

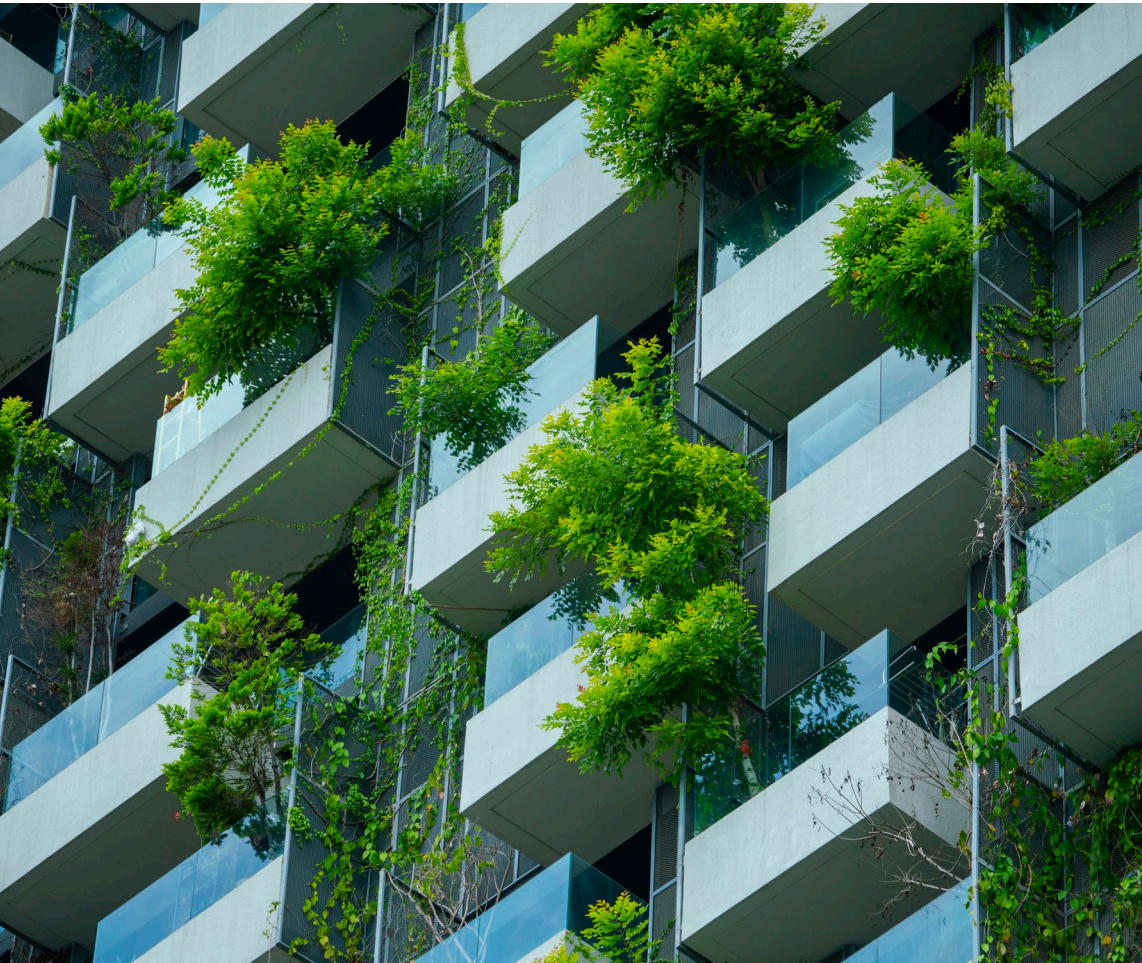
# Decarbonizing European Real Estate Won't Be Easy

Jan. 20, 2025

With 80% of the EU's residential properties built before 2000, real estate companies could face massive investments in their quest to cut emissions after 2030.

*This research report explores an evolving topic relating to sustainability. It reflects research conducted by and contributions from S&P Global Ratings' sustainability research and sustainable finance teams as well as our credit rating analysts (where listed).*

*This report does not constitute a rating action*



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Real estate accounts for more than one-third of the EU's greenhouse gas emissions (hereafter also emissions), according to the European Environment Agency. These emissions come mainly from fossil-fuel-powered heating and cooling of buildings. Eurostat figures show that buildings are responsible for about 40% of energy use in the EU, where regulations have been tightening with the aim of fully decarbonizing buildings by 2050. The revised Energy Performance of Buildings Directive, for instance, which took effect in May 2024, is expected to lead to a wave of renovations.

S&P Global Ratings has therefore explored potential associated risks for rated for-profit real estate companies with residential property based in Europe. Our data and analysis are responses to a survey sent to 20 rated European residential real estate companies (with gross residential assets valued at an average of above €4 billion), data from the EU Building Stock Observatory (EUBSO), companies' disclosures, and other information sources. We also analyze solutions currently available in the market to reduce emissions and the main challenges to implement them.

We focus on existing residential buildings, since we expect decarbonization efforts will center on those. We understand that many of the same risks may also apply to social housing companies and issuers of residential mortgage-backed securities, which are not covered in this report.

## Key Findings

- **Rated real estate companies in Europe are targeting a 40%-50% reduction of emissions by 2030.** This represents a 15%-20% energy efficiency improvement, which is in line with updated regulatory requirements. Decarbonization solutions are already generally available, but companies will need to continue to renovate their portfolios to meet regulations and their own goals.
- **Renovations to meet the regulatory efficiency requirements could cost rated companies €10,000 to €30,000 per residential unit** for the lowest-performing properties and based on an apartment size of 80 to 100 square meters (sqm). The amount depends on the property's condition and location; renovation is cited as a cheaper and quicker solution overall than new construction.
- **Companies with portfolios of old fossil-fuel-heated buildings face the biggest challenges** due to poorer insulation and high use of fossil fuel energy to heat buildings, implying higher investment needs. Overall credit impacts have so far been limited. This is because, in each European market, we believe the residential real estate companies we rate have: the financial capacity to invest in retrofitting; a strategy to address the least energy-efficient buildings; and the potential to pass on some of the resulting costs to the tenants.

## Decarbonizing European residential real estate - by the numbers

### High emissions

Buildings are responsible for **40%** of energy use in the EU, and almost two thirds of residential building energy use relates to heating and cooling, with a heavy fossil fuel dependence



### EU regulations

The EU is targeting a **22%** energy reduction in buildings by 2035, and could introduce new carbon taxes



### Decarbonization potential

Most of the solutions needed exist. We understand that it could cost **€10,000-€30,000** per residential unit to bring the worst performing apartments in line with regulations



### Short-term targets

Rated residential real estate companies are targeting **40%-50%** greenhouse gas reduction by 2030



Source: S&P Global Ratings.

## Real Estate Is A Major Contributor To Global Emissions

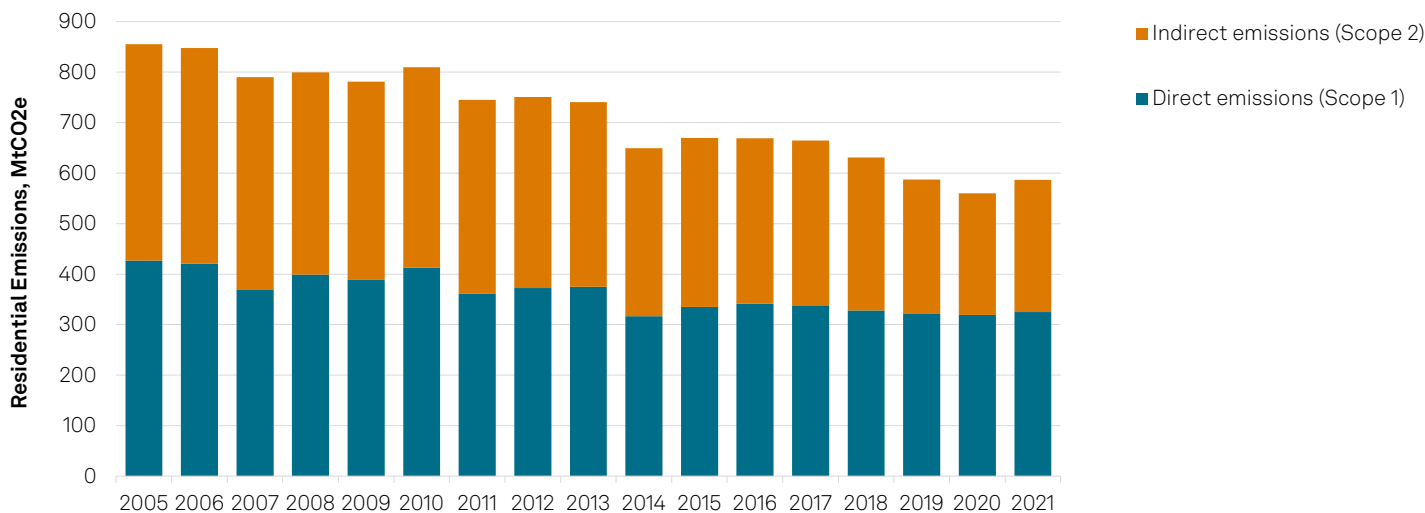
Energy use in buildings accounts for about 26% of global greenhouse gas emissions annually, according to the United National Environment Programme. In addition, construction and renovations, which require materials such as steel and cement, are responsible for a further 10% of emissions.

**The real estate sector is also inextricably linked to society and, as a key consumer of energy, water, and construction products, to other parts of the economy.** As a result, it can influence the carbon trajectory of the energy and transport sectors, as well as key industries like steel, concrete, glass, and ceramics manufacturing. In turn, full decarbonization of the real estate sector also depends on the decarbonization of these other sectors.

**Companies that are residential landlords could play a key role in achieving the EU's decarbonization goals.** This is because about one-third of residential property in the EU (by floor space) is rented, according to the EUBSO. Total energy-related emissions from residential buildings in the EU have steadily decreased in recent years (see chart 1). But this is mainly linked to declining fossil-fuel-generated electricity and increasing renewable energy sources.

Chart 1

### EU27 residential buildings emissions trends



Sources: EU Building Stock Observatory, United Nations Environmental Programme, International Energy Agency, S&P Global Ratings.

## Emissions Regulation Brings Risks And Opportunities

The EU is tightening regulation on emissions in the real estate sector. The revised Energy Performance of Building Directive (EU/2024/1275; or EU Directive) took effect in May 2024. This shift implies that owners of residential and commercial property need to take significant action to comply with tougher energy efficiency requirements.

**The revised EU Directive has several aspects that aim to reduce emissions from residential buildings.** These include:

- A binding target to reduce energy consumption in residential buildings by 16% by 2030 and by up to 22% by 2035, compared to 2020. A longer-term target is to reduce energy intensity enough so that all buildings generate zero emissions;

- A requirement for EU member states to develop renovation strategies to improve building energy efficiency;
- Common criteria for energy performance certificates (EPC) and more-harmonized data collection. EPC classifications will be based on a scoring system that reflects buildings' relative energy efficiency ranking, rather than a specific kilowatt hours (kWh) per square meter (/m<sup>2</sup>) per year, and will be harmonized across the EU;
- The gradual phase-out fossil fuel-reliant boilers for heating and hot water, and the promotion of more energy efficient products such as heat pumps; and
- Further measures targeting the construction of new buildings, including requirements to be emissions free and address wider lifecycle emissions.

**The EU Directive implies that new rules and financial support will emerge.** The main target for reducing energy consumption in residential buildings is energy intensity, measured as kWh of primary energy per square meter. Under the Directive, member states will likely need to set performance thresholds that raise the average performance of the national building stock, in line with overall EU targets. Historically, some governments have supported landlords with subsidies on refurbishments that improve energy efficiency and upgrade heating systems, thus contributing to improving efficiency trends. But a significant uptick in renovation rates will likely need additional financial support to deliver increased benefits.

**However, each country may choose different approaches to achieve the Directive's energy reduction targets, including financial support.** EU member states must also ensure that at least 55% of the emissions reduction is attributed to 43% of the buildings with the lowest energy efficiency. This implies that new national policies will need to address properties that require deeper and typically more expensive renovations.

**EU members have until 2026 to transpose the Directive's requirements into national laws.**

Some countries have already implemented regulations requiring improvement in energy efficiency and reduction of emissions (see table 3). These all pre-date the 2024 EU Directive, however. The U.K., which is no longer subject to the EU Directive, has similar regulations in place that limit the ability of landlords to rent the least-efficient properties. Currently, this is at band E for England and Wales, though there have been proposals to tighten this further by 2030.

Table 1

## National building regulations in selected European countries

Country	Targets
France	In 2021, new regulations were introduced, which tightened the rules and regulations. The new regulations encourage the renovation of the lowest performing assets (EPC F and G) and, since September 2022, it was made mandatory to perform regulatory energy audits on such assets. Further, from January 2025, G-rated properties will not be allowed on the rental market, followed by F-rated properties from 2028 onwards.
Germany	The Gebäudeenergiegesetz (GEG, Building Energy Law) specifies the requirements for the issuance and use of energy performance certificates and mandates the use of renewable energies for heating and cooling in buildings. It was amended in 2023, where the permissible annual primary energy demand for new buildings was reduced from 75% to 55% of the reference building. It was further amended in 2024, to include the requirement that new heating systems must generate at least 65% of their heat from renewable energy sources.
Ireland	In Ireland, EPCs are called Building Energy Rating (BER) certificates. The government has not implemented any restrictions on the rental market with respect to BERs at this time.
Sweden	The Integrated Climate and Energy Policy, introduced in 2009, targets a 20% improvement in energy efficiency by 2020 and a 50% improvement by 2050. It sets specific energy threshold targets in kWh/m <sup>2</sup> for a whole building portfolio, as well as specific levels to be achieved for new and renovated buildings.
U.K.	Since April 2020, rented properties in England and Wales needed to have an EPC rating of E or above. The law is expected to be updated to set stricter requirements on existing houses. The new UK government has proposed a minimum rating of EPC 'C' by 2030 in England, although this will be subject to further consultation. In Scotland, a performance level of C is required for rented properties by 2028.

Source: National regulations, S&P Global Ratings.

### A proposed scheme to complement the EU Emissions Trading System (EU ETS) and carbon-related legislation could increase costs in residential buildings that rely on fossil fuels for heating and cooling.

To date, emissions from buildings have not been fully addressed by the existing EU ETS. That said, electricity used in buildings is indirectly covered by utilities' ETS obligations and therefore reflected in end users' energy bills. The EU has proposed a new emissions trading scheme (ETS2), which we understand will be similar but separate from the EU ETS. If implemented, ETS2 will cover emissions from the use of fossil fuels in buildings--potentially impacting landlords and tenants--as well as road transport, and could take effect as soon as 2027. The proposed ETS2 would apply directly to sellers of fuels, who would be required to purchase allowances in a similar way to existing EU ETS. We expect these costs to be passed through to utilities that supply gas and oil to customers, and ultimately those who pay heating bills, which could be the landlord or tenants directly. Some countries have already implemented such a tax. For example, Germany introduced its Fuel Emissions Trading Act in 2019, which imposes a tax of €45 per ton of carbon dioxide equivalent on fossil fuels used in buildings and transport.

## Why Decarbonizing EU Residential Properties Is Complex

Emissions from residential buildings vary across Europe, driven by the heating and cooling demands of each climatic region. Though overall emissions from buildings have decreased due to the decarbonization of electricity across Europe, trends in the use of energy have been relatively steady over the last decade, with space heating accounting for close to two-thirds of all energy use in residential buildings across the EU.

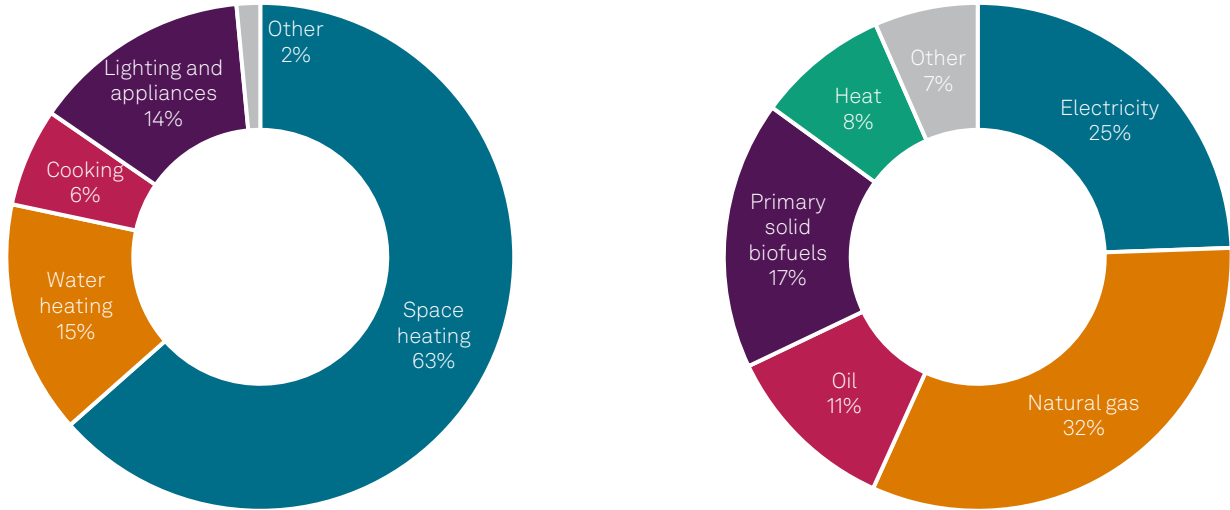
### Fossil fuels are still by far the main way in which residential buildings are heated (see chart 2).

On average, buildings in colder regions typically have higher energy demand. This doesn't always translate into higher emissions, especially where district or electricity-powered heating is prevalent (see chart 3). For example, in Sweden, emissions are relatively low thanks to the high

share of renewables in the country's electricity grid, even though energy use is relatively high. Conversely, Ireland's emissions are higher than most other countries due to much greater use of oil-fired heating, which is more emissions-intensive than other options.

Chart 2

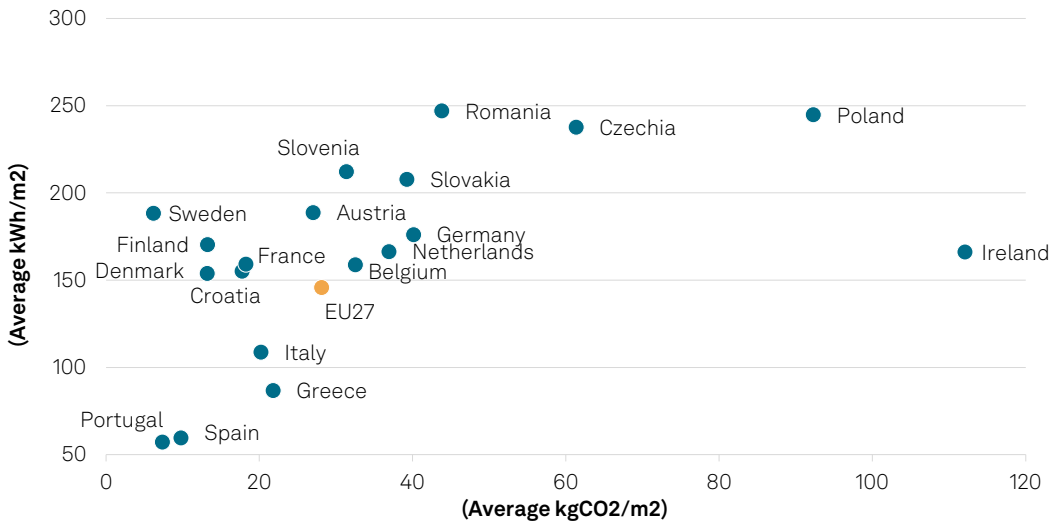
Residential building energy uses (left) and sources (right) 2022, EU27



Sources: EU Building Stock Observatory, S&P Global Ratings.

Chart 3

Energy and emissions performance for residential buildings per m2, 2021



Sources: EU Building Stock Observatory, S&P Global Ratings.

**Older buildings tend to be less efficient and represent a significant upgrade challenge.** Most buildings in the current stock will still exist in 2050, and therefore older buildings are a key source of exposure to tightening regulations, in our view. Europe has an estimated 125 million residential buildings, but only 20% of them have been built since 2000 (see chart 4). We see the age of the building stock as an important indicator of energy efficiency. This is because older buildings tend to have low thermal performance, reflecting a low ability to retain heat, unless they have

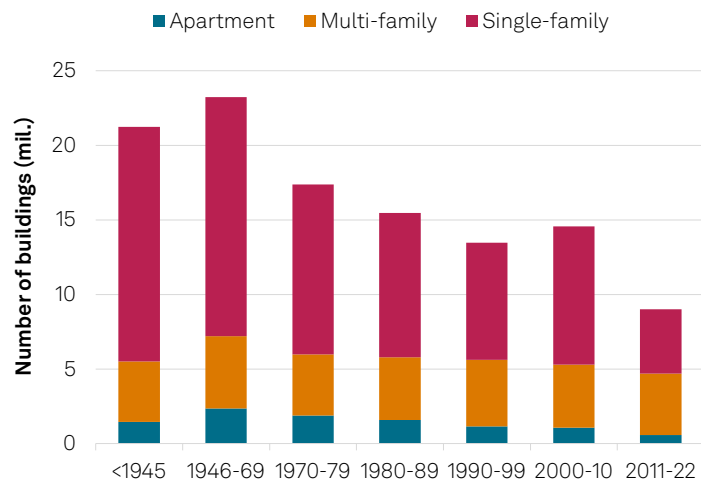
been retrofitted. Newer buildings tend to have improved insulation materials and installation methods, which make them better able to manage heating and cooling, ultimately resulting in lower energy demand.

**Most of the rated real estate companies cite administrative hurdles, availability of labor, and tenants' consent issues as the main obstacles to carrying out renovation work.** Owners have also stated that retrofitting is costly and often cannot be replicated from one building to another. The Building Performance Institute Europe reports that, across the EU, only 1% of buildings are renovated each year. At that rate, in our view, the EU could be unlikely to meet its decarbonization targets for buildings, even if emissions from the electricity supply continue to decrease.

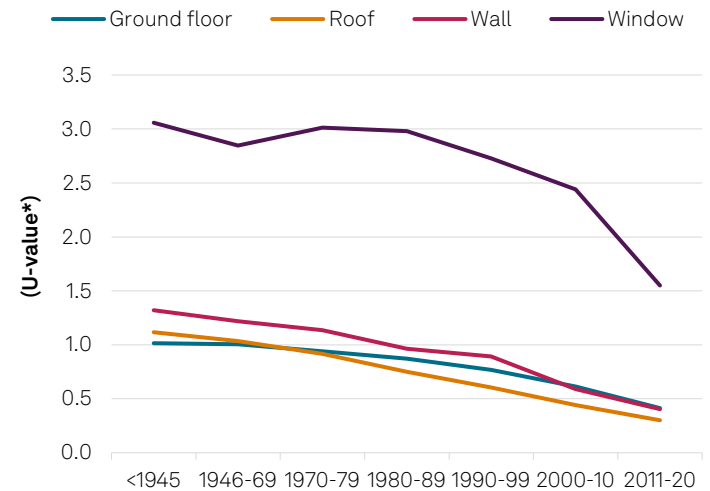
Chart 4

**Most EU residences are decades old, but thermal performance is higher in buildings constructed after 1999**

Building type by age in the EU27, 2020



Building elements in newer buildings have a much higher thermal performance, improving efficiency.



Data as of 2020. U-value is a measure of thermal transmittance – the rate at which heat passes through a material or structure. Lower values indicate lower transmittance and therefore better insulation and higher energy efficiency. Sources: EU Building Stock Observatory, S&P Global Ratings.

**New buildings can entail embodied emissions.** It is easier to comply with current environmental requirements with new construction than through renovations, since there is a greater ability to use an energy-efficient design. But construction works can still involve a substantial amount of embodied emissions, meaning those associated with the production of building materials, like cement and steel, along with fuel and transport from construction machinery and vehicles. These upfront emissions can represent 20%-60% of a building's total lifetime emissions impact, depending on factors such as the type of building, materials used, and emissions caused by energy used during its lifetime. The amount of embodied emissions associated with new builds is about three times that of renovations, according to research by Ramboll et al., while multi-family homes also involve lower embodied emissions than single-family homes, given their more efficient structures.

**Continued new construction to meet rising demand for housing means embodied emissions could become increasingly important for real estate companies.** This is especially true as

electricity continues to decarbonize. To date, the focus on embodied emissions has mainly been driven by voluntary standards. But an increasing number of EU countries are updating building regulations to account for construction impacts.

## **Transition Risks Relate Mainly To Regulation And Complexity**

The extent of rated real estate companies' decarbonization risks depends on the direction of policy, costs and funding, and tenants' sentiment. Based on the data and observations collected in this research, we believe the following factors could become increasingly relevant as transmission channels for European real estate companies' credit quality over the next five years:

- Compliance with regulations.
- Investment required to meet self-determined carbon targets.
- Implications of carbon taxes, such as EU ETS2, for the sector.

### **Regulatory compliance may have financial and other implications**

Companies that align with decarbonization goals early may face fewer regulatory penalties and associated costs once target deadlines are reached. The real estate companies we rate are generally the largest in their respective markets, and we consider them to have the financial capacity to invest in retrofitting and a strategy to meet regulatory requirements over the medium term. Companies whose portfolio contains a large share of buildings constructed in recent years also tend to have more compliant buildings.

That said, the situation is not homogeneous across Europe. As EU building regulation becomes stricter, companies with a large share of residential portfolios with low energy performance may face large capital expenditure (capex) to upgrade their assets. Buildings may require significant investments to enhance energy efficiency or transition to alternative heating systems.

### **A material increase in capital expenditure is likely**

Investments to meet regulatory objectives and company-defined decarbonization targets will most likely lead to higher capex. According to companies in our survey, the costs could average between €10,000 and €30,000 to bring the least energy-efficient properties up to compliance with regulations, based on a typical 80sqm to 100sqm apartment. The companies suggest the average capex will be €50,000 per property to achieve the highest energy performance, though these estimates vary by location and each property's current energy efficiency levels.

Many rated real estate companies have already mapped the first steps in their decarbonization path. However, in our view, further tightening of regulations or an increase in renovation costs would require larger capex and therefore likely weigh more heavily on credit ratios. Such a situation could be particularly relevant and material for companies with less-modern portfolios.



## Potential carbon tax may create risks for the housing market

Broad adoption of taxes, such as the EU ETS2 or similar domestic taxes, across Europe would most likely increase the costs of rated residential real estate companies. That said, its implementation may be limited, since a carbon tax could significantly increase operating costs for heating and electricity, which if billed to landlords and thus may lead to higher rents or utility costs, ultimately affecting their tenants. This would likely be felt more acutely in buildings with fossil-fuel-powered heating systems but also depend on local regulations.

All three represent risks for the credit quality of residential for-profit real estate companies, since they can lead to increased capex and operating costs, as well as potential changes in asset valuations due to non-compliance with more stringent emissions and energy efficiency standards.

### Physical climate risks could also become increasingly relevant

Although this research focuses only on transition risks, residential buildings are also inherently exposed to physical climate risks. The realization of such risks can have material impacts on all stakeholders.

Depending on buildings' locations, physical climate risks could include wildfires, floods, and storms, which are becoming more frequent and severe, as well as chronic risks such as long-term changes in temperature and precipitation patterns and sea-level rise. These risks could cause direct damage to properties, put tenants' health and safety at risk, and require investments to manage potential impacts, including the relocation of tenants.

## Rated Companies Have Ambitious Short-Term Goals

Most of the major residential-focused companies we rate have set targets to reduce greenhouse gas emissions by 2030, based on information in their public disclosures (see table 1). These include improving energy efficiency directly (on a kWh/m<sup>2</sup> basis) or indirectly (via EPCs or green certifications).

**Companies with emissions targets are aiming for a 40%-50% reduction, and those with energy-based targets are aiming for a 15%-20% improvement**, or to improve their worst-performing buildings. This puts them in line with the EU's goals by 2030. Some targets are specific to new construction, focusing on energy use levels or embodied emissions as part of scope 3 (indirect) emission-reduction targets.

**The variety of targets and measures makes it difficult to compare rated residential companies' decarbonization strategies.** Some companies have set absolute targets, which apply to total emissions regardless of their portfolio's size. Others have set intensity-based targets to reduce emissions per unit of floor space, meaning their total emissions could increase if portfolio growth outpaces per-unit emission cuts. Many companies have also adopted renewable energy targets. Nevertheless, despite some ambitions of decarbonizing completely by 2050, detailed plans do not extend to the longer term, indicating greater uncertainty after 2030.

Table 2

### Near-term carbon targets of selected rated real estate companies with residential portfolios across Europe

Company	Targets
Adler Group S.A.	50% reduction in emissions in its existing portfolio by 2030 (compared to 2020). New construction as well as refurbishments to promote energy-efficiency continue to be certified according to recognized standards such as DGNB/LEED®/BREEAM and should achieve at least the DGNB standards "Gold" or "Very Good".
Akelius Residential Property AB (publ)	42% reduction of carbon emissions scope 1 and 2 intensity by 2030 (compared to 2020) 15% reduction of energy intensity by 2030 (compared to 2020) All properties which are fully or partly owner-used office are certified by green building certification 20% of portfolio's floor area certified by LEED, BREEAM, WELL, BOMA, or other independent certification by 2030
Deutsche Wohnen SE	Reduction of CO2 intensity in Germany from current level of 33 to less than 25 kg CO2e/m2 of rental area by 2030
Fastighets AB Balder (publ)	50% reduction in its own operations (Scope 1 and Scope 2) by 2030 emissions (compared to 2022) 55% reduction in CO2/m2 in value chain (Scope 3) emissions by 2030 (compared to 2022)
Grainger plc	Net zero carbon for the operation of buildings (Scope 1 and 2) emissions by 2030. Improve 100% of properties to EPC 'C' by 2030.
Grand City Properties S.A.	40% reduction in CO2/m2 by 2030 (compared to 2019) 20% reduction in energy intensity (kWh/m2) by 2030 (compared to 2019)
Heimstaden Bostad AB (publ)	42% reduction target by 2030 (including Scope 1,2 and customer energy use) Reduce the amount of purchased energy by 2% per sqm per year by 2025 Require that suppliers covering 27% of spend should set science-based targets by 2027
in'li Société Anonyme	Reduce primary energy consumption to less than 95kWh/m2 and emissions to less than 15kgCO2/m2 by 2030
Samhällsbyggnadsbolaget i Norden AB (publ)	42% reduction target by 2030 (including scope 1 and scope 2) emissions (compared to 2022) Reduce the emissions of properties by 25 percent by 2025 and by 60 percent by 2030 (compared to 2020) 5% annual decrease in energy consumption in properties under property management 25% reduction in Scope 3 emissions by 2025 and 60% by 2030 (compared to 2020).
SATO Oyj	Reducing energy consumption by 17.5% by 2026 (compared to 2022) 80% of energy consumption renewable or carbon neutral, increasing local energy production by +300% by 2026 Carbon neutral in terms of in-use energy consumption by the end of 2030 Raise the two lowest energy classes (F and G) of homes to the next level by 2030.
SCI Lamartine	Reduce average energy consumption of the portfolio to 97 kWh/m2 by 2036 (compared to 103 kWh/m2 in 2020) Reduce emissions in portfolio to 15 kgCO2/m2 by 2030 (compared to 25 kgCO2/m2 in 2020)
TAG Immobilien AG	Reduce emissions in the German portfolio to about 28 kgCO2/m2 by 2025 and 22 kgCO2/m2 by 2030
Vesteda Residential Fund FGR	55% reduction in energy consumption by 2030 (compared to 1990) Green energy labels (A, B or C) for 99% of portfolio by 2024
Vonovia SE	Reduce emissions in portfolio to less than 25 kgCO2/m2 by 2030 Reduction in average primary energy consumption in completed new buildings to 27 kWh/m2 by 2025
Wilhem AB (publ)	Reduce Scope 1 and 2 emissions (including energy purchased for properties) by 50% by 2030 (compared to 2018) Measure and reduce other indirect emissions, including from construction, by 50% by 2030 (compared to 2018)

Sources: Based on publicly available company disclosures, S&P Global Ratings.

### Arrangements to handle households' energy use and sources of energy affect how residential real estate landlords report emissions. Such arrangements can involve:

- Landlords sourcing and paying for energy (electricity, heat, or both) on behalf of tenants and recovering the costs through the rent.
- Landlords sourcing and paying for energy in common areas only.
- Tenants sourcing and paying for energy themselves.

Another complication stems from significant differences in EPC classifications across Europe. Overall, this makes it harder to compare companies targeting energy efficiency improvements using this type of metric. But regardless of the arrangements, real estate companies are still making efforts in improving the efficiency of their properties and integrating lower-carbon heat

and power. Therefore, in our view, targets that address the actual performance of property portfolios--in either kWh/m2 (energy use) or carbon dioxide (CO2)/m2 (emissions)--will likely make a more material difference to the building sector's overall emissions than other metrics.

**Most of the solutions are already available, but meeting long-term goals implies a significant increase in renovations.** The European Commission estimates that existing buildings would need to be retrofitted at a rate of 2%-5% percent annually to meet the EU's short- and long-term decarbonization goals. An increase in the number of renovations implies significant investments in retrofits and the construction of "green" buildings. We anticipate that most existing buildings will need at least one type of intervention. But multiple interventions (often referred to as deep renovations) could be required to achieve substantively improved building performance --for example combining better insulation with heat pumps to reduce energy use and emissions. Deep renovations can be difficult to coordinate when properties are occupied, an issue cited by many companies we surveyed. Since each building tends to be different in age, structure, location, and accessibility, we see the ability to replicate renovations across portfolios as a key challenge facing real estate companies.

## Solutions Vary, As Do Their Impact

To deliver on their decarbonization goals, rated residential real estate companies we surveyed are using combinations of four main approaches (see table 2).

Table 3

### Key decarbonization solutions: our assessment of feasibility and impact

Likely implementation horizon

			Short term	Medium term	Long term	
Decarbonization solutions	Application	Scope	Development stage*	Disruption level	Estimated cost	Decarbonization impact and/or limitations
<b>Clean power and heat</b>	On site renewables and energy storage	In use – existing and new build	Adoption	Medium	Medium/High	Can avoid emissions associated with power use
	Heat pumps		Adoption	Medium/High	Medium/High	Heat pumps are typically more efficient than gas heating
	Other heat (geothermal/ district heating)		Adoption	High	High	Impact varies depending on the source of heat
<b>Energy efficiency</b>	Insulation	In use – existing and new build	Adoption	Medium	Medium	Up to 50% reduction in energy use if fully implemented
	Windows		Adoption	Medium	Medium	
	Lighting and appliances		Adoption	Low	Medium	
<b>Technology</b>	Smart building controls	In use – existing and new build	Demonstration	Medium	Medium	Can deliver marginal reductions in energy use (typically <10%)
<b>Low carbon construction</b>	Building design	Construction and renovation	Demonstration	Low	Medium	Renovation produces around 50-60% less emissions than new builds.
	Low-carbon materials		R&D to Adoption	Medium/High	High	Best performing materials can have >50% lower embodied carbon

\*Scale: R&D -> Demonstration -> Adoption. R&D--Research and development. Disruption level refers to whether the solutions will impact the normal operation of the assets—for example where solutions require substantive time to complete or require tenant to vacate properties, this would be more disruptive. CCUS--Carbon capture, use, and storage. Source: S&P Global Ratings.

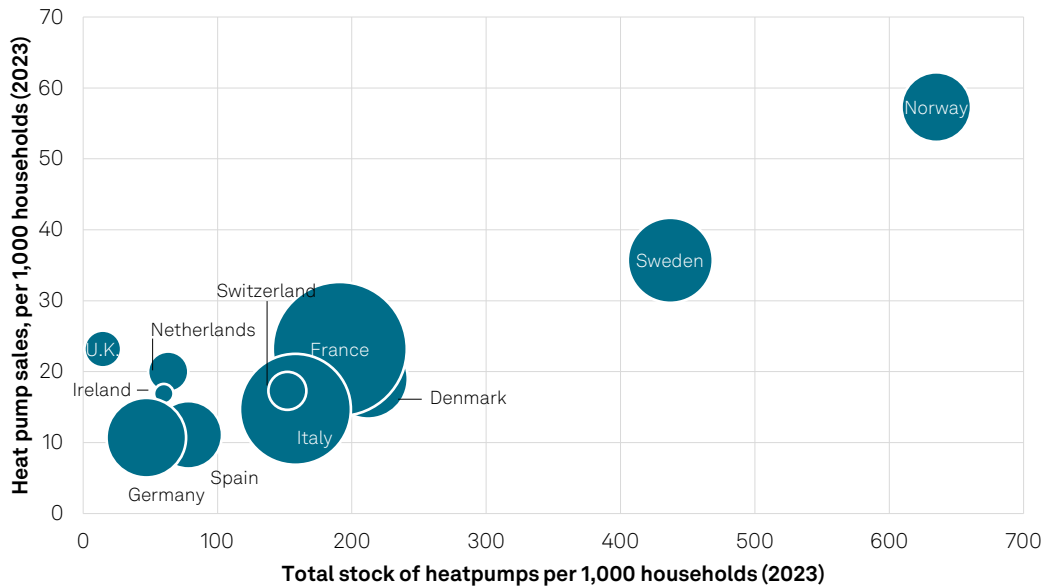
## There are common solutions for clean power and heat

Electrification of heat is a key solution, especially because it can take advantage of renewable energy in the long term. Heat pumps already provide heating and cooling to about 16% of Europe's residential and commercial buildings, according to the European Heat Pump Association (EHPA). They deliver three to five units of heat for every unit of energy input, making them more efficient overall than gas-fired boilers. The decarbonization benefits are amplified when heat pumps are powered by low-carbon electricity, which is expected to increase over the coming decades. Until then, the attractiveness of heat pumps remains sensitive to the relative cost of electricity compared to gas.

European heat pump sales rose 38.9% in 2022 compared to 2021, and were down only slightly in 2023, with more than 3 million units sold, according to the EHPA. Yet some countries with larger building stocks, notably Germany, France, and the U.K., have installed fewer heat pumps to date (see chart 5). This could be because of a lack of space, different requirements for radiators and other components, and the availability of skilled labor, as stated by companies in our survey and in external research.

Chart 5

### Nordic countries have the highest heat pumps sales rates, though France and Italy are the biggest European markets



Bubble size represents total number of heat pumps installed up to 2023. Sources: European Heat Pump Association, S&P Global Ratings.

District heating already provides 12% of space heating and hot water, with about one-third generated from clean sources, such as geothermal energy. Rated companies in the Nordics, in particular, already benefit from this. However, implementing this solution in other jurisdictions will likely be complex and costly, owing to the infrastructure and building works needed.

On-site solar panels are among the cheapest ways to reduce reliance on power grids. When combined with energy storage solutions, they still involve capex and require good access to mounting locations. Only a small number of rated real estate companies have set specific goals to increase on-site renewable energy generation. That said, the carbon intensity of power across Europe is steadily decreasing, which helps to reduce emissions for some buildings.

## Energy efficiency can come through various means

Improving a building's envelope (windows, roofs, walls) has significant potential to reduce energy use. Many rated companies have included such actions as part of their decarbonization strategies. These works, however, take time and are difficult to execute while a tenant is in place. Therefore, timing is a critical consideration. Still, energy use could be cut by as much as half if more efficient materials are used. For example, according to estimates from the Netherlands Organization for Applied Scientific Research, if between 2020 and 2030, all buildings in Europe were fitted with high-performance glazing windows, as much as 29% of energy for heating and cooling buildings in Europe could be saved. Similarly, the Buildings Performance Institute Europe suggests that renovation to improve the insulation of roofs and walls of residential buildings in the 27 EU member states, would result in a 44% reduction of energy demand for heating in buildings, or 777 terawatt hours, per year.

## "Smart" technologies can complement more invasive solutions

Smart technologies that optimize energy use and, more broadly, artificial intelligence could contribute significantly to the decarbonization of the real estate sector. Such technologies notably include sensors and building management systems. Sensors, for instance, can identify where energy is being wasted or saved, which equipment is not in use and can be switched off, and when windows or doors have been left open. Smart meters can transmit information on energy usage, while smart devices--such as in heating and cooling systems--can forecast occupancy patterns and optimize energy needs accordingly. Many rated real estate companies are already using smart technologies to increase energy efficiency in their buildings. Although mainly suited to prime office buildings or shopping centers, smart technologies have the potential to increase energy efficiency in multi-family residential buildings.

## Building design and materials can support low-carbon construction

As embodied emissions become an increasing focus, good design and low-carbon materials are increasingly part of real estate companies' strategies for new building constructions and refurbishments. The design stage presents the biggest opportunity, where more efficient systems can be integrated. Real estate companies are increasingly setting targets to meet specified levels of carbon or energy performance and including these as part of their design criteria. In our view, this is generally less common than approaches for existing buildings.

Low-carbon materials, while important, are not as widely available as the solutions that address energy use and can come with a cost premium. With cement, steel, bricks, and glass all key contributors to embodied emissions, real estate companies are increasingly specifying lower-carbon variants for use in buildings. But they are difficult to obtain due partly to low availability of recycled inputs. Some cement and steel producers have begun to use recycled steel as an input instead of virgin steel, which can reduce steel's carbon intensity by 55% (see "[Decarbonizing Metals Part One: A Pressing Issue with Uncertain Fixes](#)," published June 3, 2024).

## High Decarbonization Costs Could Delay Progress

Both capex and energy-related costs could be factors in delivering lower-carbon buildings, with the worst performing properties costing significantly more than better-positioned buildings. Based on the responses from our survey of rated companies, we understand that an average investment of up to €50,000 (based on a typical apartment of 80 sqm to 100 sqm) could be required to upgrade the worst-performing buildings to the highest levels of energy efficiency.

**Given the direction of EU regulations and the ambition of real estate companies, significant investment will be required.** Achieving the EU's Energy Performance of Buildings Directive's goals for residential buildings by the target year of 2030, implies an additional €76 billion of spending per year on building renovations, according to analysis from Bruegel. About €42 billion of this would be needed for the worst 15% of buildings, which we see as representing a material risk for companies whose real estate portfolios contain a large number of buildings with low energy efficiency.

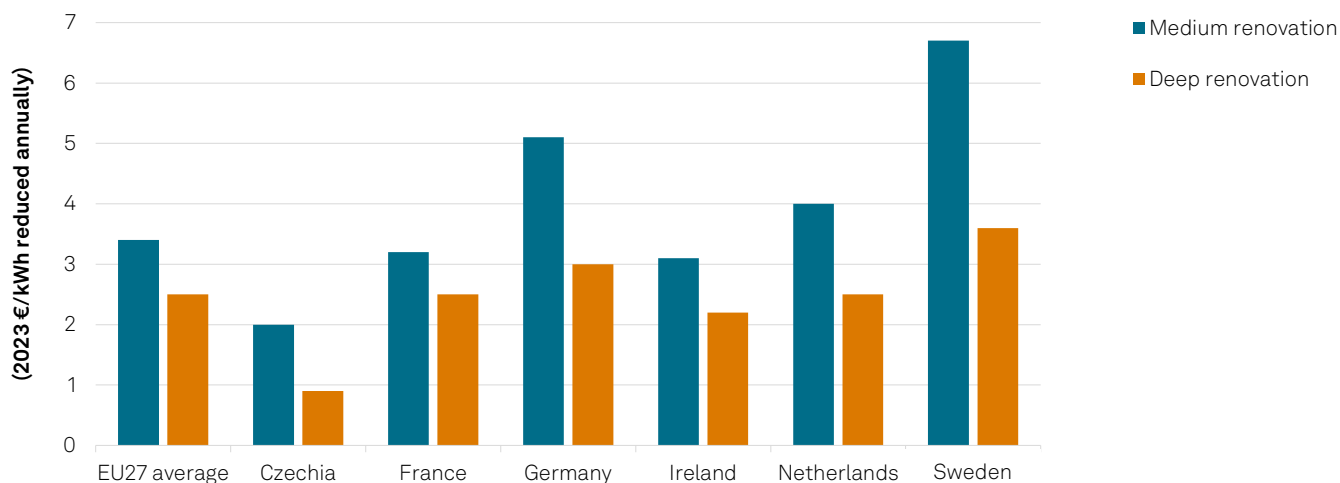
**It can take between 10 years and 25 years to recoup money spent on upgrading buildings.** This may well influence investment decisions, depending on the combination of decarbonization solutions applied. Energy reductions achieved should eventually offset the cost of the solutions, either directly to real estate companies or indirectly if tenants are willing to pay for a more energy-efficient home. Decarbonization could also increase property values. But funding the initial capital could still be expensive, especially for larger portfolios and in places where the energy intensity of buildings is higher; since the EU Directive is based on a percentage reduction, higher energy use means a greater absolute reduction is also required.

**Government support for decarbonizing the real estate sector is likely to depend on the approaches taken in each EU member state.** Investment costs also depend on the extent of renovation required. Deeper renovations can be more cost-effective per unit of energy reduced in the long term (see chart 6) but require overall greater amounts of total capex.

Chart 6

### Deep renovations tend to be more cost efficient than lighter renovations

Estimated investment required to reduce annual consumption by 1kWh (€/kWh)



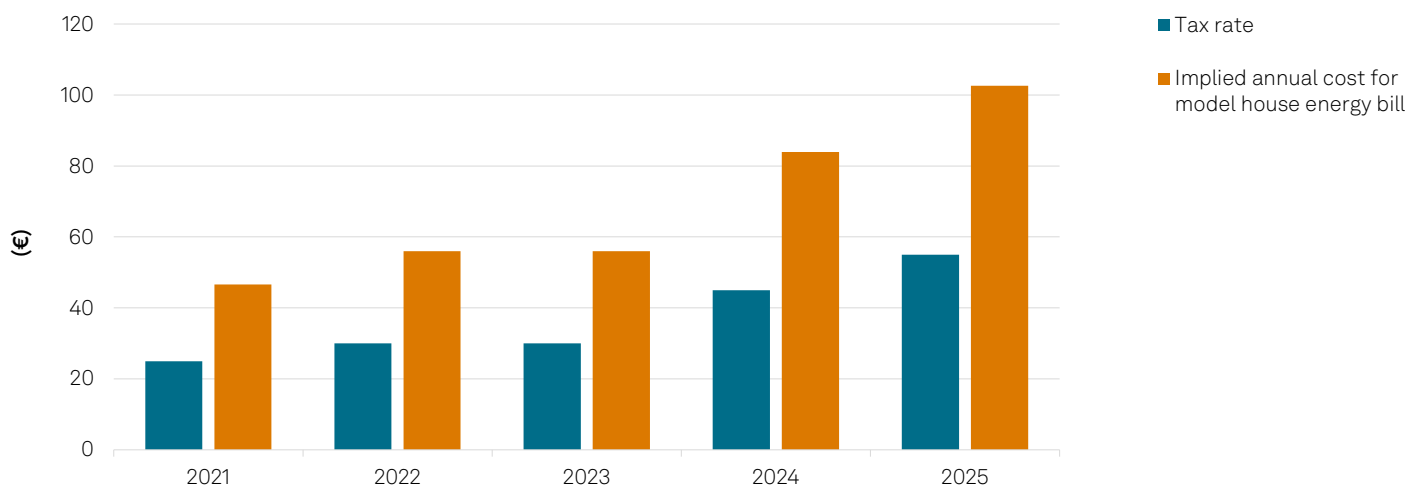
Note: Costs based on the resulting energy savings recorded following renovations undertaken between 2012-16, adjusted for inflation. Doesn't include any net benefit from reduced energy costs. Sources: Bruegel, based on Ipsos and Navigant and Eurostat, S&P Global Ratings.

**Households could feel an impact if carbon taxes based on fossil fuel-powered energy used in homes are introduced and passed on through utility bills.** Some of these costs might be borne by real estate companies if they pay for energy, either in communal areas or for an entire building. Either way, this could affect tenants' overall housing costs, which could be a socially and politically sensitive issue, particularly when it affects low-income households. In Germany, for instance, the current carbon tax could add about €100 to annual energy bills in 2025 for a typical 100 m<sup>2</sup> residential unit (see chart 7). Given recent energy price increases across Europe, such an increase could be relatively small. If costs linked to the EU's proposed ETS2 approached the EU ETS' high of €100 per ton of CO<sub>2</sub> in recent years, then the tax could be as much as €200 for that same property. It could also increase the pressure on households in markets more vulnerable to energy costs. Funds raised via carbon pricing are normally used to support low-carbon investments and subsidies, at least in part, as is the case in Germany.

Chart 7

### German taxes on heating fuel have increasing impact on energy bills

Implied additional cost for the average 100m<sup>2</sup> residential unit that uses fossil fuels



Based on 100m<sup>2</sup> residential unit using the weighted average of energy use rates for heating, cooking and hot water, assuming national proportions of natural gas and oil use. Implied costs would be higher if the building used only fossil fuels. Sources: EU Building Stock Observatory, German regulations, S&P Global Ratings.

## Credit Risks Have So Far Been Manageable

Decarbonizing real estate portfolios could take a lot of time, effort, and money. In view of the need to comply with regulations and potentially mounting costs for remedial works, European real estate companies could face increasing credit risks. Related costs have been manageable for rated companies to date. However, whether these will transmit to creditworthiness will depend on the future direction of policy, costs of decarbonization solutions, tenants' sentiment, and affordability of housing.

**Decarbonization-related investments will likely require significant capital outlays but may reduce the risk of obsolescent buildings due to regulatory changes, for example.** Securing funding for necessary retrofitting can be difficult, since public resources may be limited, and private investors may prefer to place their money elsewhere to get better returns. Nevertheless, portfolios containing a large proportion of buildings with low-carbon credentials may achieve

higher cost efficiencies or attract premium rents in the longer term, thereby enhancing the assets' value.

Credit implications from these factors could include:

- A material increase in capex;
- Higher rents, which could create affordability issues; and
- Changes in asset valuations.

## The size and impact of capex is unlikely to be homogenous

Real estate companies' investments to achieve their decarbonization targets do not currently represent the majority of their total capex. What's more, we expect capex to remain relatively modest for companies that started to modernize the buildings in their portfolio during the last decade. Companies that responded to our survey expect total capex on energy efficiency measures for their entire portfolio to be well below 10% of the gross asset value, though this also depends on the condition and location of assets.

Nevertheless, capex may increase significantly in the future for companies with less-modern portfolios, particularly if emissions regulation tightens further. To mitigate this, landlords might decide to invest in energy-efficiency upgrades or renewable energy sources in the near term. However, that could require substantial upfront capital with relatively long payback periods and certain logistical obstacles, especially when portfolios are large and deep renovation works might be needed.

## Rent increases could be restricted or make housing less affordable

Companies' increased costs related to decarbonization would most likely be passed to tenants in the form of higher rents. This could make housing less affordable, particularly in already high-cost areas. But landlords' ability to implement rent increases would also depend on local housing market regulations and conditions in the rental contracts.

**That said, the potential impact of rent increases (for example, increased vacancies) might not be very material for companies operating in markets where residential housing is in short supply.** And this is the case in many urban areas across the EU. We expect demand for housing to remain robust, especially for residential buildings that have been renovated.

**Affordability issues could still arise.** We note, for example, that a shortage of affordable housing, due to the demand-supply imbalance in Germany, has been pushing rent levels upward. Although the government has implemented measures like rent controls and subsidies to address these challenges, some households are still struggling with elevated housing costs.

**But properties with lower carbon footprints may become more attractive if energy prices are high, potentially allowing landlords to charge premium rents for energy-efficient homes.** At the same time, according to the responses to our survey, rated real estate companies currently think stronger EPC classifications have limited potential to support higher rents. They cite other factors as being more important, such as the location of properties, as well as links to public transport and other amenities. In addition, some properties have fixed rents where tenant stays are typically longer. So, in our view, the impact of a trend in rent increases, based on energy efficiency, could take time to become visible in large housing markets.



## Related changes in asset valuations affect leverage

Stricter energy efficiency standards are likely to affect property values. Properties with lower carbon footprints may see increased valuations, while those that do not comply with decarbonization standards could receive lower valuations. This can affect the value of real estate companies' residential portfolios and leverage ratios over the long term. In addition, energy-inefficient properties may experience decreased demand and could struggle to find tenants over the long term. Landlords that are more proactive in optimizing their portfolios could be better placed to mitigate those risks.

## Looking Ahead

The real estate sector is among the largest emitters of carbon dioxide, largely due to the heating and cooling of buildings, and already faces pressure to decarbonize. Regulation, particularly in the EU, is tightening. European real estate companies we rate have begun to take steps to decarbonize. We believe available technologies should allow them to meet their 2030 targets but acknowledge that this comes with significant levels of uncertainty, in terms of technology, cost, and the impact on tenants.

Although the real estate sector is a major contributor to greenhouse gas emissions, climate transition risk has not been a significant driver of credit quality so far. This is because of these companies' ability to pass through utility costs, diversified portfolio of assets, undersupply of housing, and increased investment in green assets to reduce emissions.

We believe residential company landlords with a higher proportion of assets with sustainability credentials (like higher EPC classifications or other third-party certifications) are better positioned than peers to attract high-quality tenants, command higher rents, and achieve cost efficiencies over the long term. Companies that plan ahead are more likely to enhance their creditworthiness and financial stability in the face of increasing pressures.

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## Appendix

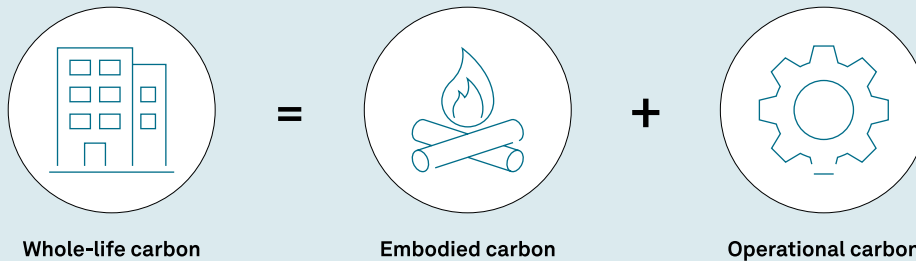
### The real estate data problem

The real estate sector is highly complex, both in terms of its main actors and in terms of how each country ranks building performance. This complexity can make it difficult to directly compare portfolios.

#### Emissions

Real estate emissions can be categorized using emissions scope (as defined by the GHG Protocol) or by lifecycle stage. The classification of companies' emissions under the scope basis can vary depending on their operating model. The three scopes are: Scope 1 – direct GHG emissions, e.g., heating a building with natural gas; Scope 2 – indirect GHG emissions related to purchased electricity, heat, and steam; and Scope 3 – all other indirect GHG emissions from the value chain, e.g., construction and refurbishment, and tenant energy use.

Building lifecycle emissions can also be categorized as embodied carbon (emissions from building construction, maintenance, and demolition) and operational carbon (emissions from energy used in the operation of the building). Together, these represent 'whole-life carbon.' Increasing emphasis is being placed on optimizing buildings' emissions across the lifecycle, including as part of planning processes. Mapping the sources of emissions from a lifecycle basis to corporate reporting can be complex, as it depends on who is responsible for the emissions at a given point in time. For example, a developer, building manager, and tenant might account for the same emission differently in their individual corporate disclosures.



Source: Decarbonizing Real Estate – Foundations for Success – ShareAction, February 2021.

#### Building performance data

EPCs vary by country but provide a measure of the energy performance of a home. An EPC is compulsory when selling or renting a property in all EU countries and in the U.K., and classifications are normally set in local regulations (and for EU members, also based on EU Directives). As a result, there is a variety of EPC definitions and, historically, it has been difficult to compare EPCs across European jurisdictions. EPC labels typically include a class, based on a ranking system from class A (most energy efficient) to class G (least energy efficient). The classes indicate the expected level of energy use and carbon dioxide the property emits in the number of kilowatt hours per meter squared per year (m<sup>2</sup>/year). However, a class C in one country does not necessarily reflect the same kWh/m<sup>2</sup> in another, nor does it reflect the relative ranking of buildings. For example, a house achieving 120 kWh/m<sup>2</sup>/year in France would be placed in the 'C' class, while in the Netherlands it would be in the 'A' class.

## Related Research

- [Decarbonizing Hard-To-Abate Sectors: Credit Quality Implications And Six Key Observations](#), June 25, 2024
- [Building Energy Regulations And The Potential Impact On European RMBS](#), Sept. 6, 2023
- [ESG Materiality Map: Real Estate](#), July 20, 2022
- [Carbon Pricing, In Various Forms, Is Likely To Spread In The Move To Net Zero](#), Aug. 9, 2022

## External Research

- [How to finance the European Union's building decarbonisation plan](#), Bruegel, July 2, 2024
- [Supporting the development of a roadmap for the reduction of whole life carbon of buildings](#), Rambol, Building Performance Institute Europe, Kulevuvuven, April 4, 2023
- [EU Buildings Climate Tracker 2<sup>nd</sup> Edition](#), Building Performance Institute Europe, November 2023
- [Achieving the cost-effective energy transformation of Europe's buildings](#), Publications Office of the European Union, May 5, 2019

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