CEPS EXPLAINER

HOW TO INTEGRATE SOCIAL AND CLIMATE OBJECTIVES INTO THE EU'S HOUSING POLICY

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SUMMARY

We spend the largest part of our lives either inside buildings or travelling between them. How and where we build is not only fundamental for household spendings but also for society's social fabric. Housing policy also has significant implications for energy demand, material requirements, greenhouse gas (GHG) emissions and mobility needs as well as safety, security and – more generally – resilience.

In the EU, buildings are responsible for about 40 % of net energy consumption. In the EU, housing expenses are the largest expense, amounting to almost one quarter of total spending on average. Making housing more affordable and sustainable means we need a new and more comprehensive perspective on housing, one which would unlock the efficiency and innovation potential of the climate and digital transitions.

Three aspects stand out. First, the time dimension, which addresses the whole life-cycle of buildings. Second, the value chain dimension, which includes the impacts from primary construction materials to the design and use (or reuse) of buildings, as well as recycling. Third, the spatial dimension, which covers the consequences of where buildings are located, including for mobility and energy systems. Buildings' higher costs can be offset by longevity, which in return can be supported by more flexible and modular designs. Eco-services such as storing GHG emissions in building materials can also create new revenue streams.

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Introduction

We spend about 80 % of our time in buildings or moving from one building to another. Housing, and more generally the built environment, have come into focus both within the Member States and at EU level for both climate and affordability reasons. A major step was the most recent revision of the Energy Performance of Buildings Directive (EPBD). The original focus on reducing energy demand and thus 'operational' CO_2, was extended to include the 'embodied emissions' (emissions resulting from a product's entire life cycle) from raw material extraction, to manufacturing, transport, construction/installation, maintenance and disposal.

Buildings influence climate change in several ways. They generate emissions through fossil energy and materials' embodied emissions. At the same time, buildings could act as carbon sinks, meaning they can either bind or remove GHG emissions from the atmosphere. Buildings are also exposed to the impacts of climate change, including increased heat, flooding and storms.

Thus, to increase buildings' resilience, we need new designs and innovation in where and how we build. There's also high potential for reducing energy and GHG emissions with innovative building materials and designs that take integrated energy systems into account.

BOTH THE INCREASING INCOME SHARE OF HOUSING COSTS AND THE INABILITY TO KEEP HOMES WARM INDICATE THAT HOUSING AFFORDABILITY IS VERY MUCH A STRESS FACTOR FOR GENERAL WELLBEING.

Affordability has quickly moved up the political agenda. According to the OECD's 2024 *How's Life?* report, housing costs are a burden, especially for low-income households. The same report reveals that in 2022, one out of five low-income households across the OECD spent more than 40 % of their disposable income on housing costs. In 2023, one in 11 people reported being unable to keep their homes adequately heated. Both the increasing income share of housing costs and the inability to keep homes warm indicate that housing affordability is very much a stress factor for general wellbeing.

The energy price crisis in the wake of Russia's full-scale invasion of Ukraine brought prices and costs even more into focus. According to the EU Building Stock Observatory, in 2022, the residential sector was responsible for 27 % of final energy consumption, with only 13 % attributed to the services sector. Residential final energy consumption in 2022 was 64 % for heating, 15 % for domestic hot water, 1 % for space cooling, 14 % for lighting and electrical appliances, and 6 % for cooking. The direct and indirect share of the residential

sector's GHG emissions in total energy-related emissions was 22 % while the service sector represents another 13 %.

Addressing these challenges requires new and innovative approaches not only for the existing built stock but also for new buildings and infrastructure. Innovation will be needed for enhancing the longevity, adaptability and sustainability of buildings, but also their social relevance, for example ensuring urban spaces remain vibrant and resilient.

This Explainer discusses how the current building stock could be transformed from a net CO_2 emitter to a net CO_2 sink – without compromising on either resilience or affordability. It starts with the current EU regulatory framework and proposes two pathways. One focuses on building materials and extends to the design of single buildings and then to *groups* of buildings. The second examines mounting affordability pressures and emphasises the importance of user costs.

A QUICK RECAP OF THE EU CLIMATE, ENERGY, AND INDUSTRIAL POLICY FRAMEWORK

The existing EU regulatory framework is already mostly in place to address the new triple policy objectives of climate, affordability and resilience. The question remains how this transformation can be started and advanced.

The initial answer is that the EU climate policy framework, with its focus on reducing GHG emissions, energy efficiency, promoting renewable energy and construction materials, would be a good entry point.

The EU framework's principal elements, reviewed in a previous CEPS In-Depth Analyses, can be broken down into i) emissions policies, i.e. the ETS, CBAM and ETS 2, ii) energy policies promoting energy efficiency and renewable energy, and iii) policies directed towards buildings and construction, such as the EPBD and the EU's product policy (in the form of the revised Construction and Product Regulation (CPR) and Eco-design for Sustainable Product Regulation). These would be possibly supported by the Green Claims Directive, the Corporate Sustainability Reporting Directive and the Corporate Sustainability Due Diligence Directive of the EU Taxonomy Regulation.

According to the previously mentioned CEPS In-Depth Analysis, the main EU levers for reducing life-cycle carbon emissions are:

- By 2027, all EU countries will develop a roadmap for introducing limit values for the life-cycle carbon emissions of all new buildings from 2030.
- Better valuing of the existing building stock.

- If new buildings are unavoidable, rules and regulations that increase their lifespan and flexibility to accommodate changing needs.
- Rules and regulations, for example on circularity, that promote demand for construction materials, products and processes with a low life-cycle carbon impact, including reuse and recycling.

Reducing life-cycle carbon emissions also addresses energy consumption – at least indirectly. This is positive as energy – if it's of the fossil variety – is a reasonable proxy for GHG emissions. Reduced energy consumption, be it fossil or non-fossil, should also improve affordability. Supply chain resilience can be encouraged by focusing on lead markets to drive low-carbon investments and, if combined with European content requirements, it can potentially safeguard strategic EU value chains.

The EPBD's recast is the most relevant as it aims to reduce energy consumption and transform both the existing and future building stock into decarbonised – and ultimately zero-emission – buildings by 2050. National plans setting out energy and emissions performance targets are crucial for implementing the EPBD.

Several other EU regulations play a key role in supporting the EPBD's objectives. For example, the Energy Efficiency Directive (EED) sets binding efficiency targets and public sector renovation duties. The Renewable Energy Directive (RED III) provides renewable energy and incentives for local energy systems, or so-called energy communities. It places particular emphasis on renewable heating, cooling and district energy systems, a key driver for decarbonising buildings.

Carbon pricing under the new EU Emissions Trading System for Buildings and Road Transport (ETS2), due to start in 2028, disincentives the use of fossil fuels in buildings and provides for funding through the accompanying Social Climate Fund (SCF) to help households and SMEs absorb its costs, to support building renovations, and to deploy clean heating solutions.

STRUCTURAL CHANGES FOR FUTURE-PROOF BUILDINGS

Making buildings future-proof requires changes both for the existing building stock and new buildings. On the one hand, there should be a progressive focus on building materials and a more comprehensive approach from designing individual buildings up to groups of buildings. On the other hand, there's a need to gradually increase the level of ambition in line with newly available technologies. Figure 1 highlights a small number of examples.

Figure 1: The evolution of scope and ambition in the transformation of buildings

System Scope	Ambition: average	Ambition: advanced	Ambition: targeted
Materials	substitution with low emission materials	reuse and recycling of building materials	carbon capture and storage in cement
Single Buildings	high thermal standards and efficient energy use	building designs with high material productivity	thermal building components
Ensembles of Buildings	coupling buildings via localised energy systems	digital control of these energy systems	linking buildings through mixed use and zoning

Source: Authors' own elaboration.

A decisive step is reducing emissions from materials. This could begin with substituting emission-intensive materials like conventional cement with bio-based materials or low-carbon cement. A more ambitious approach would be to reduce the amount of materials used, by increasing their productivity in building design (e.g. less material-intensive concrete structures) and utilising recycled building materials. An even more ambitious approach would be capturing CO_2 from cement production and transforming it via pyrolysis into a solid material that can be added to concrete.

There's also considerable potential for single buildings, notably several options for improving their design. These include high building standards and low-emission heating and cooling systems. However, integrating thermal building components (TBC) into static structures, such as floors and walls would be even more ambitious. And finally, the highest level of ambition would be to make buildings an active element in energy systems by adding renewable energy-generating components (e.g. integrated solar panels) and utilising the building's structure for thermal storage.

For *groups* of buildings, a starting point would be coupling buildings via localised energy systems that include joint control for the optimised use of electricity, gas, heating and cooling. The next step would be implementing geothermal energy and a low-temperature heating and cooling grid.

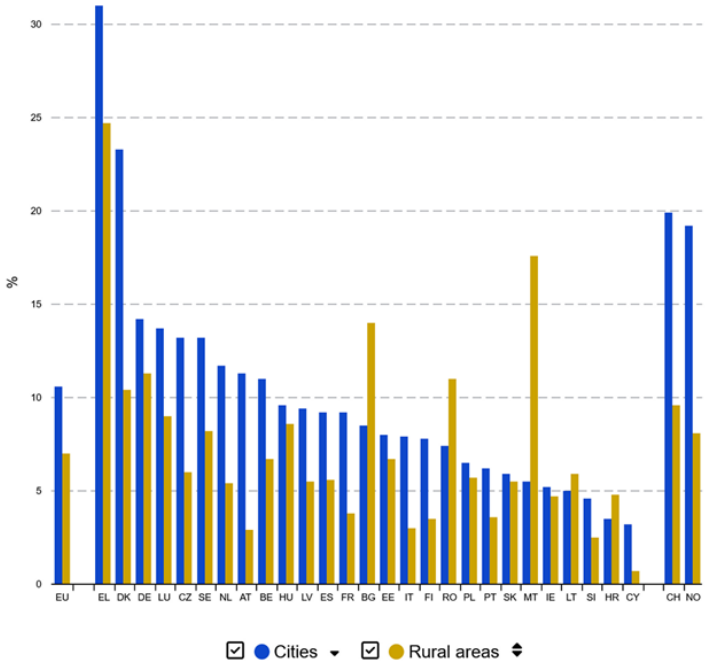
Even more ambitious concepts include grouping buildings as part of a larger neighbourhood, where each building (whether housing, workplaces, schools, leisure facilities etc.) is connected through careful zoning, thus reducing overall mobility needs.

HOUSING AFFORDABILITY

According to the 2024 OECD *How's Life?* report, housing costs are a burden for low-income households. Two indicators from Eurostat also illustrate this. The housing cost overburden rate highlights the share of the population living in a household where total

housing costs are more than 40 % of disposable income. In the EU in 2023, 11 % of the population in cities lived in such a household, while the corresponding rate for rural areas was 7 %.

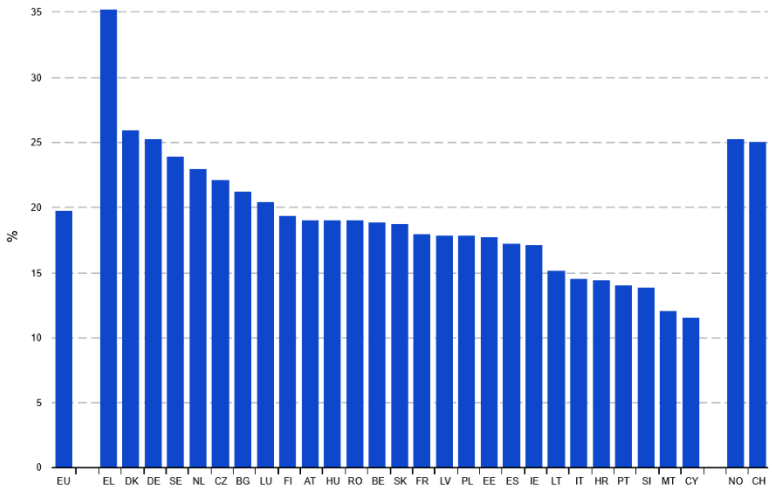
Figure 2: Housing cost overburden rate in cities and rural areas, 2023 (in %)



Source: Eurostat.

Another indicator is the share of housing costs in total disposable income. In 2023, EU households spent just under 20 % of their disposable income on housing.

Figure 3: Housing costs in disposable income – Total, 2023(in %)



Source: Eurostat.

Buildings are characterised by their high investment costs (including land costs) and the length of their service life, with the relevant cost indicator being the user costs, namely the annual cost of ownership or use, which is a sum of annual capital costs and annual operating and maintenance costs.

In principle, capital costs could be reduced through more productive construction technologies (e.g. time and material saving processes), lower interest rates and longer asset lives (i.e. lower depreciation rates). Operating costs – especially energy – could be lowered by higher efficiency, such as better thermal performance and smarter control systems, while maintenance costs reflect the building's durability and the longevity of its individual components.

What makes user costs effective is a value chain that focuses on specific services provided by buildings. These include thermal services, such as keeping rooms at a desired temperature, and mechanical services, like a building's static structure and any installed machinery. These cater to many functions, like living spaces for different age groups, through to education, business and leisure activities.

AFFORDABLE HOUSING HAS LONG BEEN THE MAIN OBJECTIVE OF SOCIAL HOUSING IN MANY EU MEMBER STATES. EXTENDING THIS TO FOCUS ON FIGHTING CLIMATE CHANGE REQUIRES A NEW AND BROADER UNDERSTANDING OF SOCIAL HOUSING POLICY.

Affordable housing has long been the main objective of social housing in many EU Member States. Extending this to focus on fighting climate change requires a new and broader understanding of social housing policy. As climate change worsens, other aspects should be considered, such as taking measures to reduce residents' climate vulnerability.

Due to buildings' longevity, investment and operating phases should be considered together. An integrated perspective that already considers the building stock's energy efficiency would translate directly into lower energy demand. Thus, it's possible to achieve synergies between providing affordable housing and avoiding energy poverty.

Building regulations, building codes and funding guidelines establish the technical and quality requirements for buildings (in terms of energy efficiency, thermal quality, greening and shading, adaptation to climate change, etc.) and are mostly defined at the national or sub-national level.

Legal requirements could lead to higher costs for low-income households. Some measures may be needed to mitigate this, for example more stringent renting regulations. Housing subsidies for residential construction can be leveraged for affordable housing but also to influence buildings' climate impact. This would apply to completely new buildings and for renovating existing ones.

Housing subsidies, however, must be carefully designed with affordability in mind. Taking Austria as an example, recent analyses show that housing subsidies are not well targeted as they tend to drive land consumption and soil sealing.

Learning from lighthouse projects

Structural changes can already be seen in some innovative lighthouse projects. They demonstrate the need for broad approaches – yet their success will be judged on their affordability and how well they scale up.

NEST at EMPA, Switzerland

NEST is Switzerland's flagship platform for accelerating the real-world adoption of sustainable building, as well as energy and water technologies. Units are installed through plug-and-play for limited periods, with notable examples including digitally fabricated (DFAB) housing exhibits, digitally fabricated construction methods brought to full-scale, UMAR (Urban Mining & Recycling) and demonstrations for disassembly and material reuse, exploring CO_2-reduced/negative materials.

Vinnova, Sweden

Vinnova is Sweden's innovation agency, which paves the way for innovation by providing sustainable solutions and strengthening Swedish competitiveness. Their flagship programmes are Smart Built Environment, Sweden's strategic innovation programme for digitalised, resource-efficient construction and property management, and Viable Cities, a mission-driven programme working towards climate-neutral cities by 2030.

Building project Käthe-Dorsch-Gasse, Vienna

This is Vienna's flagship social housing project that runs heating and cooling entirely on renewables in a 300-home social housing complex. This is done through a hybrid geo-solar system, featuring 64 boreholes 150 metres deep, unglazed solar absorbers, asphalt collectors, thermally activated slabs (TABS) for heating/cooling, wastewater heat recovery for domestic hot water, and a PV system with an onsite battery.

Smart Quart Bedburg-Kaster, North-Rhine Westphalia, Germany

The Bedburg-Kaster building project is a new, resource-conserving residential neighbourhood in the Kaster district of Bedburg. On a tract of land measuring 60 000 square metres, new housing is being developed in a small-town layout. A low-temperature district heating and cooling network supplies the project's 110 buildings. Heat and power come from local wind, on-site PV and wastewater heat recovery, all fully supported by battery storage.

POLICY IMPLICATIONS

The competencies and responsibilities for stimulating innovative designs for the built stock and the supply of affordable housing are split between the EU, national and sub-national levels. Despite this, there are several identifiable policy implications at EU level.

- **Fostering building designs with high standards**

  The already existing knowledge and innovative building practices need to be given much more attention. The EU could provide guidance and support by creating guidelines on building codes or, more generally, best-practices networks. Such networks could also be developed by the Member States, industry, thinktanks and housing experts. This could become an important catalyst for innovation.

- **Lead markets for innovative materials**

  The EU could foster a supportive environment for upscaling value chains for innovative buildings. The revamped EPBD now provides predictability for stimulating future demand for low-carbon building materials and energy. The Construction Product Regulation can be combined with the new strategy stemming from the Industrial Accelerator Act, and public procurement processes could be reviewed to provide the tools for incentivising EU products and production. Any cost increases could be offset by buildings having a much longer lifespan.

- **Performance-based support for social housing**

  Local, regional or national governments could set standards in social housing. It would be the responsibility of national policymakers to bring forward ambitious standards for materials, operational performance and longevity. This will likely require national networks to bring together expertise from innovative approaches, the construction industry, technical and academic experts, civil society and policymakers. National practices could then also inform other EU Member States.

- **Targeted zoning regulations**

  At the national and regional levels, a key policy area will be reviewing spatial planning. Efficient innovative zoning regulations are a precondition for fostering urban building developments.

Conclusions

Housing has become a politically salient issue in the EU. Policymakers struggle to reconcile housing sustainability and affordability while guaranteeing safety and security needs linked to climate change and resilient supply chains. Moreover, the EU's construction industry is finding it increasingly difficult to build.

Many individuals find it equally challenging to find affordable housing. Tilting the balance towards affordability may be an appropriate short-term solution, as the challenges of mitigating climate change through sustainable production and consumption won't resolve themselves, thus leaving many vulnerable people to increasingly intense climate change events.

To find this seemingly elusive balance, this Explainer proposes three avenues where the EU could help address the four policy implications above.

First, a more complete focus on the full life-cycle emissions will reveal the benefits – and profitability – of innovative solutions. These may initially have higher costs or a higher carbon footprint, but in the long run, once adopted by the market, these shortcomings will even out.

Second, there needs to be a full value chain perspective, from primary construction materials to the use (or re-use) of various materials, all of which could highlight the benefits of circularity and longevity for reducing costs, the environmental footprint and resilience. Finally, where buildings are physically located should be evaluated in terms of energy and mobility needs and any associated costs.

Third, being able to use buildings for longer requires flexible solutions, like adapting and repurposing the building stock to changing demand dynamics.

The current EU regulatory framework is a good start for incorporating these three perspectives and the four associated policy pathways. By and large, EU Member States should properly implement policies and act sooner rather than later to provide the highest quality buildings at the most reasonable costs.

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