

Our current projects

Pre-publication stage/April 2020

Decarbonisation of buildings

Long version:

The EU is committed through the European Green Deal and the European Climate Law to reducing its carbon emissions to zero by 2050. The decarbonisation of buildings has an important role to play in delivering this commitment because more than one third of EU greenhouse gas (GHG) emissions arise from energy being consumed in buildings, including for heating, cooling, ventilation, air-conditioning, hot water production, and lighting.

The decarbonisation of *new buildings* can be achieved by including nearly zero energy building (NZEB) requirements in building regulations, which typically leads to building designs which prioritise the use of very high levels of insulation, mechanical ventilation with heat recovery, low carbon energy heating systems and excellent heating control systems.

In contrast, the decarbonisation of *existing buildings* is more difficult because it is costly to replace existing building elements, the rates of building refurbishment / renovation are low in the EU, most existing buildings are occupied, and many building owners have limited resources with which to finance renovations. In addition, the appearance of existing buildings is an important part of a locality's cultural heritage and in some cases is legally protected.

The steps that need to be taken to achieve the decarbonisation of buildings will have important *impacts on the whole of the EU's energy system* in three key ways.

- Firstly, the overall building energy demand will be reduced.
- Secondly, the mix of energy supplies to buildings will change, for example natural gas boilers, which are now a major source of heat for buildings, are likely to be largely replaced by other heat sources such as heat pumps, electric resistance heaters, biogas, and solar heaters.
- Thirdly, the building sector will play an important role in helping to manage fluctuations in electricity supplies arising from variable renewable electricity generators (solar, wind, hydro, and ocean). This will be done by the storage of heat in building fabric and/or in heat stores attached to district heating or cooling systems, and by storing electricity in batteries, located either in buildings or in electric vehicles, which are connected to charging points in buildings. Thus, buildings will also contribute flexibility to the management of electricity grids by using smart demand management systems to deliver demand response services.

Buildings contain very large quantities of *embedded carbon emissions*, which have impacts on the climate throughout a building's life cycle, including during construction, maintenance, renovation, and eventually demolition. These embedded emissions can be minimised by making appropriate choices of building design, building materials, and construction

methods, as well as by adopting the most sustainable building maintenance and renovation options.

A vast amount of research on energy in buildings has been funded by the EU over many years but, until recently, *sustainable heating has been largely neglected* in EU climate and energy legislation. Requirements for “nearly zero energy buildings” were put in place in 2010 through the EU energy performance of buildings directive (EPBD), and this directive was amended in 2018 to include a requirement for each EU Member State to establish a long term building renovation strategy. In addition, the EU is now working to develop a sustainability framework, “Level(s)”, which will provide a common EU approach for assessing environmental performance of the built environment. Level(s) offers a tiered approach to life cycle assessment and will contribute to the development of the circular economy.

A new *EASAC project* was launched in 2020 to study the latest scientific evidence and the available experience of implementing policies that aim to promote the decarbonisation of buildings, and to identify the most cost effective and successful policy options. As part of this work, an expert group will review the emerging policy and legislative proposals from the EU as well as the latest scientific literature. EASAC will present the results of the project in a report containing independent science based advice, and highlighting the most important steps that should be taken by EU policy makers to reduce GHG emissions from buildings, in line with EU climate change commitments.

Independent evidence or comments relating to any of the points mentioned above would be welcome, and should be sent to secretariat@easac.eu. Publication of the report is scheduled for 2021.