

Research

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# The commercial case for making buildings more sustainable

# Introduction

Creating a more sustainable and resilient future requires today's buildings to undergo marked transformation in their infrastructure and operations. From industrial complexes designed in decades past to glass-clad skyscrapers in central business districts, many buildings might be fit for purpose today but will not make the grade in the coming years as low-carbon, resilient spaces.

Yet in today's testing economic environment, many real estate executives, both occupiers and investors, tasked with future-proofing their real estate portfolios are finding it hard to build the business case for action and secure buy-in from senior leaders.

The global economy is going through a difficult period amid rising interest rates, elevated inflation and a sluggish trade recovery. Investment in real estate is down and fundraising is more challenging. The office sector, in particular, is experiencing dynamic shifts in demand with the impact of hybrid work on lease renewals.

Despite the shorter-term hurdles, developing and implementing clear decarbonization and resilience strategies now is the smart decision for longer-term performance. In many respects, the commercial case for sustainable buildings has never been stronger.

## Three key factors are driving the need to futureproof real estate:

# 1

### **Mounting costs from climate risks,**

including heatwaves, flooding, storms and droughts, are increasingly impacting urban areas – with big implications for building owners.

# 2

### **Rising demand for sustainable buildings**

and spaces that support corporates' low carbon goals and meet employees' rising expectations will change lease markets at scale. For every 3 square meters of demand, only 1 square meter of low carbon space is in the current pipeline<sup>1</sup>.

# 3

### **More restrictive finance and tougher regulation**

are coming down the line. Companies face more stringent building performance standards and corporate disclosure mandates.

<sup>1</sup>Across 20 global office markets, JLL, September 2023



# 01

## Building the business case:

### **Mounting costs from climate risk**

No city – and few buildings within – is immune from the growing impact of climate change. From searing heat and prolonged drought to ever more frequent and intense storms and flash flooding, each city faces its own mix of physical risk factors. These can all have a significant impact on buildings, both in terms of their immediate operations and their longer-term structural integrity and resilience.

Coastal cities, including several major cities across Asia (such as Shanghai, Hong Kong and Mumbai) and those on the east coast of the United States (including Miami and New York) are particularly vulnerable to flooding and increasingly intense cyclones. Other cities, like Dubai, Madrid and many in the U.S. Sun Belt have greater exposure to heat, drought and fire.

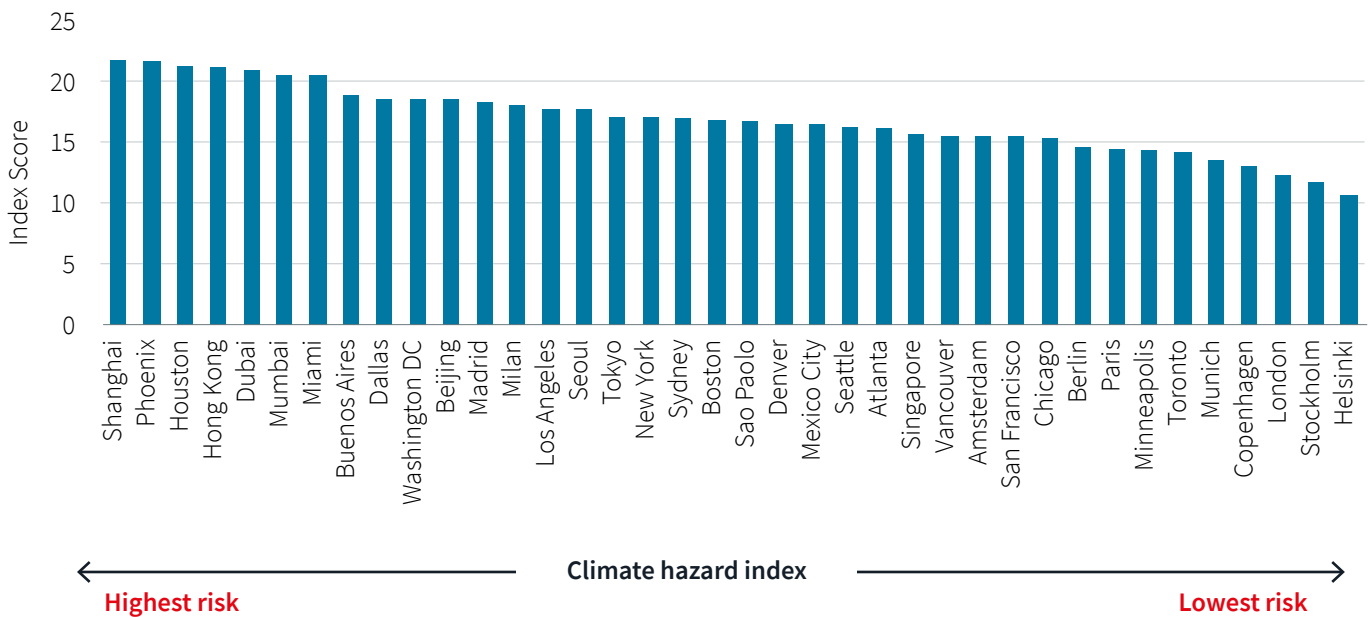
Putting a price tag on the physical risk of climate change is becoming more straightforward. In 2021, 10 of the biggest climate disasters from around the world cost US\$170 billion in insured losses. The actual value of losses will be much higher as this figure doesn't account for the disruption to business continuity, as well as the broader human costs. Furthermore, each year the cost of uninsured losses goes up, as the data leads to insurers withdrawing from key industrialized and populated areas.

For cities, it's not just dealing with events that make international news headlines. Those already on the front line of climate change are suffering from repetitive smaller events which may be growing quickly in scale and intensity.

In the U.S. the impacts of climate-fueled events, including storms, wildfires, hurricanes, flooding, droughts and freezes, have cost US\$612 billion in the last five years.

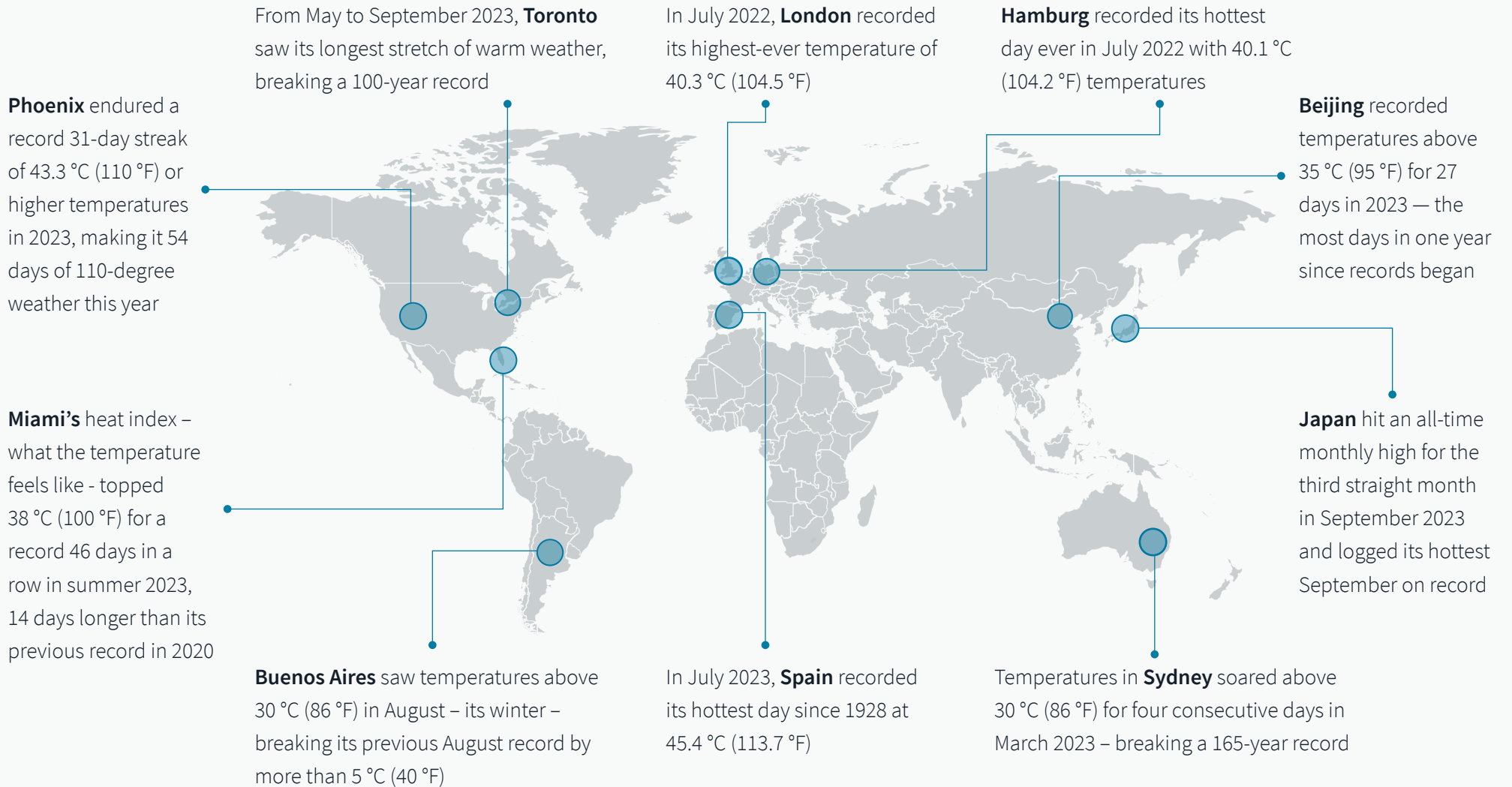
Although some cities are feeling the effects more acutely than others right now, all will face long-term challenges to existing buildings, infrastructure and supply chains. According to C40, more than 350 cities already experience summer temperatures of over 35°C (95°F). By 2050, that number will rise to about 970 cities. Extreme heat is now the most widely reported climate hazard facing global cities, according to the non-profit CDP.

**Different vulnerabilities to climate risk:  
Asian and U.S. Sun Belt cities are most exposed**



Climate Hazard Index: Based on 7 hazards: drought, fire weather, heat, precipitation, river flood, sea level rise, tropical cyclone. Assumes an RCP 8.5 in 2050. JLL Research in collaboration with Munich Re, 2022.

# Record temperatures across the globe



**By 2050, as weather patterns become more unpredictable and extreme weather events become more frequent, the risks to building value – and ‘business as usual’ - will mount.**

These climate risks will have significant implications for owners and occupiers, both in terms of their buildings and their operations. Analysis from non-profit First Street Foundation and engineering firm Arup estimates that costs from flood damage in the U.S. will reach US\$16.9 billion a year by 2052 and affected businesses

would collectively lose 4 million days to recovering from flood events.

However, for some companies, climate risk remains a blind spot. While JLL’s research (Decarbonizing the Built Environment, 2022) found that 78% of investors and 83% of occupiers identify climate risk as a financial risk, only 23% of executives are contingency planning for disruptions in the next 12 to 18 months (PwC Pulse Survey, 2023).



# Understanding the risks to specific portfolios

## Disruption to business operations

Both acute risks like extreme weather events and chronic risks, such as rising temperatures and drought, pose threats to people, buildings and supply chains.



**Disruption to operations** and property downtime will result in reduced revenues and increased supply chain costs.



**Damage to buildings and infrastructure** will lead to increased maintenance, repair and restoration costs, along with higher insurance premiums.



**Worker shortages:** it will become more difficult and expensive to find workers in areas significantly affected by physical risks.



**Higher operating costs:** resources such as energy and water could become more expensive for companies who haven't adopted appropriate mitigation measures.

## Disruption to buildings

Even today's prime buildings will need to adapt to a rapidly changing climate in the coming years to maintain their appeal. More than 90% of the world's largest companies will have at least one real estate asset financially exposed to climate risks such as water stress, wildfires or floods by the 2050s, according to S&P Global.

Companies that don't put mitigation measures in place stand to face higher costs and lower revenue.



**Value depreciation:** non-resilient buildings exposed to physical risks will drop in value and become harder to insure, resulting in lower rental demand.



**Rising capital expenditure:** repairing damages and incorporating climate mitigation infrastructure will incur higher capital costs.



**More frequent and severe physical risks** will increase maintenance costs. Failure to maintain buildings risks obsolescence and stranded assets.

*Decarbonization efforts will help to reduce the pace, scale and severity of climate change but they can't turn back the clock.*

One of the biggest challenges in assessing climate risk is the wide range of approaches and the lack of consensus on standardization. Some providers are thinking about value at risk in terms of insured value, others are looking at change in asset value or replacement cost.

Nonetheless, climate modeling and scenario analysis tools are becoming more sophisticated, enabling more companies to understand their risks and develop plans to take appropriate action. These short-term resilience measures should be integrated into longer decarbonization plans which are key to reducing longer-term risk.





# Assessing climate risk: the view from LaSalle

Assessing the risks posed by climate change is an exercise LaSalle Investment Management knows well. It has processes in place to ensure climate risk is evaluated among all other risks and opportunities when making investment or ongoing business decisions.

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Underwriting material risks properly is critical, whether directly in net operating income (NOI) or cash flow or indirectly in risk assumptions, says Julie Manning, Global Head of Carbon and Climate Strategy at LaSalle.

In some cases, climate risk has been a major driver in fund managers passing on deals; for example, where the flood plain has been raised since a building's original construction or where the structure of a building was not designed to withstand the expected intensity and frequency of future tropical cyclone events.

## Getting started

Data is the first step to gauge material risks. At the investment level, it is used to drive decision-making around buying an asset, managing that asset and evaluating the portfolio. At the business level, LaSalle looks at the data more broadly to help inform its resilience and investment strategy programs.

Yet as climate modeling is a nascent, constantly evolving technology, data cannot be taken at face value. It changes constantly as models are updated with new evidence, science advances or standard error corrections. Having the necessary context to evaluate what it's showing – and what it's not showing – about risk exposure is key to successfully assessing climate risk.

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If you're looking at buying a building and the data tells you the building scores a “B” on physical climate risk, what does that tell you? How will you act on that? Will you reduce your bid price? Will you assume a “B” is actually pretty good and just move on? You need to understand many things about the data. For example, what physical hazards did that grade cover, and were they averaged, or were all of them Bs? How do similar buildings in that market score, how is this building the same or different? What am I willing to invest in to improve resilience?

A good list of secondary sources can also help to dig deeper into a particular risk in a particular location. In some cases, LaSalle uses resilience assessments from third-party consultants to review physical risk exposure and recommend any hardening strategies and estimated cost adjustments.

## Taking action

Real estate has so far been reactive, focused on reporting and transparency. LaSalle is now proactively concentrating on maximizing current and future resilience, both in its existing assets and when evaluating new investments. Each of LaSalle's funds/portfolios now manages its own exposures and concentrations. Plus, at a higher business level, LaSalle can see which assets are most vulnerable and proactively works with investment teams on resilience measures to manage those risks.

Annual reviews provide ongoing monitoring with resilience strategies evolving in response to changing risks. And alongside transition risk and decarbonization strategies, physical climate risk is increasingly being evaluated. Feedback from resilience reviews is folded into recommendations that are received from energy or net zero audits, which enables LaSalle to consider the whole picture on climate risk mitigation and adaptation.



## 02

# Building the business case:

### **Rising demand for sustainable buildings**

With an exponentially increasing number of corporates signing up to net zero targets and an ongoing focus on minimizing operating costs, demand for space that is aligned with these goals will increase. Historically, green certifications have been the primary mark of a sustainable building - and tenants have been willing to pay the price. Transaction evidence still shows healthy rental premiums for certified building across a range of global office markets – but the industry is shifting.

# Green premiums today, net zero tomorrow

## Green premiums across global markets



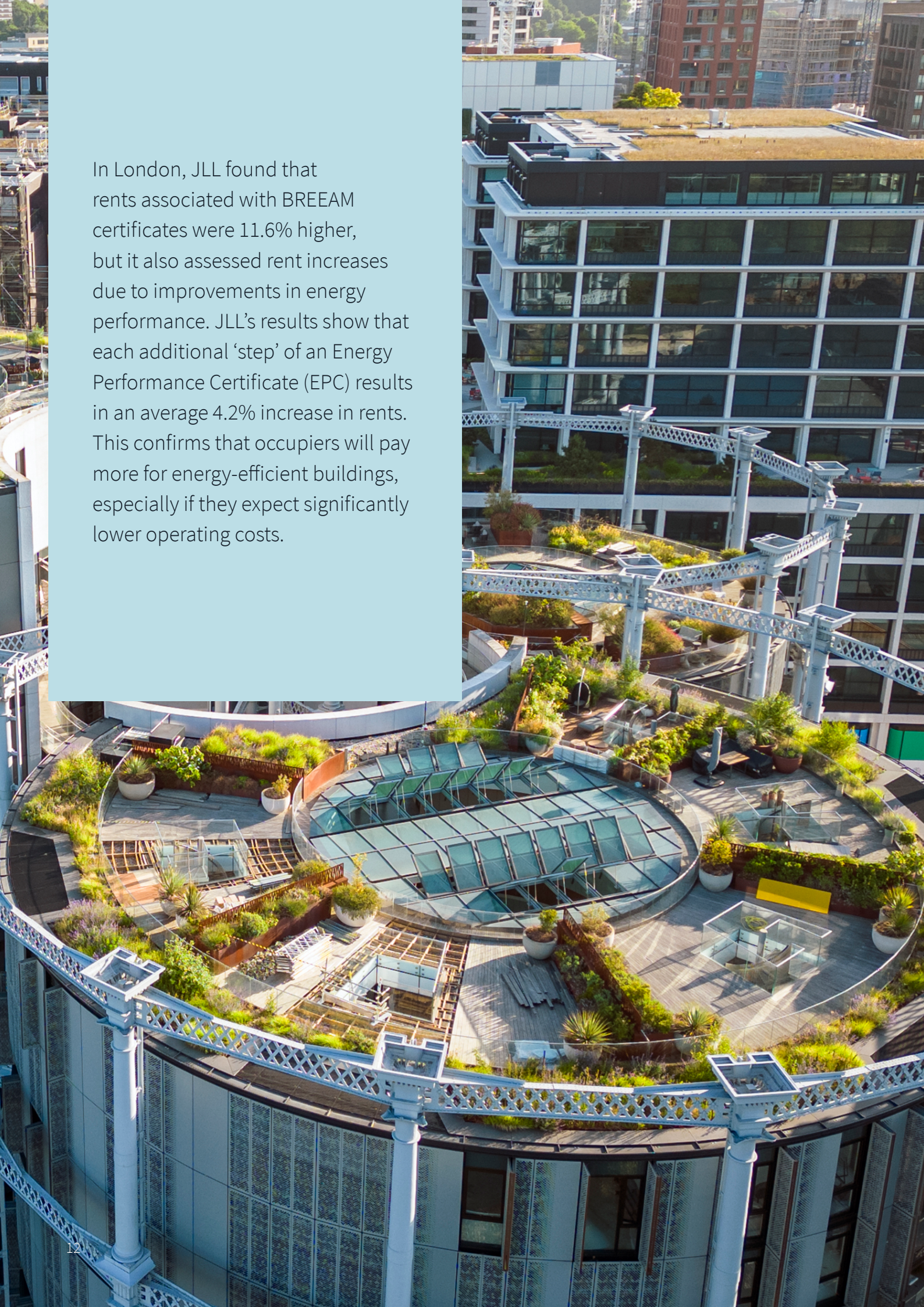
Source: JLL Research, 2023; JLL's Sustainability and Value – London Offices Investment report

Note: All three studies calculated green premiums using a hedonic pricing model, meaning that the impact on rental values from environmental certification was isolated from other effects, such as building age and location

In many major markets globally, green certifications are becoming less of a differentiator and more of a requirement. In the U.S., for example, 77% of San Francisco's Class A office stock is LEED-certified, compared to 49% in Phoenix. The green premiums associated with these certifications are 5% and 11% respectively. Building owners and investors can still benefit from an early-mover advantage in late-adopter markets like Phoenix, but risk facing a brown discount in more established markets, like San Francisco.

Occupiers face a distinct challenge. The most popular certifications today are typically design and construction based, and buildings' emissions and energy use are only one component of these certifications. Tenants will increasingly seek environmental performance indicators, such as energy intensity and electrification, on top of green credentials. JLL is already seeing evidence of this in advanced European markets, like London and Paris, where low-carbon prime office spaces are reaching historic rental highs this year, even with an overall slowdown in the sector.

In London, JLL found that rents associated with BREEAM certificates were 11.6% higher, but it also assessed rent increases due to improvements in energy performance. JLL's results show that each additional 'step' of an Energy Performance Certificate (EPC) results in an average 4.2% increase in rents. This confirms that occupiers will pay more for energy-efficient buildings, especially if they expect significantly lower operating costs.



## Supply-demand imbalances

The growing focus on sustainability across the business world and wider society is impacting demand and supply dynamics, especially in cities where aging stock is unlikely to comply with future regulations or expectations.

Corporate demand for sustainable buildings is expected to increase rapidly as more companies set and act on carbon commitments. Across 20 major global office markets, only 34% of future demand for low carbon workspace will be met in the next several years.

For every 3 square meters of demand, only 1 square meter is in the current pipeline.

This equates to an overall demand surplus of 10.2 million square meters (109.8 million square feet) of low-carbon office space across these 20 markets.

## Supply-demand modeling

Supply-demand modeling across global regions is calculated by comparing tenant carbon commitments and future requirements with high-quality sustainable office space available now and in the pipeline.

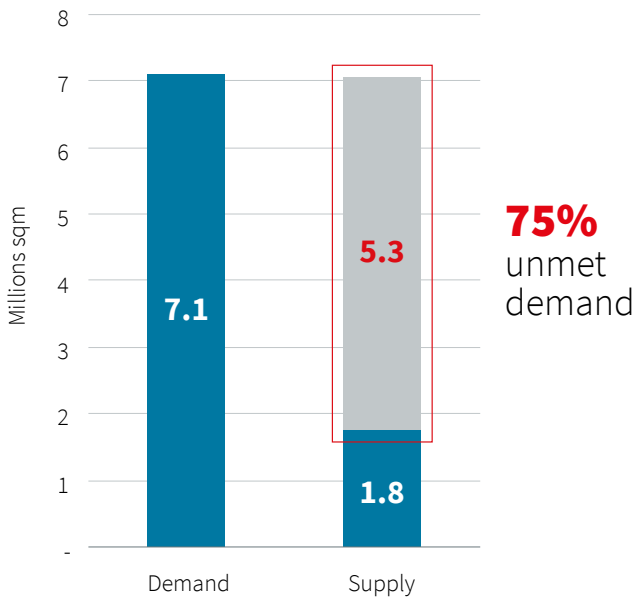
Evaluation of existing space varies across countries due to data availability and a lack of standardization. Because of this, comparing like-for-like supply-demand imbalances across regions creates inconsistencies when it comes to

measuring and monitoring ESG performance in their built environment.

While direct comparisons across regions should be done with caution due to these data discrepancies, one notable trend that emerges consistently across markets is that demand for low carbon space will far outstrip supply.

Despite the differences in data, this trend showcases the urgent need for more sustainable building solutions worldwide.

## Supply–demand imbalance: United States



Source: JLL Research, September 2023

In the United States, prominent energy benchmarking and reporting requirements have enabled rigorous analyses of supply and demand. Building-level energy performance data was used to adjust for quality of existing stock, resulting in a more acute imbalance compared to Europe and Asia Pacific.

The U.S. analysis is comprised of eight major cities, but imbalances vary significantly among them. On the one hand, Seattle is likely to have the most balanced market due to robust construction activity, high levels of building electrification and an energy grid that is among the cleanest in the country. Chicago on the other hand will likely struggle to meet demand due to limited energy-efficient building stock, a constrained development pipeline and inadequate clean energy supply on the grid.

### Data notes:

City coverage: Boston, Chicago, Dallas, Miami, New York, San Francisco, Seattle and Washington, D.C.

Demand comprises of future lease requirements up to and including 2030, by tenants that are among the top 100 largest corporate occupiers (by floorspace) in each market and signed up to a carbon commitment. Demand figures account for the suitability of existing buildings and has been adjusted using environmental performance levels of current stock (using building-level energy efficiency data). Demand has also been adjusted to factor in downsizing trends present in the market.

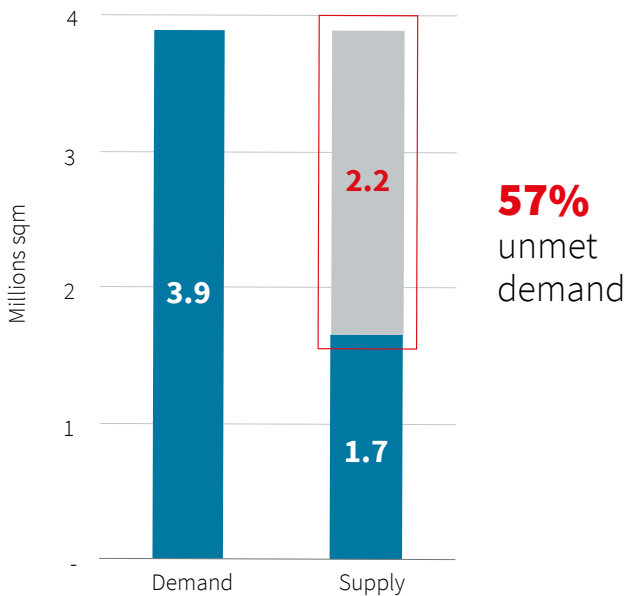
Supply comprises of the development pipelines of under construction/renovation projects with a stated target for high-scoring green certification.



### City spotlight: New York City

New York is dominated by finance and professional services, sectors that tend to be highly carbon conscious. Across the leased footprint of the top 100 occupiers, 72% is tied to a carbon commitment. Demand from these corporates, at an estimated 2.2 million square meters by 2030, is expected to be twice the current development pipeline of suitable space. Through Local Law 97, New York City has passed one of the most stringent building performance standards in the world. While 86% of premium office buildings will comply with the 2024 limit, at current performance levels, only 4% will comply with the 2030 limit.

## Supply–demand imbalance: Europe



Source: JLL Research, September 2023

Supply-demand modeling in Europe was calculated across six cities using best available data to adjust for quality of existing stock, such as building grade and condition. Tenants throughout Europe are among the most ambitious when it comes to setting climate targets, but the region is plagued with aging stock, slow rates of retrofitting as well as a lack of uniform data reporting.



### Data notes:

City coverage: Berlin, Frankfurt, Hamburg, Munich, London and Paris.

Demand comprises of future lease requirements up to and including 2030 by tenants that are among the top 100 largest corporate occupiers (by floorspace) and signed up to a carbon commitment. Using best available data, such as building grade and condition, demand has been adjusted to factor in downsizing trends and suitability of existing buildings.

Supply comprises of the development pipelines of under construction/renovation projects for each market, excluding built-to-suit (BTS) developments and not accounting for pre-planned and approved future projects. High-quality future green supply is identified if a development has a stated target for high-scoring green certification.

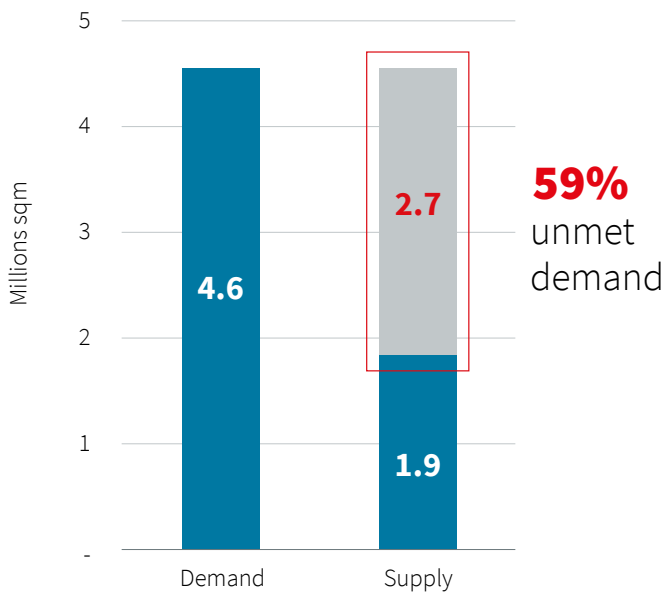


### City spotlight: Paris

Paris is among the most climate progressive cities in Europe. Across their leased footprint, 80% of the top 100 corporate occupiers in Paris are signed up to carbon commitments, amounting to roughly 1.5 million square meters of future occupational requirements by 2030. Of these committed occupiers, 17% have signed up to NZC targets under the SBTi framework. As such, future demand is likely to exceed supply by 54%.

Paris is addressing this supply-demand gap by passing regulations to improve energy efficiency and reduce carbon emissions in both current and future stock. RE2020, which came into effect in 2022 requires developers to measure energy, comfort and carbon across all new offices, hotels, residential and retail buildings, with more stringent measures taking effect in 2025.

## Supply–demand imbalance: Asia Pacific



Source: JLL Research, September 2023

The supply-demand modeling for the Asia Pacific region also varies by country depending on data availability, using energy grades, electrification rates or highest-level green certifications to adjust for existing stock. Analysis of six major cities shows that 59% of overall demand will not be met with the current pipeline, yet significant differences exist at a country level. As a result of more stringent regulations on the built environment, future demand for low carbon space will exceed supply by 70% across the Australian cities, compared to 56% for Singapore.



### Data notes:

City coverage: Delhi, Hong Kong, Melbourne, Mumbai, Singapore and Sydney.

Demand is calculated by analysis of future lease requirements for the top occupiers in a city and their stated carbon commitments. Adjustments have been applied to demand to account for currently available high-quality sustainable space using best available data (using energy grade for Singapore, LEED platinum for Hong Kong, Mumbai, and Delhi and electrification rates for Australian cities to adjust for existing low carbon stock).

Supply is calculated by evaluating the supply pipeline for high quality sustainable office buildings pre-registering for the highest grade of green certification credentials.



### City spotlight: Sydney

In June 2023, the National Australian Built Environment Rating System (NABERS) formally introduced a Renewable Energy Indicator as a parameter in its rating scheme, with the focus on rewarding buildings transitioning to electrification and procurement of renewable energy for operations. As the proportion of all-electric buildings in Sydney remains low, the city will see a deficit of NZC ready stock. Demand will be five times larger than future supply of all-electric 100% renewable energy buildings in the next five years.



## Spotlight on COP28, hosted by Dubai, UAE

In **Dubai**, 59% of the top 100 office occupiers have carbon commitments, with much of the demand for low-carbon space coming from international occupiers.

While Dubai has some similarities with other cities in meeting this demand, it also faces a unique set of challenges due to extreme climate conditions, rapid urban development, water scarcity, high-energy demand buildings and an acute need for behavioral change.

On the other hand, the market also presents opportunities. Because Dubai is still developing rapidly, local government officials and developers would benefit from implementing stringent buildings codes and construction practices to ensure buildings are sustainable at the onset – a much easier route than having to go through expensive and complex retrofits. Building owners can also capitalize on abundant solar energy potential and leverage smart city technologies.



# Ivanhoé Cambridge: Integrating carbon-related risks and opportunities into investor cashflows

## Ivanhoé Cambridge's Green IRR

Real estate has a huge role to play in the global push towards a low carbon economy, but investment processes still typically require viable decarbonization strategies to 'pencil out'. In most cities, carbon has no significant value and asset investment calculations therefore rarely account for a building's carbon emissions performance. Yet, failure to decarbonize an asset may lead it to becoming obsolete, likely resulting in a decline in value. According to a market study by Aviva Investors, 3% to 10% of an asset's value is at risk due to the low-carbon transition<sup>2</sup> but, without factoring in the cost of carbon, calculations of investment worth can often be overestimated and the value of low-carbon assets be underestimated. To solve this challenge, Ivanhoé Cambridge has developed a leading model to help expedite decarbonization across its portfolio.

## How does it work?

Ivanhoé Cambridge's Green IRR shows an evolution of the company's internal calculations of investment worth processes to integrate carbon-related costs and benefits more intentionally into its financial models. It is a new metric that voluntarily internalizes an asset's carbon-related operating costs as well as anticipating environmental performance-based green premiums or brown discounts.

## How does it help decision-making?

The company's Green IRR enables it to better identify the level of risk to its assets and which assets are most sensitive to the low-carbon transition. It helps inform investment decisions and deliver insights to its asset management teams that highlight concrete numbers. This allows Ivanhoé Cambridge to more effectively prioritize improvements that would enhance the environmental performance across its portfolio, making it more resilient to changing market demands and regulatory requirements.



<sup>2</sup>Measuring the mythical: Quantifying the green premium in real estate, Aviva Investors, July 2021



## 03 Building the business case:

### More restrictive finance and tougher regulation

Right now, the impact of sustainability in real estate financing remains limited, although cases are starting to emerge in the market. In the coming years, the sustainability credentials of companies and the resilience of their real estate will increasingly be considered when it comes to financial decisions.

- **Assets falling** short of evolving standards will find it increasingly expensive to secure funding at preferential terms or could lose subsidies.
- **Insurance premiums** for non-resilient buildings or those in vulnerable locations will rise to reflect more frequent acute risks. Swiss Re estimates climate risks are expected to add US\$200 billion to annual property insurance premiums by 2040.
- **Long-term capital planning** will become more complicated as physical risks become more unpredictable.

Regulation too may not have an immediate effect, especially on existing buildings, but it is coming both directly with building performance standards and indirectly through corporate disclosure mandates. Disclosure frameworks are an important tool in promoting transparency. They can support corporations that are actively working to reduce their negative environmental impacts as well as serve as mechanisms of accountability for those that are not.

## Significant developments in corporate disclosure requirements in the past 18 months

In March and April 2022 alone, three major corporate disclosure proposals were released: the EU's Corporate Sustainability Reporting Directive (CSRD), the U.S. Securities and Exchange Commission's (SEC) Climate-Related Disclosure requirements and the International Sustainability Standards Board (ISSB).



The CSRD became effective in January 2023 and by July, the final European Sustainability Reporting Standards (ESRS) were published. The ISSB finalized its rulings in June 2023. The SEC has pushed final publication of its climate disclosures further back - it is now expected in early 2024.

All three frameworks are aligned with the Task Force on Climate-related Financial Disclosures (TCFD), and beginning in 2024, the ISSB will take over monitoring for the TCFD.

## Alignment of the leading global reporting frameworks

Components	TCFD	SEC	ISSB	CSRD
Region	International	U.S.	International	EU
Required/voluntary	Voluntary	Required	Voluntary	Required
Company types (public/private)	N/A	Public	N/A	Public and private
Industry/sector specific requirements			[Industry]	[Sector]
Scopes 1 & 2				
Scope 3	[though highly encouraged]			
Climate risk and opportunities				
Risk management/resilience				
Climate targets and progress				
Assurance				
Double materiality				
Year effective		TBD		2025
Implications beyond climate		Expected to expand to address human capital	Intention to expand to entire ESG landscape	

■ Not specified/required   ■ Mandatory disclosure   ■ Dependent disclosure

Source: Source: JLL Research, 2023

## Regulations: City initiatives

City governments across the globe are responding to the climate emergency by setting bold commitments to move to a net zero economy, often well ahead of national targets. Incoming policies and initiatives are targeting buildings to reduce carbon emissions, mitigate growing risks from unpredictable and intense weather events, and help build longer term resilience to a changing climate.

Analysis of the targets, actions, regulations and instruments across 16 cities covering carbon, energy, buildings, circularity, biodiversity and resilience, shows a wide spectrum of commitment and action, from the ‘Climate Progressive’ cities such as New York, Paris and Singapore, to those cities that are just ‘Starting Out’ on their route to decarbonization.

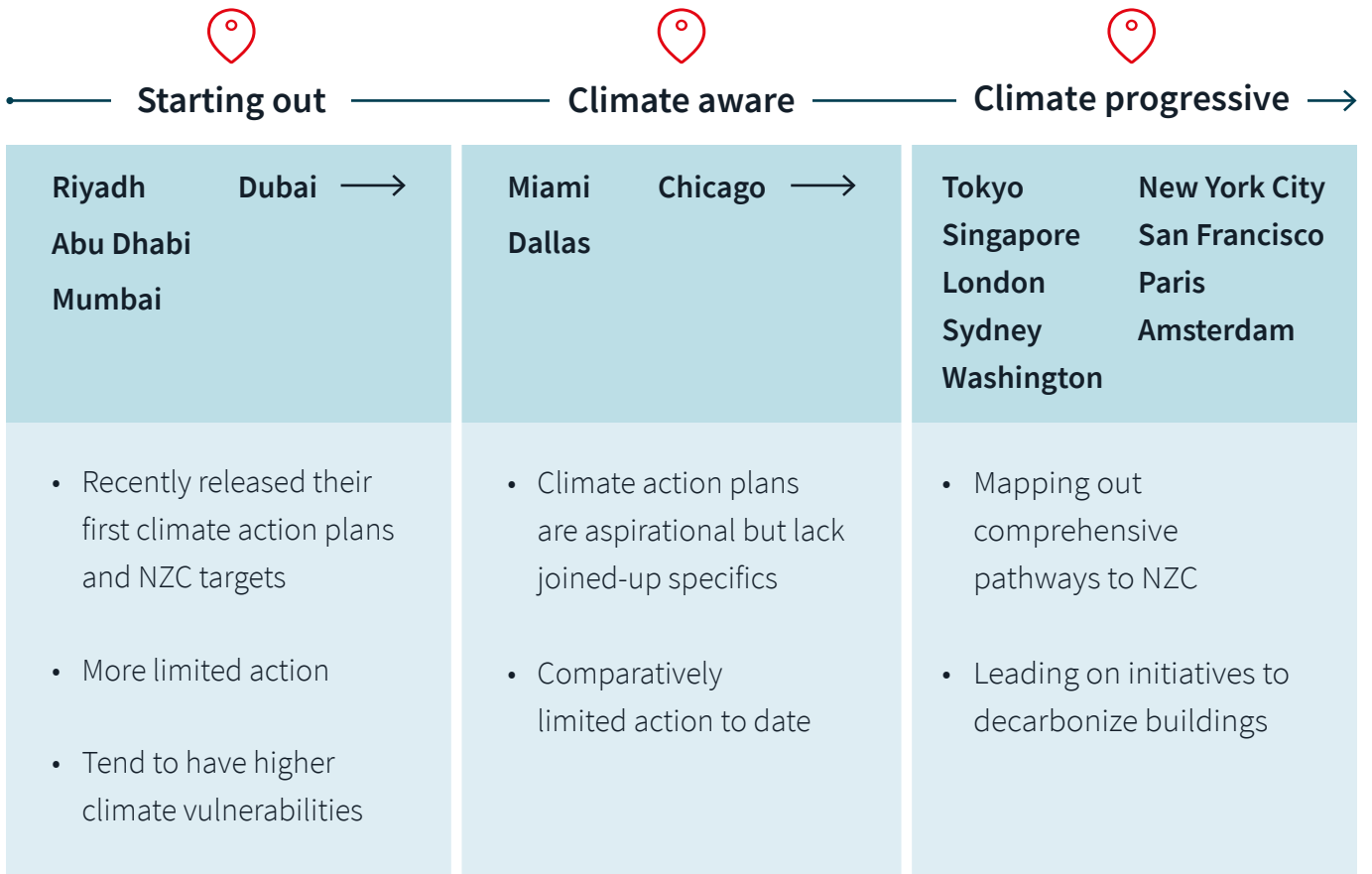
Over **60%** of carbon emissions in cities typically comes from buildings

‘Climate Progressive’ city governments are rolling out a vast array of ‘carrot and stick’ policy instruments covering new and existing commercial and residential real estate. For example, New York has introduced several pioneering local laws while Paris is taking a lead in considering embodied carbon, and Singapore has set out a holistic approach to greening its buildings.



# City Decarbonization Continuum

## Cities at different points in their decarbonization journey



Based on an analysis of the targets, actions, regulations and instruments being used to create more sustainable cities, across 30 metrics on carbon, energy, buildings, circularity, biodiversity and resilience.

Source: JLL Research, 2023

But even among the most progressive of cities, there is still much to achieve. All cities will need to set more specific – and measurable – goals to work towards so they can evaluate progress along the way.

Although market forces driving investors and occupiers are moving faster than regulations right now, companies, especially those with operations across multiple cities, will need to stay informed of incoming and evolving policies to avoid financial penalties and reputational damage.

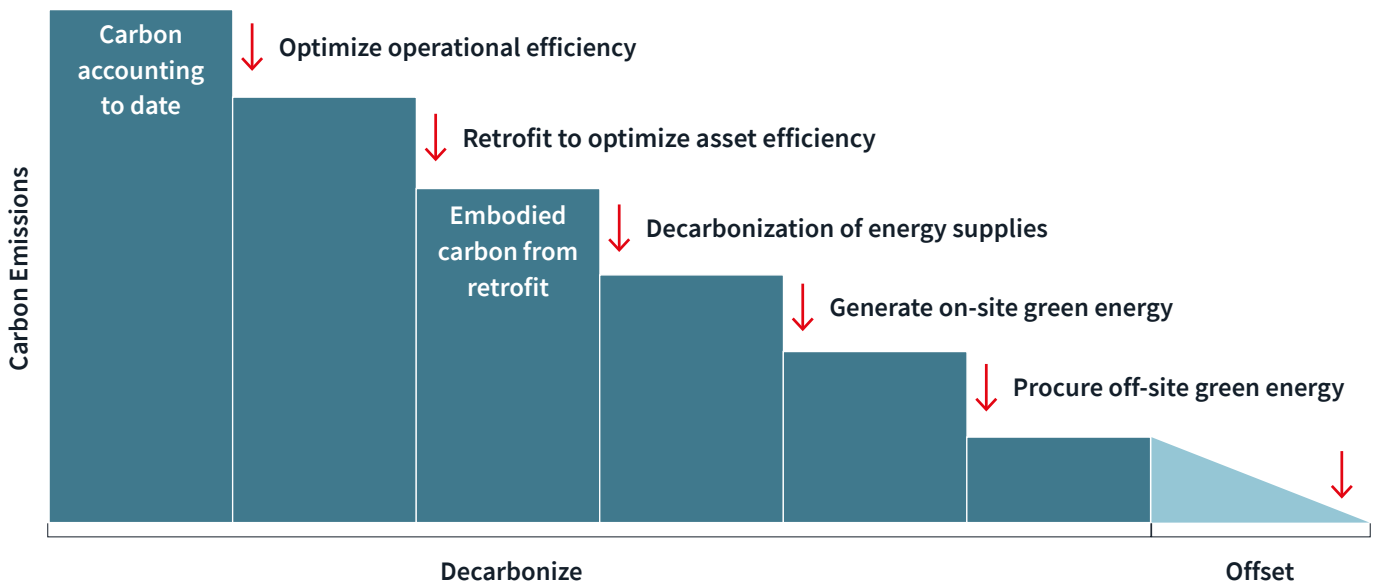
Given the extended timescales involved in decarbonizing operations and retrofitting buildings, taking action sooner rather than waiting for new regulations to be announced will help companies remain compliant.

# Retrofitting and adaptation for a more sustainable future

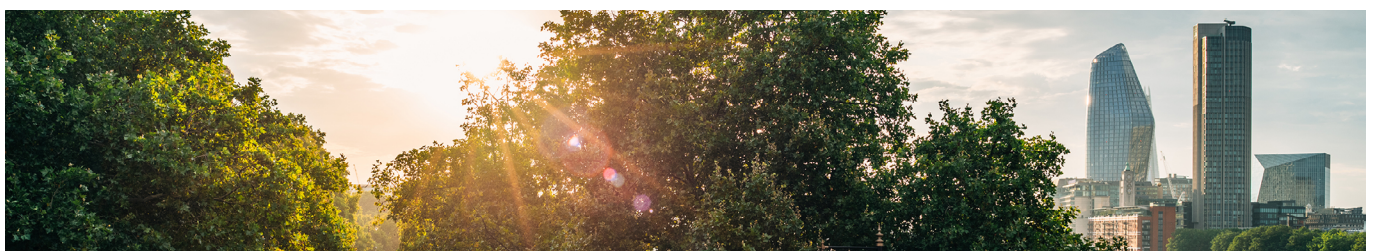
The real estate industry has the expertise and technology needed to create low-carbon buildings. Even though the decarbonization process will take several years, in many cases it is an easier win to drive progress on carbon commitments, compared to more complex tasks such as tackling Scope 3 emissions across supply chains.

Every real estate portfolio will take a slightly different route to cut emissions and build resilience, but the steps to decarbonize, as set out in **WEF-JLL Green Building Principles**, are clear.

## NZC interventions need to be strategically planned



Source: JLL Research, 2023





# Measures to drive resilience and decarbonization goals

Adaptions to city infrastructure and buildings can better mitigate physical risks and ensure that buildings operate more efficiently while contributing to a low carbon future. These should be considered in relation to factors including location, need and risk mitigation when determining the business case.

Not all measures require logistically challenging or expansive infrastructure. Smaller-scale solutions implemented in communities or directly on buildings can contribute significantly to decarbonization and resilience goals.

## Nature-based solutions

Adding more greenery, whether city-wide tree planting initiatives or mandating green roofs on larger commercial buildings, is a popular way to boost resilience and mitigation efforts.

Many cities around the world have introduced legislation in recent years that requires green roofs on new, and sometimes, existing buildings. Some cities, such as Hamburg and New York, are providing financial incentives to install green infrastructure.



## Rainwater harvesting

Harvesting rainwater has been around for centuries, but as more cities face water shortages, it's in focus as a way for communities to improve their water resilience and reduce their reliance on municipal supplies. Technology, such as smart sensors, and ongoing data analysis are helping to optimize how water is collected and used.

In New Mexico, all roofs on commercial buildings must be able to harvest and store rainfall for use in irrigation, while in South Australia, new houses are required to install a rooftop rainwater tank, connect to a community tank or implement water recycling.

Conversely, other cities are putting measures in place to manage excessive rainfall. In Pittsburgh in the U.S., the 2022 stormwater code requires new developments to plan for projected increases in heavy rainfall rather than use historical data.

## Installing microgrids

With many city grids struggling to meet both higher power demands and clean energy goals - not to mention maintain normal operations during extreme weather events - microgrids are gaining traction. These self sufficient systems can generate and store their own clean power and distribute it locally to connected buildings, with the unique ability of operating independently from the main electrical grid.

In Columbus, Ohio a severe storm in 2022 left hundreds of thousands of residents without power for nearly a week. The city recently installed the first of five planned microgrids with 100 kW of onsite solar generation and 440 kWh of battery energy storage. San Diego is likewise installing eight microgrids to support both short-term resilience and the city's longer-term goal of being powered 100% by renewables by 2035.



## Changing building design

Most of the focus in the built environment has been on decarbonization. Yet incorporating measures that also improve resilience present opportunities for building owners and users to reduce risks, secure operational continuity, promote social equity, and save on costs in the long run.

While workers outside are most exposed to heatwaves, those working inside are increasingly feeling the effects of extreme heat. At 32°C (90°F), productivity levels drop by about 25% – and slumps by 70% when the temperature rises further past 38°C (100°F). By 2030, the U.S. alone could lose an average of US\$200 billion a year from the impact of heat on productivity, according to Vivid Economics.

Today’s old commercial buildings are a big part of the problem, constructed at a time when the climate was different and air conditioning was unnecessary. Adding in more air conditioning or other energy intensive appliances will only exacerbate global warming.

More sustainable long-term solutions include better insulation to reduce heat loss or gain, cooling features such as external shutters and blinds, and innovative design and technology to optimize efficiencies.

In Abu Dhabi, where temperatures can soar to 46 °C (115°F), the 26-story Al Bahar Towers have computer-controlled folding screens that adjust to the sun’s position to provide shade. Elsewhere, smart windows, which are glass panes connected to the internet, use artificial intelligence to automatically tint glass for a more comfortable indoor environment while reducing reliance on lighting and air conditioning.

A new generation of supercooling materials is also under development. Scientists are modifying the optical properties of materials used to coat buildings to alter the amount of heat absorbed and reflected depending on the air temperature outside.



# Retrofitting must meet wider sustainability goals

## Illustrative asset enhancement upgrades

### Solar PV roof panels



Generate on-site renewable energy to reduce energy costs and GHG emissions

### Outdoor/green space



Increase biodiversity and reduce air pollution, while promoting employee physical and mental wellbeing

### Smart glass



Benefit from natural light and outdoor views while preserving privacy and conserving energy

### Sensored lighting



Sensors switch off or dim lights to reduce energy use based on occupancy levels

### Cycle storage



Interior storage spaces with shower/locker facilities

### Geo-exchange system



Installation of heat pumps under the existing building to offset heating and cooling loads



### Building reuse

Retain existing building structure to reduce waste to landfill and reduce embodied carbon emissions



### Health and wellness

Design elements prioritizing health and wellbeing, such as fresh air, thermal comfort and ample daylight



### Smart building control and metering

Digital controls and real-time data for increased occupant comfort, reduced energy use, and reporting



### Transportation/commuting connections

Connections to public transportation and safe walking/cycling lanes



### Electric vehicle charging

Charging stations on-site or nearby



### Water harvesting

Reduce water waste with basement cistern to gather rainwater from roof for reuse in the building's mechanical systems

Source: JLL Research, 2023

## Supporting long-term success

The exact combination of factors to build a strong business case for sustainability investment will vary significantly between companies, but overall, these decisions must be thought of in the long term. Today, returns on sustainability are largely undervalued. Yet even in the face of near-term economic headwinds, efforts to decarbonize real estate and improve its resilience to climate change are now more important than ever.

While efforts to decarbonize buildings are critical in mitigating the effects of climate change in the years to come, they need to be accompanied by resilience measures to ensure that buildings can withstand a changing climate.

**By implementing the right measures in the right way at the right time, owners can minimize the impact of physical and transition risks on their buildings – most specifically on their value and the income they generate – while corporates can reduce the disruption to their spaces and business operations. Both can unlock opportunities by developing sustainable and inclusive spaces that are ready for what lies ahead.**





**Key questions for investors** developing a business case:

The combined benefits of decarbonization and resilience measures are much greater than most decision-makers take into account.

Returns on sustainable investments can lead to i) rental uplifts, ii) high-quality tenant attraction, iii) greater yields, iv) higher occupancy levels, v) lower compliance costs and vi) reduced operational costs.

**01** Has your business case fully integrated the value upside of the six benefits listed above?

**02** Are you maximizing opportunities to integrate resilience and decarbonization plans into asset repositioning strategies?

**03** Does your capital expenditure plan provide a credible pathway to ensuring future financing?

**04** Are you including tenant emissions in your pathways?

**05** Have you considered pursuing new revenue opportunities with tenants through aspects such as electric vehicle charging and 'solar and energy-as-a-service' (EaaS) contracts?





**Key questions for occupiers** developing a business case:

Targeting emissions reductions and improved resilience in real estate operations present more immediate and controllable opportunities for occupiers looking to advance on ESG goals, compared to broader value chain operations.

- 01** How are you adapting your portfolio in relation to physical and transition risks? Do you know which sites are most vulnerable?
- 02** Have you aligned your renewal and relocation strategies with climate commitments and incorporated building performance metrics into site selection processes?
- 03** Will your climate disclosure practices be compliant with future regulation?
- 04** Can you link capital expenditure plans to material emissions reductions and other ESG goals?
- 05** Are you integrating actions needed to boost resilience alongside ones that will add long-term value, such as addressing employee health and wellbeing needs, social impact and creating inclusive spaces?
- 06** Have you engaged with landlords to establish short-term contingency plans for extreme weather events and to identify areas for longer-term collaboration and cost-sharing of decarbonization plans?



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JLL's research team delivers intelligence, analysis and insight through marketleading reports and services that illuminate today's commercial real estate dynamics and identify tomorrow's challenges and opportunities. Our more than 550 global research professionals track and analyze economic and property trends and forecast future conditions in over 60 countries, producing unrivalled local and global perspectives. Our research and expertise, fueled by real-time information and innovative thinking around the world, creates a competitive advantage for our clients and drives successful strategies and optimal real estate decisions.

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