Challenge 2: Reforming the built environment for the future city

There are technical issues of buildings that can be easily referred to, such as energy and water-saving parameters. There are also materials used in the construction process that can influence the local microclimate and the capacity of buildings to cope with extreme heat or cold.

We can also look at buildings from a different perspective: they have an important role to play, especially when we think how they impact the city functions and shape. For example, housing patterns may raise the city's density and thus positively influence non-motorized transport, as well as limits urban sprawl.

We spend a significant part of our lives in buildings, so they impact the life-attitude we have. Limited urban space makes us think about the buildings not only as providers of their usual services but also from the perspective of greening the city, thanks to e.g. green walls and roofs, and even as "carbon sinks" storing carbon dioxide.

Buildings and their vicinity are important for yet another reason. Different construction materials as used in cities, practically all of the infrastructure and buildings and everything we need to make our cities function, burden the thermal environment and generate the urban heat island.. In such case, tthe nnual mean air temperature of a city with 1 million people or more can be 1-3°C warmer than its surroundings. Few degrees doesn`t sound like a lot but in the evenings the difference can be as high as 8-12°C, especially in southern European regions.

Heat islands can affect cities by increasing energy demand for cooling and costs forair conditioning, air pollution and greenhouse gas emissions, water pollution and can also cause heat-related illness and mortality. Solutions to urban heat island are simple and nature based – like using light colored and cool construction materials, reducing traffic in cities (which acts as a heat source), developing pocket parks and planting more trees and other vegetation, increasing shading, etc.

Keywords: buildings, standards, water management, heat islands, green spaces, energy efficiency, greenhouse gases (GHG) emissions, living comfort, vertical gardens, green rooftops, accessibility

Proposed discussion points:

- What would you change in a building you are currently using or residing (and to its close surrounding area) so as to make it more environmentally friendly?
- What were the local, traditional building patterns and materials used in your area? Are they environmentally friendly and – if so – could they be more widely used?

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- What is your preferable place and type of building to live and work in? Discuss your choices with colleagues and check which of these are the friendliest for the environment.
- Do you feel the difference between being close to buildings within green urban spaces and to ones that are in dense city areas with limited, if any, greenery?
- How can buildings and their vicinities be changed to make them greener and more resilient to extreme weather events, such as rain downpour, or to urban heat? Can nature-based solutions play a role in this regard?

Exemplar Science Team's projects:

Warm, warmer, hot! How to cool down our city/neighborhood/school? – Science Teams investigate temperature conditions in their city/neighborhood/school (air temperature /surface temperature – different parts of the city / different times of a day, a year/different materials etc.) looking for the specific places where a heat island effect is the most visible and how it affects citizens. Afterwards, Science Teams look for solutions to cool down those spaces using cool materials and nature-based solutions (green solutions) at the first place.

Drought in the city. How to keep water in our school yard? – Science Teams investigate conditions for water circulation in the surrounding of the school building (rainfall measures, investigation of surface permeability and presence of green areas – land cover, rainwater drainage system). Afterwards, they look for solutions to keep water in their school yard so it can be used more effectively.

Growing cities. How to provide equal place for humans and nature in the city? Science Teams investigate how the city and the wider region have changed in the past years – how much has it expanded in the last 10-20-30 years? What was the share of green spaces with years? Has the city center changed (new buildings, change in land use or land cover) and what are the impacts to the city's identity and to the quality of life? What are the plans for development of i.e. their school surrounding? Afterwards, Science Teams look for solutions to redesign particularly "grey" part of their city (or maybe the one which will be revitalized by the city council in the next few years?) to propose solutions, also in view of providing more space for humans and nature.

Resources to find out more about this Challenge:

- Urban Agenda for the EU https://ec.europa.eu/futurium/en/urban-agenda-eu/what-urban-agenda-eu;
- European resources on energy efficiency https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/%20energy-performance-buildings-directive_en;

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- A Roadmap for moving to a competitive low carbon economy in 2050 – factsheet in EN https://ec.europa.eu/clima/sites/clima/files/strategies/2050/docs/roadmap_fact_sheet_en.pdf; full document https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A52011DC0112 (available in 23 European languages).

Linked to Sustainable Development Goals (SDGs):

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