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Accelerating Accountability: The Case for Carbon Pricing

ULI cChange

The Urban Land Institute is a global, member-driven organisation comprising more than 46,000 real estate and urban development professionals dedicated to advancing the Institute's mission of shaping the future of the built environment for transformative impact in communities worldwide.

ULI's interdisciplinary membership represents all aspects of the industry, including developers, property owners, investors, architects, urban planners, public officials, real estate brokers, appraisers, attorneys, engineers, financiers, and academics.

Established in 1936, the Institute has a presence in the Americas, Europe, and Asia Pacific regions, with members in 81 countries. ULI has been active in Europe since the early 1990s and today we have more than 5,000 members and 15 National Councils.

The extraordinary impact that ULI makes on land use decision making is based on its members sharing expertise on a variety of factors affecting the built environment, including urbanisation, demographic and population changes, new economic drivers, technology advancements, and environmental concerns. Drawing on the work of its members, the Institute recognises and shares best practices in urban design and development for the benefit of communities around the globe.

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C Change is a ULI-led programme to mobilise the European real estate industry to decarbonise. We're a movement empowering everyone to work together for a sustainable future. We connect the brightest minds from across the value chain. We challenge barriers, share expertise, and champion innovation to move swiftly to accelerate solutions that will transform our industry and protect our planet. C Change means real change.

C Change was formed in late 2021 by a group of leading real estate players that was united in its aim to focus on collaboration to ensure companies large and small have access to practical solutions and education on decarbonisation.

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Introduction

Carbon pricing is a priority for the ULI C Change programme because it is a critical tool to accelerate the pace at which we tackle emissions. This enables us to work more quickly towards our responsibilities under the Paris Agreement. It also signals more clearly our intention to be accountable for the impact of the real estate industry's carbon emissions on society.

Although we need to be driven by a duty of care, we also see more industries, companies, and countries being held responsible by citizens and environmental groups for lack of action and damage to the environment.

Finally, implementing an internal carbon price will help prepare us for the increasing likelihood of regulations linked to carbon emissions, whether in the form of taxes imposed on buildings at a city government level or emission trading schemes at a regional government level.

Accelerating Accountability: The Case for Carbon Pricing is a companion piece to C Change's *Universal Principles for Carbon Pricing in the Real Estate Sector* published as part of the C Change programme of work.

We believe that only an aligned industry can develop a successful carbon pricing initiative. This unity is why the principles, which support companies in implementing an internal carbon price, have been codesigned by a group of leading real estate industry associations.

The principles are also founded on a full value chain approach. Although there are stakeholders that are ultimately financially responsible for carbon emissions, such as capital providers and developers, we believe other stakeholders in the value chain, such as contractors, architects, and engineers, are important contributors in reducing emissions.

As these principles are released, we are mindful that the take-up of carbon pricing in the industry is low, and this report is designed to examine the wider benefits of carbon pricing for individual companies and the industry. We have also included case studies to highlight the practical ways companies are already navigating any barriers to successfully implement carbon pricing.

We welcome your feedback on this paper and hope that you will also review the principles and participate in our programme, bringing further progress.

Real estate organisations which have published *Universal Principles for Carbon Pricing in the Real Estate Sector*

1. Why carbon pricing?

At 37 percent of global carbon emissions, real estate is a major contributor to climate change and, while we often acknowledge the scale of our carbon footprint, the true impact of our "externalities" has not yet been considered. More simply put, our emissions have a societal cost, because they negatively affect the environment, the economy, social equality, and public health.

The concept of carbon pricing is simple: the polluter pays. Those who emit carbon must take financial responsibility for managing the emissions' effect on society and the planet. This mechanism sees government bodies imposing a price for each tonne of carbon that companies produce through their activities, or the companies imposing this price as an internal cost on themselves.

Carbon pricing is a priority for the ULI C Change programme because we believe the industry should address its responsibilities head-on. To meet our Paris Agreement responsibilities, we have to reduce emissions by at least 55 percent by 2030.[1]

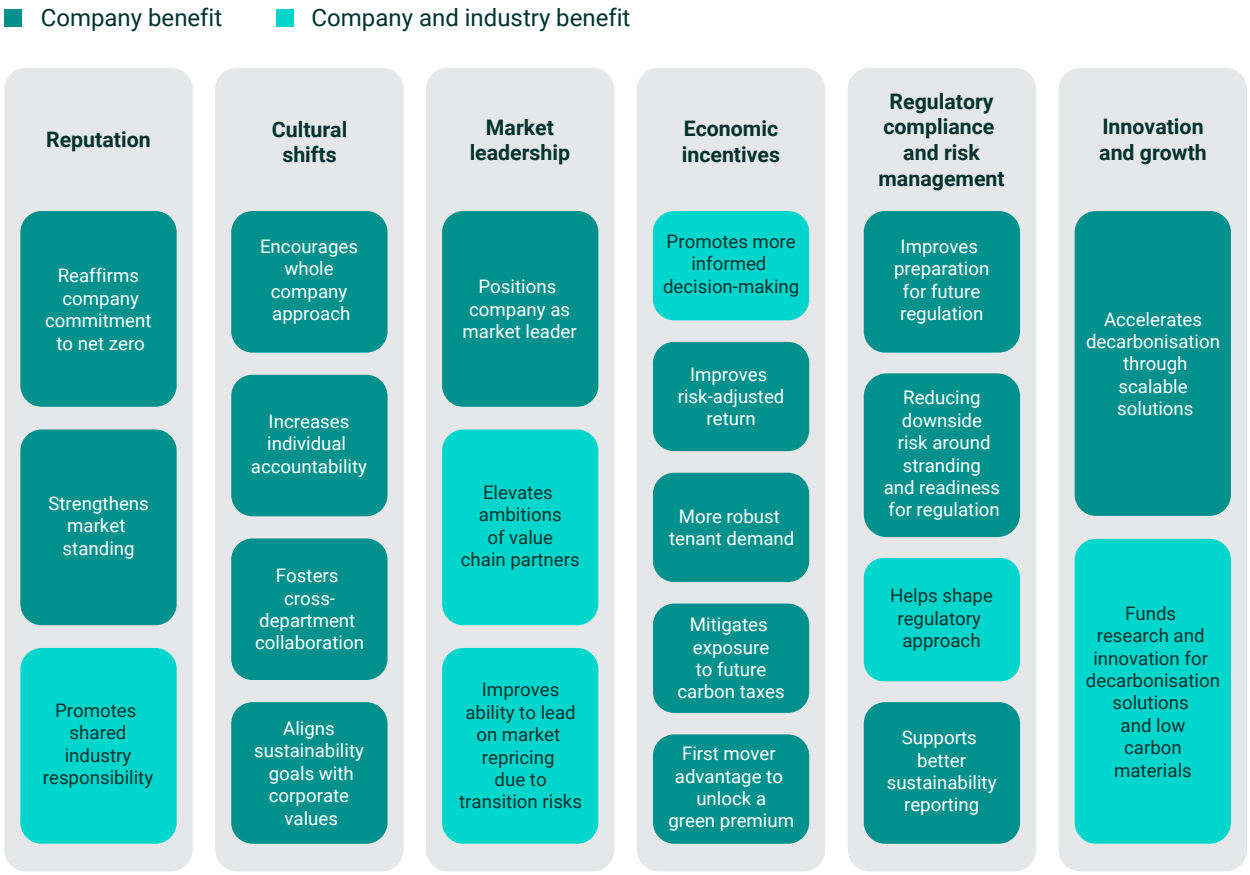
If we take action now, we give ourselves a chance for better long-term planning and the ability to address the risk of stranding buildings, a problem described later, which is likely to happen ahead of 2030. The current low adoption rate of carbon pricing in our sector means that we have an early-stage opportunity to work collectively and to be proactive in shaping an industry-wide carbon pricing mechanism. However, we are also currently operating in rather challenging economic conditions, and we need to balance short-term economic priorities with long-term resilience.

Wider benefits of carbon pricing

Internal[2] carbon pricing, which this report focuses on (see *2. How does carbon pricing work?*), is at its core an accounting-led solution and that can make it appear technical or reduce it to the notion of a penalty or tax. However, the broader impact of carbon pricing can be truly transformational (see *5. Benefits of setting an internal carbon price*).

Figure 1

Benefits of carbon pricing



First of all, implementing carbon pricing can significantly speed up the pace of decarbonisation and drive innovation at scale. It enables us to mobilise private capital by more closely aligning financial and strategic interests with climate goals. The funds raised through this instrument are often used to explore new technical solutions or emerging sustainable materials, which can be scaled across portfolios.

It is also a powerful tool for driving culture change within organisations, as it offers a common approach for everyone – not just sustainability teams – to embed carbon consciousness in financial/investment decision-making Integrating decarbonisation into company culture also demonstrates true commitment to environmental and social responsibilities, and positions organisations as leading market players encouraging best practice across the value chain.

Potential regulation

The need to decarbonise may not be enough of an incentive alone to implement a carbon price, but when combined with the threat of regulation, the case becomes more compelling, and the industry cannot afford to be unprepared.

Although current external carbon pricing mechanisms in other industries cover about 24 percent of current emissions,[3] these types of mechanisms do not extend to much of the 37 percent of emissions globally from real estate. Therefore, the prospect of an emissions trading system (ETS) covering our industry is very real with the European Union (EU) currently considering including buildings in its ETS II (see *2. How does carbon pricing work?*). It would be operational in 2027 at the earliest.

Currently, clear, consistent and tailored regulation is lacking, and it is a great opportunity for the built environment industry to take proactive steps in defining a carbon price strategy, rather than waiting for it to be imposed. We understand best the dynamics of our own sector, and our complexity means there is not a one-size-fits-all solution. Moreover, by implementing an internal carbon price in advance, real estate organisations reduce the risk of future compliance costs, penalties, and nonconformity while also addressing their environmental responsibilities.

Adopting internal carbon pricing not only prepares us for regulation but also allows us to reap benefits

ahead of potential legislation by ring-fencing capital within the industry. External carbon taxes or other regulation will cause capital to flow out of the sector. An internal carbon pricing system is a closed circle: the capital allocated to carbon pricing would remain within the company/industry and could be focused on initiatives that accelerate the pace at which we decarbonise the built environment.

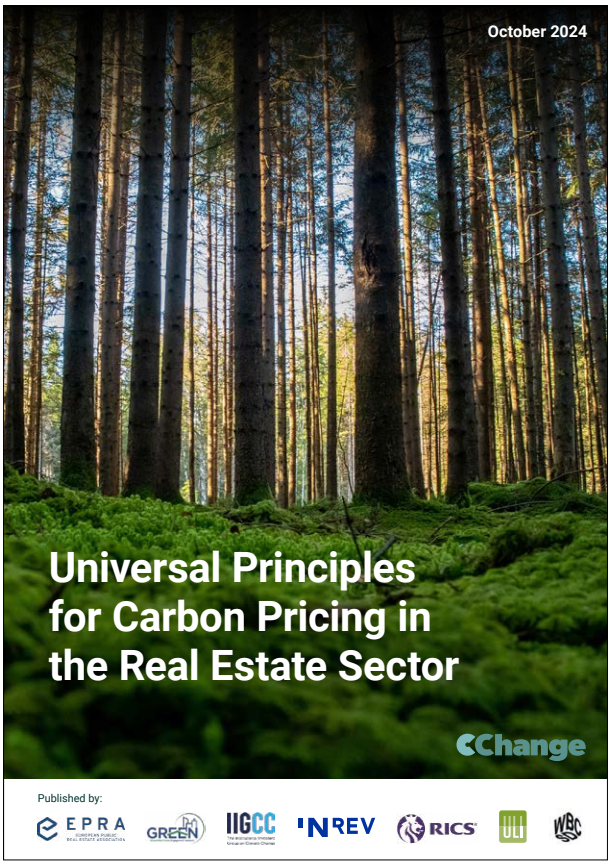
Environmental activism

Without preparation, our future could also be shaped by the public demanding action through the courts. Governments and major polluters such as oil and gas have already been subject to pressure from environmental and citizen groups for lack of action, "climate washing", or damage inflicted on our environment. According to McKinsey, the oil and gas industry was directly responsible for 9 percent of global emissions. In addition, the fuels it produces create another 33 percent.[4] This percentage of emissions puts the built environment on a similar scale to those already being targeted – as an industry, we cannot be complacent.

In 2023, at least 230 new climate cases were filed against governments and companies globally.[5] More than 30 companies are being held accountable for climate-related harm because of their contributions to greenhouse gas emissions in so-called "polluter pays" cases. For example, in 2023, the state of California sued five major oil companies and the American Petroleum Institute to hold oil companies accountable over what it called "decades of deception" over carbon emissions resulting in lack of action and physical climate impact such as extreme weather events.

In addition, more citizens are filing court actions against governments for failure to address climate change. Earlier this year, a group of older Swiss women won a case in the European Court of Human Rights with the claim that the Swiss government was not taking enough action on climate change.

Adopting internal carbon price mechanisms can demonstrate to external stakeholders that companies are holding themselves accountable for their emissions as well as committing to accelerated reductions.



2. How does carbon pricing work?

Carbon pricing is an approach that uses market instruments to incentivise carbon reductions and can be categorised into external and internal mechanisms.

External carbon pricing
Globally, governing bodies are starting to put a price on carbon; they implement legislation whereby the national government or local authority levies a price on the emissions caused by a sector or company. This regulatory approach ranges from a straightforward tax on emissions to a complex cap-and-trade system.

Carbon taxes directly target emissions, for example, at the fuel source or at buildings in the case of real estate. Within real estate, carbon taxes have so far been used as a penalty per tonne of carbon if certain emission reduction targets are not met or target levels of emissions are exceeded. For example, in Milan, building refurbishments need to reduce emissions by 15 percent or face a €25 per tonne carbon tax based on estimated operational emissions over the next 50 years. In New York, Local Law 97[6] requires most buildings over 25,000 square feet to meet new energy efficiency and greenhouse gas (GHG) emissions limits. Any emissions over the limit are charged at US$268 per tonne.

An ETS releases and distributes tradeable emissions permits to companies in sectors that are covered by the scheme. Each company will be allocated an annual per-tonne quota of emissions, which gives it the right to emit a certain amount of carbon dioxide or equivalent GHGs. Companies with spare allowances can trade those to others who expect to exceed their quota. The EU ETS also periodically auctions off new allowances with any capital raised going to member states or an innovation fund. The trading and auction process sets a market price for carbon with the estimated average price for 2024 expected to be €65 per tonne.[7]

Currently, few regulations apply to real estate directly. Certain future regulations, such as the EU ETS II, include plans to apply to buildings, but real estate is already indirectly affected by the current EU ETS that covers high-emissions sectors, for example, industry, electricity and heating, and mining.

Although those regulations do not have direct implications, the potential direction of movement shows enough evidence for real estate managers and investors to think about what effect a direct tax may have on their portfolios and consider implementing internal schemes in the meantime.

Internal carbon pricing
Internal carbon pricing is the term used when a company imposes a cost on itself for the carbon it emits. In this case, the capital is kept in the company and is often allocated internally to other decarbonisation activities. The company can either model the impact with a shadow carbon price or implement the mechanism as a full fee-paying system.

In the scenario of a shadow price, a hypothetical future cost is allocated per tonne of carbon emitted and is used to demonstrate the financial case of lower carbon alternatives and thus guide investment decisions. It is often applied to the business case for new construction assets and their materials but can also be used as an educational tool for buildings already under operation and those being retrofitted or repurposed.

A fee-paying system allocates an actual fee per unit of emitted carbon. Fees accrued through this system are then paid into specific “transition” funds dedicated to decarbonisation activity expenditure or for research and innovation.

Typically, organisations will implement shadow or fee-paying mechanisms to better understand their transition risk exposure with emission-producing buildings and to help in their green transition ahead of potential regulation.

Assigning a monetary value to emissions through a fee-paying mechanism incentivises decarbonisation within an organisation and its supply chain, highlighting emission-heavy processes through the value chain and building the business case to address them.

Where does carbon offsetting fit in?

Carbon offsetting is sometimes used by real estate companies as part of a carbon emissions reduction strategy, but it should not be confused with carbon pricing.

Carbon offsetting, or buying carbon credits, is a process whereby a company compensates for its own emissions at source by funding schemes that make equivalent reductions elsewhere. For example, the company might invest in forestry and conservation projects or community initiatives in other regions to provide renewable energy.

The company pays to offset these emissions and then counts those reductions against its at-source emissions. Although growth in the voluntary carbon market supports these investments, concerns exist about the nonstandard approaches to buying carbon credits and the lack of scrutiny about the effectiveness of the projects.

Carbon offsetting can be useful for real estate companies, but best practice recommends it as a final step for residual or hard-to-abate emissions once all on-site initiatives have been exhausted.

3. Current take-up of carbon pricing

The use of carbon pricing is becoming increasingly widespread at a government and corporate level as it becomes an accepted tool to tackle emissions. According to the World Bank, 75 carbon taxes and emissions trading schemes – 36 ETSs and 39 carbon taxes – operate worldwide, covering 24 percent of global emissions, up from 7 percent 10 years ago.[8]

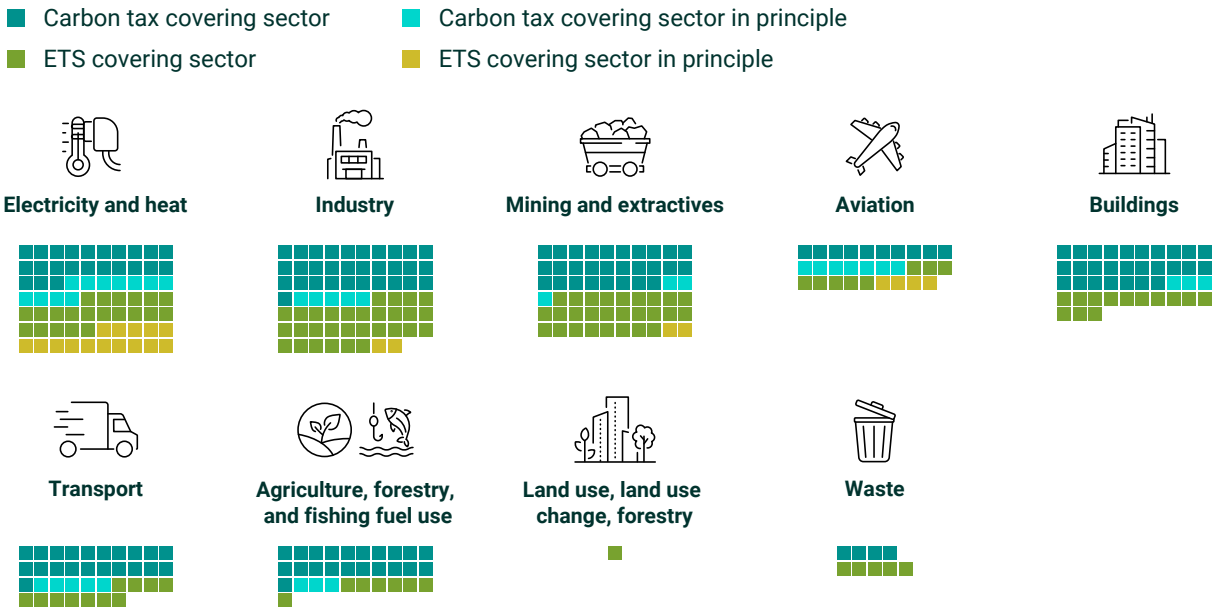
Although revenues exceeded US$100 billion for the first time in 2023, overall pricing is still considered too low to meet the Paris Agreement goals.

The ETSs and carbon tax schemes are most likely to target the power and industry sectors, although some governments are considering less traditional sectors, including shipping and waste. Mining and extraction, aviation, buildings, and transport are also frequently targeted (see Figure 1).

ETSs tend to target big emitters with taxes applied "upstream" at the point at which emissions are generated, while road transport and buildings tend to be covered more by carbon taxes, which are often applied "downstream" where the energy is used or consumed.

Figure 2

Covered sectors in implemented ETSs and carbon taxes



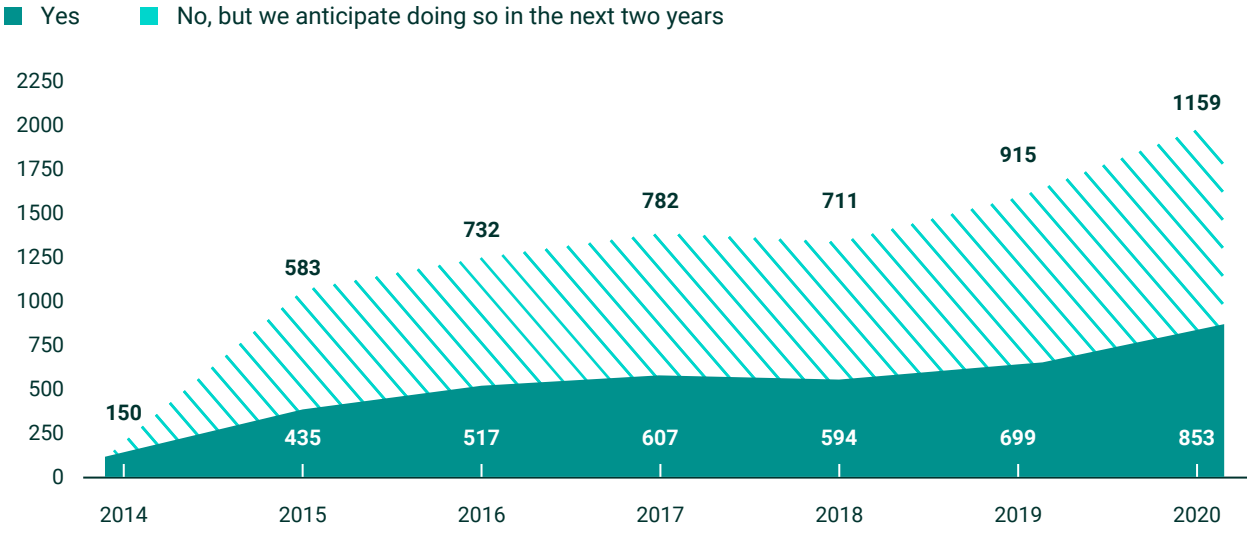
Note: ETSs = emissions trading systems
Source: World Bank

The pace of growth in the private and voluntary carbon pricing market is strong, with more than 2,000 companies now disclosing current or planned use of internal carbon pricing in 2020 (see Figure 2). This number includes 226 of the world's 500 biggest companies by market capitalisation, according to the latest data from CDP, which runs a global disclosure system for private and public stakeholders to manage their environmental impacts.

In 2020, 853 companies had implemented an internal carbon price with 1,159 saying they planned to do so in the next two years. Shadow pricing was the most common approach with 90 percent of companies focused on Scope 1 emissions.

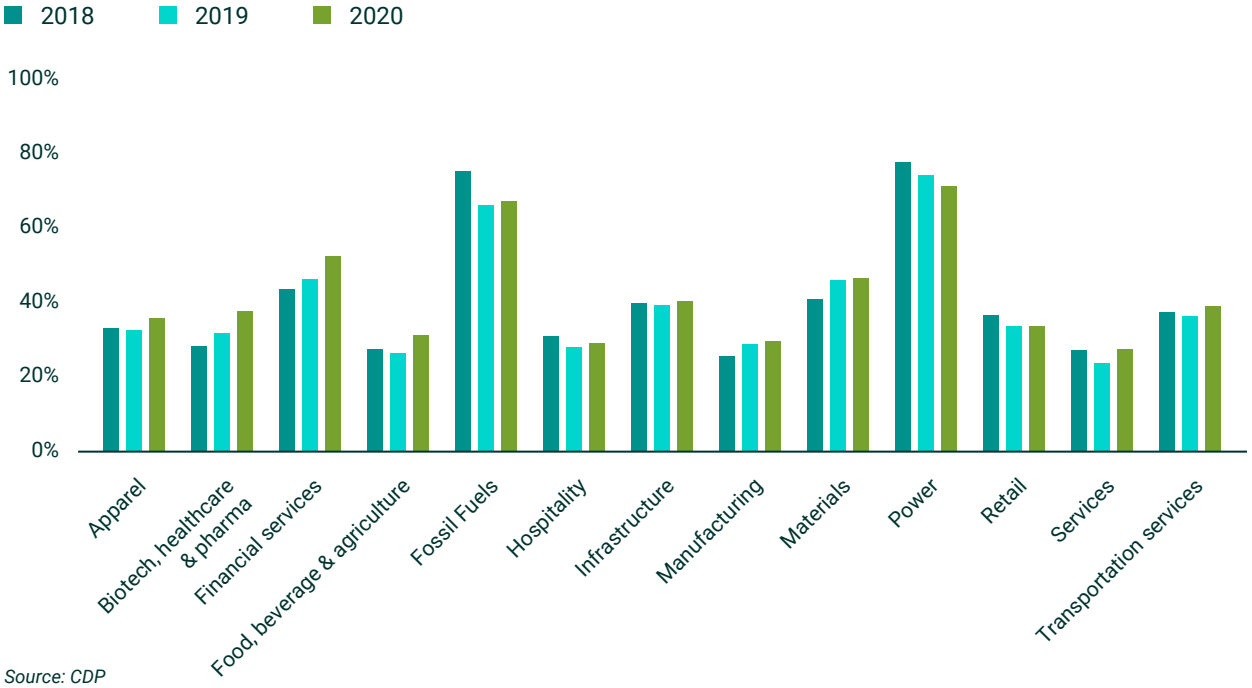
Sector-wise, the highest proportion of companies using or planning an internal carbon price was in the power and fossil fuel industries with financial services seeing a 6.2 percent growth to 2020 from 2019 (see Figure 3).

Figure 3
Growth of internal carbon pricing



Source: CDP

Figure 4
Share of companies pricing or planning to price carbon: 2018-2020



Source: CDP

At 60 percent, almost two-thirds of respondents said internal carbon pricing helped drive low-carbon investment, with 58 percent saying it also drove energy efficiency. Another strong objective at 55 percent of respondents was to change internal behaviour.

CDP reports a clear relationship between how a company uses an internal carbon price and whether or not it is preparing for potential regulation. Companies facing regulation are more likely to state navigating GHG regulations as an objective while others not facing regulation are more focused on changing internal behaviour, meeting stakeholder expectations, and engaging suppliers.

Unsurprisingly, CDP also reports that companies facing carbon regulations use carbon pricing as a compliance tool. However, in geographies where legislation is less stringent, organisations see carbon pricing as a way to change internal behaviour, meet stakeholder expectations, and engage suppliers.

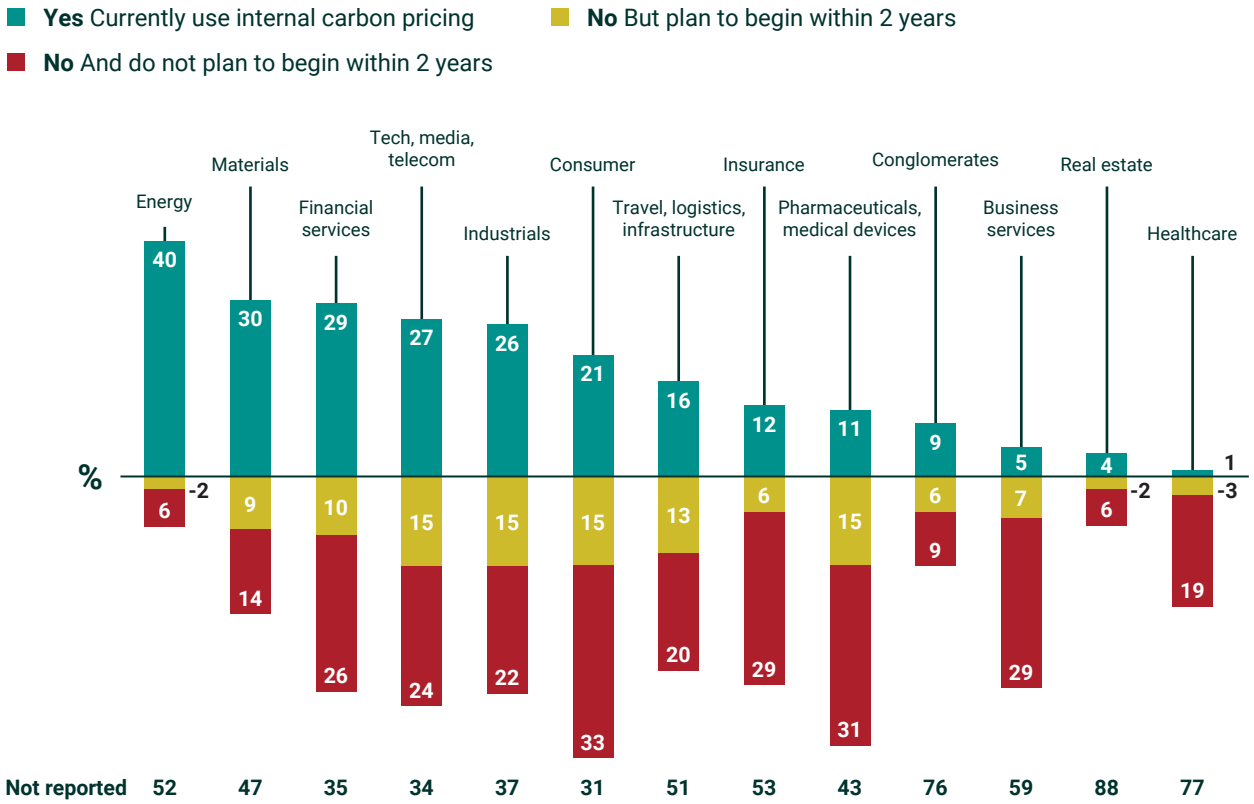
Real estate does not feature as an industry in CDP's report, but a separate report by McKinsey in 2019 found that of the top 100 global real estate firms by revenue, just 4 percent were using internal carbon pricing and publicly disclosing this fact, with another 2 percent planning to do so in the next two years (see Figure 4).[9] In the same report, those percentages can be compared with 40 percent in the energy industry and 29 percent in financial services.

Despite the low take-up of carbon pricing by the real estate industry, the ULI C Change Survey conducted in 2024 revealed the number of respondents who reported using a voluntary, internal carbon pricing mechanism had increased by 21 percent over the past 12 months, demonstrating momentum is increasing.

Comments from the small sample implementing carbon pricing said the main reasons were to evaluate the potential costs of carbon emissions, understand potential future risks, as well as build a better business case for decarbonisation of assets. For those yet to consider a carbon price, lack of industry take up, no buy-in from leadership and a lack of understanding were seen as the main barriers.

Figure 5

Take up and future expected use of internal carbon pricing by sector



Determined by a sampling of the top 100 companies in each sector ranked by 2019 revenue.
Source: McKinsey/Carbon Dosclosure Project

4. Challenges for carbon pricing in real estate

As with all emerging best practices, some challenges need to be overcome to encourage large-scale adoption of carbon pricing. Many of the case studies in this report are leading the way in addressing early barriers to adoption.

Pricing

The difficulty in pricing carbon is often raised as a reason not to move forward with an internal carbon pricing mechanism. The concern is that setting a cost that is either too high or too low can be counterproductive. If the price is too low, it enables companies to absorb the cost without it driving change. If it is too high, then it makes asset plans unviable and slows or stalls progress on decarbonisation.

The range of pricing is still wide across internal and external mechanisms and can depend on what the companies take into account when setting a price. For example, companies might calculate a number that they see as pricing in their own risk, while other organisations might consider a "true" social cost such as followed by Utrecht in the Netherlands, where the carbon tax is €875 a tonne.

Companies tend to be clustering around €90 a tonne in Europe (often with reference to the price set by the EU ETS). However, some cities have been more ambitious such as Utrecht, and New York at US$268 per tonne.

A consensus is absent on how high an internal carbon price needs to be to speed up decarbonisation progress by real estate companies. Investment into such retrofits can be significant, and without a sufficiently high carbon price, there is not necessarily a monetary incentive for owners/managers to carry out the work.

The lack of a verified, recognised or consistent approach to setting a price could also make it more challenging for owners/investors to support implementation.

Companies featured in our case studies have addressed this pricing concern in different ways. Engineering and manufacturing company Emerson and investment manager PATRIZIA (see pages 18 and 24) have used recognised reference points such as the UK and EU ETSs as benchmarks while Hong Kong-based Swire Properties (page 26) researched real estate and other industries to support its price point and reviews this information annually.

Great Portland Estates (GPE) (page 20) tested and fine-tuned its shadow price by using historic development appraisals. IPUT (page 21) is using its carbon pricing to address its embodied carbon in its development pipeline and has supported its pricing with the use of whole life carbon assessments.

Setting a price can be challenging because it is difficult to get a robust assessment of the real estate industry's footprint, and the variability of energy costs adds to the issue, because the costs directly affect the cost to reduce emissions.

The *Universal Principles for Carbon Pricing in the Real Estate Sector* by C Change addresses what is a current gap in industry guidance on pricing. It recommends that one uniform price be applied to both operational and embodied carbon to reduce the complexity of implementation. It also suggests proxies to help set an internal price

such as the EU ETS, calculating the internal costs of decarbonisation, and reviewing guidance on national abatement costs such as from the IEA or the UK abatement curve.

Operational versus embodied

The ongoing difficulties of tackling operational versus embodied carbon are also present in carbon pricing.

Compared to embodied carbon, operational emissions have historically been easier to measure, although availability of accurate operational data can still be a challenge. For example, getting the data requires collaborating with tenants, which generally own the data in the spaces they operate. However, operational emissions can at least be calculated and charged on a consistent annual basis, making it easier to implement a carbon price based on data.

In contrast, the complexity of the supply chain and materials involved in construction or retrofitting makes embodied carbon challenging to measure consistently or accurately, and there is currently no standard industry approach. Embodied carbon is also more difficult to incorporate into carbon pricing because it is a major upfront cost of carbon. This situation brings into question how embodied carbon should be accounted for over the hold period for or the lifetime of the building (including future owners).

Some companies, such as IPUT (see page 21), have addressed embodied carbon through internal carbon pricing with the support of whole life carbon assessments, which measure the emissions through the life of the building from construction to demolition and disposal.

COIMA (see page 16) is one of a number of companies trialling a carbon pricing approach to embodied carbon for the city of Milan. This trial comes before implementing the next phase of the city's carbon tax, which currently focuses on operational carbon.

This issue is addressed by the C Change's *Universal Principles for Carbon Pricing in the Real Estate Sector*, which recommends assuming a whole life carbon approach, with all stakeholders measuring embodied and operational emissions for the full life cycle and along the value chain within their scoped boundaries.

Inconsistent policy frameworks
Carbon pricing is on the mind of governments at the regional, national, and local levels, but internal carbon pricing mechanisms are at some risk of being superseded because they are part of an emerging policy area.

In addition, companies that own or manage assets across several markets could face a complex policy landscape that might increase operational costs and reporting burdens depending on carbon taxes at a national and city level. These conditions would make it challenging to implement a consistent internal carbon pricing mechanism across a company and could influence investment strategy or decisions to decarbonise assets.

COIMA's approach (see page 16) has been to ensure that existing frameworks such as Level(s) and the EU taxonomy are incorporated to connect the dots at a European level.

Competing economic priorities
The effect of higher inflation and a higher interest rate environment in the past two years is still a material challenge for many companies as they work to contain costs and maintain profit margins.

For some companies, this economic landscape may not be seen as conducive to embarking on a new initiative such as carbon pricing, which adds a further financial challenge to investment decision-making. It also requires a significant business resource, which might not be a priority at this time.

The outcome from internal carbon pricing might also favour long-term thinking, investment, and returns, when companies at this time may want to demonstrate short-term returns and allocate capital to growth sectors.

Owners and managers are also likely to be led by the needs of other stakeholders such as investors and tenants, which will also be managing their business in more challenging economic circumstances.

Industry take-up and awareness
A ULI survey from 2024 showed that the leading barrier to implementing a carbon price is the lack of industry take up followed by no buy in from leadership/key stakeholders. Many of the other barriers (see Figure 6) suggest a low level of education about carbon pricing with 35 percent not understanding the concept and the same percent not understanding the reasons to implement carbon pricing.

Over half of respondents were keen to see industry guidelines developed to set best practice, the first phase of which has been achieved through the publication of the principles while 48 percent were looking to regulation as a next step (see Figure 7). There was also clearly appetite from respondents to gain a better understanding of carbon pricing

mechanisms. ULI C Change has supported this aim through a number of online and in-person workshops, webinars and this report.

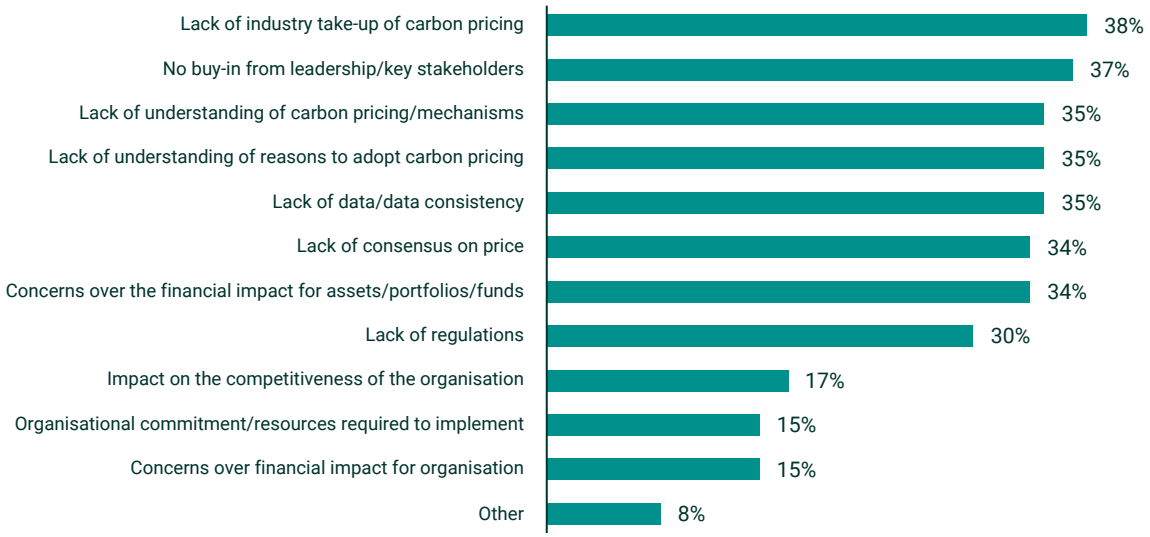
Another issue is that some companies have been reluctant to implement carbon pricing as there is no obvious competitive advantage to being an early adopter. Traditionally, market leaders are rewarded for taking a first-mover advantage whether through better returns or faster business growth. However, the valuation process does not properly recognise transition risks, so it potentially makes a company less competitive in the short term – as a buyer, it is building in additional costs through pricing carbon.

But making these risks transparent now will likely be an advantage in the long term for resilience and risk-adjusted returns.

Industry take-up will also only increase if solutions are found to support the complexity of company and investment set-ups. For example, internal carbon pricing might need to be at a fund/joint venture/operating company level rather than across a company, and it may also need to deal with a range of jurisdictions and structures as PATRIZIA and COIMA are now considering (see pages 24 and 16).

Figure 6

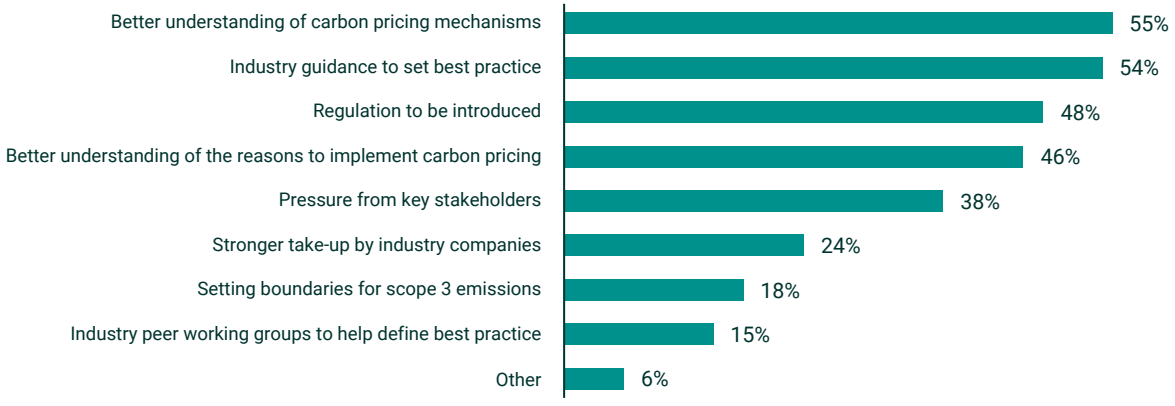
The main barriers to organisations implementing an internal carbon pricing mechanism



Percentage of respondents indicating a barrier.
Source: ULI C Change Survey 2024

Figure 7

The next steps to best support organisations to explore carbon pricing further



Note: N = 124, all respondents. Percentage of respondents indicating a best next step.
Source: ULI C Change Survey 2024

Case study COIMA

COIMA, a leading Italian real estate fund manager with the majority of its portfolio in Milan, has implemented carbon pricing mechanisms since 2021. Its dual approach to carbon pricing includes both a €25 per tonne tax on operational carbon, mandated by Milan's local regulations, and an internal shadow price integrated into its valuation models for operational and embodied carbon. This strategy allows COIMA to manage carbon costs effectively and align with sustainability goals across both the business and individual building life cycles.

The primary catalyst for COIMA's adoption of both external and internal carbon pricing was local regulation in Milan, as outlined in the city's building regulations.* These regulations require new buildings to achieve carbon neutrality, while refurbishments must reduce operational emissions by at least 15 percent. If this reduction cannot be met, the owner must pay an upfront fee of €25 per tonne of operational carbon to cover the next 50 years.

Since then, COIMA has implemented a rigorous operational carbon strategy that surpasses the reduction targets required for building refurbishments. For new constructions that fail to achieve operational carbon neutrality, COIMA compensates by covering the residual carbon cost.

Milan is now developing the second phase of these regulations, which will also address embodied carbon emissions. The *Piano Aria Clima* (PAC) is yet to be enforced under building regulations, as the city has launched a "testing" phase in collaboration with several real estate developers, including COIMA. This regulation draws inspiration from the C40 Cities initiative, a global network of nearly 100 mayors of leading cities united in addressing the climate crisis.†

COIMA is currently testing the inclusion of embodied emissions through a shadow pricing mechanism, aided by EU regulations and frameworks such as Level(s), an assessment and

reporting framework that provides a common language for measuring the sustainability performance of buildings.

“We were already using Level(s) to calculate the entire carbon life cycle because the requirement to assess embodied carbon is included in the EU taxonomy for new construction. So, several pieces at the European level are starting to connect the dots,” says Stefano Corbella, COIMA’s Sustainability Officer.

Carbon pricing has significantly influenced the company’s decision-making, particularly in fostering better collaboration with tenants to share the costs and benefits of energy efficiency improvements, and in optimising construction techniques to reduce both costs and emissions.

A notable example is the Porta Romana Olympic Village complex in Milan, built for the 2026 Winter Olympic Games, where innovative use of timber and steel has reduced both costs and the carbon footprint. While the €25 per tonne tax alone has not drastically changed construction practises or technologies, it has still made an impact.

“We believe there is room to optimise the construction process, which will help reduce carbon emissions. At €25 per tonne, this adds roughly 10 euros per square metre to the construction cost, which doesn’t significantly alter the technology,” says Corbella.

Further regulatory incentives are needed to drive the widespread adoption of sustainable construction materials and practices, particularly in Italy, to push the existing regulations further. COIMA’s evolving strategy includes developing a transition fund to shift from shadow to actual pricing for embodied carbon. However, with a portfolio of 30 funds, the company still needs to develop an effective approach to satisfy investors and obtain permission to reinvest in decarbonisation initiatives or invest in carbon credits.

* Piano Regolatore, “Norme di attuazione.”
† For more information, see https://www.c40.org/.

Case study: Emerson

With Emerson wanting to step up its progress towards its net zero operations target, the US-based multi-national engineering, industrial manufacturing and software company, has turned to an internal carbon price to inform its next steps.

Emerson has implemented a range of low- or no-cost energy efficiency work across its portfolio of around 200 manufacturing sites, headquarter buildings, and research and development buildings worldwide, but with much of the low-hanging fruit work complete, it requires fresh thinking to close the gap further.

Any next steps are likely to require capital investment, so Emerson wanted to use metrics that went beyond internal rate of return to ensure capital is allocated to the projects most critical for achieving its net zero target. “The traditional methodology of how we allocate capital and funds to our buildings and our operations, and the traditional metrics that we’re looking at for our internal rate of return for payback wasn’t going to be sufficient for some of the investments that were mission critical for achieving net zero,” says Adam Glassl, Sustainability Energy Manager.

Emerson opted for an internal carbon price of US$90, which was chosen to align with current market carbon pricing rates, including the EU ETS. Emerson tracks pricing movements by the ETS and other major carbon markets around the globe, and will adjust its carbon price to ensure consistency in the future.

This price was chosen to provide a credible realistic price that was explainable to key internal stakeholders. It is also high enough to affect decision-making but was not seen as too high to be counterproductive for internal stakeholders newly engaging with the process.

Internal buy-in for the carbon pricing was crucial, and months of consultation with the finance and accounting teams occurred before the proposal was pitched to the executive leadership team. “We wanted to make sure that we were educating our key stakeholders and using the implementation of the carbon price as an opportunity to teach them why this was going to be important and relevant in the years to come,” says Glassl.

Standard templates were produced to ensure a consistent analysis for any investment that would affect the energy consumption or carbon footprint of a building. Emerson also worked on four pilot projects in Europe, Asia Pacific, and the Americas to help educate its teams.

Although Emerson remains something of an early adopter, there is an acceptance that political and regulatory change is shifting towards a carbon tax. Again, Emerson thinks its adoption of a legitimate market price makes it better prepared if national or local carbon taxation schemes are adopted.

For Emerson, the carbon price has proved helpful in understanding where its short- and long-term capital investments would have the most impact between now and 2030.

5. Benefits of setting an internal carbon price

Setting an internal carbon price is emerging as a powerful tool for companies to proactively reduce emissions while simultaneously driving value across multiple dimensions of their business. There are many ways in which setting a carbon price can benefit businesses in both the short and long term.

Environmental and social responsibility
Investors and wider stakeholders have increasing expectations about integrating environmental, social, and governance (ESG) factors in decision-making. Implementing internal carbon pricing demonstrates a clear commitment to environmental and social responsibility through a proactive approach to addressing climate change and taking responsibility for a company's emissions.

This commitment strengthens a company's market reputation and sends clear signals to stakeholders of its social licence to operate. For example, it shows willingness to be held accountable through reporting and disclosing emissions, its readiness ahead of any climate change–related regulation, its focus on working with best-in-class suppliers, and its support of the sustainability ambitions of stakeholders such as investors and building occupiers.

GPE (see page 20) implemented a carbon price when it realised there was a clear need to accelerate change because its intended measures would result in a 50 percent reduction in carbon emissions but leave the other half unaddressed.

Carbon pricing also enables the company to demonstrate the shared responsibility across the sector for reducing carbon emissions. An owner/manager will ultimately be held responsible for the emissions, but others in the value chain can contribute in different ways, such as an architect responding to a carbon budget or developers supporting the use of new low-carbon materials or other innovation during construction.

Cultural shifts
One striking observation across the case studies is the ability of internal carbon pricing to bring about organisational change. By giving employees a simple goal based on a carbon price, the tool becomes a whole-company approach, fostering a sustainability mindset that encourages individual, team, and company accountability. Ultimately, carbon pricing can be a tool for business model transformation and a way to truly embed carbon consciousness into the business.

IPUT reports a mindset shift in its company (see page 21) while Spanish electricity company Endesa says a carbon price brought about more individual accountability (see page 22).

For many companies, it has widened the responsibility (and knowledge) of emission reductions from the ESG or investment teams to include finance and accounting teams with all benefitting from cross-department ideas and solutions. This inclusion drives alignment between all internal stakeholders as all departments need to participate.

For Emerson and Ivanhoé Cambridge (see pages 18 and 23), engaging with the finance teams resulted in strong internal engagement, while GPE (see page 20) said in addition to its finance team, it helped project and development managers, and engineers think differently about projects and potential new initiatives.

This alignment then fans out along the value chain as internal stakeholders instil their carbon approach in third-party suppliers and other stakeholders.

From a company perspective, it aligns sustainability goals with corporate values, enhancing engagement and attracting environmentally conscious investors, and it could support efforts to attract and retain talent.

Case study: Great Portland Estates

In 2020, Great Portland Estates plc (GPE), a UK property development and investment company with a London-based portfolio of office and retail assets, launched its road map to net zero, setting out plans to decarbonise the business.

As a part of the process, the company modelled the impact of the planned initiatives on anticipated carbon reductions by 2030. This exercise highlighted a clear need for accelerating the pace of decarbonisation, because it showed that the intended measures would result in a 50 percent reduction in carbon emissions, leaving the other 50 percent unaddressed or to be offset. GPE decided that setting an internal carbon price would be the right mechanism to fulfil that need to accelerate the pace.

As a first step, the company applied the internal carbon price to the upfront embodied carbon emissions, up to the practical completion of development projects, where GPE has the most control over decision-making. Because the company has such a high level of influence, it has extended the price to its Scopes 1 and 2 operational emissions.

Setting the right price proved to be the biggest challenge. The board of directors was engaged in the process from the outset, and it reviewed numerous available benchmarks, including the UN Global Compact, the EU and UK ETSs, and the carbon price set by the local authority.

To ensure that the pricing level would be right and have the desired effect on decision-making, GPE first applied a shadow price to historic development appraisals, to see what effect it would have had on the carbon and financial performance of the assets. This fine-tuning process resulted in GPE setting a fee-paying carbon price of £95 per tonne.

Although the support of the leadership team was crucial, rolling out the internal carbon mechanism required wider collaboration. The project and development managers needed to think differently about their decisions, the finance team was involved in setting up the transition fund, and the engineering team provided ideas on initiatives funded by the money raised by the carbon price.

One of the initiatives funded was a metering renewal project that allowed GPE to digitise and optimise its energy management, which served as a tangible example of carbon pricing bringing benefits to the company and not just being a cost.

“For GPE, carbon pricing drove behavioural change and encouraged thinking about carbon impacts of developments, along with financial performance,” says Janine Cole, Sustainability and Social Impact Director. “Because there is a price attached to carbon, different design decisions are made in the full knowledge of their carbon impact, in turn embedding carbon consciousness into the business.”

After keeping the price stable for three years, GPE has recently increased the price to £150 per tonne, to further speed up the pace of change and to increase the money in the transition fund, which enables funding research projects and innovation.

Case study: IPUT

It was IPUT Real Estate's significant planned development pipeline that led the Dublin-based fund manager to implement an internal carbon pricing mechanism in 2022, but its introduction has also signalled cultural change towards carbon reduction across the company.

On the back of signing up to the World Green Building Council's advancing net zero commitment, IPUT knew it needed an ambitious plan to tackle the embodied carbon that would be the largest component of its carbon footprint. The company opted to levy an internal carbon price of €80 for each tonne of upfront embodied carbon generated by its development projects across its €2.7 billion portfolio.

The €80 per tonne levy took IPUT a step beyond the sustainability team measuring carbon, with the attached price ensuring it became an integral consideration across the company. "We essentially put a euro sign in front of it, which meant that rather than just the sustainability team saying it's a good idea to start measuring the carbon, we got the feed in from our valuation team who were looking at the appraisals and our development team," says Shane Caldwell, Head of Sustainability.

With its approach to develop and own its buildings for the long term, it also implemented whole life carbon assessments not only for a consistent approach but also to consider carbon across the life of the building from an early stage.

The introduction of internal carbon pricing has been a mindset shift that now influences its decision-making right through the supply chain including design and materials, as well as the choice of suppliers willing to buy into its plans to reduce carbon. "It was an opportunity for us to really take a leadership position in the market," adds Caldwell. "It meant we were engaging with our supply chain around this in terms of designers, cost consultants, and also our occupiers."

There is already some evidence of an impact on occupier demand and rental levels. IPUT achieved a rental premium on its first net zero timber frame logistics warehouse, which was let to logistics provider Maersk. It was also Maersk's first net zero warehouse, so this move supported its sustainability goals.

The money raised from the levy is ring-fenced in a transition fund, which is allocated to projects and research that support carbon reduction and can have an effect at scale across IPUT's portfolio. The capital sits as a cash reserve in the accounts with oversight by the company's audit structure. The transition fund also has a separate steering group that approves how the money is allocated. So far, allocations have included research on scaling up renewables on its logistics portfolio as well as targeting the skills gap as a founding member of the Irish Supply Chain Sustainability School. The transition fund money has also been used to acquire land in Ireland where trees have been planted to create local offsets for the company's residual carbon footprint post-2030.

Market leadership
Companies adopting internal carbon pricing mechanisms can gain a competitive edge in the market by positioning themselves as leaders in sustainability. This action aligns with the growing demand for green buildings and environmentally responsible business practices, increasing their appeal to tenants and investors alike.

From an investment perspective, achieving net zero for buildings requires capital expenditures, and those market players more advanced in transitioning their assets are more responsive to building these costs into future acquisitions. As more of the market becomes attuned to this process, it will lead to a resetting of pricing in the market as buyers and sellers incorporate the costs of transition.[10]

Currently, there are low levels of understanding of how pricing needs to shift, but for companies incorporating carbon pricing scenarios in their analysis, such as Ivanhoé Cambridge (see page 23), they are able to take a more informed view on investment pricing. Their activity in the market will reflect this view, leading to longer-term pricing shifts.

Finally, as carbon pricing changes the thinking within companies, it can also have an external impact with companies needing to work with third-party suppliers such as designers and cost consultants to align with their internal decarbonisation goals. IPUT (see page 21) said leading on sustainability through carbon pricing influences their selection of third-party suppliers towards best-in-class sustainability experts and encourages other companies to upskill to remain competitive.

Case study: Endesa

Spanish electricity company Endesa introduced an internal carbon price in 2023 to supplement its plan to be a net zero emissions company by 2040.

Its internal carbon pricing initiative (Precio Interno de Carbono, or PIC) creates emissions inventories for each organisational unit of the company, against which a price per tonne of CO2 is agreed. Activities in scope include energy consumption and waste management in offices, commuting to work, travel, and the fleet of Endesa vehicles.

The costs of emissions are added to a Climate Fund, which is being used to help meet an annual reduction of 870 tCO2/ year through initiatives such as waste segregation in buildings and expansion of the fleet of electric scooters.

Case study: Ivanhoé Cambridge

When Ivanhoé Cambridge, the real estate group of the CDPQ, wanted a better understanding of the business case for major decarbonisation projects, it turned to traditional financial modelling by developing a "green" internal rate of return (IRR). Its Green IRR, which runs in parallel with its regular financial analysis, allows it to take a broader look at the financial benefits of green capital expenditures, particularly for projects where the payback for project costs is likely to be longer than the expected holding period.

Ivanhoé Cambridge's Green IRR includes project costs but also "shocks" the cash flow by including potential brown costs such as a proxy price on carbon of around CA$100 per tonne of CO2 that increases over time, or a brown discount at exit, depending on the building's geosector. It also models more positive aspects such as energy savings, the likelihood of improved rents or lower-cost financing through sustainability linked loans, as well as potential green premiums at exit.

By integrating both current and future costs and benefits into decision-making, the Green IRR metric aims to capture how the market might change. It also helps in understanding the cost of doing nothing, particularly as future buyers are likely to include future green capital expenditure requirements in their bid price. "It helps us to have the whole picture and better inform our investment decisions," says Rachel Horwat, Director, Sustainable Investments. "It's really about anticipating carbon risks and opportunities and how the market will change in the next five to 10 years given all these trends and the low carbon transition that's going to change pricing in the market."

Ivanhoé Cambridge's Green IRR currently acts as a shadow tool alongside its regular financial IRR and has quickly become a useful asset management tool and an early warning system if an asset faces significant financial carbon risk. It has been an internal educational tool, uniting the ESG and asset management and investment teams with a common language to assess costs and benefits rather than assuming projects with longer payback periods are not viable.

Ivanhoé Cambridge uses the Green IRR to assess new investments, substituting energy and carbon proxies based on typical assets if data are not available. The investor hopes that this metric will also contribute to pushing more realistic pricing around brown or green factors at the time of purchase.

Ivanhoé Cambridge did consider an internal carbon tax but felt the accounting complexity outweighed the benefits, with its Green IRR offering the same outcome to integrate carbon costs into decision-making. "The intention with carbon pricing is to force the integration of that cost into decision-making, whether it's a carbon tax or a carbon shock the importance is that it's considered in decision-making. I think the outcome is the same, but it's two different approaches," says Horwat. The investor is now working on a second iteration of the model with increased sophistication around the data inputs.

Case study: PATRIZIA

Global real estate investment manager PATRIZIA has set an overarching goal to achieve net zero carbon emissions across its corporate operations and real asset portfolio by 2040 or earlier. As a part of the company's decarbonisation efforts, PATRIZIA Hanover Property Unit Trust – an open-ended fund with assets located across the UK – adopted a fund-wide net zero carbon strategy in 2020.

Initially, the strategy focused on purchasing carbon offsets and carbon credits while gradually improving the assets' carbon performance, which earned the fund a carbon neutral status for its landlord-controlled emissions. However, it soon transpired that this approach needed to go further, primarily because of questions around the quality of offsets and limited control over how the budget dedicated to offsetting is spent.

The fund decided to introduce a fee-paying internal carbon price mechanism to create an accounting provision for initiatives that offer significant carbon savings but have long payback periods, such as embodied carbon reduction activities. The mechanism is aligned with the annual average of the UK ETS carbon price, which is a benchmark widely understood and accepted by key stakeholders. A key realisation was the need to adapt as the market becomes more sophisticated and it is anticipated that the price or mechanism will continue to evolve.

PATRIZIA Hanover Property Unit Trust's internal carbon pricing plays a crucial role in accelerating the fund's transition to net zero, enabling investment in measures that typically might not be considered financially viable. It also provides more control and transparency over how the money raised is spent, positively affecting the credibility of the fund's decarbonisation efforts.

Following the successful pilot, PATRIZIA is now considering a two-tiered approach to rolling out a carbon price mechanism across more funds. The company would start with a shadow carbon price that would inform investment decision-making, highlight financial risks and opportunities associated with decarbonisation, and prepare the organisation for a potential fee-paying carbon price mechanism within the funds focused on ESG. This staggered approach is important in effectively tackling the complexities of a diverse, international portfolio.

"My advice is to start small and use carbon pricing first on funds that are already bought into sustainability. There will be willingness to pilot, figure out what works and what doesn't, and ultimately roll out an effective, tested solution across the organisation," says Edward Pugh, Head of Sustainability.

Economic incentives

Although traditional decarbonisation pathways provide a long-term outlook, an internal carbon price can support actionable business plans through informed and financially sound decision-making. It can help demonstrate the financial benefits and viability of capital expenditures or lower-carbon choices such as alternative materials, particularly when it comes to new construction or retrofit projects.

A shadow carbon price can affect decision-making and incentivise low-carbon options as it highlights the carbon cost relative to business as usual. With a fee-paying approach, the impact is even greater. It can reallocate capital to where it is needed most, which can accelerate decarbonisation by funding low-carbon measures with longer paybacks. The money raised can also provide capital for innovation. Both shadow and fee-paying mechanisms can help preserve the value of assets in the long term and prepare for potential future regulation or taxes.

PATRIZIA (see page 24) is using the funds raised from its carbon pricing mechanism to create an

accounting provision for long payback initiatives such as heat pumps while GPE (page 20) funded a metering renewal project.

Having a better understanding of the impact of carbon can also make companies more informed buyers and sellers as they can use it to price in future risk and increase long-term resilience. Companies report that information gathered through carbon pricing helps them take an integrated assessment – both financial and carbon – which can provide a new more holistic approach to assessing viability and risks.

There is already early evidence of a potential positive impact on risk-adjusted returns from those implementing carbon pricing, including IPUT (see page 21). The use of innovative materials can be more expensive, but owners have seen compensation come through higher rents and longer lease contracts. Market-leading green buildings have also attracted high-quality tenants seeking the latest in sustainable buildings, future-proofing these types of assets.

In some instances, carbon pricing might help the business case for buildings which face higher stranding risks. If the economic cost can be considered in line with the social cost of the stranding, it could build a stronger case for decarbonisation.

Operationally, internal carbon pricing incentivises strategy and behaviour that improves long-term asset value. Understanding the carbon impact of buildings helps take a strategic approach to refurbishments and improvements across a portfolio.

It can also encourage drives for efficiency at an asset level such as smart building systems, upgrading/optimising HVAC and lighting, or switching to renewable energy. This approach can help involve different teams in the process such as asset and property managers who can use the data for longer-term planning and engage tenants in the process.

Capital raised from carbon pricing can also be reinvested in technology or initiatives that support scaleable improvements to building operations.

Regulatory compliance

Proactively implementing internal carbon pricing strategies can put companies in an advantageous position should external carbon pricing regulations emerge. They would be better informed on the likely mechanisms and could already be mitigating future costs that would have been subject to tax.

The case could also be that as more companies implement an internal carbon price, their approach would influence how policy makers share regulation for the industry.

Many companies, including Emerson (see page 18) and PATRIZIA (page 24), that are adopting some form of carbon pricing look to regulated-led benchmarks for pricing to model realistic scenarios in case of future regulation. COIMA's approach (page 16) has been shaped by current operational carbon regulation in Milan and EU frameworks, as well as a shadow approach ahead of embodied regulation in the city.

Other forms of accountability will also drive the adoption of internal carbon pricing. For example, carbon pricing is integrated into the International Sustainability Standards Board (ISSB) reporting standards (IRFS S2). The ISSB standards are designed to result in a high-quality, comprehensive global baseline of sustainability disclosures for financial stakeholders.

Risk management

The industry is still educating itself on how to manage risks associated with decarbonisation. One major risk is a sudden stranding risk. Stranding occurs when certain regulations come into force such as those demanding minimum Energy Performance Certificate ratings, which render some buildings unlettable immediately.

However, there is also a less predictable risk if market players begin to recognise the negative valuation impact of buildings that have not been decarbonised, and they start to build that into their assessments. These actions could lead to illiquidity in some markets and the stranding of some buildings. This risk is likely to occur when a proportion – not necessarily the majority – of the market recognises this issue.

Case study: Swire Properties

Swire Properties, a real estate company that develops and manages properties across Hong Kong; Miami, Florida; mainland China; and Southeast Asia, has made significant strides in advancing its sustainability agenda. It is one of the first companies in Hong Kong to implement an internal carbon pricing mechanism, building upon its ambitious established targets of net zero by 2050 and Science-based Targets Initiative (SBTi) 1.5°C alignment.

Swire Properties' internal carbon pricing programme launched in 2023 operates on a hybrid model, combining a carbon fee of US$22 per tonne of CO2 for the company's operational emissions and a US$100 shadow price applied to future capital expenditures.

This price point, which is under annual review by the Internal Carbon Pricing Taskforce (represented by Swire Pacific, Swire Properties, and other Swire Pacific operating companies), was determined through rigorous research and benchmarking from pricing projections made by credible bodies including the Network for Greening the Financial System. This mechanism ensures a competitive rate that also aligns with the company's broader sustainability goals and financial planning.

The hybrid nature of Swire Properties' mechanism directly connects investments to operations. The shadow pricing ensures that carbon emissions are factored into the financial evaluation of new developments, aligning investments with long-term carbon reduction goals. The carbon fee from operational emissions is allocated directly to a decarbonisation fund, used for large-scale innovation projects that go beyond its typical optimisation projects to help the company achieve its science-based targets (SBTs).

This mechanism encourages teams to consider the long-term environmental impact of their decisions and make the business case financially, in accordance with Swire Properties' wider net zero carbon goals and SBTs' trajectories. This instrumental shift in mindset and approach not only drives better decision-making but also further reinforces a culture of collaboration and environmental stewardship throughout the company.

Swire Properties' proactive approach has also positioned the company to anticipate and mitigate future risks associated with carbon pricing policies, especially in regions such as Hong Kong where the Stock Exchange of Hong Kong has enhanced its climate-related disclosure under its environmental, social, and governance (ESG) framework to progressively reflect IFRS S2 Climate-related Disclosures, issued by the ISSB. By integrating carbon costs into its financial planning, Swire Properties is preparing well for a future where carbon pricing will likely play a critical role in business operations while minimising its own impact on the planet.

Ivanhoé Cambridge's Green IRR, which includes proxies for potential carbon taxes and other factors modelling a "brown discount," is able to act as an early warning system for buildings with significant financial carbon risk (see page 23).

Carbon pricing enables companies to understand and price some of those risks, both to have in place a strategy to reduce standing risk over the longer term, and to mitigate against potential carbon taxes or other types of regulation.

Overall, with carbon pricing driving more progress in decarbonisation, companies will have more sustainable properties that will be resilient to transition risks and be attractive to stakeholders including investors and tenants.

Innovation and growth

Adoption of carbon pricing is driving innovation both within the company and the wider industry. As companies try to reduce their carbon emissions (and the internal cost of carbon), it is pointing them towards innovative solutions in building design, construction materials, and energy management systems. This process is accelerating decarbonisation and mainstreaming scalable solutions into the market, which in turn become more affordable in the long run.

Often, the capital raised by companies implementing internal carbon pricing is allocated to a transition fund, which has been used by companies for research into decarbonisation solutions or new technology. IPUT has invested in scaling up renewables on its logistics portfolio (see page 21) while Swire Properties uses the funds from its transition fund for innovation work beyond its typical optimisation projects (page 26).

Innovation and new technology are crucial components to meeting responsibilities under the Paris Agreement, and capital reallocated through carbon pricing is injecting investment into new ideas and helping scale solutions. These changes are facilitating the transition to a low-carbon economy, ensuring long-term growth and viability in a changing market landscape.

6. Next steps

The importance of internal carbon pricing is clear if we want our industry's path to decarbonisation to be ambitious and accelerated. This step needs to happen to ensure that real estate companies hold themselves responsible for the externalities they are creating.

Its ability to drive change and innovation, while enabling companies to take responsibility for their own emissions, makes it a positive solution that is enhanced through industry alignment and collaboration.

The publication of *Universal Principles for Carbon Pricing in the Real Estate Sector* by C Change and its partners has been a good first step and demonstrated a willingness by the industry to align, but further work and participation from the industry are needed.

From a practical perspective, we need to address some of the issues specific to real estate about how internal carbon pricing aligns with how real estate is managed – funds, joint ventures, and so on – as well as tackling multicountry portfolios alongside a changing regulatory environment.

However, much of the future work centres on education and awareness with the industry working together to learn from each other in what continues to be an emerging field. We need to improve the knowledge levels of internal carbon pricing and be able to communicate its wider benefits to counter its first-glance reputation as a punitive financial fee.

To promote early adoption, this education needs to be set in the context of future regulation and reputational risks. This context demonstrates a responsible industry approach and prepares us financially if regulations are enacted. As the principles take a whole value chain approach, we need to ensure that our interactions are multidisciplinary and that we understand how carbon pricing affects different stakeholders.

We would encourage the continued sharing of experiences through case studies and ULI events such as workshops and webinars. At its heart, ULI C Change is a collaborative programme, and we welcome all participants to become involved in our work. Please look out for opportunities via our website and newsletters.

Endnotes

1 The 45 percent reduction is from the 1990 baseline. For more information, see https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/delivering-european-green-deal_en.

2 In the United States, internal carbon pricing is sometimes referred to as voluntary carbon pricing.

3 For more information, see https://openknowledge.worldbank.org/entities/publication/b0d66765-299c-4fb8-921f-61f6bb979087

4 Chantal Beck, Sahar Rashidbeigi, Occo Roelofsen, and Eveline Speelman, "The Future Is Now: How Oil and Gas Companies Can Decarbonize," McKinsey & Company article, January 7, 2020 https://www.mckinsey.com/industries/oil-and-gas/our-insights/the-future-is-now-how-oil-and-gas-companies-can-decarbonize

5 Joana Setzer and Catherine Higham, "Global Trends in Climate Change Litigation: 2024 Snapshot," Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science, policy report, https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2024/06/Global-trends-in-climate-change-litigation-2024-snapshot.pdf

6 For more information, see https://www.nyc.gov/site/sustainablebuildings/ll97/local-law-97.page

7 "EU ETS Market Outlook 1H 2024: Prices Valley Before Rally," Bloomberg NEF, May 1, 2024, https://about.bnef.com/blog/eu-ets-market-outlook-1h-2024-prices-valley-before-rally/

8 For more information, see https://openknowledge.worldbank.org/entities/publication/b0d66765-299c-4fb8-921f-61f6bb979087

9 Jessica Fan, Werner Rehm, and Giulia Siccardo, "The State of Internal Carbon Pricing," McKinsey & Company article, February 10, 2021, https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/the-state-of-internal-carbon-pricing

10 For more information on transition risks, see the ULI Transition Risk Guidelines, https://europe.uli.org/wp-content/uploads/2023/07/Transition-RIsk-Guidelines-2023-Final.pdf.