

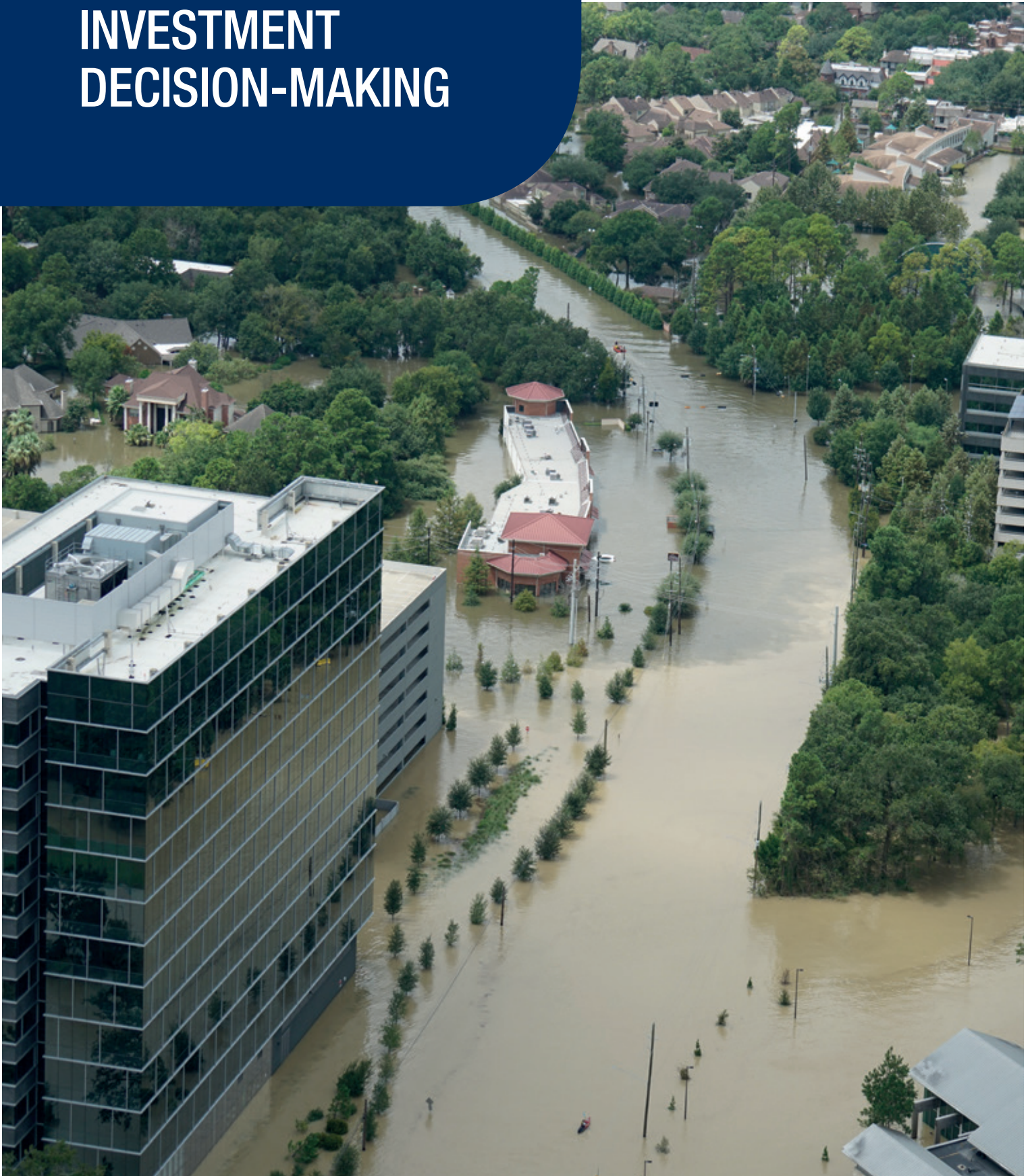


Urban Land  
Institute

# CLIMATE RISK AND REAL ESTATE INVESTMENT DECISION-MAKING

HEITMAN

A REAL ESTATE INVESTMENT MANAGEMENT FIRM





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Front cover image: Flooding in Houston after Hurricane Harvey. (istockphoto © Karl Spencer)

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## ABOUT ULI

The Urban Land Institute is a global, member-driven organisation comprising more than 42,000 real estate and urban development professionals dedicated to advancing the Institute's mission of providing leadership in the responsible use of land and in creating and sustaining thriving 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 80 countries.

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.

Peer-to-peer learning is achieved through the knowledge shared by members at thousands of convenings each year that reinforce ULI's position as a global authority on land use and real estate. In 2018 alone, more than 2,200 events were held in about 330 cities around the world.

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.

More information is available at [uli.org](http://uli.org).

Follow ULI on Twitter, Facebook, LinkedIn, and Instagram.

## ABOUT HEITMAN

Founded in 1966, Heitman LLC is a global real estate investment management firm with approximately \$42 billion in assets under management. Heitman's real estate investment strategies include direct investments in the equity or debt capitalization of a property or in the securities of listed and publicly traded real estate companies. Heitman serves a global client base with clients from North American, European, Middle Eastern, and Asia-Pacific institutions, pension plans, foundations, and corporations and individual investors.

Headquartered in Chicago, with additional offices in North America, Europe, and Asia-Pacific, Heitman's more than 325 employees offer specialized expertise—from a specific discipline to local insight.

# ACKNOWLEDGMENTS

This report was made possible through a collaboration between ULI and Heitman. ULI and Heitman would like to thank the following contributors to the development of this report:

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*Cars parked in the business district of a city during a snowstorm. (istockphoto © aapsky)*

# CONTENTS

<b>FOREWORD</b>	<b>1</b>
<b>EXECUTIVE SUMMARY</b>	<b>2</b>
<b>INTRODUCTION</b>	<b>3</b>
<b>WHY CLIMATE RISKS MATTER FOR REAL ESTATE</b>	<b>5</b>
<b>CLIMATE RISK: THE STATE OF THE INDUSTRY</b>	<b>8</b>
INSURING CLIMATE RISK	8
THE CHALLENGE OF INVESTMENT HORIZONS	9
A VIEW FROM THE INSURANCE INDUSTRY	10
MARKET-LEVEL IMPACTS	11
INVESTORS AND INVESTMENT MANAGERS—WORKING IN PARTNERSHIP	11
INVESTMENT LOCATIONS: UNDERSTANDING ASSET RISK	11
THE ROLE OF CORPORATE REPORTING IN CLIMATE RISK AWARENESS	13
<b>MEASURING AND MANAGING CLIMATE RISK: CURRENT BEST PRACTICES</b>	<b>14</b>
MAPPING PHYSICAL RISKS	14
CASE STUDY: ALIGNING RISK INVESTMENT HORIZONS	15
DUE DILIGENCE AND OTHER INVESTMENT DECISION-MAKING PROCESSES	15
THE REIT PERSPECTIVE: GEOGRAPHIC RISK, ASSET-LEVEL MITIGATION, AND CITY ENGAGEMENT	16
MITIGATION FOR ASSETS AT RISK	16
CASE STUDY: BUILDING CLIMATE ANALYSIS INTO INVESTMENT DECISIONS	17
EMERGING PROPTECH FOR CLIMATE RISK	19
ADAPTING ASSETS TO MITIGATE CLIMATE RISKS	19
CASE STUDY: MIAMI-DADE: THE ROLE OF THE PUBLIC SECTOR	22
ENGAGING WITH POLICYMAKERS AND CITY-LEVEL RESILIENCE STRATEGIES	22
<b>LOOKING TO THE FUTURE</b>	<b>23</b>
<b>DEFINITIONS</b>	<b>25</b>
<b>NOTES</b>	<b>26</b>
<b>CONTRIBUTORS</b>	<b>28</b>

*Extreme heat increases the risk of wildfires, as seen here near to Southern California homes. (istockphoto © f00sion)*



# FOREWORD

Understanding climate risk and its real estate investment implications is a complex challenge for property investors. For the immediate future, the world is seeing an increase in the frequency and intensity of extreme weather events due to climate change. In the longer run, the consequences of climate risks such as sea-level rise and extreme heat will increasingly highlight the vulnerability of individual assets and locations—and potentially entire metropolitan areas.

ULI has been proactive in working with members and city officials to better assess and develop mitigation strategies to counter these potential risks. For example, the Institute published *Ten Principles for Building Resilience* in early 2018, and launched the Developing Urban Resilience website ([developingresilience.uli.org](http://developingresilience.uli.org)) to showcase real estate projects with resilient design strategies. ULI Europe also released *Climate Change Implications for Real Estate Portfolio Allocation: Industry Perspectives* in 2016.

ULI's Urban Resilience program, and Center for Sustainability and Economic Performance, have and will continue to offer resources and research addressing these issues.

This report is the result of collaboration with global investment manager Heitman, which has developed a proactive approach to address climate risks and is at the forefront of investment managers looking to better quantify these risks. The timeliness and relevance of the topic was clearly demonstrated by the high response rate of ULI members asked to participate.

The research addresses the state of current practice for assessing and mitigating climate risk in real estate as well as highlighting best practices across the industry. Although not all investors and investment managers have been public about their work, many have started to develop innovative strategies to assess and mitigate near-term and long-term climate risks.

It is important for the industry to come together as it addresses climate change. There are many opportunities to collaborate to help increase our understanding of the topic as well as to develop common standards, and to share successful strategies and solutions.

Failure to address and mitigate climate risks may result in increased exposure to loss as a result of assets suffering from reduced liquidity and lower income, which will negatively affect investment returns. At the same time, investors who arm themselves with more accurate data on the impact of climate risks could help differentiate themselves and benefit from investing in locations at the forefront of climate mitigation.

We hope this research will prompt more investors and investment managers to join the debate on how to address this critical and complex challenge.

**Ed Walter**, Global CEO, ULI

**Maury Tognarelli**, CEO, Heitman

# EXECUTIVE SUMMARY

An increase in the number and intensity of severe weather-related events, such as hurricanes and flooding, has demonstrated more clearly the real risks that climate change presents to real estate. It is an urgent and complex challenge which must be addressed but for which the industry does not yet have a clear strategy.

Both the physical and transitional risks associated with climate change have financial impacts for real estate owners and operators. Physical risks, such as catastrophes, can lead to increased insurance premiums, higher capital expenditure and operational costs, and a decrease in the liquidity and value of buildings. Transitional risks, which center on the economic, political, and societal responses to climate change, can see locations, and even entire metropolitan areas, become less appealing because of climate-change-related events, leading to the potential for individual assets to become obsolete.

Currently, some industry players making investments into areas with potential climate risks have found that insurance premiums have gone up or coverage has gone down, but they still consider the price point and risk acceptable. However, the majority has not yet

observed a significant impact on insurance premiums or coverage. Insurance (while sometimes expensive) has provided coverage for most damages from catastrophic events, but it cannot protect them from a reduction in an asset's liquidity or depreciation in value.

As a result, investors and investment managers said they acknowledged that using insurance as the main protection for asset value is not an effective solution to mitigate the risk of devaluation, particularly because premiums currently are largely based on historical analysis and are not likely to consider future climate risks.

Although insurance might provide short-term protection, a growing group of investors and investment managers are exploring new approaches to find better tools and common standards to help the industry get better at pricing in climate risk in the future. These include:

- Mapping physical risk for current portfolios and potential acquisitions;
- Incorporating climate risk into due diligence and other investment decision-making processes;
- Incorporating additional physical adaptation and mitigation measures for assets at risk;

- Exploring a variety of strategies to mitigate risk, including portfolio diversification and investing directly in the mitigation measures for specific assets; and
- Engaging with policymakers on city-level resilience strategies, and supporting the investment by cities in mitigating the risk of all assets under their jurisdiction.

Assessing and pricing climate risks is an evolving issue for the industry. With the complexity surrounding the emerging fields of data and technology, many industry players are still evaluating how best to factor potential risks into their actions to mitigate perceived exposure and how to reflect concerns in financial projections.

Developers and owners can play an important role in helping the investment community get better at factoring in climate risk. Those exploring the issue have initially committed resources to information gathering and reporting to gain understanding and improve awareness. However, in the coming years, methods are likely to become more sophisticated. The industry needs to be able to better measure the value impact so it can base its future decision-making on a quantitative rather than qualitative understanding of the risks and the potential return from investing in mitigation strategies for their assets.



# INTRODUCTION

Many assets held by real estate investors are in cities that may be vulnerable to the effects of climate change. These effects, ranging from more intense and frequent weather events such as hurricanes and typhoons to gradual changes such as sea-level rise or more frequent and longer heat waves, create risks for investors that are likely to increase over time. Globally, the number of extreme weather events increased by more than 250 percent between 1980 and 2013.<sup>1</sup> Recognition is growing of the risks these events pose to investment; the

2018 edition of the World Economic Forum's *Global Risk Landscape*, which ranks societal, technological, economic, environmental, and geopolitical risks, identified extreme weather events, natural disasters, and the failure of climate change mitigation and adaptation as being most likely to occur and to have the greatest impact globally.<sup>2</sup>

For leading real estate investors and investment managers, the need to understand and develop strategies to address climate-related risks is already

understood and being prioritized. Recent weather events caused significant physical damages to properties and infrastructure. In 2017, the year Hurricanes Harvey and Maria hit the United States and storms battered northern and central Europe, insurers paid out a record \$135 billion globally for damage caused by storms and natural disasters.<sup>3</sup> This figure does not represent actual damages, which in the United States alone equaled \$307 billion, according to National Oceanic and Atmospheric Administration estimates.<sup>4</sup>



Storm waves at Dawlish, England, breaking against sea wall.  
(istockphoto © Moorefam)

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“The real estate investment industry as a whole is still early in its development of strategies to recognize, understand, and manage these [climate] risks.”

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The real estate industry is also seen as integral in helping limit the impact of climate change. In October 2018, the Intergovernmental Panel on Climate Change (IPCC), a global group of scientists within the United Nations, released a special report stating that limiting the earth’s global temperature increase to 1.5° C above pre-industrial levels would lessen the risk of “long-lasting irreversible changes.” The report cites changes in land use, buildings, and transportation as part of the path toward this goal.<sup>5</sup>

The actual and perceived risks of climate change are already beginning to be reflected in residential market pricing. A 2018 study determined that homes vulnerable to flooding in Florida, Georgia, North Carolina, South Carolina, and Virginia had lost \$7.4 billion in value between 2005 and 2017.<sup>6</sup> The New York metropolitan area experienced similar devaluation, collectively losing \$6.7 billion of value in the same period because of increased flooding from sea-level rise.<sup>7</sup>

Similar studies looking at the residential market in Germany, Finland, and Florida found that homes exposed to flood risk or sea-level rise have sold for less than comparable properties or have seen values grow at a reduced rate in comparison to similar properties without flood risk.<sup>8</sup> Commercial real estate could see similar effects, as demonstrated by recent research on the United States, which found that overall commercial property values in areas affected

by the costliest hurricanes decreased by almost 6 percent one year after the storm and by 10.5 percent two years after.<sup>9</sup>

This report, the result of a collaboration between ULI and global real estate investment manager Heitman, looks at the current state of the real estate investment industry’s understanding of, and approach to, addressing climate risk in its investment management and decision-making process. The report comprises a literature review and 25 interviews carried out by ULI with real estate investors, investment managers, and investment consultants from North America, Europe, and Asia-Pacific, including many ULI members who are industry leaders in addressing climate risk.

Its findings indicate a growing awareness of climate risk and its potential impact on real estate among leading real estate investment managers and investors. However, the real estate investment industry as a whole is still early in its development of strategies to recognize, understand, and manage these risks and at present relies heavily on insurance cover for the majority of the financial risks in the short term.

This report highlights the types of climate risks that could affect real estate investment, the impacts they could have on investment practices and returns, and how industry leaders currently view these risks. It also outlines some of the actions being taken to better understand and manage these risks.

Awareness of and interest in this topic is growing, and in the coming years, understanding of this issue is expected to increase, as are methods to incorporate climate change into real estate investment decision-making.

Some comparisons can be made to the evolution of sustainability within the real estate industry. When companies started looking at sustainability more than a decade ago, they focused on disclosing and reporting, which helped raise awareness and understanding within the industry. Later, the industry moved to setting standards on how to report and implement sustainability measures. A similar path is likely to be followed in addressing climate risks, although these risks and their impact on real estate values are expected to be more difficult to quantify.

Some industry players have already been forced to adapt because climate risks have directly affected their portfolios. Others, despite the fact that their assets have not yet suffered from climate-related issues, have started to recognize the need to incorporate climate risk into their strategy. In both cases, investors see climate considerations as a new layer of fiduciary responsibility to their stakeholders, as well as an opportunity to identify markets and assets that will benefit from a changing climate.

# WHY CLIMATE RISKS MATTER FOR REAL ESTATE



Aftermath of a hurricane in the Florida Keys. (istockphoto © Jodi Jacobson)

The nature of climate risks—and how they will affect real estate values—is a topic that is still being explored by industry actors.

The table in this section summarizes the main types of risks that have the potential to affect real estate investment and their potential impacts.

The risks posed by climate change are often divided into *physical* risks and *transition* risks. *Physical risks* are those capable of directly affecting buildings; they include extreme weather events, gradual sea-level rise, and changing weather patterns. *Transition risks* are those that result from a shift to a lower-carbon economy and using new, non-fossil-fuel sources of energy. These include regulatory changes, economic shifts, and the changing availability and price of resources.

The location-specific physical threats posed by factors such as sea-level rise, hurricanes, wildfires and forest fires, heat stress, and

water stress are among the most easily observable risks to real estate investment. They are a particular concern since many key markets for real estate investment are in areas exposed to the physical impacts of climate change.

Recent analysis by Heitman and Four Twenty Seven, which provides market intelligence on the economic risk of climate change, focused on institutional exposure to climate risk. They found that more than 24 percent of the National Council of Real Estate Investment Fiduciaries (NCREIF) Property Index value in the United States is in metropolitan areas whose central cities are among the 10 percent of cities most exposed to sea-level rise, amounting to more than \$130 billion of real estate.<sup>10</sup>

In addition, a 2015 study published by the Royal Institution of Chartered Surveyors (RICS) modeled the potential for increased costs of running a building in eight European Union countries if commercial buildings there

are not retrofitted to address climate risks.<sup>11</sup> The model indicated that by 2050 the total increase in energy bills from 2010 levels for the eight countries would be £457 billion. For Germany, Spain, and Greece, the cost would be more than 8 percent of their gross domestic product.

To some extent, investors have already begun to address transition risks as a part of broader environmental, social, and governance (ESG) agendas around carbon reduction. These have been easier to justify because many strategies to improve energy efficiency and decarbonize buildings have an immediately quantifiable return on investment that enhances real estate values.

A survey of senior executives at real estate investment firms carried out for ULI Europe in 2014 and 2015 about the risks that climate change could pose to their portfolios found executives were largely focused on transition risks.<sup>12</sup> In contrast, several interviewees for this report asserted that physical risks are likely to be more of a focus in the future.

## TYPES OF CLIMATE RISK AND THEIR POTENTIAL IMPACT ON REAL ESTATE

	Category	Potential impact
Physical risks	<b>Catastrophic events</b> Extreme weather such as hurricanes and wildfires.	<ul style="list-style-type: none"> <li>• Costs to repair or replace damaged or destroyed assets; value impairment</li> <li>• Property downtime and business disruption</li> <li>• Potential for increased insurance costs or reduced/no insurance availability</li> </ul>
	<b>Changes in weather patterns</b> Gradual changes in temperature and precipitation—such as higher temperatures, rising sea levels, increasing frequency of heavy rain and wind, and decreased rainfall—which are likely to exaggerate the impact of catastrophic events.	<ul style="list-style-type: none"> <li>• Increased wear and tear on or damage to buildings, leading to increasing maintenance costs</li> <li>• Increased operating costs due to need for more, or alternative resources (energy and/or water) to operate a building</li> <li>• Cost of investment in adaptation measures, such as elevating buildings or incorporating additional cooling methods</li> <li>• Potential for increased damages from catastrophic events</li> <li>• Potential for increased insurance costs or reduced/no insurance availability</li> </ul>
Transition risks	<b>Market</b> The possibility that markets vulnerable to climate change will become less desirable over time. Rising capital costs to pay for building and maintaining infrastructure to manage climate risks.	<ul style="list-style-type: none"> <li>• Reduced economic activity in vulnerable markets</li> <li>• Reduced occupier demand for properties</li> <li>• Reduced asset value</li> <li>• Potential for increased real estate taxes</li> </ul>
	<b>Policy and regulation</b> Regulations to address climate change—e.g., climate risk disclosure, tougher building standards, carbon pricing, emissions caps, changes to subsidies—as well as changing policies for providing funding for infrastructure or rebuilding after major events.	<ul style="list-style-type: none"> <li>• Increased cost of doing business due to new disclosure requirements and compliance measures</li> <li>• Increased taxes—both those resulting from public policies such as carbon taxes and those for funding adaptation infrastructure</li> <li>• Loss of subsidies or other funding opportunities</li> <li>• Additional capital investment to comply with stricter regulation</li> </ul>
	<b>Resource availability</b> Changes in the availability of key resources such as energy and water, including water scarcity.	<ul style="list-style-type: none"> <li>• Increased costs and reduced net operating income due to higher prices for water and energy</li> <li>• Additional capital expenditures to adapt buildings to operate with reduced/alternative resources</li> </ul>
	<b>Reputation and market position</b> Growing stakeholder preference to work with companies incorporating climate risk into investment decisions, and consumer preference for real estate products incorporating climate mitigation.	<ul style="list-style-type: none"> <li>• Risk to company brand and reputation if no action taken</li> <li>• Lower liquidity and/or reduced attractiveness of assets that have not incorporated climate mitigation</li> </ul>



*Bosco Verticale, two residential towers in Milan, Italy, which address climate change issues through green infrastructure. (istockphoto © pierluigipalazzi)*

# CLIMATE RISK: THE STATE OF THE INDUSTRY

This section explores the research findings on the current industry perception of climate risk and the role being played by different types of actors in the real estate investment community.

## Insuring Climate Risks

The prevailing view among interviewees was that most investment managers and investors for directly held assets currently use insurance as their primary means of protection against extreme weather and climate events. “Rather than limiting investment in particular areas, it’s been more a question of how to properly insure a property,” noted one investment consultant. “A few managers won’t go into certain areas, but most focus on insurance.”

However, insurance will cover damages from catastrophic events; it will not cover loss in value from a reduction in the asset’s liquidity. In general, insurance cover needs to be renewed each year, whereas investors are holding properties over longer periods. This leaves investors exposed to climate risks over the hold period and the potential for investment devaluation.

In some cases, where markets have been affected by extreme weather, insurance premiums have gone up or coverage availability has gone down; however, investors felt that both the price point and risk were still acceptable. Some interviewees noted that they have recently seen increases in their insurance premiums, while others anticipate increases given the stronger and more frequent storms arising from climate change.

According to insurance brokerage firm, 69 percent of real estate and hospitality clients had seen an increase in rates in the year to the end of the third quarter 2018, with an average rate increase of 9.1 percent. The insurance industry is also expected to increase premiums as it changes how it funds losses. Currently, insurers tend to cross-fund property losses with other forms of insurance premiums, a practice that has led insurers to believe that property premiums are priced below their risk of losses. If property premiums are more directly related to the risk of losses, this could cause some premiums to rise. In addition, in recent years, an inward flow of alternative capital, such as reinsurance capital raised through insurance-linked securities, has helped with insurance losses. If this capital decreases, disappears, or seeks a higher return, property premiums could increase.

For the future, numerous interviewees noted that they are uncertain how long insurance coverage will be sufficient for assets in highly vulnerable locations. As one investment manager noted: “A plus-4-degree [Celsius] world is not insurable.” Discussing a part of the United States that is particularly exposed to extreme weather, another interviewee expressed his disbelief: “I find it hard to believe that people are capable of underwriting all of these risks.”

Accordingly, many investment managers are looking to insurance partners to help anticipate rising premiums caused by climate risks, availability of coverage, and to understand mitigation opportunities. Currently, premiums are largely levied on the basis of historical analysis so are not likely to take into consideration future climate risks. Moreover, premiums usually can be adjusted up or down every year, and the amount of insurance available for a property (or any insurance at all) can change on an annual basis.

Interviewees also noted that because most premiums have not yet been affected by climate risk, they are not currently rewarded by insurance providers for investing in resilience or mitigation with better premiums or more coverage than their less-resilient peers, but hope to see this happen in the future.

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“Rather than limiting investment in particular areas, it’s been more a question of how to properly insure a property.”

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One institutional investor noted that it has recently added new procedures to ensure adequate insurance for its private indirect international portfolio. Its new process includes ensuring that the expected and agreed upon insurance is in place as well as requesting and reviewing policy content and rates. “We are the only one in the industry that we know of who requests this information on an annual basis,” the interviewee added.

### **The Challenge of Investment Horizons**

For industry leaders with hold periods over seven to 10 years, concerns were increasing about rising costs and protecting the value of their investments over time. “These risks could hurt the long-term profitability of these assets so we are protecting their [investments],” said one interviewee.

Interviewees were not confident that they understood the potential financial impact of climate risks and therefore how best to prepare; it was difficult to account for impacts that could happen over the longer term

(including beyond the interviewees’ hold period). One investment consultant noted that clients are interested in adjusting required returns to factor in climate risk; however, it is difficult “to get a sense of how material that added risk premium would be.”

Predicting impacts is also challenging given the number of potential scenarios in play: “The impact of risks further out on investment are more uncertain. We know that the risk will be there, but not necessarily the locations where it is a factor, and the impact of the risk.” Other interviewees mentioned that it is challenging to quantify the effects that climate risk might have. In the words of one investor: “If we can’t measure it, how do we put a discount on it?”

Several interviewees were struggling to reconcile the potential impacts of very long term risks like sea-level rise with their hold periods. Not knowing when these impacts may take effect made them difficult to address. Many noted that impacts like

long-term sea-level rise are unlikely to affect investments during their hold cycle, but that increasing severity and frequency of extreme weather events like storm-surge sea-level rise could have an immediate impact on their assets.

Climate risks may also ultimately become more important to shorter-term investors as they consider their prospects for successfully exiting an investment. One investment manager was not concerned about the value of an asset through its own hold period but was thinking ahead to exit liquidity and therefore the next buyer’s hold period.

One investor said the risks often boiled down to the lower liquidity that would occur if climate-related risks appeared to be greater than originally thought or not properly priced. For them, addressing climate risk was about keeping assets liquid and fighting the obsolescence that can come from buildings being less marketable to tenants and investors.



*Buffalo Bayou Park, Houston, Texas, was designed to withstand flooding from torrential rainfalls common to the city. Credit: Jonnu Singleton, SWA Group*

“While we have a good supply of capital in insurance due to increased confidence in our modeling, long periods of price stability should not be assumed.”

## A VIEW FROM THE INSURANCE INDUSTRY

Perhaps no other sector is seen at greater risk from climate change than the insurance industry. It is often assumed that climate change will be ruinous to insurers and will cause premiums to skyrocket. In fact, the industry simply doesn't know what will happen. Climate change is a serious risk to society, but how it affects insurers and premiums for policyholders is a complex process.

Most insurance policies are less than 24 months in duration and premiums are adjusted based on a complex range of factors: available insurance capital, returns on insurers' assets, demand for insurance, and of course, the underlying risk. Climate change can impact any of the components driving premiums.

Climate change will shift the tail risks for many weather perils, but uncertainty is widespread across many types of weather events. There isn't a consensus on the impact climate change will have on tropical cyclone (hurricane/typhoon) frequency, but they are likely to become more severe. Sea-level rise will exacerbate storm surge. To date, however, there isn't a clear trend in insurance loss data; losses vary from year to year.

What are some takeaways the insurance industry can offer real estate owners? First, while there isn't a clear answer on premiums, expect more volatility. Climate change will increase weather volatility, which will reverberate through the economy. While we have a good supply of capital in insurance due to increased confidence in our modeling, long periods of price stability should not be assumed.

Pricing is hard to predict and influenced by macroeconomic events as well as policy. Previously single large events in one location had a bigger impact on insurance markets globally. With better modelling and more capital, these impacts are highly regional now.

For those looking for alternatives to extend insurance periods to three or five years, the capital markets have provided cover for some types of catastrophic risk through catastrophe bonds.

These insurance linked securities (ILS) provide an alternative form of insurance capital for cedents looking to strengthen their balance sheets from natural catastrophe losses.

Insurers are also becoming masters of their books of business through better understanding and pricing of risks. Tools such as catastrophe models offer a good starting point to assess current risk, but until now, the insurance industry has relied on this type of data from just two sources.

Aon, along with other insurers, is supporting the development of more open source models such as the Oasis Lost Modelling Framework to encourage a common set of standards, transparency and more competition.

Parts of the industry are also starting to recognise that the challenge of modeling climate risks for clients won't come from existing modeling tools alone. It needs new start-ups to play a role in improving quantitative metrics for helping clients address climate risks.

While insurance plays a critical role in risk management, a risk-financing strategy needs to look at risk mitigation and risk retention. Mitigation measures could help lower premiums as it might give more certainty around probable outcomes for individual assets. However, it has to be remembered that an effective insurer will be crafting a portfolio around different types of risks, good and bad. The questions for real estate owners is whether they have portfolios that are attractive to the widest range of risk transfer capital available, and do they understand how these risks might evolve and lead to changes in risk perceptions.

Finally, the insurance and real estate industries should be asking if they are building things the right way and in the right places. It all comes back to understanding risk. Brokers and insurers are here to help and there must be more cooperation across the entire value chain.

— **Greg Lowe**, Global Head of Resilience and Sustainability, Aon



## Market-level Impacts

Interviewees identified potential impacts at the market, portfolio, and asset levels. At the market level, one investment manager had attempted to investigate whether yield differs for assets in areas where physical risks are higher, but found that even if a correlation existed, a causal link to climate was difficult to demonstrate isolated from other factors that might be affecting that market.

One investment manager familiar with Moody's 2017 report<sup>13</sup> warning cities to invest in resilience or face downgrades in their bond rating, noted that one year after this report no AAA city has actually been downgraded, but this interviewee believed that eventually this would happen. At the asset level, although physical risks in terms of possible storm damage can be examined, predicting and quantifying what the impact could be are still difficult. That being said, a change in approach—by the insurance industry, by a global rating agency, or by local or national governments shifting policies on funding recovery needs after a disaster—could lead to significant market shifts.

## Investors and Investment Managers—Working Together on Portfolio Risk

The institutional investors interviewed for this research were consistent in their view that they expect their investment managers to take the lead in monitoring the potential impact that climate risk could have on their portfolios. Investors rely on the local market expertise of their managers to understand risks, including those related to extreme weather and climate. “We have to trust our partners on this,” reported an investment director at one institutional investor. An ESG specialist at another institutional investor concurred. “We’re not going to restrict our managers . . . We rely on them to be the experts in relation to managing risks and opportunities in their own portfolios.”

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“We rely on [our managers] to be the experts in relation to managing risks and opportunities in their own portfolios.”

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This does not mean that investors are not interested in their managers' approach to this issue. One large institutional investor said that an investment manager's approach to climate and ESG risks more broadly is important to remaining competitive, particularly when making long-term investments in unlisted property. Several investors interviewed also mentioned that they evaluate their investment managers' approach to climate risk as part of overall checks on their investment process.

Many interviewees reported that a small number of investors are actively working to push the industry to take climate risk into account. Some of the investment managers interviewed found these investors' efforts particularly helpful for raising awareness. One investor has this year, for the first time, sent investment managers across all asset classes a questionnaire specifically about how they are managing climate risk.

For investment managers, the drive to more effectively manage climate risk is motivated by its potential impacts on the portfolio. For some, it is also about getting ahead of questions that may arise from their investors. The head of sustainability at a global investment manager, discussing his company's introduction of scenario models for some assets, said: “We are doing this to be proactive. We want to be able to understand what the upper bound of the value impact is, so we can adjust for it with our investment strategy before getting the question from all our investors.”

## Investment Locations: Understanding Asset Risk

While awareness of climate risk is growing, none of the investors interviewed for this research ruled out investment in assets in otherwise attractive markets solely because of climate risk. Overall, interviewees anticipated that the attractiveness of coastal markets vulnerable to climate risks like sea-level rise could fall in the future, but interest is unlikely to subside in the near- and mid-term. A global investment manager that assesses all new properties against an internal set of risk indicators that includes climate risk noted that although a low score in this area had downgraded the overall risk score of otherwise attractive cities, climate risks on their own were not enough to rule out many investments.

In part, this view reflects pragmatism about where the core markets for real estate currently are. “The vast majority of what we consider core assets or core markets are in the coastal gateway areas. There's only so much that you can diversify away from that,” noted one investment consultant. That said, interviewees emphasized the need to invest in a “sensible” and “smart” way in markets where physical risks from climate change are evident. The challenge to doing so is anticipating what the risk premium could be—something which most interviewees felt was not sufficiently understood.

Most interviewees noted that growing awareness of climate risk will influence investment strategies, but in more nuanced ways than simply ruling out investing in a particular location. For example, an investment consultant posited that investors might adjust their strategies in vulnerable cities, focusing on particular submarkets such as those further inland. Numerous interviewees also noted that their attitude and approaches could change, particularly with increased frequency of major events like hurricanes, better data on the likelihood of future storms, or decreased access to affordable insurance coverage.



*Impact of Super Typhoon Mangkhut on a Hong Kong building.  
(istockphoto © winhorse)*

Broadly speaking, real estate has a built-in ability to adapt to climate change because of the nature of the asset class. Unlike bonds or shares, property's heterogeneity, limited stock, and the ability to actively manage assets give investors and investment managers more ability to adapt by making properties resilient. This gives owners the

chance to fight obsolescence and differentiate their assets even in more vulnerable areas, which could help prevent locations being ruled out for investment.

As discussed in the previous section, the risks to real estate investment go beyond just the physical. Investors also face transition

risks, especially market risk if a particular city, region, or country is not taking action to reduce the threats to assets in their jurisdiction. More than one interviewee noted that willingness to invest in cities with climate vulnerabilities hinged on seeing a proactive approach by local government, including a commitment to invest in infrastructure.

## THE ROLE OF CORPORATE REPORTING IN CLIMATE RISK AWARENESS

One evolving issue for investors and investment managers will be how to report to their stakeholders on climate-related financial risks.

Publicly listed companies have been reporting on their climate mitigation and overall sustainability and social responsibility efforts for more than a decade through a number of global reporting frameworks, including the Global Reporting Initiative, the Carbon Disclosure Project (now just CDP), and other standards. Companies have also looked to refine this reporting to be integrated into annual financial disclosures, following standards like the Sustainability Accounting Standards Board (SASB), the UN Principles for Responsible Investment (UNPRI), and alignment with the UN's Sustainable Development Goals and UN Guiding Principles on Business and Human Rights (UNGPs). In real estate, many publicly listed real estate investment trusts (REITs) and investment funds also report to the Global Real Estate Sustainability Benchmark (GRESB), which focuses on helping real estate investors assess the sustainability of their real estate holdings.

A recent addition to this sustainability reporting landscape is the Task Force on Climate-Related Disclosures (TCFD). Managed by the G20's Financial Stability Board, an international forum that coordinates financial authorities to increase the stability of international markets, TCFD was created to raise market awareness of climate-related financial risks and opportunities<sup>14</sup> and to help drive consistent reporting on climate-related risks across all industries.

It is supported by more than 500 firms and associations from across different industries globally. It is a voluntary program that lays out recommendations for consistent disclosures that help firms understand their financial risk and increase transparency for investors, lenders, insurers, and other stakeholders.

TCFD's supporters had a combined market capitalization of \$7.9 trillion, and supporting financial firms are responsible for nearly \$100 trillion in financial assets.<sup>15</sup> Currently, only a handful of real estate investment managers have expressly said they issue TCFD-compliant reports, but those participating are among some of the leading global real estate players.

Although the landscape for reporting climate-related risks is currently a crowded one, many investors surveyed appreciate the wealth of available ESG data available on real estate companies, and they are integrating climate reporting into their investment decisions.

Currently, most of them are leveraging a combination of public reporting through GRESB and CDP and using their own internal due diligence on a potential investment's ESG programs and performance. Investors participating in SASB and TCFD are hopeful that these standards will provide some consistency to climate risk and mitigation reporting and help provide more audit-quality data on their current and potential investments. While most investors surveyed have said they are hopeful that a standard will emerge to unify climate risk reporting, for now they plan to use multiple data sources to inform their decision-making on climate risk.

GRESB also recently launched a real estate Resilience Module. Its development was motivated by two key factors: to meet growing demand for information on resilience, and to increase access to information about strategies used to assess and manage risks from social and environmental shocks and stressors, including the impact of climate change.

# MEASURING AND MANAGING CLIMATE RISK: CURRENT BEST PRACTICES

For the most part, leading companies in the industry are not establishing new policies and processes on climate risk. Rather, they are modifying existing decision-making and management processes to add climate and extreme weather-related factors to those being considered alongside other risks and opportunities. Many interviewees noted that responding to climate risk will be a longer-term process, as understanding improves among their teams and investment committees, and experimental processes are formalized. This section summarizes some of the solutions currently being implemented by investors and investment managers, as well as in-depth case studies drawn from Heitman's experience.

## Mapping Physical Risks

Many leading investment managers and institutional investors are undertaking flood, resilience, and climate vulnerability scans of their portfolios. These mapping exercises seek to identify the impacts of physical climate risks on their properties, including sea-level rise, flooding, heavy rainfall, water stress, extreme heat, wildfire, and hurricanes. Potential impacts being considered range from physical access and business disruption for tenants to the effects

that longer-term temperature increases or increased wear and tear on buildings could have on operating and capital expenditure requirements. The ultimate objective for the investment community is to understand how climate will affect asset liquidity and, as a result, returns, in terms of both income and capital growth.

Several firms described natural catastrophe indices and screenings that they are developing to analyze climate risk. In some cases, these exercises are building on past risk analyses that studied risks of storms, drought, and other environmental hazards, but may not have factored in the likely increased frequency and intensity of events in the future due to climate change. Some have also taken this a step further to model financial implications, such as the potential for increased insurance premiums in high-risk areas, though many interviewees noted they had challenges associated with doing this.

Many investors and investment managers are starting to use analytical mapping exercises to provide a new way to look at their portfolios and understand the vulnerabilities of their assets. However,

most noted they have not yet determined how to integrate the information presented into decision-making processes.

Interviewees also mentioned that for global investors, variations in the coverage, quality, and methods used to produce data relevant to climate risk around the world were a barrier to understanding the risks. In addition, much of the data available relies on historical observations, which can have limited value for predictive modeling looking 10 to 20 years, let alone 50 to 80 years, into the future.

The aim of these mapping analyses is to pinpoint physical risk, quantify it, and understand the financial impact that climate risk could pose. In the long run, argued an interviewee, identifying climate risk could be more impactful in the investment process than its current practice of looking at whether a building has a sustainability certification. While sustainability often focuses largely on operations, climate risk addresses broader trends that could ultimately have a greater effect on property valuations.

Another benefit of this type of mapping would be to help investors and investment managers identify locations that may be affected less by climate change or more resilient to it. These locations and assets may well benefit from a pricing premium over time. Better data and analysis could also lead to a larger price differentiation between cities that have higher climate risks and those with lower risks.

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“The ultimate objective is to understand how climate will affect asset liquidity and, as a result, returns, in terms of both income and capital growth.”

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## CASE STUDY: ALIGNING RISK INVESTMENT HORIZONS

When Heitman began seeking greater climate risk transparency to improve its investment decisions and manage asset- and portfolio-level risk, it found that currently available data were not granular enough to assess the extent to which an asset is resilient in the face of today's climate change realities.

Currently, climate-risk assessment typically relies on insurance models and public data sets, where historical occurrences are the basis for modeling the risk of natural disasters, though data availability, accuracy, and transparency vary globally.

Since many insurance premiums renew annually, insurance companies take a short view and price risk only one year out based on probable weather and environmental risk. Institutional investors in property must consider longer-term risk that spans longer holding periods.

Heitman turned to scientific climate models that project long-term, global climate change impact and help clarify changing exposure for both acute, extreme weather events and chronic, industry-disrupting fluctuations, such as rising sea levels. However, scientific models can be challenging to access and apply to a large portfolio of real assets.

To help address these challenges, Heitman sought expertise from an emerging industry that combines next-generation climate maps with real estate data, thereby providing them with the best tools to begin effectively assessing and preparing for climate risk.

From the available partners in this emerging industry, Heitman selected Four Twenty Seven, a provider of market intelligence on the economic risk of climate change, to screen assets and potential new acquisitions and map climate risks around the world.

These new climate risk mapping tools enable Heitman to screen its current portfolio and potential new acquisitions using historical weather and environmental risk data, as well as forward-looking climate models, to build an overall view of climate-related risks for Heitman's properties, encompassing both acute and chronic risks. For example, floods are mapped in 30-meter by 30-meter (98 ft by 98 ft) zones. "A property on one side of the street could have a higher risk score for flooding than the other, reflecting differences in elevation or proximity to a local water body," said Laura Craft, head of global sustainability at Heitman.

Each asset is allocated a score from zero to 100 based on multiple dimensions—including risk related to cyclones, floods, earthquakes, sea-level rise, heat stress, and water stress—and then benchmarked to these dimensions using a proprietary database of over 1 million properties.

Heitman can now use these climate risk mapping tools to gain a better perspective of the risk profile and exposure of each asset and portfolio than what is provided through readily available data. Armed with this data, real estate investors can pinpoint areas most vulnerable to risk and, through further due diligence, determine if risk factors have been mitigated at the property and municipal level (see page 17).

### Due Diligence and Other Investment Decision-Making Processes

Issues such as flood risk have long been part of due diligence for investment decisions. The likely impact of climate change on existing environmental risks has not always been incorporated, but many interviewees predicted that this will soon change.

One global investment manager has, in recent years, examined each acquisition against a proprietary environmental risk tool created by an industry consultant that includes, among other risks, a climate change risk index. Using modeling, the index rates the climate change vulnerability over the next 20 years for the area in which the

asset is located. Factors considered include the ability of property owners in that location to manage the risks and the ability of the country in which it is located to deal with a potential event. The composite score for an area, which may range from low to extreme, is considered in the due diligence process. To date, reported the interviewee, this process has not resulted in any proposed acquisitions being ruled out.

Other investment managers and institutional investors interviewed noted the increasing use of ESG or sustainability indices during due diligence and suggested that these present a ripe opportunity for more formal consideration of climate risks. One

investment manager has recently incorporated a "catastrophe score" into its ESG checklist, which addresses flood and wind risk, with climate risk incorporated, alongside risks of earthquakes and terrorism. These scores help determine what the necessary level of insurance coverage should be to protect against damage loss. Firms may also include a risk premium in their required returns to account for climate risk. One interviewee noted that transparency indices often considered in the due diligence process, such as JLL's Real Estate Transparency Index, could be updated to explicitly address climate issues.

## THE REIT PERSPECTIVE: GEOGRAPHIC RISK, ASSET-LEVEL MITIGATION, AND CITY ENGAGEMENT

A 2018 study by climate analytics firm Four Twenty Seven in partnership with GeoPhy, a real estate technology company, assessed 73,500 properties owned by 321 REITs and found that 35 percent of REIT properties globally are geographically exposed to climate hazards, including inland flooding (17 percent), typhoons or hurricanes (12 percent), and coastal flooding and sea-level rise (6 percent).<sup>16</sup>

This report helped highlight the geographic exposure to climate risk of some primarily coastal REITs, but did not assess properties' current or planned resiliency efforts, or the investments planned by cities to help mitigate asset-level climate risks. For REITs looking to reduce their climate risk, asset-level and public investment in resilience will all have a significant impact on their specific climate risks.

Investors are beginning to ask REITs how they are incorporating climate risk into their investment and development strategies. At the asset level, one challenge is weighing the cost of mitigating climate risk with the benefits to that asset over time. Is the market ready to reward proactive investors with better capital terms, lower insurance premiums, or better tenant attraction and retention? Viewpoints from REITs suggest not; several expressed frustration that investments in asset-level resilience did not come with a clear, consistent decrease in insurance premiums, or any clear signal that tenants would pay more for (or even prefer) a more resilient building.

In the near-term, REITs investing in resilience can look to co-benefits from the investments (including minimized damages weather events, long-term operating expense stability, reduced utility expenses, and enhanced tenant experience) as well as reputational benefits with investors and the cities in which the REITs operate. Longer-term, many REITs looking to attract large-scale private capital and institutional investment believe they will be required to show that they have assessed and worked to mitigate climate risks to pass the investment screens for these investors.

At the city scale, investments made (or not made) by cities and regions will have a significant impact on the future climate risk for REITs and real estate. One global REIT interviewed pointed out that its assets are concentrated in cities that have pledged to invest more than \$5 billion in resilient infrastructure in the next 10 years. Another REIT expressed concern that while they have invested tens of millions in asset-level resilience, some cities in which they operate have been slow to commit to infrastructure investments that will make these asset-level investments pay off.

Climate models cannot project whether cities will meet their resilience investment plans but as the market starts to see how these preventive investments at the asset and the city levels can lead to avoided losses, these mitigation activities should help refine the risk profile of REITs and other real estate assets in geographies with a higher climate risk.

Another interviewee, an investment manager for a European firm that invests globally in REITs, noted that climate risk analysis in due diligence helped it determine what future capital expenditure liabilities might be for companies in which they might consider investing. The firm uses climate risk as one of the factors considered when assigning grades to the management teams that determine whether or not it will invest in a REIT. Although climate risk has not yet been the determining factor in deciding against investing in a REIT, this interviewee argued that the approach being taken by most REITs to address climate issues is insufficient, stating that “you have to do proper analysis

on future capex, run climate change scenarios, and make sure your data visibility is good enough to make long-term decisions.”

### Mitigation for Assets at Risk

Many investment managers indicated they are exploring how climate mitigation strategies—such as seawalls, dikes, building hardening, increased elevation, and additional cooling systems—can be incorporated into properties to improve their resilience and reduce the risk of losses or business interruption during a major weather event. For example, after the 2013 floods in Alberta, Canada, a global investment

manager began to move backup generators to higher floors and to modify water-pumping systems. Similar changes were made by many building owners and managers in New York City after Hurricane Sandy.<sup>17</sup>

Some interviewees proposed that for assets in markets or areas flagged as high risk, the due diligence process should include an assessment of the potential need for such capital expenditures, which could then be incorporated into valuations. One investment manager interviewed is doing so on an ad hoc basis and commissioning additional studies about potential interventions from engineering consultants where required.

Several firms were looking at how to incorporate climate risk into asset management plans after acquisition. One interviewee's firm allocated additional capital expenditure to assets identified as requiring investment to mitigate climate risk or requiring enhanced insurance. This approach is common for high-performing assets in competitive locations identified as long-term holds. One investment manager cited an asset that has required additional flood protection, but it is fully leased with strong rental growth. "It is not a project

that we would want to abandon," they said. Another interviewee also noted that there capital expenditure assumptions should be higher for properties in more vulnerable areas, such as coastal locations. "Ultimately, if you change these assumptions, this leads to different valuations of these properties—and different investment decisions. You have to make assumptions over the long term and how much that capex is."

While additional capital expenditure could negatively affect returns, for many properties in vulnerable areas, little alternative exists to the financial outlay. Failing to invest could more quickly render assets obsolete and illiquid. For some areas that are prone to climate risk, longer-run returns are likely to be lower as the operating costs and likelihood of increased capital expenditure are higher. Eventually this will be priced into the assets through higher cap rates and lower absolute valuations.

## CASE STUDY: BUILDING CLIMATE ANALYSIS INTO INVESTMENT DECISIONS

Once Heitman identified a better climate risk modeling tool (see page 15), its next step was to integrate these data into its decision-making.

For prospective investments flagged as high risk, the due diligence period allows for investigation of what mitigation measures have been implemented at the property or community level. For example, an asset may have scored above a particular weather-related risk threshold, but additional analysis could reveal that a building may have already been elevated to mitigate the direct risks of the flood-prone location. "Knowing these scores allows our due diligence teams to ask better questions about the potential risks while on site," said Laura Craft, head of global sustainability at Heitman.

These scores can inform capital expenditure calculations for mitigation measures or future insurance costs and can contribute to analysis on whether the risks alter the investment profile and potential returns. These data are also included in investment proposals regularly reviewed by Heitman's Investment Committee.

At the property level, this new data can impact underwriting and valuations of individual properties in terms of capital and operating expenditures, proactive mitigation measures that may need to be made, and anticipated long-term liquidity.

The climate risk assessment contributes to a holistic approach to constructing global property portfolios. Today, Heitman has screened all of its assets under management and is able to make better-informed decisions about asset weighting in specific portfolios. If a portfolio is determined to have a higher-than-targeted exposure, the portfolio can be rebalanced over time through limiting new acquisitions or exiting existing assets, exposed to a certain risk.

For example, Heitman's assessment tool flagged a potential asset with high exposure to sea-level and storm-surge rise. The property's location hindered mitigation measures such as elevating the building. In the due diligence process, Heitman decided not to buy the asset based on the overall high risk and potential challenges in selling this asset after a long-term investment hold.

In another instance, Heitman was considering an investment in an asset in a hurricane-prone area. Analysis determined that acquiring this investment would cause the portfolio for which the asset was targeted to have an unacceptably high exposure to hurricane and flood risk. The asset was reviewed for inclusion in another portfolio, where its presence would have a lesser impact, but the firm ultimately decided not to acquire the asset. "We now know our portfolio exposure to these climate-related risks. Over time, we want to lessen these risks. Our climate-risk assessment will not trigger an immediate sell-off of assets but it could (and has) caused us to opt not to buy assets with high exposure to environmental risks," said Mary Ludgin, head of global research at Heitman.

*1450 Brickell, Miami, a 35-story office tower designed with impact-resistant glass windows that can withstand the force of winds approaching 300 mph  
Credit: 1450 Brickell, Miami, Florida*



## EMERGING TECHNOLOGY FOR CLIMATE RISK

Tools and technologies are emerging across the real estate sector to help investment managers better assess their risks and to help navigate potential impacts of climate change. This is an emerging market that combines advanced mapping capabilities with risk analysis for real estate under a range of scenarios for extreme weather events and longer-term climate risks. Below are six of the early movers in this space. Each provider focuses on different aspects of climate risk and/or covers separate geographies. As the climate-risk-related proptech service industry continues to mature, it is likely that new entrants will enter the space.

**Carbon Delta** measures the potential risks caused by climate change and how they might be reflected in a company's future financial performance. Its models include insights into physical risks, financial costs associated with those risks, and potential impact on stocks and bonds, and future impacts on portfolios globally.<sup>18</sup>

The **Digital Coast** is a free website produced by the U.S. National Oceanic and Atmospheric Administration (NOAA) that provides U.S. coastal data, tools, training, and information communities need to address coastal issues. Its most popular tool, the sea-level-rise viewer, helps users visualize community-level impacts from flooding up to 10 feet (3 m) above average high tides.<sup>19</sup> Some REITs and asset managers are leveraging these free tools as a first step in mapping climate risks for their U.S. portfolios.

**Four Twenty Seven** provides science-driven analytics to assess current and future impacts of climate change on real assets,

equity, and fixed-income portfolios. It offers risk assessments for real estate investors and has partnered with public- and private-sector clients to assess and develop strategies to mitigate climate risks.

**Geophy** is an artificial intelligence-powered commercial real estate valuation platform, providing,<sup>20</sup> insights into the physical risks of REITs, among other calculations. This year, along with Four Twenty Seven, Geophy released the first global data set on REITs' financial exposure to climate change.

**Jupiter Intelligence** is a startup in the climate risk space that counts global REITs and major U.S. cities among its clients. Jupiter incorporates climate data into dynamic risk modeling for specific assets, with a deep-dive focus on several major U.S. real estate markets. Jupiter's tools currently focus on risks related to heat and flooding on real estate and public infrastructure in North America, but the company plans to have full global coverage by 2020.<sup>21</sup>

**Verisk Maplecroft** is a global risk analytics, research, and forecasting company that is focused on providing insight for organizational decision-makers throughout the entire supply chain. The company offers quantitative and mapping services at local, county, and sector levels based on topics including ESG investment, procurement, and business resilience.<sup>22</sup> Verisk adds climate risk to a broad portfolio of risk analysis tools and is used by many Global 1000 companies as part of their corporate and supply chain risk analysis.

### Adapting Assets to Mitigate Climate Risks

Owners and investors are looking to "harden" their assets against the risk of extreme weather events. They are also leveraging energy efficiency and other mitigation measures to reduce their risk, improve asset efficiency, and improve the occupier's comfort.

An interviewee from a REIT working in markets exposed to extreme heat highlighted that his firm is focusing on improving the cooling capacity of its properties. It is also working to ensure that outdoor spaces at its retail properties will remain inviting and sheltered from the sun during longer and more intense summer heat waves. "We

are trying to create buildings that are good places for our customers," the interviewee explained, citing the likely 50-year design lives of the assets. A similar effort in Australia described by one interviewee included using native landscaping to absorb high heat and reduce air-conditioning costs.

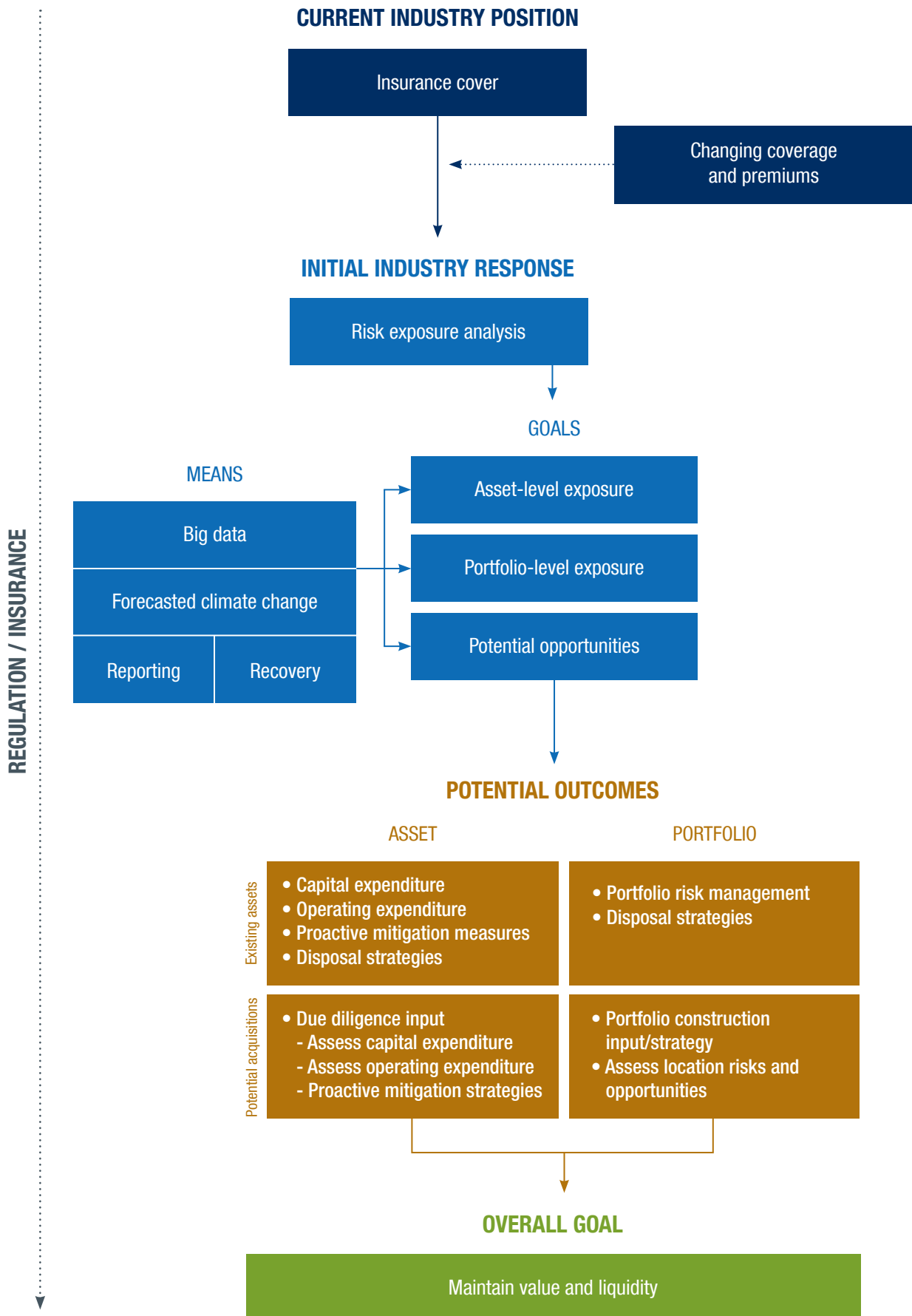
As with all investment, acquisition of assets must make sense within the broader investment approach and framework, and climate risks should now form part of that due diligence and strategy at the beginning of the process rather than being considered separately.

One investment manager explained that although mitigation measures were

important, a balance between making capital investments and remaining in line with return expectations is needed. "We will harden the building as best as we can, taking into account that we do have insurance to cover these things and we need to meet our investment returns . . . to meet our fiduciary responsibility to our clients."

In short, investments in climate change mitigation are becoming more commonplace but need to have other justifications, such as reduced operational costs or improved tenant experience, given the current expectation that insurance can cover damages. However, in the future, selling an asset could result in discounted pricing, if during the due diligence, the potential buyer factors in costs for climate mitigation.

**FIGURE 1. THE REAL ESTATE INDUSTRY’S CURRENT THINKING ON CLIMATE CHANGE RISKS**





*EDGE Olympic, Amsterdam, The Netherlands, has focused on resilience through technology, with a flexible digital infrastructure that connects all services in the building. Credit: EDGE Technologies*

## CASE STUDY: MIAMI-DADE: THE ROLE OF THE PUBLIC SECTOR

South Florida is acutely aware of its vulnerability to the shocks and stresses that will habitually affect cities and regions globally in the 21st century. Because of the immense value of the real estate between Palm Beach and Miami, its proximity to water, and latitudinal predisposition to be affected by hurricanes, the region has taken preemptive steps to mitigate both the near-term risk of extreme weather events and the longer-term impacts of climate change on the region.

In 2009, Miami-Dade County joined the Southeast Florida Climate Change Compact to collaborate as a region on issues related to climate change mitigation and adaptation. Since its creation, the partners have successfully completed a Regional Climate Action Plan, developed a unified sea-level rise projection for Southeast Florida, and completed a regional greenhouse gas emissions inventory and a regional vulnerability to sea-level rise analysis.

Based in part on the recommendations of Miami's Sea Level Rise Committee, the city updated its stormwater master plan to incorporate future conditions into its infrastructure plans and issued a \$400 million bond that will enable more robust investments in storm drain upgrades, flood pumps, and sea walls to curb flooding now and projected flooding over the next 40 to 50 years.

In 2013, the city of Miami Beach initiated a 10-year \$600 million stormwater management program to address sunny-day flooding and sea-level rise primarily by elevating roads and installing stormwater pumps. This program is fully funded by the local stormwater utility fee. In April 2018, Miami Beach invited the Urban Land Institute to host a three-day Advisory Services panel to evaluate the current program and determine if the city was on the right track.

ULI commended the city's incremental approach and its sense of urgency and recommended several enhancements to the existing program—more integrated planning, more blue and green infrastructure<sup>23</sup> to complement the pumps and pipes, and more strategic communications. It added that residents' willingness to tax themselves, and elected officials' courage in raising fees are a testament to the city's desire to adapt. In November 2018, Miami Beach approved a \$198 million general obligation bond issue for additional infrastructure and resilience-building enhancements.

Miami's proactive and strategic investment helps mitigate the inherent physical risks it faces and makes a case for not redlining regions at risk from climate change. As this report shows, savvy investors will look at both the physical risks and what cities are doing to mitigate risk for all of their real estate.

— **Jim Murley**, Chief Resilience Officer, Miami-Dade County

### Engaging with Policymakers and City-Level Resilience Strategies

Many interviewees noted that a local government's preparedness for climate change influenced their decisions regarding whether to invest long term in those markets. One global investor and manager emphasized that when making investment decisions, it considers a city's vulnerability alongside whether it has the financial resources, infrastructure and institutions, and political will to make the necessary mitigation investments. A property may be resilient to withstand climate risk, but this could be rendered useless if the infrastructure to access the property fails.

Overall, investors are seeking markets where governments have the authority, foresight, and funding to address climate risk, whether

at the municipal-government level or through supportive regional or national policies. They also want to see action being taken. Best practices cited included regular updating of flooding and rainfall vulnerability scans to influence development policy, investment in protective infrastructure, and mitigation strategies.

An institutional investor emphasized the overall role of municipalities in taking preventive measures, noting that "how active [cities] are in preventing the effects of climate change can have an impact on our investment decisions." Investment managers agreed, with one stating: "Where you have a very proactive government taking steps to mitigate these risks, it is beneficial for investors."

Some are taking a proactive approach. One investment manager noted upcoming plans to meet with elected officials in a city with well-documented climate risk. "We want them to know that we, as major asset owners in their city, are thinking about this issue and want to see action taken."

However, these preventive measures typically come at a cost through higher taxes that affect property valuations and returns. In addition to the risk of climate change, higher taxes for residents and commercial businesses could shift demographic patterns and investment decisions to an area. Cities need to be diligent in mitigating physical risks, managing costs, and raising taxes to keep population mitigation patterns and investments in the area flowing.

# LOOKING TO THE FUTURE

In a 2014 survey of real estate investment professionals carried out for ULI Europe, participants identified insufficient market recognition of climate risks and insufficient financial rewards for enhanced climate resilience as primary barriers to doing more to address climate change. Since then, the landscape appears to have changed. Awareness of climate change is increasing, in part because of the increased frequency and intensity of extreme weather events and the advent of voluntary standards such as TCFD. “I expect to see more of [a focus on climate risk],” said one investment manager. “Investors will educate themselves further on it and expect more of us.”

One thing the industry is becoming more certain of is that an adjustment is coming. As one investment consultant noted: “It’s our view and many of our clients’ that the market is not fully pricing climate risk, whether that’s transition risk or physical risk. . . . And as the market prices these issues in, we are likely to see some market correction.”

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“Investors will educate themselves further on [climate risks] and expect more of us.”

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As a whole, the industry will need to better understand and recognize the pricing impacts of physical climate risks, and how climate change is likely to have more of an effect on valuation in the future as asset and market liquidity are affected, moving the topic from being “a qualitative part of investment decision-making . . . to being quantitative and impact driven.”

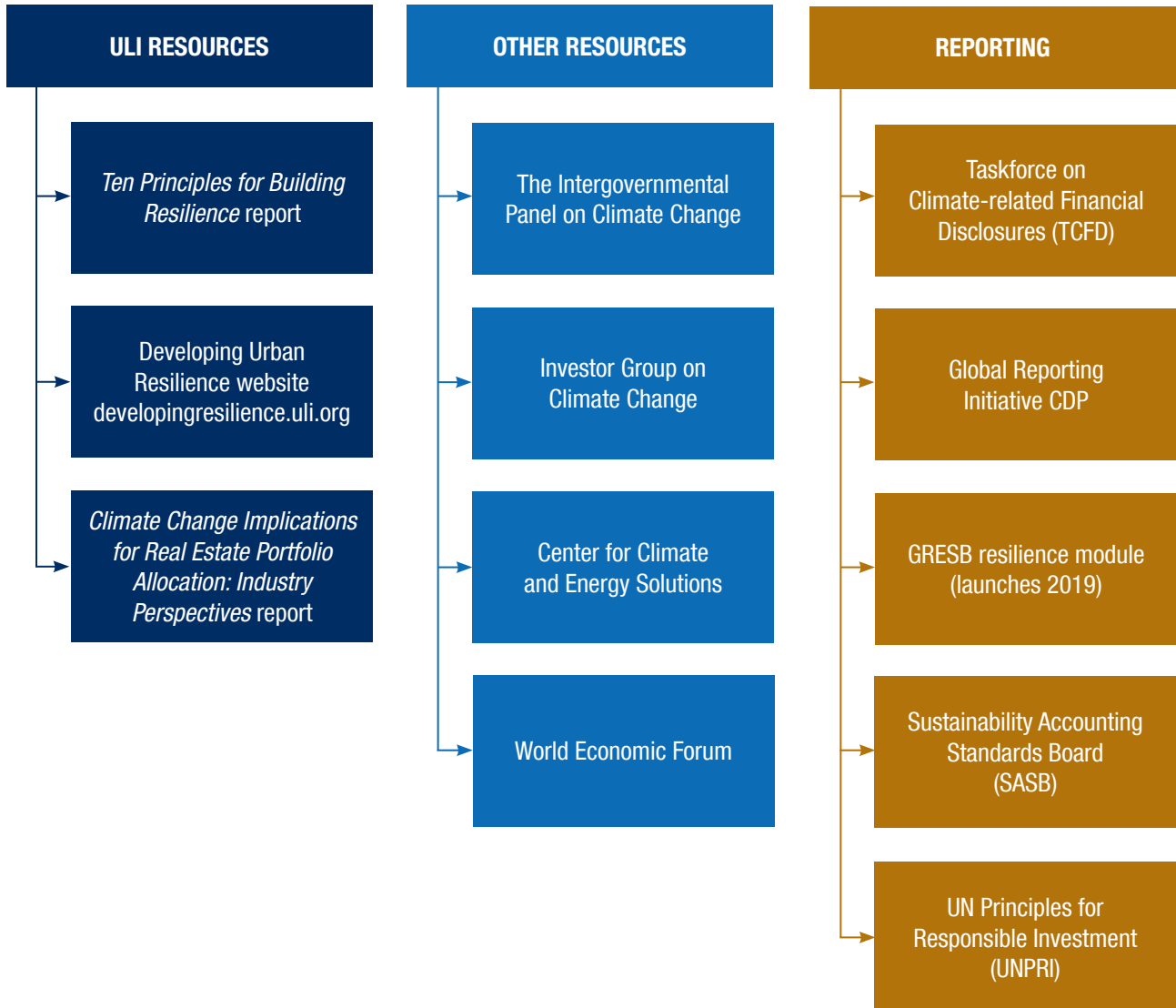
Next steps for the industry to help it improve awareness and understanding should include the following:

- Improve reporting on climate risk in annual and quarterly Resilience reports. As was seen with early work on environmental sustainability, this helps create awareness among investment managers and investors and helps drive change.
- Use big data to better understand patterns around changes in asset liquidity, valuations, and weather forecasting.

- Work with the insurance industry to understand data and gain knowledge on how climate change is affecting premiums and coverage.
- Engage with city leadership in vulnerable areas to support city-level commitment to and implementation of mitigating physical and transitional risks.

This report argues that climate change will affect valuation and markets. An eventual downward repricing of higher-risk assets will be the market’s way of redirecting capital to locations and individual assets where it is better used. But the markets are far from understanding climate risks enough to price them in today. This process will be painful for investors who are caught off guard, but those who are prepared have the potential to outperform.

**FIGURE 2. ADDITIONAL RESOURCES ON CLIMATE CHANGE AND THE REAL ESTATE INDUSTRY**



# DEFINITIONS

**CLIMATE ADAPTATION** – Strategies that focus on combating actual or expected physical impacts of climate change, including adjustments to natural or human systems or both.

**CLIMATE CHANGE** – Large-scale change in the climate system that causes substantial disruptions in human and natural systems.<sup>24</sup>

**CLIMATE MITIGATION** – strategies that focus on preventing the causes of climate change, specifically reducing or capturing anthropogenic emissions of greenhouse gases.

**CLIMATE RISK** – The exposure or potential for negative consequences caused by hazards related to climate change.

**PHYSICAL RISK** – Physical hazards that can directly affect the value of assets, related to climate change, such as sea-level rise, hurricanes, extreme heat, etc.

**RESILIENCE** – The ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events.

**TRANSITIONAL RISK** – Potential changes in policy landscape, technology, and other market forces, in response to climate change that affect the real estate and land use industry.<sup>25</sup>

*Streets flooded with rain after heavy rainfall.  
(istockphoto © undefined undefined)*

# NOTES

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<sup>22</sup> Verisk Maplecroft website, <https://www.maplecroft.com/about/introducing-maplecroft/>.

<sup>23</sup> Blue and green infrastructure refers to the natural and semi-natural landscaping elements that are incorporated into the built environment to mitigate pervious materials' impact on the environment. *Blue infrastructure* refers to features that are linked to water, while green infrastructure - includes vegetation elements.

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*A forest fire close to Caracas, Venezuela.  
(istockphoto © apomares)*



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