RENOVATION REVOLUTION

How to deliver a **renovation revolution** in Europe's buildings

A handbook to unlock greater collaboration between governments, businesses and financial institutions

November 2024

CLIMATE GROUP

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Executive summary

At COP28, over 130 countries committed to doubling the global annual rate of energy efficiency improvement. The COP pledge declared energy efficiency as the "first fuel" – cementing it as critical to combatting climate change and reaching net zero.

Buildings are central to achieving this important pledge. In the EU, buildings account for 40% of energy consumption and 36% of greenhouse gas emissions. Through the European Green Deal, the EU has set a target to become the first climate-neutral continent by 2050. As a key plank of efforts to achieve this, the EU introduced the Renovation Wave Strategy in 2020, with the aim of at least doubling annual energy renovation rates by 2030.

The EU has estimated that by 2030, at least 35 million buildings will need to have undergone energy renovations. At present renovation rates remain stuck at 1% per year, while deep renovations, which have the potential to reduce a building's energy consumption by at least 60%, represent a mere 0.2%. These rates are far below the 2.5% recommended by the International Energy Agency (IEA) to achieve net zero by 2050. At this pace, it would take a century to renovate Europe's existing building stock.

To achieve the continent's ambitious energy renovation goals, several key barriers, set out in this handbook, must be addressed:

- Financial constraints are a major obstacle, and labour shortages around green skills and training are harming the implementation of energy renovations.
- Lengthy permitting lead times are slowing the pace of change, while the availability of up-to-date data on Europe's building stock hampers effective planning.
- A lack of awareness about the multiple benefits of energy renovations, and misaligned incentives between property owners and tenants, are hurting market adoption and blocking renovations on a significant scale.

The revised Energy Performance of Buildings Directive (EPBD) came into force in the EU in May 2024 and it seeks to upgrade Europe's entire building stock to a Zero-Emission Buildings (ZEB) level by 2050, building upon the EU's previous requirement for Nearly-Zero Energy Buildings (NZEB). This landmark legislation means that by 2030, energy renovations will be required for the 16% worst performing non-residential buildings, and 26% worst performing by 2033. Additionally, public authorities at national, regional and local levels have an obligation to lead by example and renovate at least 3% of the floor area of their buildings annually.

To deliver on the EPBD, the EU is asking member states to publish National Building Renovation Plans (NBRPs) by 2025. These plans will act as planning tools to transform existing buildings into highly efficient and decarbonised buildings by 2050. In this handbook we share where our recommendations can feature in the NBRPs of member states.

The shift to a climate-neutral Europe critically depends on our collective success in energy renovation. The debate has moved from whether collaboration is necessary to how and where it must take place. Governments at every level – national, regional, and local – must forge dynamic partnerships with the private sector to expedite energy renovation efforts. The imperative now is to ensure that every stakeholder not only recognises their role but actively engages in transformative actions. This handbook is timely, arriving as nations start to translate the Energy Performance of Buildings Directive (EPBD) into concrete national and regional action plans. It serves as an indispensable guide to fostering collaboration between the public and private sectors. Together, these efforts are crucial for the successful implementation of National Building Renovation Plans and for meeting Europe's ambitious decarbonisation goals.

Kadri Simson, European Commissioner for Energy, European Commission

This handbook identifies five key enablers of progress that the public, private and financial sectors must put in place to overcome the obstacles and accelerate progress on energy renovations:

- Aggregating renovation projects to unlock financing.
- More collaborative planning to better align public and private activities.
- Improved use of data for smarter, more evidence-based decision-making.
- Embedding energy efficiency in ESG standards to increase the incentives to invest in energy renovations.
- Linking energy renovations and the EV infrastructure roll out to tap into momentum in this area of climate action.

What's needed is nothing short of a revolution in building renovations – one that transforms the places in which we live, work and learn. The green building revolution presents a $1.8 trillion global market opportunity by 2030 and Climate Group's Renovation Revolution initiative calls on governments, businesses, and financial institutions to collaborate to harness this opportunity.

This handbook collates insights from our valued corporate partners – Carrier, CBRE, Danfoss, Rockwool, Siemens, Signify and VELUX – alongside energy and building experts like Renovate Europe and the governments of European states and regions in our Under2 Coalition. By better understanding the barriers holding back energy renovations, and driving action through our five key enablers of progress, we can all work together in pursuit of increased energy efficiency, energy security and the improved health and wellbeing of Europe's villages, towns and cities.

With the goals set in legislation, and the solutions within our grasp, we must now seize this opportunity to double the annual rate of energy renovations by 2030.

The built environment paradox: Why Europe needs a renovation revolution

By Adrian Joyce, Campaign Director, Renovate Europe

Thinking about the future, thinking about innovation, thinking about quality of the built environment and its effect on our quality of life, the paradox is that the built environment of the future is already with us – at least 80% of it – because the new-build rate in the EU is below 1% per annum.

To make the built environment resilient, fit-for-purpose, and efficient we must collectively devise and implement integrated renovation plans at a massive scale, tailoring them for each segment of the building stock in the EU.

In the broader context, there are two factors that can be considered as having led to the climate emergency that we now face: the first is our emissions of CO_2, and the second is our over-consumption of the planet's resources. Both factors collide in the buildings sector, making it imperative to act – as set out in this handbook.
In undertaking a massive renovation programme to address this climate impact, it will be necessary to deploy all our ingenuity, cooperative spirit, and creativity to ensure that the impact of the renovations has the desired effect.

We'll be required to integrate passive and active technologies that operate seamlessly together in the construction, use, and end-of-life phases of a building's lifecycle, and we'll be obliged to cooperate across

different stakeholder groups, bridging conflicting interests to arrive at solutions suitable for all circumstances.

Passive technologies require an in-depth understanding of the physics of a building, a practical knowledge of which materials to use, and where to use them. The result of their correct deployment is to drastically reduce the energy needs (principally the heating and hot water) of the building through treatment of the envelope that encloses the usable spaces of the building.

Active technologies condition the indoor climate, ensuring that it is fit-for-purpose and giving to the occupants the ability to monitor, adjust, and benefit from a truly comfortable and healthy environment. To supply energy to these renovated buildings in the future in an efficient way, and to comply with the latest EU legislation, we must also use renewable energy sources.

Balancing both the supply and demand in the future will be challenging simply because the highest demand for heating

and hot water comes in the winter when solar and wind resources are, as a proportion of demand, at their lowest. Therefore, ensuring that the energy needs of our building stock are as small as possible is essential if we are to maintain the quality of life that we aspire to in the EU.

Digital technologies will increase our chances of success. From 3D surveying of existing buildings, integrating information from existing databases, to utilising building information management (BIM) during design and construction, to the use of a digital twin of a building or a neighbourhood to manage the use of our buildings, there is a vast potential for digital and AI technologies.

The challenge of renovating the building stock can be countered by taking a community-wide approach in the renovation plans that will be designed and rolled out. Sharing resources across a community of stakeholders, understanding buildings with different characteristics, different patterns of use, and different physical characteristics can empower businesses, local authorities, and building owners to go further and faster in their actions. It is important that all our efforts are also directed to making the lives of people better, because buildings are for people. Their needs should therefore be fully understood and fully incorporated into the solutions that we roll out. The "user-interface" must be properly explained, well designed, easy to use, secure, and adaptable if the passive, active, and digital technologies we use are to find acceptance in the built environment of the future. People are fiercely independent by nature and do not generally like handing control over to others, let alone to machines. These psychological factors must be kept in mind in our work.

RENOVATION REVOLUTION

How to use this handbook

The Renovation Revolution handbook offers a practical guide for governments, businesses, and financial institutions, on how they can collaborate to overcome the key barriers blocking progress on improved building energy renovation rates. It also outlines how EU governments can design their National Building Renovation Plans (NBRPs), as mandated in the Energy Performance of Buildings Directive (EPBD).

For ease of use, this handbook is laid out in three critical steps:

Step 1

Understand the barriers:

Document the key obstacles – including funding gaps, regulatory hurdles and skilled labour shortages – that limit progress on energy renovation rates. Understanding these barriers is essential for crafting effective solutions.

Step 2

Learn from best practice:

Explore success stories of scalable and replicable renovation projects that involved multiple stakeholders.

Step 3

Collaborate and drive change:

Uncover key enablers of progress that can foster greater collaboration across the built environment value chain, drawing together governments, corporates and financial institutions to accelerate energy renovation rates.

We encourage all stakeholders – from national and subnational governments, to corporate solutions providers, financial institutions and civil society organisations – to use this handbook as a tool for dialogue and planning.

Although this handbook focuses on the EU and the implementation of the EPBD, it's relevant for the whole European continent, and includes the priorities of non-EU governments including Scotland and the Isle of Man. More widely, the insights and best practices shared here can be used in a whole host of local contexts, where cross sector collaboration on renovation rates is vital for meeting climate goals.

Energy Performance of Buildings Directive (EPBD) definitions

Nearly-Zero Energy Buildings (NZEB)

NZEB means a building with a very high energy performance. The low amount of energy required to run it is nearly all supplied by energy from renewable sources, usually produced on-site or nearby.

Zero-Emission Buildings (ZEB)

ZEB means a building with a very high energy performance that requires zero or an extremely low amount of energy to run. Producing zero on-site carbon emissions from fossil fuels and zero or a very low amount of operational greenhouse gas emissions, it has the capacity to react to external signals and adapt its energy use, generation or storage. This is also known as its 'enhanced smart readiness'. The total annual primary energy use of a new or renovated zero-emission building is covered by energy from renewable sources generated on-site or nearby. Alternatively, it can be provided by a renewable energy community, a district heating and cooling system or another carbon-free energy source.

Deep renovation

A deep renovation is a renovation that transforms a building into an NZEB before 1 January 2030 and into a ZEB from 1 January 2030.

Step 1

Understand the barriers

With the support of our corporate and subnational government partners, we have curated these insights on persistent barriers affecting renovation rates in Europe, through a series of roundtable discussions, surveys, and one-to-one consultations.

Our corporate partners are Carrier, CBRE, Danfoss, Rockwool, Siemens, Signify and VELUX. We also sought the perspectives of 10 states and regions in the Under2 Coalition: Andalusia, Basque Country, Scotland, Parkstad Limburg Västra Götaland, North Holland, Emilia-Romagna and Lombardy.

Five key barriers were identified: mobilising finance; labour shortages; permit lead times; availability of up-to-date data; and market adoption.

Mobilising finance

More than 90% of subnational governments we spoke with saw the mobilisation of finance as the biggest barrier to mass building energy renovations. They highlighted that the current budgetary situation across the EU will make it difficult to realise the Energy Performance of Buildings Directive's (EPBD) decarbonisation vision.

An additional €275 billion of annual investment is needed to meet the EU's 2030 energy renovation targets. Unlocking these billions means prioritising investment in energy renovations. As the available public funding isn't enough, it's a question of how to deploy this money in a way that will unlock complementary private sector investment.

Several factors contribute to the difficulty of raising private sector funds. For a start, policy uncertainty and economic instability means that investors perceive building energy renovations as high-risk. Inconsistent building performance standards and outdated or non-existent energy performance data exacerbate this perception.

Moreover, investor focus is usually on short-term business cycles of one to five years, which do not align with climate timelines. This means they are put off by the high upfront costs and long payback periods required for building energy renovations. Rising interest rates add to these perceptions of financial burden and risk. As this is a relatively new area of investment, investors also tend to lack awareness of available opportunities. Finally, many investors don't prioritise energy efficiency factors in due diligence processes and climate risk assessments, making them less likely to include them in their investments.

> “For our region, the priorities are to make sustainable construction an engine for economic growth and the generation of quality employment.
>
> **Andalusia, Spain**

Labour shortages

More than 90% of subnational governments ranked labour shortages as a critical issue when it comes to increasing energy renovation rates. They said that the lack of green skills in the workforce has already created capacity constraints. An ageing population, insufficient training programmes and a shortage of local technical experts using the latest technologies are some of the main reasons behind this issue.

For example, some regional government representatives highlighted the challenge of homeowners being forced to wait long periods of time for heat pump installers, hampering widespread market adoption of the low-carbon heating system. In this context, the number of green skills training programmes must be drastically increased – not just to bring knowledgeable workers into the industry but also to equip them with the right financial and project management skills.

Renovation project beneficiaries – such as building owners, property managers and local governments – also need support to develop the skills to effectively plan and manage building renovations at scale.

Permit lead times

In most countries, it’s necessary to obtain a planning and/or environmental permit from the local or regional authority before carrying out energy renovations. However, businesses have identified long waits for these permits as a significant barrier to deploying energy efficient technologies at scale. The need for an Environmental Impact Assessment (EIA) can hold up projects even longer.

Permitting processes are often cumbersome and bureaucratic. Enhancing the technical capacity of government departments, including subnational governments, and automating some administrative processes could help reduce permitting lead times. Simultaneously, it’s crucial that energy renovation planning and applications are holistic, focusing on a series of coordinated actions rather than isolated changes. One single measure does not make a building truly energy efficient. To achieve a significant climate impact, renovations must include a combination of improvements. Additionally, it is important to note, grid congestion issues can lead to even longer delays in the installation of technologies such as electric heat pumps.

Availability of up-to-date data

Businesses highlighted a lack of reliable building stock data at both a regional and local level as a big concern. Existing official databases of local buildings are often outdated and missing relevant information.

When businesses can't understand local challenges and priorities, they are less able and likely to collaborate on an energy renovation programme.

Robust data on local buildings is required, so that opportunities can be better identified. To this end, European states and regions need to share better data around their building stock. Additionally, all databases should be harmonised, so they include the same information and follow agreed templates.

It's also critical to start collecting data on building indoor environmental quality. The current lack of data makes it difficult to quantify the broader benefits of energy efficiency measures for building owners beyond energy performance – even though improved health and comfort are key motivators for homeowners to undertake energy renovations.

> "The EU and the national government need to communicate the directive better.
>
> **Parkstad Limburg, Netherlands**

> "Scotland cannot meet our target of net zero by 2045 without ending the use of polluting heating systems in our buildings and moving to clean heat alternatives.
>
> **Scotland, UK**

Market adoption

Each year, just 1% of EU buildings undergo energy renovations and only 0.2% are subject to deep renovations (which have the potential to reduce a building's energy consumption by at least 60%). Meanwhile, around 16% of buildings in the EU undergo non-energy renovations annually, with little to no priority on energy efficiency improvements. This underscores the need to enhance awareness of the wider benefits and opportunities of energy renovations – to encourage more market adoption. It's important to better communicate the multiple benefits, including cheaper energy bills, enhanced comfort in terms of heating and cooling, and less polluted air, both indoors and outdoors. The Healthy Buildings Barometer by BPIE, in partnership with VELUX, offers valuable guidance in this regard.

Another challenge is aligning the priorities of property owners and their commercial tenants. For example, tenants may hesitate to invest in building improvements that primarily benefit their landlords in terms of increased property value, whereas owners might see a challenge in the upfront costs to energy efficiency improvements. Such split incentives create barriers to energy renovations, slowing market adoption. The increasing inclusion of green clauses on commercial leases – a clause requiring a tenant to implement energy saving measures with the landlord committing to cover some of the costs – is a promising solution, although greater awareness of them is needed to enhance their uptake. Additionally, inadequate data sharing on building energy usage discourages corporate tenants from adopting efficiency measures, but smart building control systems that make this data digitally available are an innovative way forward.

The health and wellbeing benefits of energy renovations in Europe

The mass energy renovation of buildings presents an unparalleled opportunity to improve European citizens' wellbeing and raise their living standards by boosting their comfort and productivity.

Helping to shape a healthier and more sustainable Europe, energy renovations can also address critical social issues, including energy poverty, public health challenges and climate resilience.

Europe's poor housing is impacting public health. In fact, inadequate housing is linked to 100,000 premature deaths annually across the continent. Around 15% of Europeans live in dwellings with a leaking roof or damp walls, floors or foundations. Between 5% and 39% live in buildings with rot in the window frames or floors. Europe's old building stock also significantly contributes to poor indoor air quality. Older heating systems and inadequate insulation allow the infiltration of outdoor pollutants and the accumulation of indoor contaminants, like mould and dust.

The financial cost is significant too. In Europe, the annual economic burden of inadequate housing amounts to over €194 billion in public health costs. By improving indoor conditions, stabilising temperatures and enhancing air quality, building renovations can potentially create savings on healthcare and welfare costs of over €9 billion per year – representing a major investment in boosting people's health and saving lives.

Over 50 million people cannot sufficiently light, heat or cool their homes across Europe. Yet energy renovations can lower household energy bills by up to 25%. For every 1% increase in energy efficiency, it is estimated that around seven million people can be lifted out of energy poverty.

What's more, as climate change accelerates, Europe is experiencing more frequent and intense heatwaves, cold spells and other extreme weather events. The summer of 2022 caused more than 61,000 excess heat-related deaths in Europe, emphasising the urgent need to make buildings more resilient. Energy renovations play a key role in climate adaptation as improvements – like better insulation and the integration of natural ventilation – help buildings maintain safe indoor temperatures during extreme heat and cold.

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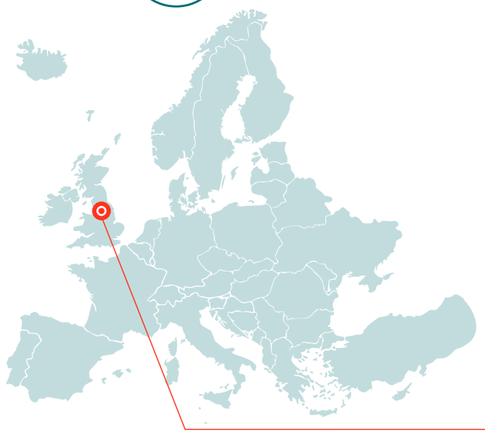
Learn from best practice

It's time to learn from those at the forefront of the renovation revolution. The following best practice case studies detail scalable solutions from corporates, that stakeholders in the built environment can use to overcome barriers blocking progress and to drive the creation of more Nearly-Zero Energy Buildings (NZEB) and Zero-Emission Buildings (ZEB) in the EU.



SIEMENS

Siemens

The University of East London (UEL) has an ambitious goal of reaching net zero carbon emissions by 2030. Located in a densely populated part of the UK, the university has three campuses and buildings dating from the nineteenth-century to the early 2000s.

Improving the energy performance of all these buildings and switching them to low carbon energy is a complex task – especially as it must be done without disrupting the education of 40,000 students. UEL's inner-city location adds to the challenge, there's no spare land to build renewable energy generation technology like solar panels, and demand on the local electricity grid is already high.

Siemens sat on UEL's Industrial Advisory Board in 2013 and over the next few years this collaboration evolved into a partnership to help UEL achieve its net zero ambitions. UEL and Siemens embarked upon an upgrade to the university's computerised building management system, which measures its energy consumption, locates areas operating inefficiently and recommends improvements. During exploratory meetings, an even deeper partnership was formed, based on the university's quest to become a sustainability centre of excellence and Siemens' ambition to help universities embrace decarbonisation processes as an educational opportunity.

The first phase of the partnership is all about energy reduction. Nearly complete, it has focused on the upgrade to the building management system, to drive greater energy efficiency, and the installation of energy efficient LED lighting. Already underway, the second phase concerns energy production, including rooftop solar panels and swapping gas boilers for heat pumps.

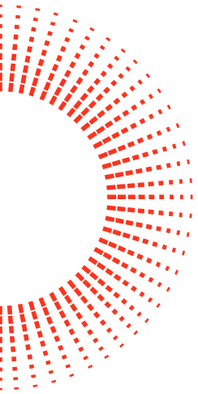
Thanks to Siemens' expertise, UEL has been able to procure the latest tech and access skilled contractors for the installation – with no university teaching being disrupted. In terms of funding, the university has self-funded it's energy transition so far but Siemens is exploring public funding opportunities, like the Public Sector Decarbonisation Scheme, to subsidise some of the cost of heat decarbonisation. UEL and Siemens plan to obtain public money by showcasing their innovative partnership as a 'best in class' example of decarbonisation at a UK university which they hope will inspire other universities to take similar action.

The university and the technology giant have also designed sustainability focussed degrees and modules together, looking at industry skills gaps – like a new Sustainable Cities MSc. The partnership's 'Living Lab' also provides students and academics with

Step 2

> “The EPBD and its national implementation present building owners with a unique opportunity to leverage cutting-edge building technologies, such as automation and control systems, to propel our journey towards sustainable and smart buildings. As we strive to meet the December 2025 deadline, let us harness all the proven energy conservation measures, ultimately creating a built environment that is not only energy efficient but also technologically advanced.

Tobias Huber, Sustainability Officer, Siemens



access to data on the energy consumption and efficiency of all university buildings. This live, real-world data set is issued by academics to teach students – but also to drive research on new technologies.

UEL has already reduced its carbon emissions by 10% since the implementation of these measures. By the end of 2024, all its rooftop solar panels will have been installed, and this will decrease emission by another 10%. UEL plans to eradicate its remaining emissions by decarbonising the rest of the university's heating and cooling systems. As part of this, the teams from Siemens and UEL are developing a heat pump that can extract heat from the river Thames and use it to heat two buildings. The long-term plan is to build a network of these pumps and share surplus heat with the local community.

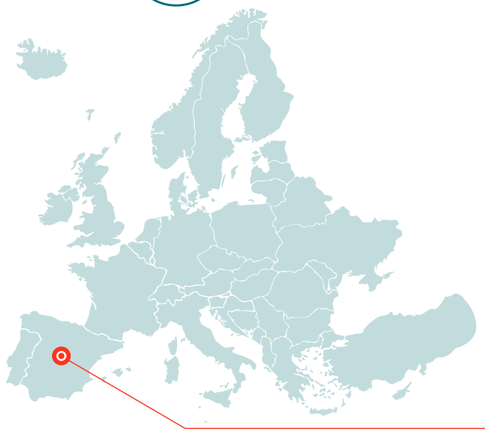
UEL is showing what's possible with the right industry collaboration. Siemens has become the university's strategic partner for reaching net zero, with their experts exploring the best technical solutions to help UEL's facilities team meet their goals.

Siemens has ambitious plans for the creation of a global network to share best practices, research and data, and to build the future workforce of sustainability experts. Other universities can also learn from UEL's approach, seizing the green transition as a chance for innovation, deepened links with industry and the development of practical sustainability courses.

Impact summary

Type of building:	University building
Location:	UK
Technology deployed:	• Building management system • Solar panels • Heat pump
Emissions reduction:	Up to 20% emissions reduction
Improvements (in line with NZEB and ZEB):	• Improved energy performance • Improved smart readiness level • Fossil fuels phased-out • Enhanced use of renewable energy • Reduced emissions
Barriers overcome:	• Availability of up-to-date data • Labour shortages • Mobilising finance
Wider benefits:	• Reduced operational costs

Learn more about Siemens' building renovations work



Signify

Signify

The tallest building in Spain, the Torre de Cristal, has 52 floors and is 250 metres tall. Constructed in 2008 in Madrid's business district, it uses around a third less energy than other office buildings of the same size – thanks to a smart façade that redistributes excess heat or cold from outside. However, even skyscrapers with an A-rating for energy efficiency don't necessarily have the efficient lighting systems to match.

Originally fitted with conventional fluorescent lamps lighting, these lights were expensive to run, harsh on the eyes and operated by a single central control panel, which caused problems for the many different tenants renting offices in the tower. They regularly complained about rooms being too dimly or brightly lit.

The building's owner, insurance company Mutua Madrileña, decided to futureproof the tower's lighting system by upgrading to the most energy efficient and flexible solution possible. The company contracted the lighting experts at Signify to install a new intelligent lighting system. The Signify team swapped the old fluorescent lights for 6,800 highly efficient and cost-effective luminaires, which are complete lighting units into which LEDs and sensors are integrated.

These luminaires are wirelessly controlled by Signify's 'Interact' management system, so the lighting is fully customisable and every room can have bespoke lighting. From an app or one of 500 wireless button panels mounted on walls, tenants can dim or turn up the lighting anywhere in their offices.

The lights can also be programmed to adapt to room occupancy or natural light levels, improving room comfort along with energy efficiency. One tenant has even set the lighting in its offices to dim gradually towards the end of the working day, signalling to employees that it's time to go home so they can enjoy a good work-life balance.

The 'Interact' system gathers detailed data about the building's lighting usage, analyses it and turns it into visuals which the tower's owners can then use to further improve lighting use and minimise energy costs. Mutua Madrileña chose Signify, because it offered an energy efficient solution that could be installed in less than a year. Works were carefully planned to avoid disruption to the tenants – the luminaires were delivered and mounted at weekends and on public holidays.

Signify's new lighting system has cut the tower's total energy consumption for lighting by 80%. If the building's owners had just swapped its fluorescents lighting for

> **“With our Interact system, light levels can automatically be adjusted based on occupancy and time of day, allowing buildings to meet all requirements of the EPBD in Europe. The intelligent lighting system also provides real-time insights on energy consumption, as well as temperature and humidity, for better management, control and operational efficiency.**
>
> **Mario Giordano, Global Head of Public & Government Affairs, Signify**

LEDs, the saving would have been 50%, but the addition of the individually controlled sensors in each light fitting reduced its energy use by another 30%. In terms of carbon emissions, the saving equates to an annual reduction of 2.66 tonnes.

These lights are as bright as old-fashioned light bulbs, they don’t flicker and are gentler on the eyes. Staff working in the office all day are less likely to get headaches or eye strain, which is good for their morale and productivity. The new lighting system also makes maintenance much easier and quicker. If a problem occurs, the software can work out the nature of the problem and flag its exact location in the building.

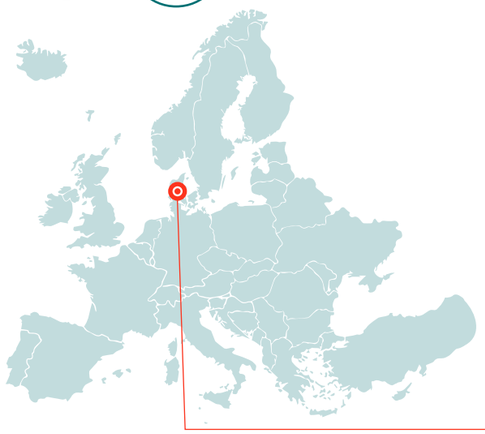
Facilities staff will then determine if they can fix the issue remotely or if they need to go to the site.

This kind of intelligent, ultra-sustainable lighting can be easily and quickly incorporated into any large building without the need for drilling into walls or adding extra wiring. It’s simply a question of changing the existing lighting fixtures and installing the software on staff devices. This energy efficient lighting solution has the potential to be installed in similar buildings all across Europe, and Signify is already at work installing the same system in 60 other commercial premises.

Impact summary

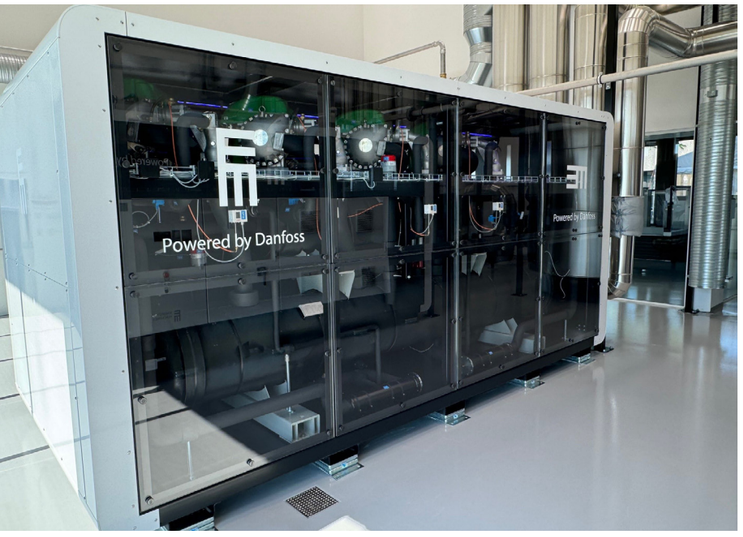
Type of building:	Office
Location:	Spain
Technology deployed:	Intelligent lighting system
Emissions reduction:	Annual reduction of 2.66 tonnes of carbon emissions
Improvements (in line with NZEB and ZEB):	• Improved energy performance • Reduced emissions • Improved smart readiness level
Barriers overcome:	Availability of up-to-date data
Wider benefits:	• Reduced operation costs • Health, comfort and wellbeing improvements

Learn more about Signify’s building renovations work



Danfoss

As heatwaves become more common around the world, hospitals are finding it harder to keep temperatures at the medically required level for their patients and staff during the summer. This was the case for Sønderjylland Hospital in the town of Sønderborg, southern Denmark.



Built in the 1970s and extended in the 1980s, the hospital never had any air-conditioning units, so its management wanted to install cooling technology to ensure the temperature always remained conducive to patient recovery. The new tech also needed to provide direct cooling for critical medical equipment, like MRI scanners, which can overheat with frequent use. An added challenge was that the installation of any cooling technology couldn't disrupt the hospital's life-saving work. The added opportunity was that the cooling loads could be used as a recovered energy source to heat the facility.

The Danish engineering company Danfoss designed a solution that solved not just the hospital's cooling problem, but also ended its reliance on three old gas boilers as backup sources for heating and hot water.

Danfoss recommended installing two new Energy Machines™ heat pumps with a combined heating capacity of 2.6MW, which not only offer fossil fuel free heating during the winter, but also provide cooling during the summer. Each heat pump

features 4 x Danfoss high efficiency, oil-free Turbocor® compressors. It's good for the environment, it creates a more comfortable indoor climate and it's also financially attractive as it will reduce the hospital's annual energy consumption by around 12,500 MWh (this equals the total heat consumption of around 740 average Danish households). This is primarily driven by the significant 400% efficiency gain of using the cooling recovery via the heat pumps for heating vs the former heating source.

Additionally, Danfoss' enabled the hospital to create an income stream from all the excess heat generated by its electrical medical and cooling equipment. Previously, this heat was simply wasted, rejected through cooling towers. Now, it's being recovered and either used directly on site for heating purposes or transferred to the town's district heating network, so local people can benefit from it in their homes.

Completed in June 2024, the installation work took just over a year. The well-planned process meant no areas of the hospital were closed at any time, ensuring there was minimal disruption to the hospital's patients and staff. The new system enables the hospital to become practically self-sufficient in terms of both

heating and cooling. It's projected that the yearly amount of energy it will have to buy from the district heating utility will go down by around 90%. Once the system is fully implemented, the hospital expects to sell back 15,800 MWh of excess heat to the grid, which could cover the heat consumption of more than 930 average Danish households.

The heat pump system at Sønderjylland Hospital showcases a new, ultra-efficient and cost-effective integrated systems approach to the heating and cooling of hospitals. Indeed, the engineering experts at Danfoss believe that it's a real-life example of how hospitals can be central to the integrated energy systems of the future. Instead of energy simply being supplied one-way – from grids to homes, public buildings and businesses – it can flow in different directions. Domestic, corporate and public customers can generate their own green energy, through excess heat recovery, technologies like solar panels, and, in addition, sell any excess back to the grid.

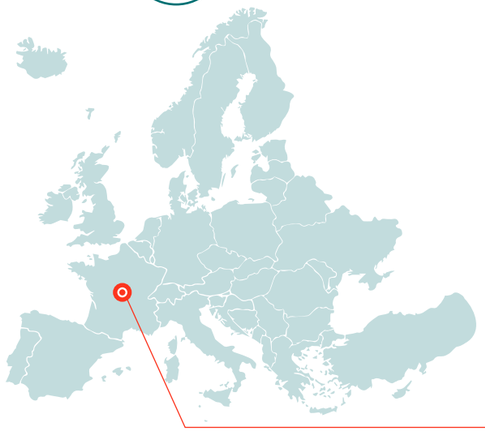
This model can be replicated in hospitals far and wide. Indeed, Danfoss is already in discussions with hospitals in Southern Denmark and the North of Germany about similar installations.

> **"The Sønderborg Hospital is a prime example demonstrating the benefits of sector coupling. Heat pumps provide cooling to the hospital and the recovered excess heat from the cooling processes is used for heating purposes. The same principle applies to many other applications, such as supermarkets, datacenters, or process heat in industry. Using excess heat, building on the synergies between heating and cooling, is a major opportunity to decarbonise while significantly increasing energy efficiency, saving costs and reducing emissions.**
>
> Andrea Voigt, Vice President, Head of Global Public Affairs, Sustainability and Communication, Danfoss Climate Solutions

Impact summary

Type of building:	Hospital
Location:	Denmark
Technology deployed:	Ultra-efficient heating and cooling system
Energy reduction:	Reduction in annual energy consumption by around 12,500 MWh
Improvements (in line with NZEB and ZEB):	• Improved energy performance • Enhanced use of renewable energy • Fossil fuels phased-out • Reduced emissions
Barriers overcome:	Mobilising finance
Wider benefits:	• Reduced operational costs • Health, comfort and wellbeing improvements • Improved climate resilience of the building

Learn more about Danfoss' building renovations work



VELUX

Europe needs to significantly boost its annual renovation rate to meet its climate targets. At the same time, it is also experiencing a housing crisis. National, regional and local policymakers must create lots of new affordable and sustainable homes, while simultaneously renovating existing properties at scale. All while ensuring the new properties don't infringe on green spaces or force residents to move to housing far from their jobs, social lives and public services.

One answer to these problems can be found on the roof of a small apartment block in the Parisian suburb of Malakoff. With the help of the architects at UPFACTOR – who design new spaces by increasing the height of existing buildings – the owners of one top-floor flat have created a pair of new, two-storey apartments by transforming the empty attic and rooftop space above them.

Built in 1900, the block wasn't suitable for a traditional upwards extension because that would have required costly reinforcement of its foundations and the temporary rehousing of the building's occupants. Instead, the architect was able to design a lightweight, yet sturdy, wooden structure that could be made off-site and craned onto the building.

The two new apartments are highly insulated and also feature passive cooling through a series of VELUX roof windows and window shades. These energy efficient windows are positioned to maximise indoor thermal comfort and minimise energy consumption. Their high-performance shades and automated ventilation system block solar radiation and reduce the amount of heat entering a building. Ventilative cooling utilises outdoor air at its actual temperature to improve the thermal comfort for building occupants, using little or no energy compared to mechanical cooling. This means there's no need for air conditioning, even on the hottest days. Moreover, they allow occupants to enjoy plenty of daylight and fresh air, which is beneficial for their health and wellbeing.

The on-site construction took just 10 days, even though the old roof had to be removed. The two apartments are highly energy efficient. Over the last three years, they've consumed 20% less energy than standard new apartments of the same size and use three times less energy than the older apartments downstairs.

But the tenants and owners of the older apartments below the new ones are also benefitting: the replacement of the empty and draughty attic with two highly insulated and heated apartments overhead has helped them to save on their energy bills and keep their apartments warmer in winter. And cooler in summer, something that is critical considering France is now experiencing hotter summers.

Building new homes on top of old buildings in urban locations results in fewer emissions than constructing whole new housing schemes, not least because the streets, public infrastructure, transport links and leisure facilities already exist in that location. It also addresses the shortage of new living spaces in highly densely populated areas.

At first, elected officials and local authorities were reluctant to support this type of project because the approach was far from standard real estate practices. However, UPFACTOR overcame this issue by sharing, through its 3D software and geographic system, all the opportunities

Step 2

> **Novel approaches, such as adding extra floors in the shape of lightweight, wooden structures that can be built off-site and craned onto existing buildings are an opportunity to not just add substantial amounts of housing without requiring new land, potentially infringing on green spaces or forcing residents to move further away from their jobs, social lives and public service, it is also a very sustainable way of doing so: The apartments are highly insulated and feature passive cooling and thus minimise energy consumption. On top of that, building new homes on top of old buildings in urban locations results in fewer emissions than constructing from new, because the streets, public infrastructure, transport links and leisure facilities already exist in that location. As such, this is a great way to both increase renovation and make smarter use of existing buildings while tackling the housing crisis across Europe.**
>
> **Fleming Voetmann, Vice President of External Relations and Sustainability, VELUX**

that could be realised. Not only did this help them secure municipal approval, but it also helped the authorities understand the scale of potential new home construction in their local area that they didn't even know existed.

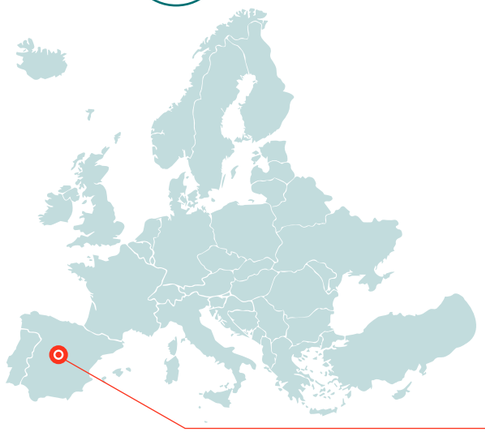
The potential to scale up this kind of project is vast. It would even be possible to build these lightweight, ultra-sustainable apartments on top of commercial premises like supermarkets. UPFACTOR is already working with landlords in Paris, Lyon, Strasbourg and Nice to build 200 new homes on top of existing buildings. Their architects believe that 10% of buildings in major French cities have the potential for this kind of elevation and are in talks with social landlords in numerous French cities about building apartment blocks upwards.

VELUX products were originally born out of a need to create more space in school buildings with a postwar shortage of materials, which led the founder to develop the characteristic roof windows to convert dark loft spaces into airy and bright classrooms. Today, for different reasons, Europe's cities are facing similar challenges, having to do more with less. The innovative approach in Malakoff takes the original VELUX vision and updates it to be a significant solution to Europe's housing and building woes, both in France and beyond, adding not just an additional attic space to an existing home, but a whole additional home.

Impact summary

Type of building:	Residential housing
Location:	France
Technology deployed:	Enhanced building insulation and VELUX roof windows and window shades
Energy reduction:	20% less energy than standard new apartments of the same size and 3x times less energy used than the older apartments below
Improvements (in line with NZEB and ZEB):	• Improved energy performance • Improved smart readiness level • Reduced emissions
Barriers overcome:	• Mobilising finance • Market adoption
Wider benefits:	• Health, comfort and wellbeing improvements • Improved climate resilience of the building

Learn more about VELUX's building renovations work



Carrier

One of Europe's grandest theatres and opera houses, the Teatro Real sits opposite the Royal Palace of Madrid. Dating back to 1850, it's Spain's leading music and performing arts venue, with a floor space of 80,000 square metres and a main auditorium that can seat over 2,000 people. On a mission to make it the nation's most sustainable theatre, its owner, the Spanish Ministry of Culture, decided to replace its old heating and air conditioning system with something more efficient and fully electric.

The theatre's maintenance director asked the heating and cooling company, Carrier, to come up with an ultra-efficient system that could meet all the building's heating, cooling and hot water needs.

Instead of traditional air conditioning units – which use a lot of energy – water chiller units provide cooling by circulating chilled water through a network of pipes and heat exchangers, absorbing heat from the air or coming from processing equipment. Reversible heat pumps offer heating during the winter and extra cooling in the summer. Finally, an additional heat pump heats up water for use in bathrooms and kitchens, replacing old electric boilers.

As the theatre is of national cultural significance and over 170 years old, Carrier had to meticulously plan every detail of the new system's installation – not least because the theatre remained operational throughout. The work took place during the summer, when the theatre puts on fewer shows. To ensure no theatregoers found themselves too hot or cold, the Carrier team staggered the new system's start-up, switching it on in stages.

The layout of the nineteenth century building meant that the installation wasn't always straightforward. For example, the water chiller units were installed in the building's basement and the building's lower-level corridors were too narrow for them to be brought in as normal. So, they had to be partially dismantled, taken down by lift and assembled in situ. Despite these challenges, the project took just under two years to complete, starting in January 2022 and completed by November 2023.

The project was partly paid for by the EU's Next Generation fund. In Spain, this fund was administered by the Institute for the Diversification and Saving of Energy (known as the IDAE), a government department dedicated to improving building energy efficiency and the uptake of renewable energy. Other sources of public money were also involved. In fact, the Teatro Real was the first building to benefit from the Spanish government's

Step 2

new energy saving certificates (known as CAEs). Launched at the start of 2023, these certificates help provide funding for energy efficiency projects.

The new system is much easier to run because all its heating and cooling units are connected to a cloud-based digital platform that continuously monitors and analyses their performance. The theatre's maintenance team now have the data to optimise the system's efficiency and to spot any technical issues early, so they can plan repairs in advance around performances.

Since the installation of its new heating and cooling systems, the theatre has cut its energy use by 48%. At the same time, its energy bills have been reduced by 41%. Environmentally, this translates into a reduction of 200 tons of carbon dioxide.

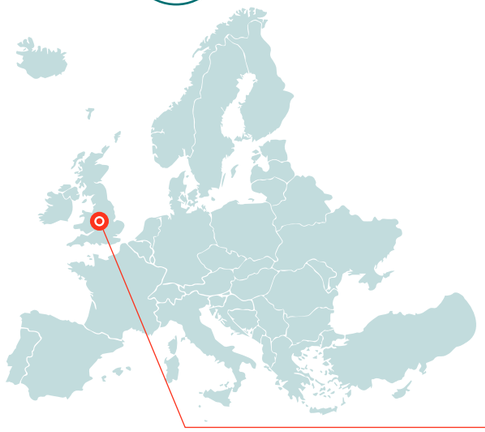
When it comes to greening historic public buildings, this project at Madrid's Teatro Real shows that grand old buildings can be modernised with the latest, cleanest heating and cooling technologies to improve their energy efficiency, reduce their carbon footprints and lower their running costs – with no impact on their aesthetics, authenticity, or events calendar.

While there's no single solution that can be placed in all kinds of buildings, access to public money and the ability to consult with experts that can analyse a building's specifics needs and put together a bespoke solution has been key in this instance.

Impact summary

Type of building:	Theatre
Location:	Spain
Technology deployed:	Ultra-efficient heating, cooling and hot water system
Emissions reduction:	200 tons of carbon dioxide to date
Improvements (in line with NZEB and ZEB):	• Fossil fuels phased-out • Reduced emissions • Improved energy performance
Barriers overcome:	Mobilising finance
Wider benefits:	Reduced operational costs

Learn more about Carrier's building renovations work



PwC

Local governments look for investors to back their critical green infrastructure projects too early. According to research into local net zero funding by the UK PwC Sustainability team, this is why many don't get the money they need to lift them off the ground.

To help local public sector leaders find and secure private capital, the management consultancy compiled its new Financing Local Net Zero Projects: A Guide for Local Authorities – in partnership with public funding body UK Research and Innovation.

Step-by-step, this guide walks local government officials through the decisions they must make to secure investment into the decarbonisation of their locality – including improving the energy efficiency of their schools, hospitals, social housing and council offices. Based on insights from a large working group that included a wide range of subnational government stakeholders – for example the UK Local Government Association and a number of local authorities in England – as well as investors and infrastructure delivery companies, it lays out how to turn an outline plan into a viable project with strong commercial appeal.

Crucially, the guide helps local governments understand the timeline for securing investment. As things stand, far too many are underprepared, meaning they don't raise the necessary capital. It outlines all the tasks that they must first complete.

They should start by working out their project's development in detail, measure its resources and costs, determine stakeholder roles, pinpoint revenue streams and design its commercial structure. Next, they need a detailed financial model and an attractive pitchbook to sell the project to investors in a way that highlights its revenue streams and profitability. At the same time, they should emphasise its social and environmental benefits – like job creation, lower air pollution and reduced carbon emissions – so funders can incorporate them into their ESG plans. Only then are they ready to go after financial backing.

Historically, local governments haven't had this kind of commercial expertise. But these days, they need to attract private investment to accelerate the renovation revolution. It's a big ask when most are already so short of time and resources.

A great practical resource, this guide gives public sector officials the tools to understand what they know, what they don't and where they need support – it helps them see things through investors' eyes. That's important, as PwC found

Step 2

there's often a disconnect between the two perspectives. Many local governments are still presenting their green infrastructure projects in ways that don't stack up commercially. As a result, private financiers aren't interested.

However, PwC's guide doesn't just help local governments turn their projects into an investible reality. It also empowers them to protect themselves from the financial risks. In the UK, in the 1990s and early 2000s, many public sector organisations inadvertently entered into public-private partnerships that were financially inadvisable. This guide enables public sector officials to go into investor conversations fully informed.

For example, it can help local authorities avoid 'investor cherry picking', which is when investors only put money into the part of a project that offers the highest return. The risk of this practice is that a building or place is only slightly improved, with money not going into the areas that need it most. To avoid it, local authorities need to build a blended net zero approach. This involves bundling different initiatives into one larger proposition, so the more profitable aspects financially offset the others.

The unique benefit of PwC's Guide is that it brings all the necessary information together. It's a one-stop-shop for local authorities with a net zero idea they want to get over the line smoothly. Focusing on a project's pipeline and commercialisation stages, it explains how to go from a concept – like the decarbonisation of a social housing estate by installing insulation and heat pumps – to the kick-off of construction.

Written for UK local authorities, it's also useful in other countries that lack the resources and knowledge to turn their net zero targets into reality. Many public sector officials will find the way it explains the different kinds of funding useful – from green bonds, social impact bonds and equity financing to more innovative financing mechanisms, including crowdfunding, performance-based finance and land value capture.

In a world in which so many local and regional governments need capital to upgrade their infrastructure, it's up to them to make their plans as attractive as possible, by highlighting a clear return on investment. At the same time, they should be aware of where the greatest financial risks lie and understand how to avoid them. PwC's guide can help them do just that.

Impact summary

Type of building:	Various
Location:	UK
Solution deployed:	One-stop finance guide for public sector projects
Barriers overcome:	Mobilising finance

Learn more about PwC's building renovations work

The financial benefits of a renovation revolution

The green building revolution presents a $1.8 trillion global market opportunity by 2030, and Europe is well-positioned to lead.

By accelerating energy renovations, Europe can boost its economic competitiveness, strengthen energy security by reducing reliance on imported fossil fuels, and enhance property asset values. Energy efficient buildings not only lower operational costs but also improve workplace productivity, and energy renovations create thousands of green jobs, fostering innovation in sustainable construction along the way.

As the world's largest energy importer, the EU spent approximately €600 billion on energy imports in 2021. Energy renovations directly lower energy consumption, leading to substantial cost savings. Households benefit from reduced energy bills and greater disposable income, while businesses experience lower operational costs and enhanced global competitiveness.

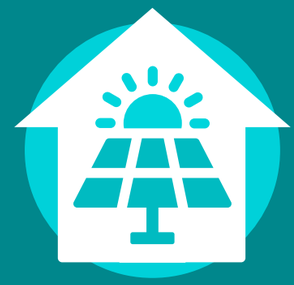
Energy-efficient buildings are not only cheaper to operate but also increasingly attractive in property markets. Buildings with higher energy efficiency ratings are more valuable, with residential properties experiencing a 3-8% price increase and commercial ones up to 10%. What's more, a renovation revolution promotes innovation in cutting-edge materials, smart energy systems and renewable energy integration in the built environment. These advances are expected to generate up to 160,000 new green jobs in the construction sector and related industries in the EU by 2030.

Finally, as mandated in the Energy Performance of Buildings Directive (EPBD), buildings will be central to deploying solar photovoltaic (PV) systems and electric vehicle (EV) charging infrastructure across Europe – helping to decarbonise energy grids and make them more flexible. The EPBD could drive the installation of 150 to 200 GW of additional rooftop solar between 2026 and 2030. This dual opportunity allows regions to meet energy efficiency and renewable energy targets simultaneously.

The EU ranks as the world's largest energy importer and spent approximately €600 billion on energy imports in 2021.

Energy renovations are expected to generate up to 160,000 new green jobs in the construction sector and related industries in the EU by 2030.

After energy efficiency improvements, residential buildings can see a 3-8% price increase, and commercial properties can experience a rise up to 10%.



The Energy Performance of Buildings Directive (EPBD) could drive the installation of 150 to 200 GW of additional rooftop solar between 2026 and 2030.

Step 3

Collaborate and drive change

To address the barriers identified in Step 1 and maximise the potential of the solutions presented in Step 2, this section focuses on five key enablers that can drive progress and unleash Europe's renovation revolution. They represent the most important insights to come out of our consultations with stakeholders, which we hope will support wider efforts to design and implement effective National Buildings Renovation Plans in the EU.

National Buildings Renovation Plans (NBRPs)

Member states of the EU need to submit the first draft of their NBRPs to the European Commission by 31 December 2025. They will use the template provided in Annex II of the Revised Energy Performance of Buildings Directive (EPBD).

There are seven key considerations to be included in these plans:

a) Overview of the national building stock

b) Roadmap for 2030, 2040 and 2050

c) Overview of implemented and planned policies and measures

d) Outline of the investment needs, the budgetary sources and the administrative resources

e) Thresholds of new and renovated zero-emission buildings

f) Minimum energy performance standards for non-residential buildings

g) Minimum energy performance standards for residential buildings

Five key enablers of progress

Delivering a renovation revolution requires significant efforts from governments, corporates and financial institutions. It is crucial that all relevant stakeholders understand their roles in driving change through collective action. Here is how this can be achieved.

1. Project aggregation

One way to drive up building renovation rates is to aggregate projects by grouping multiple smaller projects into larger, more manageable portfolios. Merging projects and treating them as single units enables better planning and long-term forecasting. It means businesses and governments can increase their understanding of investment needs, making it easier to identify budgetary sources and allocate administrative resources. This can also help open up new financing pathways, such as green bonds.

Project aggregation uses economies of scale to boost investment certainty, making these projects more attractive to investors, suppliers and contractors. It's an effective way of overcoming barriers that can hold back smaller projects – such as perceived risk and uncertainty around return on investment.

Role for corporates:

- Become partners in public building energy renovations.
- Support public authorities to make informed decisions by providing technical expertise when it comes to evaluating the scope and scale of energy renovation projects and determining the costs.

Role for governments:

- Act as facilitators for project aggregation in public building portfolios by partnering with corporates to evaluate and cost it, and encourage corporates to partner on the development of effective mechanisms for project aggregation.
- Clearly outline the overall investment requirements for aggregated projects and segment these needs into public and private investment categories, ensuring transparency and clarity in funding strategies.
- Raise awareness among corporates about participation opportunities in public building energy renovation projects, highlighting the benefits and available support.

Role for financial institutions:

- Provide financial resources to support the development and implementation of aggregated public building renovation projects, helping to ensure the necessary capital is available for large-scale initiatives.
- Engage with public authorities to implement dedicated green financing mechanisms, that encourage participation and investment from various stakeholders.

Where governments could include this in their NBRP

- Overview of implemented and planned policies and measures (c)
- Outline of the investment needs, budgetary sources, and administrative resources (d)

2. Co-creating a holistic approach

To deliver Nearly-Zero Energy Buildings (NZEB) and Zero-Emission Buildings (ZEB) across the EU, authorities need to partner with the private sector to craft a holistic approach. This co-creation is necessary because these ambitious building standards involve more than just improved energy performance. They also require the integration of renewable energy sources and the upgrading of a building's smart capabilities, in terms of automated control systems that optimise performance.

A holistic approach ensures that all the important components of a better built environment – energy efficiency, renewable integration and smart technologies – are considered during an energy renovation project, and when installed they work together effectively to meet ambitious decarbonisation goals.

Public and private sector co-creation is the best way of ensuring that a project's regulatory, financial and technical aspects are all considered sufficiently. By crafting a shared vision among project stakeholders, it can make it easier to mobilise largescale finance. The incorporation of private sector technical assistance from the start also supports the public sector to develop the right knowledge and skills. Furthermore, working collaboratively enhances wider awareness and understanding of energy renovations, which increases market adoption.

Role for corporates:

- Actively participate in the planning and design of energy renovation initiatives.
- Provide insights and expertise by sharing best practices and technical knowledge to enhance the strategic capacity of government. Also, simplify access to energy renovation resources and services.

Role for governments:

- Consult corporates in early-stage planning to align strategies and ensure a shared vision that takes into account the needs and insights of all built environment stakeholders.
- Use integrated planning to tap into multiple revenue streams and to maximise returns on investment.

For example, by combining energy efficiency upgrades with the installation of renewables, governments can benefit from both energy savings and the sale of excess electricity back to the grid.

- Develop targeted information campaigns that highlight the multiple benefits of energy renovations.

Role for financial institutions:

- Support in the design and implementation of effective financing mechanisms that support holistic energy renovation projects, for example co-creation of low-interest programs that specifically fund projects integrating energy efficiency, renewable energy, and smart technologies.

Where governments could include this in their NBRP

- Overview of the national building stock (a)
- Roadmap for 2030, 2040 and 2050 (b)
- Overview of implemented and planned policies and measures (c)
- Outline of the investment needs, the budgetary sources and the administrative resources (d)

3. Data and digitalisation

When it comes to decision-making, a robust and comprehensive database of building stock information – such as age, design, construction materials and state of repair – is essential.

The latest digital tools can make such data readily available and quickly communicable to stakeholders. Centralised digital databases and knowledge-sharing platforms deepen the understanding of the current situation and highlight effective pathways to improvement. They also facilitate the replication of successful strategies used elsewhere and support better progress monitoring. Indeed, digitalised data is pivotal for meeting key performance indicators (KPIs) – including those in NBRPs.

By using data to be open and transparent about building energy use and savings, businesses and governments can also communicate the benefits of energy renovations and encourage greater market adoption. For example, gathering and sharing data on improved indoor thermal comfort or air quality increases awareness of the health and wellbeing benefits.

What's more, in the EU, smart readiness is mandatory in NBRPs. The use of digital technologies that enhance building energy management through automation, enables buildings to become significantly more energy efficient. On a wider level, it supports better data gathering by facilitating comparisons between buildings and analysing trends at scale. It also enables smart demand-side flexibility, which involves adjusting energy consumption to align with periods of high or low energy availability. This is especially critical for electricity grids adjusting to the high energy demands of electrifying heating and hot water systems.

Role for corporates:

- Adopt and promote the use of smart building technologies that enhance energy efficiency and provide valuable data on building performance.
- Provide public authorities with data on energy consumption and carbon emissions to support the creation of accurate and comprehensive databases.
- Use tools, such as green leases, to promote data sharing on energy use among tenants and partners.

Role for governments:

- Establish and maintain centralised databases for comprehensive data collection on national building stock, ensuring the information is open source.
- Develop knowledge-sharing platforms that encourage corporates to contribute data, facilitating an enhanced understanding of building performance and energy renovation impacts.
- Encourage corporates to share consistent energy renovation data.

Role for financial institutions:

- Use data for risk assessments and the identification of energy renovation investment opportunities.
- Share information on financed projects to enrich overall data collection efforts, helping to create a clearer understanding of trends and impacts in the energy renovation sector.
- Require detailed reporting on energy performance and sustainability metrics for funded projects, fostering transparency and accountability among stakeholders as well as contributing to national databases.

Where governments could include this in their NBRPs

- Overview of the national building stock (a)
- Roadmap for 2030, 2040 and 2050 (b)
- Overview of implemented and planned policies and measures (c)
- Outline of the investment needs, the budgetary sources and the administrative resources (d)
- Thresholds of new and renovated zero-emission buildings (e)
- Minimum energy performance standards for non-residential buildings (f)
- Minimum energy performance standards for residential buildings (g)

4. Include energy efficiency as an ESG priority

Building managers, corporate landlords, corporate tenants and impact investors are increasingly influenced by environmental, social and governance (ESG) considerations, helping to prioritise sustainability within business strategies and investment decisions. Making energy efficiency a core component of ESG strategies is consequently key to driving a mass uptake of energy renovations. Additionally, financial institutions and corporates must understand the energy and carbon impacts of their property portfolios – and the risk of stranded assets if they aren't upgraded.

Incorporating energy renovations into important financial legislation can also boost investor willingness. For instance, the Sustainable Finance Disclosure Regulation (SFDR) in the EU requires financial institutions to disclose the environmental impacts of their investments, which helps investors understand the sustainability of where their money is going. If specific mention of energy renovations were added to the regulation, it could direct more financial resources towards making buildings energy efficient.

Similarly, the Emissions Trading System (ETS2), which will be fully operational by 2027, introduces carbon pricing for CO_2 emissions from EU buildings, which means that it will become increasingly expensive to run buildings that are not energy efficient – creating a financial incentive to invest in energy renovations.

Role for corporates:

- Prioritise energy efficiency in ESG strategies and corporate governance.
- Incorporate energy performance metrics into corporate sustainability reporting to enhance transparency and accountability.
- Document and report energy and carbon impacts in ESG reporting for property portfolios.

Role for governments:

- Develop regulations that mandate the inclusion of energy efficiency in ESG reporting and climate risk assessments.
- Promote transparency and standardisation in ESG criteria – particularly regarding energy efficiency – for comparability and accountability.
- Encourage financial institutions to integrate ESG criteria – particularly regarding energy efficiency - into financing solutions to incentivise investment in sustainable projects.
- Highlight the important link between climate adaptation and the value of buildings.
- Engage with the finance sector to design effective financial incentives, for example lower interest products, for renovations that meet or exceed national energy performance standards to promote adherence to best practices.

Role for financial institutions:

- Include energy efficiency as a priority consideration in investment due diligence processes.

Where governments could include this in their NBRP

- Roadmap for 2030, 2040 and 2050 (b)
- Overview of implemented and planned policies and measures (c)

5. Combine incentives with electric vehicle charging points

In 2023, a record $634 billion was invested in electric vehicle (EV) infrastructure, like charging points, across the EU – a 36% increase from the previous year. The EV sector is experiencing rapid growth and attracting significant capital, in this context, grouping building and transport infrastructure upgrades together makes financial and environmental sense.

There is an opportunity to align energy renovations with the momentum behind EV investment, tapping into the existing flow of funds. What's more, this approach can lower the total cost of making both these improvements, and investors and developers can benefit from drawing on multiple incentives, like subsidies, at once.

The promotion of sustainable mobility through buildings is included in the EPBD and it's a mandatory indicator in NBRPs. From January 2027, all non-residential buildings with more than 20 parking spaces must install at least one EV charging point for every 10 parking spaces, or ensure that at least half of parking spaces are served with electricity cables, so charging points can be added later. Additionally, all buildings owned or occupied by public bodies must have installed electricity cables for half of their parking spaces by January 2033.

These mandatory EV infrastructure requirements present an opportunity to promote building energy renovations in tandem with car charging point installation, doing these upgrades all at once. Not only would this significantly increase the appeal of projects to investors, but it would be a quick and efficient means of futureproofing the built environment and making it all-round more climate smart.

Role for corporates:

- Incorporate energy renovation plans into pre-existing EV infrastructure projects.
- Promote the benefits to other corporates, fostering collaboration and further supporting the integration of energy renovations into the rollout of EV infrastructure.

Role for governments:

- Design combined incentives to attract EV investors to energy renovation projects, for example, guaranteed short waiting times for permits. Raise awareness of the combined benefits too.

Role for financial institutions:

- Provide priority financing and investment options for combined energy renovation and EV infrastructure projects, capitalising on available finance for the expanding EV sector.
- Develop incentivised financial products tailored for EV infrastructure projects that incorporate energy renovations measures.

Where governments could include this in their NBRP

- Overview of implemented and planned policies and measures (c)

Conclusion

Slashing Europe's emissions hinges on an ambitious renovation revolution that transforms the buildings we live, work, and learn in.

This handbook has shown that, to overcome persistent barriers in financing, skills shortages, incorrect data, lengthy permitting processes, and barriers to market adoption, the public and private sectors in Europe need to collaborate to create a step-change in how we approach energy renovations in the built environment.

Governments, corporates, and financial institutions must now use all the levers at their disposal to drive change together, chiefly aggregating renovation projects to unlock greater investment, more collaborative planning between the public and private sectors, using up-to-date data to drive improved decision-making, embedding energy efficiency into ESG standards, and linking energy renovation projects with the roll out in EV infrastructure to increase the pace and scale of change.

Collective action and scalable solutions will break down the persistent barriers that have plagued renovation rates for too long. The benefits for governments, citizens, corporates and financial institutions are huge – the green building revolution presents a $1.8 trillion global market opportunity by 2030. What's more, significantly advancing the energy efficiency in the EU's buildings is expected to generate up to 160,000 new green jobs in construction and related industries by 2030, bringing with it enhanced economic competitiveness, energy security, and a host of health and wellbeing benefits for Europe's citizens.

With 2030 rapidly approaching, and looking ahead to 2050, a successful renovation revolution will mean a Europe of Zero-Emission Buildings – bringing with it more resilient, sustainable communities. In pursuit of this goal, we must now seize this opportunity and double the annual rate of energy renovations by 2030. With this vision, proven solutions, and strong partnerships, we can deliver a renovation revolution.

RENOVATION REVOLUTION

About Renovation Revolution

Climate Group's Renovation Revolution project brings together companies, sub-national governments and environmental sector NGOs to research and share findings on how governments and corporates can drive up deep renovation rates in Europe's buildings. Buildings are responsible for 40% of the EU's energy consumption and 36% of its greenhouse gas emissions. With our partners, we're unleashing a renovation revolution in Europe's built environment, shining a light on the latest innovations and uncovering how we can scale them up to increase energy efficiency and drive down emissions in European buildings.

CLIMATE GROUP

About Climate Group

Climate Group drives climate action. Fast. Our goal is a world of net zero carbon emissions by 2050, with greater prosperity for all. We focus on systems with the highest emissions and where our networks have the greatest opportunity to drive change. We do this by building large and influential networks and holding organisations accountable, turning their commitments into action. We share what we achieve together to show more organisations what they could do. We are an international non-profit organisation, founded in 2004, with offices in London, Amsterdam, Beijing, New Delhi and New York. We are proud to be part of the We Mean Business coalition.

Carrier CBRE Danfoss ROCKWOOL

SIEMENS signify VELUX RENOVATE EUROPE

Authors and contributors:

Damilola Adeyanju, Alex Miller, Jeroen Gerlag, Melissa McClements, Adrian Joyce, Afroditi Psatha