

A climate-neutral building stock

Mineral wool's important contribution to bringing EU greenhouse gas emissions to net-zero by 2050

Our sector at a glance

Eurima is the European Insulation Manufacturers Association and represents the interests of all major mineral wool producers throughout Europe. We believe in creating a better place for EU citizens through affordable, sustainable, safe and comfortable buildings. We are an energy-intensive industry with 66 plants in 21 European countries, providing around 20,000 direct jobs. Every year we produce 3.6 million tonnes of products with a value of around €3.5 billion, representing more than half of the total EU thermal insulation market. Mineral wool insulation, with its excellent thermal properties, is indispensable in the climate transformation. Mineral wool makes it possible to reduce the energy used for heating and cooling buildings, while creating a comfortable and healthy environment for building occupants.

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European Insulation Manufacturers Association

Executive summary

Europe must reach net-zero greenhouse gas emissions by 2050 in response to the climate emergency. The built environment is a vital part of the transition to climate-neutrality, since buildings use more energy and emit more CO₂ than any other single sector of the EU economy. Achieving a highly energy-efficient and decarbonised building stock by 2050 is possible, but action is urgently needed.

As European mineral wool producers, we are committed to a climate-neutral building stock by 2050. This policy briefing sets out our current thinking on how the climate impact of buildings can be addressed. It will be followed by a more detailed roadmap on how to realise climate-neutrality in our sector in the course of 2020.

¹ As an EU average, depending on the building type, embodied carbon is typically 30-45% of the total carbon footprint across a 50 years' lifecycle of a new building (own calculation, available upon request), taking into account that new buildings need to be nearly-zero energy.

² To reach 2050 climate neutrality, the renovation rate should increase to 3% per year combined with an average energy efficiency improvement of 75% according to Climate (2018), The key role of energy renovation in the net-zero GHG emission challenge (see here)

³ Our products' footprint compares very well with most of the other insulation materials, based on cradle-to-grave LCA results according to EN15804.

Buildings have a climate impact through their 'operational' and 'embodied' emissions. 'Operational' emissions include emissions generated from (water and space) heating, cooling and lighting a building. 'Embodied' emissions include emissions generated from manufacturing materials, building construction, and the end-of-life disposal. For the existing building stock, operational emissions account for the clear majority (around 85%) of the total lifecycle greenhouse gas emissions. New buildings need to be nearly-zero in operational energy and therefore have a higher share of embodied emissions (typically 30-45% of the total lifecycle emissions)¹.

Buildings will need to be net-zero in terms of both operational and embodied emissions by 2050, if we are to achieve a climate-neutral Europe. Since most of the buildings that we will occupy in 2050 have already been built, the main challenge is to renovate these existing buildings to make them more energy- and carbon-efficient². Without accelerating the renovation of the EU building stock, it will be impossible to achieve climate-neutrality. For new construction, embodied emissions represent a large, and growing, share of total lifecycle emissions. Because the majority of these emissions are emitted at the start of a building's life, it is important to focus on their reduction already in the design phase.

Our role in the transition to climate-neutral EU building stock by 2050 is therefore twofold. Firstly, as the most widely used building insulation material in the EU, mineral wool makes houses more energy-efficient, reducing operational carbon emissions and having a direct positive impact on climate change. Secondly, as an energy-intensive industry, our products have a carbon footprint that should be lowered³, which is why we invest in innovation and in measures to reduce our production emissions.

To realise a climate-neutral building stock, supportive policies should be put in place that:

- Make the deep renovation of buildings a flagship initiative of the EU Green Deal.
- Set criteria for both operational and embodied emissions in the transition to net-zero carbon buildings.
- Ensure that the carbon price is sufficiently high to incentivize industry decarbonisation, while avoiding carbon leakage.
- Put energy efficiency first and make energy efficiency mandatory for industry.
- Ensure access to secure, affordable decarbonised energy.
- Establish a circular economy action plan for the construction sector.
- Make innovation funding available.

Our vision for the 2050 built environment: climate-neutral, circular, sustainable

By 2050, we believe that the European built environment must be climate-neutral, circular (maintaining the value of products and materials as long as possible) and sustainable. We also believe that Europe is currently not on track to make that vision a reality.

At the moment, buildings account for 40 percent of the EU's energy consumption and about 36 percent of European carbon-dioxide emissions. Around half of all extracted materials are used in the building and construction sector.

⁴ Arcadis (2019), *The future of the European built environment* (see here)

We see five trends shaping the European built environment in the coming years⁴:

1. **The climate crisis** – one of the key drivers for future spatial planning, climate-neutral buildings and the acceleration of renovations.
2. **Resource scarcity** – making “circularity” the starting point for buildings, from design to deconstruction.
3. **Population change** – necessitating the adaption of European buildings to an ageing population.
4. **Urbanisation** – leading to bigger cities surrounded by ‘rurban’ (rural/urban) areas.
5. **Focus on health and wellbeing** – resulting in healthier, safer and more comfortable dwellings, with nearby green areas.

The rapid acceleration of innovation (including through digitalisation), a more sustainable financial sector and an enabling policy framework will positively influence the speed at which the European built environment evolves towards a climate-neutral, circular and sustainable future.

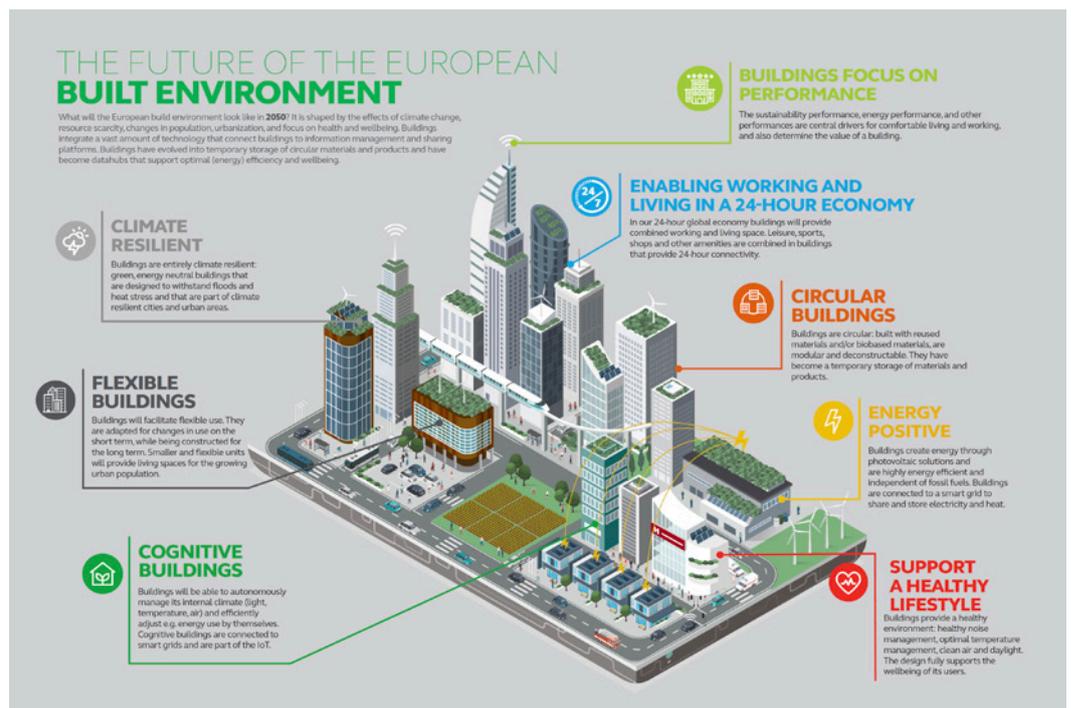


Figure 1: Source: Arcadis (2019), *The future of the European built environment*

The climate challenge for buildings

Buildings in Europe and around the world are key to meeting the net-zero carbon emissions target and limiting a dangerous - and already difficult to avoid - escalation in global temperatures. This applies to emissions associated with the heating, cooling and use of buildings, as well as to greenhouse gases emitted during construction and the manufacturing of building materials.

Buildings are the EU's single largest energy user, and their heating, cooling and use is responsible for over a third of the EU's total CO₂ emissions. Decreasing and decarbonising the energy consumption of buildings is crucial for a climate-neutral built environment, as the majority of the carbon emissions are generated at the operational stage: the heating, cooling and use of buildings. Buildings' operational emissions can be reduced to nearly zero, mostly by using solutions that are already commercially available, such as insulation.

⁵Material Economics (2018), *The Circular Economy: A powerful force for climate mitigation* ([see here](#))

But the total climate impact of the building stock is larger than these operational carbon emissions. Emissions are also released during the manufacturing, construction and end-of-life of buildings and building materials. These so-called 'embodied' emissions represent around 15% of the total carbon footprint of the existing EU building stock⁵. This share will increase significantly when the energy performance of the building stock is improved, showing that we cannot ignore the need to decarbonise construction materials.

⁶The choice between deep renovation and demolition needs to be assessed prior to making a decision, because in certain cases renovation might lead to increased GHG reductions, even if in most cases carbon can be saved by avoiding demolition (Wiedenhofer, Steinberger, Eisenmenger & Haas (2015), *Maintenance and Expansion: Modeling Material Stocks and Flows for Residential Buildings and Transportation Networks in the EU25* ([see here](#))).

Buildings will need to be net-zero in both operational and embodied carbon emissions by 2050 to achieve a climate-neutral Europe. Reducing embodied carbon has to start with the proper design of new buildings, favouring deep renovation of existing buildings to demolition⁶, as well as decarbonising the building materials themselves.

Addressing the CO₂ emissions of the whole lifecycle of a building requires policies and instruments that take account of both operational and embodied carbon. Wider sustainability criteria (such as acoustics, comfort, indoor air quality) must also be developed alongside climate policies, to support transformative action.

The European Commission already offers a tool that can support this transformation. Known as Level(s), this system offers a transparent and harmonised reporting framework to measure and account for the sustainability of buildings across their whole lifecycle, including climate performance. Integrating this "life cycle" carbon thinking into the regulatory framework would allow the building sector to play its optimal role in addressing the climate crisis.

Accelerating renovation on the road to 2050

⁷ Close to 95% of the total, see European Commission (2016), Staff Working Document for the Energy Performance of Buildings Directive

⁸ European Parliament Policy Department A (2016), Boosting Building Renovation: What Potential and Value for Europe? (see here)

⁹ Climate (2018), The key role of energy renovation in the net-zero GHG emission challenge (see here)

¹⁰ European Commission (2019), National Energy and Climate Plans – Bringing Principles to Action (see here)

Significant cost-effective energy savings remain in all Member States and the largest potential can be found in existing buildings⁷. Accelerating renovation to tap into the potential of buildings that are already standing around the EU is a must, if we are to achieve a climate-neutral Europe. This requires a significant increase in the deep renovation rates, as well as improvements to the quality of renovation.

Buildings are assets with a long life expectancy, much longer than appliances or cars. This means that buildings are replaced and refurbished at a very slow rate. Most of the European buildings that people will occupy in 2050 have already been built. Renovating these 210 million buildings is a huge challenge⁸.

At the moment, around $\pm 1\%$ of existing buildings are renovated each year, often not at a future-proof level. At this rate, it would take another century to achieve a decarbonised building stock, instead of the 30 years available ahead of the 2050 deadline. Further inaction means the EU risks missing its climate objectives by up to 400 million tonnes of CO₂⁹.

EU policymakers have agreed that the entire European building stock needs to be highly energy-efficient and decarbonised by 2050. The Energy Performance of Buildings Directive (EPBD) stipulates a European-wide ambition for all new buildings to be nearly zero-energy by 2020. This sets a future-proof vision for the sector and mobilises stakeholders. But a similar market signal is still needed for the renovation of existing buildings.

The renovation of the EU's building stock is hugely important for a climate-neutral Europe. Renovations can also ensure that buildings are comfortable, healthy and affordable places for all Europeans.

Buildings are more than energy consumers and carbon emitters. They are places where we live, sleep and work and spend up to 80% of our time. Buildings are part of the social fabric of our societies, and, if ignored, can worsen inequality. The poorest households in some EU countries today still spend up to a quarter of their total income on energy. Deep renovation of buildings can benefit the 50 million people in Europe who still live in energy poverty.

Important steps must be taken over the coming years to deliver affordable, high-quality and energy-efficient housing. Europe needs a plan to ensure that the worst energy performing buildings are phased-out over time, to guarantee quality homes for all and to set out a pathway to climate-neutrality. Investments for renovation need to increase by around 130 billion euro per year¹⁰ and be steered towards deep renovation to avoid a high-carbon lock-in.

Mineral wool's essential role in a climate-neutral building stock

As producers of mineral wool insulation, our industry is a vital part of delivering a climate-neutral EU building stock by 2050. Mineral wool is the most widely used building insulation in the EU. It has a positive impact on climate change and on people's wellbeing, making buildings more energy-efficient, comfortable, healthy and affordable places to live and work.

¹¹ Eurima (2013), Mineral Wool – Putting Natural Resources to Work for the Benefit of our Planet (see here)

Over the average 50-year lifetime of a home, a typical mineral wool insulation product can save 200 times more greenhouse gas emissions than are produced during its manufacture, transportation and installation. In fact, after just 3 months, the emission savings of a building insulated with mineral wool outweigh the emissions generated during the production of mineral wool¹¹.

¹² European Parliament Policy Department A (2016), Boosting Building Renovation: What Potential and Value for Europe? (see here)

Eurima members produce mineral wool close to end-markets, thereby reducing transport distances. Mineral wool production is an important source of local employment in the 21 European countries where we have manufacturing plants. Investments in renovation can create around 1 million additional jobs along our value chains over the next decade¹².

¹³ Figure derived from Navigant (2018) indicative benchmark analysis (in tCO₂ per t product).

We invest in further improving our products, creating new circular solutions and reducing our own carbon footprint. The mineral wool sector has already made significant improvements in carbon efficiency, with the emissions intensity of our production processes decreasing by around 12% over the last decade¹³. We also have a long history of providing environmental product declarations (EPDs) that allow us to monitor and reduce the lifecycle environmental impact of our products.

Mineral wool is recyclable, and contains a significant amount of recycled material. This makes us less dependent on virgin raw materials. We have ambitious goals to drastically reduce the amount of production waste sent to landfill and have put in place programmes to recover construction and demolition waste.

We are committed to continue significantly lowering our own carbon footprint in full support of the EU's objective of climate-neutrality by 2050. This includes supporting the following objectives:

1. Efficiency: Making our processes even more energy efficient.
2. Sustainable energy: Switching from fossil fuels to decarbonised energy sources.
3. Circularity: Further strengthening our circular business models, for instance through increasing the share of recycled content in, and the overall recycling rates of, our products.

The mineral wool industry is in the process of developing a more detailed roadmap to realise climate neutrality in our sector, including looking at ways to reduce our own emissions in line with science.

Policy recommendations

To maximise our contribution to a climate-neutral building stock in Europe, we actively advocate an enabling policy framework. We know that we cannot realise our climate-neutral vision without supportive policies, access to finance, and a market pull for increased energy renovation of the existing building stock.

Make the deep renovation of buildings a flagship initiative of the EU Green Deal

By 2050, all EU citizens should have the right to high-quality, comfortable and energy-efficient homes. This means that the majority of existing buildings need to be renovated.

The announced European Green Deal should therefore establish a 'Better buildings for all' flagship initiative, mobilising action and finance for the deep renovation of houses and schools. Finance should be more effectively mobilised from private sources through the EU taxonomy, as well as from the European Investment Bank's new lending policy, the next EU budget and the recycling of carbon pricing revenues for deep building renovations.

Increasingly higher quality standards for public and rental buildings should be introduced, setting out timelines when the worst energy performing buildings need to be phased out. This can help establish a pathway to a highly energy-efficient and decarbonised building stock by 2050 and enable higher living standards.

Set criteria for both operational and embodied emissions in the transition to net-zero carbon buildings

The EPBD has set an objective to have a highly energy-efficient and decarbonised building stock by 2050. It also specifies that by 2021 all new buildings need to be nearly zero energy buildings, but so far does not set any specific requirements for the climate performance of new buildings. The next step should be to include indicators for operational and embodied carbon, alongside other sustainability criteria, in the legislative framework. This can ensure that lifecycle carbon emissions are considered in the design of new buildings, using the Level(s) assessment framework.

Ensure that the carbon price is sufficiently high to incentivize industry decarbonisation while avoiding carbon leakage

Investments in low-carbon technologies should be rewarded by putting an adequate price on greenhouse gas emissions¹⁴. For this to work, we need a well-functioning carbon market under the Emissions Trading System (EU ETS). A high carbon price should not encourage a shift in emissions to other jurisdictions with no, or lower, carbon prices. A carbon border adjustment mechanism can create a level playing field for low-carbon products.

¹⁴ According to the **High-Level Commission on Carbon Prices**, carbon prices of \$40-80/tCO₂ are needed by 2020 and \$50-100/tCO₂ by 2030 to achieve the Paris Agreement goals.

Make energy efficiency part of every policy decision

“Energy efficiency first” should be a central principle applied to policymaking, planning and investments. The potential value of investing in energy efficiency needs to be considered in all decisions, not only on the supply side, but also in decisions about our homes, offices and in industrial investment decisions. Applying this principle will help Europe create a more cost-effective, jobs-rich, climate-neutral economy.

Make energy efficiency mandatory for industry

Significant energy efficiency potential in industry can be unlocked through better insulation¹⁵. The Industrial Emissions Directive, which looks at air, land and water quality, also helps to reduce energy use. But the current Best Available Technology Reference (BREF) Document for energy efficiency needs to be strengthened. It should also be made compulsory for industry to use this BREF in order to tap into this energy efficiency potential.

¹⁵ Ecofys (2012), Climate protection with rapid payback: Energy and CO₂ savings potential of industrial insulation in EU27 (see here)

Ensure access to affordable decarbonised energy

Access to enough competitively priced and reliable decarbonised energy can support the decarbonisation of production processes that rely on high-temperature technologies. In particular, the future demand for electricity is expected to rise significantly because of higher levels of electrification in heating, transport and industry. This electricity will have to be produced without any carbon emissions, to remain in line with the climate-neutrality objective. A shift in policy is therefore needed, to lower the cost of decarbonised energy and increase the price of energy from fossil fuels.

Establish a circular economy action plan for the construction sector

Higher recycling rates and a greater use of recycled content can further help lower greenhouse gas emissions. There are still several barriers in the way of increasing “circularity” through reuse and recycling. For instance, landfilling construction waste is often cheaper than recycling it.

A new circular economy action plan for the construction sector can tackle these barriers by introducing a ban on landfilling recyclable materials, and by facilitating the use of building material passports. Disincentivising the demolition of buildings and requiring buildings to be dismantled and sorted into relevant product categories will help lower the use of virgin materials.

Make innovation funding available

More innovative technologies to lower industrial greenhouse gas emissions must be developed and supported. Mission-oriented Research & Development (R&D) programmes for low-carbon technologies in energy-intensive industries like mineral wool are a must. This means providing sufficient support for designing and building demonstration plants at scale, as well as for their roll-out across the market. The Innovation Fund under the EU ETS will need to support industrial low-CO₂ innovation to bridge the gap from pilot to demonstration scale. Green public procurement and contracts-for-difference can help ensure market uptake to bridge the gap from demonstration to commercialisation¹⁶.

¹⁶ Wyns et al. (2019), Industrial Transformation 2050 – Towards an Industrial Strategy for a Climate Neutral Europe (see here)