

ADDRESSING CLIMATE CHANGE RISKS IN THE BUILDING SECTOR



The decade 2011-2020 was the warmest ever recorded, with global average temperature reaching 1.1 °C above pre-industrial levels in 2019. Human induced global warming is presently increasing at a rate of 0.2 °C per decade. An increase of 2 °C compared to the temperature in pre-industrial times is associated with serious negative impacts to the environment, human health and wellbeing, including a much higher risk that dangerous and possibly catastrophic changes in the global environment will occur. Buildings, and the construction sector in general, is a major contributor to climate change, responsible for **38% of global energy-related CO₂ emissions in 2019**.

Climate change is increasing the frequency, severity, spatial extent and duration of extreme weather and climate events. The building sector is highly exposed to climate change related hazards, impacting **both the structural features and indoor conditions**.

Impacts on the structural features include degradation of construction materials and even of the structural integrity of the buildings leading to increased risk of collapse. Moreover, storms, snow, floods or fires are other hazards to consider, that directly affect the lifetime of the building or its structure. Climate change may also have an impact on the economic activities within the building. Structural damages can reduce a property's value between 5% to 20%. Floods and landslides caused by extreme weather can provoke both short- and long-term service disruptions to buildings, possibly affecting energy, gas, water, or internet provision.

Indoor conditions relate to the interior thermal comfort, and as such, directly impact people living and working within buildings. Therefore, buildings' users are expected to employ heating and cooling systems to deal with the thermal discomfort caused by temperature extremes, which could have detrimental effects on health, well-being, and productivity. These effects highly depend on each geographical location. For instance, in hot climate regions, drought and overheating are among the major issues that the building sector is facing. Coastal regions on the other hand are exposed to sea level rise and

cyclones, which can cause flooding and erosion. Therefore, the **resilience** of new and existing buildings to current and future climate change conditions has to be assessed.

To address and respond to the challenges posed by climate change, **both mitigation and adaptation** approaches must be substantially integrated. Considering adaptation alone without mitigation would result in a faster climate change effect leading to more climate change threats. Mitigation measures concern the reduction of GHG emissions mainly through the increase of energy efficiency, i.e. energy savings, and the use of renewable energy, as well as proper waste management, that can be implemented through a variety of measures in both existing and new buildings. Adaptation measures are intended to decrease the vulnerability and risks posed by climate change. They are closely linked to the location and use of the building. For example, in a city facing increased numbers of heat waves, efficient, innovative and sustainable cooling measures can be applied, such as green roofs or reflective coating materials.

Although several currently applied measures contribute to both mitigation and adaptation, some can be **conflicting**. For example, cooling systems are important in order to maintain an acceptable temperature inside buildings during a heatwave but are also contributing to GHG emissions. Therefore, **climate proofing**, which is a process that incorporates climate change mitigation and adaptation strategies into the development of infrastructure projects, including buildings, must therefore be prioritized to increase resilience and, at the same time, reduce GHG emissions.

The role of the EU Policy Framework

The EU, already from 2013, has undertaken action to bring adaptation to the forefront through its climate adaptation strategy with at least 3 of the 8 actions calling for substantive action in areas of relevance for buildings, namely: a) promoting adaptation action in cities along the Covenant of Mayor initiative; b) introducing climate proofing of the EU-funded major policies; and c) making infrastructure more resilient. A new EU strategy on adaptation to climate change has been adopted by the European Commission on February 24, 2021. The new strategy sets out how the European Union can adapt to the unavoidable impacts of climate change and become climate resilient by 2050. It has the following principal objectives: to make adaptation smarter, more systemic, and to step up international action on adaptation to climate change.

The **Renovation Wave** and the **Circular Economy Action Plan** also identify climate resilience as a key principle. In the “Renovation Wave” Communication of October 2020, the European Commission states that buildings benefitting from renovation in Europe should not only become climate- and environment-friendly, but also resilient to the impacts of climate change. The Renovation Wave, which is part of the European Green Deal, intends to increase the rate and the depth of renovation in the next 10 years while also fostering energy and resource efficiency. **Deep renovation constitutes a major action to combat climate change** leading to a faster and cost-effective decarbonisation of the building sector. Currently, the annual deep energy renovation rate is quite small in the EU, averaging 0.2%. However, based on a recent related study of the Buildings Performance

Institute Europe (BPIE), the annual deep energy renovation rate should be at 3% no later than 2030 in order to achieve the 2030 climate related target and climate neutrality by 2050. In terms of adaptation, the Renovation Wave emphasizes the need to review the standards for heating and cooling in buildings while also strengthening society's readiness to face heatwaves. Furthermore, the European Commission has initiated the review of the **Green Public Procurement criteria** for office buildings, also encompassing climate resilient criteria.

The “Energy Efficiency 2021” report by the **International Energy Agency (IEA)**, estimates that the rate of improvement of global energy intensity needs to double from last decade's levels to match the Net Zero Emissions scenario by 2050. Energy efficiency actions in the building sector can provide some of the highest energy savings until 2030, compared to transport and industry sectors. Increasing the share of existing buildings that are zero carbon ready from less than 1% today to around 20% by 2030 is a key global milestone. Moreover, it is anticipated that sales of gas boilers, as of coal and oil boilers also, could be banned by 2025, except where gas supply is set to be decarbonised and boilers capable of burning 100% hydrogen or another low-carbon gas are classed as zero carbon ready.

The **Multiannual Financial Framework 2021-2027** ensures that climate adaptation efforts are incorporated into all major EU spending programmes. The Cohesion Policy, especially the Regional Development Funds, is in charge of substantial EU financing for infrastructure resilience, including buildings. In the event of emergencies, the EU Solidarity Fund can be activated, including Climate Change-related occasions.

Buildings is one of the sectors that are targeted by the **EU Mission on Adaptation to Climate Change**, as part of the Horizon Europe research program, promoting the mobilisation of funds for the renovation wave to retrofit and develop climate-proof public buildings and social housing. The **European Investment Bank** is another source of EU financing in the infrastructure sector that actively supports climate resilience.

However, it is worth considering again that the most effective way when financing adaptation measures, is to take mitigation into account and vice-versa.

The way forward

To meet the EU's aim of climate neutrality by 2050, the building sector will need to significantly decrease its energy use and be able to respond to the effects of climate change with already existing adaptation actions. Updating the current **building codes and standards** to take into account climate related risks is an important step towards this direction. In addition, the design and development of **sustainable financing schemes** for climate related investments as well as the implementation of studies on the integration of mitigation and adaptation measures in the building sector is also required. Moreover, the adoption of climate-resilient investment policies and practices and the institutional capacity development of the relevant government bodies at national and local level will support the mitigation of the expected climate risks. According to IEA, it is estimated that government policies have helped global energy efficiency investment rise by 10% in 2021,

however if net zero CO₂ emissions are to be met by 2050, overall annual investment would need to gradually triple by 2030.

Transition to clean energy through Energy Efficiency and Renewable Energy Sources is a core activity of **EXERGIA** since its establishment, particularly in major emerging economies and developing markets. In view of the climate change developments the firm has expanded its operation by supporting climate change related services in various sectors including buildings; indicatively the following services are offered:

- Support to local/national authorities for amendment of climate proofing building codes and regulations and formulation of climate-resilient investment policies and practices.
- Contribution to climate proofing implementation through projects facilitating deep renovation through integration of renewables with energy efficiency in buildings.
- Evaluation, verification and assistance in encompassing carbon mitigation provisions in development projects.
- Design and development of sustainable financing schemes, support in establishing climate change related funds and financing facilities in developing countries.