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The Urban Lab of Europe !

# The Climate Shelters project Journal N° 1

*Project led by the City of Barcelona*



**CLIMATE  
ADAPTATION**



# The Climate Shelters (GBG\_AS2C) project

The **GBG\_AS2C** project will address the heat island effects in the City of Barcelona and prepare the city to face predicted increasingly high temperatures in summer, by transforming 10 pilot schools into climatic shelters.

Considering their low degree of adaptation to heat, but also their spatial distribution throughout the city as well as their great level of penetration within communities, schools are relevant spaces for adapting the city to climate change for the benefit of all. The project will implement a package of measures designed through a participatory process, introducing blue (aquatics playgrounds), green (greening playgrounds) and grey (traditional) components in schools in order to convert them into climatic shelters - not only for students, but also for summer school camps and all citizens outside of school time, as a refreshing and shaded leisure facility. In parallel, a climate change educational project will be adopted to contribute to climate change awareness, including the involvement of children and school professionals in the health assessment process.

## Partnership

- Barcelona City Council
- Public Health Agency of Barcelona - sectoral agency
- Barcelona Consortium of Education
- Barcelona Cycle of Water - Public Service Provider
- Barcelona Institute for Global Health - Higher Education and Research Institute
- Institute for Environmental Science and Technology UAB - Higher Education and Research Institute
- Vila Olímpica School

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# 1. EXECUTIVE SUMMARY

Cities around the world experience the impacts of urbanization as well as of climate change. A characteristic example of the above is overheating, either due to the release of urban heat or the occurrence of heat waves. As a result, residents are exposed to adverse environmental conditions which impact their health, whereas increased temperatures lead to the increased consumption of energy for cooling.

Barcelona being a compact city of 1.6 million inhabitants with hot and humid climate in the warm period of the year, is exposed to excessive heat burden which is expected to be further increased in the following years due to increased frequency and intensity of heat waves, the latter being directly associated to climate change.

The **Climate Shelters** project proposes an innovative adaptation approach to climate change as it plans to intervene in schools with a package of blue (incorporation of water points of different types in the courtyards), green (more shadow spaces and greenery in the courtyards) and gray (interventions on the buildings and use of permeable materials) measures. The project is developed in the context of the Barcelona's Climate Plan which promotes the transformation of communal spaces as a climate change tackling strategy.

The project is based on a participatory process for selecting the schools, with close attention given to the spatial environmental, climatic, urban and

social characteristics of the City of Barcelona. It employs a pedagogical process as children will be involved in the design of climate solutions and in the evaluation of actions.

In this journal (the 1<sup>st</sup> for the project), the **Climate Shelters** project is at first examined within the policy context of the European Union, national and regional levels so as to assess its compliance to international and other commitments as well as to recognize its links with running policies of the City Council of Barcelona for climate change adaptation. Following, a glance to the environmental and climatic conditions of Barcelona is provided, also taking into consideration impacts of climate change in the future.

The Journal is mostly devoted to the activities of the project; it also describes the challenges during its implementation up to the beginning of 2020 as well as to those to be faced in the remaining period of the project. The intention of the Journal is to present the processes that led to the implementation of the activities as well as to describe the tools and methods used (or to be used) to overcome past, present and future challenges.

Finally, a number of case studies and lessons learned are provided with the intention to exemplify the project and reveal its strong points and replication potential.

## 2. THE OVERALL CONTEXT FOR THE PROJECT

Urban areas in Europe, especially in its southern part, experience excessive urban heat during the summer period, due to (a) their urban form (structure, urban density, building characteristics, impervious surfaces, etc.) and functions (as related to anthropogenic heat sources and heat fluxes within the urban web) and (b) the increase of air temperature and heat waves due to climate change.

In particular, cities tend to present higher temperatures than their surrounding areas. This difference in temperature is called Urban Heat Island (UHI). Nowadays, most cities are about 2°C

warmer than surrounding rural areas, whereas in the event of cities of high urban density and limited greenery, differences may even reach 5-7°C. Adverse impacts of the UHI are elevated thermal discomfort and photochemical pollution, health risks for the vulnerable part of population, limited use of the public space and increased energy consumption for cooling. Taken the above, a strong need exists to apply adaptation measures to urban heat, including among others the development of areas within the city, to act as open spaces for the citizenship in the event of excessive temperatures and heat waves.

### 3. THE CLIMATE SHELTERS PROJECT

Barcelona's answer to overheating includes an innovative pilot project to adapt schools to Climate Change, with the aim to develop a network of **Climate Shelters** around the city. The project has a duration of 3 years and is supported by the Urban Innovation Actions (UIA) of the European Commission.

Climate shelters are areas within the schools (practically their school yards) which by hosting blue, green and grey technical measures support the adaptation of the city to climate change. At the same time, the exposure of the school

population to urban heat is ameliorated, whereas the possibility for the continuous use of the climate shelters by the wider public in non-school periods and throughout the year, is provided.

The project is based on a participatory process for selecting the schools, with close attention given to the spatial environmental, climatic, urban and social characteristics of the City of Barcelona. It also employs a pedagogical process as children are involved in the design of climate solutions and in the evaluation of actions.

# 4. THE PROJECT IN THE POLICY CONTEXT OF THE EUROPEAN UNION, NATIONAL AND REGIONAL LEVELS

## 4.1 The European Union level

The European Strategy for Adaptation to Climate Change<sup>1</sup> (adopted in 2013), sets the foundations and principles regarding the Community policy on adaptation. Its main objectives are: (i) to promote adaptation actions to climate change in the Member States; (ii) to facilitate decision-making for all the agents involved through the increase in research programs and the collection and exchange of information on adaptation to climate change (through the Climate-Adapt platform); and (iii) to promote adaptation in sectors vulnerable to climate change by supporting the construction of resistant infrastructures and the promotion of financial and insurance products against natural and human disasters.

Furthermore, the European Union has deployed a dedicated policy for the adaptation of cities to climate change<sup>2</sup>. In particular, the partnership of the Urban Agenda Partnership for climate adaptation<sup>3</sup> explores the best ways to translate the needs of cities into concrete actions through proposals of better regulation as well as funding and knowledge exchange. Adaptation is complementary to efforts to cut greenhouse-gas emissions in cities, which are covered by such

sectors as energy transition in cities, urban mobility, circular economy and sustainable use of land.

Aligned to the above is the Covenant of Mayors for Climate and Energy<sup>4</sup>. In particular, the signatory cities have endorsed a shared vision for 2050 in view of accelerating the decarbonisation of their territories, strengthening their capacity to adapt to unavoidable climate change impacts, and allowing their citizens to access secure, sustainable and affordable energy.

In December 2020, the European Green Deal<sup>5</sup> for the European Union and its citizens was approved. The Green Deal resets the Commission's commitment to tackling climate and environmental-related challenges. It promotes a new growth strategy that aims to transform the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use.

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<sup>1</sup> [https://ec.europa.eu/clima/sites/clima/files/docs/eu\\_strategy\\_en.pdf](https://ec.europa.eu/clima/sites/clima/files/docs/eu_strategy_en.pdf)

<sup>2</sup> <https://climate-adapt.eea.europa.eu/eu-adaptation-policy/strategy>

<sup>3</sup> [https://ec.europa.eu/regional\\_policy/en/policy/themes/urban-development/agenda/](https://ec.europa.eu/regional_policy/en/policy/themes/urban-development/agenda/)

<sup>4</sup> <https://www.covenantofmayors.eu/en/>

<sup>5</sup> [https://ec.europa.eu/info/sites/info/files/european-green-deal-communication\\_en.pdf](https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf)

## 4.2 The National level

The National Plan for Adaptation to Climate Change (PNACC)<sup>6</sup> aims at: knowledge generation in the evaluation of impacts, vulnerability and adaptation to climate change, integration of adaptation to climate change in regulations, mobilization of key actors and establishment of a system of signals and indicators of the impacts and adaptation to climate change in Spain.

The Program also considers the urban environment, taking into consideration that cities face impacts due to climate change that affect services and sectors and that management at the

local level plays a critical role in minimizing vulnerability to climate change.

Furthermore, Spain has ratified the Paris Agreement and is committed to contributing to the achievement of the joint EU quantified economy-wide emission reduction target<sup>7</sup>. It aims in particular to reduce GHG emissions<sup>8</sup> by 38 per cent below the 2005 level by 2030. Spain is also in the process of setting a long-term goal of reducing GHG emissions by 90 per cent below the 1990 level by 2050 and possibly of achieving carbon neutrality with a 100 per cent renewable energy electricity generation system.

## 4.3 The Regional and City level

The Government of Generalitat de Catalunya has developed the Catalan Strategy of Adaptation (ESCACC)<sup>9</sup>. The strategic objective of the Strategy is that Catalonia becomes a territory less vulnerable to the impacts of climate change by increasing the adaptive capacity of sectors and systems.

The Barcelona City Council is committed to implementing locally the climate and energy policies agreed at the European and international level. The Council has signed, among others, the following agreements: the Paris Declaration

committing cities to the fight against climate change (2015), Barcelona's Commitment to the Climate (2015) and the Global Covenant of Mayors for Climate Change and Energy (2017). In addition, plans have been prepared in response to the growing risks of climate change: the Barcelona Climate Plan<sup>10</sup>, the Energy, Climate Change and Air Quality Plan (2011-2020), the Barcelona Green Infrastructure and Biodiversity Plan (2013-2020), the Tree Master Plan (2017-2037)<sup>11</sup> and the Action Plan for Preventing the Effects of Heat Waves on Human Health (annual).

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<sup>6</sup> [https://www.miteco.gob.es/es/cambio-climatico/temas/impactos-vulnerabilidad-y-adaptacion/3PT-PNACC-enero-2014\\_tcm30-70397.pdf](https://www.miteco.gob.es/es/cambio-climatico/temas/impactos-vulnerabilidad-y-adaptacion/3PT-PNACC-enero-2014_tcm30-70397.pdf)

<sup>7</sup> [https://unfccc.int/sites/default/files/resource/sbi2019\\_9a2\\_advance.pdf#page=33](https://unfccc.int/sites/default/files/resource/sbi2019_9a2_advance.pdf#page=33)

<sup>8</sup> from non – Emission Trading Sectors such as energy and industry.

<sup>9</sup> [https://canviclimatic.gencat.cat/web/.content/02\\_OFICINA/publicacions/publicacions\\_de\\_canvi\\_climatic/Planificacio\\_i\\_estrategies\\_cc/resum\\_executiu\\_escacc\\_angles.pdf](https://canviclimatic.gencat.cat/web/.content/02_OFICINA/publicacions/publicacions_de_canvi_climatic/Planificacio_i_estrategies_cc/resum_executiu_escacc_angles.pdf)

<sup>10</sup> <https://www.barcelona.cat/barcelona-pel-clima/en/climate-plan/why-does-barcelona-need-climate-plan>

<sup>11</sup> <https://ajuntament.barcelona.cat/ecologiaurbana/sites/default/files/Pla-director-arbrat-barcelona-ENG.pdf>



# 5. THE THERMAL ENVIRONMENT OF BARCELONA AT A GLANCE

Barcelona stands between the Coastal Mountain Range, the Mediterranean Sea, the River Besòs and Montjuïc mountain. It is a compact city, one of the densest in Europe, with 1.6 million inhabitants in 101.3 km<sup>2</sup> and a metropolitan area of more than 3.2 million inhabitants.

In terms of the thermal environment of the city, a distinct Urban Heat Island is observed, with its intensity being higher at night. According to data from the urban monitoring stations deployed in Barcelona, air temperatures are usually up to 3°C (annual average) higher than those in the periphery of the city; however there have been cases when differences of as much as 7 to 8°C have been observed<sup>12</sup>. Climate change will further impact the thermal environment of the city (increase in the frequency and intensity of heat waves and higher air temperatures).

Barcelona has suffered eight heat waves in the last 34 years<sup>13</sup>. However, according to the

Meteorological Service projections for Barcelona and at the end of the century, they could be significantly more frequent (between one and four per year. More tropical nights (temperatures above 20°C) and torrid nights (temperatures above 25°C) are also forecast, as well as days with extreme temperatures above 35°C.

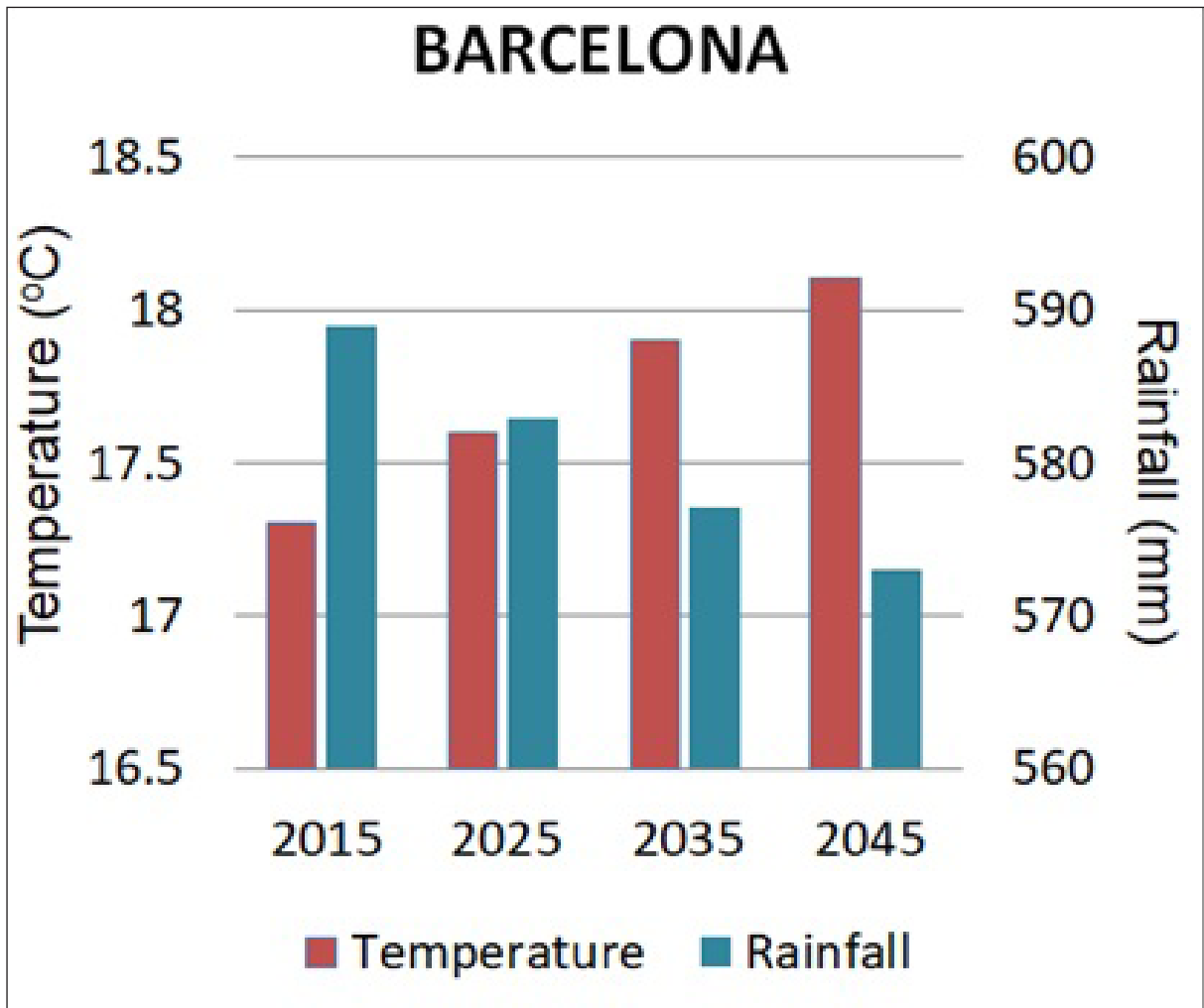
Climate change impacts vary per city district, taken that they depend on such factors as the state – and consequently the thermal vulnerability - of buildings, the presence and type of vegetation, the percentage of impermeable surfaces, the urban density, the dispersion of heat sources and the prevailing socio-economic conditions<sup>14</sup>. Highest daytime temperatures are recorded in Les Corts, Eixample Esquerra, Nou Barris and Ciutat Vella, while the areas with the lowest temperature are next to the coast, thanks to the regulatory effect of the sea. However, at night the situation is reversed, with the highest temperatures recorded on the coast.

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<sup>12</sup> Barcelona Climate Plan

<sup>13</sup> as in 8

<sup>14</sup> H. Akbari, C. Cartalis, D. Kolokotsa, A. Muscio, A. L. Pisello, F. Rossi, M. Santamouris, A. Synnefa, N.H. Wongf, M. Zinzig, 2016, Local Climate Change and Urban Heat Island Mitigation Techniques – The State of the Art, Journal of Civil Engineering and Management, 22 (1), pp. 1- 16.



*Climate simulation for Barcelona for the period 2015-2045<sup>15</sup>*

<sup>15</sup> RCP 4.5, Marks, ensemble of 17 climate models

# 6. OVERVIEW OF THE OPERATIONAL CHALLENGES

The **Climate Shelters** project<sup>16</sup> reflects considerable innovation as locally differentiated blue, green and grey measures are applied to eleven (11) schools so as to reduce the impact of summer heat during school times and when activities are held in the outdoor playgrounds and the school yards. Schools will also be open to the city residents and visitors, acting as cooling

spots especially in the event of excessive heat or heat waves.

A number of operational challenges are associated with the project (see 5.1 to 5.7). For each operational challenge, a critical analysis of the project's activities development is provided, complemented with lessons learned from the specific challenge.

## 6.1 Leadership

The challenge of leadership is more demanding in the case of an innovative project as risks are higher. In the **Climate Shelters** project, the extensive experience of the City Council of Barcelona in urban projects (also of environmental and climatic character) was reflected in the leadership of the project. In particular, the challenge was addressed through an efficient balance of the educational, pedagogical, scientific and technical aspects of the project, the

delegation of authority to the working groups established, the commitment towards participatory processes, the alignment of all partners to the aims of the project and the employment of iterative processes among partners stakeholders and experts for solution solving and decision making. Risks were further reduced by involving schools in the co-production process as early as the beginning of the project.

## 6.2 Public procurement

The **Climate Shelters** project gives weight to the technical (blue, green and grey) measures to be designed and implemented to schools (and their yards) in view of their adaptation to climate change. The task is undertaken by the Barcelona Consortium of Education (CEB), an experienced public entity taken that it has, among others, the responsibility for the construction of public

schools as well as for their annual maintenance. Critical challenges of the project are:

- (a) the realistic<sup>17</sup> (science, technical and budget wise) and innovative design of the mix of technical solutions per school and
- (b) the timely preparation of the tender documents as well as completion of the construction works (works need to start in late

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<sup>16</sup> <https://www.uia-initiative.eu/en/uia-cities/barcelona-call3>

<sup>17</sup> avoidance of hyper-specification of services/products

June 2020 and conclude by September 2020, thus taking advantage of the schools' closure period).

In terms of the challenge (a), a thorough co-production process was applied with the participation of all partners as well as of the schools. At a first phase, a substantial analysis of the schools (titled "Adapting schools to climate change by means of green, blue and grey interventions") was prepared by the Agencia d' Energia de Barcelona with the support of the Societat Organica. Following, and with the use of a guide of green, blue and grey solutions and a technical procurement document as developed by CEB, the final and feasible<sup>18</sup> – technically wise – mix of measures per school was defined. In the course to follow, architects to be selected by CEB will finalize the plans and prepare the tender documents.

In terms of (b), the project will promote procurement procedures from preselected lists of competent architects and construction companies of CEB (the lists are made by CEB on the basis of a number of criteria and are renewed every two years). The procedures comply with EU law and support the timely selection of the contractors in view of the conclusion of all construction works in the selected schools, by September 2020.

A point of interest is the intention of the project to promote the procurement for the architectural offices by dividing the schools in four lots (groups). To this end, economies of scale may be achieved, whereas the coordination of the contractors will be more efficient.

**Lesson learned-1.** Keep all partners and especially schools in the loop while in the process of assessing and selecting the technical solutions for the adaptation of schools to Climate Change as well as for exploiting the ways for the open use of the schoolyards. Partners need to provide their expertise and schools should be given the opportunity to contribute (after all, solutions will be applied to their own environment) so as to develop ownership of the project.

### Quotes from teachers


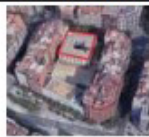








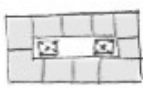
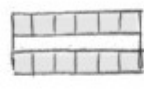
*"It was fun to design what my school needs to become a climate shelter. We do not have the expertise, but we were able to reflect the school's conditions and place the suggested solutions in some kind of priority."*

*"It was very important to include parents in the co-production process; they are in some cases hesitant to what is to be done in the school."*

**Lesson learned-2.** Taken that procurements may need considerable time for being prepared, published and evaluated, also due to the necessity to apply a participatory process, the related work package needs to start as early as the initiation of the project. In this way ample time will be available, enabling the promotion of open tenders with environmental and social innovation. However in cases when constructions are complicated and/or the time frame for their completion is restricted, the use of lists of preselected companies is considered beneficial.

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<sup>18</sup> some of the blue measures were excluded taken their high maintenance cost and/or their technical complexity (e.g. pump sea water).

|                          | 1_Cervantes  | 2_Els Llorers   | 3_Ramon Casas  | 4_Itaca   |
|--------------------------|--|---|--|---|
| 0_Situació               | Trama: Originari _ Nudi antic  | Trama: Eixample Cerdà   | Trama: Blocs autònoms  | Trama: Eixample Suburbà   |
|                          |                             |                  |                                    |  |
| 1_Informació general     | Reformada a 1992<br>Escoles + sostenibles<br>No son patis oberts<br>Accés a l'escola per Sant Pere més Baix. | Reformada en 2011<br>Escoles + sostenibles<br>Pati obert: pista esportiva (accés per la Av. Roma) | Reformada a 2007<br>Escoles + sostenibles<br>Patis oberts: Pista esportiva (accés pel carrer del Plati)              | Any de construcció 1992<br>Escoles + sostenibles                                    |
|                          | <b>EDIFICI</b>   | <b>EDIFICI</b>  | <b>EDIFICI</b>   | <b>EDIFICI</b>  |
|                          | Central  | Central   | Central  | Longitudinal  |
| Volumetria edifici       |                             |                  |                                    |  |
|                          | Pati central   | Pati central  | Passadís central   | Passadís central  |
| Tipologia planta edifici |                             |                  |                                    |  |
| Tipus de patis           | 2 tipus de patis:<br>Pista esportiva a planta baixa<br>Pati a coberta  | 2 tipus de patis:<br>Pista esportiva<br>Pati de sorral  | 4 tipus de patis: 1 pista dura + 2 patis de sorral (infantil), 2 pistes esportives + 1 pati sorral/picnic (Primaria) | 2 tipus de patis: Pista esportiva + pati de sorral                                  |

Analysis of selected schools in Barcelona in view of their adaptation to climate change<sup>19</sup>

## 6.3 Organizational arrangements within the urban authority (cross departmental working)

The challenge of effective organizational arrangements was worked out by setting one technical and one administrative committee, one project management team and four working groups as follows: Communication, Catalog of Solutions, Impact evaluation and Participatory and pedagogical processes.

**Lesson learned-3.** Establish as early as possible a robust model for cross-departmental working. Test the model and promote corrective measures

should its operation exhibits flaws and results in delays. Promote modes of communication between partners, committees and working groups and take note of the need for timely decision making, especially if the project includes technical works and procurement processes. Follow closely the time table and be ready to update it in the event of delays or changes in the project. For large groups of partners, the necessity for an executive committee should be examined

<sup>19</sup> extract from the report "Adapting schools to climate change by means of green, blue and grey interventions"; deliverable of the Climate Shelters project.

in order to expedite decisions. In general terms, projects need to continuously test and improve their organizational arrangements, taken that

their needs change during the course of the project.

## 6.4 Participative approach for co-implementation

A critical challenge in every project which involves various types of stakeholders and end users is to define, establish and implement effective participatory and co-production processes. The **Climate Shelters** project took advantage of the tradition and experience of the City of Barcelona in participatory processes as developed from other projects. To this end, it gave space to the participation of all involved stakeholders, although with emphasis given to the school community (teachers, students and parents).

### Selecting the schools - a balanced approach

An important challenge of the **Climate Shelters** project was the selection of schools. This was based on an intensive and interactive process between the partners of the project, so as to define the methodology and the list of criteria to be applied.

An open call was issued for public schools in Barcelona to become the pilot location of the project and thus enjoy technical interventions encompassing blue, green and grey solutions. Forty five (45) out of one hundred and sixty (160) schools expressed their interest by means of a motivation letter and provided the required technical information for their school to be evaluated. Ten (10) schools were selected, forming along with the Escola Vila Olímpica (partner of the project), the school network of the **Climate Shelters** project.

The challenge to design a network reflecting the prevailing educational, environmental, climatic, urban and social aspects of the city of Barcelona was met through a balanced and well defined set of selection criteria, as divided to mandatory and priority ones. The mandatory criteria referred to the number of schools per district of Barcelona (1 per district, 10 in total), the type of school (public) and the educational level (primary). Priority criteria included, among others, the state of environment in the area of the school (location of the school in a zone of maximum vulnerability to climate change, a zone of high air pollution, a zone with limited greenery), the building (thermal insulation and energy efficiency), the patio (conditions of the playground, presence of water) and the risk for social exclusion. Criteria also aimed to link the schools to running projects of the City of Barcelona, such as the Sustainable Schools<sup>20</sup> and the Open School Yards<sup>21</sup>.

As mentioned before, in each of the selected primary schools, participatory events took place and were attended by teachers, students, parents and representatives of the partners to the **Climate Shelters** project. The aims of the events were to motivate the school community to the project, to assess the needs of each school, to gather ideas and suggestions for the adaptation of the school and its yard(s) to climate change, to facilitate the interaction with scientists and architects and to **develop ownership of the project by the school community**.

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<sup>20</sup> [https://www.barcelona.cat/infobarcelona/en/352-barcelona-education-centres-promote-environmental-projects-as-part-of-the-more-sustainable-schools-programme\\_672545.html](https://www.barcelona.cat/infobarcelona/en/352-barcelona-education-centres-promote-environmental-projects-as-part-of-the-more-sustainable-schools-programme_672545.html)

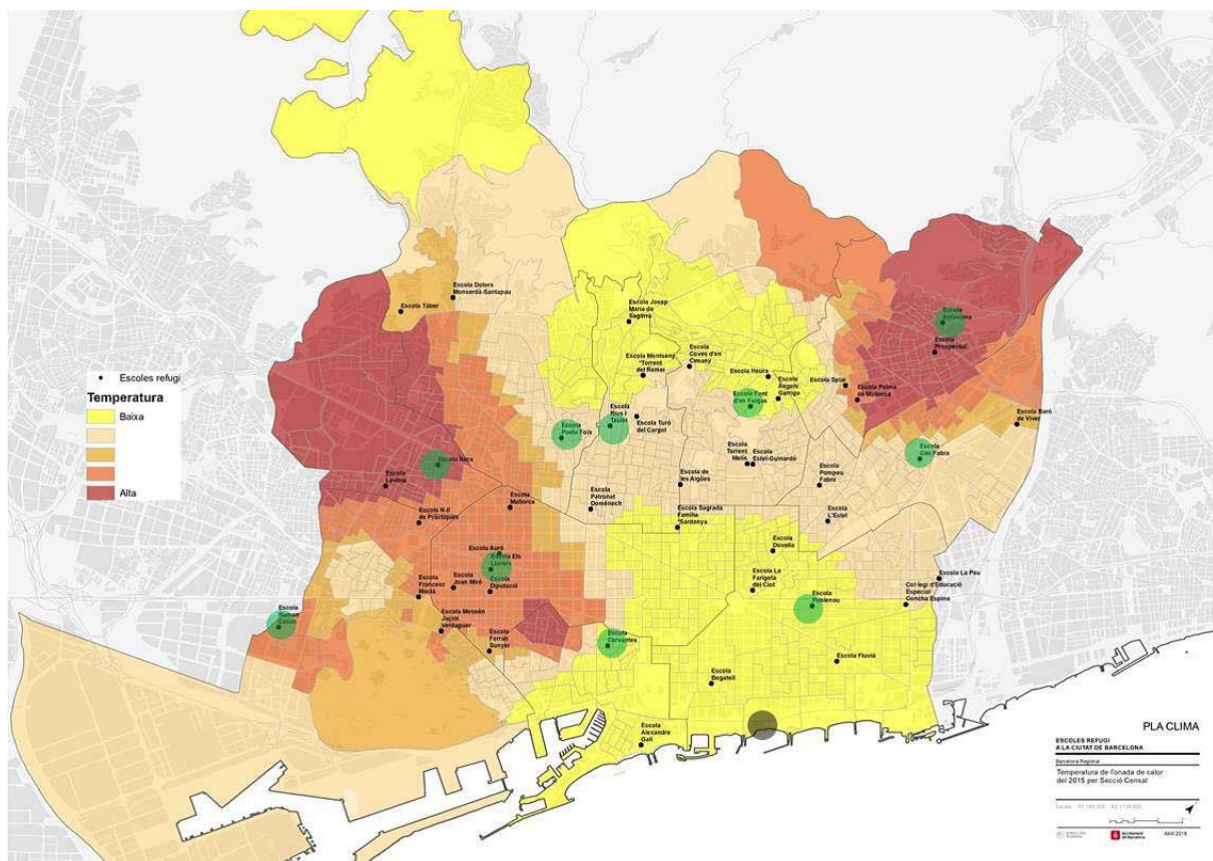
<sup>21</sup> <https://ajuntament.barcelona.cat/guardiaurbana/en>



**Lesson learned-4.** A lesson learned from the implementation of the **Climate Shelters** project is that participatory processes need to be established from the beginning of a project, or at least as early as possible within the project life, and maintained throughout its implementation. Processes by being open and inclusive and by giving space for cooperative spirit and innovating thinking, result in the participants to the project (partners, stakeholders, end users) to develop ownership of the project. The processes need to

be supported with training and communication so as participants to be able to comprehend the project and its wider context.

**Lesson learned-5.** Schools become highly motivated once participatory co-production processes are applied and space is given for innovation and creativity. Taken that they can act as hubs for the neighborhood, their role is central for social cohesion as well as for climate awareness.



*Spatial distribution of the schools (green and grey spots) of the **Climate Shelters** project. Areas in yellow and red reflect the lowest and highest temperatures respectively.*

## Being inclusive - The case of the Escola Cervantes

The Escola Cervantes is one of the eleven schools selected in the Climate Shelters project. It is located in the district Ciutat Vella, in a busy residential and commercial neighborhood, characterized by narrow streets and old buildings, some of prominent architectural style.



*Left: The Escola Cervantes (red frame) in a high urban density district Right: The school yard (red frame) and the plot area of the school building (green frame).*

The building of the school itself, is architecturally elegant and well preserved; it includes an atrium in the center of the building resulting in sunlight to easily penetrate in the school premises, a fact which is beneficial for the winter months, but imposes more cooling needs during the warm period of the year. The school has three yards, one at the ground level (also hosting a basketball court), one smaller one at level 1 (mostly a veranda converted to a yard) and one more at the very terrace of the building (3<sup>rd</sup> floor).



*Image of the Escola Cervantes from the interior.*





*Ground yard of the Escola Cervantes. The vicinity of the yard to the neighboring buildings reflects the high urban density of the area as well as the potential of the Open Schoolyard to accommodate the neighborhood in the event of high urban heat.*

An important characteristic of the school is that the families of its students correspond to sixty (60) nationalities, mostly from countries outside the European Union. Families were considered being more concerned to social issues or problems influencing their daily lives, their jobs and their households than to climate change. To this end, the challenge was to communicate the **Climate Shelters** project to the parents so as to create awareness and eventually convince them on the merits of the project: to ameliorate the impact of climate change as far as excessive heat is concerned and to improve air quality in classrooms. The participatory process was proven successful, thus enhancing and demonstrating the inclusive character of the project.

### **Integrate and Transfer - The case of Escola Vila Olímpica**

The Escola Vila Olímpica is located in the district of San Martí. It has a dual role in the **Climate Shelters** project; on the one hand it is one of the partners of the project and on the other it is one of the 11

schools of the pilot locations where solutions are going to be tested under the scope of the **Climate Shelters** project. The school was built in 1999, in close distance to the sea; it enjoys adequate internal and external spaces for school activities and has two school yards (overall 3,665 m<sup>2</sup>), the one also accommodating sporting events and the



other resembling a “pocket” urban park (soil covered with sand, high trees providing shade).

The school has long experience in environmental projects and has established a tradition of active

## 6.5 Monitoring and evaluation

Monitoring of an innovative project with many partners and end users, may be a challenge. In the case of the Climate Shelters project, a merit of the monitoring plan was its drafting along the main deliverables and milestones of the project. To this end, emphasis was given to the selection of schools, the elaboration of the technical catalog, the selection of the best investments proposals and to the participatory and pedagogical processes. It is important that monitoring plans are complemented with alert dates (prior to the completion dates per milestone) and be linked to contingency plans, at least with respect to important milestones.

In terms of evaluation, a challenge of the **Climate Shelters** project is to assess the impact of the blue,

interaction with the parental community; it has developed and runs a Commission for Sustainability with the participation of teachers, students and parents. Furthermore, the school has concentrated its activities to climate change, has planned a multitude of relevant activities to this direction and has aligned all other activities accordingly. To this end, students are better focused to the theme of the project, a fact which leads to their active involvement. It is important to note, that the school has invested efforts in interlinking grades, practically to transfer what is done in one grade to the other ones.

A challenge met by the school was to organize and pass climate information to the students; this was achieved by developing strong links between the families, the students and the teachers. A 2<sup>nd</sup> challenge was to integrate students with special needs to the project; this was made possible by developing tailor made activities, thus supporting the inclusive character of the project.

green and grey measures to the school environment. For a quality assessment, the data series need to be extended and to represent a variety of parameters. In the case of the **Climate Shelters** project, an innovative effort is made, designed and implemented by the Barcelona Institute for Global Health, the Institute of Environment Science and Technology, and the Public Health Agency of Barcelona. Quantitative and qualitative methodologies are combined to correlate the impact of the blue, green and grey measures to the state of the indoor and outdoor environment as far as the following parameters are concerned: CO<sub>2</sub>, temperature, humidity, PMs, carbon dioxide, ozone, nitrogen dioxide and climate change awareness among students and the neighborhood.

Taken the impact of the air pollutants and increased temperature to health, especially for kids, an assessment is foreseen regarding the improvement of the health conditions. Specially constructed as well as commercial sensors are placed in all schools, recordings are monitored in

real time and are accessible on line, thus reflecting transparency. In addition, a link to the Healthy Cities program is made, hands on experience and citizen awareness are promoted, whereas results may lead to a set of guidelines to be applied in schools.

## 6.6 Communication and evaluation

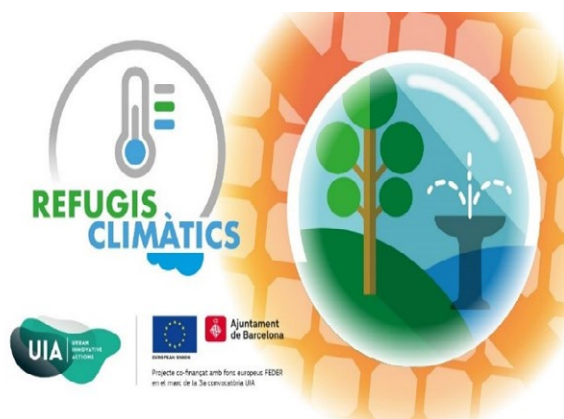
The challenge of the communication plan of the **Climate Shelters** project was (a) to transmit the need to adopt climate change adaptation measures (b) to inform local residents about the school's adaptation to climate change and potential of public use (c) to involve and raise the awareness of schools and the education community in the effort against climate change and (d) to publish and promote scientific and technical work associated with the project.

For the challenge to be met, the objectives of the **Climate Shelters** project were aligned to the overall strategy of the City Council of Barcelona for climate change. This is important so as to avoid overlapping messages and keep the message strong and clear. Furthermore, communication was aligned with the office of the Mayor of Barcelona, partners integrated the communication of the project to their own communication plans, an open deliberation was promoted for the design and selection of the logo

and name of the project (see below) and communication moments and materials were disseminated to social media.

An equally important communication challenge was to motivate schools in the project and raise attention of the neighborhood to the project. To this end, schools were given space for new communication ideas, information sessions were organized in each of the 11 selected schools and a branding of the schools was promoted. Finally, a web site for the project<sup>22</sup> has been developed within the Barcelona for Climate portal. Although it is usually preferred to have a single point of information, the prospect of a stand-alone web site for the **Climate Shelters** project needs to be assessed so as the project to avoid the overflow of information as provided in the Barcelona for Climate portal.

**Lesson learned:** A well prepared communication plan is a critical precondition for the success of a project; messages need to be disseminated as early as the start of the project to secure the awareness of the public and stimulate interest. In the event of the schools, it is important to provide space for their own communication activities. The plan needs to also inform local residents about the school's adaptation to climate change.



<sup>22</sup> [www.barcelona.cat/barcelona-pel-clima/en/climat-shelters-schools](http://www.barcelona.cat/barcelona-pel-clima/en/climat-shelters-schools)

## 6.7 Upscaling

Taken the wide interest of schools to the **Climate Shelters** project as well as its innovative character, the challenge for upscaling seems promising. In general terms, upscaling need not be done after the end of a project; on the contrary, it has to be taken care as early as possible through early assessments and in conjunction with such preconditions as: resources available, generalized upscale or upscale on a cluster per cluster basis, competent authorities to take part, etc. In the

case of the **Climate Shelters** project, the assessment on the upscaling prospect is scheduled to be done rather late in the project; moving the assessment earlier in the project life, will clear which upscaling preconditions are met and which are yet to be met. Close interaction to the political leadership is needed so as decisions to be taken proactively, especially with respect to securing the needed funding.



## 7. SUMMING UP THE MAIN ASPECTS

**Climate Shelters** reflects an innovative project aiming at the development of a network of 11 Schools adapted to the Climate change (in particular urban heat) as key-pilot with the goal to replicate the project to all the schools in the city. Schools will be a first and reference experience for the climate shelters network aimed by the Barcelona's Climate Plan, thus promoting climate justice for all citizens, especially the most vulnerable ones.

The project has concluded its preparatory phases and has successfully delivered the respective milestones; aspects to be given consideration

include the perseverance of the interest of schools as well as the close attendance of the communication plan with more emphasis given to the awareness of the public on climate change.

Finally, the next steps of the project are (a) the timely completion of the final plans and of the tender documents for the technical and constructions works per school, in view of their initiation and completion in June and September 2020 respectively and (b) the initiation of the upscaling process in support of the project's replication potential.

Urban Innovative Actions (UIA) is an Initiative of the European Union that provides urban areas throughout Europe with resources to test new and unproven solutions to address urban challenges. Based on article 8 of ERDF, the Initiative has a total ERDF budget of EUR 372 million for 2014-2020.

UIA projects will produce a wealth of knowledge stemming from the implementation of the innovative solutions for sustainable urban development that are of interest for city practitioners and stakeholders across the EU. This journal is a paper written by a UIA Expert that captures and disseminates the lessons learnt from the project implementation and the good practices identified. The journals will be structured around the main challenges of implementation identified and faced at local level by UIA projects. They will be published on a regular basis on the UIA website.



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