WORLD GREEN BUILDING COUNCIL

Building Retrofits: Why upgrade our existing buildings

A position paper on the rationale, benefits and actions needed to upgrade existing buildings and improve energy performance, cut greenhouse gas emissions and strengthen resilience.

April 2026

Introduction

Buildings are central to our lives. They are the spaces where we live, work, learn and heal. However, they are also a significant contributor to the global climate challenge.

The buildings and construction sector accounts for approximately 34% of global energy-related CO_2 emissions, driven by the energy used to power, heat, cool and construct them.[1] Meanwhile, more than 80% of the buildings that will exist in 2050 have already been built, with many of those currently inefficient, unhealthy and increasingly exposed to climate risks. [2,3]

This presents a critical challenge: **how to manage and adapt the existing built environment in a way that reduces emissions, protects communities and prepares for the rising risks associated with a rapidly changing climate.**

Retrofitting existing buildings is a central decarbonisation and resilience strategy across regions and building types, and approaches should be tailored to local economic, geographic, climatic, infrastructural, technological and cultural contexts.

Limiting embodied carbon requires action across the entire building life cycle, including near-zero emissions new construction and substantial upgrades to the existing building stock. However, policy and industry efforts remain disproportionately focused on new buildings.

In 2024, around 90 countries had mandatory energy regulations for buildings, but only 15 applied these to existing buildings.[4] Although more complex to implement, retrofit standards are critical to securing long-term improvements in environmental and operational performance.[5]

Drawing on economic, environmental and social dimensions, in this paper we:

- **highlight the benefits of retrofitting existing buildings**, including extending asset life, reducing operational costs, providing significant levels of employment and mitigating regulatory and climate risks through improved energy performance, lower embodied carbon emissions and reduced construction waste.
- **provide a review of regional and national climate action roadmaps** to demonstrate how retrofit plays a critical role in evolving policy frameworks, incentives, capacity building and international cooperation.
- **present practical case studies** to show how successful retrofit projects have already been implemented and are delivering cost and energy savings worldwide.

In 2024, around 90 countries had mandatory energy regulations for buildings, but only 15 applied these to existing buildings.

Arup, 1 Triton Square, London, Simon Kennedy

The case for retrofit

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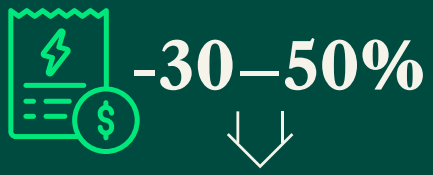
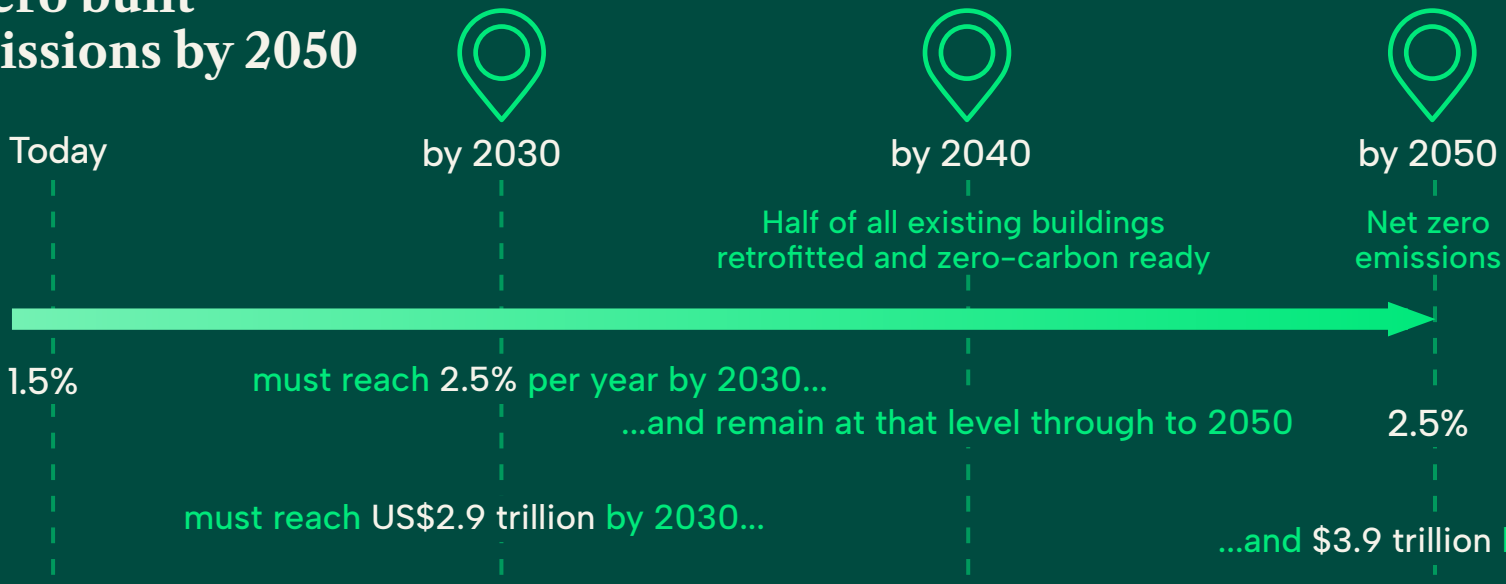
Around **80%** of the buildings that will be in use by 2050 are already standing[6]

The cost of retrofitting existing buildings can be **40% lower** than the cost of constructing new buildings of the same type[7]



Deep retrofits have the potential to generate savings in energy and operating greenhouse gas emissions of at least **30–50%**[8]

To achieve net zero built environment emissions by 2050



Quay Quarter Tower, Sydney, Multiplex

Background definitions

Adaptive reuse

The process of transforming existing buildings to serve new purposes. This approach typically involves reconfiguring interior layouts, upgrading structural capacity, and modernising building systems. By extending the life of structures, it supports sustainability through waste reduction, resource conservation, and alignment with circular economy principles.

Embodied carbon emissions

Embodied carbon emissions in buildings refer to the total greenhouse gas (GHG) emissions associated with the entire life cycle of construction products, including manufacturing, construction processes, renovation, demolition and end-of-life processing.[11]

Near-zero emission and resilient building (NZERB)

A near-zero emission and resilient building, as defined by the Buildings Breakthrough, is highly energy efficient with minimised GHG emissions across its life cycle. It is a structure that fulfils functional and technical requirements, protects its users, and preserves social, economic, and environmental value, from reasonably anticipated local hazards, both current and future.[12]

Operational carbon emissions

Operational emissions are the GHG emissions associated with the use phase of the building.[13]

Refurbishment

Typically entails non-invasive interventions focused on superficial enhancements and minor repairs that improve the aesthetic quality and functional performance of a space, without altering the building's structural or load-bearing systems.

Renovation

Renovation refers to the process of repairing, updating, or improving an existing building to enhance its functionality, appearance, safety, or energy performance. It can range from minor appearance upgrades to major replacement of equipment and building fabric.[14]

Retrofit

A more specific type of renovation involving adding or upgrading components or features to a building. Retrofits may involve installing new windows, upgrading lighting or improving the efficiency of larger appliances. Retrofit often refers to a comprehensive building remodelling and upgrade, often described as deep retrofits or redevelopments.

Economic benefits

- **Extended building lifespan**
- **Lower utility bills**
- **Shorter project timelines**
- **Enhanced competitiveness**
- **Increased job opportunities**
- **Resilient against climate threats**
- **Lower risk of becoming uninsurable or later costs**

Retrofitting as a financial opportunity for investors, owners and tenants

- **Retrofitting extends a building's lifespan**, preserves asset value and aligns with circular economy principles by maximising the use of existing materials, reducing waste and avoiding the rising financial and environmental costs of demolition and new construction. With material costs cited by 55% of professionals as the primary constraint on construction activity in the US and Canada, retrofit is increasingly the more cost-effective option.[15]
- **Enhancing energy efficiency leads to lower utility bills.** Reducing the financial burden of utility overheads contributes to greater energy equity, especially for vulnerable households.[16]
- **Retrofit projects typically have shorter project timelines** compared to new developments, allowing owners to bring upgraded spaces onto the market faster and to capitalise on this. Preserving heritage features further reinforces market appeal.
- By improving energy performance, thermal comfort and indoor air quality, **retrofitting enhances the competitiveness of existing assets** in markets increasingly driven by environmental, social, and governance (ESG) criteria. Across Asia, green-certified buildings consistently command rental premiums, reaching up to 11% in cities such as Bangkok and Manila, enabling owners to capture this value without the embodied carbon and cost of demolition and rebuild.[17,18]
- **Retrofitting creates significantly more jobs** per dollar than new construction, generating roughly 9–30 manufacturing and construction jobs per million dollars invested.[19]

Lowering emissions through innovative refurbishment

The redevelopment of 1 Triton Square, London, UK, demonstrates how, through a 'marginal gains' approach, retrofit can maximise both sustainability and strong financial returns. By reusing the existing structure and façade, the project, when compared to a new build, cut embodied carbon by 40,000 tonnes and cut costs by 66%. Through reuse and strengthening strategies, three new floors were added (increasing floor area by 70%), with the project also finishing 30% faster than a full rebuild. Source: Arup

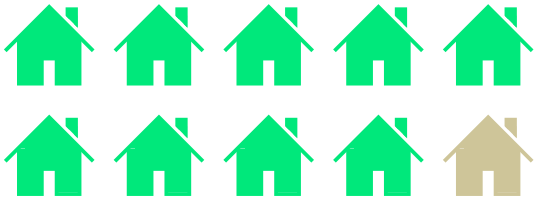
The multiple benefits of deep retrofits: a toolkit for cities

Buro Happold, working with C40 Cities and University College London (UCL), created a toolkit to help cities measure the full value of deep energy retrofits. Pilots in New York, Milan and Copenhagen show that retrofitting municipal buildings delivers strong economic returns alongside carbon savings.

This included the generation of net present value (total financial gain after costs discounted to today's value) across the three cities ranging between US$47 to US$660 million and an associated payback period between 7 and 29 years. Source: Buro Happold

Retrofitting as a risk mitigation measure

- Over 90% of the world's largest companies have at least one asset highly exposed to physical climate risks. Integrating resilience measures into retrofitting strategies can **safeguard assets against climate threats**, ensuring both operational continuity and long-term viability.[20]
- In an era of rapidly evolving regulations and climate risks, retrofitting serves as a powerful tool for future-proofing assets. Buildings that meet or exceed new energy and carbon standards are **less likely to risk becoming uninsurable assets** or require **costly compliance retrofits** down the line.



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Continuous improvement of brownfield building in Singapore

In 2018, Schneider Electric opened its retrofitted East Asia & Japan Headquarters in Kallang, Singapore, transforming a 25-year-old nine-story brownfield building into a smart, digitised facility. Since then, the project has evolved into a continuous improvement journey rather than a one-time retrofit.

After achieving up to 45% energy reduction through passive design and EcoStruxure enabled optimisation, and operating on 100% renewable electricity, the building has continued to advance its performance each year through ongoing monitoring and continuous commissioning. These efforts have included sustained enhancements in energy management practices, digital services support via EcoStruxure Advisors, and the deployment of a building wide digital twin to enable ongoing modelling and system optimisation. More recently, AI driven optimisation and self healing capabilities have been introduced to further improve efficiency and operational resilience.

This long-term, operations focused approach has supported the building's progression toward multiple milestones, including Green Mark Platinum and Green Mark Platinum Zero Energy certification.[21]
Source: Schneider Electric

Commercial complex with significant energy savings

China Hong Kong City Building commercial complex underwent a transformative retrofit to boost efficiency and sustainability. Key upgrades include smart heating, ventilation and air-conditioning (HVAC) systems with variable speed drives on chilled water and seawater pumps, advanced air handling units, and LED lighting. The project also introduced 474 kWp rooftop solar panels, electric vehicle (EV) chargers and smart energy management systems.

These initiatives deliver significant energy savings, with a payback period of five years, improved comfort, and a reduced carbon footprint. Source: HKGBC

Environmental benefits

- **Lower resource demand**
- **Less waste**
- **Lower whole life carbon emissions**

- The buildings and construction sector alone accounts for nearly 11% of global upfront carbon emissions and drives over 50% of material extraction worldwide.[22,23] In addition, the manufacture of building materials, such as concrete, steel and glass, is highly energy-intensive.[24] By adopting circular economy practices, like retaining and reusing structural components, finishes and mechanical systems, retrofits significantly **reduce the demand for virgin materials**, lowering the embodied carbon footprint of a project.
- Retrofitting also helps **avoid the vast volumes of waste** generated by demolition. Construction and demolition waste is estimated to account for more than 30% of the total solid waste generated annually.[25] Despite more than 75% of this material estimated to have residual value, it is rarely reused or recycled.[26]
- Deep retrofits of existing buildings can **cut whole life carbon emissions** by 50%–75% compared to new construction, mainly by retaining high-carbon structural elements and avoiding the decades-long carbon payback period of new builds.[27]

Adaptive reuse at campus scale

In central Milan, Italy, SOM transformed Corso Italia 23 – a 1960s Gio Ponti office complex – into a dynamic all-electric campus of three interconnected buildings, preserving existing structures and reducing embodied carbon. The project has achieved LEED Platinum, WELL Platinum, Wiredscore Gold and EPC A+ certifications,[28] showing how large-scale adaptive reuse can deliver future-ready, sustainable workplaces and vibrant urban spaces. Source: SOM

Transforming a Sydney landmark

The redevelopment of Quay Quarter Tower in Sydney, Australia, showcases adaptive reuse on a grand scale, retaining around 68% of the existing core and structure to significantly slash embodied carbon compared to full demolition. Owned by Dexus Wholesale Property Fund, Mirvac Wholesale Office Fund and Rest, delivered by Multiplex, the project is designed to meet 6 Star Green Star Office Design v3 and 5.5 Star NABERS Energy ratings,[29] reducing emissions while delivering increased usable space and contemporary functionality. Source: Multiplex

Retrofitted shopping centre

MyTOWN Shopping Centre in Kuala Lumpur, a vibrant retail and leisure destination, has strengthened its sustainability credentials since achieving GBI Silver in 2019.[30] The Centre implemented extensive retrofit strategies, including solar photovoltaic expansion, rainwater harvesting, LED lighting upgrades, high-efficiency chiller optimisation and advanced energy management systems.

These initiatives reduced building energy intensity by nearly 30%. Recognised with an Honourable Mention in the ASHRAE Malaysia Technology Awards, MyTOWN exemplifies innovation in energy efficiency and green building leadership. Source: Malaysia MyTOWN

MyTOWN Shopping Centre

Social benefits

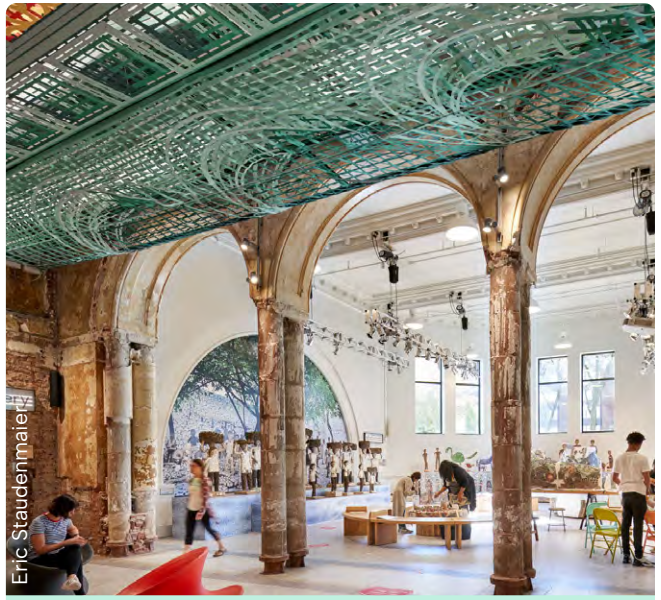
- **Improved occupant comfort**
- **Lower need for heating and cooling**
- **Enhanced air quality and temperature stability**
- **Training and reskilling opportunities**
- **Preserved heritage features**

Retrofitting for health and welfare

- Upgrading the building envelope (e.g. walls, windows, doors, etc.) improves thermal performance, delivering warmer, more energy-efficient homes in winter and cooler, **more comfortable spaces** in summer.
- This **reduces dependence on mechanical heating and cooling**, which is increasingly critical as extreme heat intensifies. Up to 74% of the global population could be exposed to dangerous heat, and by 2050 around 970 cities may experience average summer highs of 35°C, affecting an estimated 1.6 billion people.[31,32]
- Upgrading HVAC systems with automation and controls improves comfort and health by **enhancing ventilation, air quality, and temperature stability**. These upgrades reduce risks linked to dampness, overheating and cold environments.
- Increasing global retrofit rates supports a just transition by **enabling worker training and reskilling** while creating well-paid green jobs. With retrofit investments generating 9–30 local manufacturing and construction jobs per million dollars, there is strong potential for inclusive workforce pathways that prevent communities from being left behind as the transition accelerates, aligning climate ambition with decent work and social equity.[33]

Overheating look out

Rising temperatures are driving a surge in cooling demand. Global air conditioner stock is expected to triple by 2050, increasing electricity use and emissions.[34] Passive design strategies such as insulation, shading, reflective surfaces and natural ventilation can cut cooling demand dramatically. If widely adopted, these measures could reduce global cooling demand by 24%, avoid US$3 trillion in cooling equipment costs and cut emissions by 1.3 billion tonnes CO_2e. Combined with with strengthened cooling systems regulation, energy efficiency and refrigerant phase-down, cooling-related emissions could drop by up to 60% below business as usual by 2050.[35]



Adaptive reuse in the Children's Museum of Pittsburgh

The Children's Museum of Pittsburgh, USA, transformed the historic 130-year-old Carnegie Library into the LEED v4 Gold-certified MuseumLab™,[36] showcasing how adaptive reuse can merge preservation with sustainability. Through envelope upgrades, high-performance glazing, and energy-efficient mechanical systems optimised via performance modelling, the project achieved a modelled 58% energy use reduction and 60% cost savings. Source: USGBC

Dampness look out

Dampness and mould are now widely acknowledged as significant contributors to poor health, often aggravating respiratory issues.[37]

Studies indicate that:

- individuals living in damp conditions face a **30–50% higher likelihood of developing respiratory ailments.**[38]
- children in such environments are nearly **three times more prone to breathing difficulties**.[39]

How retrofitting homes can tackle health issues and inequality

Arup's analysis of 54,000 social-rented homes in Leeds demonstrates that improving housing quality, by addressing cold, damp and poor air quality, can reduce mental health issues like anxiety and depression, while also stimulating local economies and job creation. When broader social and health benefits are included in cost-benefit analyses, the value of retrofitting increases substantially, making it a powerful tool for tackling inequality and improving public well-being.


Signify

Lighting the way for Kenya's students

The Signify Foundation, in partnership with the United Nations Environment Programme (UNEP), Sustainable Energy for All (SEforALL), and Kenyan Ministry of Energy and Petroleum, has brought 17,000 energy-efficient LED lights and 767 solar floodlights to schools across Kenya.

For over 86,000 students in boarding schools, this is more than a lighting upgrade, it's a chance to reclaim learning time, safety and opportunity.

In many of these schools, unreliable lighting limited students' ability to study after dark. "Right now, lack of light is a limiting factor, both in the evenings and in the mornings," shares Nyakundi, a student whose school switches off electricity at 10pm to cut costs. The inability to read, write, or revise in the early morning or late evening has placed students at a significant disadvantage.

Now, with the installation of high-efficiency LED lighting and solar-powered floodlights, students can safely move around campus and study after sunset, while administrators see a brighter financial outlook.

The switch is expected to lower electricity bills by 24%, saving approximately US$213,000 annually, resources that schools can reinvest into essential items like books, sports equipment, or teacher training.
Source: Signify Foundation

Retrofitting for cultural preservation

- Retrofits can **preserve heritage features** and architectural quality, helping to maintain cultural identity and continuity within communities. By upgrading buildings to modern performance standards while retaining their character, retrofitting delivers on environmental benefits, alongside cultural and social value.[40,41]

Preserving the silhouette to unlock cultural and environmental value

Buro Happold supported the refurbishment and restoration of one of Sharjah's most distinctive buildings in the UAE, The Flying Saucer. Returning the building to its original silhouette and offering a panoramic view, its identity as a city centrepiece was reinvigorated. By maximising natural light and integrating modern, efficient services, the design creates an internal environment resilient to the heat outside. Drawing on the site's socio-cultural history and designing for public use, the project delivers lasting social value. Source: Buro Happold


Sharjah Art Foundation

Energy efficiency in Qaddura Camp, Palestine

The Qaddura Camp retrofit programme in Ramallah, Palestine, introduced a comprehensive package of resource efficient and circular upgrades, including double-glazed windows, insulated roofs and envelopes, improved electrical systems and lighting, energy-efficient appliances and new or upgraded solar water heaters alongside a solar energy system.

The retrofit investments cost US$7,000–$11,000 per home and generated reductions of up to 35% in electricity bills, supported by an incentive scheme that paired renovations with the installation of prepaid metres, which also helped reduce national electricity debt. Source: PalestineGBC

Heritage retrofit meets innovation

NextHub Deloitte in Bari, Italy, transformed a historic 1920s building into a cutting-edge workplace, research and development hub.

The project runs with a photovoltaic system that covers 44% of primary energy demand and achieved Gold certification under GBC Historic Building, a novel certification scheme developed by GBC Italia, and WELL v2 standards, proving that heritage preservation and sustainability can go hand in hand. Source: Deloitte


Tata Group

First heritage building to achieve IndiaGBC green building certification

Bombay House, the 120-year-old headquarters of TATA Group in Mumbai is India's first existing & heritage building to achieve India Green Building Council's GREEN Existing Building ratings, with Gold in 2014 and Platinum in 2022.[42] Through extensive retrofitting of interiors and equipment, the building saved 25% of water consumption, and improved energy efficiency by over 35% through magnetic bearing chillers, controlled HVAC systems, LED lighting and integrated Building Management Systems (BMS). The renewable energy is sourced from an off-site solar plant. Structural restoration preserved heritage features while enhancing comfort with ozone-cleaned ducts and low-flow water fixtures. Bombay House now aspires to achieve net zero operations by 2026, setting a benchmark for heritage sustainability. Source: IndiaGBC

Key considerations for retrofit

Retrofit targets and strategies for existing buildings should be shaped by economic, geographic, climatic, infrastructural, technological and cultural contexts.

Recognising that there is no one-size-fits-all approach, this section highlights key factors essential for delivering balanced and effective sustainable retrofit projects.

Retrofitted aquatic centre

Fluidra partnered with ARKANCE Spain to renovate Santiago's aquatic facilities for the 2023 Pan American and Parapan American Games, aligning with World Aquatics (formerly FINA) standards and supporting a more sustainable, resource-efficient venue. Leveraging Building Information Modelling (BIM) tools, the team achieved early clash detection and optimised design coordination.

These strategies reduced delays by 80%, cut waste costs by 20%, and ensured timely project delivery. Source: ARKANCE

Financing retrofits

Retrofitting buildings typically requires significant upfront costs, while financial benefits such as reduced energy bills accumulate over a longer period. This can result in extended payback periods.

Most companies are unlikely to pursue opportunities with a payback of more than five years, while households often base retrofitting decisions on factors beyond finances, such as perceived quality of life improvements after the retrofit.[43,44]

Deep retrofits can lead to future energy savings, risk mitigation of volatile energy prices, often lower maintenance costs, improved occupant health and enhanced climate resilience, which are typically not reflected in traditional finance instruments.

Financiers

- Dedicated financial products — like green mortgages, green bonds or performance-based loans — that encompass these financial benefits and are structured to align with the life cycle benefits of retrofits (i.e. expected future energy savings), could enable more investments in retrofitting.

Governments

- Drafting policy packages with guaranteed schemes, preferential loans, incentives and tax breaks on retrofitting services and products, labour upskilling programmes, awareness raising initiatives, and one-stop-shops helps create an enabling environment for retrofits.[45]

Insurers

- Reformed insurance frameworks — with climate-related risks communicated and accounted for, and adjusted coverage and premiums based on a building's energy and resilience features — can drive widespread retrofitting efforts.
- Certification programmes and integration of resilience into property valuations further strengthen this link, aligning financial benefits with climate risk reduction.

Key considerations for commercial retrofit

Delivering Net Zero: Key Considerations for Commercial Retrofit from UKGBC brings commercial retrofit into focus, promoting the important conversation around our existing built assets and providing new clarity and consistency to the approaches required to decarbonise them.

Innovative business models

Innovative business models are transforming the financial landscape of building retrofits, tackling financial barriers in energy retrofitting by making retrofits more accessible and less capital-intensive for owners and investors. At the centre of these innovative business models is the spreading of upfront retrofitting costs, or capital expenditure (CapEx), over a longer timeframe, often linking operating expenses (OpEx) payments to actual energy savings.

Energy service companies (ESCOs), offer both retrofitting services and take on the financial risks of the retrofit. From the client's perspective, this shift reduces the need for large loans, lowers financial risk and frees up capital for other strategic investments. By aligning costs with performance, these models make retrofits more financially viable, especially for property owners or those managing multiple assets.

- Energy Performance Contracts (EPCs), Products as a Service (PasS) models, and shared savings agreements, using performance-based approaches, help ensure accountability and minimise risk for building owners.
- Other models, such as Build Operate Transfer (BOT), are increasingly used to retrofit public buildings, allowing private partners to finance, deliver and operate assets for a fixed period before transferring ownership back to the public sector.

Energy Performance Contracting (EPC) explained

EPC as an energy service model enhances energy efficiency in industrial and commercial facilities by financing retrofit projects in existing buildings through guaranteed savings. Investments are financed by customers' energy savings, reducing financial and technical risk while ensuring environmental and economic performance. The shift from CapEX to OpEX models is being taken further by Managed Service Agreements such as "Decarbonisation as a Service".
Source: Siemens

Energy Savings Performance Contracts (ESPC)

Schneider Electric has nearly US$1 billion in performance guarantees for energy reductions, achieving savings that are 12% over and above the annual guarantee. Schneider Electric uses as a base the ISO 9001: Quality Management Systems and a performance based on real, measurable savings.

Life Cycle Assessments

Life Cycle Assessment (LCA) is a key tool for designing effective retrofit strategies, providing a data-driven view of a building's environmental impacts across its full life cycle, from materials and construction to operation and end of life. This holistic approach helps balance trade-offs between embodied and operational carbon.

When applied early, LCA supports evidence-based, context-sensitive decisions that maximise carbon reduction, resource efficiency and resilience, recognising that no single retrofit solution fits all buildings. While LCAs are best practice, they can be resource intensive. Where full assessments are not feasible, practitioners can follow Green Building Council guidance, prioritise Environmental Product Declarations (EPDs), or use embodied carbon calculators for key materials.

Connected and scalable lighting for comfortable spaces

The Instituto Corporativo de Enseñanza Superior (ICES) in Sunchales, Argentina, retrofitted its campus with a 100% LED, smart, connected lighting system.

The system automates, dims and switches lighting based on occupancy patterns, enables remote management and helps maximise energy efficiency.
Source: Signify

Ownership challenges

Retrofitting in the residential sector is particularly challenging due to fragmented ownership and split incentives. Dispersed responsibilities mean action often depends on individual or community initiative, while landlord–tenant arrangements discourage investment as owners bear upgrade costs, but tenants capture the energy savings. Short-term leases, high upfront costs and long payback periods further limit uptake.

Neighbourhood-scale retrofit offers a way forward, shifting from isolated upgrades to coordinated, area-based schemes supported by citizen action, government and industry. Using professional design teams, shared solutions such as renewable energy assets can be delivered at scale, reducing costs.

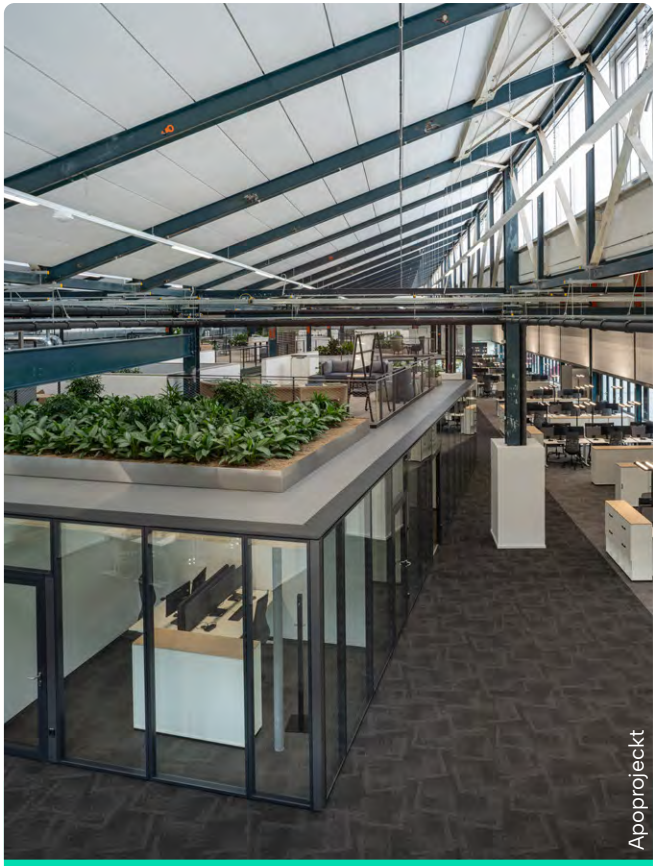
'Pay-as-you-save' financing removes upfront costs for residents, backed by long-term investors (for example, pension funds) and government-blended finance, with reinvested savings supporting decarbonisation, jobs, health outcomes and wider community regeneration.[46]

Fit-outs

Interior fit-outs are a frequently overlooked component of building sustainability yet represent a significant opportunity for emissions reduction due to short renovation cycles and high material turnover.

Unlike structural elements, which may remain unchanged for decades, interior spaces, such as finishes, partitions, lighting, and furnishings, are often replaced every 5 to 15 years, particularly in commercial and retail settings. This rapid turnover leads to substantial embodied carbon emissions, resource consumption and waste generation. Despite this, fit-outs are rarely included in retrofit strategies or carbon accounting frameworks, creating a blind spot in sustainability planning.

Expanding the scope of reporting schemes to include interior elements can enhance transparency and motivate designers and project teams to adopt circular principles such as modularity, material reuse, and adaptability.



Adaptive reuse transforms industrial hall into future-ready workspace

Apoprojekt converted a former industrial facility in Neufahrn, Germany into a resource-efficient office space. Modular, prefabricated steel elements were added to create flexible meeting and collaboration areas that can adapt to future needs. Upgraded energy-efficient systems further enhance performance, making the project a scalable model for sustainable building deep retrofits. Source: Apoprojekt

Corso Italia, SOM, Dave Burk

Climate action roadmaps

A regional overview

Regional drivers and needs for building retrofits vary widely, shaped by a complex interplay of cultural characteristics, building typologies, climate conditions, regulatory environments and socioeconomic factors.

This need for inclusive approaches is a driver in the development of nationally or regionally specific climate action roadmaps for the built environment. Roadmaps present a proven mechanism for impact. They provide a clear, co-created pathway for how countries and cities can align policy, finance and industry action to achieve total decarbonisation and resilience in the built environment. Roadmaps are driving impact through:

- setting out policy asks resulting in policy implementation
- outlining actions for businesses to follow
- facilitating private sector alignment
- creating an enabling environment for increased finance flow to support implementation.

WorldGBC, alongside our network, has been actively developing and implementing roadmaps in Europe under the #BuildingLife project for the last five years. Green Building Councils (GBCs) and their members have shown that concerted, coordinated action on roadmaps can empower industry to lead and inspire policymakers to raise ambition. With over 800 companies endorsing national climate action roadmaps and half of them already publishing detailed action plans to cut emissions, the collective momentum is now translating into measurable action and demonstrating the real-world impact of ambitious, industry aligned pathways.[47]

Roadmaps provide a clear, co-created pathway for how countries and cities can align policy, finance and industry action.

We have conducted a review of around 30 global, regional and national roadmaps (see *Resources*) from WorldGBC, our member Green Building Councils (GBCs), the UN Environment Programme (UNEP) – Global Alliance for Buildings and Construction (GlobalABC) and other organisations to identify common themes and calls to action that promote retrofits and scalable solutions.

In this section, we have summarised the key findings, followed by a regional overview, which can provide a starting point for those leading the development of new roadmaps in these regions.[48]

Retrofit at the core of decarbonisation

The assessed roadmaps consistently identify retrofit as a cornerstone strategy for achieving decarbonisation goals. While the level of detail varies, there is a growing recognition of the need for more detailed, context-specific solutions that address local building typologies, climate conditions and market maturity.

Practical tools and methodologies

The assessed roadmaps highlight the importance of accessible tools to guide and validate retrofit projects. These include:

- energy audits to identify performance gaps and prioritise interventions
- benchmarking systems to compare building performance across portfolios
- certification schemes, such as energy performance certificates or green building labels, to set benchmarks and ensure quality.

These tools not only support decision-making but also help track progress and ensure alignment with national and global climate targets.

Policy as a key enabler

Policy and regulation are globally acknowledged as essential to driving retrofit efforts. There is a recurring theme of the assessed roadmaps emphasising the importance of evolving building codes and policy frameworks that can support retrofit goals. These include:

- developing and enforcing Minimum Energy Performance Standards (MEPS) for existing buildings
- promoting life cycle assessments (LCAs) to account for embodied carbon
- energy labelling and disclosure of retrofit outcomes to increase transparency and accountability.

Effective policy frameworks should also be flexible, allowing regions to tailor retrofit priorities based on their unique risk profiles, socio-economic conditions and development goals.

GBC advocacy efforts across 30 countries have contributed to government policy and regulatory changes in the last year affecting over 560 million people[49]

Incentives and market activation

Both financial and non-financial incentives are important in stimulating retrofit activity. This has been noted across some of the assessed roadmaps, and includes:

- grants, subsidies, tax credits, low-interest loans and technical assistance for developers and building owners
- streamlined permitting processes and/or planning incentives
- recognition programmes and green certifications to reward leadership.

In parallel, training and upskilling programmes are needed to build a competent workforce capable of delivering high-quality, scalable renovations. Raising awareness among users and building owners about the economic, health, and comfort benefits of retrofitting is also essential to drive demand.

€60 million has been leveraged to scale innovation in support of European roadmap actions on Whole Life Carbon and circularity[50]

➔ Capacity building and knowledge sharing

Building institutional and technical capacity is a recurring theme. This includes:

- strengthening local governance and technical institutions
- facilitating peer learning and knowledge exchange across regions
- supporting research and innovation in retrofit technologies and business models.

420,000 training hours were delivered to over 89,000 people by GBCs in the last year[51]

Sustainability and market competitiveness

Edificio San Martín in Colombia, developed by Ménsula S.A., exemplifies sustainable renovation through its LEED BD+C Core & Shell v4 Gold certification[52] and transformation into a high-performance A+ office asset. The project eliminated irrigation water use, reduced potable water consumption by 2.7 million litres, and cut annual energy use by 536 MWh (equates to ~US$121,000 in annual electricity-bill savings at recent Colombian tariffs).[53]

Over 70% of the existing structure was reused, and 89% of construction waste was diverted. These efforts not only improved environmental performance but boosted asset value by 25% and rental rates by over 50%, proving that deep green retrofits can deliver both sustainability and market competitiveness.[54] Source: CCCS (Colombia GBC)

Our call to action

Retrofit of existing buildings is essential for decarbonising the built environment, but solutions must reflect local contexts. As evidenced throughout this paper, successful retrofit projects have already been implemented and are delivering cost and energy savings worldwide.

The solutions are known, the priority now is to scale them and replicate proven approaches. Policymakers, industry leaders and stakeholders should collaborate to build on existing roadmaps, using them as foundations for aligning, updating, and, where roadmaps do not exist, developing new inclusive, country or region-specific roadmaps that combine strong policy frameworks, financial incentives, practical tools and capacity-building initiatives.

Join the WorldGBC network in shaping and implementing these roadmaps and champion the prioritisation of comprehensive retrofits.

National Green Building Councils play a pivotal convening role, supporting the critical dialogue between business and policymakers needed to turn ambition into action. Together, we can accelerate emissions reduction, safeguard assets, and drive an equitable transition toward a sustainable future.

Americas

Despite low renovation rates in Latin America, leadership from both the private and the public sector is increasing with initiatives promoting retrofit.

Some examples, coming from the WorldGBC network, include:

- Argentina and Chile are including explicit mentions to retrofit into building codes.
- Brazil is increasing policies for urban regeneration.
- Canada aims to accelerate deep, energy-efficient retrofits across its vast and ageing building stock, targeting a retrofit rate of around 3% per year to reach net zero by 2050, with a strong focus on electrification and resilience to climate hazards.[55]
- The number of LEED O+M (Operation and Maintenance) certified projects in countries like Colombia is rising as they increase profitability while generating a high value in energy efficiency, occupant comfort and operations management.[56]
- Colombia has been creating tax incentives for implementing strategies on energy efficiency, both as products or services, and renewable technologies.
- Costa Rica is creating policies to support the development of retrofits over demolition and increasing requirements on waste management.
- Ecuador is introducing voluntary standards for buildings undergoing significant renovations.
- Mexico is creating programmes to support retrofits for low and middle-income households.
- Peru is developing energy efficiency guides for public buildings.

Major barriers remain, such as the lack of comprehensive data on the extent and impact of renovations, which hinders informed decision-making and policy development. A general upgrade of building codes and capacity building is recommended, with a special consideration to informal settlements.

Europe

In the EU's ambitious journey toward climate neutrality, retrofitting existing buildings emerges as a critical strategy.

With projections indicating that up to 80% of the buildings that will be in use by 2050 already stand today, the assessed roadmaps underscore the urgency of upgrading the current building stock. Alarmingly, 35% of these buildings are over half a century old, and 97% fall short of the energy efficiency standards needed to meet future carbon targets.[57]

To accelerate deep retrofits, WorldGBC's *EU Policy Whole Life Carbon Roadmap* proposes the **implementation of Minimum Energy Performance Standards (MEPS)** to push existing buildings toward higher efficiency and align with complementary tools such as **Building Renovation Passports (BRPs)**.

Recognising the financial barriers to large-scale renovation, the assessed roadmaps call for **robust funding mechanisms**. EU recovery funds and the Social Climate Fund are earmarked to support deep retrofit efforts, particularly for the worst-performing buildings and vulnerable populations. In addition, tailored grants, subsidies, and accessible loans are recommended to ensure equitable access to retrofit opportunities.[58]

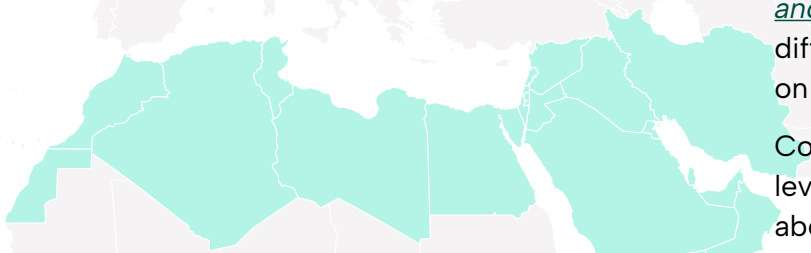
Africa

In Africa's rapidly urbanising landscape, energy retrofits are emerging to improve building performance and advance climate goals.

However, the **current regulatory environment** across African countries offers limited support for retrofitting. Few national building codes address retrofit standards, creating a gap in policy that the assessed roadmaps seek to close. The assessed roadmaps recommend a phased approach: voluntary codes in the short term, mandatory codes for all buildings by 2040, and near-zero carbon codes for most countries by 2050. In parallel, building refurbishment is encouraged as a strategy to gradually improve performance and extend building life.[59]

To ensure transparency and guide future improvements, the assessed roadmaps advocate for the **widespread adoption of building labelling and passports**. Instruments such as building passports will support informed decision-making and help align individual buildings with broader climate action plans.

Financial and non-financial incentives are also recognised as crucial to scaling retrofit efforts. At present, fiscal incentives such as grants, rebates, and tax breaks are minimal across the continent. The assessed roadmaps call for a significant increase in these supports, particularly for low-income households and poorly performing buildings.



MENA region

Across the MENA region, the building and construction sector in Arab Countries accounted for 23% of total final energy consumption, with projections suggesting that a strict adoption of MEPS and building energy efficiency codes (BEECs) would reduce this by 5% by 2030. A further 30% reduction could be achieved by 2050 through large scale retrofits.[60]

The GlobalABC *Regional Roadmap for Buildings and Construction in the Arab Region* outlines differentiated retrofit targets for countries based on their development status for the Arab region.

Countries have been categorised into three levels of development, with requirements about implementing Energy Efficiency Building Codes and enforcement plans to ensure broad coverage and alignment with net zero objectives.

The *UAE Sustainability Built Environment Blueprint* highlights retrofits as a critical enabler for achieving the UAE's net zero targets, with opportunities to establish nationwide retrofit requirements and guidelines supported by local incentives.

The report emphasises **harmonising regulations, introducing energy performance certificates, and linking retrofit compliance to rental and mortgage frameworks**. It calls for **performance monitoring, auditing, and certification** of equipment to ensure efficiency, while highlighting the role of **ESCOs and shared savings models** to accelerate adoption.

Retrofit programmes, such as Dubai's target to upgrade 30,000 buildings by 2030, demonstrate the potential for significant energy and carbon reductions, cost savings, and improved building performance.[61]

Asia Pacific

The Asia Pacific region is seeing growing momentum in retrofitting existing buildings, with various countries setting a strong example of leadership in this space. However, progress across the wider region remains uneven, and accelerating action is critical to meet climate goals.

In Australia, for instance, existing buildings seeking a Green Star rating must be 10% more energy efficient than the 2019 National Construction Code, which is the same requirement for new buildings.[62] In addition, the New Zealand Green Building Council asked building owners to start certifying their existing buildings to zero carbon in 2020 and have all their buildings zero carbon by 2030.[63]

China provides a further example of growing momentum. Building energy efficiency has increased significantly over the last decade, with over 64% of total floor space in urban buildings categorised as energy-efficient by the end of 2023, up by almost 30 percentage points from 2013.[64] However, several barriers are hindering retrofit efforts across Asia, including a lack of reliable data on building performance, high urban density, regulatory constraints (particularly for historic structures) and the substantial upfront investment required. The absence of detailed information on the condition and energy use of existing buildings makes it difficult to prioritise and implement effective retrofit strategies.

To overcome these challenges, a strategic approach is essential. Governments and stakeholders must **develop national decarbonisation strategies** that establish baselines and set clear targets for retrofitting. **Deep energy renovations**, that reduce energy use by 30–50% or more, should be prioritised. Increasing the annual renovation rate in Asia to 1.5% by 2025 and 2% by 2040 are key milestones.[65]

Equally important is improving the depth of renovations by encouraging comprehensive upgrades to building envelopes and systems.

Acknowledgements

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Sam Robjohns, Climate Action Coordinator, WorldGBC

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Green Building Councils

Argentina Green Building Council

Canada Green Building Council

Chile Green Building Council

Colombia Green Building Council (CCCS)

Costa Rica Green Building Council

Egypt Green Building Council

Emirates Green Building Council

Green Building Council Australia

Green Building Council Brasil

Green Building Council Finland

Hong Kong Green Building Council

Jordan Green Building Council

Malaysia Green Building Council

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Serbia Green Building Council

Sustentabilidad para Mexico (SUMe)

Tanzania Green Building Council

Tunisia Green Building Council

UK Green Building Council

US Green Building Council

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Resources

Tools and guidelines

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EBC: Deep Energy Retrofit — Case Studies

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Multiplex: 76 Southbank, London

MyTOWN Shopping Centre, Malaysia

Palestine GBC: Qaddura Camp, Palestine

RMI: 1,000 Apartment Challenge: REALIZE Massachusetts

Schneider Electric: Connected and scalable lighting for comfortable spaces

Serbia GBC: The Sava Center retrofit

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Signify Foundation: Lighting the way for Kenya's students

SOM: Corso Italia 23, Milan, Italy

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About World Green Building Council

At the World Green Building Council (WorldGBC) our role is to help property and construction markets around the planet reach tipping points and by 2050 achieve:

- total decarbonisation of the built environment
- healthy, equitable and resilient buildings, cities and communities
- regeneration of natural systems and a thriving circular economy

That means building the right policy environments, the right financing environments and the right social and cultural environments to deliver sustainable built environments.

As the largest local–regional–global action network leading the transformation to resilient and decarbonised buildings, cities and communities, we are driving systemic changes together with 85 Green Building Councils (GBCs) and industry partners from all around the world.

We work with businesses, organisations and governments to deliver on the ambitions of the Paris Agreement and UN Global Goals for Sustainable Development (SDGs).

This position paper complements WorldGBC's Building the Transition programme – our flagship global programme to deliver our *Strategic Plan 2025–2027*. This programme sees WorldGBC continue to scale solutions with the GBCs by matching global ambition with local impact.

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