LIFE my building is green

LIFE17 ENV/EN/000088

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

Action: E2. Communication activities for the target audience.

Deliverable: E.2.1) Digital publication in 3 languages with the summary of the papers of the conferences and congress.

Date: 10/11/2023

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

Publication in 3 languages of the summary of conferences and congresses.

Date: 10/11/2023

Data Project

Project location:	Spain
Project start & end dates:	01/09/2018 - 31/12/2023
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:	+34 914203017
E-mail:	miguel.vega@rjb.csic.es
Project Website:	http://www.life-mybuildingisgreen.eu

Data Deliverable Responsible

Name Beneficiary:	CSIC
Contact person:	Jesus Muñoz
E-mail:	jmunoz@rjb.csic.es

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1. SUMMARY

This document is part of action E2. "*Communication activities for the target audience*", specifically framed in sub-action E2.1 "*European Conferences and Congresses on the impact and functionality of the NBS in cities*".

Project communication and dissemination is a roadmap for all partners, target groups and stakeholders that clearly sets out the communication objectives to be achieved. At the outset, the project idea, target groups and stakeholders should be contextualized, as well as the expected impact or achievements to be reached.

Sub-action E2.1 included two conferences in Badajoz and Porto and a European congress in Madrid on the impact and functionality of Nature-based Solutions (NBS) as sustainable tools for climate adaptation in buildings and cities.

For each event, a series of talks and debates were held, grouped by thematic blocks that dealt with aspects such as the impact of climate change on public buildings, management of the housing stock, innovative technology in terms of SbN, climate adaptation measures, certification and quality systems, etc. The event was also used to disseminate knowledge gained and results of the project and to provide recommendations to the different social groups to better share the climate problem in educational buildings.

This document presents the abstracts of the talks organized at the conference held in Badajoz on November 13, 2019, organized by the Diputación de Badajoz, the conference held in Porto on October 31, 2023, organized by the Porto City Council, and the final European congress of the project held in Madrid on September 19-21, 2023, organized by the Real Jardín Botánico (RJB-CSIC) in collaboration with the Madrid City Council.

2. INTRODUCTION

Brief presentation of the project

The LIFE-myBUILDINGisGREEN project is a project developed by a set of partners from the Iberian Peninsula, co-funded by the LIFE program of the European Union, and whose objective is the design, development and testing of innovative Nature-based solutions (SbN prototypes) to improve the bioclimatic comfort of educational buildings that allow the improvement of the well-being of the users of these buildings.

The project consortium is led by the Consejo Superior de Investigaciones Científicas (CSIC) through the Real Jardín Botánico (RJB-CSIC) and the technical support of the Instituto Eduardo Torroja de Ciencias de la Construcción (IETcc-CSIC). The beneficiary partners are the CARTIF technology center, the Badajoz Provincial Council, the Intermunicipal Community of Central Alentejo (CIMAC) and the Municipality of Oporto.

For the implementation of the Nature-based Solutions (hereinafter NBS), three pilot buildings have been selected within the framework of Action A1 of the project, which are kindergarten and primary schools located in Solana de los Barros (Badajoz, Spain), Évora (Portugal) and Porto (Portugal).

This project arises to address one of the effects of climate change that has intensified in recent years due to the consecutive heat waves experienced throughout Europe, but with more adverse effects in the southern region of the continent. As a result, education and social care centers in southern Europe experience indoor temperatures above 32ºC for several months of the year, making it very difficult to live in these buildings.

To this end, the project will implement the SbN mentioned in different parts of these buildings, such as roofs, facades or outdoor spaces, with a view to improving air quality and bioclimatic comfort both inside and outside the buildings, as well as soil permeability.

The development of the project will make it possible to achieve a series of environmental, social, economic and governance results aimed at improving the adaptation of cities to climate change. Among the results related to the scope of this deliverable, the following stand out:

- Installation of 19 SbN distributed in the 3 pilot buildings in Spain and Portugal;
- Reduction of at least 4ºC inside the buildings and improvement of the well-being of the users of these buildings;
- Reduction of energy consumption for cooling and water consumption for irrigation;
- Reduction in carbon dioxide (CO2) and nitrogen oxides (NOx) emissions;
- Citizen empowerment for the use of BNS as a way to adapt to climate change;
- Elaboration of good practice manuals for the application of BNS as tools for adaptation to climate change.

3. CONFERENCE SUMMARIES

3.1CONFERENCE IN BADAJOZ, 13-NOV-2019

The objective of this conference was to inform the target audience identified at regional level about the impact and functionality of SBN as sustainable tools for climate adaptation in buildings and cities. The attendees belonged mainly to public administrations, management teams and users of educational centers, associations and entrepreneurs of the construction sector and vocational training centers.

A total of 115 people participated, 83 of whom answered the survey on their sector. Most of the participants (58%) belonged to public administrations:

Five talks were presented and ended with a round table discussion summarizing the main points of the meeting.

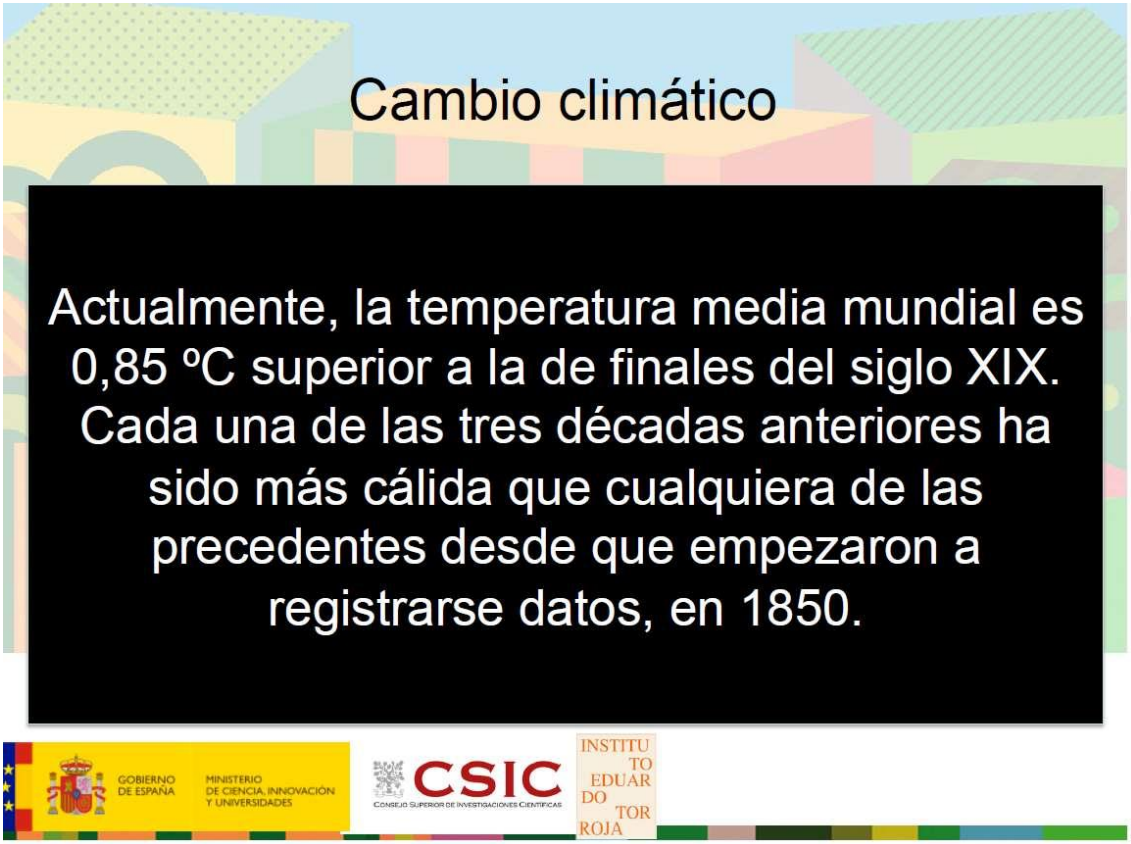
3.1.1 IMPACT OF CLIMATE CHANGE ON BUILDINGS. INTERNATIONAL, EUROPEAN AND NATIONAL STRATEGIES.

José Antonio Tenorio. Civil Engineer, Senior Scientist at the Eduardo Torroja Institute (CSIC).

The conference presented data on the increase in temperatures, on the updating of GHG emissions and energy efficiency targets, and on the changes needed in international, European and Spanish policies.

The speaker addressed several environmental problems and possible ways to mitigate them, such as circular economy, energy efficiency and sustainability. He approached these problems from the perspective of the concept of opportunity and opportunity cost, i.e., what we do not gain by not attacking these problems from the standpoint of improving efficiency, sustainability and the circular economy.

Finally, he explained the different European Directives related to the impact of climate change on buildings and their transposition to Spain, highlighting, for example, the long-term strategy for energy rehabilitation in the building sector in Spain.



3.1.2 REGIONAL STRATEGIES FOR ADAPTATION TO CLIMATE CHANGE. EXTREMADURA 2030.

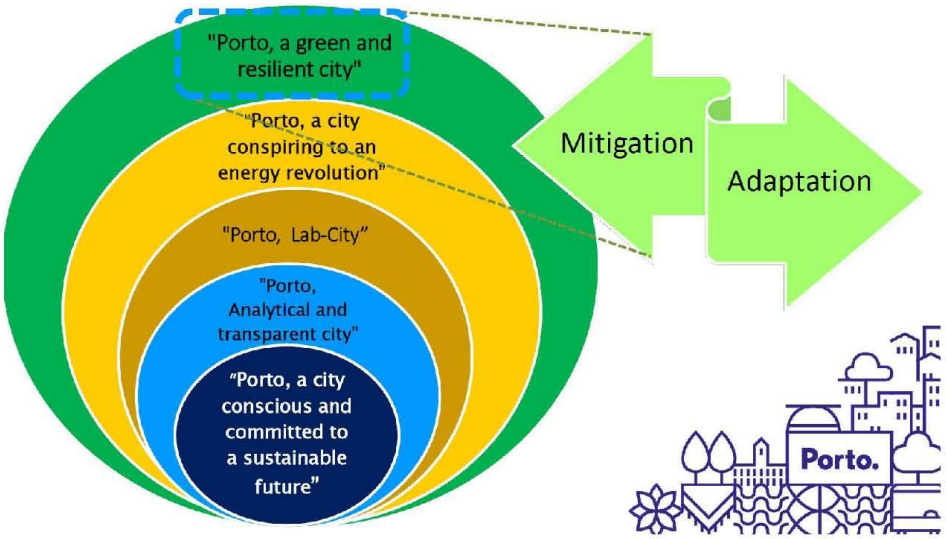
Fernando Babiano. Dirección General de Arquitectura, Junta de Extremadura; Teresa Batista, Comunidade Intermunicipal Alentejo Central; Nuno Morais, Câmara Municipal do Porto.

Three examples of actions at a regional geographical level were presented at this conference. Fernando Babiano presented the results of the LIFE RENATURAL NZEB project "Natural and Recycled Materials and Products to achieve Nearly Zero Energy Consumption Buildings with low carbon footprint", in which natural materials, such as cork, are used in the cladding of buildings, obtaining reductions of between 60 and 80% of the energy consumed in the buildings in which these SBN were installed.

Teresa Batista spoke about the air conditioning problems in the schools of the Intermunicipal Community of Central Alentejo. She explained the work carried out so far under the LIFE-MYBUILDING IS GREEN project, emphasizing the participatory process of students and parents in defining the solutions to be implemented in schools, which are a guarantee of the success of the work of our project.

Nuno Morais showed the actions carried out in transport in Porto, favoring the use of public transport and electric vehicles, after which they have obtained estimated reductions of 45,000 T and 500 T of CO_2 , respectively. Porto has three main municipal strategies on the

subject: ClimAdaPT.Local, for emissions reduction; Green Roofs, for the development and installation of Nature-Based Solutions; and FUNPorto, for the expansion of urban forests connecting territories used by citizens.



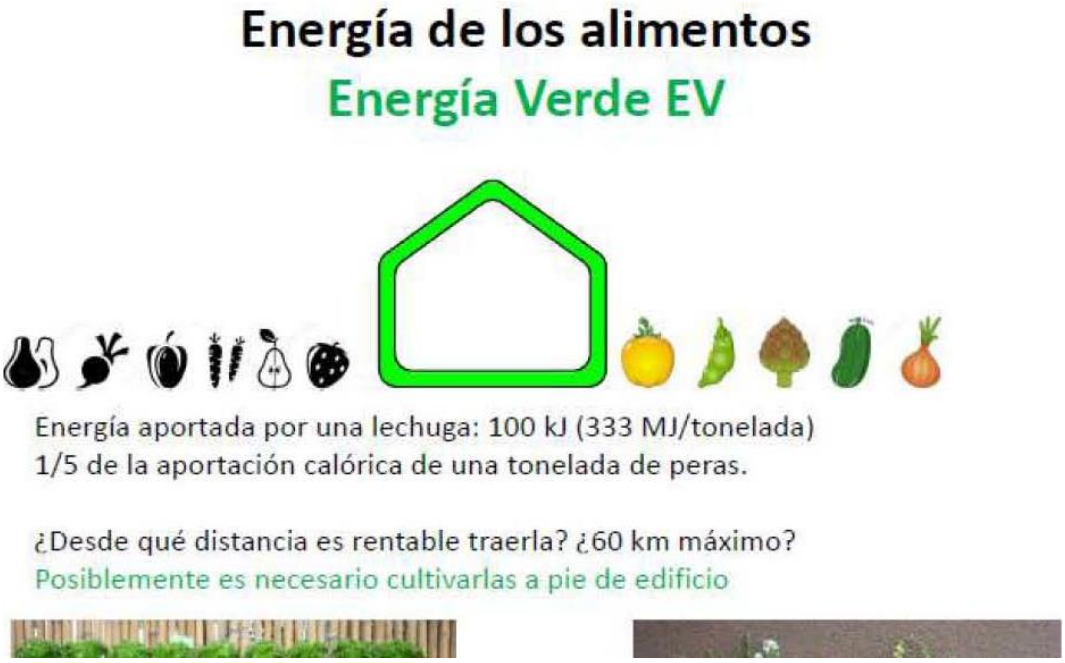
3.1.3 CLIMATE CHANGE ADAPTATION MEASURES. NATURE-BASED SOLUTIONS.

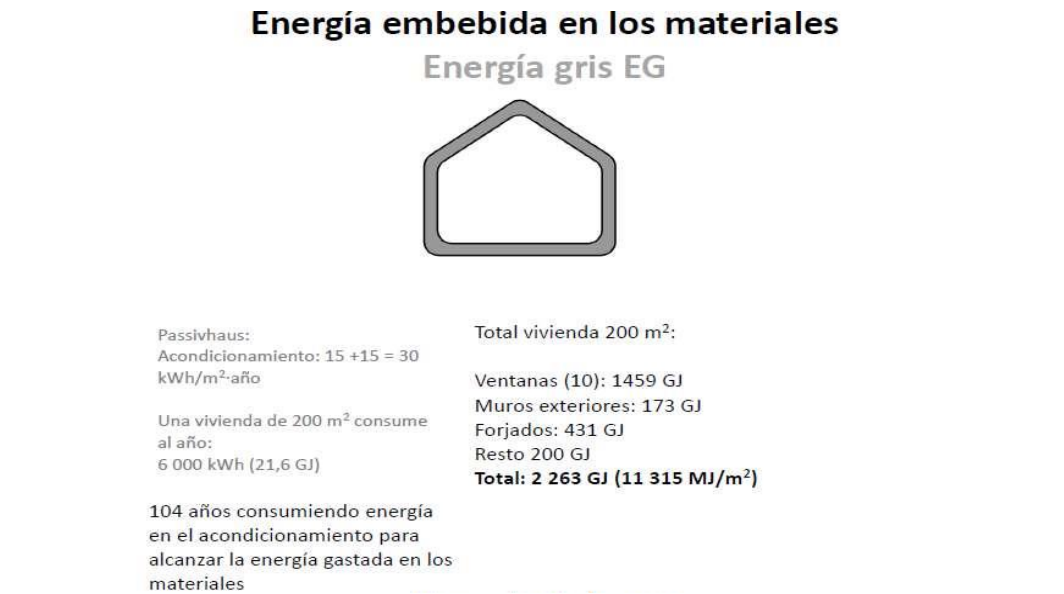
Javier Neila, Architect Escuela Técnica Superior de Arquitectura de Madrid.

Dr. Neila presented an interesting lecture in which he talked about the different energies needed for a building to function; some are obvious and consumed locally, but others are more difficult to perceive, although they can have an important weight in the total energy consumed:

- Easily measured energy, and therefore with possibilities of action, that which is necessary for:
  - building refurbishment
  - domestic hot water
  - electricity cost
- Energy without apparent responsibility, but necessary for the building to fulfill its function:
  - transportation linked to the use of the building
- Lost energy, that related to:
  - the drinking water connection
  - production of construction materials
  - the management of waste generated (gray water, sewage, waste, etc.).
  - the production of the food consumed

All these energies must be taken into account to generate buildings that are truly adapted to climate change, linking all of them to the use of the building.





3.1.4 NATURE-BASED SOLUTIONS FOR CLIMATE CHANGE ADAPTATION. ROOFS. FACADES.

Paulo Palha, President, Associação Nacional de Coberturas Verdes; Daniel Lacueva, Vice President, Asociación Española de Cubiertas Vegetales y Ajardinamientos Verticales.

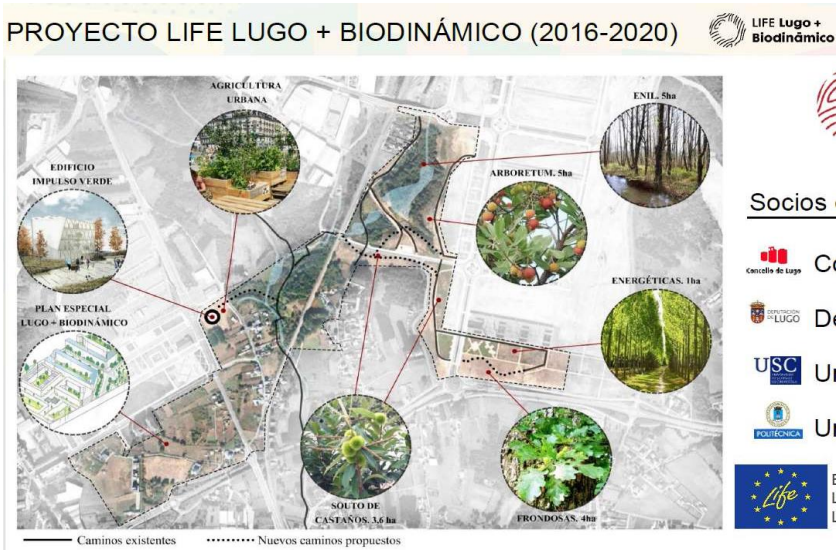
Paulo Palha addressed the use of green roofs in cities to reduce temperatures and noise levels inside buildings, their carbon footprint and heat island effect, as well as to increase biodiversity, job creation, economic development and real estate appreciation.

Daniel Lacueva established the differences between a vertical garden and a vegetal wall, and broke down a classification of vertical gardens with numerous examples of each, as well as the needs of each in terms of supports, nutrition, light and irrigation.

3.1.5 EUROPEAN PROJECTS APPLYING NBS.

Belén Feijoó, LIFE LUGO + BIODINÁMICO

This conference presented the LIFE LUGO + BIODINAMIC project, which seeks the use of Galician wood structures with demonstrations of each solution in a building called "Green Impulse". In this building, passive architecture solutions and renewable energies are used, while in its surroundings urban agriculture actions and the creation of green areas are promoted.


PROYECTO LIFE LUGO + BIODINÁMICO (2016-2020)
LIFE Lugo + Biodinámico
AGRICULTURA URBANA
ENIL. 5ha
EDIFICIO IMPULSO VERDE
ARBORETUM. 5ha
ENERGÉTICAS. 1ha
PLAN ESPECIAL LUGO + BIODINÁMICO
SOUTO DE CASTAÑOS. 3,6 ha
FRONDOSAS. 4ha
Caminos existentes
Nuevos caminos propuestos
Socios

3.2CONFERENCE IN MADRID, 19-21-SEP-2023

The final congress of the LIFE-myBUILDINGisGREEN project was held at the Royal Botanical Garden (RJB-CSIC) from September 19 to 21, 2023, where the results achieved to date were presented.

Participants included professionals in green infrastructure and the adaptation of buildings and cities to climate change, managers of projects and initiatives related to SBNs at various levels of government: European, national, regional and local, and citizens interested in learning how to approach a policy of transition to more sustainable building systems and city development.

The first day addressed topics such as the concept of green cities, sustainability and, especially, the role of SBNs in this context, showing several examples already in operation in Madrid. The second day focused on specific projects that promote the use of SBNs for the adaptation of cities and buildings to climate change, grouping projects co-financed by the LIFE Program of the European Union in the first session and other initiatives available in Spain in the second session. A third session addressed the concept of city and its history, with the aim of understanding its role as a community of knowledge and innovation that shares a climate and strategic vision of municipal public and climate policies.

The format was thematic sessions of 4-5 short talks (10') followed by a discussion by all present on the topics covered in each session.

3.2.1 SESSION 1: CLIMATE CHANGE STRATEGIES: FROM EUROPE TO THE LOCAL LEVEL.

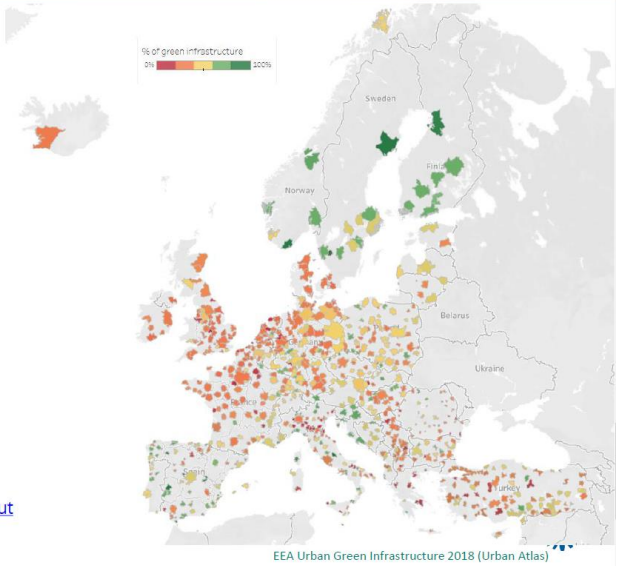
Ine Vandecasteele, Urban Adaptation Expert at the European Environment Agency; Jole Lutzu, Sustainable Resources, Climate and Resilience Technician at ICLEI Europe; Nuria Preciado Franch, Cities Area, Fundación Biodiversidad; Andrea Gonçalves, Architect of the Environment and Development Unit of the Intermunicipal Community of Central Alentejo, CIMAC; Luis Tejero, S.G. for Energy and Climate Change, Madrid City Council.

Ine Vandecasteele started with her talk "**Adaptation Strategies in Europe: The role of NBS**", in which she presented the different EU actions to integrate NBS in the different policies and sectors of application. She also showed the different calls included in the EU Adaptation Strategy to achieve a faster and more effective adaptation.

Integrating NBS in cities

~ 42% **Green infrastructure** (green and blue spaces) in city area in 38 EEA member countries 2018
highest (96%) Cáceres in Spain, lowest (7%) Trnava, Slovakia.

Publicly accessible green areas only 3% of the total city area. Varies - Geneva (Switzerland), The Hague (Netherlands) & Pamplona/Iruña (Spain), seeing accessible green space account for more than 15% of the city area.



How green are European cities? Green space key to well-being – but access varies — European Environment Agency (europa.eu)

EEA Urban Green Infrastructure 2018 (Urban Atlas)

Jole Lutzu, in his talk "**European examples of urban adaptation. The role of nature-based solutions**" showed how ICLEI (Local Governments for Sustainability), a global network of more than 2500 local and regional governments committed to sustainable urban development in more than 100 countries, work to create sustainability policies and drive local action for low-emission, nature-based, equitable, resilient and circular development.

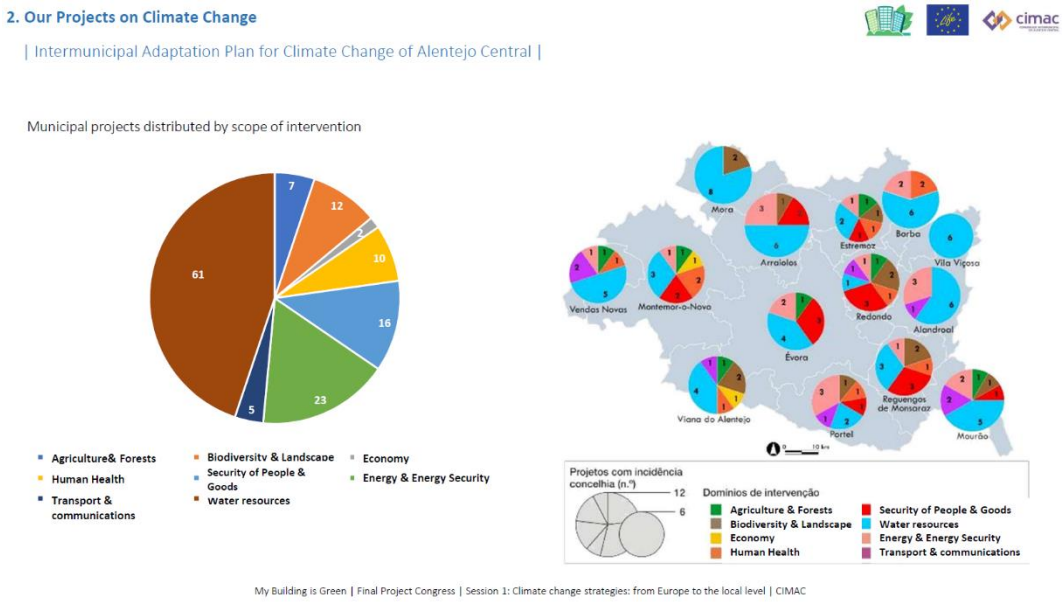
CINCO TRAYECTORIAS DE DESAROLLO QUE APOYAMOS

ICLEI Local Governments for Sustainability EUROPE

Las CINCO **trayectorias de desarollo** reflejan el enfoque de ICLEI para lograr una ciudad sostenible, así como las contribuciones locales a la aplicación de los objetivos establecidos en marcos internacionales como los Objetivos de Desarrollo Sostenible. Cualquiera de nuestros proyectos o iniciativas individuales puede orientarse a lo largo de uno o más trayectorias específicas. También estudiamos cómo se conectan entre ellas para fomentar el cambio de forma INTEGRADA. Por ejemplo, consideramos cómo el desarrollo basado en la naturaleza contribuye a la resiliencia, o cómo introducir la equidad en el desarrollo con bajas emisiones.

Nuria Preciado, in her talk "**Urban renaturalization as a strategy against climate change**", informed about the different calls for proposals that Fundación Biodiversidad has open for the implementation of SBN in the urban environment. She emphasized that the projects must address solutions from an ecosystemic approach, be ecologically coherent and promote ecological succession and natural processes and cycles.

In her talk "**Climate change strategies: from Europe to the local level**", **Andrea Gonçalves** talked about the different projects developed by CIMAC that address problems related to climate change.



As a culmination of this session, **Luis Tejero** showed us in "**Strategies against climate change: from Europe to the local: Madrid**" different SBN already underway, such as the renaturalization of the Manzanares River, the network of community orchards and gardens, the network of school playgrounds and environments and the Metropolitan Forest, major actions developed in Madrid in recent years.

3.2.2 SESSION 2: NATURE-BASED SOLUTIONS FOR THE IMPROVEMENT OF THERMAL COMFORT IN CITIES IN SPAIN AND PORTUGAL.

Alejandro Peña Paredes, Director of the Rural Development and Sustainability Area of the Badajoz Provincial Council; Marta Pinto, Head of the Environmental Management Section of the Municipality of Oporto; Francisca Hipólito, R+D+i Technician at Las Naves, Valencia City Council; Andrés de las Alas-Pumariño, General Coordinator of the Sustainable Development Area of the City, Fuenlabrada City Council; Jesús Muñoz, IP LIFE mBIG.

In "**Climate change and SBN in small municipalities**", **Alejandro Peña** discusses the SBNs that can be implemented by local entities and that, despite not being large cities, have a great impact on the territory, especially in the most environmentally valuable areas.

Marta Pinto showed in "**Natural Based Solutions in Porto**" some SBNs that are being applied in Porto, mainly related to surface water permeability and the creation of parks that connect areas of the city that are now poorly connected.

Francisca Hipólito presented the "**GrowGreen Project**", a European project of which one phase is being developed in the city of Valencia. In this city its objectives are to implement a series of SBN that improve the living conditions of the neighborhoods through the use of gray water, installation of green roofs and facades, the creation of biodiverse gardens with native species that function as corridors between areas of the city whose connectivity now passes through hard areas, unpleasant for the citizen.

Andrés de las Alas-Pumariño presented the work of the Fuenlabrada City Council in his talk "**Sustainable city development: regeneration - built city - sustainability**". Fuenlabrada, a city in the metropolitan area of Madrid, is divided by several infrastructures (railways, highways, etc.) that break up the urban fabric. Its objective is to use these infrastructures as biological corridors, as well as to connect the different neighborhoods by means of SBN.

This first session ended with a visit to several actions of the Madrid City Council to learn in situ about the challenges involved in these changes in the mentality of decision-makers and citizens themselves: the renaturation of the Manzanares River,

and a visit to a school performance:

3.2.3 SESSION 3: EUROPEAN PROJECTS FOCUSED ON THE DEVELOPMENT OF NATURE-BASED SOLUTIONS.

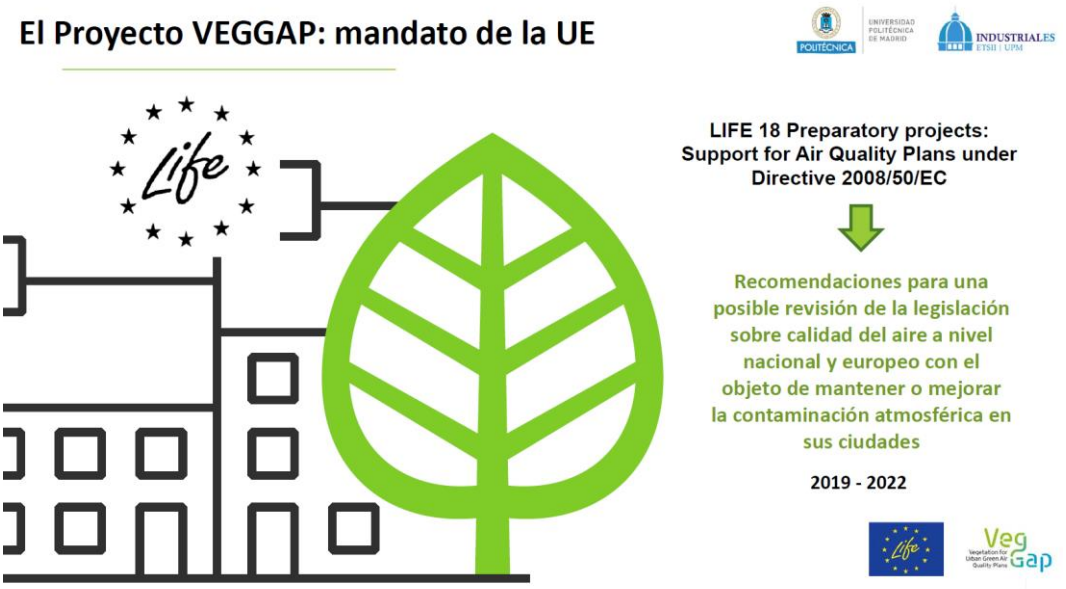
Miguel Vega, General Coordinator (LIFE-myBUILDINGisGREEN); Hugo Riquelme, Co-founder of Singular Green; Marta Pinto, Head of Environmental Management Section of the Municipality of Porto (H2020 URBINAT); Rafael Borge, Professor at Universidad Politécnica de Madrid (LIFE VEG-GAP); Lucas Perea Gil, Head of Cooperation and Funds Department of EMASESA (LIFE WaterCool); Carmen Alonso, IETcc-CSIC (LIFE-myBUILDINGisGREEN).

Miguel Vega presented the **LIFE myBUILDINGisGREEN** project, with special emphasis on the prototypes used for green facades and roofs, ventilation, exterior structures and pavements that allow rainwater permeability. He also presented the progress made towards the inclusion of SBNs in the technical building codes.

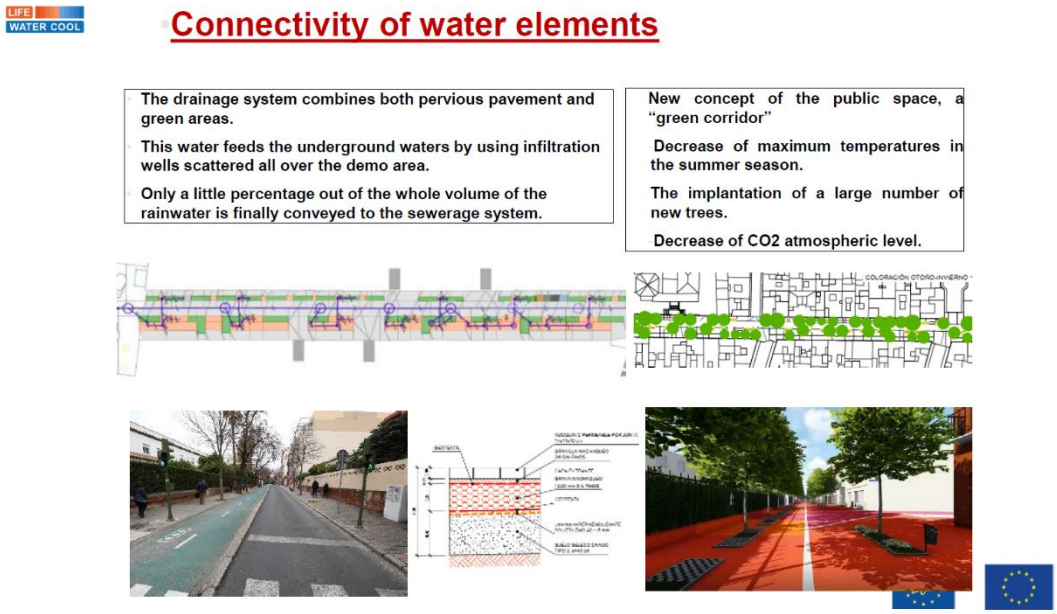
Hugo Riquelme, from **SingularGreen**, presented the prototypes that will be installed as part of the myBUILDINGisGREEN project, as well as several SBNs already installed in several Spanish cities, such as Alcoy, Puertollano or Valencia.

Marta Pinto presented the action "**Alameda de Cartes Park: the why and the how**", planned within the URBiNAT project. In this action, a participatory process was carried out so that the citizens were a determining actor in the actions carried out by the Municipality of Porto.

Rafael Borge presented the LIFE **VegGap** project, whose objectives are to quantify the contribution of vegetation as both a source and a sink of pollution, as well as to quantify the effect of urban ecosystems on temperature (heating and cooling) and their impacts on air quality.



This session was closed by **Lucas Perea**, who spoke about the project "**LIFE WaterCool - Water efficient systemic concept for the climate change adaptation in urban areas**", which aims to increase the thermal comfort of urban infrastructures such as bus stop shelters, pergolas or shading in urban parks, reusing groundwater in a sustainable way.



3.2.4 SESSION 4: OTHER INITIATIVES FOR THE PROMOTION OF NATURE-BASED SOLUTIONS.

Raquel Marijuan (CARTIF); Jesús Iglesias, European Union Climate Pact Ambassador (SBNCLIMA S.L.); Paula Rivas, Green Building Council Spain; Víctor Irigoyen, Observatory of Nature-based Solutions, CONAMA Foundation; Jorge del Préstamo, Spanish Association of Green Roofs and Vertical Landscaping (ASESCUVE); Miguel Vega, General Coordinator (LIFE-myBUILDINGisGREEN).

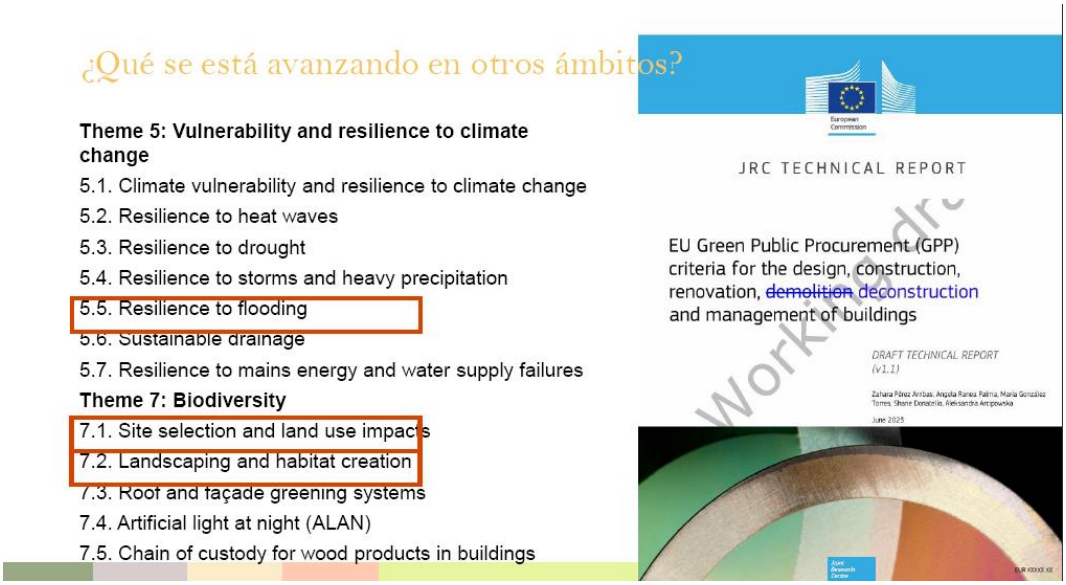
This session was moderated by Raquel Marijuan, and private or sectoral initiatives that promote the use of SBNs were presented.

Jesús Iglesias, in "**Nature-based solutions: definition, standard and governance**", showed initiatives led by civil society and warned about the inappropriate use of language and even actions to promote SBNs in *greenwashing* campaigns that distort the honest work of adaptation.

5. Gobernanza inclusiva

Fuente: Bosque Urbano Málaga, 2021, http://bosqueurbanomalaga.org/

Paula Rivas, in her talk "**The SbN in sustainability certifications**" addressed the work being done by the Green Building Council Spain to get the contributions of SBNs certified, which would increase their use. Currently there are contributions that are difficult to measure for certification, others are only measured qualitatively, while only those related to water consumption are measured quantitatively. Current work is focused on achieving quantitative parameters also for biodiversity increases, without neglecting other aspects such as energy efficiency or carbon sinks, the change in the urban microclimate or the management of rainfall and runoff.



Victor Irigoyen presented the CONAMA Foundation, whose objective is to promote an open dialogue to foster sustainable development in Spain and Latin America. One of its tools is the "**Observatory of Nature-based Solutions**", a platform for the exchange of knowledge in the BNS sector that constitutes a community available to experts in the sector for the exchange of knowledge, the creation of alliances and the dissemination and promotion of BNS actions.

Jorge del Préstamo, representing the Spanish Association of Green Roofs and Vertical Landscaping, spoke to us about the "**Benefits of green envelopes**", emphasizing aspects such as energy efficiency, acoustic insulation, waterproofing, and finally the creation of new spaces and the added value of real estate.

Miguel Vega closed this second day by presenting the main conclusions of the day, and encouraging the participants to interact and establish contacts to broaden the target groups of our work. After lunch, **Jesús Muñoz** gave a guided tour of the Royal Botanical Garden, highlighting the reasons why this area of Madrid was recently declared a UNESCO World Heritage Site.

3.2.5 SESSION 5: NATURE, CULTURE AND EVOLUTION.

This session, led by the Madrid City Council, included an introductory talk in which **Eudald Carbonell**, Co-Director of the Sierra de Atapuerca excavations and General Director of the Atapuerca Foundation, explained various concepts about nature, culture and evolution that explain the birth of cities and their development up to the present day. Later, **Cristina Pino**, General Director of Green Zones of the Madrid City Council, presented the Madrid Biodiversity Plan.

Afterwards, technical staff from the City Council and congress participants took part in a workshop for the creation of a knowledge and innovation community that shares the same climate and strategic vision of municipal public and climate policies. The workshop was led by Luis Tejero, Marisol Mena, Marta Román and Begoña Pernas.


¿Hacia dónde vamos?
Feminización ciudadana
REAL JARDIN BOTANICO CSIC
REAL JARDIN BOTANICO CSIC
Life

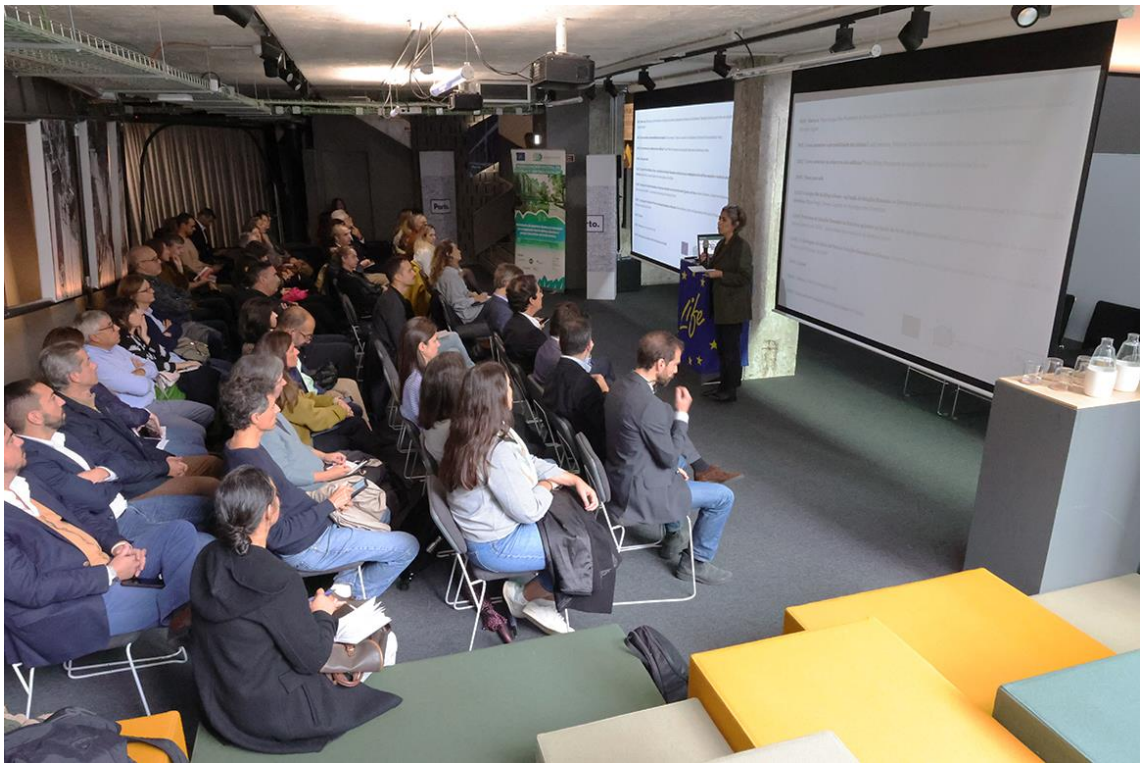

Life

3.3CONFERENCE IN PORTO, 31-OCT-2023

This conference took place on October 31, 2023. The lectures were given at the Porto Innovation Pole building, followed by a visit to the facilities of the Falçao Basic School where the SBNs installed by the LIFE project were shown.

The event was aimed primarily at municipal technicians, architects and urban planners, urban project developers, professors and university students of architecture and landscape architecture, as its main objective was to show these professionals sustainable, economical, multifunctional and flexible solutions to address the environmental challenges we face in cities, and particularly in educational centers that are becoming increasingly inhospitable to carry out their educational function.

The talks were attended by 55 people, and the visit to the Falçao Basic School by 32 people. The participants were decision-makers (e.g., the Councilor for the Environment of the Municipality of Vila Nova de Gaia, a neighbor of Porto), technicians from the Municipality of Porto and other neighboring municipalities, researchers from Porto universities, and engineers and architects interested in the use of SBN in their work.

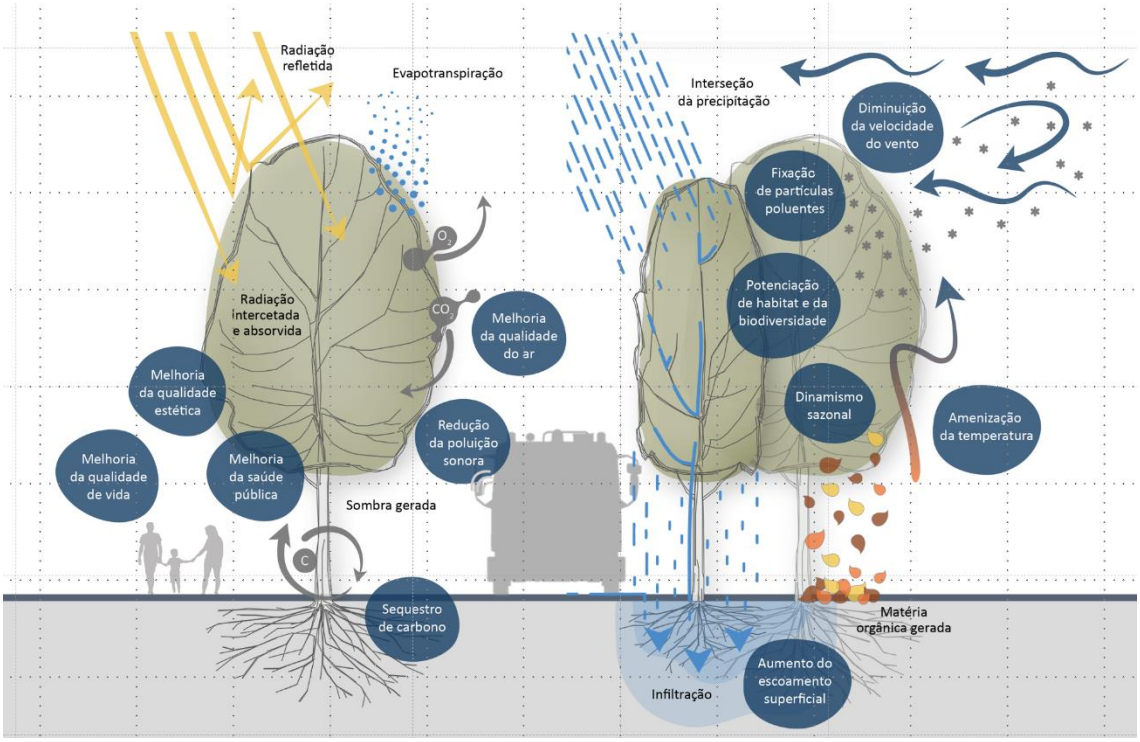


Five lectures were presented and ended with a discussion of the topics covered in the talks.

3.3.1 HOW TO INCREASE THE PERMEABILITY OF CITIES?

José Lameiras, Assistant Professor at the Faculty of Sciences of the University of Porto.

This presentation dealt with the importance of making cities more permeable, and the role of green spaces in this permeability. The example of the Asprela Park was given, which can retain and slow down 10,000 m^3 of water. A map of Porto's soil permeability was presented, showing 32% green spaces and 68% urban space, of which 24% corresponds to buildings and 44% to roads and paved areas. One of the objectives of the city authorities is to reduce this figure of impervious land because, despite having a large green area per inhabitant, public access space is still much lower. Also highlighted was the article published by the European Commission in June of this year which states that increasing tree cover to 30% of cities could reduce deaths associated with the urban heat island effect. In this context, the importance of the Municipal Afforestation Plan, a strategic document whose main objective is to improve sustainable public forestation in the city of Porto, was recalled. The presentation also covered other city projects designed for urban regeneration and climate resilience through nature-based solutions, such as the new Alameda de Cartes Park. This park was designed to promote biodiversity and ecological enhancement of the urban landscape, foster microclimatic comfort, and increase the quality of life and safety of the resident population.

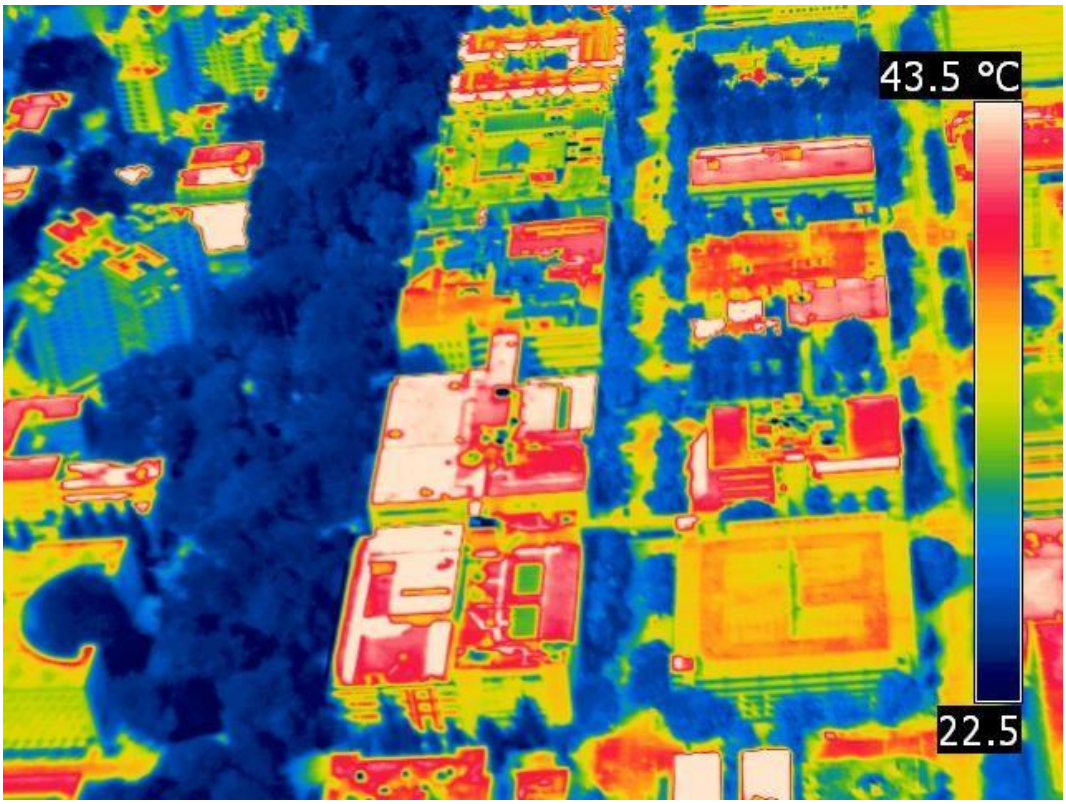

Radiação refletida
Evapotranspiração
Interseção da precipitação
Diminuição da velocidade do vento
Fixação de partículas poluentes
Potenciação de habitat e da biodiversidade
Dinamismo sazonal
Amenização da temperatura
Radiação intercetada e absorvida
Melhoria da qualidade do ar
Melhoria da qualidade estética
Melhoria da qualidade de vida
Melhoria da saúde pública
Redução da poluição sonora
Sombra gerada
Sequestro de carbono
Matéria orgânica gerada
Infiltração
Aumento do escoamento superficial

3.3.2 HOW TO ENHANCE THE COVERAGE OF BUILDINGS?

Paulo Palha, Presidente da Associação Nacional de Coberturas Verdes; José Lameiras, Professor Auxiliar na Faculdade de Ciências da Universidade do Porto.

In this presentation he posed the question: Why don't we use the rooftops of buildings to improve the livability of cities? It discussed their potential importance and the myriad contributions they can make to the creation of healthy, sustainable, biodiverse and resilient urban territories. In Porto, 131 green roofs have been identified to date. This presentation gave several examples of the benefits of green infrastructure: increasing the green surface in an urban context and reducing the negative impact of buildings in an urban environment. The water retention capacity of 10cm of substrate is 90% of summer rainfall and 75% of winter rainfall, increased photosynthetic activity, reduction of the greenhouse effect, reduction of the heat island effect, absorption/filtration of pollutant gases and suspended particles from the atmosphere, promotion of biodiversity, among others. Several examples of what has been done in this area around the world were also presented.

The presentation also made reference to the Quinto Alçado de Porto project, which aims to define the model that the city of Porto should adopt to include green infrastructures, particularly green roofs, in the city's environmental and urban strategy.



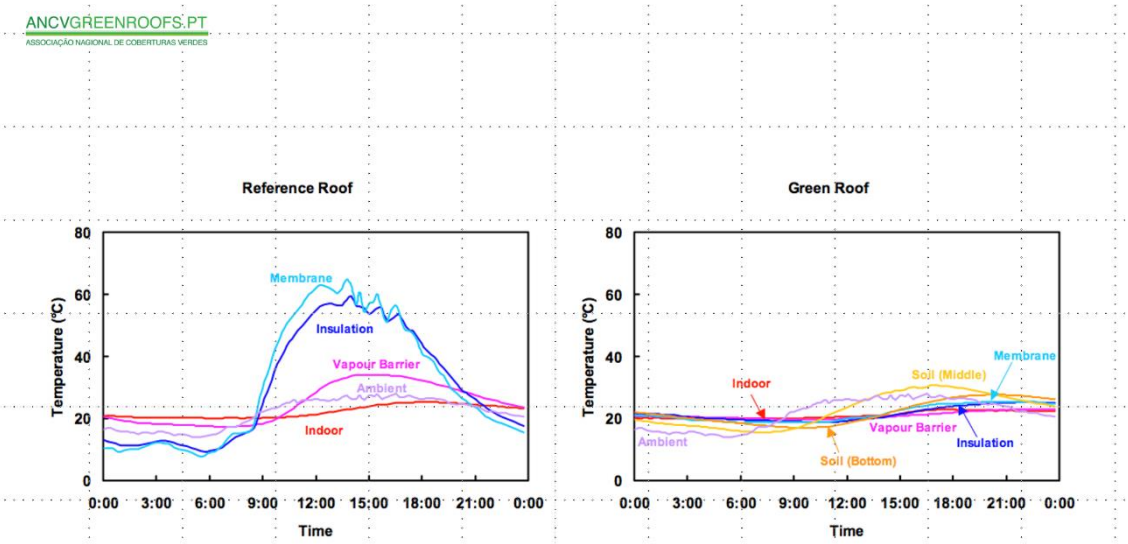


Figure 3: Temperature profile within the roofing systems on a summer day (July 16, 2001) indicating that the Green Roof reduces the temperature fluctuations within the roofing system.

Fonte: National Reserch Council Canada, Liu, K.; Baskaran, B. Thermal performance of green roofs through field evaluation, 2003

3.3.3 MY BUILDING IS GREEN PROJECT - APPLICATION OF NATURE-BASED SOLUTIONS FOR LOCAL ADAPTATION OF EDUCATIONAL AND SOCIAL BUILDINGS TO CLIMATE CHANGE

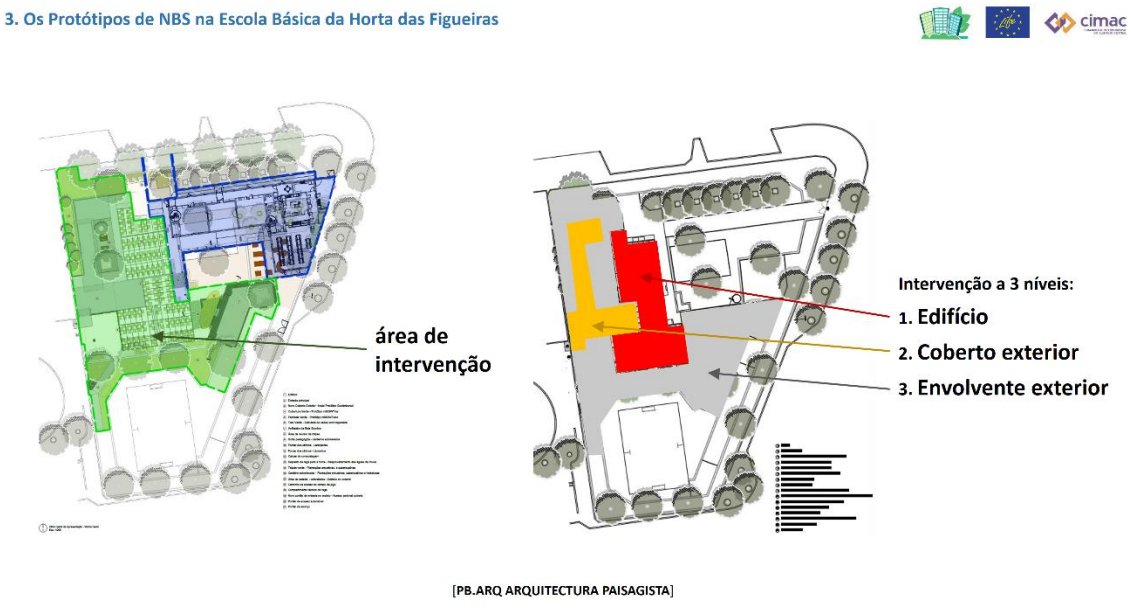
Miguel Vega, Consejo Superior de Investigaciones Científicas.

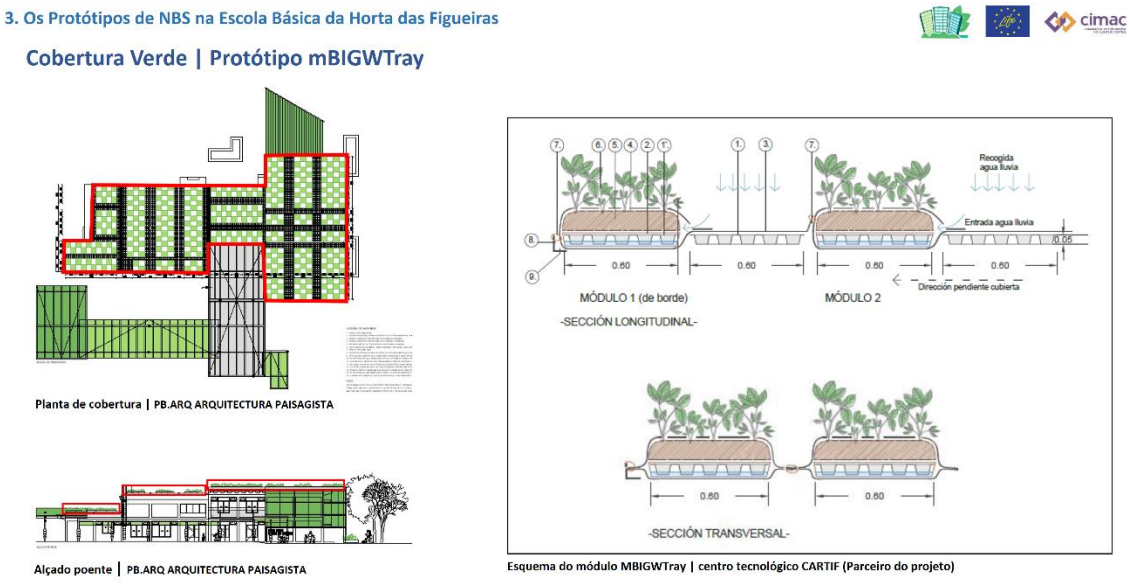
General presentation of the LIFE myBUILDINGisGREEN project. Discussed the proposed SBNs, many of which include prototypes: green facades and roofs, ventilation, exterior structures and pavements that allow rainwater permeability. Also discussed in detail was how SBNs are climate adaptation tools that reduce building costs while increasing comfort. Governance actions were discussed, the most important of which is the fight to integrate SBNs into technical building codes.

3.3.4 PROTOTYPES OF NATURE-BASED SOLUTIONS APPLIED AT THE HORTA DAS FIGUEIRAS SCHOOL, IN ÉVORA

Andrea Gonçalves, Environment and Development Unit of CIMAC - Comunidade Intermunicipal do Alentejo Central.

Presentation of the project we are carrying out in the Horta das Figueiras School in Évora in the framework of the LIFE myBUILDINGisGREEN project and in which the NBS are the protagonists. The NBS prototypes were installed during the school vacations and now technical site visits are being organized for municipal technicians, administrations and construction companies with the aim of provoking a multiplier effect of knowledge and replicability of the SBNs in the Central Alentejo region. The works carried out in the building were shown. An important component of the project is the monitoring of the impact of the SBNs, which is only possible in the medium term.





3.3.5 THE APPROACH OF THE CITY OF PORTO TO NATURE-BASED SOLUTIONS

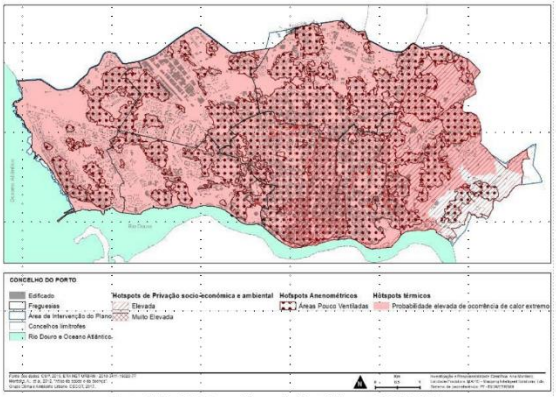
Pedro Pombeiro, Director of the Municipal Department of Planning and Environmental Management of the Municipality of Porto.

Porto's approach to Nature-Based Solutions was presented. Through an "X-Ray of the city", the presentation demonstrated that NBS are the best solutions to combat climate change. It was compared to what would be a medical diagnosis of the city. For the Porto City Council, BSSs play an essentially instrumental role (i.e. they are a means to an end). Using medical terminology, the speaker invited to imagine the city as a living organism, which starts to show some symptoms and pathologies. "The last complementary examination has to do with demography and health, and Porto has a vulnerable population," said Pedro Pombeiro. After presenting the clinical picture of the city, he considered that the therapy (solution) for these situations is preventive and curative. "In Porto we are exploring a lot the NBS, which are experimental in nature and there are no global solutions, but tailor-made suits for the problems." One example was the Asprela Park, funded by Horizon 2020, which has a sponge effect, i.e., it absorbs all incoming water. Among other measures, the Porto City Council has been increasing the permeable surface of the city, rehabilitating water pipes and doubling green spaces, favoring the sponge city effect, which is thus better prepared to deal with the effects of extreme weather events. He also spoke of other green spaces and urban projects that make the city more resilient: the City Park, which has the effect of a basin, the rehabilitation of the Tinto River - which through the Parque Oriental presents a "plunger" effect -, the Trindade Station and the Campanhã Intermodal, which present a "buffer" effect. Emphasis was placed on the intervention to which the Falcão School has been subjected, highlighting that "we have a happy marriage between green roofs and foltovoitac panels in that space". The presentation also mentioned the Futuro Project (cultivation of native trees), which also has a protective effect. "There are 3,042 trees planted along the VCI, 9,964 trees on offer, including public and private organizations and the Porto BioLab - the former Quinta de Salgueiros, which has the effect of 'urban acupuncture'."

Pedro Pombeiro also emphasized that the City of Porto's approach to Nature-Based Solutions also involves the fight against energy poverty, where Porto assumes that the difficulty is to create incentives for private buildings, but in this situation, the City Manager believes that the solution could be the Porto Environmental Index. Aimed at encouraging developers of recovery, rehabilitation and construction projects to promote the use of nature-based solutions in their projects, this Index, which is part of the new PDM, aims to encourage increased bioclimatic comfort of the city's buildings and reduce the vulnerability of the most fragile to extreme weather events.

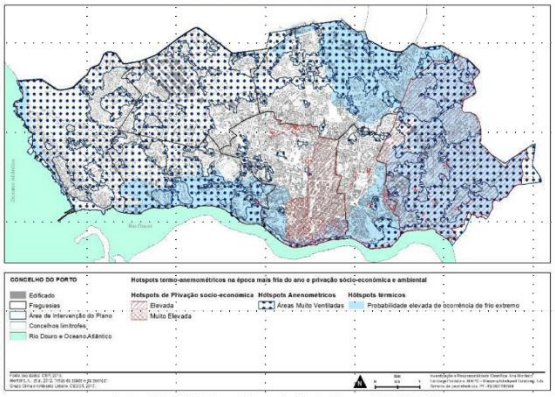
RADIOGRAFIA DA CIDADE – Demografia e Saúde

Hotspots **termo-anemométrico na época mais quente do ano e áreas de maior privação sócio-económica e ambiental.**



Fonte: CMP, 2016; Grupo Clima e Ambiente Urbano, CEGOT, 2017.

Hotspots **termo-anemométrico na época mais fria do ano e áreas de maior privação sócio-económica e ambiental.**



Fonte: CMP, 2016; Grupo Clima e Ambiente Urbano, CEGOT, 2017.

TERAPÊUTICA: o efeito "esponja"

Parque Central da Asprela

Porto.