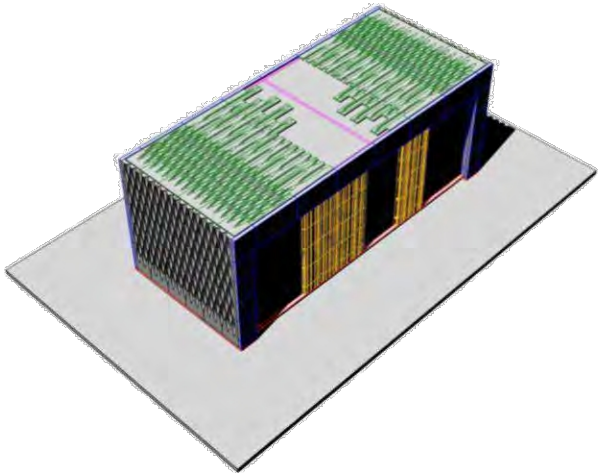
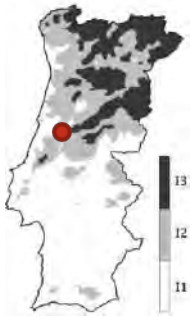
Vegetation - Cortiça Compatibility Assessment

- Conducting growth studies





Coimbra

Vegetation - Cortiça Compatibility Assessment

Vegetation - Cortiça Compatibility Assessment

Conclusions:

Growth studies were carried out to determine the compatibility between the vegetation and the BCI element of the system under development.

SATISFACTORY RESULT

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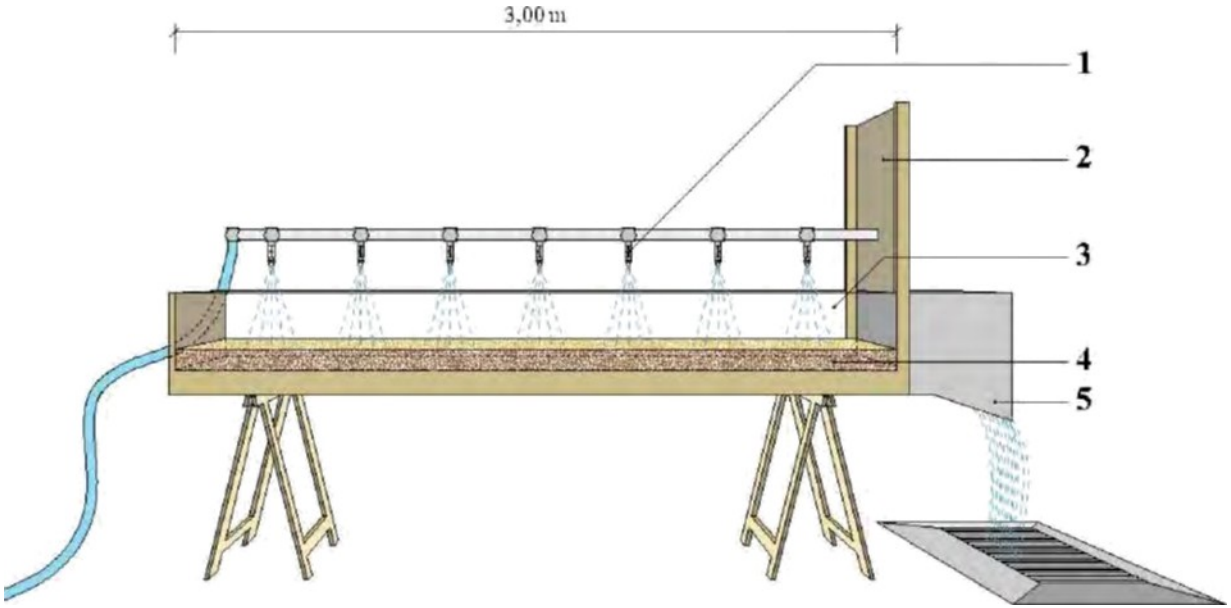
Performance of the new system

-Drainage and retention.

Ensaio Veical and Horizontal



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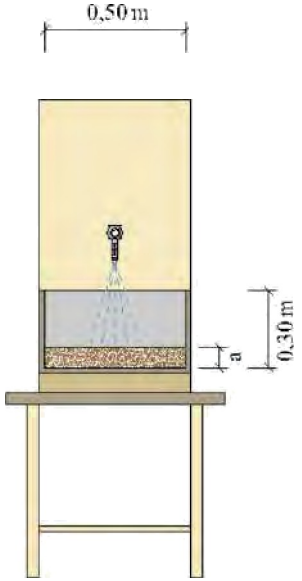

Cross Section

*'RP^ratus for vertical and horizontal drainage test:
1- Sprinklers; 2- Janela ajustável de guilhotina; 3- Caixa para promete;
4- Promise; 5- Broom ramp.

C9MPETE @2020

2020

C9MPETE

Ensaìo Vertical and Horizontal

2020

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OREEN URBAN LIVING

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2020

Ensaio
Vertical and

*ŽÄO2O

GREEN URBAN LIVCBG

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Fundo Europeu
de Desenvolvimento Regional

C
°iMPETE
2020

Ensaìo
Vertical and

*ŽÄO2O

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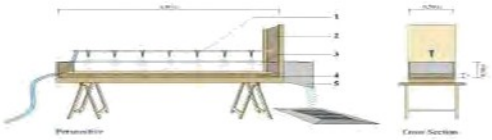
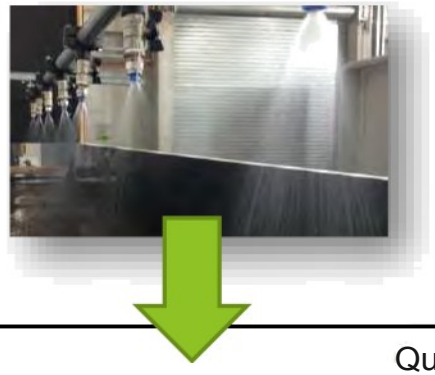
de Desenvolvimento Regional

b
IIS?\iG
Vertical e Horizontal



Maximum two sprinklers 9 L/min/m2



Test	Qualitative 25% sprinkler output	50% sprinkler output	100% sprinkler output	Quantitative Limin	L/min/m2
STD 50mm	OK	OK	OK	35,0	23,3
STD 50mm + Substrate	OK	Partial flood	Substantial flood	9,2	6,1
FD-25E	OK	OK	OK	62,7	41,8
FD-25E + Substrate	OK	OK	OK	50,5	33,7
STD 50mm Grooved* STD 50mm Grooved* STD 50mm Grooved* STD 50mm Grooved	OK	OK	OK	66,3	44,2
STD 50mm Grooved* + Substrate	OK	OK	OK		

Performance of the new system - thermal behavior - thermal behavior - thermal behavior - thermal behavior - thermal behavior - thermal behavior -

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thermal behavior - thermal behavior - thermal behavior - thermal behavior

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Apparatus

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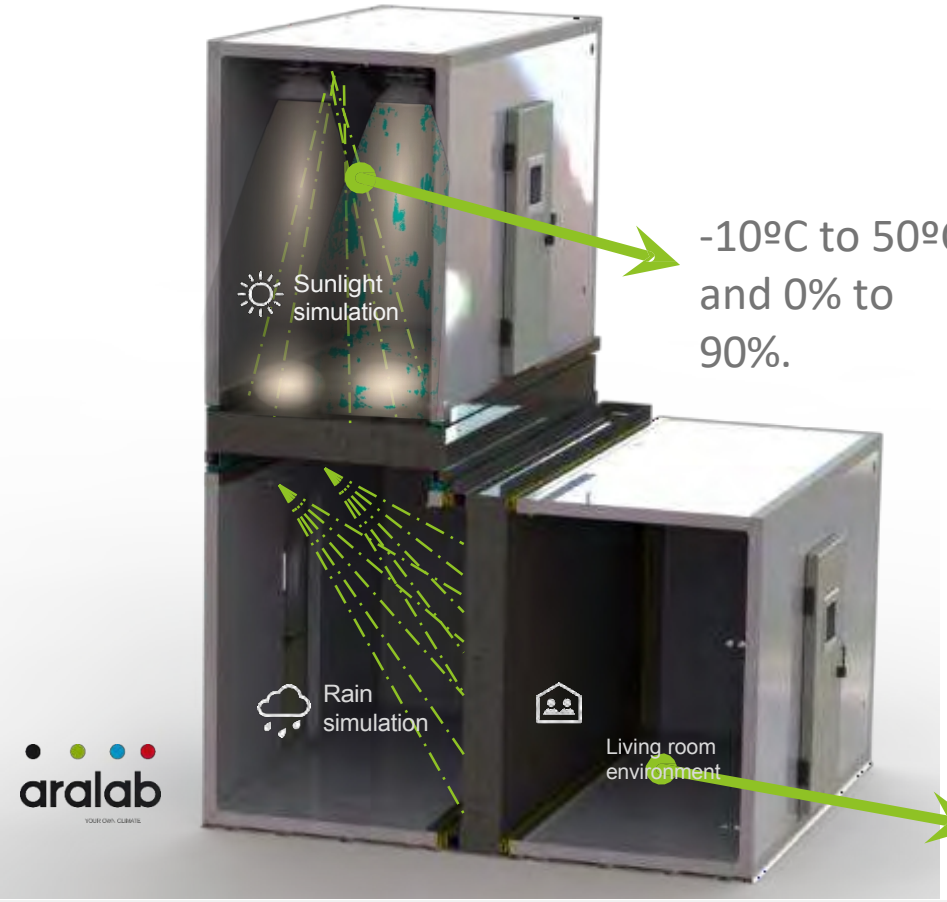
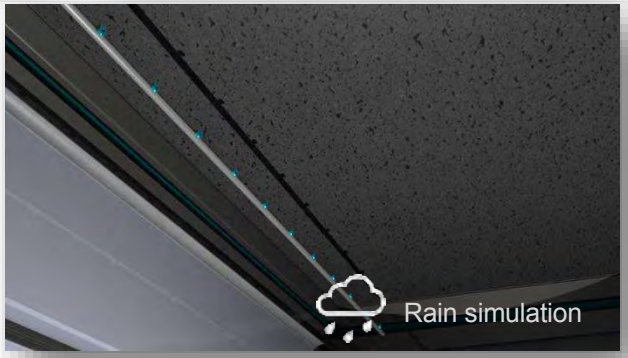


-10ºC to 50ºC and 0% to 90%.



10ºC to 45ºC and 0% to 90%.

aralab

Bioclimatic chamber

Simulation capabilities

Lights on the top chamber simulates the sunlight with different radiation settings. The water sprinkles installed allow to replicate a rainy day. All other parameters as humidity and temperature are controlled in order to mimic the climate. The living room simulation area is monitored in temperature, humidity and other parameters to evaluate the effect of the green roof or walls.

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Apparatus

GREEN URBAN LIVING

Outdoor Chamber

Indoor Chamber

Controller

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Boundary conditions

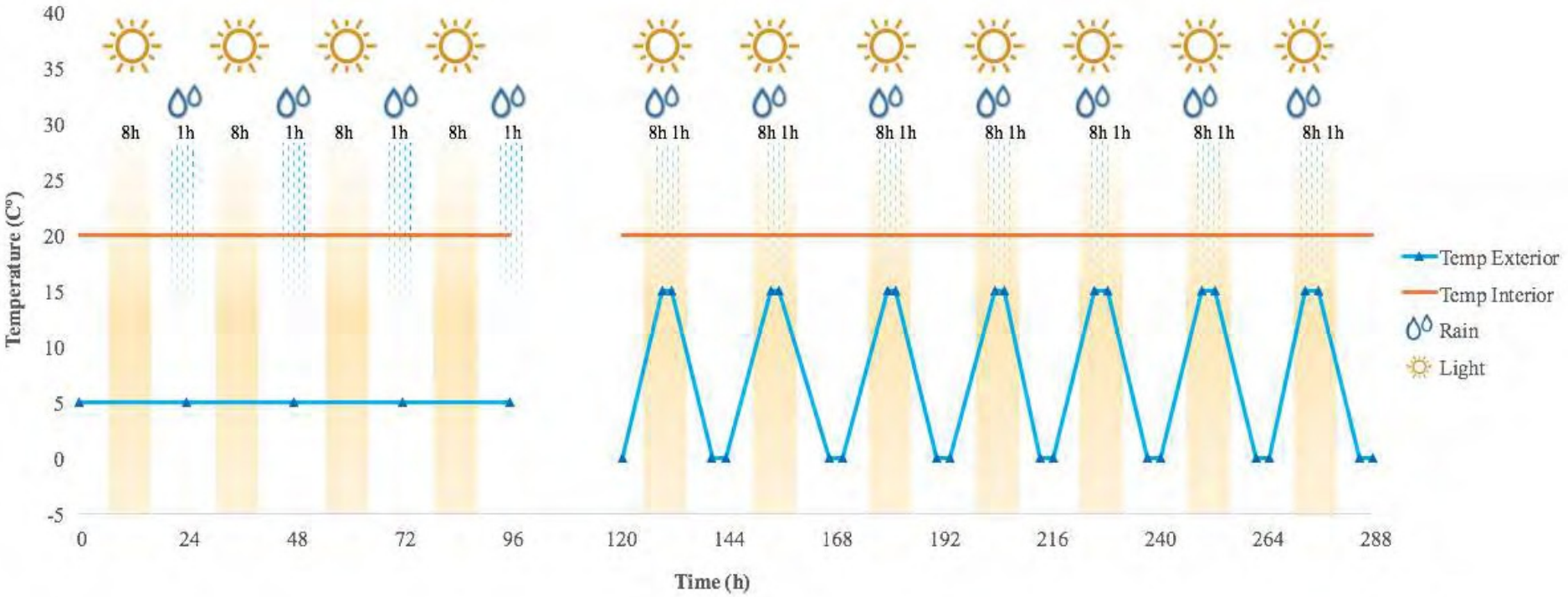
GREEN URBAN LIVING

-10ºC to 50ºC and 0% to 90%.

10ºC to 45ºC and 0% to 90%.

Winter cycles

HEATING SEASON



Steady-state

Transient

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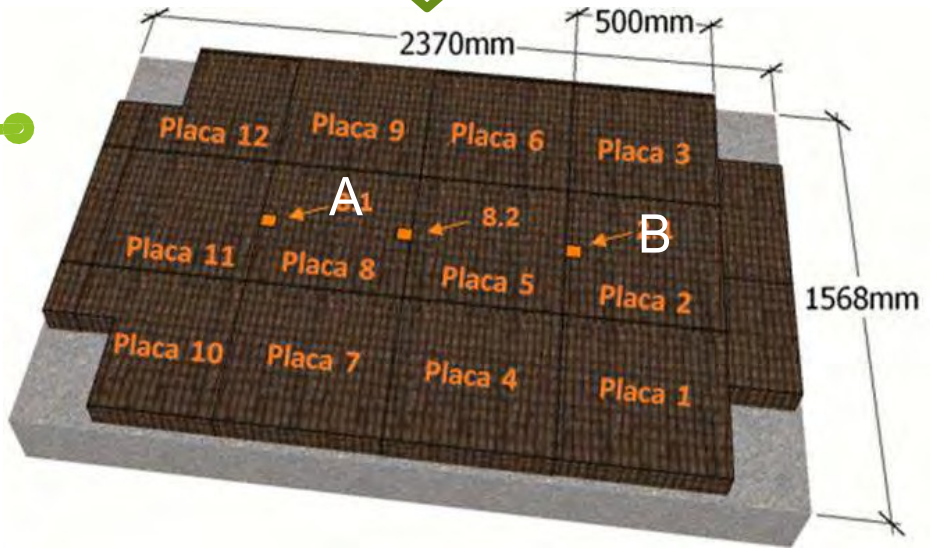
Case study

Extensive green roof made of healthy engineered expanded cork



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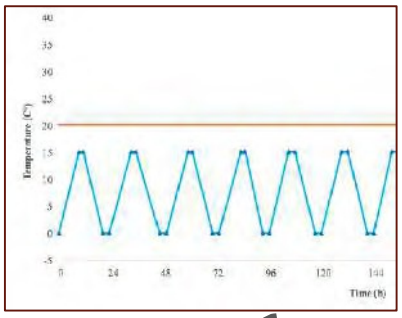
Case study

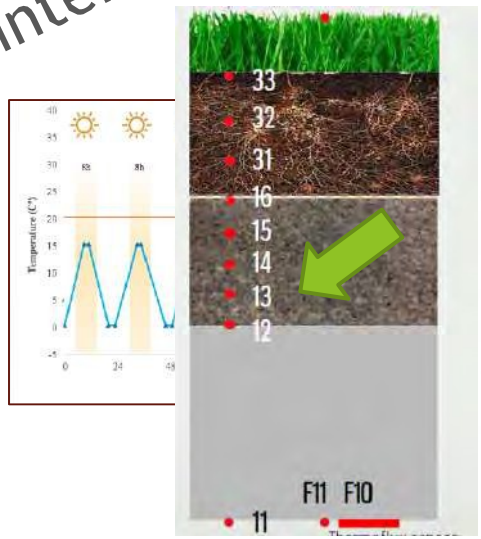
OREEN URBAN LIVING

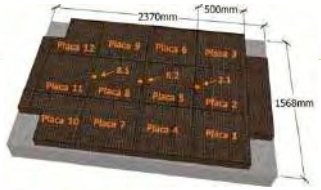
1.8 Liters/m2

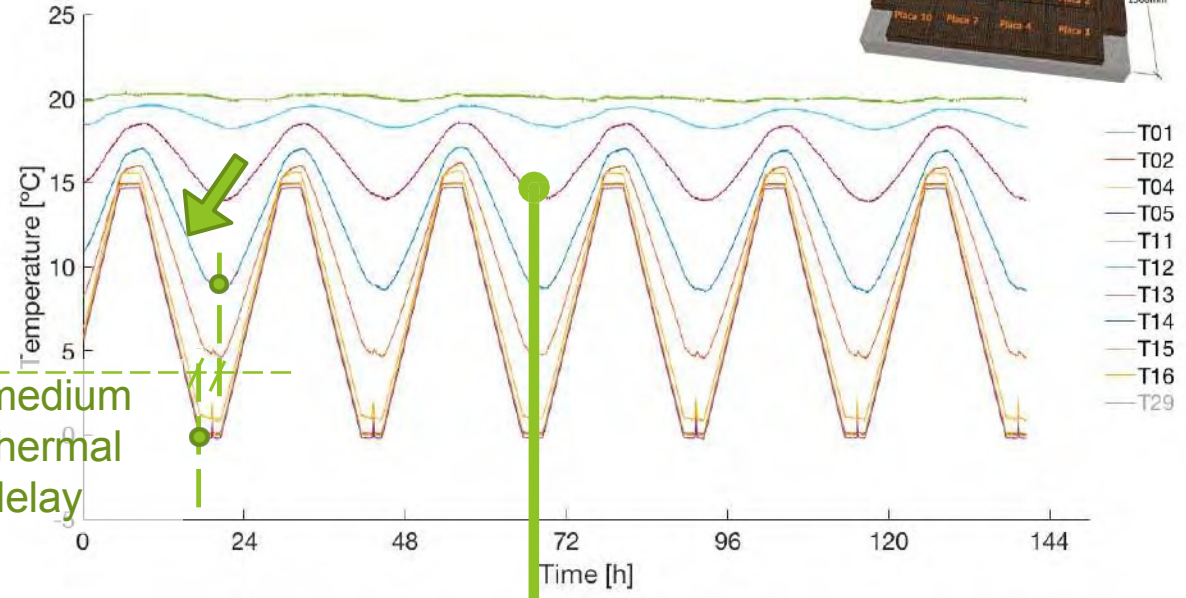
Case study



Winter cycles

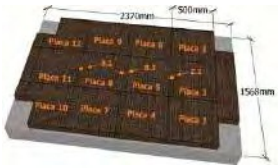






medium thermal delay

13



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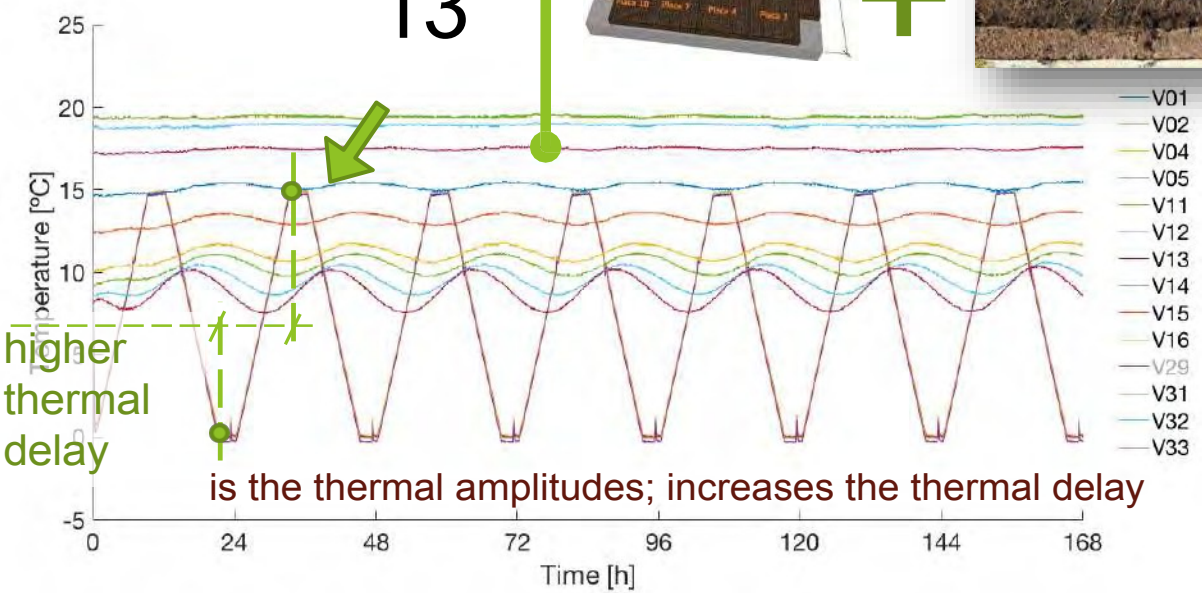
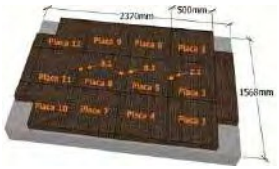


higher thermal delay

is the thermal amplitudes; increases the thermal delay

Case study



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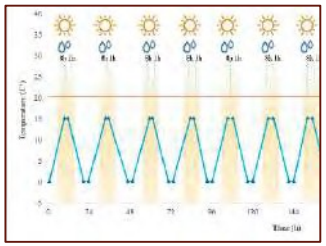
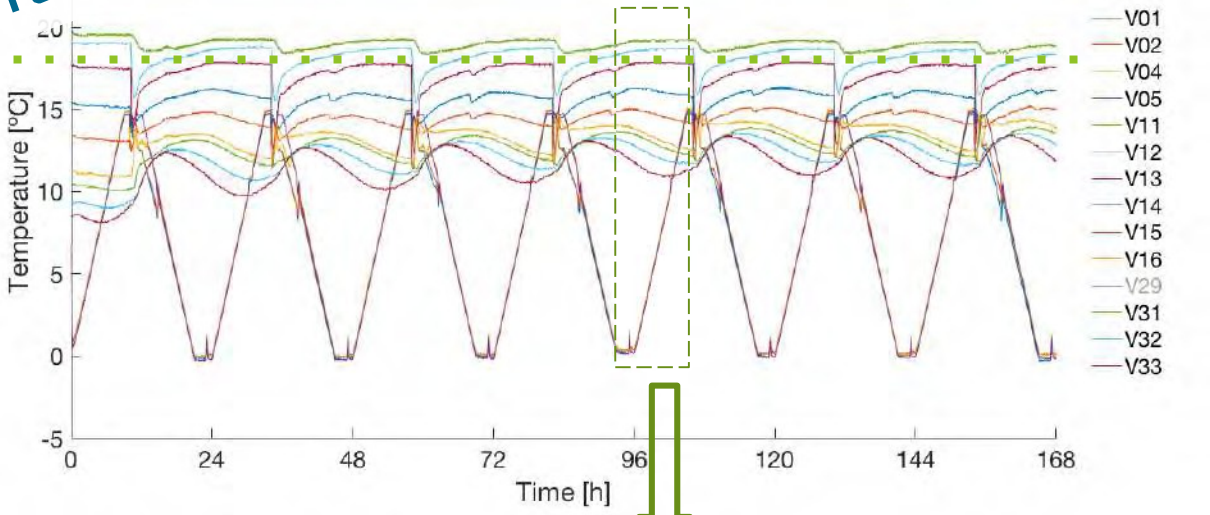
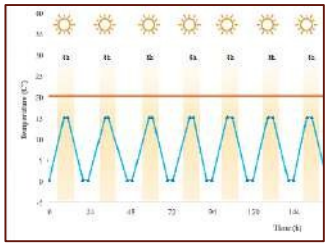
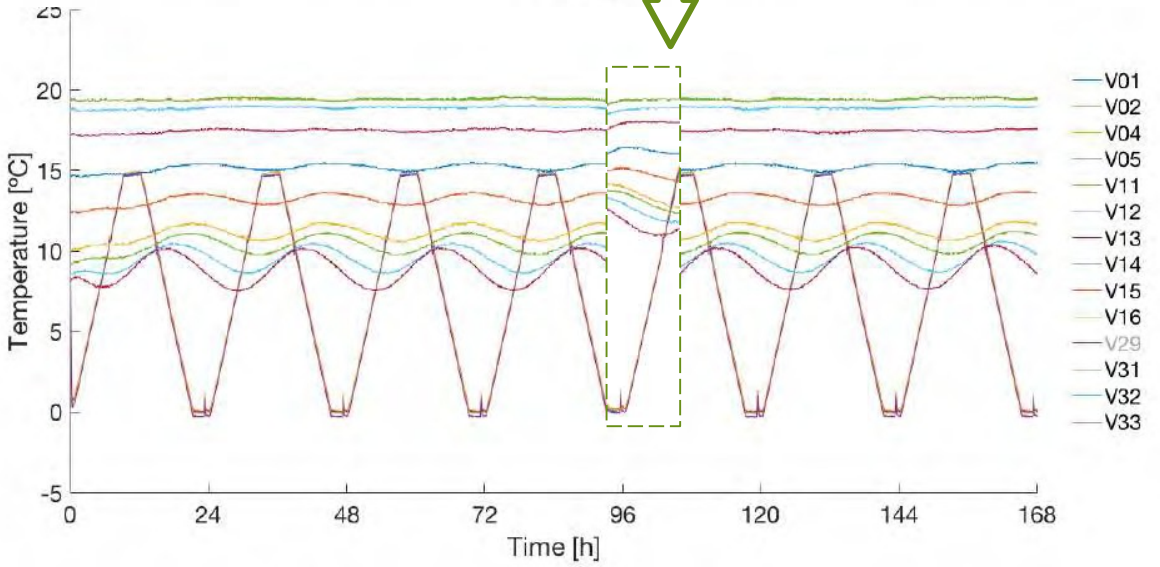
With rain





Winter cycles





ANI AGÊNCIA NACIONAL DE INOVAÇÃO

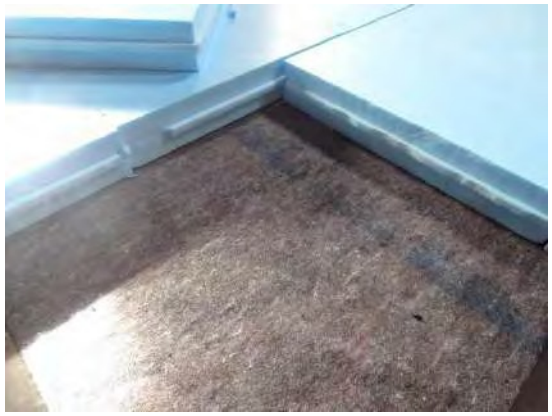
Performance of the new system - acoustic behavior - acoustic behavior - acoustic behavior - acoustic behavior - acoustic behavior - acoustic behavior - acoustic behavior -

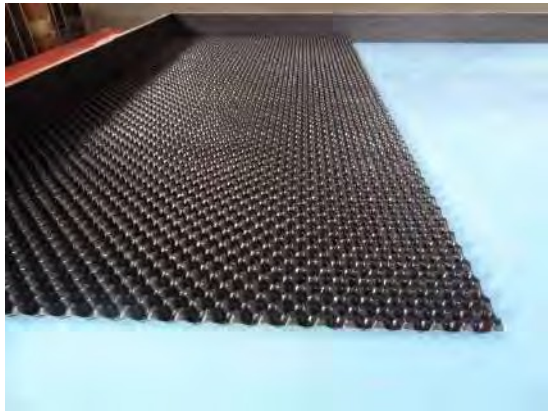
acoustic behavior

ISOLAMENTO A SONS AÉREOS - materials and methodologies

ISOLAMENTO A SONS AÉREOS - materials and methodologies

Conventional system





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COMPETE 2020
PORTUGAL 2020
UNIÃO EUROPEIA
Fundo Europeu de Desenvolvimento Regional

ISOLAMENTO A SONS AÉREOS - materials and methodologies

Non-conventional system






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PORTUGAL 2020
UNIÃO EUROPEIA
Fundo Europeu de Desenvolvimento Regional

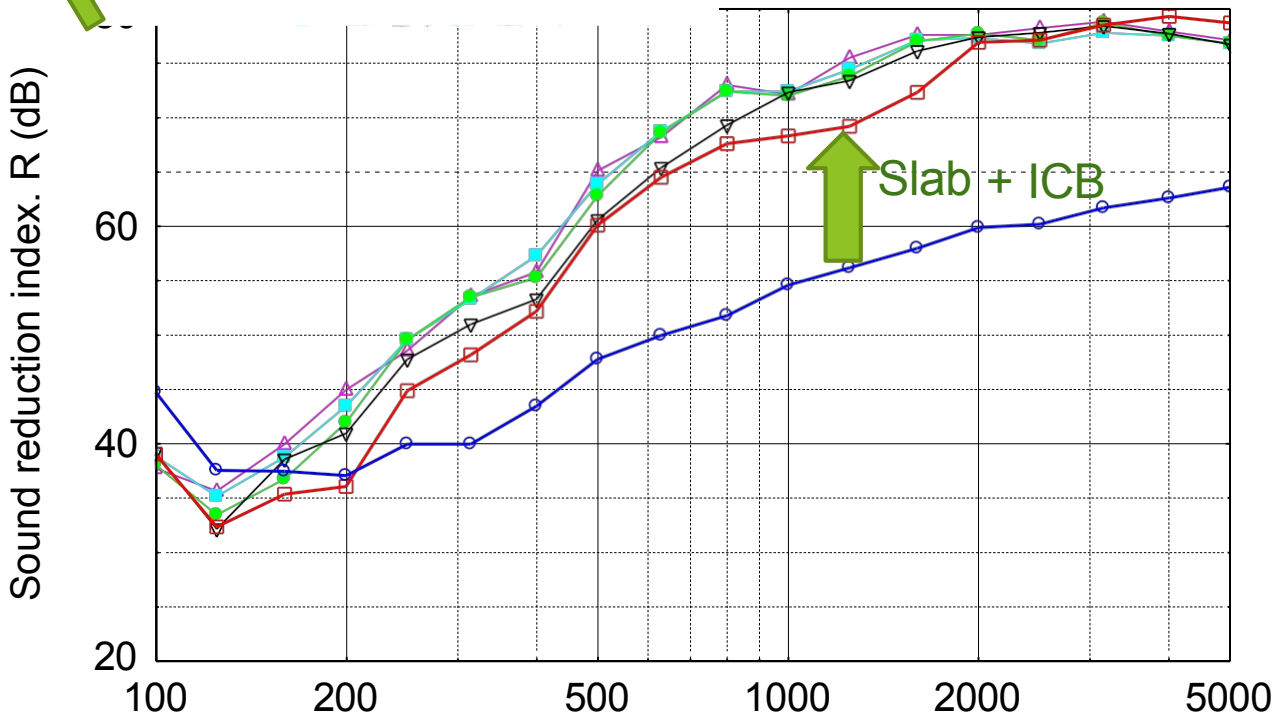
ISOLAMENTO A SONS AÉREOS

Influence of different layers for the non-conventional system.

- +anti-roots+expanded cork+filter+10 cm substrate+sedum and herbs, R_w = 59 dB
- +anti-roots+expanded cork+filter+10 cm substrate+grass, R_w = 59 dB
- +anti-roots+expanded cork+filter+10 cm substrate, R_w = 58 dB
- +anti-roots+expanded cork+filter+7.5 cm substrate, R_w = 57 dB
- +anti-roots+expanded cork, R_w = 55 dB
- Concrete slab, R_w = 51 dB

+ plants

+ substrate



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COMPETE 2020
PORTUGAL 2020
UNIÃO EUROPEIA
Fundo Europeu de Desenvolvimento Regional

Performance of the New System

- Evaluation of vegetation compatibility ✓
- Drainage and retention ✓
- Acoustic performance ✓
- Thermal behavior ✓

António Tadeu, Julieta António, M. Kanoun-Boulé,

***Nuno Simões**, Ricardo Almeida*

ANI AGÊNCIA NACIONAL DE INOVAÇÃO | COMPETE 2020 | PORTUGAL 2020 | UNIÃO EUROPEIA Fundo Europeu de Desenvolvimento Regional


GREEN URBAN LIVING
AMORIM
AMORIM ISOLAMENTOS, S.A.
ITeCons
ANQIP
NEOTURF

Annex 5 - Presentation of Support to Leca's Intervention

C. M. Porto
10 Julho 2019



Leca® expanded clay as an integral part of green roof systems

AGENDA

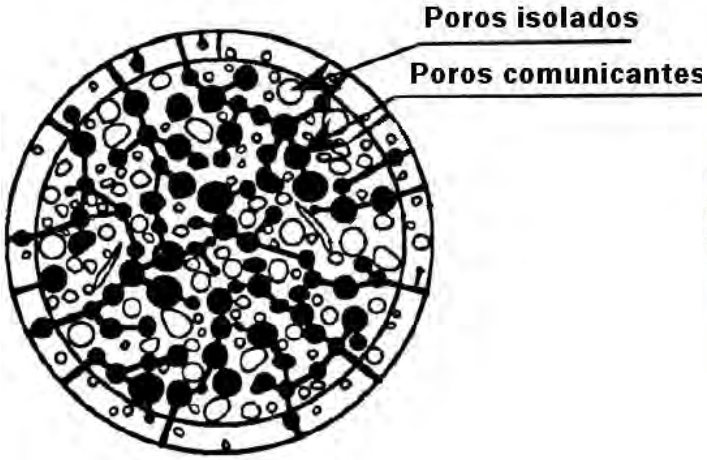
- Expanded argyle Leca®
- Leca® *Green Covering* Systems

A Leca® expanded clay

A Leca® expanded clay

- Light aggregate: density between 275 kg/m^3 and 455 kg/m^3 ;
- Totally inert material: it does not contain any type of organic or toxic material, it does not release any type of substance under any circumstances;
- Non-hygroscopic (does not absorb air humidity, not varying its dimensions and shape);
- Unalterable over time, rot-proof;
- Volumetric mass ratio/optimized resistance.

A Leca® expanded clay



- The interior tanks function as mini water reservoirs;
- Storage of H_2O = water absorbed by the granule + water stored in the voids between the granules.

Leca® *Green Roofing* Systems

Leca® *Green Roofing* Systems

Leca® expanded clay is a draining layer:

Leca® *Green Roofing* Systems

Leca® expanded clay is a draining layer:

- Natural material;
- Fully recyclable;
- Non-polluting;
- Mild;
- +/- draining with grain size;

Grain size: 10-20 mm
Baridade: ±275 kg/m³
Water absorption: 38% of mass
+ drainage

Leca® Light Plus (or Leca® L)

Granulometry: 1-5 mm
Baridade: ±430 kg/m³ **Water absorption**: 28% of mass
+ retention

Leca® S

Leca® *Green Covering* Systems

A Leca® expanded clay is not a substrate:

Leca® Hydro

Grain size: 4-10 mm
Baridade: ±330 kg/m³
Water absorption: 46% of mass
Water retention: 37% - 41%.
Cation troca: 4 - 5 meq/100g
Porosity: ±32%.

- Natural material;
- Fully recyclable;
- Non-polluting;
- Aligeira or substrate;
- Retain water and nutrients, gradually releasing them over time;
- Do not react with the chemicals used in plant cultivation;
- It acts as an insulator in the substrate matrix;
- It favors the roots lodging;
- It contributes to the resilience of the soil because the internal movement of moisture and air is not restricted;
- Substantially reduce substrate compaction.

Leca® *Green Covering* Systems

A Leca® expanded clay is not a substrate:

Leca® Hydro

CATÓLICA

Estudo analítico:

CARACTERIZAÇÃO DO PRODUTO LECA® HYDRO

Relatório nº 2010/ref.ª int

Porto, 26 de Julho de 2010

Solicitado por:

SAINT-GOBAIN WEBER PORTUGAL, S.A.

Escola Superior de Biotecnologia
Universidade Católica Portuguesa

CATÓLICA

Estudo analítico:

CARACTERIZAÇÃO DE SUBSTRATOS À BASE DE LECA® HYDRO

Relatório nº 190/2010

Porto, 16 de Maio de 2011

Solicitado por:

SAINT-GOBAIN WEBER

Escola Superior de Biotecnologia
Universidade Católica Portuguesa

Thank you!

A Saint-Gobain brand

my building is green
A LIFE PROJECT

LIFE my building is green

LIFE17 ENV/EN/00088

Application of Nature-Based Solutions for local adaptation of educational and social buildings to Climate Change

Action: E2.3
Deliverable: Round Table - Nature-Based Solutions: Climate Change and Governance Deliverable: Round Table - Summary and Results Date: 06/2021

LIFE my building is green - LIFE17 ENV/ES/00088

Deliverable: Round Table - Synthesis and Results

Date: 06/2021

Data Project

Project location:	Extremadura (Spain), Norte (Portugal) e Alentejo (Portugal)
Project start date:	01/09/2018
Project end date:	31/08/2022
Total budget:	2.854.102 €
EU contribution:	1.697.369 €
(%) of eligible costs:	59,99 %

Data Beneficiary

Name Beneficiary:	CIMAC - Comunidade Intermunicipal do Alentejo Central (Intermunicipal Community of Central Alentejo)
Contact person:	Teresa Batista
Postal address:	Rua 24 de Julho nº1
Telephone:	266 749 420
E-mail:	geral@cimac.pt
Project Website:	www.mybuildingisgreen.eu

Data Deliverable Responsible

Name Beneficiary:	CIMAC - Comunidade Intermunicipal do Alentejo Central (Intermunicipal Community of Central Alentejo)
Contact person:	Teresa Batista
E-mail:	tbatista@cimac.pt

Index

1. SUMMARY EN ESPAÑOL

In accordance with the provisions of action E2.3, the members of the consortium agreed to hold a Round Table in Évora, whose initial objective would be for it to be held in person.

However, due to circumstances related to the COVID-19 pandemic that devastated the entire world, the event was held online, taking the form of a Webinar.

As CIMAC is the beneficiary responsible for implementing action C.4 - Governance for Adaptation to Climate Change in Education and Social Services Buildings, starting in December 2020, it was considered pertinent that this Round Table focus on this central theme.

Thus, the Round Table entitled ***"Nature Based Solutions: Climate Change and Governance"***, took place on December 15, 2020, on the Cisco Webex Meetings online platform.

2. SUMMARY

In accordance with action E2.3, it was the understanding of the members of the consortium to hold a Round Table in Evora, the initial objective of which was to be carried out in a face-to-face format.

However, due to circumstances related to the COVID-19 pandemic that devastated the entire world, the event was held online, using the Webinar format.

As CIMAC is the beneficiary responsible for the implementation of Action C.4 - Governance for Adaptation to Climate Change in Education and Social Services Buildings, starting in December 2020, it was considered appropriate that this Round Table should focus on this central theme.

Thus, the ***Roundtable entitled "Nature-Based Solutions: Climate Change and Governance"*** was held on December 15, 2020, on the Cisco Webex Meetings online platform.

3. OBJECTIVES AND TARGET-AUDIENCE

For the ***Round Table "Solutions Based on Nature: Climate Change and Governance" the following objectives and target audience were defined:***

3.1. Objectives

Increase awareness, sensitization and knowledge of N a t u r e - B a s e d Solutions as climate adaptation measures in buildings and cities.

3.2. Public - except

Educational Community, Elements, Local and Regional Administrations, Urban Sector, Social Communication.

4. ROUND TABLE - NATURE-BASED SOLUTIONS: CLIMATE CHANGE AND GOVERNANCE

4.1. Divulgação

For the dissemination of the ***Round Table "Nature-Based Solutions: Climate Change and Governance", which*** began on November 27, 2020, the following materials were prepared and disseminated:

- Cartaz
- Program
- Conventions
- Digital content for the platforms Facebook, Instagram and Twitter
- Banner for CIMAC's Site and for the Project's Site
- Capa Falsa in the regional newspaper Diário do Sul
- Registration Form - Google Forms

The above-mentioned materials were sent to the project partners, requesting their dissemination in their communication channels.

As far as CIMAC is concerned, the disclosure was made on the Institutional Site, Facebook Page, Instagram Page, sending of invitation to the mailling list created based on the public-alvo, publication of advertisements in the regional newspaper Diário do Sul, and publication of a false layer in the same newspaper.

The invitation followed, in accordance with the mailling list created based on the public-at-large, for the following entities:

- ✓ Entities linked to the governance of schools and buildings (Regional Education Directorates / Junta da Extremadura / municipalities);
- ✓ School managements of the municipalities of CIMAC's area of coverage, the Metropolitan Area of Porto and the Badajoz Provincial Council;
- ✓ Country associations linked to the pilot buildings;
- ✓ Responsible for the municipalities in CIMAC's area of coverage, the Metropolitan Area of Oporto and the Badajoz Provincial Council;

- ✓ Others: partnerships linked to nature-based solutions; Partnership Green Hedges, etc...
- ✓ Intermunicipal Communities of Alentejo, Área Metropolitana do Porto and
- ✓ Diputación de Badajoz.

4.2. Summary of the Initiative

The Round Table began with the presentation of the project "My Building Is Green", by the coordinator Salustiano Torre Casado, followed by presentations by José Fermoso, representative of CARTIF, also a partner in the project, and Pedro Batalha, the Landscape Architect responsible for the project of intervention in the Basic School (EB) of Horta das Figueiras.

José Fermoso made a brief presentation on the NBS prototypes that will be installed in facades and partitions, roofs, external surfaces and parking lots of each selected pilot building, referring also that this installation will be complemented by the implementation of sustainable measures of induced natural ventilation, seasonal shading (natural and artificial) and the choice of native species of the Mediterranean and Atlantic areas.

Pedro Batalha presented the project developed for the EB of Horta das Figueiras, where it was possible to perceive in detail each space that will be intervened, as well as the solutions that will be implemented to make the building more resilient to climatic changes.

During the course of this project, the school community has always been very involved in the whole process, as Patrícia Claudino, representative of the Country Association, and Ilda Massano Coelho, representative of the School Management, revealed in their speeches, highlighting the enormous importance of the fact that the Project Team has met most of the students' requests to make their school more self-sufficient.

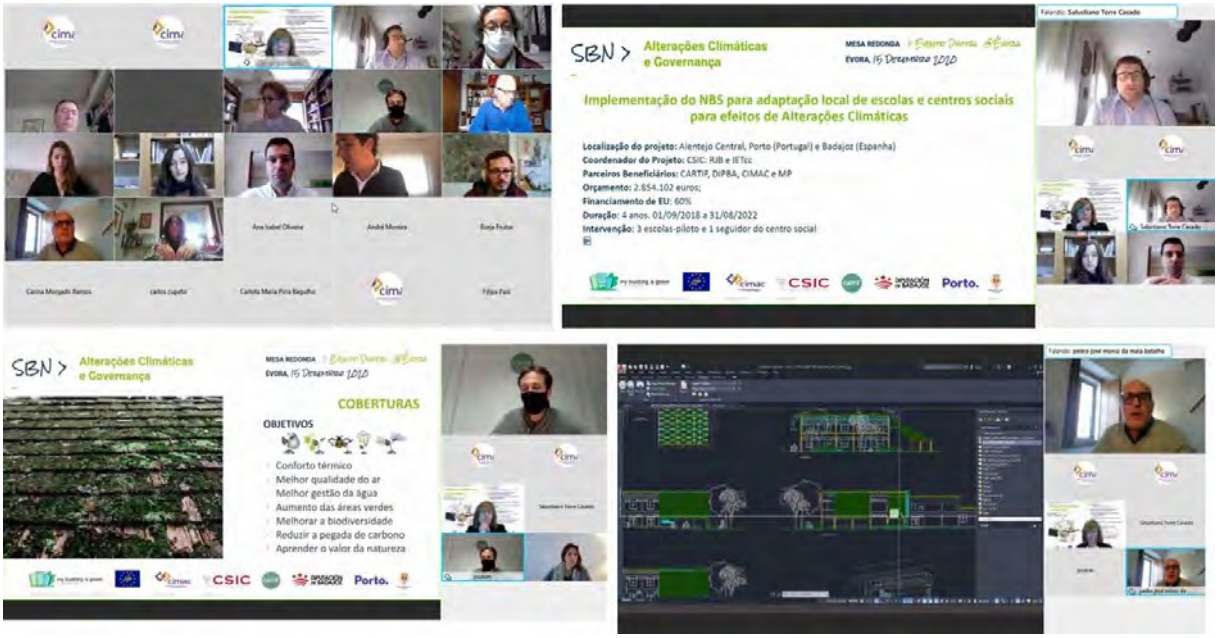
In this event we also got to know a little more about the implementation of the NBS in two other pilot buildings that integrate this project, being one of them a school located in the city of Porto, and the other a school located in the province of Badajoz.

Sara Fernandes, Vereador da Câmara Municipal de Évora, closed the cycle of presentations by presenting the local strategy for adapting to climate change.

The round table was streamed on CIMAC's Facebook page, and recorded: https://www.facebook.com/736126933172376/videos/209661487313409

Subsequently, this recording resulted in a video edition of about 20 minutes, with the summary of the Round Table.

Participants were issued a certificate of participation.



4.3. Results

- Total number of registrants: 59
- Participants with registration: 31
- Participant without registration:11
- Project Team Participants: 11
- Maximum number of participants: 50

5. CLIPPING

https://www.cimac.pt/eventos/mesa-redonda-solucoes-baseadas-na-natureza-alteracoes-climates-e-governanca-2/

https://life-mybuildingisgreen.eu/mesa-redonda-solucoes-baseadas-na-natureza-alteracoes-climates-e-governanca/

https://www.ecoalentejocentral.pt/recursos/noticias/item/725-mesa-redonda-solucoes-baseadas-na-natureza-alteracoes-climaticas-e-governanca-15-de-dezembro

https://www.radiocampanario.com/ultimas/regional/cimac-promove-mesa-redonda-online-solucoes-baseadas-na-natureza-alteracoes-climaticas-e-governanca

https://canalalentejo.pt/mesa-redonda-solucoes-baseadas-na-natureza-alteracoes-climaticas-e-governanca/

https://diariodosul.pt/2020/12/09/cimac-promove-debate-em-torno-das-alteracoes-climaticas/

https://jornalpalavra.pt/cimac-promove-mesa-redonda-sobre-solucoes-as-alteracoes-climatic/

https://www.cimac.pt/cimac-promoveu-mesa-redonda-no-ambito-do-projeto-my-building-is-green/

https://odigital.sapo.pt/cimac-promove-mesa-redonda-sobre-alteracoes-climaticas/

diário do SUL

Prioritário

Publicações Periódicas

ctt

Taxa Paga

PUB.

SBN > Alterações Climáticas e Governança

Programa

MEŒ ŒDONDA > Evento Digital @Évora
ÉVORA, 15 Dezembro 2010

Moderadora ÿ' Teresa Batista - C//vłAC

10h00 > Sessão de Abertura
CaJos Pinto de Sé - *Pmsidente do Conselho* /ntermunicipø/ *ds CIMAC*
Salumiano Torre Casado - Project Coordinator

10h15 Ž Implemennação de °Soluęães Baseadas na Naturæa° paæ a Adaptação às Akerações Climáticas.

Prat&ipos e Solugóas Bsseadas na Natureza aplicadæ nøs piloto døproprojeto MyBIG
José Fermoso - *ŒRTIF*

Apwaenta@o do Projeto da Eeoola EB da Horta daa NgueiæB
Pedro Bæalha -£quipa Pojetista

11h00 EQœdgia de Aplicação das NBS nos Equipæmentos Œucæłxos da cldade dD GOFtÓ
Repiesentonte da Cbmais Municipal do Pono

11h1d Ş Importăncia da sansibilizaç8o paæ as Alteæções Climătăcas. na Camunidadø Escołar
Adflia Condeço - *Representative* of the Oíeção da Esco/a EB *da ÆNa* das *figueias*

11h20 Ž Impacto do pojetoæ Camunida& Eacotar
Patricia Claudino-Associa@o dePais *da Escela* EB da *Hola das Figueiras*

11h30 Ž Estrat@la Local de AdapN@o ãs Meaçôes Clim4dcas: 0 futua da sustemabllidade nos edlgØw @@lcos
BaR Fernandes - *Veædorado Munic'"pio 0e EÆa*

11h4îD Ş Dsbate

12:00 ÿ' Enceæmeriæ
Ædré Espenica - *Primeiro-SecretárÒ da* C/kłAC

Soluçóes Baæadasna Natureza (NBS - katue-Based Saluûsns)

A vu1 "eaDIdaa" ãa atetaçœs cgmatiæs de GdlfÏÖõõß ÉI Mult0 ØCBf¢MaÓ& n&g r0gld g B f¥lunlCÍğlQs clg Es:penha e P'œtugat tendo em conta as altar tempołatuiss que sBo atlngldacro aeuintertor, enseaprlmavera e oinlcîo do outar'o. Aasocłado a eete fator disiupbvo, æżilinhaw que em Espanha e P'xtugat muttos dos oœt'os de educeçšo e sewłçoø sodeld fwam œnscubos annes de æpdæ rrenæç8o Hsw das œndîçæø iAmDø.

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evzźØa0 dLif8Me ßS Ofidas dfi œl0r, Ondč as tempe'aiU/8S dem'o destas eds ailngem 32a du ecte oe mecea de melo a outubro, causartdo aérlœ problemaszias de aaćtd0 R atrecs tćmãœ peza crtœçae. Idosos e defldemee - pzipoø œnsîderedos de rîsoo.

0 projeto europeu LIFE-myBtJILDINGfgEREEN, 6 Rnandado pclo Proğzæna LIFE(LIFE17 CCA / Eli ŒI0O8B), ø fern come objetlvo a estuao da apŁcação de Wugbes baeeadas na neluteza" (HBS) para a æeoluçžo do problema- m 0 Proȷetotern a duæção de4 anos,é cœrderiedo pelo

Reid JæJin Bolenaz łłŁJsœC' Gendo-orro parti6źpantea o Cœnfo dø Tecnnłogiø CARTIF dv VBüedoîk e Œ'munîdade l pal do Alœtejo Cenbal (CIMAC\ D MMiciğio do Pono e a Biputación de Badajœ.

0 projeto pmende anallsar a impœto daa æk'çôee baseadas na natureza como medidas de adaptação às altereędeøcJirn8tk'as in b9s ediffck'spiloto,dues øscœlas e um œnbo de sæviços scxgaiø. A8slm, promovør<s Bo rned6 das das da adnpt8ção susta "täveis baseælas nos eoosaistemaz

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soaaø a pdo públœ em geral quø ocupa, reguBimænta, these cons sntæ 79 e 7Pk do seu tarnpo.

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diário do SUL

A Clh4AC - Comunldadø Intarmunicipal do Alantejo Caœal, pomove nø pÖxi- mo dia 15 dezembo, pelas 1OhDD, em plæBfDrma onl1ne, a Mesa RedDnda 'Soluç6e Baecada8 na Natueza: Alteaç6w slim&icaa e sovemanşa'.

This initiative arises in the context of the My Building Is Green project, of which CIMAC is a partner, and its objective is to raise awareness, awareness and knowledge of the B&O Solugóea.8O&da8 n8 N8tuŒZ8 O0mO m4dİdaØ de ødaptaç&o clmãtlca em sdlkdos e ódadea.

Participe! Contamos consigo!

my building is green
A LIFE PROJECT

projeto financiado pela UE através do programa LIFE

organização

cimac

parceiros

CSIC

DIPUTACIÓN DE BADAJOZ

Porto.

apoio

ANNEXES

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Climatic Alterations and Governance

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DIPUTATION DE BADAJOZ

Porto.

SBN

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Moderator Teresa Batista - C/MDC

10h00 Sessão de Abertura "

Carlos Pinto de Sá - *Presidente do Conselho Intermunicipal da* C/MDC
Salustiano Torre Casado - *Coordenador do Projeto*

Implementation of "Nature-Based Solutions" for Climate Change Adaptation

Prototypes and Solutions Based on Nature applied in pilots of the MyBIG project
Jose Fermoso - CODE/F

Apresentação do Projeto da Escola EB da Horta das Figueiras
Arq. Pedro Batalha - *Equipa Projetista*

Strategy for the Application of the NBS in the Educational Facilities of the City of Oporto
Representative of the Câmara Municipal do Porto

Importância da sensibilização para as Alterações Climáticas na Comunidade Escolar
Representative of the Directorate of the EB School of Horta das Figueiras

Impact of the project on the school community
Patricia Claudino - *Associação de Pais da Escola EB da Horta das Figueiras*

Local Strategy for Adaptation to Climate Change: 0 future of sustainability in public buildings
Sara Fernandes - *Municipal Governor of Évora*

/Debate

Encerramento
André Espenica - *Primeiro-Secretário da CIMAC*

SBN

Invite

CIMAC - Comunidade Intermunicipal do Alentejo Central is honored to invite you to attend the Round Table "So/tiçôes *Baseadas na Natureza: Alterações Climáticas* e Governança", on December 15th, at 10h00, through the online platform.

This initiative is part of the My Building Is Green project, of which CIMAC is a partner, and aims to increase awareness, sensitization and knowledge of Nature-Based Solutions as climate adaptation measures in buildings and cities.

To attend this Digital Roundtable, you must register HERE.

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Climatic Alterations and Governance

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project *financed by the EU through the LIFE program*

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partners

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Climate Change and Governance

ROUND TABLE ÉVORA,

/Ç EVENTO DIGITAL 10H00 DEZEMBRO 2020

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projeto financiado pela UE através do programa LIFE

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COMUNIDADE INTERMUNICIPAL DO ALENTEJO CENTRAL

CSIC

DIPUTATION DE BADAJOZ

Porto.

CÂMARA MUNICIPAL DE ÉVORA

Presenças no evento - Round Table "Soluções Baseadas na Natureza: Alterações Climáticas e Governança" - December 15 - 10:00 a.m.

C/inscription

Nome	Sobrenome	Entity	Cargo	E-mail Address
Álvaro	Charrua da Piedade	APA,IP/ARH do Alentejo	Senior technician	alvaro.piedade@apambiente.pt
Anabela	Pascoal	Municipality of Cascais	Superior Technique	anabela.pascoal@gmail.com
André	Moreira	CIMAC	Stagiaire	andre.moreira@cimac.pt
André	Spenica	CIMAC	Encerramento	andre.espenica@cimac.pt
Andreia	Lagartixo	CIMAC	Communication Technique	andreia.lagartixo@cimac.pt
Borja	Fruits	CSIC - Institute for Construction Science Eduardo Torroja	Researcher	borjafv@ietcc.csic.es
Carina	Ramos	CCDR Alentejo	Senior Technician	CARINA.MORGADORAMOS@GMAIL.COM
carlos cupeto	coupe	UÉv	professor	cupeto@uevora.pt
Carlota Maria	Pirra Bagulho	ARS Alentejo	Health Technique Environmental	carlota.bagulho@arsalentejo.min-saude.pt
FILIPA	COUNTRY	MUNICIPALITY OF MONTEMOR-O-NOVO	ENVIRONMENT SENIOR TECHNICIAN/ENG.ª BIOPHYSICS	fpais@cm-montemornovo.pt
Florbela	Vitorino	Municipality of Arraiolos	Architect	fvitorino@cm-arraiolos.pt
Helena	Roque	Municipality of Redondo	Technical Cabinet of Environmental Intervention	gia@cm-redondo.pt
Ilda	Massano Coelho	School Rep.	Speaker	immcoelho@hotmail.com
Jaime	Sources	Badajoz Provincial Council	Superior Technician in Communication	jfuentesr@dip-badajoz.es
Jéssica	Fogeiro	Associação Nacional de Coberturas Greens	Executive Coordinator	fogeiro4@gmail.com
João	Lopes	CMSeixal	Architect	joaoplopes2001@gmail.com

Nome	Sobrenome	Entity	Cargo	E-mail Address
João	Anania	CIMAC	Senior Technician	joao.anania@cimac.pt
João	Grilo	CIMAC	Informatician	joao.grilo@cimac.pt
José	Fermoso	CARTIF	Speaker	josdom@cartif.es
Jose Maria	Figueira	Intermunicipal Council of CIMAC	Eleito	jm.rodrigues.figueira@gmail.com
josefa	galapito	APA_ARH Altentejo	superior technician	josefa.galapito@apambiente.pt
Liliana	de Sousa	GeoAttribute - CIPOT, Lda	Project Manager	coopera@geoatributo.com
Luis	FERNANDES	SEPNA-GNR	Adjunto de Secção	luis.luisfernandes@gmail.com
Luis	Branco	Mora's CM	Senior Technician	lpbranco@cm-mora.pt
Manuela	Oliveira	University of Évora	Professor	mmo@uevora.pt
Marcos	Saints	Centro Interdisciplinar de Ciências Social - CICS.NOVA.UÉvora	Integrated researcher	mosantos@uevora.pt
Marina	Pardal	Diário do Sul Group	Journalist	marina.pardal@gmail.com
Milene	Silva	Municipality of Redondo	GIS Technician/Geographer	1000n.silva@gmail.com
Nuno	Morais	Representative CM Porto	Speaker	nunomorais@cm-porto.pt
Patricia	Claudino	Ass. Pais da Escola	Speaker	patriciadeusclaudino@gmail.com
Paula Helena	Saints	CM Évora	senior technician, Gab. Presidential Support	paula.h.santos@cm-evora.pt
Paulo	Palha	ANCV - National Association of Green Covers	Chairman	paulopalha@neoturf.pt
Pedro	Batalha	Equip Projetista	Speaker	pedro.batalha@pbarq.pt
Pedro Manuel	Pereira da Costa	Câmara Municipal de Évora	Assessor	pedro.costa@cm-evora.pt
Perpetua da Conceição Lopes	Pereira	APA_ARH do Alentejo	Senior Technician	perpetua.pereira@apambiente.pt
RAMONA	AVILA GONZÁLEZ	BADAJOZ COUNTY COUNCIL	TECHNICIAN OF PROJECT	ravila@dip-badajoz.es

Nome	Sobrenome	Entity	Cargo	E-mail Address
Rui	Sequeira	APA/ARH Alentejo	Head of Division	rui.sequeira@apambiente.pt
Rute	Alexandre	CIMAC	AT UAD	rute.alexandre@cimac.pt
Salustiano	Torre Casado	Project coordinator	Speaker	storre@rjb.csic.es
Sara	Fernandes	Vereadora CM Évora	Speaker	sara.fernandes@cm-evora.pt
TEBA	TORRES ZAPATA	CARTIF FOUNDATION	RESEARCHER	cartor@cartif.es
Teresa	Batista	CIMAC	Moderator Event	tbatista@cimac.pt

S/inscription

Nome	Sobrenome	Entity	Cargo	E-mail Address
Abilio	Fernandes			abiliodiasfernandes@gmail.com
Ana	Dias			
Ana Isabel	Oliveira	Rep. Pais escola		ana.oliveira.a@gmail.com
Armando	Silva			
Carla	Henriques	DCME -DEIS		
Guadalupe	Gomez			
Luis	Picanço			
Maria	Ilheu			
Maria	Santana			
Miguel	Anton			
Rachel		Cartif		

Resumo: Total registered participants: 59 | Participants with registration 31 | s/registration 11 | **total 42**

Equip program 11

Maximum number of participants linked 50

my building is green
A LIFE PROJECT

LIFE my building is green

LIFE17 CCA/EN/000088

Application of Nature-Based Solutions for local adaptation of educational and social buildings to Climate Change

Action: Proceedings of the online workshop/roundtable "SbN as a tool to address climate change".

Date: 10/25/2022

LIFE my building is green - LIFE17 CCA/ES/000088

Proceedings of the online workshop/roundtable "SbN as a tool to address climate change".

Date: 10/25/2022

Data Project

Project location:	Spain
Project start date:	01/09/2018
Project end date:	31/08/2022
Total budget:	2,854,102 Euro
EU contribution:	1,697,369 Euro
(%) of eligible costs:	59,99 %

Data Beneficiary

Name Beneficiary:	CSIC
Contact person:	Miguel Vega
Postal address:	Plaza de Murillo, nº 2
Telephone:	34914203017
E-mail:	miguel.vega@rjb.csic.es
Project Website:	http://www.life-mybuildingisgreen.eu

Data Deliverable Responsible

Name Beneficiary:	CSIC
Contact person:	Miguel Vega
E-mail:	miguel.vega@rjb.csic.es

MINUTES OF THE ONLINE WORKSHOP/ROUND TABLE "SBN AS A TOOL IN THE FACE OF CLIMATE CHANGE".		
Location: online	**Start time:** 10:20 a.m. **End:** 12:30	**Date:** 03/03/2021

WORKSHOP/ROUND TABLE SPEAKERS		
CP	**Name**	**Cargo**
1	Andrés Alcántara Valero	Corporate Development Technician. IUCN-Med
2	José Luis de la Cruz Leiva	Secretary of the Association for Sustainable and Progressive Societies (ASYPS)
3	José Ramón Picatoste Rueggeroni	Head of Adaptation Strategies Area. Sub. G. Coordination of Actions against Climate Change. OECC
4	Miguel Ángel Antón	LIFE mBiG Technician (DIPBA)
5	Ramona Avila	LIFE mBiG Technician (DIPBA)
6	Isabel Sánchez Íñiguez de la Torre	Technical Manager of the Urban Green up Project. Innovation and Economic Development Agency of Valladolid. Valladolid City Hall
7	Juan Luis Beresaluze Pastor	Head of the Mayor's Office and Environment Service. Alicante City Council

POINTS TO BE ADDRESSED	
1	Brief summary of the development of the online workshop/roundtable "SbN as a tool against climate change" and the participation of DIPBA on behalf of the LIFE-mBiG project.
2	Program of the online workshop/roundtable "SbN as a tool against climate change".
3	Guide to the online workshop/roundtable "SbN as a tool to address climate change".

WORKSHOP/ROUND TABLE SUMMARY

The online workshop/roundtable "BNS as a tool against climate change" was organized by the Spanish Network of Cities for Climate of the Spanish Federation of Municipalities and Provinces (FEMP). The workshop had the format of a round table and Miguel Ángel Antón and Ramona Ávila (DIPBA) presented the LIFE-mBiG project and the work that would be developed on the implementation of Nature-based Solutions (NBS) in the CEIP Gabriela Mistral of Solana de Los Barros (Badajoz).

The workshop was aimed at political and technical representatives that are part of the Network and the Network of Local Governments +Biodiversity, with 150 attendees.

The Network has more than 300 local entities from all over Spain, among them the Diputación de Badajoz. For more information about this Network, please consult the following online brochure: https://redciudadesclima.es/sites/default/files/folleto_RECC.pdf

Following the graphic material on DIPBA's participation in this workshop, you can find the Program of the workshop and a complete guide that includes the contents discussed during the workshop/roundtable. In addition, the FEMP published a video summary of this event on its YouTube channel: https://www.youtube.com/watch?v=KgO4VhFd3Fc

GRAPHIC SUPPORT

Screenshots taken during the workshop and online roundtable.

Nature-based solutions as a tool climate change

March 3, 2021

ONLINE

ONLINE WORKSHOPS

Spanish Network of Cities for Climate

THE ROOM WILL BE OPEN FROM 10:10 A.M. ONWARDS.

10:20 - 10:30 h	CONNECTION AND RECEPTION OF ATTENDEES
10:30 - 10:35 h	WELCOME
10:35 - 11:00 h	**Nature-based solutions as a tool to address Climate Change** **Andrés Alcántara Valero,** Corporate Development Department Technician. IUCN Centre for Mediterranean Cooperation.
11:00 - 11:20 h	ROUND OF QUESTIONS
11:20 - 12:10 h	ROUND TABLE: **Moderator: José Luis de la Cruz Leiva,** Secretary of the Association for the Sustainability and Progress of Societies (ASYPS) • **José Ramón Picatoste Rueggeroni,** Head of Adaptation Strategies Area. Sub. G. Coord. Actions against Climate Change. Spanish Climate Change Office • **Ramona Ávila González,** MyBuilidingisGreen Project Technician. Provincial Council of Badajoz • **Isabel Sánchez Íñiguez de la Torre,** Technical Manager of the Urban Green up Project. Innovation and Economic Development Agency of Valladolid. Valladolid City Council • **Juan Luis Beresaluze Pastor,** Head of the Mayor's Office and Environment Service. Alicante City Council
12:10 - 12:30 h	DIALOGUE WITH THE PANELISTS
12:30 h	FAREWELL

FEMP FEDERACION ESPAÑOLA DE MUNICIPIOS Y PROVINCIAS

Red Española de Ciudades por el Clima

oecc Oficina Española de Cambio Climático

GOBIERNO DE ESPAÑA MINISTERIO PARA LA TRANSICIÓN ECOLÓGICA Y EL RETO DEMOGRÁFICO

Nature-based solutions as a tool to address climate change

CLIMATE ACTION WORKSHOPS

March 3, 2021

Spanish Network of
Cities for Climate

CITIES FOR CLIMATE **LIBRARY** | **22**

FEMP
FEDERACION ESPAÑOLA DE MUNICIPIOS Y PROVINCIAS

Red Española de Ciudades por el Clima

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Oficina Española de Cambio Climático

GOBIERNO DE ESPAÑA · MINISTERIO PARA LA TRANSICIÓN ECOLÓGICA Y EL RETO DEMOGRÁFICO

Spanish Network of Cities for Climate

Index

Spanish Network of Cities for Climate

Presentation

One of the strategic lines of the Spanish Network of Cities for Climate is to promote discussion forums to boost local action on climate change and promote a major transition towards sustainability and human progress. This is the idea behind the FEMP's cycle of *online* Climate Action Workshops, organized by the Spanish Network of Cities for Climate. Cities for Climate.

This new cycle of workshops is part of the activity plan of the Spanish Network of Cities for Climate for 2020-21, included in the resolution for the granting of subsidies under Article 22.2.C) of the General Subsidies Law, which includes, among other support tools, the holding of the workshops.

Bearing in mind the relevance of the climate crisis for the progress of societies, it is necessary to continue deepening the debate on the greatest environmental challenge for global development and the involvement of Local Governments. For this reason, the 13th General Assembly of the Network, held on March 9, 2020, approved the development of different workshops on the topics that local leaders considered of greatest interest, among others, the novelties of the European Green Pact and the Recovery Fund, the link between the Urban Agency and the challenges of climate change, adaptation to climate change and Nature-Based Solutions as a tool against climate change or the control of atmospheric pollution.

Spanish Network of Cities for Climate

Nature-based solutions as a tool to address climate change

The rate of change in the last 50 years has been unprecedented in human history, with extraordinary increases in the
in world economic output and life expectancy. The population has doubled, the global economy has quadrupled and more than one billion people have been lifted out of extreme poverty. Globally, we produce more food, energy and materials than ever before (WEF, 2020).

However, this remarkable growth and prosperity has come at a high cost to natural systems. Human activities have already severely altered 75% of terrestrial and 66% of marine ecosystems. Nature is declining at an unprecedented rate, with nearly 1 million species at risk of extinction due to human activity.

Climate change and biodiversity loss are linked and interdependent. We can only achieve sustainable development, biodiversity and climate objectives if we scale up and accelerate the implementation of technological, social and nature-based solutions.

In this regard, Nature-Based Solutions (NBS) encompass a wide range of adaptation and mitigation measures.

to climate change. The implementation of BNS contributes at the same time to conserving the natural environment, creating habitats for endangered species, reducing carbon emissions and increasing absorption capacity.

The European Commission defines BNS as "solutions inspired and supported by nature, which are cost-effective, provide simultaneous environmental, social and economic benefits, and help build resilience; such solutions bring more nature and natural features and processes, and greater diversity, to cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions".

Therefore, BNS can play an important role in reducing vulnerability and risks related to temperature rise, flooding and water scarcity. They can reduce soil compaction, mitigate the heat island effect and improve water storage capacity in urban watersheds. Therefore, the European Commission emphasizes that Nature-Based Solutions should benefit diversity and support the provision of ecosystem services.

In practice, BNS for adaptation include approaches based on the design and improvement of green and blue infrastructure such as urban parks, green roofs and facades, tree planting, river and pond conservation, as well as other types of interventions that use the functions of eco-systems to provide some form of adaptation to climate risks.

According to the study carried out by the Observatory of the Fundación Repsol Chair of Energy Transition, it is estimated that the

SbN can contribute up to 37% of the emissions mitigation needed to limit global warming to 2°C by 2030. The main BNS initiatives in terms of mitigation potential are those related to forests (68% mitigation potential), followed by those related to agricultural land and grasslands (20%) and those related to wetlands and water bodies (12%). Therefore, we can affirm that BNS are essential to respond to climate challenges.

Spanish Network of Cities for Climate

Workshop Objectives

Nature-based solutions (nbsns) can be powerful tools for combating biodiversity loss and supporting climate change mitigation and/or adaptation, as well as disaster risk reduction, while offering other benefits for human well-being, such as positive health effects. BNS are actions that conserve, manage or restore nature by helping to conserve biodiversity, but which, in turn, contribute to positively addressing social challenges, empowering people, and reducing the risk of disasters. and provide job and business opportunities.

BNS are based on the principle that ecosystems in healthy conditions provide multiple benefits and services for human well-being and can therefore address economic, social and environmental objectives simultaneously. Depending on their context, BNS are also framed as ecosystem conservation-based adaptation, green infrastructure development, ecosystem-based disaster risk reduction or natural water retention measures.

Within this framework, the workshop Nature-based solutions as a tool to address climate change aims to inform Local Entities on how BNS can improve the quality of life of all citizens and increase the resilience to climate change of their municipality, contributing to build climate-neutral and resilient municipalities, in a process of ecological and just transition.

To this end, an exchange of local experiences has been carried out, the result of which will serve as an example to other entities to successfully face the challenge of climate change. The workshop focused on the opportunity offered by the SbN to design climate actions that favor adaptation, taking into account social cohesion and quality of life, developing an ecological and multifunctional city that protects natural resources and is integrated into the characteristics of the territory, applying a process in which the whole city participates.

Workshop Development

The workshop Nature-based solutions as a tool to address climate change took place in the form of a workshop on the The program includes a keynote speech on the issues to be addressed, followed by a roundtable discussion led by a moderator, according to the following program.

Nature-based solutions (NBS) can help build healthy, inclusive and sustainable communities in urban environments, as well as build their resilience and facilitate their climate adaptation. BNS are innovative actions, so their development and implementation lead to new scientific knowledge. In addition to the obvious environmental benefits, they generate positive social and economic impacts, and offer citizens the possibility of participating in the design and development of their cities.

Therefore, the Workshop was held with the aim of exchanging expert opinions on the subject and helping Local Entities to consider BNS as part of their climate action measures. Throughout the Workshop, important conclusions have been reached on the opportunities offered by BNS for the generation of local resilience.

Program

Andrés Alcántara Valero, Technician of the Corporate Development Department of the IUCN Center for Mediterranean Cooperation, framed his presentation on the importance of BNS as a tool for action against climate change.

First, he stated that the term "Nature-based Solutions" was first used in 2000 in the context of seeking new solutions to mitigate and adapt to the effects of climate change, while protecting bio-diversity and enhancing sustainable livelihoods. In 2009, IUCN established BNS in a position paper for the United Nations Framework Convention on Climate Change (IUCN, 2009), after which the term has been rapidly adopted in sustainable development policies, considering BNS as an innovative tool for driving a green economy, with a scope ranging from global to local.

Thus, IUCN defines Nature-based Solutions as "actions to protect, manage and sustainably restore natural or modified ecosystems that address societal challenges (e.g., climate change, food security and natural disasters) in an effective and adaptive manner, while simultaneously providing human well-being and biodiversity benefits".

Through the study conducted by IUCN in 2017-2018, it was possible to identify the best tools for facilitating the

The tools are divided into seven areas of action: Awareness, education and communication tools, Regulatory tools, Governance tools, Capacity building tools, Economic and financial tools, Information and knowledge sharing tools, and Technical tools.

These previous analyses have informed the development of an IUCN standard. This standard is based on 8 criteria and 28 indicators that help assess the extent to which a proposed solution qualifies as a BNS and identify what measures can be taken to further strengthen the robustness of the intervention, using a robust and appropriate scale. In this way, the standard enables the design of a solution based on scientifically valid criteria and indicators, while generating a mechanism for analyzing and managing the effectiveness, relevance and robustness of the implemented solution throughout its lifetime.

One of the key advantages of the IUCN standard is that it is presented as a self-assessment tool in the form of an Excel spreadsheet into which users can insert full or partial individual indicators, resulting in a percentage match, traffic light indications of compliance and a table highlighting weaknesses.

In short, it is important to use tools such as the IUCN standard so that municipalities can make informed decisions, based on scientific criteria, to identify what is most appropriate for their local communities.

is really a BDS and which is the most appropriate one to implement in your municipality, in addition to providing you with a framework for monitoring and evaluating the implemented measure.

Panel discussion: main conclusions

After Andrés Alcántara Cruz's presentation, the panel discussion began, in which the panelists were asked about specific aspects of the BNS, based on the actions carried out by the organizations they represent.

José Ramón Picatoste, Head of the Adaptation Strategies Area of the Spanish Climate Change Office of the Ministry for Ecological Transition and the Demographic Challenge, showed that Nature-Based Solutions can simultaneously address more than one specific societal challenge: climate change, water security, food security, human health, disaster risk reduction, ecosystem degradation and biodiversity loss, and social and economic development.

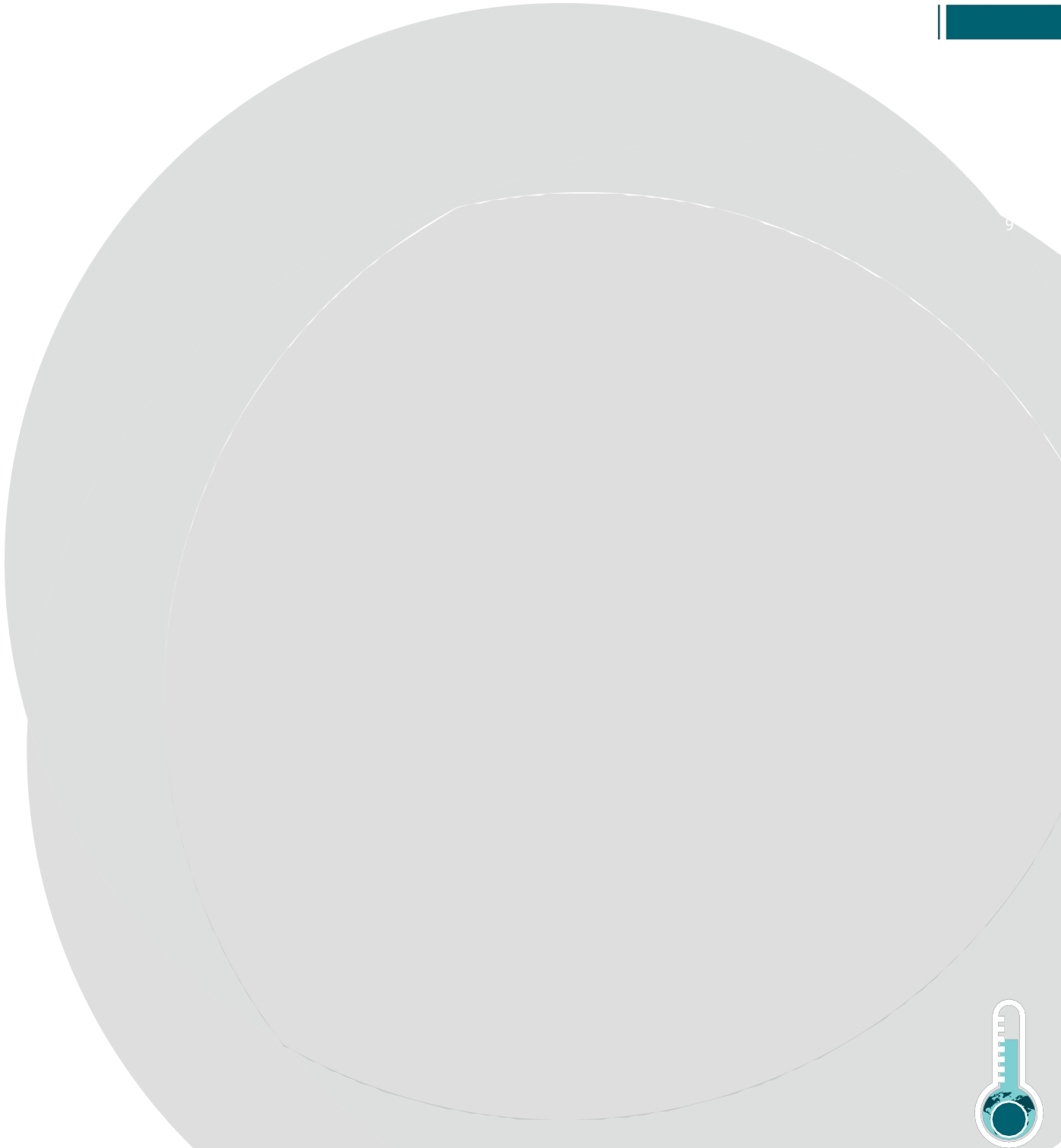
Considering the challenge of climate change, BNS contribute to strengthening resilience, reducing the risks associated with climate change, while contributing to mitigation by strengthening ecosystem services such as carbon sequestration. The opportunities offered by BNS for linking climate change adaptation and mitigation occur in different areas, including forest management, agriculture, land management, water management and urban planning.

At the international, European and national levels, there is a very favorable context that supports the development of BDS initiatives, with associated financial options that open up very good opportunities for their development.

He concluded his presentation by recommending that municipalities take advantage of the Recovery and Resilience Funds to develop local action plans that contribute to the integration of climate change and green infrastructure in urban planning and management, and in interventions in urban space.

Juan Luis Beresaluze Pastor, Head of the Mayor's Office and Environment Service of the Alicante City Council, pointed out that the City Council, in collaboration with the mixed company Aguas Munici- palizadas de Alicante, included in the Master Plan for Investments aimed at improving water management (through the Urban Planning and Green Zones Departments) the construction project for a floodable park that would meet both the objectives of the project and the objectives of the project, included in the Master Plan for Investments aimed at improving water management (through the Urban Planning and Green Areas Departments) the construction project for a flood park that would meet both the objectives of a large green area and those of an infrastructure designed to prevent flooding in the most at-risk area of the San Juan beach.

This park is a true example of a nature-based project that, at an affordable cost, provides very interesting economic and social benefits, reducing flood damage, allowing the reuse of reused water in an area characterized by the scarcity of this resource and generating a semi-natural green space, which becomes, in the long term, an important source of income for the local population.



itself into an environmental, educational and social awareness-raising resource in the face of climate change.

Isabel Sánchez Íñiguez de la Torre, Technical Manager of the URBAN GreenUP *Project* of the *Innovation and Economic Development Agency of the Valladolid City Council,* focused her speech on the H2020 URBAN GreenUP project currently being developed in Valladolid.

The URBAN GreenUP project, funded by the European Union through the H2020 framework program, aims to develop an urban renaturalization methodology. The city of Va- lladolid participates in the project as a demonstrator city, together with Liverpool (UK) and Izmir (Turkey), to validate the methodology and its replicability, with the implementation of different Nature-based solutions in its urban area.

The City Council of Valladolid shared its experience in the renaturalization process, showing several of the actions carried out, the expected impacts, as well as the difficulties encountered, and presented the main characteristics of the methodology for the implementation of BNS that is currently being developed as part of this project.

Ramona Ávila González, Technician of the MyBuilidingisGreen Project, and Miguel Ángel Antón Gamero, Sustainable Building Technician of the Provincial Council of Badajoz, presented the *MyBuilidin- gisGreen* project through which the Provincial Council of Badajoz will implement Sustainable Building Solutions.

based on Nature in a public school in Solana de los Barros (Badajoz) as a measure of adaptation to climate change.

This project seeks to reduce the temperature inside the building during the increasingly recurrent heat waves by using deciduous climbing plants as shading on sunny facades and by installing roof gardens on substrates improved with recycled aggregates. The implementation of these measures, together with the provision of permeable soils and shading structures on the exterior, as well as improved ventilation in the interior, are expected to achieve a reduction in indoor temperature of up to 6°C, in addition to a 50% reduction in cooling energy consumption.

Thus, the experience developed by the Provincial Council of Badajoz concludes that Nature-based solutions, such as shading elements in facades and roofs of buildings, are efficient and cost-effective measures, provide environmental, social and economic benefits, and help increase their resilience to climate change, confirming the need to introduce these solutions as an additional element in building processes, standards and regulations.

One conclusion that can be drawn from the Workshop is that, based on the success of the experiences described above, nature-based project planning may be the most appropriate formula for the pursuit of adaptation to the new environment.

our municipalities to climate change. To this end, it is essential to have full collaboration between administrations and their concessionaires in order to direct investments towards urban sustainability.

Endowing public spaces with natural values turns them into spaces of much greater value for citizens, allowing for many other actions related to the improvement of air quality, CO_2 capture, biodiversity recovery and, above all, education and social awareness.

For the success of the process of urban renaturalization of cities through Nature-based Solutions, it is advisable to involve, from the very beginning, all related actors: citizens, communities, NGOs, scientists, universities and companies, as well as the different services and areas of the City Council.

It is important to clearly establish the objectives to be achieved locally and globally, and to define a series of indicators to be able to objectively assess the impact of the actions with respect to a baseline scenario. These objectives must be linked to the main international, European and national frameworks.

Finally, it is also important to strengthen collaborations and networks for the exchange of experiences among Local Entities in the field of Nature-based Solutions, for mutual learning and joint formulation of projects to scale up the dimensions and scope of the proposals.

Panelists' articles and reflections

The following are the articles presented by the participants in the Workshop, in which the topics discussed are developed in greater depth.

Nature-based solutions at the municipal level

ANDRÉS ALCÁNTARA VALERO
Technician of the Corporate
Development Department of the IUCN Centre for Mediterranean
Cooperation

The term "Nature-based Solutions" was first used in 2000 in the context of seeking new solutions to mitigate and adapt to the effects of climate change while protecting biodiversity and enhancing sustainable livelihoods. IUCN established the SbN in a position paper for the United Nations Framework Convention on Climate Change (IUCN, 2009), after which the term has been rapidly adopted at the policy level, with the SbN seen as an innovative tool to drive a green economy and with a global-to-local scope.

The IUCN General Assembly established in its resolution 069, adopted in 2016, that by Nature-based Solutions.

means "*actions aimed at protecting, managing and sustainably restoring natural or modified ecosystems that address societal challenges in an effective and adaptive manner, while simultaneously providing human well-being and biodiversity benefits".*

Principles of the SbN concept (IUCN, 2016. Resol. 069).

1. The SbN adopt the rules (and principles) of nature conservation;

2. SbNs can be implemented autonomously or in- tegrated with other solutions to societal challenges (e.g., technological and engineering solutions);

3. SbN are determined by site-specific natural and cultural contexts, including traditional, local and scientific knowledge;

4. BDS provide social benefits in a fair and equitable manner that promotes transparency and broad participation;

5. BNS maintain biological and cultural diversity and the capacity of ecosystems to evolve over time;

6. SbN are applied at the scale of a landscape;

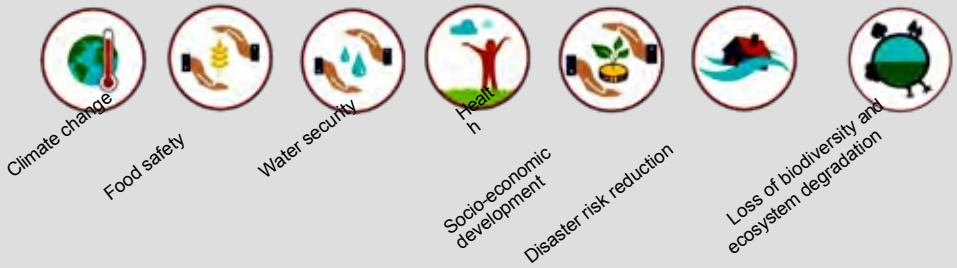
7. BDS recognize and address the trade-offs between obtaining a few economic benefits for immediate development and future options for the production of the full range of ecosystem services; and

8. BDS are an integral part of the overall design of policies and measures or actions to address specific challenges.

The European Commission also defined Nature-Based Solutions as "*solutions to societal challenges that are inspired and supported by nature; that are cost-effective and provide environmental, social and economic benefits, and help to increase resilience*", and supports the development of this concept in a strong research and innovation policy on BNS in the context of its Horizon 2020 Framework Program, with the aim of positioning Europe as a world leader in this field. BNS will continue to be an important component of the future EU research and innovation program, *Horizon Europe* (European Commission, 2020).

The IUCN definition emphasizes the need for the modified eco-system (the city or municipality), well-managed or restored, is at the heart of any BNS. It rests on the conceptual pillar of returning the interdependence between the sustainable use of biological diversity and social well-being to the center of policies and the decision-making process that derives from them. In short, it is a matter of integrating and valuing ecosystem services in the planning and implementation of sectoral policies to generate other solutions at the same level as the conventional ones in use, which are necessary to meet the major social challenges facing municipalities.

Therefore, the BNS are a set of tools that go beyond traditional biodiversity conservation and its management principles by refocusing the debate on human beings and their actions, specifically with the integration of social factors:



The importance of a standard for SbNs

In recent years there has been a growing interest in BNS and a wide range of projects with this approach have already been

implemented in the urban environment. A large number of governments, communities, businesses and NGOs are increasingly adopting the BNS approach. For example, by 2020, two-thirds of the governments that supported the Paris Agreement included BNS measures in their national climate plans, such as reforestation, green infrastructure, sustainable agriculture and aquaculture, coastal protection and others.

IUCN Global Standard

The IUCN Global Standard for Nature-based Solutions, launched in July 2020, addresses this need. It consists of eight criteria and their associated indicators, addressing the pillars of sustainable development (biodiversity, economy and society). The user can thus assess the appropriateness, scale and economic, environmental and social viability of an intervention; consider its potential trade-offs; ensure transparency and adaptive project management; and explore possible linkages with international goals and commitments. The Standard also offers a user's manual and a self-assessment tool that identifies areas for improvement and further study. These criteria seek to address identified weaknesses related to scale, policy frameworks and complementarity with other interventions.

The 8 criteria and 28 indicators support users in assessing the extent to which a proposed solution meets the requirements

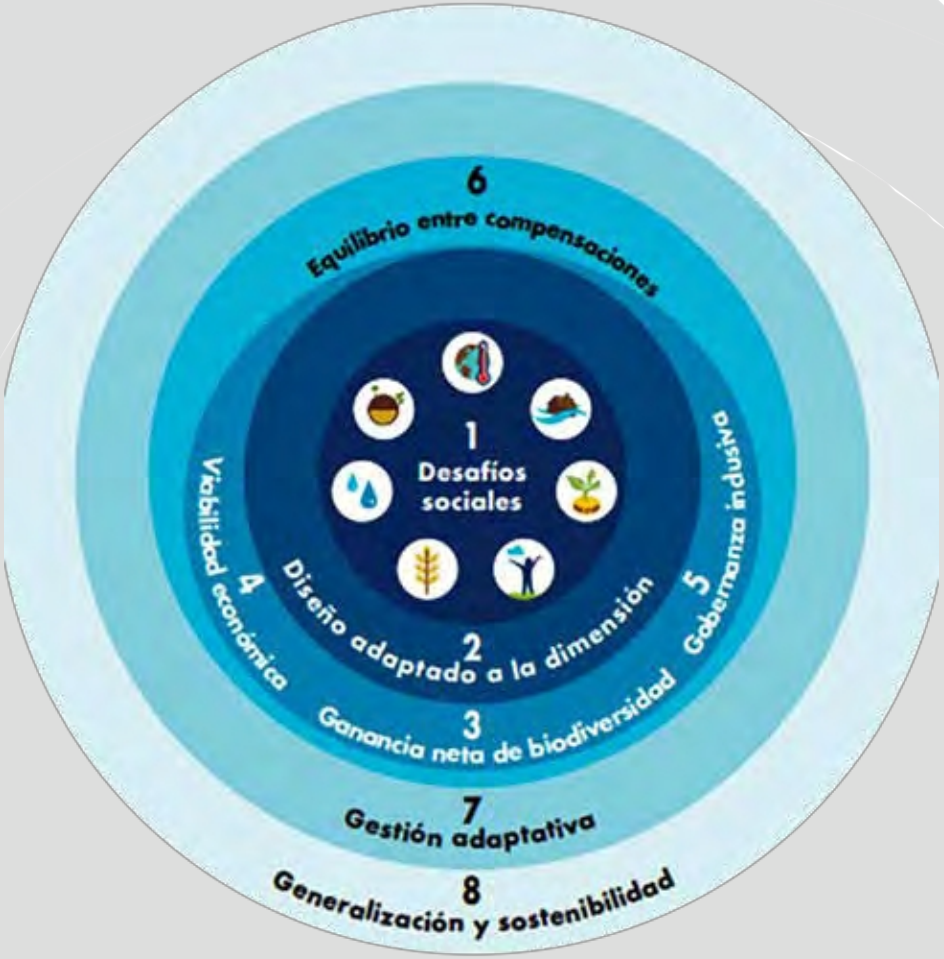


Figure 1. The eight criteria that make up the IUCN Global SbN Standard are interconnected. © IUCN

to become an SbN and identify what measures can be taken to further strengthen the robustness of the intervention,

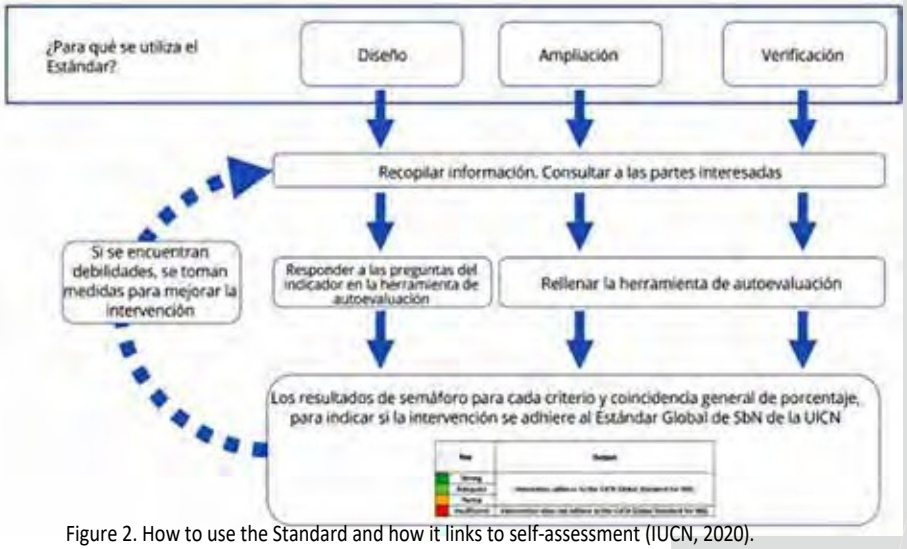


Figure 2. How to use the Standard and how it links to self-assessment (IUCN, 2020).

The system also allows users to design a solution to meet the criteria and indicators, while creating adaptive management mechanisms to maintain relevance and robustness. It also allows users to design a solution to meet the criteria and indicators, while creating adaptive management mechanisms to maintain the relevance and robustness of the solution throughout its lifetime.

Who the IUCN Standard is addressed to

The Standard has been created for anyone working in the field of SbN verification, design and extension. Users can range from public and private sector project managers, to landscape planners, urban planners, governments and representatives of the financial sector (donors and investors) in charge of formulating land management policies.

In November 2020, the CONAMA Foundation, together with the IUCN Centre for Mediterranean Cooperation, launched the Observatory for Nature-based Solutions in Spain (http://sbn.conama.org/web/index.php) with the aim of compiling ongoing initiatives and success stories that can serve as a reference. This platform brings together various experiences in the application of BNS in Spanish cities, as well as providing a meeting point for experts from various fields to create a network community for BNS in Spain.

The Chair of Nature Conservation has also been created at the International University of Andalusia (UNIA) (https://catedrauicn.org/), promoted by the IUCN Center for Mediterranean Cooperation, to develop teaching, training, research and knowledge generation activities, as well as the transfer and dissemination of the concept of Nature-based Solutions.

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Spanish Network of Cities for Climate

Nature-based solutions as a tool to address climate change

JOSÉ RAMÓN PICATOSTE RUGGERONI
Head of Adaptation Strategies Area of the Spanish Climate Change Office

Nature-based solutions (NBS) are particularly appropriate for adaptation and disaster risk reduction associated with climate change, and can contribute through carbon sequestration to efforts to reduce the concentration of greenhouse gases in the atmosphere.

The implementation of BNS for adaptation has grown strongly globally since the early 2000s, with evidence of multiple cases where they contribute to reducing exposure to climate risks. In the urban environment, flooding is mainly addressed through the implementation of urban green spaces and permeable surfaces to improve water infiltration and retention, and reduce runoff. The rehabilitation and protection of urban streams and wetlands, as well as nature-based management of peri-urban spaces and watersheds where cities are located, also contribute to reducing runoff peaks and thus the risk of flooding in urban areas. For their part, temperature-related risks in urban areas are reduced by green spaces, trees and green and blue BNS infrastructures, all of which have cooling effects that reduce the urban heat island effect.

In terms of climate change mitigation, BNS applied in cities can increase the capacity of carbon sinks through the protection and sustainable management of urban green elements and spaces and the restoration of peri-urban ecosystems. Globally, it is estimated that BNS in terrestrial ecosystems could contribute about one-third of the mitigation efforts needed to keep global warming below 2 °C (Griscom et al., 2017).

In addition to these climate change adaptation and mitigation benefits, BNS provide a wide range of additional direct and indirect environmental, social and economic co-benefits. For example, developing green infrastructure in urban environments, in addition to the adaptation and mitigation effects already noted, contributes to improving air quality, improving wastewater treatment and reducing water pollution.

However, many BNS developed in the urban environment remain relatively novel and small-scale solutions that present significant challenges and unknowns in terms of design, implementation and maintenance. There are significant knowledge gaps and uncertainties for future BNS research and innovation.

The Spanish platform for adaptation to climate change AdapteCCa is a tool for knowledge exchange and training on impacts, vulnerability and adaptation to climate change.

climate change. AdapteCCa has a collection of case studies in Spain that illustrate how BDS are being implemented for climate change adaptation in different sectors and environments, including urban. In addition, AdapteCCa is interconnected with the European adaptation platform Clima- te-ADAPT, providing access to all its BDS case studies.

The international framework provides an enabling context and a strong opportunity to support the development of BNS initiatives. Today, BNS are increasingly integrated into major international frameworks and organizations, such as the UN Framework Convention on Climate Change, the Convention on Biological Diversity, the Sustainable Development Goals and the 2030 Agenda, the Sendai Framework for Action for Disaster Risk Reduction, the OECD, etc. SbN have also been highlighted in IPCC, IPBES and other reports (e.g. UNEP's *Adaptation Gap Report* 2020) for their potential to address major global social and ecological challenges.

At the European level, BNS support the EU's main political priorities, in particular the European Green Pact framework. Within the Green Pact, the new European Adaptation Strategy of February 2021 includes, among its 14 actions, one specifically focused on the promotion of BNS, with a particular emphasis on the urban environment, and another focused on increasing support for local adaptation planning and implementation. For its part, the EU's Biodiversity Strategy 2030, which adopts

The new law, approved in May 2020, recognizes the BNS as essential for climate change adaptation and mitigation and establishes that they must be systematically integrated into urban planning, particularly in infrastructure, public spaces and the design of buildings and their surroundings.

At the Spanish level, the recently adopted National Plan for Adaptation to Climate Change 2021-2030 includes as a guiding principle the "Ecosystem Approach and Nature-based Solutions" for adaptation to climate change. The area of work relating to cities, urban planning and building promotes synergies with the Spanish Urban Agenda, adaptation to climate change in territorial and urban planning, and in the building sector. In addition, the National Strategy for Green Infrastructure, Connectivity and Ecological Restoration, adopted in 2020, fully considers the urban environment and aims to restore ecosystems and consolidate a network of fully functional and connected natural and semi-natural areas in Spain by 2050.

This favorable global, European and national context supports the development of BDS initiatives and offers multiple financial opportunities.

Firstly, the EU's Multiannual Financial Framework (MFF) cycle 2021-27, with its funds and instruments (European Social Fund plus, Regional Development Fund, LIFE Program, *Horizon Europe* Program, etc.), supports the development of the

European ecological transition policies contained in the Green Pact, including the new, more ambitious European Adaptation Strategy. Thirty percent of total MFF expenditure is to be allocated to climate-related projects, including Nature-based Solutions.

The extraordinary European funds, called EU *Next Generation*, together with the MFF, will contribute to recovering from the damage caused by the COVID-19 pandemic and to strengthening the resilience of socioeconomic and environmental systems in the face of the impacts of climate change. Within this framework, Spain is preparing its National Recovery, Transformation and Resilience Plan for the period 2021-2023, which includes a series of reforms and investments to be financed with this instrument, including numerous actions related to BNS and green infrastructures for the urban environment.

At the national level, the Plan de Impulso al Medio Ambiente para la Adaptación al Cambio Climático (PIMA-Adapta) finances adaptation projects within the framework of the National Plan for Adaptation to Climate Change. Its budget comes from the proceeds of the Emissions Trading Scheme and includes actions in different areas, including cities and the urban environment.

In 2020, PIMA-Adapta-Climate Change was launched, with a budget of 9 million euros and with the objective of encouraging and supporting adaptation to climate change in space.

The beneficiaries of PIMA-Adap- tation-Climate Change are local entities and municipalities with a population of less than 100,000 inhabitants and, in the case of actions for the design and implementation of the design and implementation of climate change adaptation and mitigation strategies, local authorities and municipalities with a population of less than 100,000 inhabitants, and in the case of actions for the design and implementation of climate change adaptation and mitigation strategies, local authorities and municipalities with a population of less than 100,000 inhabitants. The beneficiaries of PIMA-Adap- ta-Climate Change are local authorities and municipalities with a population of less than 100,000 inhabitants and, in the case of actions for the design and implementation of Low Emission Zones, the plan is aimed at municipalities with between 50,000 and 100,000 inhabitants. Nature-based solutions aimed at preventing risks associated with climate change in urban and peri-urban areas will play a prominent role among the actions to be financed. The Autonomous Regions are responsible for the management of the funds and their distribution among the Local Entities in their territory, in accordance with the territorialized distribution of the budget approved at the Sectoral Conference on the Environment.

In conclusion

Nature-based solutions are particularly appropriate for climate change adaptation and mitigation, while offering multiple co-benefits through the maintenance of numerous ecosystem services that benefit cities and the urban environment.

There are many BDS initiatives in the urban environment. Numerous information and knowledge platforms contain illustrative examples of how Spanish and European cities are adapting to climate change, which is a valuable source of

information and knowledge.

experience bank that enables the exchange and networking among the community that develops and implements SbN in the cities of Spain.

The international, European and national context is fully aligned to prioritize the ecological transition and contribute to the recovery of the damage caused by the COVID-19 pandemic, so as to strengthen the resilience of socioeconomic and environmental systems to the impacts of climate change. BNS in the urban environment is part of the set of investments planned for this purpose.

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The floodable park of La Marjal. Nature as a tool for the fight against climate change.

JUAN LUIS BERESALUZE PASTOR
Head of the Mayor's Office and Environment Service. Alicante City Council

Alicante, like other cities in eastern Spain, periodically suffers episodes of heavy rains associated with atmospheric phenomena such as cold drops or droughts that have historically caused considerable material and human damage.

In the management of the integral water cycle, Alicante has had to consider numerous actions aimed at preventing, avoiding or minimizing the effects of these torrential rains, including the construction of an extensive rainwater drainage network, the construction of water retention reservoirs in the event of floods and the duplication of the sewerage network by means of separate networks for rainwater in newly developed areas.

The Alicante City Council, in collaboration with the mixed company Aguas Municipalizadas de Alicante, has an Investment Master Plan that includes the execution of major projects aimed at improving water management in our municipality, complying with objectives of responsibility, sustainability and social commitment.

The Investment Plan implemented a first subway storage facility in the southern part of the city, in the "José Manuel Obrero" area. San Gabriel neighborhood, with a retention capacity of 65,000 m^3 of rainwater. Based on the experience of this reservoir, the possibility of designing reservoirs of this type in other sectors of the city with flooding problems arose.

The new urbanization area of the San Juan beach occupies an alluvial plain, where the Huerta de Alicante was located, known as "la Condomina", land that with the new urbanization and construction of roads was depressed, becoming, at specific points, floodable despite having a separate network for rainwater.

Having detected this problem, the Alicante City Council, through its Urban Planning and Green Zones Departments, drew up the construction project for a flood park that would meet both the objectives of a new green area and those of an infrastructure designed to prevent flooding.

As a result of the public-private partnership between the City Council and the mixed company Aguas Municipalizadas de Alicante, the flood park was built as a nature-based solution to prevent flooding, creating a wet area, a sea, imitating, as far as possible, the natural conditions of these ecosystems characteristic of the Mediterranean coast.

This meant incorporating into the park's design criteria aimed at maximizing biodiversity, promoting the attraction of

native wild species and to make rational use of reused water from the Monte Orgegia wastewater treatment plant in Alicante.

Therefore, the project meets the three strategic objectives of the water policy of Aguas Municipalizadas de Alicante and, consequently, of the City Council:

- Sustainable and responsible investment in full water cycle infrastructures
- Contribution to urban greening by encouraging the use of reclaimed water
- Social commitment to create a quality green space for the use and enjoyment of the citizens of Alicante.

The project has three clearly defined aspects: a hydraulic aspect, consisting of the creation of a rainwater retention infrastructure with a capacity of 45.000 m³, calculated for a return period of 50 years; a social aspect, since the park has become a very important area for the leisure and recreation of the local population and its visitors; and finally, an environmental aspect, since it has the biological and landscape characteristics of the Mediterranean climate, different from the rest of the surrounding green areas, which has made it a driving force for numerous aquatic species.

With respect to project data, the La Marjal park has an execution budget of €3,670,000 (excluding VAT).

and had a duration of 24 months. The financing was assumed entirely by the mixed company Aguas Municipalizadas de Alicante and the main contractor for the works was the company ECI- SA. During the execution of the project, which was completed in 2015, the municipal technicians who drafted the project were the project managers for each of the areas involved.

After 6 years of existence, the achievements obtained have been considerable. Flood damage has been avoided in several episodes of heavy rainfall, including the preci- pitation of March 13, 2017, a day when approximately 15,000 m^3 of rainwater was stored, and those of August 21, 2019, which retained 22,000 m^3. The amount of water accumulated in the La Marjal park since its commissioning, in March 2015, amounts to a total of 55,000 m^3 of water, which has been able to be raised to the treatment plant for reuse both in agriculture and in the irrigation of other green areas of the city of Alicante.

In addition, it has become a reference park for the city of Alicante and for the Alacantí region, carrying out numerous educational and scientific activities throughout the year.

The park allows the reuse of reclaimed water in the rest of the green areas in this sector of the city; it should be noted that currently more than 70% of Alicante's green areas are irrigated with reclaimed water.

But we cannot forget the environmental aspect: there has been an increase in biodiversity in the area, since its design, the selection of plant species and the diversity of the park's environments have encouraged the nesting of numerous aquatic species native to the Spanish Levant, including mallards, grebes, coots and even kingfishers. In addition to these, there are many other birds that use the park on their migratory routes as a resting and feeding point to continue their journey, as shown by the results of the scientific banding campaigns carried out annually in collaboration with the University of Alicante.

The uniqueness, location and presence of various food sources (both in the lake and in the vegetation) have made La Marjal a coastal wetland, a perfect attraction point for migratory birds that find the necessary resources and an area more than conducive to the nesting and stay of both summer and winter species.

In the various scientific banding campaigns carried out in the park, a total of 99 bird species have been detected, something difficult to expect in an urban park. These banding campaigns have been complemented with environmental education activities, holding several open days on the occasion of special days, such as World Water Day, World Bird Day, World Wetlands Day, etc.

On the other hand, in order to control the insect population in the humid zone, biological control measures have been incorporated to fight against insects, in order to avoid annoying neighbors, visitors and other animal species with the use of insecticides; among them we can mention the introduction of larval fish in the ponds and the installation of bat and swallow nests in strategic points of the park.

The daily management of the park is shared between the Alicante City Council, which is responsible for the maintenance and management of the park as a green area, and the company Aguas Municipalizadas de Alicante, which is responsible for the management and maintenance of all hydraulic infrastructure related to the regenerated water in the park.

In maintenance work, we can distinguish between two scenarios: dry weather and heavy rainfall. In the case of dry weather, the aim is to ensure, on the one hand, the quality of the stored water and, on the other, the correct functioning of the auxiliary systems associated with the water sheet, such as the pumping and recirculation system, the bottom aerators, level control, etc.

There is a program for cleaning the ornamental sheet of reclaimed water to prevent the proliferation of algae and the accumulation of sludge on the bottom, while at the same time, an annual cleaning, collection and elimination of algae that may be located at surface level and a total cleaning (bottom cleaning) is foreseen, which, as it requires the emptying of the lake, involves, as a prior step, the controlled capture of the fauna.

(birds, fish and amphibians) for their subsequent reintroduction. These works are carried out in collaboration with the wildlife recovery services of the Generalitat Valencia and, logically, it is taken into account not to influence the breeding periods of birds.

In the event of heavy rains, the La Marjal park functions as an anti-flood reservoir, storing the rainwater that, until its construction, accumulated and caused flooding problems in the area of Pintor Pérez Gil Avenue and adjacent areas.

The tasks and functions to be carried out in the so-called "rainy moment" scenario, both by Aguas Municipalizadas de Alicante, E.M. and by the various services of the City Council of Alicante, are defined in the "Protocol for the coordination of actions before the start-up of the La Marjal flood park".

From the beginning of the filling of the flood park until its emptying is complete, the management of the park as a whole is the responsibility of Aguas Municipalizadas de Alicante, E.M. The tasks to be carried out during this phase consist basically of sending the corresponding warning messages, both to municipal services and, if necessary, to users who may be using the park facilities (by means of an audible alarm system), and controlling and coordinating the filling and emptying phases of the park.

At this stage, and during the emptying phase, the stored water, depending on its characteristics, can be sent directly to the sea through the existing network of collectors in the area or diverted to the Monte Orgegia WWTP for treatment and subsequent reuse.

This is a true example of a project based on nature that, at an affordable cost, provides very interesting economic and social benefits, reducing flood damage, allowing the reuse of regenerated water in an area characterized by the scarcity of this resource and generating a semi-natural green space that becomes, in itself, an educational resource and a means of raising social awareness of climate change.

The park has won numerous awards and recognitions and has been used as an example of a sustainable project in various media and events related to the urban environment.

In conclusion

As an Administration and as managers of such important services as the integral water cycle, we believe that projects such as this one are an example of our commitment to contribute to the sustainability of our cities and to improve the quality of life of our citizens while preserving the environment.

The Park contributes to addressing the effects of climate change (against drought, through the use of reclaimed water and against the effects of climate change).

to flooding, as a storm tank), in addition to contributing as green space to the absorption of CO_2.

This local project contributes globally to the achievement of the Sustainable Development Goals of the UN 2030 Agenda, specifically Goals 6 Clean Water and Sanitation, 8 Jobs and Economic Growth, 9 Industry, Innovation and Infrastructure, 11 Sustainable Cities, Communities, 13 Climate Action, 15 Terrestrial Life and Ecosystems, and 17 Partnerships to Achieve the Goals.

And, most importantly, La Marjal Park is now a sustainable space that prevents flooding, contributes to the improvement of the environment and biodiversity, and generates value for citizens.

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An experience of urban renaturalization: the URBAN GreenUP project in Valladolid

ISABEL SÁNCHEZ ÍÑIGUEZ DE LA TORRE
Technical Manager of the URBAN GreenUp Project. Innovation and Economic Development Agency
of Valladolid. Valladolid City Council

The URBAN GreenUP project "*New strategy for re-naturing cities through Nature-Based Solutions*", funded by the European Union through the H2020 framework program, has as its main objective the development of a methodology for the implementation of Urban Renaturalization Plans in municipalities through the implementation of Nature-Based Solutions (NBS), to mitigate the effects of climate change, improve air quality and water management, as well as increase the sustainability of cities and their resilience. With a duration of five years, it began in 2017, so at the time of writing it is in the second half of the established execution period.

Coordinated by the CARTIF Technology Center, the project consortium is made up of 25 partners who participate in the different areas of the project to achieve the different goals established. Among them is the City Council of Valladolid, which participates mainly as a demonstrator city, together with Liverpool, in the United Kingdom, and Izmir, in Turkey, to validate the methodology developed through the implementation of different BMS in their municipalities.

The actual experience of these three pilot cities allows for the establishment of a replicable methodology, incorporating what has been learned to through the resolution of difficulties encountered, the exchange of experiences and knowledge acquired, and the promotion of good practices. The project also has five follower cities (Chengdu in China, Ludwigsburg in Germany, Mantua in Italy, Medellin in Colombia and Qui Nho'n in Vietnam) that are implementing their own urban renaturation plans following the strategies developed in the project. The replicability of this methodology is remarkable and it is intended to be a clear, simple and easy-to-establish tool for any city or urban area.

The URBAN GreenUP project defines 42 actions for the city of Valladolid, divided into technical (33) and non-technical (9). Within the techniques, 3 categories are established: urban renaturalization, sustainable water management and singular green infrastructures.

The project has an integrated approach for the implementation of these technical interventions in the city, but complemented with numerous non-technical social actions, which seek to facilitate citizen participation, increase awareness of climate change, and promote communication and dissemination of the project among citizens.

Valladolid's SbNs are located along a green corridor that incorporates a bike lane that crosses the city from east to west, ensuring the connectivity of the interventions and the

	RE- NATURING URBANIZATION	WATER INTERVENTIONS	SINGULAR DI	NON TECHNICAL INTERVENTIONS
Sub-Demo A	VAc1- New green cycle lane	VAc8- SUDs for green bike lane	VAc15- Cycle-pedestrian green paths	Common non-technical interventions: VAc37, 38, 39, 40, 41 & 42
	VAc2- Planting 1,000		VAc16- Smarts soils as substrate	
	trees VAc3- Tree shady		VAc19- Natural pollinator's mod.	
	places		VAc22- Green Noise Barriers	
Sub-Demo B	VA-c6- 3 Green Resting areas		VAc17- Smarts soils as substrate	Common non-technical interventions: VAc37, 39, 40, 40, 41 & VAc42
			VAc20- Compacted Pollinator's mod.	
			VAc23- Green Noise Barriers	
			VAc24- Vertical mobile	
	VAc4- Shade and cooling trees		garden VAc25- Green Façade	
			VAc26- Electro wetland Roof	
			VAc27- Green Covering	
			Shelter VAc28- Green Roof	
			VAc29- Green Shady Structures	
			VAc30- Urban Garden Bio-Filter	
Sub-Demo B		VAc9- SUDs (re-naturing	VAC18- Smarts soils as subtrate	VAc34: Educational path in
		parking) VAc13- Nat. wastewater	VAc19, 21- Natural pollinator's mod.	VAc13 VAc35: Educational àth in
		Plant VAc10- Rain gardens	VAc20- Compadted Pollinator's mod.	VAc11
	VAc5- 250 trees to re-naturing parking	VAc12- Green filter		VAc36- Urban Farming
		area Vac11- Floodable	VAc31- Urban orchards	Educational activities
		Park	VAc32- Community composting	Common non-technical interventions: VAc37, 38, 39, 40, 41 & VAc42
			VAc33- Small-scale urban livestock	
	VAc7- Urban Carbon Sink	VAc14- Green Pavement Parking		

Figure 1. Actions defined to be implemented in Valladolid within the framework of the URBAN GreenUP project (Source: URBAN GreenUP project).

Figure 2. Location of the SbN in Valladolid within the framework of the URBAN GreenUP project (Source: Google/URBAN GreenUP project).

understanding of the actions, not as separate elements, but as a whole. This corridor is not located on the periphery as a perimeter green ring, but crosses the historic urban center, which implies an important challenge to create solutions that bring nature closer to these already consolidated areas, without sufficient free space to make room for greenery, reconciling it with the requirements of the historic heritage.

Although some are still to be carried out, the city of Valladolid can already boast of having several of the urban renewal interventions implemented to improve the quality of life of its inhabitants, as well as to protect the environment.

In the center of the city are located several of the most outstanding actions carried out. Tourists and locals pose in the emblematic Plaza de Zorrilla, next to the word "Valladolid", which has been built in the city.

Figure 3. Vegetable Letters in Zorrilla Square in Valladolid (Source: Valladolid City Hall).

Figure 4. Vertical Garden next to the cathedral of Valladolid in Portugalete square (Source: Valladolid City Council)

in green. Ten vegetal letters on a wooden bench, showing the city's commitment to nature and sustainability. This place has become one of the most photographed spots in Valladolid, which implies a spectacular social repercussion.

In the central Portugalete square and in the commercial Santiago street, there are two more benches for pedestrians to enjoy, which incorporate a vegetal wall equipped with solar fans.

to refresh the environment, as an innovative solution. Different modules of planters in the form of plant boxes, distributed in different parts of the city (Atrio de Santiago, Plaza de San Benito and Plaza Mayor), complete the set of mobile urban vertical gardens, where the planting of vegetation on the ground is not possible.

The Plaza España has been dressed in green by incorporating a green roof on the canopy, which is configured as a garden in a green area.

Figure 5. Green roof on the canopies of Plaza España in Valladolid (Source: Valladolid City Hall).

Figure 6. Green roof in the municipal market of El Campillo in Valladolid (Source: Valladolid City Hall).

height. The well-being of the merchants at the fruit and vegetable market held there, as well as that of the shoppers, is significantly increased thanks to the thermal insulation and feeling of freshness that this solution provides.

When there is no soil available for vegetation, flat green roofs are a very simple solution to increase the green surface of cities and their associated benefits. A similar solution has also been chosen for the roof of the El Campillo market, with the use of different technical solutions, including the innovative use of natural sheep wool as an insulating material and plant substrate.

As a result of a public-private collaboration, the El Cor- te Inglés building on Constitución Street has an impressive green façade, whose design has been adjusted to the existing one, introducing vegetation in one of the most commercial and central streets of the city, encouraging consumption and making it much more pleasant for the passerby.

Figure 7. Green facade at El Corte Inglés in Valladolid (Source: Valladolid City Hall).

Figure 8. Newly installed green awnings in Santa María street in Valladolid (Source: Valladolid City Hall).

In the near-by Santa María Street, work will soon be completed on the plant canopies, which include the installation of an efficient lighting system with presence detectors to increase pedestrian safety. This solution is highly innovative, since the plant species are planted on a textile substrate and, through a hydroponic irrigation system, obtain all the nutrients necessary for their growth.

To improve noise pollution levels, plant noise barriers will soon be installed on Paseo Hospital Militar. The biofilter garden will also be installed centrally.

will be located in the Portugalete square to purify the air coming from the subway parking lot, through the passage of air contaminated by different substrates.

In addition to these interventions, the URBAN GreenUP project envisages the planting of numerous trees in different locations and the creation of an urban forest that will act as a carbon sink in the Santos Pilarica neighborhood in the east of the city. Several rest areas will be built for the enjoyment of the new green areas and plant species will be used to attract pollinating insects, which are essential for the recovery of the city.

biodiversity and ecological balance, also within the urban center. Another series of actions have been carried out to improve the city's urban gardens, such as the installation of composters.

Permeable pavements and sustainable urban drainage systems are the interventions related to efficient water management included in the project. Among them is the construction of an *electrowetland*: a small garden, fed by sewage water for its treatment, where, due to the characteristics of the different materials used, a positive and a negative pole is produced, generating electricity, as has been experimented in previous pilot projects. In this case, a further step will be taken, as it will be built for the first time on urban land in order to be able to assess the benefits on a real scale.

According to the experience of the city of Valladolid, the process of incorporating BDS into the urban fabric, and even more so in the consolidated historic center, is not an easy path. It could be said that the more innovative the solution, the more difficulties arise. The so-called "challenges and barriers" encountered include administrative difficulties, such as the complexity of administrative procedures; legal difficulties, such as the rigidity and lack of certain rules and regulations; social difficulties, such as the lack of understanding of some particularly innovative actions by some citizens; economic difficulties, mainly due to the lack of budget, etc., with technical difficulties being perhaps the most straightforward.

to be solved. However, the expected benefits in the city, both environmental (pollution reduction, reduction of the heat island effect, increased biodiversity, runoff control...), economic (creation of green jobs, savings in air conditioning systems and increased tourism) and social (improved quality of life and health, active participation, education in sustainability...) undoubtedly compensate for the efforts made.

The lessons learned by the city of Valladolid in the implementation of the SbN, and all the challenges that this implies, are taken into account in the development of the methodology for the renaturalization of urban plans, which is one of the main objectives of the project, as mentioned above.

This methodology, which is still under development, is a "step-by-step" process. It consists of 18 actions organized in 3 phases and 7 strategic steps. The phases refer to three different stages: the analysis of the city in its current situation, the different future renaturation possibilities that could be developed and the definition of the urban renaturation plan to be implemented. The strategic steps establish different actions or milestones, highlighting the participatory nature of citizenship and the creation of interdisciplinary groups as a formula for success, as well as the importance of establishing indicators to objectively quantify the impact of the different BMS with respect to a baseline scenario.

How to start?	1st . Understand your pre-sent	2nd . Choose your future aspirations	3rd . Integrate RUP and keep	"Renaturing Urban Plan".
A. Engage and Co-create	Action 1A. Identify and involve stakeholders	Action 2A. Prepare for co-delivery		Chapter I. Introduction to Re-naturig
B. explore	Action 1B. Undertand your "city" needs	Action 2B. Choose your "city" Targets	Action 3B. Prepare RUP Plan integration into the Urban Plans of Local Municipality	Chapter II. City Targerts
C Diagnose	Action 1C. Understand your "city" capacity	Action 2C. Evaluate NBS Scenarios and select one	Action 3C. Define list of NBS Projects and Actions	Chapter III. City NBS Adopted Scenarios
D Visualize	Action 1D. Map Challeges	Action 2D. Set spatial priorities for NBS	Action 3D. Prepare assesment of the Impact and Risck	Chapter IV. City Impact
E. Plan	Action 1E. Establish Baselines	Action 2E. Choose how success will be monitored	Action 3E. Prepare the Up-scale Plan	Chapter V. Monitoring Program and Action Plan
F. Inform	Action 1F. Promote the initiative	Action 2F. Publish the RUP	Action 3F. Define budget, roles and responsibilities	Chapter VI. Roles and Responsibilities
A. Engage and Co-create	Action 3A. Assess lessons learned and validate the strategy			Chapter VII. Processes and reforms

Figure 9. Urban renaturation methodology of the URBAN GreenUP project (Source: URBAN GreenUP).

This methodology is adapted to the reality of each urban area, allowing its application to an area, neighborhood or municipality. Depending on how advanced the area is in its renaturalization process, the methodology can be started at a different point. The order for the implementation of the methodology can be, according to the chart shown in the image above, either vertical (from top to bottom) or horizontal (from left to right). The methodology also has a circular and time-continuous character. To support the implementation of the methodology and its replicability, the URBAN GreenUP project includes the publication of a series of documents, catalogs and tools (available at www.urbangreenup.eu).

Thus, the URBAN GreenUP project, through the development of the methodology and the experience in the demonstrator cities, wants to contribute its grain of sand to the necessary process of renatu- ralization of urban areas for the benefit of all.

In conclusion

In order to increase the quality of life of their inhabitants, as well as to reduce the impact of climate change and protect the environment, the renaturalization of urban areas is necessary. Many urban development plans do not clearly envisage the use of Nature-Based Solutions as a way to increase the quality of life of their inhabitants, reduce the impact of climate change and protect the environment.

key elements in its configuration, so it is necessary to establish simple methodologies for its application. The development of methodologies that adapt to the different circumstances that a municipality may have is very important and it is essential to draw on real experiences. The URBAN GreenUP project aims to develop a replicable methodology that uses what has been learned in the implementation of different BMS in several demonstration cities, such as the city of Valladolid, where several of the interventions have already been successfully implemented. The process can be difficult, but the social, economic and environmental benefits achieved are motivating.

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LIFE-My Building is Green Project: application of Nature-based Solutions for local adaptation of educational and social buildings to climate change. Provincial Council of Badajoz

RAMONA AVILA GONZALEZ
LIFE *MY BUILDING IS GREEN* Project Technique

MIGUEL ÁNGEL ANTÓN GAMERO
Sustainable Building Technician. Provincial Council of Badajoz

The Rural Development and Sustainability Area of the Provincial Council of Badajoz participates as a beneficiary partner in the LIFE Project called "*Application of Nature-based Solutions (*NBS*) for the local adaptation of educational and social buildings to climate change*", together with the Spanish National Research Council (CSIC), as the project's coordinating partner; FUNDACIÓN CARTIF based in Valladolid, as technological partner; the Comunidade Intermunicipal do Alentejo Central (CIMAC), based in Évora (Portugal); and the municipality of Oporto (Portugal).

Both the Diputación de Badajoz and the project seek to learn how to adapt buildings to climate change, using Nature-based solutions, in order to contribute to climate change mitigation.

Climate change, mitigation and adaptation

Climate change is now recognized as one of the most serious environmental, social and economic challenges facing the world. The impacts of climate change (mainly heat waves, changes in annual and seasonal precipitation patterns, etc.) are affecting the well-being and health of children and the elderly as the most vulnerable groups. In addition to the strategic measures in which the Provincial Council of Badajoz is working to mitigate climate change (mainly in the improvement of building envelopes and the implementation of renewable energies in buildings and in the lighting and mobility sector), this European project plans to apply Nature-Based Solutions to an educational building in the province of Badajoz to improve its adaptation to climate change, that is, to go a step further in the face of the already evident consequences of climate change, seeking to adapt the buildings of the most vulnerable groups. At the same time, the project plans to work on two other buildings, one in the Alentejo region and the other in Oporto.

The choice of the pilot building

During the first stage of the project, the beneficiary partners work on the design and selection of any and all criteria for identifying pilot buildings for the project. In order to establish these criteria, the expected objectives and requirements needed to implement prototype Nature-based solutions are analyzed, as well as to monitor the

impact that these prototypes will have once implemented. Technical criteria were established, among others, on the configuration and characteristics of the roofs and facades, and the orientation of the building.

Once the criteria were known, the Department of Education of the Regional Government of Extremadura and the municipalities of the province were assisted in the selection of the most suitable school in the province as a pilot building to implement the planned Nature-based Solutions, with a pre-selection and subsequent selection of the most suitable building. In all the pre-selected schools we found a great predisposition and collaboration for the implementation of the project, which is a symptom of the great concern about the increasingly recurrent heat waves.

Finally, the most suitable building for our project was chosen as the Ga- briela Mistral Public School for Infant and Primary Education in Solana de los Barros, Badajoz.

SbN prototypes. Execution of the works

Once the pilot building on which to act had been chosen, and after an analysis of the European databases on Nature-based Solutions, intensive work was done on defining the prototypes, designing them expressly for this project, preparing and drafting the corresponding project and the optional technical specifications for the execution of the works.

The following prototypes of Nature-Based Solutions are expected to be implemented, mainly, among other objectives, to shade buildings from excessive sunlight at the beginning and end of the school year:

Façade shading prototypes

Among other prototypes, together with the action on roofs, it is considered that the sunny facades of the building should be the main object of action to avoid excessive sunlight on them. In the context of the project, an external façade framework has been designed to support the planting of deciduous climbing plants to allow beneficial sunlight in winter while providing shade in the hottest months.

With the collaboration of all the partners, a self-supporting modular structure was defined to be anchored to the facade of the building, with the aim of being replicated and used in any conventional facade. This is the FAVE prototype (façade vegetal), a structure that will serve as a support for the growth of climbing plants that will form horizontal and vertical shading screens, appropriate to the orientation of the façades.

The species chosen are the virgin vine and the Japanese vine, species naturalized in Extremadura.

Nature-based prototypes on roofs

The flat roofs of the buildings will be planted with plant species on substrates improved with recycled aggregates. Perennials and sedum plants have been chosen to be placed either directly on the substrate placed on the roofs or on elevated trays of little thickness to generate ventilation under the roofs.

Other prototypes

At the same time, it is planned to improve the shading of the buildings by planting large plant species on the exterior and creating shading in exterior areas to reduce the heat island effect in the building's surroundings, also enhanced by the provision of permeable soils, which will also reduce the flow of water to be treated by the sewage systems.

At the same time, one of the most effective measures will be enhanced: the ventilation of the building. To this end, automated ventilation systems will be installed as prototypes to generate night ventilation and thus cool the building.

It is expected that there will be no irrigation water consumption in the future and minimal consumption during the first two years after implementation, for which a rainwater collection system has been designed to be used for irrigation of the implemented solutions.

In order to specify the design of the solutions, simulations of the buildings have been carried out to determine their repercussions on the behavior of the buildings. The results are encouraging, as the expected objectives are expected to be achieved.

The building began monitoring in September 2019, before implementing the chosen solutions, with the installation of sensors that measure temperature, humidity and CO concentration$_2$, with the aim of verifying and evaluating, once the SbN prototypes have been implemented, the impact that has occurred and the importance of these measures as alternative climate adaptation solutions.

As an example, in September 2020, maximum temperatures of 32.7°C were recorded inside classrooms.

The project team is currently implementing and executing the set of prototypes of Nature-Based Solutions, which is considered to be the central and fundamental core of the project. The implementation works are scheduled to begin next May and will last five months, with the work being carried out *on* site during the summer vacation period, so as not to interfere with school activities, and should be completed before the start of the next school year, on September 15.

Dissemination and adaptation of policies

The project envisages the creation of actions and governance tools that will make it possible to sign agreements for the integration of Nature-Based Solutions into political, technical and institutional regulations and action plans.

Likewise, we are working on demonstrating the feasibility and transferability of Nature-based Solutions as sustainable adaptation measures to public and private stakeholders. Based on the experiences, results and evaluations carried out, we are working on the integration and transferability at local, national and European level, with the organization of expert and demonstration workshops in the pilot buildings, as well as the holding of congresses and technical meetings with organizations and stakeholders from the sectors of politics, building and climate change, creating capacities that allow improving the knowledge about BNS to the responsible authorities and users, directors and managers of education and social services centers, and to the building sector.

Expected results of the project

The following results are expected to be achieved with the implementation of the project:

- For the entire project: Reduce CO emissions by 20%$_2$ (27 tons per year) and NOx emissions by 7% (144 kg per year). Collect 2,700 ^{m3} of rainwater to reduce the volume to be treated in the sewage network.
- For each building: reduce irrigation water consumption by 50%, increase sustainable green areas by 0.5 ha, and reduce energy costs for cooling by 50% and heating by 10%.

In conclusion

Through the implementation of the project we aim to analyze and verify the impact of Nature-Based Solutions as climate change adaptation measures, promote sustainable ecosystem-based adaptation measures, and increase the capacity to apply this knowledge in practice through demonstration and dissemination.

In addition, it seeks to improve the governance of authorities in any sector so that they integrate Nature-based Solutions, with the creation and dissemination of governance tools and territorial agreements.

Finally, the project will contribute to the development and implementation of the European Union's climate change adaptation policy.

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