LIFE Project Number

# LIFE17 CCA/ES/000088

# Final Report

## Covering the project activities from 01/09/2018[1] to 29/02/2024

Reporting Date[2]

**29/05/2024**

LIFE PROJECT NAME or Acronym

# LIFE-myBUILDINGisGREEN

Data Project

| | |
|---|---|
| **Project location:** | Portugal: Alentejo Central, Norte and Spain: Extremadura |
| **Project start date:** | 01/09/2018 |
| **Project end date:** | 31/08/2022 **Extension date:** 29/02/2024 |
| **Total budget:** | 3,049,289.64 € |
| **EU contribution:** | 1,697,369 € |
| **(%) of eligible costs:** | 55.66 % |

Data Beneficiary

| | |
|---|---|
| **Name Beneficiary:** | Agencia Estatal Consejo Superior de Investigaciones Científicas |
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| **Project Website:** | https://life-mybuildingisgreen.eu/en/home/ |

[1] Project start date

[2] Include the reporting date as foreseen in part C2 of Annex II of the Grant Agreement

**This table comprises an essential part of the report and should be filled in before submission**

Please note that the evaluation of your report may only commence if the package complies with all the elements in this receivability check. The evaluation will be stopped if any obligatory elements are missing.

| **Package completeness and correctness check** | |
|---|---|
| **Obligatory elements** | **✓ or N/A** |
| Technical report | |
| The correct latest template for the type of project (e.g. traditional) has been followed and all sections have been filled in, in English<br>*In electronic version only* | ✓ |
| Index of deliverables with short description annexed, in English<br>*In electronic version only* | ✓ |
| Mid-term report: Deliverables due in the reporting period (from project start) annexed<br>Final report: Deliverables not already submitted with the MTR annexed including the Layman's report and after-LIFE plan<br>Deliverables in language(s) other than English include a summary in English<br>*In electronic version only* | ✓ |
| Financial report | |
| The reporting period in the financial report (consolidated financial statement **and** financial statement of each Individual Beneficiary) is the same as in the technical report with the exception of any terminated beneficiary for which the end period should be the date of the termination. | ✓ |
| Consolidated Financial Statement with all 5 forms duly filled in and signed and dated<br>*Electronically Q-signed or if paper submission signed and dated originals* and in electronic version (pdfs of signed sheets + full Excel file)* | ✓ |
| Financial Statement(s) of the Coordinating Beneficiary, of each Associated Beneficiary and of each affiliate (if involved), with all forms duly filled in (signed and dated). The Financial Statement(s) of Beneficiaries with affiliate(s) include the total cost of each affiliate in 1 line per cost category.<br>*In electronic version (pdfs of signed sheets + full Excel files) + in the case of the Final report the overall summary forms of each beneficiary electronically Q-signed or if paper submission, signed and dated originals** | ✓ |
| Amounts, names and other data (e.g. bank account) are correct and consistent with the Grant Agreement / across the different forms (e.g. figures from the individual statements are the same as those reported in the consolidated statement) | ✓ |
| Mid-term report (for all projects except IPs): the threshold for the second pre-financing payment has been reached | **N/A** |
| Beneficiary's certificate for Durable Goods included (if required, i.e. beneficiaries claiming 100% cost for durable goods)<br>*Electronically Q-signed or if paper submission signed and dated originals* and in electronic version (pdfs of signed sheets)* | ✓ |
| Certificate on financial statements (if required, i.e. for beneficiaries with EU contribution ≥750,000 € in the budget)<br>*Electronically Q-signed or if paper submission signed original and in electronic version (pdf)* | **N/A** |
| Other checks | |
| Additional information / clarifications and supporting documents requested in previous letters from the Agency (unless already submitted or not yet due)<br>*In electronic version only* | ✓ |
| This table, page 2 of the Mid-term / Final report, is completed - each tick box is filled in<br>*In electronic version only* | ✓ |

**signature by a legal or statutory representative of the beneficiary / affiliate concerned*

# 1. Table of contents



# 2. List of key-words and abbreviations

**RJB-CSIC**: Royal Botanical Garden, Spanish National Research Council
**IETcc-CSIC**: Institute for Construction Science Eduardo Torroja, Spanish National Research Council
**CSIC**: Spanish National Research Council
**DIPBA**: Badajoz Provincial Council
**CIMAC**: Intermunicipal Community of Alentejo Central
**MP**: Municipality of Porto
**GOP**: Municipal Company to manage and explore the non-habitational patrimony and urban infrastructures in the Municipality of Porto.
**ANCV**: Portuguese National Association of Green Roofs.
**LIFE-mBiG**: LIFE-myBUILDINGisGREEN
**NBS**: Nature-Based Solutions
**DEL**: Deliverable
**MIL**: Milestone
**FS**: Financial Statement

# 3. Executive Summary

The LIFE-myBUILDINGisGREEN (LIFE-mBiG) project is a project developed by a group of partners from the Iberian Peninsula, co-funded by the LIFE programme of the European Union. The project consortium is led by the Spanish National Research Council (CSIC) through the Royal Botanical Garden (RJB-CSIC), with technical support from the Institute for Construction Science Eduardo Torroja (IETcc-CSIC). Beneficiary partners include the CARTIF technological centre, the Provincial Council of Badajoz, the Intermunicipal Community of Alentejo Central and the Municipality of Porto.

The main objective of the project is to increase climate resilience in educational buildings in Spain and Portugal by implementing Nature-Based Solutions (NBS) as climate adaptation tools. The project has been implemented through a series of actions that are explained in detail throughout this final report. Below is a brief summary of the work carried out in each of the categories of these actions.

Before sharing the summary of the project's actions, it is important to mention that LIFE-mBiG started on 01/09/2018 and had an estimated duration of four years, ending on 31/08/2022. However, due to various setbacks that were difficult to foresee, such as the COVID-19 pandemic, the war in Ukraine or the exorbitant increase in the cost of the international production chain, the project experienced certain delays that made it necessary to request two extension amendments in order to be able to meet all the proposed objectives. As a result, the official end date of the project was 29/02/2024.

**Actions A. Preparatory actions**. In these actions, which were carried out in a timely manner, information on existing buildings was collected, the selection criteria for the pilot buildings were identified and the projects for the implementation of the proposed NBS were designed. The main deliverable to highlight in these actions is the report with the selection criteria of the pilot buildings, which can help future projects in the prioritisation of some buildings over others.

**Actions C. Implementation actions**. The development of the type C actions proceeded as estimated in the project proposal, however, the above mentioned events caused a considerable delay of some of these actions, which affected the deadlines for the completion of most of the project actions. Type C actions included the elaboration of the baseline of the pilot buildings against which to compare the results of the monitoring of the project indicators, the execution of the NBS implementation works, the development of the NBS impact monitoring plan and the transferability of the project actions and the implemented NBS. The main product of this action is the implementation of the 19 NBS in the three pilot buildings, which will improve the well-being of their users, mainly children. It is worth highlighting in this category other deliverables such as the report on the results of the monitoring of the project indicators, various technical deliverables on the different NBS implemented, the reports on governance tools, various documents that facilitate the transferability of the project actions or the LIFE-mBiG Climate Adaptation Package, which includes training material for early childhood and primary education teachers, environmental educators and trainers with more technical profiles.

**Actions D. Monitoring actions**. These actions included the monitoring work of the environmental, social and economic indicators established by the LIFE programme, most of which coincided with the indicators established by the project to measure the impact of the implemented NBS. Due to the aforementioned delays in the development of the NBS implementation work, it was not possible to carry out full monitoring in any of the pilot

buildings. However, practically conclusive results were obtained for the school in Spain. In order to correct the lack of useful information on the effectiveness of the NBS, the project team has developed a detailed After-LIFE Plan which, in addition to transferability and dissemination actions, has included a realistic monitoring plan to obtain the missing data on the evolution of the project indicators. In this category, the deliverables of the evolution of the KPI webtool indicators and the socio-economic report of the project stand out.

**Actions E. Communication actions**. The communication actions have included activities aimed at the users of the pilot buildings and their area of influence, municipal technicians and other administrative bodies, managers of educational centres and the general public, with the aim of improving knowledge about the benefits of NBS as tools for climate adaptation in buildings and increasing the capacities of professionals on the design and implementation of this type of solutions. The extension of the project beyond the estimated time has meant that many more communication activities have been carried out than initially planned, significantly exceeding the objectives set out in the initial project proposal. The main communication outputs and deliverables are the project website, the Layman report, the online training on the LIFE-mBiG experience, as well as the various knowledge platforms where project information is shared (e.g. Climate-Adapt platform).

**Actions F. Management actions**. These actions included the overall coordination of the project, a final audit of the partners involved and the preparation of the After-LIFE plan. As has been highlighted, the After-LIFE Plan in the case of LIFE-mBiG is of great relevance due to the need to continue measuring indicators of the impact of the NBS implemented in the three pilot buildings after the end of the project. Therefore, special care has been taken to elaborate a realistic After-LIFE plan involving all project partners. In the case of the audit, it was not necessary in the end because none of the project partners received EU funding of more than 750,000€. The main result of the management actions is the After-LIFE Plan, which is of great importance in this project.

Among the **main deviations** of the project's actions, the following stand out:
- Baseline monitoring started later than expected. However, delays in the start of construction works in the schools allowed all necessary measurements to be taken.
- The three pilot buildings experienced delays in the implementation of their NBS, however, the project extensions allowed the scheduled works to be completed.
- The monitoring actions were not completed in any of the pilot buildings, although they were almost completed in the school of Solana de los Barros (Badajoz, Spain). A greater monitoring effort is needed during the After-LIFE period, also because a more advanced and better established vegetation stage is needed to record the expected results.
- Transferability actions were initiated from the beginning of the project, looking for partners to support the replication of the implemented NBS. Due to delays in the school works, the first allies were not secured until the first set of NBS were completed. An extra effort in the last two years of the project has facilitate to exceed the transferability targets set.

# 4. Introduction

Climate change is one of the most serious environmental, social and economic challenges facing the world. Educational buildings in Europe will face many challenges in the coming decades, such as the complete renovation of buildings that have suffered structural failure over time and where insulation measures have been largely ignored. In addition, climate change will add to these pressures through a range of impacts such as heat waves or changes in annual and seasonal rainfall patterns. This can affect the health and well-being of children, who are the main users of these buildings.

The LIFE-myBUILDINGisGREEN project aims to address the effects of climate change in terms of rising temperatures in school buildings, which have been exacerbated in recent years by successive heat waves across Europe, but with more adverse effects in the southern region of the continent. As a result, educational and social care facilities in southern Europe experience indoor temperatures above 32°C for several months of the year, making these buildings very difficult to live in.

LIFE-mBiG is a project developed by a group of partners from the Iberian Peninsula, co-funded by the LIFE programme of the European Union. **The main objective of the project is to increase climate resilience in educational buildings in Spain and Portugal by implementing Nature-Based Solutions (NBS) as climate adaptation tools**. Thus, LIFE-mBiG works on the design, development and testing of innovative NBS (prototypes) to improve the bioclimatic comfort of these educational buildings in order to increase the well-being of the users of these buildings.

In order to achieve this general objective, the project has worked towards a number of specific objectives:

1. Improve the knowledge of NBS at building level.
2. Analyse the cost-benefit of NBS as climate adaptation tools.
3. Promote governance actions.
4. Transfer and replicate NBS prototypes.
5. Connect with European policies and tools.

In three primary schools in Spain (CEIP Gabriela Mistral, Solana de los Barros) and Portugal (EB1 Horta das Figueiras, Évora and EB1 Falcão, Porto), the LIFE-myBUILDINGisGREEN project designed, implemented and tested several NBS to minimise climate impacts. The proposed NBS consisted of a series of green roofs, green facades and other shading and water harvesting NBS designed to (i) keep indoor temperatures low during hot periods and thus minimise energy use for cooling, (ii) provide shade and (iii) improve water retention around the buildings by minimising rainwater run-off. At CEIP Gabriela Mistral, a water harvesting system was also installed in conjunction with the installation of two of the green roofs. The water collected by this system is reused to irrigate the implemented NBS and the school's green areas. To complement the effect of these NBS, an automatic ventilation system has been installed to open and close the school's windows during the night and in the morning to cool the building and reduce $CO_2$ levels. A permeable paving was also installed, allowing vegetation to grow on its surface and facilitating the infiltration of water into the ground, reducing the amount of water entering the sewerage system. At the Porto school, the intervention was also linked to a roof water collection system that feeds a pond next to the Horta Urbana da Oliveira. In this school, the intervention was also linked to the installation of photovoltaic panels (in a system linked to green roofs), so that the school becomes energy self-sufficient.

In addition to these physical actions on the ground, local and regional authorities with competences in climate change and green infrastructure were involved in capacity building to enable the transferability of the implemented NBS. To this end, visits were organised to raise awareness of the NBS among neighbours in the schools' catchment area, as well as the educational community in the surrounding towns and/or neighbourhoods. A series of demonstration workshops were also organised to show the work carried out to experts and municipal technicians, with a view to possible future replication in other types of buildings. In order to reach a wider audience, a free online course was also developed on the possible NBS that can be used to adapt buildings to climate change, including a summary of the experience gained in the three pilot buildings in Portugal and Spain and an outline of the monitoring system of indicators that measure the effectiveness of the implemented NBS, where the first results obtained were shown. Moreover, numerous meetings were held with different stakeholders involved in the adaptation of buildings to climate change in both countries, from the local to the national level, such as the staff of the Spanish Ministry of Housing and Urban Agenda (Technical Building Code), members of the Spanish Climate Change Office, municipal and regional representatives from Spain and Portugal, etc., to discuss the possibilities of transferring the applied NBS to other contexts and to including the NBS in Green Infrastructures and Climate Change National Strategies. In Porto, the experience of the LIFE-myBUILDINGisGREEN project inspired the introduction of the NBS in the Porto Environmental Index. This is a new municipal regulation in the making (foreseen in the Municipal Master Plan 2021) that aims to encourage urban developers to incorporate NBS in their projects through financial and construction benefits.

Impact assessment of NBS implementation is essential to ensure that these solutions are effective, sustainable and beneficial at the environmental, social and economic levels. Impact assessment at these three levels helps to determine their effectiveness in solving specific problems and to ensure their efficiency. In turn, the impact assessment of the NBS supports replication by providing critical information to decision-makers, enabling them to make evidence-based decisions and prioritise solutions that are beneficial to both the environment and society.

The impact assessment of the NBS prototypes implemented in the LIFE-mBiG project follows the methodology proposed in Deliverable *C1. Baseline report of the pilot buildings*. For this purpose, a monitoring plan has been established and a set of indicators has been selected based on the main environmental and social challenges, using the European project EKLIPSE as a reference. A total of 22 indicators have been selected to monitor the impact of the actions in the three pilot buildings of the project.

The implementation of the NBS prototypes in the three pilot buildings focused on improving the thermal comfort of school users, increasing the green area in a sustainable way, reducing the carbon footprint, improving water management in the buildings, restoring and promoting local biodiversity in the urban environment, and raising awareness of the value of nature and the ecosystem services it provides. Full information on the results of the project can be found in Deliverable *C3. Report and results of the monitoring and evaluation of the impacts proposed in the pilot buildings*.

# 5. Administrative part

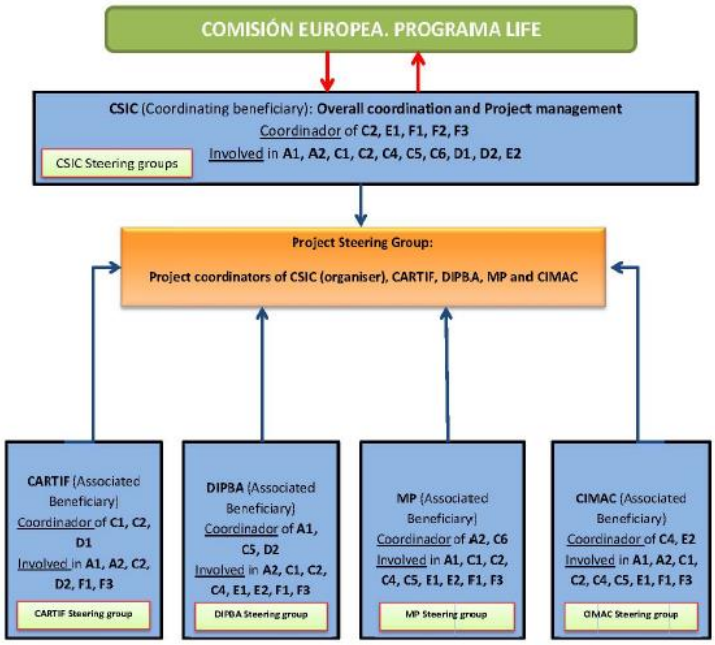
CSIC, as coordinator-beneficiary of the project, assumed the administrative, financial and technical management functions of the project, and was responsible for it against EASME on behalf of all beneficiaries (DIPBA, CARTIF, CIMAC, MP). It monitored and evaluated the overall development of the project and its results, which were reported first to the external monitor and secondly to EASME.

For project management, a technical office has been set up in the offices of the Beneficiary Coordinator (CSIC). In addition, an online project management platform (ALFRESCO) has been created to store, share, track all project actions and have real-time financial control. Within the daily work of the project and the people who participate in it have been created working groups which have a well-defined and different objective and tasks within the project. These groups are:

- Administrative and financial management group
- Technical group and monitoring
- Communication group

To have a smooth communication within the project email lists have been created for each workgroup.

The LIFE-mBiG external monitor has access to this platform where he can constantly view each and every administrative, financial, deliverable, schedule, project image, etc. As a general rule, the administrative and financial management group should upload and share on the online project management platform, every three months, all information relating to Timesheets and Financial Statement with all the documents that justify each type of expenditure.




The project management team has met in person 7 times since the start of the project. However, constant video conference meetings have been held every time they were required to clarify and solve important aspects of management and to keep a routine control of management. The working group of the technical part of the project has met in person and online many times to solve all the problems concerning the execution of the project. In addition, the LIFE-mBiG project has met with different public bodies, stakeholders, school directors and social centres to comply with several actions that needed this kind of collaborations.

The project management team has had good communication with EASME and the monitoring team, responding and giving everything they have requested. The LIFE-mBiG project has suffered delays in its technical and administrative tasks because of the COVID-19 pandemic, the War in Ukraine and the exorbitant increase in the cost of the international production chain. These delays involved the requesting of two extension amendments in order to meet the objectives committed to in the grant agreement. With the exception of a part of the indicator monitoring process that will be completed in the After-LIFE period, all project objectives were met satisfactorily.

# 6. Technical part (maximum 25 pages)

## 6.1. Technical progress, per Action

**ACTION A1. Information collection and design of technical criteria for the choice of pilot buildings**

*Status of the action:* completed

| | | | |
|---|---|---|---|
| **Foreseen start date:** | 01/10/2018 | **Actual start date:** | 01/10/2018 |
| **Foreseen end date:** | 30/06/2019 | **Actual (or anticipated) end date:** | 30/06/2019 |

This action consists of three sub-actions and aims to design and choose technical criteria that have allowed us to choose the pilot buildings of the project. Once the selection criteria have been chosen, an on-site inventory of potential candidates for the pilot building of the project has been carried out. Finally, with the three pilot buildings chosen, the competent authorities in Spain and Portugal have been asked for administrative authorization to implement the NBS prototypes in each pilot building.

*Progress achieved*:

**Sub-action A1.1. Design and Selection of Technical Criteria**

At the beginning of the project, a technical meeting was held to begin with the design and definition of each one of the criteria that would allow us to identify the education buildings and social services of each region (Extremadura, Alentejo and Porto). With the collaboration of all partners, technical and constructive, environmental, economic and social criteria were established. Then, all beneficiary partners used the identified criteria to elaborate a matrix to analyse and evaluate quantitatively and qualitatively the potential of the buildings in the project regions. The criteria were categorised into exclusionary criteria, those that applied a first filter of buildings, and inclusionary criteria, those that scored the buildings according to their constructive, social, economic and environmental characteristics. For each criterion, a value was assigned to justify the choice of the pilot building in each region based on the selected criteria. Extended information on the selected criteria can be found in the main deliverable of this action, downloadable from this section. A brief summary of the selected criteria is also available in unit 8 of the online training developed by LIFE-myBUILDINGisGREEN, accessible via this link.

From DIPBA, since the additional staff in charge of this sub-action was not yet incorporated, the tasks related to this sub-action began to be carried out by non-additional staff. For this reason, the hours of dedication of this staff have been allocated as expenses in the FS.

The main difficulties were encountered in establishing criteria related to the age of the buildings and the need for flat roofs or a maximum slope of 5%. In order to observe the impact of the project more easily, it was considered to establish a criterion based on the age of the buildings. The older the building, the easier it would be to observe the benefits of the NBS implantation.

Finally, the consensus and participation of the relevant educational administrations was achieved, as all the criteria for the selection of buildings and the evaluation matrix were presented to the regional authority of education. In this sense, the support of the administrations was strong and the participation in sub-action A1.2 was commendable. A document with all the technical criteria and a selection matrix to be used in the selection of the building was produced on time. This made it possible to move on to the next sub-action (A1.2).

**Sub-action A1.2. Inventory and Choice of buildings on the ground.**

Depending on the results obtained in sub-action A1.1. and supported by the technical criteria and evaluation matrix, a list of potential education buildings for each region of the project was shortlisted. With this list, all the beneficiary partners and specially DIPBA, CIMAC and MP performed excellent fieldwork with considerable dedication.

**DIPBA** used the selection matrix to collect the information necessary to evaluate the various selection criteria. For this purpose, the regional education administration (Junta de Extremadura) was contacted and provided a large number of candidates chosen on the basis of two main criteria: flat roofs and buildings prior to 1980 (the year of application of most building insulation regulations in Spain). Subsequently, the resulting list of potential candidates was used to visit the different pre-selected buildings and score them on the basis of the selection criteria set out in the selection matrix, ranking them from highest to lowest scores, with the building in first position being selected, which was communicated to the Junta de Extremadura, the Local City Council and the educational community. The selected building was the **Gabriela Mistral school, in Solana de los Barros.**

**CIMAC** carried out a first online questionnaire so that the directors of the schools of the Alentejo region would report on all the issues that would allow the evaluation of the selection matrix. Subsequently, 40 schools were visited and notes were taken on each of these visits. During this phase, CIMAC staff worked for several days on the inventory work, meeting with stakeholders with competences in education in the Alentejo region and organising a round table with municipal technicians and mayors of the municipalities that make up the Alentejo region. The buildings were visited and scored according to the criteria established in the selection matrix, and the building with the highest score was chosen. The choice was communicated to the Education Delegation of the Alentejo region, the City Council of Évora and the school community, and the selected building was the **Horta das Figueiras school located in Évora**.

**MP** carried out an inventory very similar to that carried out by DIPBA where all the schools of the city of Porto that met the conditions collected by the technical criteria were visited. During this inventory phase the MP staff worked for several days in the inventory work, meeting with stakeholders with competences in education in the city of Porto and organized a round table with the municipal technicians of Porto. The buildings were visited and scored under the criteria set out in the selection matrix, and the building with the highest score was chosen. The selected building was then communicated to the Municipal Education Department, as well as to GOP. According to the matrix and the used criteria, the selected pilot building was the **Falcão school located in Porto**.

In order to carry out this sub-action, the beneficiary partners DIPBA, CIMAC and MP have encountered difficulties in terms of finding schools with flat or slightly sloping roofs, roofs with good access for the visit, or buildings with enough space to carry out the future work.

Another important difficulty is the number of kilometres travelled by the beneficiary partners to visit the schools in the different counties and the difficulty for the school management team to reserve time in their daily work to show the building.

**Sub-action A1.3. Administrative Authorization**

The beneficiary partners, DIPBA, CIMAC and MP, have been essential to obtain administrative permits since they have contacted the Junta de Extremadura directly in the case of DIPBA, the Municipality of Évora in the case of CIMAC, whilst the MP acts directly since it is granted administrative authorization since it has direct competences.

DIPBA and CIMAC held all the necessary meetings with the representatives of each administration (General Secretariat of Education of the Junta de Extremadura, Municipality of Évora and General Secretariat and Mayor of the City of Solana de los Barros and Évora) explaining the implementation actions to each administration. In the case of DIPBA and

CIMAC, Administrative authorizations were finally obtained, both from the City Council (26/07/19), and from the Junta de Extremadura (16/10/19). The authorizations were obtained after the scheduled date (6/2019). These delays are justified as follows:

- Pursuant to the plan envisaged for action A2 (drafting of projects), which began processing on 1/2019, only from 5/2019, once it processed the contracting of the corresponding service with the process stipulated in the Law on Public Sector Contracts, and defined the prototypes to be used, according to the database created, a preliminary draft could be had that defined the actions to be carried out so that the Administrations would know them and could give their approval.
- The building ownership is shared by the local and regional administrations. The plot is municipal property, and a period elapsed during which both administrations were debating who should grant the authorization. The above delay, however, did not delay the development of other actions, as the approval given by the administrations was available at the various meetings held, so this has not impacted other actions.

Each of the administrative processes, which are third parties regarding the project, has determined the final deadlines for receiving written authorizations. In the case of DIPBA and CIMAC, the main difficulty has been to confirm the ownership of the building on which to act, and also for the administrations to respond to a request for authorization that they did not consider urgent. For future similar actions, the following protocol is proposed:

- To contact with the mayor or the council of the municipality where to act to have in advance the acceptance to act.
- To contact the General Secretary of the City Council to check if the building is in the inventory of Goods of the City Council and its ownership can be certified.
- If the previous point is confirmed, to generate the administrative documents referral to the City Council and follow-ups.
- If the building is not in the inventory of Goods of the City, to contact the Secretary General of Education to know the feasibility of the action.

*Expected results*:

- Reference report for the design and selection of technical criteria that allow to choose pilot buildings to implement NBS as tools for climate adaptation and improvement of well-being in education buildings and social services.
- Inventory and fieldwork report where potential buildings in project regions have been valuated through established selection criteria.
- Choice of the three pilot buildings where the NBS prototypes will be implemented.
- Report of the competent authority on the granting of administrative permits in order to act in pilot buildings.

| Deliverable name | Deadline | Attached in report |
|---|---|---|
| Reference Report for the Design and Selection of Technical Criteria | 12/2018 | Yes (mid-term) |
| Inventory report and sampling | 04/2019 | Yes (mid-term) |
| Favourable permit grant report | 07/2019 | Yes (mid-term) |

| Milestone name | Reached | Actual deadline |
|---|---|---|
| Establishing the technical criteria for the choice of pilot buildings | Yes | 12/2018 |
| Choosing pilot buildings | Yes | 02/2019 |
| Definitive Administration Authorization for the Implementation of NBS in Buildings Pilot | Yes | 07/2019 |

**ACTION A2. Drafting of projects for the application of nature-based prototypes in pilot buildings**

- *Status of the action:* completed

| | | | |
|---|---|---|---|
| **Foreseen start date:** | 01/01/2019 | **Actual start date:** | 01/04/2019 |
| **Foreseen end date:** | 31/09/2019 | **Actual (or anticipated) end date:** | 08/07/2022 |

In action A2. "Drafting Projects for the Application of Nature-Based Solutions in Pilot Buildings" there was a set of preparatory tasks in terms of existing information collection and subsequent design and development of nature-based solutions that were carried out.
The two deliverables of this action are presented in a single document entitled "*A2. NBS databases and implemented projects*" and two annexes containing extended information on the identified NBS and the working matrix. The unified deliverable A2 contains a database with possible Nature Based Solutions (NBS) to be implemented in educational and social centres.
After showing the identified NBS, technical information on the NBS selected by LIFE-myBUILDINGisGREEN is included, grouped in 7 categories: plant selection, façades, roofs, outdoor green areas, induced ventilation, seasonal shading and permeable surfaces.
In addition, two annexes are included with the working matrix (*A2. Annex 1 – Databases & Work Matrix*) and extended information on the identified NBS (*A2. Annex 2 – Extended info on NBS prototypes*). Due to delays in the approval of the final construction work in the case of the Porto and Évora schools, this deliverable was submitted in two parts to the LIFE monitor, one prior to the mid-term report and one updated during the visit that took place in Badajoz in June 2022, when the final construction projects were approved for the corresponding administrations.

*Progress achieved*:

**Sub-action A2.1. Collection of information by reviewing NBS Databases in Europe.**

The beneficiary partners of the project have analysed and explored a significant volume of databases, technical documents and scientific articles on knowledge and success stories in the implementation of NBS in buildings and for different types of climate. Thanks to the different Networking meetings with European projects such as EKLIPSE, URBAN GREEN UP, GROW GREEN, INDNATUR, LIFE REUSING POSIDONIA and the round tables held in Alentejo Central and Porto with public and private experts in the construction sector, biotechnology, national associations of vertical gardens and green roofs of Spain and Portugal, we have obtained enough proven and validated information to build a database.

**Sub-action A2.2. Logical Framework and Goal Tree for the selection of NBS.**

A matrix has been developed where the different NBS that can be used by the project have been listed, including relevant information such as the objectives that are intended to be achieved with their implementation, the needed materials and technologies or the KPIs that measure the benefits of those NBS. The NBS selected for the project must be prototypes that play a crucial role in the project's demonstration activities. In this sense, the prototype solutions to be included in the buildings have been technically developed and a summarize of their characteristics has also been included in deliverable A2. Also during this action, and as support information for the selection of the best NBS, IETcc-CSIC has studied the bioclimatic behaviour of the pilot buildings, the foundation of passive strategies and solar calculations.
The main difficulty of this sub-action has been the need to redefine some prototypes applicable to façades and roofs, being necessary to start from scratch in some cases to ensure the achievement of the objectives. The simulation of the complete implementation of all the planned prototypes has presented some difficulty, also taking into account that this work coincided with the holiday period when there was less staff available to work on the project.

**Sub-action A2.3. Preparation and drafting of projects and technical documents**

Once all the information and technical documentation has been passed on to the beneficiary partners DIPBA, CIMAC and MP to initiate administrative procedures for the recruitment of external staff "Architects" who drafted the construction projects and technical documents for the execution of future works through the C2 action. To implement the NBS prototypes it is necessary to carry out a public work in short, having been shown necessary to draft an implementation project in each case, so it has been necessary to hire this service, since the services of the different administrations of the partners have not been able to assume such work with their own means. These external assistance work did not have a budget item and therefore the relevant changes should be made between the different expenditure items in the project.

In the case of **DIPBA**, the formalities were initiated and this partner started to work the drafter on 3/6/19, simultaneously with the development of sub-actions A2.1 and A.2.2. The project was delivered on 22/11/19 and the procedures for action C.2 for the implementation of prototypes were initiated by approving the project and bidding for the necessary work.

In the case of **CIMAC**, the formalities were initiated and this partner started to work on the drafting on 01/11/2019. The CIMAC project was presented to beneficiary partners on May 2020 and it was officially approval by the competent body (Câmara de Évora) on July 2022.

In the case of **MP**, the formalities were initiated and this partner started to work on the drafting on 15/11/2019. The final version of the implementation project was officially approved by the competent body (Câmara de Porto) on 03/03/2021.

The greatest difficulty in drafting construction projects has been that the beneficiary partners DIPBA, CIMAC and MP did not have their own staff experts in the calculation of structures, analysis of results and simulation of the impact of NBS prototypes on pilot buildings. For this reason, the beneficiary partners have contracted these drafting services by means of a minor contract of services to third parties. In addition, the COVID-19 pandemic has also complicated very directly the drafting and face-to-face visit of beneficiary partners CSIC and CARTIF to Alentejo Central and Porto to hold the technical meetings with the entities that have drafted the projects. All these meetings have been held by video conference with the difficulty that this entails in this type of work.

*Expected results*:

- Development of market NBS database and prototypes designed by LIFE-mBiG. Working matrix for the choice of NBS based on the typology, characteristics and bioclimatic strategy and solar calculations of each building.
- Development of 3 construction projects for the 3 pilot buildings of the project.

| Deliverable name | Deadline | Attach in report |
|---|---|---|
| Preparation and drafting of 3 NBS projects for each pilot building | 08/2020 | Yes (mid-term) |
| Preparation of NBS Databases and Work Matrix | 12/2019 | Yes (mid-term) |

| Milestone name | Reached | Actual deadline |
|---|---|---|
| Knowledge Platform (NBS Databases) | Yes | 12/2019 |
| Registration and delivery of 7 NBS projects | Yes | 07/2022 |

## ACTION C1. Preparation and drafting of the Pilot Buildings Baseline

- *Status of the action:* completed

| | | | |
|---|---|---|---|
| **Foreseen start date:** | 01/04/2019 | **Actual start date:** | 01/04/2019 |
| **Foreseen end date:** | 31/03/2020 | **Actual (or anticipated) end date:** | 31/08/2020 |

Once the pilot buildings have been selected and the projects for the execution of the works for each centre have been elaborated, the beneficiary partners of the project and in particular CARTIF and CSIC have developed a scheme to monitor the impact of NBS prototypes in each pilot building.

*Progress achieved*:
This action has reviewed the proposed indicators in the proposed phase, developed their methodologies for implementation in the project, deployed the planned monitoring teams and started the procedures for obtaining the necessary information for social indicators. In addition, the information available prior to interventions has been collected to make a baseline of the buildings to assess the impact of NBS at the end of the project. This information has been collected in the deliverable "*C1 - Baseline report of the pilot buildings*".

*Table 1. Indicators initially proposed for LIFE-myBUILDINGisGREEN.*

| ENVIRONMENTAL AND SOCIAL CHALLENGES | INDICATORS |
|---|---|
| **Adaptation and mitigation to climate change** | **Indoor building temperature.**<br>**Building envelope temperature.**<br>**External environmental conditions of the building.**<br>**Modelling of energy savings.**<br>**Heating savings estimation.** |
| **Water management** | **Indicators relating to water consumption** and the savings that can be made by using the proposed NBS.<br>**Indicators relating to savings in rainwater management.** |
| **Green areas management** | **Increase in plant and animal biodiversity.**<br>**Number of recovered native plant species suitable (non-allergenic, poisonous, etc.) for integration into green areas.** |
| **Air quality** | **$CO_2$ concentration inside the classroom.**<br>**Noise reduction levels from outside.**<br>**Number of pollution bio-indicator species installed** and area covered with these bio-indicators.<br>**Training** in the observation of pollution bio-indicator species. |
| **Urban regeneration** | **Energy efficiency measures.**<br>**Increase in green area ($m^2$ and in %)**. |
| **Governance and participation** | **Citizens' perceptions of urban nature.**<br>**Learning policies and strategic plans for adaptation to climate change.**<br>**Open participatory processes. Monitoring of citizen participation in the open processes of defining the recreational area / park to be installed.** |
| **Social cohesion** | **Number of agreements and disagreements**. |
| **Public health and welfare** | **Reduction in the number of absences and absences of students and teachers**. |
| **Economic opportunities and employment** | **Number of jobs created.**<br>**Creation of new skills in self-employed and NBS-related companies in the area.**<br>**Reduction of absenteeism among school staff.** |

The main difficulty in carrying out this action has been the logistics and the communication of the data collected by the installed sensors to the CARTIF data storage platform. It was necessary to turn off any security internet firewall that cut the sending of data, with all the problems this creates. All pilot buildings have had to manage the mobile network internally for the storage and sending of data.
The COVID-19 pandemic caused CARTIF and CSIC to fail to conduct monitoring, maintenance and installation visits to new sensors for the measurement of Temperature,

Humidity and $CO_2$. This caused a delay in information collection and data collection for the wording of the deliverable of action C1.
The increase in staff costs for this action is due to the higher number of samplings carried out to establish the baseline, as the NBS implementation works were long delayed in the pilot buildings and there was more time to study the baseline indicators.

*Expected results*:

- Report the baseline of the pilot buildings, as well as the evaluation and calculation of the same indicators for the three buildings.

| Deliverable name | Deadline | Attach in report |
|---|---|---|
| Baseline report of the pilot buildings | 08/2020 | Yes (mid-term) |

| Milestone name | Reached | Actual deadline |
|---|---|---|
| Evaluation and calculation of the baseline for the three pilot buildings | Yes | 03/2020 |

**ACTION C2. Implementation of NBS in pilot buildings. Execution of works**

- *Status of the action:* completed

| | | | |
|---|---|---|---|
| **Foreseen start date:** | 01/12/2019 | **Actual start date:** | 01/02/2020 |
| **Foreseen end date:** | 31/12/2020 | **Actual (or anticipated) end date:** | 09/02/2024 |

This action is the core of the LIFE-mBiG project as it is the action during which the different construction projects are carried out in the pilot buildings. The indicated foreseen end date is the one that we committed in the original grant agreement, however, this date was changed by the subsequent extension amendments to this agreement, being the last accepted foreseen end date on 29/02/2024.
For this purpose, public calls for tenders were carried out in which several companies express their interest in carrying out the proposed works. This phase of public tenders was not easy due to different reasons. Some of these reasons could be foreseen and were solved relatively easily, however, others, such as the COVID-19 pandemic or the subsequent war in Ukraine, made the tendering process more difficult and made certain construction materials more expensive, forcing the project team to request an extension of the project end date on two occasions.
Prior to the installation of the NBS prototypes, the RJB-CSIC carried out a study on the best plant species to be used by each NBS. This study lasted throughout the course of the project, as some of the species selected did not behave as originally planned, which meant that they had to be replaced after the works had been completed. This led to a significant increase in the costs of the CSIC staff dedicated to this task
The execution of the works in the three pilot buildings involved the installation of the NBS prototypes designed for LIFE-mBiG, the implementation of induced natural ventilation systems, and the installation of permeable paving. Although permeable paving was installed in the Solana de los Barros and Évora buildings, due to the high cost of the prototype version, this was only tested at laboratory level by IETcc-CSIC, obtaining results of its effectiveness.
During this action, documents were produced such as technical manuals for the NBS used in the pilot buildings, a work matrix with the selection of plant species to be used in the designed prototypes, action plans for the implementation of induced natural ventilation and seasonal shading formulas, and technical manuals for the installation of permeable surfaces, which aim

to facilitate the process of transferability of these solutions to any person or entity wishing to use them in the future.

*Progress achieved*:

**Sub-action C2.1. Adapted vegetation. Analysis and choice criteria**

The RJB-CSIC developed a characterization of seeds and plants to identify the best plant species to be used in Nature-Based Solutions in temperate climates. Due to the problems caused by the COVID-19 pandemic, laboratory and greenhouse work at the RJB-CSIC facilities could not be carried out until well into the project. The workload was heaviest during the months when the NBS were implemented in each pilot building, as it was necessary to monitor the development of the vegetation in the specific environments of each school. In addition, extra effort was required that was not foreseen in the project proposal, as some of the species identified did not work in practice in the way that had been theorised. It should be added that it is not easy to create universal guidelines for the use of vegetation in NBS, as the same species can behave differently in apparently similar environments.

The work done by the RJB-CSIC includes a guide that allows the user to know the best options of plant species to use in the design and implementation of Nature-Based Solutions. The selected species must meet a series of requirements such as low maintenance, adaptable to sudden changes in humidity and solar radiation, with low irrigation requirements, with root systems that allow their support in different types of substrate or that are easily available in nurseries and with not very high costs.

**Sub-action C2.2. Application of NBS in exterior facades and interior loading walls.**

All the beneficiary partners of the project have defined several prototypes to be implemented in the facades and walls of interior compartmentalization for the 3 pilot schools of the project:

- mBiGFAVE: planter systems mounted on metal structures anchored to building facades.
- mBiGFAC: cable systems guiding the growth of deciduous climbing vegetation.
- mBiGToldo: hydroponically irrigated awning systems.
- Indoor vertical garden: installed in a corridor of the Spanish pilot building.


More detailed information can be found in deliverable *C2.4 – Technical Manuals for the implementation of NBS prototypes in the different structures of the pilot buildings*.

**Sub-action C2.3. Creation of sustainable roofs and bioclimatic roofs**

All project beneficiary partners have defined several prototypes to be implemented on the coverage of the 3 pilot schools of the project:

- mBiGCUVE1: extensive green roof with more than 25 native plant species.
- mBiGCUVE2: an adaptation of the previous one including an inner air chamber.
- mBiGCUVE-SUS: the CUVE with optimised substrate from recycled aggregates.
- mBiGUL: green roof supported on cork substrate.
- mBiGSECAR: sloping green roof that collects rainwater for other NBS.
- mBiGBioSol: green roof combined with photovoltaic panels.
- mBiGTray: green roof consisting of a system of trays that reduce water loss.


More detailed information can be found in deliverable *C2.4 – Technical Manuals for the implementation of NBS prototypes in the different structures of the pilot buildings*.

**Sub-action C2.4. Implementation of sustainable and efficient green areas as a solution for adapting outdoors**

CSIC has designed surfaces of sustainable vegetation with the contribution of innovative organic substrate composed of heterotrophic and autotrophic protist microorganisms and the incorporation of mineral substrate with the recycling of aggregates of the construction provided by IETcc-CSIC. These prototypes are described in Action A2 and the corresponding deliverable.

**Sub-action C2.5. Development of Action Plans for the Implementation of Induced Natural Ventilation Formulas**

Beneficiary partner CARTIF together with IETcc-CSIC have designed a ventilation system by programming the closing and opening of windows in the Spanish pilot building. The best timing for this system has been based on outdoor wind speed, humidity and indoor $CO_2$ concentration. CARTIF introduced this natural ventilation system for the improvement of indoor air quality at the Mediterranean Congress in Tunisia in 2019 and received the 1st prize for publication in its category. More information about this sub-action can be found in deliverable *C2.2 – Action Plans for the implementation of natural induced ventilation and seasonal shading solutions* and its annexes.

**Sub-action C2.6. Development of Action Plans for the implementation of different seasonal shading structures.**

Outside schools and specifically in the playground areas, the project has created a citizen activity of local participation with schoolchildren, parents and teachers. This activity has consisted of the design of NBS that allow the shading of its playground and the drawings and models have been made by schoolchildren between 4 and 11 years. All this information has been collected in the project and finally all beneficiary partners have developed NBS of external shading responding to the challenges demanded by the educational community:

- mBiGPEVE: green roof supported on cork substrate.
- mBiGPond: pond that acts as a reservoir of biodiversity, is a living educational resource and is maintained with rainwater collected by another NBS.
- Outdoor wooden structures that provide shade in high-occupancy spaces.

More detailed information can be found in deliverable *C2.4 – Technical Manuals for the implementation of NBS prototypes in the different structures of the pilot buildings*.

mBiGPEVE

Outdoor wooden structure

mBiGPond

**Sub-action C2.7. Creating permeable surfaces on the outside of buildings**

Different models of paving have been installed in the pilot buildings, improving rainwater infiltration, increasing the capture of this water for irrigation and reducing runoff into the sewage system. This type of pavement also allows the proliferation of natural vegetation. In parallel, the effectiveness of a permeable surface prototype developed by the IETcc-CSIC has been tested in laboratory. Its technical specificities can be found in deliverable *C2.3 – Technical Manual for the installation of permeable surfaces, as NBS prototypes*.

mBiGSUVE

*Expected results*:

- Guide to the choice of plant species adapted to climate change
- Technical Manuals for the Implementation of NBS Prototypes in Buildings
- Action Plans for the implementation of natural ventilation and seasonal shading formulas
- Technical manual for the installation of permeable surfaces, such as NBS in buildings

| Deliverable name | Deadline | Attach in report |
|---|---|---|
| Guide to choosing plant species adapted to climate change | 04/2020 | Yes (final report) |
| Technical Manuals for the implementation of NBS prototypes in the different structures of the pilot buildings | 07/2023 | Yes (final report) |
| Action Plans for the implementation of natural induced ventilation and seasonal shading solutions | 12/2020 | Yes (final report) |
| Technical Manual for the installation of permeable surfaces, as Nature-Based prototype Solutions | 07/2022 | Yes (final report) |

| Milestone name | Reached | Actual deadline |
|---|---|---|
| Choosing plant species for installation in prototypes | Yes | 09/2020 |
| Implementation of Induced Natural Ventilation System and Seasonal Shading | Yes | 12/2021 |
| Prototype implementation based on permeable pavement | Yes | 02/2024 |
| Installation of NBS prototypes in the different structures of pilot buildings and exterior surfaces | Yes | 02/2024 |

**ACTION C3. Monitoring and Evaluation of NBS as climate adaptation measures in pilot buildings**

- *Status of the action:* open

| | | | |
|---|---|---|---|
| **Foreseen start date:** | 01/01/2020 | **Actual start date:** | 01/01/2020 |
| **Foreseen end date:** | 30/06/2022 | **Actual (or anticipated) end date:** | 29/02/2024 |

Once the works were carried out in the pilot buildings, CARTIF and CSIC monitored and assessed the impact of the NBS implemented in the pilot buildings. The development of this action consists in the execution of the monitoring plans of the impact of the solutions implemented by LIFE-mBiG. During the monitoring, the indicators identified in action C1 were measured, so that they could be compared with the project baseline and the real impact of the NBS could be analysed. In addition, other types of socio-economic indicators were measured and used for reporting in this area, as described in action D2.
The indicated foreseen end date is the one that we committed in the original grant agreement, however, this date was changed by the subsequent extension amendments to this agreement, being the last accepted foreseen end date on 29/02/2024.

*Progress achieved:*
Due to some issues such as the COVID-19 pandemic, the War in Ukraine, etc., the start of works in the pilot buildings was delayed and it was not possible to implement the full monitoring plan, which had a minimum duration of two years, in any of the buildings.
In the case of the Spanish building, an additional 6 months of effective NBS monitoring is needed to obtain more conclusive results. This time is extended to a year and a half in the case of the Porto building, and the full two years of monitoring are necessary in the case of Évora. It is also necessary to continue the long-term monitoring to check the effect of the NBS at a more advanced stage of vegetation development.
The LIFE-mBiG project partners have committed themselves to carry out all necessary sampling during the After-LIFE period (March 2024 – February 2028). To do so, they have elaborated a realistic and coherent document, available here, in which they will use internal funds and those of other initiatives in order to conclude the monitoring and other actions of the After-LIFE period on transferability and communication of the results in the long term.
A summary with the mains results obtained by the project can be found in section 6.4 of this report. Also, in this section, you can download the full report of the results obtained at the end date of LIFE-mBiG (February 2024). As more consistent results on the impact of the implemented NBS are obtained, this document will be updated and disseminated to the target groups identified by the project.

*Expected results*:
- Report and result of monitoring variables that give us information on the impact of NBS on pilot buildings

| Deliverable name | Deadline | Attach in report |
|---|---|---|
| Report and result of the monitoring carried out and evaluated of the proposed impacts on the pilot buildings. | 02/2024 | Yes (final report) |

| Milestone name | Reached | Actual deadline |
|---|---|---|
| Monitoring and collection of information after the realization of the NBS prototype interventions. Impact assessment performed. | 75% Solana de los Barros<br>25% Porto<br>0% Évora | 02/2024 |

**ACTION C4. Governance for the active adaptation of Climate Change in Education and Social Buildings**

- *Status of the action:* completed

| | | | |
|---|---|---|---|
| **Foreseen start date:** | 01/12/2020 | **Actual start date:** | 05/12/2018 |
| **Foreseen end date:** | 30/06/2022 | **Actual (or anticipated) end date:** | 29/02/2024 |

The governance action is one of the project's transferability actions. In this case, work has been carried out with different administrations with different levels of competence (local, regional and national) to centralise and incorporate the climate problem of temperature increase in educational and social buildings in southern Europe and the application of NBS as adaptation solutions to this problem in the agenda of the different politicians and decision-makers.
The indicated foreseen end date is the one that we committed in the original grant agreement, however, this date was changed by the subsequent extension amendments to this agreement, being the last accepted foreseen end date on 31/12/2022. This action experienced considerable delays due to the fact that it was difficult to obtain the support of the Administrations without having completed any of the NBS implementation works in the pilot buildings of the project. Once the works on the Solana de los Barros building were completed (December 2021), we started to obtain the expected support, which became more numerous after the completion of the works on the Porto building (February 2023). However, the work of obtaining governance support was practically transversal throughout the life of the project. That is the reason why we set 05/12/2018 as the actual start date, when the project team met the staff from Green Building Council to explore possible collaborations and support. This increase in the available time also explains the slight increase in staff hours dedicated to this task, as it has allowed for a greater number of meetings than those envisaged in the project proposal.

*Progress achieved:*

**Sub-action C4.1. Gathering of information from Responsible Administrations and identification of key actors**

In order to achieve the aforementioned objective, a documentation platform was elaborated with the key institutions and experts in this field that could potentially be approached by the LIFE-mBiG project, and who could become important allies allowing a wide transferability of the actions and solutions conceived by the project. This platform is available in both Spanish and Portuguese because there are organisations from both countries.
On this platform the user will find an instruction document on the platform, an Excel file with the list of identified local, regional and national entities, extra information documentation on each key entity identified at the three levels and documentation (agenda, presentation, photos, minutes/conclusions, agreements, collaboration agreements, commitments, ordinance proposals, etc.) of the meetings held with key entities at different levels.

**Sub-action C4.2. Data analysis and development of tools for project governance**

Based on the organisations collected in the database included in the documentation platform, the project team has identified a number of tools that can serve as a model for future projects to facilitate their transferability actions. These tools have been called **Governance Tools**. For the final identification of these tools, the project beneficiary partners have been advised by various institutions at local, regional and national level.
Some examples on the type of tools that we have identified are: commitments and proposals for municipal regulation, tax incentives of city councils, recommendation for private buildings, territorial and inter-municipal agreements, NBS integrated in the technical building code,

certification of building sustainability, etc. More information can be found in deliverable *C4.2 – Reference report on Governance Tools*.

**Sub-action C4.3. Integration of the NBS into implementing policies and regulations**

Based on the documentation generated and stored in the documentation platform and the identified governance tools, the project team held a series of meetings with key stakeholders with an interest in the objectives of LIFE-mBiG. As a result of these meetings, we reach a number of agreements allowing the transferability of the project's actions and facilitating the subsequent use and implementation of the project's NBS in other contexts.

Among the agreements signed and the progress achieved, the following stand out: (a) signing of territorial agreements with 14 municipalities in Alentejo Central, in which they commit to promoting the joint implementation of consultative or other activities that result in the climate adaptation of school centres through the implementation of NBS; (b) signing of declarations of interest to promote initiatives for the implementation of NBS as a climate change adaptation measure with 8 municipalities in the province of Badajoz; c) inclusion of the NBS concept and its benefits in the municipal regulations of the City Council of Porto; d) signature of a letter of support from the unit responsible for the Spanish Technical Building Code (CTE) in which they confirmed their interest in the NBS of the project and offered their advice to include these NBS in the future in the Online Catalogue of Building Solutions of the CTE. During the After-LIFE period, the project team will continue to work to obtain new support from various administrations to improve the transferability options of the project's NBS. In fact, it is expected that at least two more public buildings per region participating in the project will implement one of the NBS tested by LIFE-mBiG.

More information about the results obtained by applying some of the governance tools identified in action C4.2 can be found in deliverable *C4.3 – Report on NBS included in Edification Technical Code and Local Regulation*. In some cases, it has not been possible to materialise concrete agreements or commitments with the institutions addressed, but useful information has been obtained on the steps to be taken in the future to achieve such agreements and commitments. Therefore, this document may be useful for future projects addressing the issue of transferability of Nature-Based Solutions through governance institutions.

*Expected results*:

- Documentary platform where all the institutional information of the different regional authorities that interact with the project will be collected.
- Identification and definition of governance tools for obtaining governmental support for the transferability of the project's NBS
- Obtaining government support for the transferability of the project's NBS: territorial agreements, declaration of interests, municipal regulations, Technical Building Code…

| Deliverable name | Deadline | Attach in report |
|---|---|---|
| Governance document platform | 01/2023 | Yes (final report) |
| Reference report on Governance Tools | 03/2023 | Yes (final report) |
| Report on NBS included in Edification Technical Code and Local Regulation | 04/2023 | Yes (final report) |

| Milestone name | Reached | Actual deadline |
|---|---|---|
| Signing of 15 Territorial and Inter-municipal Agreements | Yes | 03/2023 |
| Integration of the NBS into the technical building code, municipal regulations and multiannual programmes | Yes | 04/2023 |

**ACTION C5. Integration and transferability at local, national and European level**

- *Status of the action:* completed

| | | | |
|---|---|---|---|
| **Foreseen start date:** | 01/06/2020 | **Actual start date:** | 19/03/2019 |
| **Foreseen end date:** | 31/10/2021 | **Actual (or anticipated) end date:** | 29/02/2024 |

This action is closely related to Action C4, as many of the meetings organised under the previous action were used to define and improve the quality of the documents produced under Action C5. Meetings with experts and participation in various European and other technical workshops were also organised to explore the transferability possibilities of the project's NBS. The key difference in the transferability of this action compared to action C4, is that action C5 is aimed at more technical profiles that may be interested in using the LIFE-mBiG NBS in the future, at the educational community that wants to teach about the benefits of NBS in educational centres or at professionals from other European countries with similar climate problems to those we have in Portugal and Spain.
The indicated foreseen end date is the one that we committed in the original grant agreement, however, this date was changed by the subsequent extension amendments to this agreement, being the last accepted foreseen end date on 29/02/2024. As in action C4, this action experienced considerable delays due to the fact that it was difficult to develop transferability documentation without having completed any of the NBS implementation works in the pilot buildings of the project. Even though, the project team work transversally on action C5 throughout the life of the project. That is the reason why we set 19/03/2019 as the actual start date, when the project team met the staff from the Spanish Association for Green Roofs and Facades (ASESCUVE) to explore possible collaborations and support.

*Progress achieved:*

**Sub-action C5.1. Integration and Transferability at national and local level**

As mentioned above, a large number of meetings and events such as round tables, webinars, etc. were held throughout the project with authorities and technical experts (green infrastructure, climate change and environment) to discuss the experiences and results of the NBS prototypes in the pilot buildings of the project. In this link, you can download the list of all transferability events that have been carried out in the framework of LIFE-mBiG. Some of the events organised by LIFE-mBiG, such as round tables, conferences, congresses, networking meetings, etc. are available in the corresponding communication actions (actions E), as these are deliverables included in such actions.
On-site events were also organised in the three pilot buildings to raise awareness of the particularities of the NBS implemented in each case. These workshops were aimed at technical profiles, municipal and regional authorities and technicians, as well as school managers, with the idea of promoting the transferability of the project's NBS to other buildings or contexts. The programmes of these workshops can be consulted in this link.

**Sub-action C5.2. Integration and Transferability at EU level**

This sub-action included two face-to-face meetings, two webinars with European entities and stakeholders in the project's thematic area and the participation in at least eight workshop for experts and transnational conferences. In this sense, the LIFE-mBiG project has gone far beyond the committed objectives. Due to the long hiatus generated by the COVID-19 pandemic and in order to justify staff time during this period, the project team participated in numerous online and face-to-face events. In total, the project has actively participated in 32 meetings, workshops, congresses, meetings, forums, online seminars, etc., with European entities and stakeholders. In this link you can consult a document listing all these events with some

interesting details. The information about the conferences and European congress hosted by the project can be consulted in the corresponding communication action (actions E).

**Sub-action C5.3. Reference reports on the implementation of NBS in education and social services buildings for the 4 main climate risk regions in the EU**

As explained in action C4, the project has worked to ensure that its results are included in regulations and action programmes so that they can be transferred and replicated by the different regional authorities that consider NBS as sustainable climate adaptation measures at a local level. As a result of the meetings held during action C4 and sub-actions C5.1 and C5.2, and based on the information included in deliverable *C5.7 - Design of 15 Nature-Based Solutions projects*, the project has elaborated 4 reports of recommendations for implementing selected NBS in schools based on the climate and building context. Four schools from four different countries have been selected: Spain, Portugal, Italy and the Netherlands, to represent different contexts in terms of climate risk areas, type of challenges, solutions and budget. These reports are available at this link.

**Sub-action C5.4. Integrating the project's NBS into the common methodology for climate change vulnerability assessment in the EU**

Based on the previous experience of the work carried out by IETcc-CSIC with building and infrastructure insurance companies and the progress made during the numerous meetings organised in the project with Green Building Council and those responsible for the EU LEVEL(s) mechanism on sustainability certification of buildings, four protocols for expert workshops for consulting and insurance companies and experts on NBS and quality certificates have been elaborated. Those addressed for insurance companies are available at this link and include possible considerations to take into account when including insurance policies in NBS. Those addressed for experts on NBS and quality certificates are available at this link and are focused on the sustainability certification of buildings.

**Sub-action C5.5. Scaling up and replication in EU buildings**

To address this sub-action, Replicability and Financial Plans of the project were created. Based on these plans, the project team elaborated the deliverable *C5.7 - Design of 15 Nature-Based Solutions projects*, including the design of 15 example projects in 15 schools in different European countries, representing the four major climate risk areas of the continent. For each of these schools, an analysis of bioclimatic strategies was carried out and, based on basic characteristics such as the type of roof, the height of the buildings or their orientation, the best LIFE-mBiG NBS were proposed for each building, estimating what their real impact would be and what energy savings could be made in each case.

*Expected results*:

- Design of 15 NBS projects.
- Elaboration of 4 transferability reports and 4 protocols for expert workshops
- Organisation of 6 demonstration workshops
- Elaboration of a transferability plan and a financial plan

| Deliverable name | Deadline | Attach in report |
|---|---|---|
| Demonstration workshop agendas (6) | 02/2024 | Yes (final report) |
| Reports (4) of recommendations for expert meetings | 10/2023 | Yes (final report) |
| Protocols (2) for expert workshops for consultancies and insurance companies | 12/2023 | Yes (final report) |

| | | |
|---|---|---|
| Protocols (2) for expert workshops on NBS and quality certificates | 12/2023 | Yes (final report) |
| Replicability Plan of the LIFE-myBUILDINGisGREEN experience | 08/2023 | Yes (final report) |
| Financial Plan for the replicability of the LIFE-myBUILDINGisGREEN experience | 08/2023 | Yes (final report) |
| Design of 15 Nature-Based Solutions projects | 08/2023 | Yes (final report) |

| Milestone name | Reached | Actual deadline |
|---|---|---|
| Demonstration workshops in Badajoz | Yes | 03/2023 |
| First meeting with European stakeholders | Yes | 06/2019 |
| 2 webinars | Yes | 05/2021 |
| Demonstration workshops in Porto | Yes | 09/2023 |
| Second meeting with European stakeholders | Yes | 10/2019 |
| Strategy for NBS replication in Education and Social Services Buildings in the 4 climatic risk regions of the EU | Yes | 12/2022 |

**ACTION C6. Action Plan to Strengthen Adaptability in Current and Future Buildings**

- *Status of the action:* completed

| | | | |
|---|---|---|---|
| **Foreseen start date:** | 01/04/2021 | **Actual start date:** | 01/09/2022 |
| **Foreseen end date:** | 31/08/2022 | **Actual (or anticipated) end date:** | 31/01/2024 |

The last transferability action of the project was focused on the creation of training material to be used later on with different audiences. The indicated foreseen end date is the one that we committed in the original grant agreement, however, this date was changed by the subsequent extension amendments to this agreement, being the last accepted foreseen end date on 31/01/2024. This action experienced considerable delays due to the fact that it was first necessary to make progress on previous transferability actions, which also had associated delays. In addition, much of the content of the deliverables of this action depended on the completion of the NBS implementation work in the pilot buildings, so the actual start date of this action was 01/09/2022.

*Progress achieved:*
Firstly, the project created a database of experts and institutions with key competences to strengthen the capacities of trainers working in sustainability education, including climate change adaptation in cities, and technical staff working in the design, implementation and/or maintenance of green infrastructure. In parallel to the development of the database, the Nature-Based Solutions Package for Climate Adaptation in Buildings was prepared, which is what we have called the "LIFE-mBiG Climate Adaptation Package". This is a deliverable that is composed of a series of documents that are a training resource to be used later on with different audiences, with priority being given to trainers in early childhood, primary and environmental education centres, as well as more technical profiles. For the development of this deliverable, the project created an Expert Committee composed of staff from the project itself with experience in environmental education and other experts coming from organisations working on education in different fields, such as Hipatia Eco-Social School in Madrid.

The database has served as an organisational document for the subsequent dissemination of the LIFE-mBiG Climate Adaptation Package to those people and institutions that can make use of the material contained therein, either through education or through the use of the Nature-Based Solutions implemented by the LIFE-mBiG project. In addition, the project partner institutions themselves will use part of these educational resources generated in future training programmes to raise awareness of the project's NBS among students in their regions, using the pilot buildings as references in the use of NBS for the adaptation of buildings to climate change. An example is the training programme developed and launched in November 2023 by the City Council of Porto in the Falcão school, pilot building of the project, whose contents are included in the LIFE-mBiG Climate Adaptation Package.

Training workshops in Porto (left) and Solana de los Barros (right)

The LIFE-mBiG Climate Adaptation Package is available here and includes a climate adaptation handbook for Educators, a compilation of informative LIFE-mBiG video clips, two presentations (summary and extended version) on the content of LIFE-mBiG (including their corresponding transcriptions), and an information note on the licence of use.
Although initially this action was supposed to be led by MP, it was finally CSIC who led the action, as the Portuguese partner had several problems to carry out simultaneously the dedication of staff to the delayed NBS implementation process in its pilot building and the planning and preparation of the material corresponding to this action. Therefore, CSIC had to dedicate a higher number of staff hours also to this action, compared to those included in the Grant Agreement.

*Expected results*:

- Identification of capacity building structures and interested experts.
- Compilation of educational material for the transferability of NBS in educational and social buildings

| Deliverable name | Deadline | Attach in report |
|---|---|---|
| Database of capacity building structures | 12/2023 | Yes (final report) |
| NBS Package for Climate Adaptation in Buildings | 01/2024 | Yes (final report) |

| Milestone name | Reached | Actual deadline |
|---|---|---|
| Meetings with National, Regional and Local Authorities to incorporate NBS into Green Infrastructure and Climate Change strategies | Yes | 01/2023 |
| Expert Committee for the "NBS Package for Climate Adaptation in Buildings" | Yes | 01/2023 |
| Final version of the "NBS Package for Climate Adaptation in Buildings" | Yes | 01/2024 |

## ACTION D1. Monitoring the impact of project indicators

- *Status of the action:* Open

| | | | |
|---|---|---|---|
| **Foreseen start date:** | 01/07/2019 | **Actual start date:** | 01/10/2019 |
| **Foreseen end date:** | 31/08/2022 | **Actual (or anticipated) end date:** | 25/04/2024 |

This action includes the qualitative and quantitative monitoring and evaluation of project indicators to determine the degree of achievement of the objectives set. The indicators that were measured were those included in the KPI webtool. The indicated foreseen end date is the one that we committed in the original grant agreement, however, this date was changed by the subsequent extension amendments to this agreement, being the last accepted foreseen end date on 29/02/2024. In order to measure some economic indicators, it was necessary to obtain the final cost data declared by each beneficiary partner. This was not possible until a month and a half after the end of the project, as the social security costs for the month of February were not known until that date. Therefore, the actual end date is 25/04/2024, which is the date when the last deliverable of this action was uploaded to BUTLER. However, due to subsequent revisions of the budget declared by CSIC, the budget was slightly modified from what was declared in the KPI webtool. Being such a large organisation, the operation of expenditure checking at CSIC requires too much time to perform all the relevant checks by the CSIC Finance Department. As no modifications can be made to the deliverables of actions D1 and D3 after their submission date, there are slight differences in the indicator 14.1 with respect to the actual values.

*Progress achieved:*
At the beginning of the project, CSIC and CARTIF determined the best indicators to be measured. These were included in the KPI Webtool. Due to the aforementioned delays in the start of the works on the pilot buildings, the measurement of the indicators also suffered delays. As already explained in action C3, the indicators continue to be measured after the end of the project, in the After-LIFE period. The values obtained will be shared with the LIFE Programme and through the project's communication channels. This action includes the deliverables related to what indicators were measured. Some of those indicators were incorporated at the end of the project, following the indications of the external LIFE monitor.

*Expected results:*
- LIFE-mBiG intermediate and final scoreboards

| Deliverable name | Deadline | Attach in report |
|---|---|---|
| Intermediate scoreboard | 03/2022 | Yes (final report) |
| Final scoreboard | 12/2023 | Yes (final report) |

| Milestone name | Reached | Actual deadline |
|---|---|---|
| First monitoring of the progress of project actions | Yes | 03/2020 |
| Intermediate monitoring of the impact of project actions | Yes | 03/2022 |
| Final monitoring of the impact of project actions | 75% Solana de los Barros<br>25% Porto<br>0% Évora | 02/2024 |
| Assessment and calculation of the baseline in pilot buildings. LIFE Performance Indicators | Yes | 03/2020 |

**ACTION D2. Monitoring the socio-economic impact of project actions**

- *Status of the action:* completed

| | | | |
|---|---|---|---|
| **Foreseen start date:** | 01/01/2021 | **Actual start date:** | 01/01/2021 |
| **Foreseen end date:** | 31/08/2022 | **Actual (or anticipated) end date:** | 29/02/2024 |

The development of action D2 aims to explain how the project has affected different socio-economic aspects, such as, for example, the number of jobs generated, the impact of the project on the well-being and health of the users, etc. The indicated foreseen end date is the one that we committed in the original grant agreement, however, this date was changed by the subsequent extension amendments to this agreement, being the last accepted foreseen end date on 29/02/2024. This action experienced considerable delays due to the fact that it was necessary to complete the implementation of NBS to get consolidated results.

*Progress achieved:*
The socio-economic impacts, as stated in the project proposal, have been measured through surveys of the users of the educational centres where the project intervened, as well as the population in the area of influence of these buildings. In addition, the different socio-economic aspects of the project have been analysed to determine its impact in the regions where LIFE-mBiG takes place, including to a lesser extent the regions of the other project partners.
This action summarised the socio-economic situation of the project intervention regions, analysed the economic impact of the project actions and the social benefits acquired by the population affected by the project, and synthesised the environmental impact of the project, which is further developed in deliverable *C3 - Report and results of the monitoring and evaluation of the proposed impacts on the pilot buildings* of LIFE-mBiG. The final version of the socio-economic report of the project can be consulted in this link, however, the main socio-economic benefits obtained by the project are presented in section *6.4 Analysis of benefits* of this report.

| Beneficiary partner | External assistance | NBS prototypes, equipment, consumables | Personnel* | Jobs created | Persons recruited |
|---|---|---|---|---|---|
| CSIC | 33,818.82 € | 37,507.62 € | 315,898.87 € | 2 | 6 |
| CARTIF | - | 25,540.37 € | 407,566.43 € | 6 | 18 |
| DIPBA | 10,907.62 € | 260,221.01 € | 141,200.85 € | 10 | 11 |
| MP | 114,026.32 € | 216,362.78 € | - | 7 | 7 |
| CIMAC | 48,117.60 € | 225,047.54 € | - | 5 | 5 |
| **TOTAL** | 206,870.36 € | 764,679.32 € | 864,666.15 € | 30 | 47 |

*Table 2. Direct economic impact and job creation of LIFE-mBiG*
**Only the budget used for the recruitment of new staff for the implementation of the project is included*

*Expected results*:

- Socio-economic report of the LIFE-mBiG project.

| Deliverable name | Deadline | Attach in report |
|---|---|---|
| Socio-economic report of the LIFE-mBiG project | 02/2024 | Yes (final report) |

| Milestone name | Reached | Deadline |
|---|---|---|
| Socio-economic assessment of activities carried out by the LIFE-mBiG project | Yes | 02/2024 |

**ACTION D3. Evaluation, Control and Monitoring of project performance indicators. LIFE KPI Webtool**

- *Status of the action:* Open

| | | | |
|---|---|---|---|
| **Foreseen start date:** | 01/10/2018 | **Actual start date:** | 01/10/2018 |
| **Foreseen end date:** | 30/09/2021 | **Actual (or anticipated) end date:** | 25/04/2024 |

This is a continuation of the action D1. In D1, we identified the indicators we needed to measure to evaluate the impact of the project actions. Now, in action D3, we interpret the results obtained during the monitoring process in the LIFE-mBiG project. The indicated foreseen end date is the one we committed in the original grant agreement, however, this date was changed by the subsequent extension amendments to this agreement, being the last accepted foreseen end date on 29/02/2024. As Action D3 interprets the results of the indicators identified in Action D1, the actual end date of both actions is the same: 25/04/2024. As mentioned in action D1, due to subsequent revisions of the budget declared by CSIC, the budget was slightly modified from what was declared in the KPI webtool. Being such a large organisation, the operation of expenditure checking at CSIC requires too much time to perform all the relevant checks by the CSIC Finance Department. As no modifications can be made to the deliverables of actions D1 and D3 after their submission date, there are slight differences in the indicator 14.1 with respect to the actual values.

*Progress achieved:*
Action D3 is a continuation of action D1. It explains the methodology of the indicators selected in the KPI Webtool and their evaluation, including a series of conclusions for each indicator and determining whether the objectives set were achieved and justifying those cases in which they were not achieved or conclusive results were not yet obtained. Most indicators have met or significantly exceeded the targets set at the beginning of the project. However, some indicators such as energy and fuel consumption have not yet been fully measured, so the impact of the NBS on these indicators at the end of the project is still not known. As previously mentioned, we will continue to evaluate these and other indicators in the After-LIFE period to share conclusive results. The full report including the evaluation of the KPI Webtool indicators can be found in this link, however, a summary of the evaluation of the KPIs can be found in section *7. Key Project-level Indicators* of this report

*Expected results:*
• Technical Report on the verification of compliance with the values of the LIFE KPI Webtool

| Deliverable name | Deadline | Attach in report |
|---|---|---|
| Technical Report on the Evaluation, Control and Monitoring of Project Performance Indicators | 02/2024 | Yes (final report) |

| Milestone name | Reached | Actual deadline |
|---|---|---|
| Implementation of the KPI's system and Verification Sources | Yes | 12/2018 |
| 100% evaluation of project performance indicators | 75% Solana de los Barros<br>25% Porto<br>0% Évora | 02/2024 |

## ACTION E1. Communication Plan and dissemination of the project

- *Status of the action:* completed

| | | | |
|---|---|---|---|
| **Foreseen start date:** | 01/10/2018 | **Actual start date:** | 01/10/2018 |
| **Foreseen end date:** | 31/08/2022 | **Actual (or anticipated) end date:** | 29/02/2024 |

In the framework of this action, the project team elaborated a Communication Plan (available here) that served as a basis for creating internal guidelines to be followed for the dissemination and communication of the LIFE-mBiG project actions to help achieve its goals. The indicated foreseen end date is the one we committed in the original grant agreement, however, this date was changed by the subsequent extension amendments to this agreement, being the last accepted foreseen end date on 29/02/2024.

*Progress achieved:*

**Sub-action E1.1. Creation of communication material**

At the beginning of the project, the Project Identity Manual and the general basis for digital and written communication of the project were created. The communication material created by LIFE-mBiG was the project website in three languages (Spanish, Portuguese and English); the Twitter/X and LinkedIn channels with publications mainly in Spanish and English, but the most relevant also in Portuguese; a YouTube channel that includes more than 50 videos in the three languages, some of them contracted to external companies; posters, leaflets, notepads, pens and roll-ups for events; notice-boards set in the pilot buildings to inform about the implementation of NBS; and the Layman report with a synthesis of all the information related to the project, the results achieved, its weaknesses and the problems that have arisen during its implementation. The Layman report was sent to more than 19,500 people with potential interest in the project.

**Sub-action E1.2. Articles and media**

The project was promoted in a multitude of external media and specific magazines. As another measure to compensate for the staff hours declared during the pandemic period, the project team, specially CSIC and DIPBA, dedicated an extra effort to the visibility of the project in the media, achieving results much more ambitious than those committed in the Grant Agreement. All the articles and publications made by the project in its own and external media can be consulted in the LIFE-mBiG communication dossier, which is not a deliverable of the project but is useful to see how far-reaching and impactful the project has been in terms of communication.

**Sub-action E1.3. Contribution to existing specific broadcasting channels and networks**

In this sub-action, the project team has worked to share information about the project with platforms, channels and networks related to the project work streams. The identified platforms, channels and networks are Oppla and Network Nature, the European Committee of the Regions, digiNEB.eu, EKLIPSE, the UnitedNations PreventionWeb, AdapteCCa, CONAMA's Observatory for Nature-Based Solutions, Spanish Network of Cities for Climate and Spanish Network of Local Governments +Biodiversidad. In addition, project information is shared through the Climate-Adapt platform. Due to the relevance of this platform with the line of action of the project, adaptation to climate change, a specific action has been dedicated to the publication of project information on this platform.

**Sub-action E1.4. Networking and clustering**

Since the start of the project, networking activities have been carried out with more than 30 other projects, entities and key people related to the scope of the project. Among the types of collaborations developed by the project are the transferability of Nature-Based Solutions developed by other projects, the organisation of training and dissemination events in conjunction with other European projects, logistical support in the organisation of project activities or the dissemination of material produced by LIFE-mBiG, among other collaboration channels. All the networking actions can be consulted in the Networking report.

*Expected results:*

- Elaboration and publication of the Communication Plan.
- Publication of a website, several communication channels and different communication material.
- Elaboration, publication and dissemination of the Layman report.
- Promotion of the project through the publication of 16 press releases in external media, 300 impacts in digital media from the project and the beneficiary partners' communication channels, 4 appearances on TV, 4 appearances on radio and 12 articles in specific media.
- Dissemination of the project as a successful study case in thematic channels.
- Broad collaboration of the project with other initiatives working in the field of expertise of LIFE-mBiG.

| Deliverable name | Deadline | Attach in Midterm report |
|---|---|---|
| Layman report in 3 languages | 12/2023 | Yes (final report) |
| Sending at least 5 success guides to the different channels and networks identified | 02/2024 | Yes (final report) |
| Project website in 3 languages | 02/2019 | Yes (mid-term) |
| Report and results of networking actions with other projects, target groups and stakeholders | 12/2023 | Yes (final report) |
| At least 16 press releases, 300 digital media impacts, 4 TV appearances, 12 radio appearances and at least 12 articles in specific magazines. | 12/2023 | Yes (final report) |
| Communication Plan or Strategy | 12/2018 | Yes (mid-term) |
| Database with news and press and video articles | 12/2023 | Yes (final report) |

| Milestone name | Reached | Actual deadline |
|---|---|---|
| Start of the Communication Strategy | Yes | 10/2018 |
| Creating the Website | Yes | 12/2018 |
| Sending the Layman Report to the website | Yes | 12/2023 |
| LIFE and H2020 project leaders are contacted to be included on the Steering Committee | Yes | 01/2019 |

## ACTION E2. Communication activities for the target audience

- *Status of the action:* completed

| | | | |
|---|---|---|---|
| **Foreseen start date:** | 01/06/2019 | **Actual start date:** | 01/06/2019 |
| **Foreseen end date:** | 31/08/2022 | **Actual (or anticipated) end date:** | 29/02/2024 |

This communication action is more focused on the organisation of key events to disseminate the project and its achievements to a wide range of audiences. The indicated foreseen end date is the one we committed in the original grant agreement, however, this date was changed by the subsequent extension amendments to this agreement, being the last accepted foreseen end date on 29/02/2024.

*Progress achieved:*

### E2.1. European Conferences and Congresses on the impact and functionality of NBS in cities

This sub-action includes two conferences, in Badajoz and Porto, and a European congress in Madrid, about the impact and functionality of Nature-Based Solutions (NBS) as tools for sustainable climate adaptation in buildings and cities.

• **Badajoz Conference "Natural solutions for adapting buildings to climate change"** (13/11/19): the purpose of this event, hosted by DIPBA, was to improve the dissemination and social impact of the objectives of the project, raising awareness of how the NBS are a measure of local adaptation to climate change in buildings. The main thread was climate change its consequences - especially in terms of user comfort - and the need to adapt to it, for which the NBS affected one of the possible measures, whose impacts are positive.

Outside the room where the conference was held, a networking space was organized and an exhibition of products and solutions related to the scope of the event. There were 115 participants in the event, most of them from Public Administration, but also some students, companies, and freelancers. More information about the event can be consulted in the conference report available here.

• **Madrid Congress "LIFE-myBUILDINGisGREEN final congress"** (19-21/09/23): this 3-day event was hosted by RJB-CSIC in collaboration with the Madrid City Council and was attended by 100 professionals in the field of green infrastructure and the adaptation of buildings and cities to climate change. The languages of the event were mainly Spanish but also English. The first day of the event focused on the concept of green cities and consisted of two interactive sessions in the morning and a visit in the afternoon to some Nature-Based Solutions in the city of Madrid. The second day focused on concrete projects that promote the use of Nature-Based Solutions as an alternative for adapting cities and buildings to climate change, including EU cofounded initiatives, and a guided tour of the facilities of the Royal Botanical Garden. Finally, on the last day, the Madrid City Council led the session “Nature, culture and evolution”, in which work was done to build a community of knowledge and innovation that shares a climate and strategic vision of public and municipal climate policies. More information about the event can be consulted in the congress report available here.

• **Porto Conference "How to use Nature to adapt cities to climate change?"** (31/10/23): the purpose of this event, hosted by MP, was to explore the city of Porto’s approach to NBS, discussing the panorama of urban gardening and the new Alameda de Cartes Park. The event included a visit to the intervention carried out at the Falcão Basic School, one of the project’s pilot buildings.

This event took place at the Porto Innovation Hub and was attended by 70 municipal technicians, architects, urban project promoters, teachers and university students in the field of architecture and landscape architecture. This conference suffered a considerable delay in its

organisation because it was initially planned to be organised in conjunction with the National Green Roof Congress. However, this national event was postponed until after the end of the LIFE-mBiG project and the Porto conference had to be organised as an individual project event. More information about the event can be consulted in the congress report available here.

As part of this sub-action, the summary of all the talks presented at the three events was also published and is available in Spanish, English and Portuguese.

**E2.2. Training Platform "NBS Building Training"**

One of the most remarkable milestones among the communication actions is the creation of an online training on the experience of LIFE-mBiG, which introduces the problem of temperature increase in buildings due to climate change, possible NBS available to address this environmental issue, the experience of the three pilot buildings, as well as the monitoring scheme and the first results obtained. The online training, which has been used by 123 different users, is available in Spanish, English, and Portuguese. It is important to highlight that a large part of the excess staff hours declared in Action E2 corresponds to this sub-action, as CIMAC and CSIC staff programmed, assembled, designed and maintain the eLearning platform, which was initially planned to be done through external assistance.

As part of this sub-action, the project team elaborated a Best-Practices Guide to bring together the lessons learnt during the project, to identify the positive points of the solutions implemented, the difficulties encountered and how they were resolved, and to highlight the problems that still need to be solved.

**E2.3. Roundtables and/or Discussion Forums, Meetings with scientists, managers, technicians and politicians**

This sub-action contemplates the realization of round-tables and other events for debate, as an objective to provide the necessary information to make more fluid and constructive the relationship between scientists, technicians and politicians to increase their awareness and knowledge about NBS, as measures of climate adaptation in buildings and cities.

The first of these events took place in Évora on 18-19 February 2019 and was composed of several events: (a) internal meeting of the general coordinator of the project with the CIMAC team; (b) meeting with the General Directorate of Schools and with the Portuguese Environment Agency; (c) visit to the educational community of two potential pilot buildings; (d) Open Conference on Application of NBS for the Adaptation of Public Buildings to Climate Change addressed to educational and research staff of the University of Évora; (e) formal presentation of the project to representatives and technicians of the 14 municipalities of Alentejo Central.

The next event took place in Porto on 25 February 2019 and was also composed of several events: a) an internal meeting of the general coordinator of the project with the MP team; b) a visit to the educational community of the selected pilot building in Porto; c) formal presentation of the project to local partners such as other areas of the Porto City Council, municipal companies, the National Association of Green Roofs, the University of Porto and the Porto Energy Agency; d) meeting with the Department of Innovation and Environment of the Porto City Council.

On 10 July 2019, the Porto round table was organised to discuss the project approach and the proposed NBS. It was attended by green roof and vertical garden associations from Spain and Portugal. In 2020 and 2021 two round tables were also organised led by CIMAC and DIPBA, respectively, with similar objectives but focused on each pilot building in Évora and Solana de los Barros (Badajoz). On both occasions, the format of the round table had to be online, due to the restrictions imposed by the COVID-19 pandemic.

All detailed information on these events can be found in the roundtables report available here. Videos of the Porto and Évora roundtables are also available: Porto (10/07/19) and Évora (15/12/20).

**E2.4. Itinerant exhibition "NBS as alternative solutions of climatic adaptation in buildings"**

In the course of the project, a series of visits to the pilot buildings have been organised to show the NBS implemented by LIFE-mBiG. This audience was mainly composed of pupils and teachers from other schools in the area, although neighbours from the area of influence of the project's pilot buildings were also invited. A total of seven on-site exhibitions have been held in the pilot buildings of Solana de los Barros (Badajoz) and Porto, with an attendance of 419 people. CIMAC has not been able to hold exhibitions on its NBS because the implementation of the NBS concluded in February 2024. However, several visits are planned to take place during the After-LIFE period.

Although the number of organised events mentioned in the previous paragraph is already higher than the number committed to in the Grant Agreement, it should be noted that the door is open for a greater number of such events in the future, as the three pilot buildings of the project have become benchmarks of sustainability and adaptability of public buildings to the effects of climate change, especially to high temperatures.

In addition to these on-site exhibitions, MP organised the design of a graphic exhibition on the project theme to improve public awareness in the city. This exhibition will be repeated at various locations in the metropolitan area during 2024 and 2025.

All the information about the events organised in this sub-action can be found in the audience report available through this link.

*Expected results*:

- Reports and results of the opinions expressed by guests, congressional representatives, professionals and the public to the events carried out by the LIFE-mBiG project.

| Deliverable name | Deadline | Attach in report |
|---|---|---|
| Report and results of the Conference in Badajoz | 12/2019 | Yes (mid-term) |
| Report and results of the Conference in Porto | 12/2023 | Yes (final report) |
| Online Training Platform "NBS Building Training" | 12/2023 | Yes (final report) |
| Report and results of the Congress in Madrid | 12/2023 | Yes (final report) |
| Best Practices Guide | 12/2023 | Yes (final report) |
| Report and results of discussion forums and roundtables | 07/2023 | Yes (final report) |
| Digital publication in 3 languages with the summary of the presentations of the conferences and Congress | 12/2023 | Yes (final report) |
| Audience Report at Traveling Exhibitions | 02/2024 | Yes (final report) |

| Milestone name | Reached | Actual deadline |
|---|---|---|
| Start of discussion forums and roundtables on NBS | Yes | 06/2019 |
| Itinerant Exhibition In Badajoz | Yes | 05/2023 |
| Itinerant Exhibition in Portugal | Yes | 02/2024 |
| Creation of the Online Training Platform | Yes | 10/2022 |
| Conference in Badajoz | Yes | 11/2019 |
| Conference in Porto | Yes | 10/2023 |
| European Congress in Madrid | Yes | 09/2023 |

## ACTION E3. NBS Knowledge Transfer as Climate Adaptation Solutions

- *Status of the action:* completed

| | | | |
|---|---|---|---|
| **Foreseen start date:** | 01/10/2018 | **Actual start date:** | 01/10/2018 |
| **Foreseen end date:** | 31/08/2022 | **Actual (or anticipated) end date:** | 05/02/2024 |

*Progress achieved:*
The last communication action is focused on the transfer of the knowledge generated in LIFE-mBiG to the Climate-ADAPT platform of the European Union.
Although this action does not have specific economic resources, a separate section for the transfer of project information to Climate-ADAPT is distinguished because this is the meeting point for all experts working on adaptation to climate change in the EU, so it is essential to include information on LIFE-mBiG.
A short dossier with project information was published on this platform in the middle of the project. From summer 2023 until the end of the project, CSIC worked with the platform's technicians to publish the NBS implementation project of the Solana de los Barros school (Badajoz) as a case study. This case study was finally published on 5 February 2024. During the After-LIFE period, when more conclusive results are available, two more case studies concerning the pilot buildings in Porto and Évora are expected to be published.
In addition, the project website has hosted a specific section that connects to Climate-Adpat and the rest of the platforms where all the LIFE-mBiG information is available. All this information is contained in the deliverable *E3 - Report of contents uploaded to Climate-ADAPT*.
The CSIC staff in charge of this sub-action had to dedicate a not insignificant number of hours to the connection and publication of the contents in Climate-Adapt. As initially there were no estimated hours of dedication for this action, the hours that the staff have finally been dedicated have been divided between those declared in the communication actions E1 and E2, increasing even more the difference with the initially estimated in the project proposal.

*Expected results:*
- Connection between the project information and the Climate-ADAPT platform.

| Deliverable name | Deadline | Attach in report |
|---|---|---|
| Digital infrastructure for connection with Climate-Adapt | 12/2023 | Yes (final report) |
| Report of content and results transferred to Climate-Adapt | 02/2024 | Yes (final report) |

| Milestone name | Reached | Actual deadline |
|---|---|---|
| Connecting and transferring knowledge to the Climate-Adapt Database | Yes | 02/2024 |

## ACTION F1. Overall project coordination

- *Status of the action:* completed

| | | | |
|---|---|---|---|
| **Foreseen start date:** | 01/09/2018 | **Actual start date:** | 01/09/2018 |
| **Foreseen end date:** | 31/08/2022 | **Actual (or anticipated) end date:** | 29/02/2024 |

*Progress achieved*:
Project management bodies were established at the partner meeting held at the project coordinator's premises in Madrid on 20/09/2018. The **Partnership Agreement** was presented at the meeting to all beneficiary partners. During **November 2018** the document was signed by all partners and stored on the project management platform.
In March 2022, the General Coordinator voluntarily resigned from his job position. CSIC had to look for a **new General Coordinator** for the project, and in June 2022 Miguel Vega was hired to lead the management of the project until its completion (February 2024).
Due to the reasons already mentioned (COVID-19 pandemic, war in Ukraine, etc.) and the transition in the change of the General Coordinator of the project, it was necessary to ask for **two extension amendments** of the project duration, one from September 2022 to December 2023 and another from January to February 2024.
The continuation of the contract of the General Coordinator of the project during the months of extension for the successful completion of the project has led to a very significant increase in the staff costs declared by CSIC compared to the initial project proposal.

The structure of the project teams consisted of:

- A technical team, represented by 2 or 3 people from each beneficiary partner (CSIC, CARTIF, DIPBA, CIMAC and MP) and led by the Project Coordinator (CSIC).
- An Administrative-Financial Management team: consisting of at least 2 people from each beneficiary partner and led by the Project Coordinator (CSIC).
- A Communication team consisting of at least 2 people from each beneficiary partner and led by the Project Coordinator (CSIC).
- An online management platform was created with ALFRESCO technology. With this platform, it was possible to share technical documents and store all financial and administrative documents. A virtual folder was created on this platform with the name MONITOR. In this folder, the LIFE-mBiG project monitor had a real knowledge of the technical, administrative and financial status of the project in real time.

| Deliverable name | Deadline | Attach in report |
|---|---|---|
| Memorandums of Understanding between the Coordinator and beneficiary partners | 11/2018 | Yes (mid-term) |
| List of progress indicators and kick-off meeting report | 12/2018 | Yes (mid-term) |

| Milestone name | Reached | Actual deadline |
|---|---|---|
| Nomination of Project Coordinator | Yes | 10/2018 |
| Consortium agreements signed | Yes | 11/2018 |

## ACTION F2. Project final audit

- *Status of the action:* not needed

Deliverable *F2 – Audit report* has not been carried out. This is due to the fact that in 2019 EASME issued an amendment for all projects whereby only those beneficiaries receiving more than 750.000 € from the EU are obliged to perform an audit. This is not the case for LIFE-mBiG and therefore no project beneficiary is obliged to audit. This was confirmed by the team of LIFE external monitors through consultation on the helpdesk platform with ticket number TCK001833. An e-mail with the answer to this query has been uploaded in BUTLER.

## ACTION F3. After-LIFE

- *Status of the action:* completed

| **Foreseen start date:** | 01/01/2021 | **Actual start date:** | 22/12/2022 |
|---|---|---|---|
| **Foreseen end date:** | 31/08/2022 | **Actual (or anticipated) end date:** | 29/02/2024 |

The After-LIFE period is the time (March 2024 – February 2028) when the beneficiary partners continue to measure, disseminate and transfer the results obtained during the project execution time (September 2018 – February 2024). The way in which the beneficiary partners of the project will do this is detailed in the After-LIFE Plan.
The indicated foreseen end date is the one we committed in the original grant agreement, however, this date was changed by the subsequent extension amendments to this agreement, being the last accepted foreseen end date on 29/02/2024. The actual start date is the date on which CSIC and CARTIF (technical partners) planned the roadmap to be followed to draw up the After-LIFE Plan.

*Progress achieved:*
As mentioned in previous sections of this document, due to various events during the development of the project, it has not been possible to carry out full monitoring of the pilot buildings where the NBS designed by LIFE-mBiG have been installed. The level of monitoring of these solutions depends on the building: it is practically complete for the school in Solana de los Barros, somewhat less complete for the school in Porto and is just starting in Évora. Nevertheless, periodic surveys have been carried out to establish the baseline for the three buildings, which is more consistent in the case of Évora due to the long period of monitoring before the solutions were installed. For this reason, the lack of detailed monitoring of the NBS in the pilot buildings is included in this After-LIFE Plan. A timelier monitoring is also included until the end of the After-LIFE period of the project (February 2028), when the behaviour of the NBS will be studied at a more advanced stage of vegetation development.
In addition to this monitoring, the After-LIFE Plan will address issues related to the communication and dissemination of its results, the transferability of its actions and training on the solutions implemented.
The success of the After-LIFE Plan depends to a large extent on the responsible team assigned to implement the actions included in this document. The dedicated staff must meet at least two criteria: a) to have been involved in the implementation period of the LIFE-mBiG project and b) to be permanent staff of the beneficiary institutions participating in the project.
At the beginning of the LIFE-mBiG project, some of the staff of the educational centres where the project intervenes were reluctant to implement NBS in their centres, sometimes questioning

the positive effects of the implemented NBS. During the execution of the project these people became aware of the advantages of this type of solution and have now become key allies and ambassadors in amplifying the impacts of the LIFE-mBiG project. Therefore, in addition to the people directly involved in the implementation of the After-LIFE Plan, we consider it vital to have the collaboration of people from these schools to act as points of contact and facilitators of the actions that take place in their pilot buildings.

*Expected results*:

- Establish the work to be carried out during the After-LIFE period and the staff in charge of its implementation.

| Deliverable name | Deadline | Attach in report |
|---|---|---|
| After-LIFE Plan | 02/2024 | Yes (final report) |

| Milestone name | Reached | Actual deadline |
|---|---|---|
| Kick-off meeting for the elaboration of the After-LIFE Plan | Yes | 12/2022 |
| Submission of the After-LIFE Plan. Exploitation of the results | Yes | 02/2024 |

## 6.2. Main deviations, problems and corrective actions implemented

The content of the project actions did not deviate significantly from the original plan. However, the execution time of some of the core actions of the project increased excessively, affecting the overall duration of the project, as many further actions depended on the previous to be completed to start. This has been caused by two major events that were virtually impossible to foresee, namely the COVID-19 pandemic, which led to long-lasting mandatory work stoppages for almost the entire society, and the war in Ukraine, which led to skyrocketing prices for many products such as energy and building materials. The only feasible way to cope with these time deviations was the request for two extensions amendments of the project duration, which allowed the project to be successfully completed but increased the project costs for almost all partners, especially for the coordinating entity, CSIC, and the last partner to implement the NBS in its pilot building, CIMAC. The main deviations suffered by some of the actions of the project and the corrective measures are detailed below. More details about problems and corrective actions can be found in deliverable *E2.2b – Best Practice Guide*.

**Action A2. Drafting of projects for the application of nature-based prototypes in pilot buildings**

In this action, the prototypes initially proposed in the proposal for generic buildings were adapted and modified to the characteristics of the pilot buildings chosen and to increase the transferability options in the market with interested potential customers, such as the National Association of Green Covers of Portugal and Spain. That is why several more prototypes were designed, which met the prototyping conditions and the technical, social, environmental and economic characteristics demanded by a NBS while falling within the budget approved by EASME for the LIFE-mBiG project. More information about the technical aspects of the used prototypes can be found in deliverable *C2.4 - Technical Manuals for the implementation of NBS prototypes in the different structures of the pilot buildings*.

The actual end date of this action refers to the time when the last construction project of the pilot building in Évora was confirmed, which is when deliverable A2 was updated.

**Action C1. Preparation and drafting of the Pilot Buildings Baseline**

In this action, there have been some deviations from the initial planned plan, in terms of:

• The initial project proposal did not include the monitoring of $CO_2$ concentration inside the classrooms, but it was considered a key indicator of indoor air quality to measure the impact of the natural ventilation system. The budget was adjusted to be able to measure this parameter.

• The installation of the equipment to measure $CO_2$ concentration, temperature and relative humidity inside the classrooms as well as outside temperature and relative humidity was slightly delayed compared to the estimated date. This is not a major deviation as, due to the delayed start of works in the pilot buildings, sufficient data were obtained to establish a solid baseline.

• It has been decided to use weather data from official sources from locations near the deployment zones instead of installing a weather station at each location. The quality of the data obtained is sufficient for the calculation of indicators. For key calculations only temperature and humidity are required, so two sensors have been installed outside each school in the main areas to study the induced natural ventilation formulas.

• The transfer of pupils from the pilot building in Porto to different schools during the construction works did not allow the establishment of an appropriate baseline for social indicators measured through surveys. Therefore, data were collected directly from the management team of the school involved.

**Action C2. Implementation of NBS in pilot buildings. Execution of works**

This is the core action of the project and has suffered the longest delays, causing cascading delays for the other actions that depended on its completion. The reasons for major delays in the implementation of NBS in each pilot building are summarised below:

• **Gabriela Mistral school (Solana de los Barros, Spain)**. In this case the COVID-19 pandemic played a role in the delay for the award of the works but was not the most decisive factor. The main factor delaying the award of the works was the lack of local companies specialised in implementing NBS on building roofs. The corrective measure was to survey this type of company nationwide. There was also a lack of involvement on the part of the construction company during the implementation of the NBS, a problem which, in order to be overcome, required regular meetings to guarantee their commitment to the successful completion of the project.

• **Falcão school (Porto, Portugal)**. When the pilot building for the LIFE-mBiG project was selected, there was also a requalification project by the Municipal Education Department, so we face the first set back, because it was needed to fit the mBiG prototypes into the architectural project for school refurbishment, but that harmonization of projects ensured the basic engineering and architecture issues to properly accommodate the designed NBS prototypes.

Despite the Education Department project, the municipality, together with the Porto Energy Agency, developed the "Porto Solar" project, which consisted of installing photovoltaic panels to produce electricity from renewable sources for self-consumption in 29 municipal buildings, including 4 service and emergency buildings and 25 primary schools, one of which is the Falcão Primary School. The need to reconcile the design of the prototypes with the “Porto Solar” project and the redevelopment works became challenging from a planning point of view. This led to some delays in the conception, design and execution project. The need to integrate different visions and needs led to delays in finalising the execution projects.

There also was a delay in the execution of the school’s requalification works, which impacted on the NBS implementation schedule. The COVID-19 pandemic and the lack of resources and materials resulting from the outbreak of the conflict in Ukraine led to delays in the supply of raw materials and construction materials, and the rise in prices had an impact on the duration of the project's implementation.

• **Horta das Figueiras school (Évora, Portugal)**. CIMAC is the promoter of the project at the school, but the Évora municipality is the owner of the school building. This requires close and attentive liaison and communication between the two organisations, which was not the case at the start of the project. As a result, when the architectural and speciality project for the implementation of the NBS was completed, it was found that the intervention being proposed for the school clashed with a previous project by the municipality to extend it. For this reason, the project had to be altered, taking into account the constraints of integrating other municipal projects and the requirements of the respective teams. Although the issue was resolved and the projects for the school were made compatible, the situation resulted in a 12-month delay in completing the design of the NBS implementation project and increased costs for its realisation (new public procurement procedure with the design team to draw up the amendment to the initial project).

The difficulties in contracting public works contracts that have arisen in various situations require procedures to be planned and deadlines to be set that are more accurate and coincide with reality. In the case of the work on the school in Évora, these difficulties led to procedures being deserted and cancelled, culminating in a delay in the start of the work and its completion. The difficulty in contracting this work was due to a number of cumulative reasons, namely:

- The financial crisis of 2008, the SARS-CoV-2 pandemic, and the subsequent outbreak of war in Ukraine, with consequences for the construction sector, from the lack of labour to the exponential rise in raw materials and building materials, with the base price for launching the procedure being inadequate in relation to the reality of the market and not proving to be attractive.
- In addition, there is a lack of companies specialised in implementing innovative NBS on the domestic market.

The lack of an accurate diagnosis of the state of conservation of the building was reflected in unforeseen events on site, which led to the need to contract additional work, with consequent delays in the execution of the contract.

There were initial difficulties in managing the expectations of the school personnel and parents, particularly with regard to the planning of the work, the relocation of two of the four classrooms to another school during a school term, the delimitation of the construction site and the execution of the work at the same time as school activities. This issue was addressed with information sessions for parents about the timetable for the work and the positive results expected from the implementation of NBS, which resulted in a very positive implication by them.

**Actions C3, D1 and D3 about monitoring of project indicators**

The monitoring actions were fully conditional on the completion of the NBS implementation work in the pilot buildings, and had to be carried out during the two years after the implementation of the NBS.

In the case of **CEIP Gabriela Mistral (Spain)**, monitoring was carried out for 1.5 years, with almost conclusive results. However, due to difficulties in the growth of some climbing plant species, a longer sampling time with optimal plant development is necessary.

The **Falcão school (Porto, Portugal)** managed to carry out a sampling of 0.5 years, thus showing the first positive results, however, further sampling is necessary in the years after the end of the project.

The **school in Évora (Portugal)** completed its implementation works in the same month as the end of the project, so it was not possible to carry out any sampling.

In order to correct this situation, the After-LIFE plan includes detailed planning of the next surveys to assess the real impact of the implemented NBS. In addition, long-term monitoring is also included, after the initial two years of monitoring, to assess the impact of the NBS also

with much more developed vegetation growth. CIMAC and MP have placed several sensors that allow for remote collection of information on certain indicators, avoiding a greater number of trips to the pilot buildings by CSIC and CARTIF. This allows the project partners to realistically meet the monitoring plan committed to in the After-LIFE period. For more information on the details of the monitoring after the end of the project, please refer to deliverable *F3 - After-LIFE Plan*, where the project partners commit to update and disseminate the new results obtained after future sampling.

**Actions C4, C5 and C6 about transferability of NBS and project actions**
Although the transferability actions have been carried out in a transversal manner throughout the project, seeking alliances from the beginning, it was not possible to start obtaining satisfactory results until the first NBS were implemented. Even so, all the established objectives have been achieved. Only it has not yet been possible to include the NBS of the project in the Technical Building Code (CTE) due to the fact that more time is needed to test the functioning of the NBS and to test them in other contexts than educational centres. However, in the deliverable *C4.3 - Report on NBS included in Edification Technical Code and Local Regulation* the steps to be taken to be able to include the NBS in the CTE in the future are included, for which we obtained the support of those responsible for the CTE in the Spanish Ministry of Housing and Urban Agenda. This would be a major achievement of the project at national scale, because it would impact positively in all buildings after its approval.

**Action D2. Monitoring the socio-economic impact of project actions**
The transfer of pupils from the pilot building in Porto to different schools during the construction works did not allow the monitoring of some social indicators measured through surveys, as stablished in the project proposal. However, data were collected directly from the management team of the school involved.

**Actions E. Communication Actions**
In general, the communication actions have lasted much longer than expected, as they are transversal actions throughout the life of the project. This has made it possible to obtain much more ambitious results than those initially committed to in the project proposal, but it has also required an increase in the number of hours of dedication of some of the staff.
The only deviation to be highlighted would be for action E3, which according to the project proposal diffusely contemplate a direct connection with the Climate-ADAPT platform. When we met with technicians from the European Environment Agency (EEA) who manage this platform, they informed us that it is not possible to directly upload information to Climate-ADAPT, as it must be previously reviewed and validated by the EEA. Even so, the project has shared all its progress with the platform by uploading a descriptive dossier, a case study on the implementation of the NBS in the Spanish pilot building and specific articles derived from the project's actions.

## 6.3. Evaluation of Project Implementation

The **methodology** defined by LIFE-mBiG beneficiaries is based on four pillars:

1. Technical-Administrative Partnership (TAP), where the technical partners lead the work of designing and monitoring the NBS and advise on their implementation, and the administrative partners use their competences to coordinate and execute the work on-site. Transferability and communication actions are supported by all partners.

2. Definition of selection criteria for pilot buildings that are easy to replicate in other contexts and generation of clear and sufficient documentation for the replication of project actions.
3. Testing of prototypes in three pilot buildings that serve as a reference for future replication in new buildings, following agreements reached by the beneficiary partners with other public authorities.
4. Relevance of training processes to improve the capacities of personnel dedicated to the transferability of the NBS for the climate adaptation of buildings.

In the absence of more conclusive results during the After-LIFE period, the methodology has been confirmed as satisfactory, as positive results can be seen for those indicators measured over a longer period of time and at the level of interest of other entities in the NBS implemented by LIFE-mBiG, which implies a great potential for replication of the solutions proposed by the project.

A **presentation of the achievements reached** by the project in the light of project main objectives is reported below.

| Action | Foreseen in the revised proposal | Achieved | Evaluation |
|---|---|---|---|
| Action A1 | *Objective*: choosing 3 pilot buildings<br>*Expected results*:<br>- Building selection criteria report<br>- Building inventory report<br>- Administrative permits report | - Building selection criteria report<br>- Building inventory report<br>- Administrative permits report | Successfully achieved on time. |
| Action A2 | *Objective*: designing NBS prototypes and drafting construction projects<br>*Expected results*:<br>- NBS and LIFE-mBiG prototype database<br>- Working matrix for the choice of NBS<br>- Development of 3 construction projects for pilot buildings | - NBS and LIFE-mBiG prototype database<br>- Working matrix for the choice of NBS<br>- Development of 3 construction projects for pilot buildings | Successfully achieved after the deadline. The last construction project was the one from Evora and was officially approved on July 2022. |
| Action C1 | *Objective*: development of baseline in pilot buildings<br>*Expected results*:<br>- Baseline report and evaluation and calculation of baseline indicators | - Baseline report and evaluation and calculation of baseline indicators | Successfully achieved on time. |
| Action C2 | *Objective*: implementation of NBS in pilot buildings<br>*Expected results*:<br>- Guide to the choice of plant species adapted to climate change<br>- Technical Manuals for the Implementation of NBS Prototypes in Buildings<br>- Action Plans for the implementation of natural ventilation and seasonal shading formulas<br>- Technical manual for the installation of permeable surfaces, such as NBS in buildings | - Guide to the choice of plant species adapted to climate change<br>- Technical Manuals for the Implementation of NBS Prototypes in Buildings<br>- Action Plans for the implementation of natural ventilation and seasonal shading formulas<br>- Technical manual for the installation of permeable surfaces, such as NBS in buildings | Successfully achieved after the deadline. The implementation of NBS in the last pilot building (Évora) ended in February 2024, due to those reasons already explained in previous sections of this report. |
| Action C3 | *Objective*: monitor NBS as climate adaptation tools in 3 pilot buildings<br>*Expected results*:<br>- Report and result of monitoring and evaluation of the impacts of NBS on pilot buildings | - Report and result of monitoring and evaluation of the impacts of NBS on pilot buildings | Partially achieved after the deadline. The only pilot building that almost completed the monitoring plan was the one located in Solana de los Barros. For the Porto building, incomplete results are shown for less than one year of monitoring. In the case of the Évora building, monitoring could not be carried out during the project execution period. This is due to the reasons already explained in previous sections of this report. There is a real commitment to conclude effective monitoring during the After-LIFE period as well as long-term monitoring at a more advanced stage of vegetation growth. |
| Action C4 | *Objective*: getting governance support for the transferability of NBS | - Documentary platform with institutional information | Successfully achieved after the deadline. This action experienced considerable delays due to |

| | | | |
|---|---|---|---|
| | *Expected results*:<br>- Documentary platform with institutional information<br>- Identification of governance tools<br>- Application of governance tools for the obtaining of government support for the transferability of the project's NBS | - Identification of governance tools<br>- Application of governance tools for the obtaining of government support for the transferability of the project's NBS | the fact that it was difficult to obtain the support of the Administrations without having completed any of the NBS implementation works in the pilot buildings of the project. Once the works on the Solana de los Barros building were completed (December 2021), we started to obtain the expected support, which became more numerous after the completion of the works on the Porto building (February 2023). However, the work of obtaining governance support was practically transversal throughout the life of the project. |
| Action C5 | *Objective*: promoting the transferability of the project in various contexts and at different levels<br>*Expected results*:<br>- Design of 15 NBS projects<br>- Elaboration of 4 transferability reports and 4 protocols for expert workshops<br>- Organisation of 6 demonstration workshops<br>- Elaboration of transferability and financial plans | - Design of 15 NBS projects<br>- Elaboration of 4 transferability reports and 4 protocols for expert workshops<br>- Organisation of 6 demonstration workshops<br>- Elaboration of a transferability plan and a financial plan | Successfully achieved after the deadline. This action experienced considerable delays due to the fact that it was difficult to develop transferability documentation without having completed any of the NBS implementation works in the pilot buildings of the project. Even though, the project team work transversally on action C5 throughout the life of the project. |
| Action C6 | *Objective*: promoting the transferability of project actions by generating training materials<br>*Expected results*:<br>- Identification of capacity building structures and interested experts<br>- Compilation of educational material for the transferability of NBS in educational buildings | - Identification of capacity building structures and interested experts<br>- Compilation of educational material for the transferability of NBS in educational and social buildings | Successfully achieved after the deadline. This action experienced considerable delays due to the fact that it was first necessary to make progress on previous transferability actions, which also had associated delays. |
| Action D1 | *Objective*: monitoring the impact of project indicators<br>*Expected results*:<br>- LIFE-mBiG intermediate and final scoreboards (KPI) | - LIFE-mBiG intermediate and final scoreboards (KPI) | Partially achieved after the deadline. At the beginning of the project, CSIC and CARTIF determined the best indicators to measure on the project. These were included in the KPI Webtool of the LIFE Programme. Due to the aforementioned delays in the start of the works on the pilot buildings, the measurement of the indicators also suffered delays. As already explained in action C3, the indicators continue to be measured after the end of the project, in the After-LIFE period. |
| Action D2 | *Objective*: monitoring the socio-economic impact of project actions<br>*Expected results*:<br>- Socio-economic report of the LIFE-mBiG project | - Socio-economic report of the LIFE-mBiG project | Successfully achieved after the deadline. This action experienced considerable delays due to the fact that it was necessary to complete the implementation of NBS to get consolidated results. |
| Action D3 | *Objective*: assessment of the compliance with the KPIs defined in the LIFE KPI Web Tool<br>*Expected results*:<br>- Technical Report on the verification of compliance with the values of the LIFE KPI Webtool | - Technical Report on the verification of compliance with the values of the LIFE KPI Webtool | Successfully achieved after the deadline. This action experienced considerable delays due to the fact that the evolution of the indicators could not be assessed until the end of the project, including the final costs declared per partner, which were shared in mid-April 2024, when the last staff costs were known. |
| Action E1 | *Objective*: define the Communication Plan and dissemination tools<br>*Expected results*:<br>- Elaboration and publication of the Communication Plan<br>- Publication of a website, several communication channels and different communication material<br>- Elaboration, publication and dissemination of the Layman report<br>- Promotion of the project through the publication of 16 press releases in external media, 300 impacts in digital media from the project and the beneficiary partners' communication channels, 4 appearances on TV, 4 appearances on radio and 12 articles in specific media<br>- Dissemination of the project as a successful study case in thematic channels | - Elaboration and publication of the Communication Plan<br>- Publication of a website, several communication channels and different communication material<br>- Elaboration, publication and dissemination of the Layman report<br>- Promotion of the project through the publication of 16 press releases in external media, 300 impacts in digital media from the project and the beneficiary partners' communication channels, 4 appearances on TV, 4 appearances on radio and 12 articles in specific media | Successfully achieved after the deadline. Some results such as the Communication Plan, the website or the communication channels were achieved within the indicated deadline. However, other communication results depended on the completion of all project actions and were therefore delayed with respect to the original date set in the Grant Agreement. |

| | | | |
|---|---|---|---|
| | - Broad collaboration of the project with other initiatives working in the field of expertise of LIFE-mBiG | - Dissemination of the project as a successful study case in thematic channels<br>- Broad collaboration of the project with other initiatives working in the field of expertise of LIFE-mBiG | |
| Action E2 | *Objective*: promoting the project and its results among the target audience<br>*Expected results*:<br>- Reports and results of the opinions expressed by guests, congressional representatives, professionals and the public to the events carried out by the LIFE-mBiG project | - Reports and results of the opinions expressed by guests, congressional representatives, professionals and the public to the events carried out by the LIFE-mBiG project | Successfully achieved after the deadline. The communication events organised by the project prior to the COVID-19 pandemic (e.g. round tables, Badajoz conference, etc.) were on schedule. The remaining events experienced delays as they depended on the implementation of the NBS in the pilot buildings and the finalisation of other project actions which were also considerably delayed. |
| Action E3 | *Objective*: transferring NBS knowledge as climate adaptation solutions<br>*Expected results*:<br>- Connection between the project information and the Climate-ADAPT platform | - Connection between the project information and the Climate-ADAPT platform | Successfully achieved after the deadline. Although contacts with the Climate-ADAPT platform staff were initiated at the beginning of the project to find out how LIFE-mBiG and Climate-ADAPT could be connected, it was not until the implementation of the NBS in the first pilot building that the sharing of information on this platform could begin. |
| Action F1 | *Objective*: coordinating the actions of the LIFE-mBiG project<br>*Expected results*:<br>- List of progress indicators and kick-off meeting report<br>- Memorandums of Understanding between the Coordinator and beneficiary partners | - List of progress indicators and kick-off meeting report<br>- Memorandums of Understanding between the Coordinator and beneficiary partners | Successfully achieved on time. |
| Action F2 | *Objective*: Ensuring the correct economic management of the project<br>*Expected results*:<br>- Audit report | Not applicable | In 2019, EASME issued an amendment for all projects whereby only those beneficiaries receiving more than 750.000 € from the EU are obliged to perform an audit. This is not the case for LIFE-mBiG and therefore no project beneficiary is obliged to audit. |
| Action F3 | *Objective*: Ensuring sustainability of project actions<br>*Expected results*:<br>- Elaboration and publication of the After-LIFE Plan | - Elaboration and publication of the After-LIFE Plan | Successfully achieved after the deadline. The After-LIFE Plan can only be realised after the completion of most of the project actions. As many of the project actions experienced considerable delays for the reasons mentioned above, the publication of the After-LIFE Plan was also delayed with respect to the initial date proposed in the Grant Agreement. |

Regarding **policy impact**, some significant developments occurred from the local to the European context.

The definition and design of NBS prototypes as climate adaptation tools in schools and social centres meets one of the main objectives of European climate change policies and is closely related to the **Green Deal** the EU is promoting. Designing models and manuals to increase the resilience of these buildings to the effects of climate change are priority scenarios in European climate change policies. The LIFE-mBiG project addresses all these policy scenarios not only with the implementation of NBS, but with the definition of bioclimatic strategies, solar radiation calculations and assessment of the impact of NBS against adverse climatic conditions of pilot buildings.
The LIFE-mBiG project is also relevant for the **European Committee of the Regions**, positioning itself as a reference case study in its database, and having the possibility to influence future regional and local regulations in the EU.

At the **national level**, work has been done to integrate the NBS in the **Technical Building Code**, advancing in the process of making the NBS available in the Computer Catalogue of Building Solutions. More time is still needed to monitor the impact of the NBS and to test them in other contexts, but the first steps have already been taken to facilitate their transferability.
In addition, the project partners have held meetings with staff from the Biodiversity Foundation, the Spanish Climate Change Office, the Portuguese Environment Agency and the Portuguese General Directorate of Educational Buildings to position the NBS as alternatives to the adaptation of cities to climate change, as included in the different **National Green Infrastructure** or **Climate Change Strategies**.

At **regional level**, DIPBA and CIMAC have worked so that the municipalities of the province of Badajoz and Alentejo Central, respectively, include the NBS in their action plans and local policies. In this sense, 8 **declarations of interest** have been signed in Badajoz and 14 **commitment agreements** in Alentejo Central for the future transferability of the project's NBS in the buildings of these municipalities.

Finally, at the **local level**, in Porto, the experience of the LIFE-mBiG project inspired the introduction of NBS in the **Porto Environmental Index**. This is a new municipal regulation in the process of being created (foreseen in the **2021 Municipal Master Plan**) which aims to encourage urban project developers to introduce NBS in their projects through fiscal and construction benefits.
For its part, CSIC is currently working closely with **Madrid City Council** to ensure that the results of LIFE-mBiG can influence the **city's future policies on adapting public buildings to climate change**.

## 6.4. Analysis of benefits

### 1. Environmental benefits

#### a. Direct / quantitative environmental benefits:

The solutions implemented in the three schools have had an impact on a total surface area of 13,642 $m^2$ in which climate resilience has been improved, increasing the green surface area of the pilot buildings by a total of 3,911.61 $m^2$, through the implementation of green roofs, green facades and pergolas, ponds and draining pavements.
The Nature-Based Solutions (NBS) have allowed a decrease in temperature both in the building envelope, with **temperature reductions of more than 20ºC** comparing gravel roofs with green roofs, and inside the buildings during the hottest months of the year, managing to **reduce the temperature below 27ºC** (maximum comfort temperature according to the Regulation of Thermal Installations in Buildings, RITE) in September in the case of the school in Solana de los Barros. In the rest of months, the temperature has decreased between 4 and 6ºC with respect to the baseline, however, the comfort temperature indicated by the RITE has not yet been reached. It is expected that, with more advanced stages of vegetation growth, this temperature reduction will be comfortably exceeded. For the establishment of the comfort temperature, Spanish Royal Decree 486/1997 of 14 April 1997, which establishes the minimum health and safety provisions for workplaces, was also taken into account.
The temperature reduction mentioned in the previous paragraph also leads to savings in energy consumption for air-conditioning inside buildings, which translates into economic savings and savings in the volume of $CO_2$ emissions.
In the case of the pilot building in Badajoz, **a reduction in electricity consumption for cooling is 11.2%** at the end of the project. This **reduction is up to 30% regarding the diesel consumption for heating**. This means a considerable reduction in the volume of $CO_2$

emissions produced by the project's pilot buildings. It is estimated that in the case of the pilot building in Porto, the **reduction amounts to 7.39 tonnes of $CO_2$ emitted per year**.
An additional benefit of this type of NBS is the reduction of rainwater that is lost through runoff into the sewage system. A large part of this water can be reused and its treatment in wastewater treatment plants is avoided, which reduces consumption costs for irrigation and treatment. In addition, the installation of certain draining pavements that allow vegetation to spread on their surface increases the capacity of the water to reach the aquifers, improving its availability in the future. To date, it has been calculated that the average **reduction of runoff water reaching the sewer system is reduced from an initial 21.5% to 3.37% after the implementation of NBS**.
In terms of biodiversity, more than 25 new species have been found in the Porto building compared to the situation before the implementation of NBS. This increase reaches **77 new species in the case of the Solana de los Barros** pilot building in Badajoz, where the NBS vegetation has had one more year of growth than in Porto. The predominant animal diversity is among flying insects such as flies, mosquitoes and Hymenoptera (dragonflies, butterflies), but some detritivorous arthropods are already found, such as some springtails or species of the genus *Armadillidium*, which are indicators of habitat quality, as they are able to metabolise heavy metals and, therefore, eliminate them from the substrate. The abundance and diversity of these species is expected to increase over the years.
With regard to the number of indigenous plant species, during the implementation of the NBS, 32 plant species were used, mostly non-indigenous, but which ensured the successful establishment of the plantation, as irrigation was only to be carried out in the first few years, so as to facilitate the establishment of the plants in the initial stages of planting. The aim was that these species, chosen for their resistance, would act as facilitators in the colonisation by native species over time. Indeed, 14 months after planting, the green roofs were colonised by 16 additional native species, some of which (e.g. *Medicago sp, Trifolium sp*. or *Veronica polita*) cover a considerable area, to the detriment of the non-indigenous initially planted.

### b. Qualitative environmental benefits

Throughout the project, a total of 19 NBS have been implemented with an estimated average lifetime of at least 30 years under proper maintenance conditions. These solutions comprise various types of green roofs, some with solar panels, others with sloping roofs that collect rainwater and others with various materials that improve the efficiency of the substrate where the vegetation grows. There are also solutions for green façades on metal structures, awnings, cable meshes or indoor vertical gardens. In addition, work has been carried out in the courtyards through the use of ponds that serve as a reservoir of biodiversity, draining paving that improves rainwater management and allows the proliferation of shallow vegetation on the surface, wooden structures that increase the shaded area in the playgrounds, as well as the planting of new flowerbeds with substrates from recycled aggregates that improve the aeration of the root system of the plants used, improving their development prospects.
A series of energy efficiency measures were also carried out at the Falcão school. Roof insulation was improved and the type of glazing used was improved with internal solar shading. The installation of the new lighting used LED technology, and most areas were provided with more than one circuit so that only the necessary luminaires were connected and not the entire site. In areas such as the toilets, presence detectors were chosen to control the local lighting, ensuring that the light remains off if the room is not occupied. The energy savings will be even greater in all the pilot buildings over the years when the vegetation development is optimal.

**2. Economic benefits:**

During the course of the project, a total of 3 full-time jobs with exclusive dedication to LIFE-mBiG were created for staff of the project beneficiaries. These jobs and two new positions for the maintenance of the NBS and the measurement of indicators are maintained after the end of the project.

If the jobs created through the contracting of external assistance and NBS implementation works are also counted, the project has created a total of 30 jobs, covered by 47 different people, some of whom will remain employed after the end of LIFE-mBiG. Most of these jobs are related to profiles aimed at raising awareness and transferability of the NBS as an educational resource, the control of plant species and irrigation systems that allow the proper maintenance of the implemented solutions or the maintenance of telecommunications for the operation of the sensors installed in the schools that allow the monitoring of the impact of the NBS to continue in the long term.

As mentioned in the previous section, the reduction in energy consumption is directly related to a reduction in the maintenance costs of the educational centres, with significant reductions in energy consumption for heating and cooling being observed in the case of the Solana de los Barros building. In addition, the production of energy with photovoltaic panels in the case of the Porto building makes it possible to obtain excess energy that can be used in other public buildings. In fact, the installation of the photovoltaic panel system at EB1 Falcão generates an annual production of 28,625 kWh, of which 14,592 kWh are consumed internally by the school. The surplus is used for other municipal buildings. This energy production will save €3,502 per year in energy costs.

**3. Social benefits (e.g. positive effects on employment, health, ethnic integration, equality and other socio-economic impact etc.).**

Thanks to the various training and dissemination activities carried out, 863 people have improved their skills on the use and implementation of NBS, while 1,054 people have improved their knowledge and perception of NBS. It is expected that these numbers will be higher in 3 years' time, approaching 4,500 people trained and made aware of the benefits of NBS.

In addition, the positive benefits of NBS affect 723 pupils, teachers and non-teaching staff in the schools selected as pilot buildings for the project.

Other people in the surroundings of the pilot buildings should also be taken into account, who will also benefit from the ecosystem services provided by the implemented NBS, such as heat island effect reduction, increase of local biodiversity, increase of air quality, landscape beautification, etc.

On the other hand, although more consistent results need to be obtained, it is observed that the reduction of temperature in the pilot buildings implies greater well-being of students, teachers and other staff of the educational centres, which may be related to improved attention in class, reduced absenteeism, or improved health of the people who use these buildings.

4. **Replicability, transferability, cooperation:**

The transferability actions have been another particular strength of LIFE-mBiG. The project team has worked in collaboration with various public bodies, lobbying organisations (e.g.: GBCe), associations of private companies in the sector such as ASESCUVE and ANCV, other projects and initiatives with similar lines of work, etc.

In the course of the project, a wide range of documentation has been produced to facilitate the replication of the solutions used by LIFE-mBiG. At EU level, 15 simple projects have been developed showing how LIFE-mBiG NBS can be implemented in other schools in countries in

the four major climate risk regions of the EU, and the benefits they can provide to these buildings. This document is available in the results section via this link.
By the end of the project, it is expected that at least some of the NBS developed and tested by LIFE-mBiG will be replicated in 2-3 other schools in each region involved in the project, which will considerably multiply the positive results generated. A total of 67 key stakeholders have also been involved and have provided or received significant input to the project, working closely with 85 project subject matter experts and 105 members of lobby organisations outside the project team.
The project's communication channels have had a great impact on the target audience, with more than 7,500 unique visits to the LIFE-mBiG website. For its part, the Layman report has been sent to more than 19,500 people with a demonstrated interest in the project's topic.
During the After-LIFE period, the project plans to spend a total of €245,000 from its own funds and other initiatives on actions to replicate and promote the results obtained.
There are clear possibilities to replicate the NBS of the Gabriela Mistral school in other municipal buildings in the province as climate change adaptation measures, once their efficiency has been proven. DIPBA is currently working on Sustainable Development Strategies that include measures to adapt to climate change and that include pilot actions to create climate shelters, energy rehabilitation of municipal buildings, naturalisation of urban public spaces, etc. There is also a plan to provide photovoltaic installations as an energy saving measure for schools whose maintenance depends on the municipalities. Different organisations are contacting DIPBA to visit and get to know the installations carried out in the LIFE project, so regular visits will be scheduled to facilitate knowledge of the installations and the results of the project. All these measures and transferability plans will be a great boost in the creation of green jobs in the region, positioning the Gabriela Mistral school as a reference building for the use of NBS to improve thermal comfort in buildings. So far, the DIPBA has managed to sign 8 declarations of interest from various municipalities in the province to replicate the NBS in their public buildings.
In the case of Porto, there is a real possibility of introducing NBS in other public buildings and promoting them in partnership with private urban managers. It is intended to replicate Falcão solutions in other municipal schools and meetings have already been held with the team of the Portuguese General Secretariat for the Environment to enable lines of funding for these replications. Although MP has its own funds to be able to start this replication process, funding at national level could speed up the process considerably. In Porto, they are also developing the Porto Environmental Index, a mechanism to stimulate private urban managers to introduce NBS in their investments and works through fiscal and constructive incentives. Data on the real costs of investing in the Falcão roof and the possibility of raising awareness with a visit to the Falcão school roof will be important to help demonstrate that it is possible and desirable.
CIMAC has achieved the signing of 14 commitment agreements by all the municipalities of Alentejo Central to replicate the NBS of the project once its environmental, economic and social benefits have been demonstrated.
Last but not least, work has been carried out with the team of the Spanish Ministry of Housing and Urban Agenda in charge of modifying the Technical Building Code (CTE) to study the possibilities of including the NBS implemented in the project into the CTE Computer Catalogue of Building Solutions. It is still necessary to obtain more solid and long-term data on the impact of the implemented NBS, as well as to test them in other types of buildings than educational buildings. However, we have the support of the CTE to be able to include the NBS in their catalogue in the future, which will multiply the number of people who can replicate these solutions in the coming years.

5. **Best Practice lessons**:

The LIFE-mBiG project has enabled the learning of a number of practices that are particularly useful when implementing NBS projects. The most noteworthy practices are described below. For a more exhaustive analysis of the best practices and limitations of the project, it is recommended to consult deliverable E2.2b - Best Practices Guide.

**Planning**

- Pre-planning is necessary to define priority activities and their maximum timeframe in order to obtain the necessary licences and authorisations in time.
- It is important to accurately identify the parties involved in an NBS implementation project, especially those with decision-making power, and to involve them from the early stages in project decision-making. It is also important to involve the day-to-day users of the buildings from the beginning to ensure their commitment to the success of the project during its life cycle. Nor can the advice of more technical entities such as ANCV in Portugal or ASESCUVE in Spain be missing, to guarantee the success of the functionality of the installed prototypes.
- Architectural projects should be elaborated in as much detail as possible, without underestimating the time spent on these projects. More detailed projects avoid major unforeseen events in the construction phase.
- During the drafting of construction projects, it is very important to contact companies in the sector in order to obtain in advance the conditions and budgets for execution to be integrated into the project, but always with as much publicity as possible in the sector, and considering the limitations to such contacts imposed by laws on public contracts (Ley 9/2017, in the Spanish case).

. In this way, it is possible to avoid possible unopposed tenders, as well as to minimise unforeseen events during the execution of the NBS and the resulting budget overruns.

- It is important to properly estimate the load that the roofs of buildings can support, as higher loads allow for greater substrate thicknesses, allowing for the growth of larger species. An alternative to have more load-bearing capacity would be to remove the protective layer of gravel that often exists on many roofs.
- Considering that it will take several years for the climbing vegetation of the prototype vegetated cable façade to completely cover the entire surface area generated by the cable system, the installation of micro-perforated screens (in the form of squares) was considered to ensure immediate shading of the associated outdoor space and façade. As vegetation develops, the screens will be removed.

**Execution**

- The choice to use PVC has advantages over asphalt sheeting, since the latter has organic components in its composition that attract plants. In the medium to long term, the roots of the plants, in search of the organic components of the asphalt fabric, could penetrate the anti-root fabric and end up spreading horizontally across the roof, especially near the drains, where the water is concentrated, ending up obstructing the drainage system with the consequent risks of overloading, leaks and other construction pathologies.
- All the prototypes require a drip irrigation system, designed according to the planned distribution of the plants. Although plants with low water requirements have been searched for to guarantee the growth of the species, an adequate water supply is necessary that does not depend exclusively on rainfall, especially in the first years. The system that has been implemented in LIFE-mBiG is programmable and allows the incorporation of fertilisers to facilitate plant growth. The installation also has a system for collecting and storing rainwater and excess irrigation water for reuse.
- In accordance with regulations, the waterproofing must be tested by flooding with the drains temporarily covered for at least 48 hours to check for leaks or problems before proceeding with the next layers of the roof.

- The first moments after planting the species are particularly delicate. Depending on the time of year in which they are to be planted, special care must be taken to ensure that the irrigation systems are fully set up and fully functional, guaranteeing the survival of the newly planted species, especially in hot weather.
- Monitoring the work at least weekly, following the established work plan, allows deviations to be observed and measures to be taken.
- The involvement and motivation of the contractors in carrying out the work, as well as investing in specialised NBS training, proves to be an asset for the successful implementation of the prototypes.
- In order to ensure the cooperation of the target groups in case of unforeseen events during implementation, it is important to keep all parties involved informed. Due to changes in the schedule of works at the Évora school, pupils had to be relocated to other schools during the school year, which seemed to be a challenge in terms of organising families. However, an information campaign was carried out beforehand and the parents of the students were consulted, which facilitated the process of relocating the pupils.

**Results**

- It is very useful to allow access to the covers once the works are completed. In this way they can be used as an educational resource for students and as awareness raising material on the benefits of NBS for the general public.
- The planters where the vegetation for the green façades of modular metal structures will grow should be as large as possible, to allow for a faster and more abundant growth of the vegetation used, enabling the façade to obtain the expected shading as soon as possible.
- The success of the NBS requires constant vigilance and specialised maintenance, especially during the warm seasons, to ensure adequate watering and the presence of the necessary water. Inaccurate forecasting of the timeframe for contracting subsequent maintenance services can create constraints.
- The system of cables to support the green surface that will create the climbing vegetation is not developing as expected at the Porto school. This may be due to the design of the structure itself, with only vertical cables, and to the temperature they acquire from direct sunlight, factors that will condition the adherence of the plants. The problem could be solved by integrating horizontal elements that reinforce the mesh supporting the vegetation growth (forming a grid similar to the solution designed for the Évora school). The use of a support system using natural materials instead of steel could also be considered in order to overcome the problems related to the temperature of the materials.

## 6. Innovation and demonstration value:

We emphasize that in Action A2, an intense procedure has been carried out for the design, measurement and drafting of new NBS prototypes to be implemented in the pilot buildings. This work has largely laid the innovative technical basis of the LIFE-mBiG project that aims to demonstrate that these NBS prototypes are good tools to mitigate the effects of climate change (heat waves) in schools.

The group work, the design and analysis of the NBS prototypes carried out in the CSIC and CARTIF facilities and the elaboration of bioclimatic strategies and calculation of solar radiation and listening to the business groups and qualified professionals, have made the LIFE-mBiG project conceived as an innovative project in the field of NBS for the building.

Innovative manuals have been made for the choice of pilot buildings that will receive the implementation of the NBS prototypes. It is important to influence this part, as it is necessary to establish technical criteria that allow to define the characteristics of the building, the challenges and needs presented and choose the solutions of NBS for these challenges.

The educational programmes designed from the material provided by LIFE-mBiG address for the first time the benefits of NBS in their academic curricula with kindergarten and primary school students.
On a large scale, it is the first time that NBS are tested in public education buildings in Spain and Portugal and the project has received a lot of external media attention, mainly in the last stage of the project, when the issue of sweltering classroom temperatures has been in the news at national, regional and local level. Thus, the pilot buildings of the project have easily become reference buildings in the use of this type of solutions, receiving a great demand from various organisations to visit these facilities and transfer them to other contexts.

## 7. Policy implications:

The definition and design of NBS prototypes as climate adaptation tools in schools and social centres meets one of the main objectives of European climate change policies and is closely related to the GREEN DEAL that the EU is promoting. Designing models and manuals to increase the resilience of these buildings to the effects of climate change are priority scenarios in European climate change policies. The LIFE-mBiG project addresses all these policy scenarios not only with the implementation of NBS, but with the definition of bioclimatic strategies, solar radiation calculations, assessment of the impact of NBS against adverse climatic conditions of pilot buildings.
Since the start of the project, meetings have been held with public bodies such as the Biodiversity Foundation and the Spanish Climate Change Office to influence the inclusion of NBS as alternatives for improving climate resilience in urban environments, ensuring that these solutions are highlighted in the National Strategy for Green Infrastructure and Ecological Connectivity and Restoration that came into force in July 2021 and in the National Plan for Adaptation to Climate Change (PNACC) 2021-2030.
The NBS implemented in the school of Porto have allowed working on their inclusion in local regulations to improve the transferability options of these solutions. The City Council itself is developing the Porto Environmental Index, a mechanism to stimulate private urban managers to introduce NBS in their investments and works through fiscal and constructive incentives. Data on the real costs of investing in the Falcão roof and the possibility of raising awareness with a visit to the Falcão school roof will be important to help demonstrate that this is possible and desirable. In addition, meetings have already been held with the team at the Portuguese General Secretariat for the Environment to enable lines of funding for the replication of this type of solution, which would accelerate the transferability of these solutions.
In the case of DIPBA, it is working on Sustainable Development Strategies that include measures to adapt to climate change and which include pilot actions to create climate shelters, energy rehabilitation of municipal buildings, naturalising urban public spaces, etc.
As for the barriers experienced by the project due to the existence of certain regulations, the Public Sector Contracting Law in both countries has made it difficult in the three buildings to obtain the best companies available within the established timeframe. Extra work and effort has been made to find competent companies and to avoid leaving the tenders deserted, and project extensions have been requested in order to be able to complete the works within the project execution period.
In terms of the competences of various bodies in the management of the schools, some barriers were also experienced. For example, in the case of Évora, CIMAC is the promoter of the project in the school, but the Municipality of Évora is its owner of the building. This requires a close and attentive relationship and communication between the two organisations, which was not the case at the beginning of the project. Consequently, when the architectural and speciality project for the implementation of the NBS was finalised, it turned out that the proposed intervention for the school clashed with a previous project of the city council to extend it. For

this reason, the project had to be modified, taking into account the constraints of integrating other municipal projects and the requirements of the respective teams. Although the issue was resolved and the projects for the school were made compatible, the situation led to a delay of 12 months in the finalisation of the design of the NBS implementation project and an increase in the costs for its realisation (new public procurement procedure with the design team to elaborate the modification of the initial project).

# 7. Key Project-level Indicators

Most indicators have reached or exceeded the values estimated at the beginning of the project. Only a few indicators have not achieved the proposed targets. The detailed interpretation of the evolution of each indicator can be found in deliverable *D3 - Technical Report on the Evaluation, Control and Monitoring of the project's performance indicators*. The reasons why some indicators did not reach the values estimated at the beginning of the project are detailed below.

**INDICATOR 1.6. PEOPLE AFFECTED BY THE PROJECT**

- Persons whose lives have been positively affected by the MAIN project actions: the estimated values are higher than the actual values for two main reasons: a) the number of pupils in the schools was not as high as initially estimated, b) there is a significant number of people positively affected by the project who are not taken into account, such as relatives of pupils and school staff and/or neighbours in the area of influence of the pilot buildings.

**INDICATOR 4.1.1. ENERGY CONSUMPTION**

- Electricity and diesel: the different between the estimated and actual values for each school is due to the lack of data, at the beginning of the project, when the estimates were made. The values introduced in this phase of the project for these indicators are more accurate, as they include real data from the electricity and fuel consumption bills for the buildings in Évora and Badajoz.

In the case of the pilot building in Évora, the electricity consumption related to the cooling systems of the building is 3% of the total electricity consumption. In this school, the diesel consumption is that used to heat the buildings. In Évora, the implementation of the NBS was completed during the last month of the LIFE-mBiG project, so the impact on the reduction of consumption could not yet be evaluated. However, these indicators will be evaluated in the After-LIFE period. It is estimated that the reduction of electricity for cooling in this pilot building can be up to 55% and the reduction of diesel for heating can be up to 10% (see deliverable C3).

In the case of the pilot building in Badajoz, a reduction in electricity consumption for cooling of 11.2% is observed at the end of the project, taken into account the period of months calculated in 2022 and 2023, compared to the months for which data is available before the interventions from 2018 to 2021. Regarding the diesel indicator, for the baseline, the consumption in 2019 has been taken as a reference value and the consumption in 2022 and 2023 has been taken as a reference value for the situation after the implementation of the NBS. At the end of the project, a 30% reduction in diesel consumption for heating is observed, taken into account the outdoor temperature ratio, using data from the AEMET station in Mérida (see deliverable C3).

Data on electricity and diesel consumption for the pilot building in Porto are insufficient to assess these indicators. Monitoring of these indicators is included in the After-LIFE Plan.

**INDICATOR 12.1. NETWORKING**

- Professionals - experts in the field and Members of interest groups/lobbying organisations: In order to measure the number of professionals/experts and the members of interest groups/lobbying organisations contacted by the project for joint collaborative actions

(networking), the projects and organisations of these types that interacted in some way with LIFE-mBiG were consulted, resulting in a total of 10 initiatives and 11 interest groups with which there was close collaboration during the course of the project. The significant difference with the value estimated for these indicators at the beginning of the project is due to the fact that the calculation of the values obtained does not take into account anything more than close relations with the project or organisation and not just contacts at an informative level. In addition, we believe that the value estimated at the beginning of the project was greatly overestimated. For more information on the nature of the cooperation between the identified initiatives and stakeholders and the LIFE-mBiG project, please refer to deliverable E1.7 - Networking report.

**INDICATOR 12.2. PROFESSIONAL TRAINING**

- Professionals - Experts in the field: the calculation at the general level of the project takes into account the people who have received training on NBS through the online training platform "NBS Building Training" (deliverable E2.2) and the people who have participated in the on-site demonstrative workshops on the NBS implemented aimed at technical staff, authorities, municipal technicians, heads of training centres, etc. Also taken into account are the people who have participated in the project's conferences and congresses, as well as in the professional workshops organised by the CSIC in Madrid: a) course on gardens and green roofs (July 2019), b) course on green roofs (March 2020), c) course on design and construction of sustainable buildings (November 2022), d) course on sustainable and inclusive construction (April 2023), and e) participatory workshop on bioclimatic strategies and NBS (May 2023). The delay in the completion of the installation of NBS in Portuguese schools meant that the target set at the beginning of the project for this indicator was not met. However, as stated in the After-LIFE plan, a large number of training and transferability events are planned, which will increase the number of people trained in NBS in the coming years.

**INDICATOR 14.1. COST OF IMPLEMENTATION DURING THE PROJECT**

- Implementation costs during the project and expected costs in case of continuation, replication and transferability after the project period: due to subsequent revisions of the budget declared by CSIC (910,530.70€), the budget was slightly modified from what was declared in the KPI webtool (3,051,489.06€). Being such a large organisation, the operation of expenditure checking at CSIC requires too much time to perform all the relevant checks by each of the research centres participating (two of them in this project) and by the CSIC Finance Department later. As no modifications can be made to the deliverables of actions D1 and D3 after their submission date, there are slight differences in the values included in the KPI Webtool for indicator 14.1 with respect to the actual values (3,049,289.64€).

# 8. Comments on the financial report

Various events during the course of the project (COVID-19 pandemic, war in Ukraine, skyrocketing prices, etc.) have made the project much costlier than estimated in the initial project proposal for various reasons. This endangered the continuity of the work of the LIFE-mBiG consortium. However, the beneficiary partners assumed that, despite having to dedicate more of their own resources, the project theme was of particular relevance to all the organisations involved and it was decided to go ahead with the project. In the end, practically all the objectives were met and some were even surpassed. Having said this, we propose as a recommendation to the LIFE Programme that in its calls for proposals it should set aside an extra amount of funds for events that are difficult to foresee, such as those that occurred during the course of this project, in order to alleviate the extra costs caused by the execution of the project under these circumstances. An analysis of the cost of the project by category of expenditure is shown below.

**Personnel**

There was a higher expenditure in the personnel category for all project partners due to the delay of many of the actions caused by the COVID-19 pandemic, the war in Ukraine, the skyrocketing prices, etc. and unforeseen events that occurred during the NBS implementation work. Among the unforeseen events that have arisen, the following stand out: a) replacement of the first General Coordinator of the CSIC project by a new one (Miguel Vega) who would continue his contract during the requested extension periods and whose participation has been essential to revitalise the stagnant tasks of the project and to be able to meet almost all the objectives in due time and form; b) continuation of the half-time contract of a CSIC technician (Arturo Martínez) during the extension periods to support the General Coordinator in the more technical aspects of the project; c) increase in the number of hours dedicated to the project by various CSIC researchers and technical staff (Jesús Muñoz, Pablo Vargas, Irene Fernández, Silvia Villegas) to solve problems with the growth of certain plant species used in the NBS implemented and to select new alternatives to be tested during the After-LIFE period; d) increase in the number of hours dedicated to the project by the web content and communication channels manager (Juan Carlos Hernández) due to the extension of the project; e) dedication of hours not initially estimated by a CSIC researcher (Javier Diéguez) to support the identification of animal species in the samplings carried out in the three pilot buildings. In the case of DIPBA, the increase in personnel costs is due, on the one hand, to the initial estimates for personnel costs, since they were calculated based on 8 hours/day and in DIPBA staff worked 37.5 h/week, 7.5 h/day. On the other hand, there was a significant increase in the salaries of public employees, which has led to an increase in the forecasts for 2017, 2018 and 2019. However, the travel costs for DIPBA have been much lower than the forecasts, since DIPBA has used its own electric vehicles whose expenses have not been declared in the Project.

In addition, during the various stoppages caused by COVID-19, a greater effort was made in other tasks to improve the project's objectives in communication and transferability and to be able to maintain the new jobs created by the project, since the termination of these contracts and their subsequent new public recruitment would mean greater delays than those already caused by the pandemic. In this way, the communication and transferability objectives have been improved as explained in the description of the corresponding actions in this report.

Although the overspending in the staff category has occurred for all beneficiary partners, some have chosen not to declare such expenses and to stick to the initially estimated expenses, as the declaration of more hours than initially estimated would lead to a mismatch in their internal accounts.

Less time than initially estimated has been devoted to the elaboration of the corresponding deliverables in Actions D1 and D3 for CARTIF. This is due to the fact that the work carried out in Action C3 (evaluation of project indicators) has also served to complete Actions D1 and D3 in their case, optimising the time spent and the quantity of personnel costs, which has been a bit lower than foreseen in the grant agreement (2,59% less).

**Travel**

The COVID-19 pandemic meant that a large part of the scheduled events had to be carried out online, so travel costs were much lower than originally estimated. In addition, not being able to complete all the expected sampling in the pilot buildings has also led to lower expenditure in this category, as less travel has been undertaken. However, the beneficiary partners have planned further trips during the After-LIFE period with their own funds to complete the monitoring of the pilot buildings. This was also true for CARTIF, who did not spend the majority of their costs for this category around 61% for the previous mentioned causes. In the case of DIPBA, the travel costs have also been much lower than the forecasts, since DIPBA has used its own electric vehicles whose expenses have not been declared in the Project due to the difficulties to measure the cost of these expenditure.

**External assistance** (EA)
The expenditure on EA was lower than estimated in the project proposal, as some EA estimated at the beginning were not necessary during the project implementation, e.g. expenses for contracting external services for the reception and logistics of the NBS European congress in Madrid, since it was carried out with CSIC's own staff, or the costs of installation, configuration, management and maintenance of the eLearning platform, which were borne by CIMAC and CSIC's own staff in order to be able to devote them to other categories of higher expenditure.

**Infrastructure**
The purchase of new trees reflected in this category was not carried out since, it was not necessary to plant them in any of the schools as the existing trees together with the new NBS implemented in courtyards were sufficient to achieve the objectives set by the project.

**Equipment**
The expenditure entered in the equipment category corresponds to the eligible cost expenditure, after calculating the depreciation of the equipment purchased. A lower equipment cost than estimated in the project proposal can be observed, despite the fact that all the equipment envisaged in the Grant Agreement has been procured.
CARTIF did not need as much budget for equipment as estimated (27% less), however for the prototype they needed to carry out some expenses that were not foreseen, so they tried to use the remaining from equipment (1.396 €) and part of the remaining travel budget.

**Prototypes**
Together with the personnel category, this was the other category that raised the total cost of the project considerably, especially for the NBS prototypes implemented in Évora.
In the case of DIPBA, between the awarding of the NBS implementation contract and the execution of the construction project, there was the onset of the COVID-19 pandemic and the subsequent increase in the cost of construction products and raw materials, so that, when the works were completed, a price revision had to be carried out, which increased the initial estimated cost. In addition to the increase in the prototypes due to the revision of prices due to the causes already explained, the technical assistance service for the elaboration of the project, which was initially categorised as external assistance, had to declared as prototypes, which also means an increase in the total costs of this category.
In the case of CIMAC, the works were executed 5-6 years after the drafting of the project proposal. Taking into account the number of events that occurred during this time (COVID-19, the war in Ukraine, the increase in the price of products, etc.), the market prices at the time the contract was advertised were much higher than the estimated prices.
For CARTIF, prototype costs were necessary since, they needed small structure to put the plants inside and to better collect rainy water in order to assure the feasibility of the project, besides prototype assays materials were required. This is why they took part of the travel and equipment funds to fortunately and properly develop the prototype.

**Consumables**
Although expenditure on consumables has been about 20 % lower than estimated, there are no issues to highlight in this category, as the various products were procured as included in the Grant Agreement.
CARTIF did not have consumables, but quite some plants were needed, since some of them died and they had to replace them in the demo site, also small pieces for demo maintenance and work such as valve anti-return, wood board/planks, hermetic closed box for reactor, batteries for the sensors, etc. (all this was around 255 €).

**Other direct costs** (ODC)
The expenditure on ODC has been slightly lower than estimated, so that this category has been the one that has been the best adjusted to the values included in the Grant Agreement.

For CARTIF, the construction of a Vertical Garden was not initially budgeted for, but was included in the project tasks (Action C4 and C5), which has led to an increase in the budget within this category. The purchase of new air quality monitoring equipment has been made to improve the monitoring of the indicators in the pilot buildings, these were some of the reasons of this increase. Nevertheless, the total project expenditure remains lower than foreseen for this beneficiary partner.

**Overheads**

The new overheads have been calculated on the basis of the new direct costs of the project, so they have turned out to be slightly higher than originally estimated.

In the case of CARTIF, indirect costs were approximately the same, even slightly minor, due to we used less budget than foreseen.

As can be seen, some of the overspending on personnel and prototypes has been offset by the underspending on other items, especially travel and EA. The total carry-over between expenditure categories is 13 %, complying with the 20 % carry-over rule of the LIFE programme.

## 8.1. Summary of Costs Incurred

| PROJECT COSTS INCURRED | | | | |
|---|---|---|---|---|
| | Cost category | Budget according to the grant agreement in €* | Costs incurred within the reporting period in € | %** |
| 1. | Personnel | 1,426,168 € | 1,664,305.72 € | 116.70 % |
| 2. | Travel and subsistence | 128,721 € | 33,304.27 € | 25.87 % |
| 3. | External assistance | 268,594 € | 216,468.69 € | 80.59 % |
| 4. | Durables goods: total non-depreciated cost | | | |
| | - *Infrastructure sub-tot.* | 1,303 € | 0,00 € | 0.00 % |
| | - *Equipment sub-tot.* | 10,295 € | 6,056.38 € | 58.83 % |
| | - *Prototype sub-tot.* | 753,052 € | 881,455.82 € | 117.05 % |
| 5. | Consumables | 31,573 € | 25,508.70 € | 80.79 % |
| 6. | Other costs | 24,669 € | 22,706.06 € | 92.04 % |
| 7. | Overheads | 185,104 € | 199,589 € | 107.82 % |
| | **TOTAL** | **2,829,479 €** | **3,050,900.96 €** | **106.89 %** |

*) If the Agency has officially approved a budget modification through an amendment, indicate the breakdown of the revised budget. Otherwise this should be the budget in the original grant agreement.

**) Calculate the percentages by budget lines: e.g. the % of the budgeted personnel costs that were actually incurred

## 8.2. Accounting system

Regarding the Accounting System, all beneficiaries use accounting programs and internal account analysis codes as follows:

- CSIC uses a program called SOROLLA2 and the internal account code for the RJB is 211LIF-LIFE17 / CCA / ES / 000088 and for the IETcc it is 0963 - LIFE17 CCA / ES / 000088
- CARTIF uses an economic accounting program and the internal account code is 1.3.53 MY BUILDING IS GREEN
- DIPBA uses the Badajoz County Council accounting program and the internal account code is 2018/2 / LIFE / 1-LIFE17 MYBUILDINGISGREEN_CCA / ES / 000088
- CIMAC uses the accounting program of the Intermunicipal Community of Alentejo Central and the internal account code is 0297079778930 - EUR - LIFE myBUILDING
- MP uses the accounting program of the Porto Municipal Chamber and the internal account code is AP_LIFE-myBUILDINGisGREEN

CSIC, beneficiary coordinator of the project, has transferred the first and second payments (70% pre-financing) to the beneficiary partners using two models:

- Annex 1A. Distribution of project income to partners from entities other than CSIC.
- Annex 1B. Distribution of project income to participants from other CSIC centres.

As for the cost approval procedure, it depends on the amount we are referring to. Most of the necessary procurement or external assistance is within the legal limit set for direct award so the procedure is simple: Usually when employees need to buy something to achieve some project action, they ask the project manager authorization to make the purchase. For large purchases, the contracting process follows European and regional laws of public tender procedures.

All partners use the electronic system to record time. Each employee has a LIFE Excel timesheet to record daily hours worked (within the LIFE-mBiG project or other tasks) and which is then physically signed by the employee and the project supervisor. All the timesheets accomplish with requirements established by "Annex X to the Model LIFE Grant Agreement. Financial and Administrative Guidelines point "II.1 Time Registration System".

All project partners inform each supplier that the project code and acronym be put on each invoice initiated as an expense to the LIFE-mBiG project. In those cases, when the inclusion of the project code or acronym is not possible, the invoice was stamped with the official project stamp.

Regarding financial reporting, a quarterly update is requested from beneficiary partners in order to ensure compliance with all legal requirements and to facilitate financial reporting to EASME and the external monitoring team when necessary.

## 8.3. Partnership arrangements (if relevant)

There are no relevant issues regarding the financial transaction procedure between CSIC (coordinating beneficiary) and associated beneficiaries. All of them have received their pre-financing amount of 30% (October 2018) and mid-term payment of 40% (January 2021), and will receive the balance payment as set out in the final financial statements of each beneficiary partner once CSIC has received the final payment from the European Commission.

## 8.4. Certificate on the financial statement

There is no beneficiary partner of the LIFE-mBiG project that has the obligation to carry out a project audit because they do not receive more than € 750,000 from the EU. Not concerned for the final report.

## 8.5. Estimation of person-days used per action

| Action type | Budgeted person-days | Estimated % of person-days spent |
|---|---|---|
| ACTION PREPARATORY. A1 | 84,049<br>554 person-day | 100% |
| ACTION PREPARATORY. A2 | 172,216<br>986 person-day | 100% |
| Action C: Implementation actions. ACTION C1 | 44,043<br>217 person-day | 120% |
| Action C: Implementation actions. ACTION C2 | 202,571<br>1,629 person-day | 135% |
| Action C: Implementation actions. ACTION C3. | 122,468<br>586 person-day | 80% |
| Action C: Implementation actions. ACTION C4 | 53,005<br>388 person-day | 115% |
| Action C: Implementation actions. ACTION C5 | 161,943<br>1,056 person-day | 131.5% |
| Action C: Implementation actions. ACTION C6 | 22,727<br>241 person-day | 100% |
| Action D: Monitoring and impact assessment. ACTIÓN D1 | 92,957<br>526 person-day | 80% |
| Action D: Monitoring and impact assessment. ACTIÓN D2 | 22,050<br>125 person-day | 100% |
| Action E: Communication and Dissemination of results. ACTION E1 | 122,496<br>787 person-day | 137.5% |
| Action E: Communication and Dissemination of results. ACTION E2 | 111,908<br>732 person-day | 120% |
| Action F: Project management (and progress). ACTION F1 | 203,484<br>1,100 person-day | 137,5% |
| Action F: Project management (and progress). ACTION F2 | 0 | 0% |
| Action F: Project management (and progress). ACTION F3 | 10,251<br>73 person-day | 100% |
| **TOTAL** | 1,426,168<br>9,000 | 116.70 % |