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Special Report

Climate Change Adaptation – *ESG Investing's Most Important Missing Piece?*

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Climate adaptation **is one of the major Environmental, Social and Governance (ESG) challenges of our time**. Several recent estimates indicate potential corporate losses of trillions of dollars in the coming decades due to climate change. Yet few corporate executives, investors, or rating agencies are adequately addressing climate adaptation.

The unique threats posed by a changing climate require **bold leadership, new ways of thinking, more inclusive and collaborative behavior, and cultivation of the talent and innovation** that are the life blood of successful businesses.

Our intent in publishing this Special Report is to **raise awareness and understanding in the ESG space** of a vital business and societal challenge, and stimulate much greater thought, interaction, and action focused on climate adaptation.

Climate Change Adaptation – *ESG Investing's Most Important Missing Piece?*

Executive Summary

Climate adaptation, that is, effectively managing the emerging risks and corresponding business opportunities of a changing climate, is one of the major Environmental, Social and Governance (ESG) challenges of our time, yet few corporate executives, investors, or rating agencies are adequately addressing it. Investors, and the senior executives and Board members of the companies they invest in, need to better understand what adaptation risks mean to their companies and value chains and must take substantial, timely, and decisive action to protect lives, property and other assets, livelihoods, and the financial security of hundreds of millions of people across the world.

A changing climate poses material financial risks to all businesses. Several recent estimates indicate potential corporate losses of *trillions* of dollars in the coming decades due to climate change. The impacts experienced by specific companies and industries will vary depending on their geographic location, business model, value chain, and other characteristics. Nevertheless, it is safe to assume that all will be affected in significant ways from extreme weather events, new regulatory requirements, investor and broader stakeholder demands, and impacts on customers, employers, and suppliers.

Contrary to earlier projections, the global climate already has changed appreciably, and will continue to warm for the remainder of this century and beyond regardless of any future greenhouse gas (GHG) emission reductions. Extreme weather and its impacts are with us now and are likely to increase in frequency and severity, posing new threats to business activity and all that sustains it. The "new normal" will include broken supply and delivery chains as well as lack of water, power, and other utilities, and access to company facilities for weeks or months at a time. It also will likely result in a lack of access to insurance and other traditional risk management methods at reasonable cost, as well as other major impediments to business as usual. C-suite executives and Boards that ignore these risks do so at their own peril.

Thus far, neither corporate nor investor behavior (including that of ESG investors) indicates that these threats are adequately understood or are being acted upon. To the extent that corporate leaders are addressing climate change, they tend to be focused on GHG emission reductions (mitigation) rather than on modifying their business practices to reflect the changes in climate that are becoming increasingly clear (adaptation). For their part, institutional investors appear to either be unaware of the need for greater focus on how a changing climate will affect their portfolios or are struggling with how to deal with the complexity of how more frequent and severe weather will affect the future performance of the companies in which they invest.

Far greater attention must be paid to climate adaptation, particularly within the private sector. The unique threats posed by a changing climate require bold leadership, new ways of thinking, more inclusive and collaborative behavior, and cultivation of the talent and innovation that are the life blood of successful businesses. We have every expectation that corporate leaders can, and sooner or later will, rise to meet this unprecedented challenge. Large public corporations have a unique ability to mobilize capital and resources quickly, operate within and across multiple geographies, and innovate to solve problems and satisfy new emerging needs. Accordingly, the next few years will be pivotal in determining which of these organizations prosper and which fail as climate-related hazards further disrupt complex market environments.

Investors, particularly large institutions, as well as capital market-focused non-government organizations (NGOs), also need to be active participants in efforts to shift economies and host societies to a more resilient posture. Engagement with portfolio companies about adaptation readiness should become a regular component of periodic reviews among investment analysts, portfolio managers, and company representatives. More generally, investors should actively seek opportunities to fund the many corporate, public sector, and hybrid (e.g., public-private partnerships) projects and initiatives that will be needed to increase local resilience across the US and internationally.

Leaders within investment institutions and forward-looking corporations should begin now to respond to the threats posed by a changing climate. They can start by leading or vigorously supporting efforts to increase local, regional, and societal resilience. They also can review their asset portfolios, asset selection and risk management methods, and assumptions, making updates and improvements where appropriate. Finally, private sector leaders must support national and international efforts to forge binding international agreements appropriate to the scale and severity of the climate crisis.

Many companies across virtually all industries, including financial services, have made great strides in recognizing and responding to important environmental, health, and social issues in recent years. Others have offered only anecdotes, promises, and platitudes. Businesses bring a rare and perhaps unique ability to create, incubate, and leverage innovative ideas, approaches, and products and rapidly deploy them at scale. They must apply these talents to the problem of climate adaptation in large numbers and continue their efforts until we have greatly improved our resilience at every level of society. Our collective future security and prosperity depend on it.

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Introduction

A changing climate poses material financial risks to all businesses. Recent estimates indicate, for example, that large public companies could lose more than $1 trillion during the next five years due to just the direct and indirect supply chain effects of a changing climate (CDP, 2021). Overall financial impacts will assuredly be much greater. The losses experienced by specific companies and industries will vary depending on their geographic location, business model, value chain, and other characteristics. Nevertheless, it is safe to assume that all will be affected in significant ways from extreme weather events, new regulatory requirements, investor and broader stakeholder demands, and impacts on customers, employers, and suppliers.

To this point, neither corporate nor investor behavior (including that of ESG investors) indicate that these threats are adequately understood or are being acted upon. To the extent that corporate leaders are addressing climate change, they tend to be focused on greenhouse gas (GHG) emission reductions (mitigation) rather than on modifying their business practices to reflect the changes in climate that are becoming increasingly clear (adaptation). For their part, institutional investors appear to either unaware of the need for greater focus on how a changing climate will affect the future performance of their portfolios or are struggling with how best to prepare for climate risks and capture available opportunities arising from a changing climate.

In this Special Report we make the case that far greater attention must be paid to climate adaptation, particularly within the private sector. The unique threats posed by a changing climate require bold leadership, new ways of thinking, more inclusive and collaborative behavior, and cultivation of the talent and innovation that are the life blood of successful businesses.

In our Situation Assessment section we present the facts that support our assertion that a course change is needed. In The Private Sector Response section we summarize the role and activities to date of corporations, capital markets, and insurers. In the Implications section we frame the basis for a multi-stakeholder approach – for businesses, investors, and other important segments of society to work collectively to build climate resilience. Then, in What is Needed Now we offer our thoughts on some key enabling steps that will help companies, capital providers, share- and other stakeholders, and our societies at large become more resilient and sustainable in the face of the grave looming threats posed by a changing climate. We close with a sincere and urgent Call to Action.

Specific strategies that might be employed by corporate leaders, investors, and other stakeholders are beyond the scope of this report and will be addressed in subsequent written works by Adaptation Leader. Our intent in publishing this Special Report is to raise awareness and understanding in the ESG space of a vital business and societal challenge, and stimulate much greater thought, interaction, and action focused on climate adaptation.

Situation Assessment

The Science and Available Facts

A warmer climate is here to stay.

Current atmospheric science tells us that significant changes in climate are now locked in, regardless of possible future emissions reductions, as documented most recently in the Intergovernmental Panel on Climate Change (IPCC) AR6[1] report, which focuses on climate impacts and adaptation. That is, even if GHG emissions were to cease tomorrow, the accumulation of these warming agents during the past 150 years or so (particularly the past 20) would guarantee that the climate would continue to change for the remainder of this century and beyond. *And we are nowhere near zero GHG emissions*. Despite a dramatic downturn during the early stages of the COVID-19 pandemic, fossil fuel use and attendant GHG emissions have resumed their upward climb, and exceeded 36.3 Gt in 2021, a record high (IEA, 2022).

Although the needed transition to non-fossil fuel-powered sources of energy is well underway, current trends suggest that it will not be complete for decades. Moreover, over-reliance on a strategy based on a hoped-for technological bailout would be very unwise. Although carbon capture and storage (CCS) technologies are actively being developed and tested, they are only at the pilot stage; it is very unclear when, or indeed if, any such technologies will be available at reasonable cost at the necessary scale when they are most needed. Similarly, GHG offset projects (e.g., afforestation), though helpful as a "bridging" strategy, are not likely to be sufficient to counterbalance current and projected GHG emissions, much less those from past activities.

[1] IPCC is the international body for assessing the science related to climate change. It provides policymakers with regular assessments of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation. IPCC assessments provide a scientific basis for governments at all levels to develop climate related policies and underlie negotiations at the United Nations Framework Convention on Climate Change (UNFCCC).

The AR6 Working Group II report, "Climate Change 2022: Impacts, Adaptation and Vulnerability," issued on Feb 28, 2022, is available at: https://www.ipcc.ch/report/sixth-assessment-report-working-group-ii/

The weather-related effects of climate change are already here and are the "new normal."

The need for productive action on these issues has become much more urgent given recent events and additional scientific clarity. The physical changes (e.g., extreme weather) associated with a warming planet are now apparent and have happened much sooner than predicted just a decade ago. Many within the corporate and policy communities have in the past relied on the early findings of the IPCC, which predicted widespread climate impacts occurring late in the current century and becoming more pronounced and serious thereafter. The most recent IPCC reports confirm a more accelerated trajectory.

The idea that the climate change issue was important but not necessarily urgent became entrenched in the minds of many, particularly in the political class – those constantly focused on the next election cycle. Viewed within that light, the absence of the willingness to make difficult decisions and required sacrifices in the near term in service of a more sustainable future could be viewed as rational, if disappointing. But no longer. Whether rational, self-serving, or craven, the world in which these decisions (or their absence) have been made no longer exists. Billion-dollar climate-related disasters are now commonplace in the U.S. (22 in 2020, 20 in 2021) (NCEI, 2022) and many other countries. This is part, but not all, of our new normal. This reality is reflected in the latest round of IPCC reports in 2022 (discussed in more detail below), which make clear that expedited action is required, including on adaptation and resilience.

These effects are not being experienced equally, leading to profoundly unfair impacts.

Greatly complicating matters is that, in general, the people and organizations in the regions experiencing the greatest climate impacts, both domestic and international, are those least able to afford to act in response. For example, many poor and underserved communities are situated in low-lying areas that are particularly vulnerable to sea-level rise, more severe storms and storm surge, and in some areas, mudslides. People in such communities often lack the resources to move to higher and safer ground or to modify their properties and/or lifestyle to make them more resilient to weather-related hazards, leading to serious environmental justice issues. For those who may still believe that this is a potential problem limited to the developing world, a recent definitive study shows that 3.6 million properties in the US (2.6% of the total) have an annual risk of flooding of 20 percent or more and that tens of thousands of these properties are in non-coastal cities such as Chicago, Philadelphia, Portland (OR), and Fresno (First Street Foundation, 2020). The recent deadly flash flooding in Kentucky demonstrates that this is neither an abstract nor a distant possibility. Similar concerns exist with respect to other climate-related hazards such as extreme heat, drought, and wildfire.

Corporations in every industry and economic sector will be affected by a changing climate.

Corporations, even those with the agility and resources needed to shift operations, will not be immune to these climate-related effects, because impacts will vary greatly across and within countries and corporate property portfolios. Casual assumptions that great distance from a seacoast, or absence of facilities in low-lying areas or in regions not prone to wildfires will protect a given corporation from climate-related risks are no longer prudent. Maintaining such assumptions could subject an organization, its assets, its people, and its financial viability to unforeseen threats.[2]

Evidence of these threats and their importance to investors has been available for some time. In 2015, The Economist Intelligence Unit estimated present value losses to investable assets due to climate change at $4.2 trillion, roughly equivalent to Japan's Gross Domestic Product (GDP) at that time. Moreover, their research pointed out that the "tail risks" – those related to extreme scenarios – were far more serious. Depending on the discount rate and time horizon selected, they estimated that present value losses could be as high as $43 trillion, or 30 percent of the 2015 value of all the world's stock markets (The Economist Intelligence Unit, 2015). Although the authors concluded that these risks could be sharply reduced by curbing GHG emissions, they also pointed out that much of the expected impact would arise not through direct (and localized) impacts but by weaker overall growth and lower returns across all asset classes. Such broad-spectrum, indirect impacts mean that diversifying out of particular companies, industries, and sectors will not be effective in limiting down-side investment risks due to climate change.

Other contemporaneous and more recent studies also strongly suggest that climate change is a systematic (non-diversifiable) risk. For example, rising temperatures can be expected to sharply curtail labor productivity, even in developed countries, and if current trends in global warming continue, average global incomes could fall by more than 20 percent by the turn of the next century (Burke, Hsiang, and Miguel, 2015).

The effects of climate change are already apparent and cannot be ignored.

From the most recent IPCC report, it is clear that climate change has already adversely affected the physical and mental health of millions of people in all regions of the world. It has resulted in excess mortality and morbidity, increased the spread of food-, water-, and insect-borne disease, and degraded ecosystems and the services they provide. A warming climate now poses risks to nutritional security, well-being, livelihoods, and economic activity, including in the US and other advanced economies (IPCC, 2022). These effects will inevitably be felt by businesses, yielding both risks and to some degree, opportunities. Effectively anticipating and responding to these changes in the business environment will be crucial to corporate, and by extension, investor success in the coming decades. As discussed below, there is reason to be skeptical that most corporate leaders or their providers of capital (investors) are prepared to meet this challenge.

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[2] For discussions of climate change risk to businesses generally, see, e.g., the following:

PWC (n.d.). "UN's IPCC report tightens focus on climate risks for business: What executives need to know," available at: www.pwc.com/us/en/services/esg/library/un-ipcc-report-climate-risks-for-businesses.html

Zurich Insurance (2021). "Here's how climate change will impact businesses everywhere – and what can be done," 16 November available at: https://www.zurich.com/en/knowledge/topics/climate-change/how-climate-change-will-impact-business-everywhere

McKinsey (2020). "How business leaders confront climate risk," *McKinsey Quarterly*. 15 May, available at: https://www.mckinsey.com/capabilities/sustainability/our-insights/confronting-climate-risk

Tanya Fiedler, *et al.* (2021) "Business risk and the emergence of climate analytics," *Nature Climate Change* 11, 87–94 (2021). https://www.nature.com/articles/s41558-020-00984-6

It could get worse – much worse.

There is reason to believe that the predictions of the dire effects described above are *too optimistic*. Studies that predict the impacts of climate change, including the most recent IPCC reports, have tended to reflect conservative assumptions and a certain degree of scientific consensus. Some informed observers believe, however, that many such assessments have omitted or downplayed many of the most serious effects of a warming climate, primarily because they are a) difficult to quantify, and b) outside all human experience.

Such "missing" risks are increasingly likely to manifest if efforts to maintain global average temperatures below the commonly cited ceiling of 2° C are not successful. They include not only the likelihood of stronger tropical storms, extreme heat, and more frequent floods and droughts, but also more profound and irreversible impacts such as further destabilization of ice sheets (and the dramatic rise in sea levels they would bring), disruptions to major oceanic and atmospheric currents, and the collapse of entire ecosystems. Even worse, one such impact might cause or accelerate others (DeFries, R., Edenhofer, O., *et al.,* 2019). The challenges that would be posed to business and all human societies if sea levels rose by seven or more meters,[3] the AMOC[4] stopped or slowed dramatically, and/or the Amazon rain forest dried out and transitioned to savannah are difficult to imagine but frightening to contemplate.

Collectively, we are not getting it done.

Thus far and as discussed in the sections that follow, all the major societal actors involved in protecting human life, safety, and prosperity have failed to devote adequate attention, effort, and investment to meet the need for decisive climate adaptation action. Accordingly, greater focus and follow-through addressing climate adaptation are urgently needed to limit human suffering – especially for the most vulnerable. Moreover, we believe that it is past time for the old canard that "adaptation equals defeatism" to be set aside in favor of a broader, more constructive view. Current facts on the ground dictate that we now prepare to actively adapt to a range of alternative climate change scenarios. Further delays or a timid approach risk greater loss of physical, cultural, and social assets; destruction of firm and brand value; and depletion of asset owner capital and the financial security of millions. The stakes could not be higher.

Policy and Governance Approaches

The need for international, collective climate action has been recognized for some time. To address the threats posed by climate change, international agreements have been forged to put the world on a course that will mitigate them. In particular, the Paris Climate Agreement, for the first time, established the expectation that an effective response to climate change must include both GHG emissions reduction (mitigation) and climate adaptation, and that these two imperatives should receive equal attention and support.[5] Moreover, mitigation and adaptation are inextricably linked – the more we mitigate (curtail) GHG emissions, the less need there will be to adapt to a changing climate. That is, this is not an either/or choice – we must have both.

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[3] Loss of the Greenland ice shelf, through melting or by sliding into the ocean, would raise Atlantic Ocean levels by approximately seven meters. Further loss of glacial ice in Antarctica would raise ocean levels even higher.

[4] The Atlantic Meridional Overturning Circulation (AMOC) is a global scale oceanic current that transports warm water from the tropics to the polar regions and cooler water from the poles toward the equator. It is also known as the Global Conveyor Belt. A portion of the AMOC is commonly known as the Gulf Stream. Absent the AMOC, temperatures at the poles would be much colder, and temperatures near the equator would be much higher. Thus, it serves to moderate water and air temperatures worldwide.

[5] The full text of the Paris Agreement is available at: https://unfccc.int/sites/default/files/english_paris_agreement.pdf

See Kathleen Mogelgaard, *et al.*, "What Does the Paris Agreement Mean for Climate Resilience," WRI, December 23, 2015 ("That set the stage for negotiations and an Agreement that placed adaptation issues on par with mitigation."), available at: https://www.wri.org/insights/what-does-paris-agreement-mean-climate-resilience-and-adaptation.

The next major international meeting will bring much-needed attention to adaptation.

This November, the annual Conference of the Parties (COP)[6] will hold its 27th meeting to discuss the climate crisis in Sharm el-Sheikh, Egypt; this gathering has already been dubbed the "Climate Adaptation COP."[7] Last year's conference in Glasgow, Scotland was notable both for its lack of breakthrough agreements on major agenda items and for the insufficient attention it focused on meeting the urgent needs of communities around the world that are already suffering from the impacts of a changing climate. It is imperative that this year's meeting produce more tangible results, because the longer we wait for decisive and effective action, the more urgent and extreme the chosen corrective measures must be.

Existing and proposed corporate disclosure rules focus on mitigation and largely neglect adaptation.

Within an investment context, regulators are beginning to take notice. Nonetheless, disclosure requirements, such as the recent SEC proposed climate reporting rules,[8] and others, focus far more on mitigation than on adaptation, and hence do not compel the needed expansion of "climate action" to include both. Given this limitation, they are at this point inadequate to protect investors and guide corporate executives toward management practices that would mitigate climate risks and improve resilience. Adaptation Leader considers this policy failure a major reporting risk factor. Newly proposed disclosure rules for publicly traded companies in the US, which are heavily based on previously issued TCFD[9] guidance, focus disproportionately on mitigation rather than adaptation. The new proposal is a welcome step forward and, if finalized in its current form, will greatly improve the quality, consistency, and utility of corporate disclosure of GHG emissions and mitigation strategies and performance. Nevertheless, the proposed rule gives only very limited consideration to climate adaptation.

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[6] The Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) is an annual gathering of more than 100 nations focused on efforts to minimize changes in global temperatures. The UNFCCC COP 27 placeholder website, pending further details, is available at: https://unfccc.int/cop27

[7] See, e.g., Jack Stuart, *et al.,* "COP27 must deliver climate finance where it is needed most," (commentary) Mongabay, January 20, 2022, ("This opportunity to shape the "Adaptation COP" agenda..."), available at: https://news.mongabay.com/2022/01/cop27-must-deliver-climate-finance-where-it-is-needed-most-commentary/; and, Mariana Castano Cano, "Reflections on the Glasgow Climate Pact," 10 Billion Solutions, Nov. 30, 2021, ("COP27 must be the Adaptation COP."), available at: https://10billionsolutions.com/english/f/reflections-on-cop26?blogcategory=Newsletter

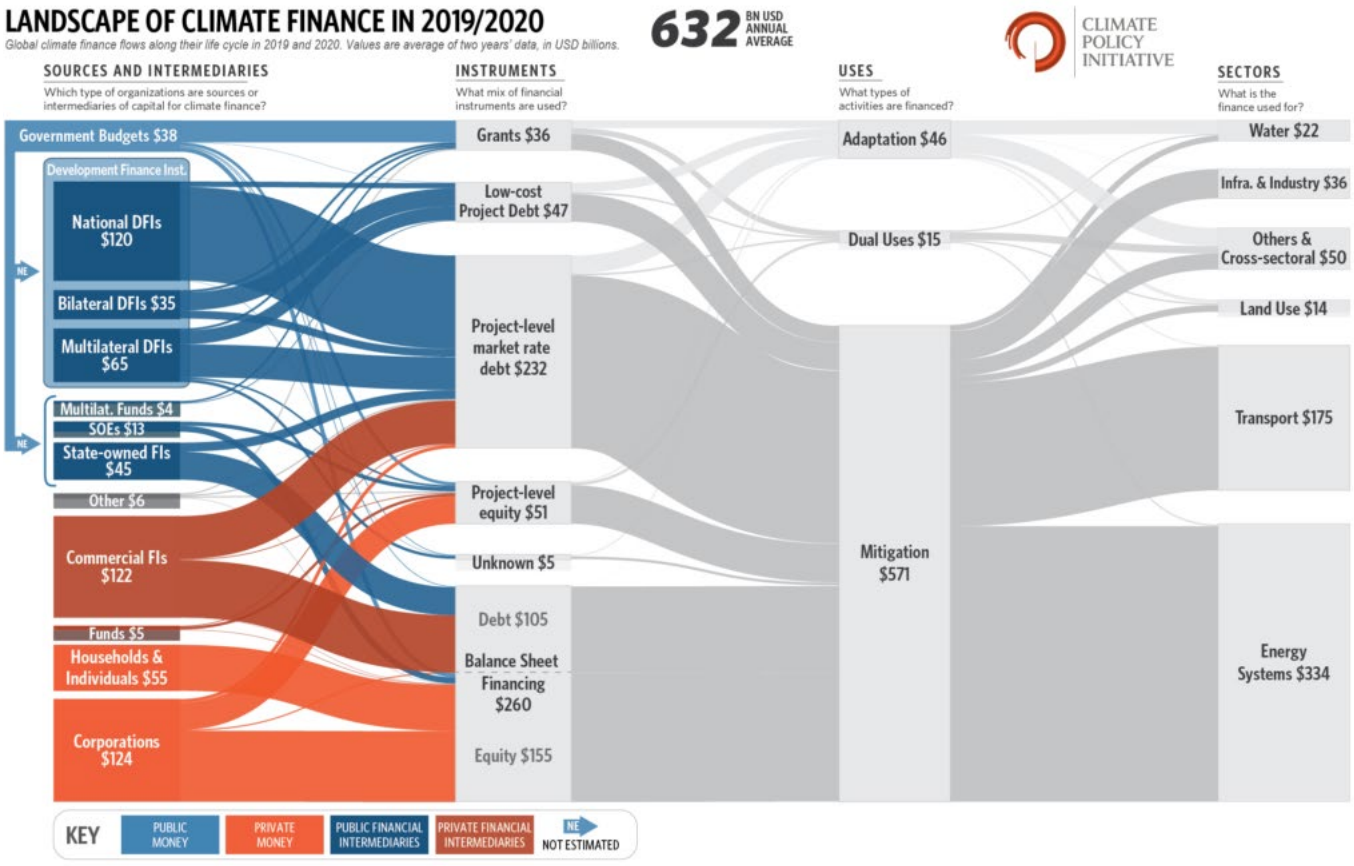
[8] On 21 March 2022, the US Securities and Exchange Commission (SEC) proposed new rules to enhance and standardize climate-related corporate disclosures for the benefit of investors. The proposed rule text, "The Enhancement and Standardization of Climate-Related Disclosures for Investors," is available at: https://www.sec.gov/rules/proposed/2022/33-11042.pdf

[9] The Task Force on Climate-Related Financial Disclosures (TCFD) was created in December 2015 by The Financial Stability Board (FSB) to improve and increase reporting of climate-related financial information. The TCFD issued widely followed climate-related financial disclosure guidance in June 2017. The TCFD website is available at: https://www.fsb-tcfd.org/

Although it is not clear at this time what the final reporting requirements will include, if indeed they are finalized, significant changes would be required to the draft reporting requirements for adaptation to receive attention (from both disclosing companies and investors) commensurate with that focused on GHG mitigation. Adaptation Leader provided extensive comments on SEC's proposed rule addressing shortcomings in its treatment of climate adaptation and recommending specific improvements.[10] Absent major enhancements to the proposed rule, investors in U.S. securities markets will continue to receive only partial and inadequate information on corporate exposure to climate risks and the strategies and tactics that senior executives intend to deploy to control them.

Funding for international adaptation lags far behind recognized needs.

On a broader scale and in fairness, many governments and multilateral institutions have in fact recognized the nature and severity of the climate crisis and have issued policies and/or strategies to improve climate resilience within their domains. Their focus, however, has been primarily on developing countries, with many adaptation-related activities supplementing pre-existing economic development strategies and programs. Unfortunately, though, funding and implementation on adaptation still lag far behind acknowledged needs (Climate Policy Initiative, 2021)[11], as illustrated by the CPI financial flows graphic below.



[10] Adaptation Leader's comments to the SEC may be found here: https://www.adaptationleader.org/wp-content/uploads/2022/06/Adaptation-Leader-Comments-to-SEC_061922_POSTFINAL.pdf

[11] Recent estimates place the funding needed for climate adaptation in developing nations in the range of US $155 billion to US $330 billion annually by 2030 and even more thereafter (UNEP, 2021 p. 29). In contrast, although USD $632 billion in financing was provided by a variety of sources to address the climate crisis in the latest year for which data are available (2019/2020), only $46 billion flowed to adaptation and $15 billion was provided to cross-cutting activities that addressed both adaptation and mitigation (UNEP, 2021 p. 32).

The Private Sector Response

Corporations

In recent years, there has been substantial and growing pressure for companies to be viewed as "sustainability leaders." This pressure has been brought to bear from several quarters, including employees, major customers, and most importantly, investors. Investors in particular expect the leaders of the companies in which they invest to not only manage environmental and social risks adroitly, but also to exploit opportunities and employ sound and transparent governance practices.[12] It is now widely understood that corporate sustainability, including adequate management of climate-related risks and opportunities, is an issue warranting senior management and Board-level attention.

Unfortunately, most companies seem to conflate climate action and GHG mitigation.

Most corporate climate action to date has been focused on GHG emissions reduction (mitigation). This has led to large gaps in climate adaptation assessment, planning, capacity-building, and implementation, posing large residual risks at multiple spatial/geographic scales. Although there has been a discernible increase internationally in the extent and completeness of climate adaptation planning, financing, and implementation, a much greater and more consistent commitment to building climate-resistant companies, economies, and societies is needed. Sectors in which the need for additional investment is particularly acute include agriculture, infrastructure, water, and disaster management (UNEP, 2021).

In general, adaptation and resilience-related risks and corresponding business opportunities have not been adequately recognized, planned for, or acted upon by either corporate executives or investors. Many companies now publicly disclose their GHG emissions, at least the GHGs that they emit directly ("Scope 1") and those from purchased electricity and other energy resources ("Scope 2"). A growing but still limited number compile and report their supply and value chain ("Scope 3") emissions as well. Within the context of how best to address climate change, company executives appear to be focused primarily on emissions reductions in their own firms (e.g., "net-zero" commitments).[13] Given the urgency and importance of needed reductions in GHG emissions, this emphasis is understandable.

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[12] See, e.g., Tove Malmquist, "Corporate sustainability leadership during a pandemic, *GreenBiz,* November 2, 2020, available at: https://www.greenbiz.com/article/corporate-sustainability-leadership-during-pandemic ; Rich Lesser & Rich Hutchinson, "How to become a sustainability leader—and create sustainable value," *Fortune*, September 23, 2021, available at: https://fortune.com/2021/09/23/sustainability-strategy-corporate-leadership-bcg-rich-lesser/; and, Mark Lee & Aiste Brackley, "The 2020 Sustainability Leaders" (The GlobeScan / SustainAbility Survey), available at: https://www.sustainability.com/thinking/the-2020-sustainability-leaders/.

See also, Peter Soyka, *Creating a Sustainable Organization: Approaches for Enhancing Corporate Value Through Sustainability,* Pearson, 2012.

[13] See, e.g., National Academies of Sciences, Engineering, and Medicine (US), "Is it possible to achieve net-zero emissions?" available at: https://www.nationalacademies.org/based-on-science/is-it-possible-to-achieve-net-zero-emissions and "Getting to Net Zero Emissions by 2050," available at: https://nap.nationalacademies.org/resource/other/dels/net-zero-emissions-by-2050/index.html#page-top.

See also, McKinsey, "The net-zero transition: What it would cost, what it could bring," available at: https://www.mckinsey.com/business-functions/sustainability/our-insights/the-net-zero-transition-what-it-would-cost-what-it-could-bring?cid=netzero-pse-gaw-mst-mck-oth-2201&gclid=EAIaIQobChMIyNSKm9Gq9wIVwnNvBB3gIAohEAAYASAAEgImrfD_BwE&gclsrc=aw.ds

At the same time, however, it is increasingly clear that some adverse effects of a warming climate are inevitable and must be addressed with urgency at the C-suite and Board level, regardless of the absence of complete information. This is where an understanding of adaptation and resilience can deliver real value, but literacy and capacity on climate adaptation – in both public and private sectors – remain low, particularly in comparison with those focused on mitigation.

Climate-related disruption of commercial activity is coming and must be actively managed – starting now.

From the foregoing, it is now clear that the new reality that all businesses will encounter during the next few decades is likely to include, at the very least, the following major disruptions:

- ***Broken supply and delivery chains***[14]
- ***Lack of electric power, too much or too little water, and/or barriers to employee access to company locations for weeks or months at a time due to the ravages of fires, tornadoes, floods, and other disasters***[15]
- ***Inadequate/unavailable insurance or other traditional methods of hedging risk, and***[16]
- ***Environmental Justice issues if company locations and assets must be relocated.***[17]

[14] See, e.g., HSBC, "Improving Supply Chain Resilience to Manage Climate Change Risks," June 2020, report with The Sustainability Consortium, available at: https://www.sustainablefinance.hsbc.com/sustainable-infrastructure/supply-chain-resilience-and-climate-change; and, Jacques Leslie, "Climate Change Is Disrupting the Global Supply Chain Too," *Wired,* March 19, 2022, available at: https://www.wired.com/story/climate-change-is-disrupting-the-global-supply-chain-too/

[15] See, e.g., Douglas MacMillan & Will Englund, "Longer, more frequent outages afflict the U.S. power grid as states fail to prepare for climate change, *Washington Post,* October 24, 2021, available at: https://www.washingtonpost.com/business/2021/10/24/climate-change-power-outages/ ; and, Bev Adams, "As extreme weather worsens, businesses develop flood resilience strategies," *GreenBiz,* July 29, 2020, available at: https://www.greenbiz.com/article/extreme-weather-worsens-businesses-develop-flood-resilience-strategies

[16] See, e.g., NAIC, "The Potential Impact of Climate Change on Insurance Regulation," 2008 report, available at: https://content.naic.org/sites/default/files/inline-files/cipr_potential_impact_climate_change.pdf ; and, Arthur Neslen, "Climate change could make insurance too expensive for most people – report," *Guardian*, March 21, 2019, available at: https://www.theguardian.com/environment/2019/mar/21/climate-change-could-make-insurance-too-expensive-for-ordinary-people-report

[17] See, e.g., "The EPA publishes its 2021 climate impact adaptation plan," Oct.7, 2021 available at: https://www.epa.gov/newsreleases/epa-publishes-its-2021-climate-adaptation-action-plan

C-Suite and Board-level attention seems to be focused elsewhere.

Yet, in response to these threats to their continued success or even viability, many companies have taken surprisingly modest action. There is little evidence that the leadership of most companies has actively or fully considered the impact of a changing climate on their strategies or operations (e.g., assets, markets, product/service lines, functions, business models) or future success. Climate adaptation activity is often limited to scenario exercises in conformance with TCFD guidance, with often unclear follow-up or action.[18] Moreover, to the extent that companies are contemplating their non-mitigation strategies and actions to address climate change, there is little evidence that they are also considering the climate justice issues that will arise as they are forced to relocate their physical assets (e.g., to higher elevations) – which might lead to substantial equity and inclusion concerns.[19] The absence of any widely accepted metrics or reporting frameworks focused on climate adaptation also may contribute to a sense that this issue is too uncertain and distant to justify detailed disclosures.

Indeed, awareness of the full business implications of extreme weather wrought by a permanently warmer climate appears to be limited. Corporate disclosure of climate-related risks and how the company will manage or reduce them is incomplete in most industries. At one level, this is understandable. Predicting how a changing climate is likely to affect the operations, facilities, and value chain of a company, and how these effects will influence future revenues, costs, cash flow, and risk profile is inherently complex and subject to uncertainties that cannot be eliminated.

The available data suggest that corporate climate adaptation activity is too narrowly focused and at an early stage of development.

The most comprehensive source of data on corporate disclosure of climate adaptation activity has been developed by CDP, formerly the Climate Disclosure Project.[20] According to CDP's most recent analysis of responses to its annual climate risk survey (fielded in 2018), just over half of respondents indicated that climate-related risks have the potential to have a "substantive financial or strategic impact on their business" (CDP, 2019, pg. 5). Unfortunately, twice as many reporting firms have focused on transition rather than physical, operational, supply chain, or customer-related risks, and reported most frequently on policy and legal issues (e.g., pricing of GHG emissions). Climate-related impacts (both risks and opportunities) were quantified by more than 2,000 respondent companies. The most frequently quantified risks were higher compliance costs from GHG emissions pricing and reduced production capacity from physical (e.g., storm- or flood-related) climate change impacts. Within a subset of larger companies (215 of the Global 500), total estimates of assets at risks were nearly $1 trillion, with one-quarter from stranded assets. On the other side of the ledger, these same companies identified more than $2.1 trillion in new opportunities, mainly from low-emission products and services (CDP, 2019, pg. 5). Moreover, the reported aggregate costs of capturing these opportunities were far lower than the upside benefits across nearly all industries, begging the question of why more companies are not moving more aggressively to capture them and improve their bottom lines.

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[18] See, e.g., TCFD, "The Use of Scenario Analysis in Disclosure of Climate-related Risks and Opportunities," webpage available at: https://www.tcfdhub.org/scenario-analysis/; and, ADEME, "How to make business decisions to adapt to climate change? Methods and case studies in France and internationally," 2021 report, available at: https://librairie.ademe.fr/changement-climatique-et-energie/4758-how-to-make-business-decisions-to-adapt-to-climate-change--9791029717994.html

[19] Giulio Berruti, *et al.*, "Time's Up: Urgent Climate Adaptation and Business Transformation Key to Secure a Livable Planet", BSR blog, March 4, 2022, ("...solutions will not be effective if not designed to be fair and inclusive to people."), available at: https://www.bsr.org/en/our-insights/blog-view/urgent-climate-adaptation-business-transformation-to-secure-livable-planet; and, Eric Chu & Clare Cannon, "Equity, inclusion, and justice as criteria for decision-making on climate adaptation in cities," *Current Opinion in Environmental Sustainability,* 51; 85-94 (2021), available at: https://doi.org/10.1016/j.cosust.2021.02.009

[20] Note that the CDP was co-founded by and primarily serves the needs of professional investors. For further information, see: https://www.cdp.net/en

A few observations help to put these findings into further perspective. US-based companies, and those in other western hemisphere countries more generally, lagged far behind their European counterparts in reporting data on climate risks and/or opportunities. In addition, reporting by firms in the financial services, fossil fuels, and power industries was far higher than in the others, perhaps because issues pertaining to possible GHG emission limits are more immediate and consequential for these firms than for those in most other industries.

A more critical examination of responses to the CDP survey provides some interesting findings. Review of responses to CDP's 2015 survey and a subsequent review of the 2018 results surfaced some consistent concerns (Goldstein 2019). In particular, these "blind spots" suggest that reporting companies in general:

- ***Underestimate the magnitude of physical climate change risks***
- ***Underreport supply chain risks***
- ***Have a bias towards 'soft' and 'hard' adaptation methods while underrecognizing the potential of ecosystem-based adaptation***
- ***Often fail to report on the costs of adaptation, and***
- ***Tend to neglect the possibility of nonlinear (e.g., accelerating) climate change and its impact on business.***

These studies strongly suggest that corporate reporting behavior regarding climate adaptation is too narrowly focused and myopic. In the earlier evaluation of 2015 CDP survey responses, less than three percent of respondents predicted that climate change would affect their business through indirect social effects such as reduced aggregate demand, and only eight percent perceived that physical climate risks might affect their clients/customers. In terms of strategies employed by companies to adapt to a changing climate, more than 75 percent of respondents reported relying on "soft" strategies such as enhancing planning, relationships, and knowledge and information flows, while 47 percent reported "hard" strategies such as developing or improving water or energy infrastructure strategies or adjusting infrastructure design or emergency management practices. In contrast, less than four percent of companies reported using ecosystem-based adaptation (EbA) strategies,[21] which offer the advantage of being both more durable and effective in the medium-long term than most hard infrastructure (e.g., sea walls) and providing a number of collateral benefits. Nearly half of reporting firms used combinations of these general approaches, though unfortunately, nearly one in five (18 percent) reported using no strategies at all (Goldstein, A., Turner, W.R., *et al.,* 2019).

[21] EbA approaches rely on natural systems and processes to enhance resilience. Examples include sustainable agriculture, watershed protection, and reforestation.

Looking ahead, most publicly traded companies will need to dramatically improve their understanding of how climate change will affect all aspects of their business(es) and value chain(s) and provide more complete and insightful information to investors on an ongoing basis. In doing so, they will need to ensure that they are tapping (or developing) all of the relevant expertise required. Because most of the focus to date has been on GHG mitigation, adaptation expertise, which involves a very different set of knowledge and skills, may be lacking in many organizations, even sophisticated multinational corporations. Capacity-building in this regard is an urgent need.

Corporate leaders would be wise to consider the full implications of climate change in their ESG deliberations. We have every expectation that they can, and sooner or later, will. Large public corporations have a unique ability to mobilize capital and resources quickly, operate within and across multiple geographies, and innovate to solve problems and satisfy new emerging needs. Accordingly, the next few years will be pivotal in determining which of these organizations prosper and which fail as climate-related hazards further disrupt complex market environments.

ESG Investors

Recent years have witnessed booming activity in the ESG market space, with trillions of dollars invested according to one or more ESG factors in both US and European equity markets. Indeed, at this time it would be difficult to find a major institutional investor or mutual fund company that does not offer at least a small number of investment products with an ESG theme. This rapid growth and the absence of clear definitions and standards around "sustainable" investments have led many observers to become concerned about "greenwashing."[22] In this context, greenwashing is the assertion of portfolio construction methods that select or favor securities with environmentally and/or socially superior attributes while not having the means or the data to implement such methods. Accordingly, the purveyors of investment vehicles that are marketed as "climate conscious," or "sustainable" could be considered to be greenwashing if their evaluation methods do not include a robust capability to assess the climate resilience (i.e., adaptation posture) of individual portfolio holdings. These concerns, and the growing influence of ESG investors given their now-substantial size and market power, have led to calls for greater regulatory oversight in both US and international capital markets.

ENVIRONMENTAL

Air, Water, Waste
Climate change
Biodiversity & ecosystems
Energy & renewables

SOCIAL

Community & stakeholders
Employees & labor
Diversity, equity & inclusion
Human rights

GOVERNANCE

Board expertise & independence
Shareholder rights
Transparency & disclosure
Business integrity & incentives

[22] See, e.g., Evie Liu, "SEC's Gensler Is Targeting Greenwashing of ESG Funds," Barron's, March 1, 2022, available at: https://www.barrons.com/articles/sec-gensler-greenwashing-esg-funds-51646166625; and, "Greenwashing and the SEC: the 2022 ESG Target," National Law Review, April 23, 2022, available at: https://www.natlawreview.com/article/greenwashing-and-sec-2022-esg-target

The growing investor interest in climate change has spurred new regulatory requirements and other expectations (e.g., TCFD) for GHG emissions disclosure. These include the newly proposed required disclosures for GHG emissions in the US and parallel efforts in Europe. As discussed above, however, while an important step forward, these new and prospective requirements pay insufficient attention to climate adaptation.

Another key constituency in the ESG ecosystem is the specialty data providers that collect, analyze, and report on corporate sustainability metrics. Many of these entities (most of which are now owned by one of the large mainstream investment data providers) also produce ratings, rankings, and other judgments of which companies are more sustainable than their peers, and therefore, more worthy of investment.

Despite the importance of climate change as a factor in evaluating the prospects of investable companies both now and into the future, there is only limited evidence that investors or their data suppliers are asking for, receiving, or using information on climate adaptation strategies or implementation activities (including nature-based solutions) for or from public companies.[23]

The potentially widespread, severe, incompletely evaluated, and unpredictable impacts on individual companies (and entire industries) from a profoundly changing climate pose financial risks to owners of their securities (stocks and bonds) that are likely to be significant but are not well understood, particularly among retail investors. We note here that in the recent flurry of coverage in the business and academic press of the perceived shortcomings and failures of ESG as currently practiced, there has been scant (or no) mention of climate adaptation/resilience as an important missing risk factor. We hope that, if nothing else, this Special Report has illuminated the significance of this gap.

Insurers

Insurance provides the foundation for a vast amount of economic activity.

Another mainstay of the capital markets, both in the US and internationally, is the insurance industry. Insurance companies both play an important role in managing risk for their clients ("insureds") and are major investors themselves.[24] Historically, insurance has played a key role in supporting commercial activity and economic development by helping people, businesses, and other entities "de-risk" their activities. Such insurance has been provided by large and small insurance companies as well as by public sector agencies in some cases.[25] Indeed, the generally effective operation of markets for insurance has greatly facilitated home ownership in the US as well as a huge number of large and small business transactions. In return, well-run insurance companies can generate impressive profits. Some have grown to very substantial size and wield significant economic power.

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[23] Although corporate disclosure of climate risk and adaptation response strategies is at a very early stage, several major ratings agencies (e.g., Moody's), purveyors of investment-related data and services, and institutional investors (e.g., Blackrock) have acquired climate risk analytics methods and expertise in recent years.

[24] To have adequate funds to pay insurance claims for the foreseeable future, insurance companies invest in a variety of securities and other assets to generate income on an ongoing basis. Insurance companies typically invest heavily in fixed income securities (bonds) but also attempt to boost income by investing in equities (stocks) as well.

[25] The Federal Emergency Management Agency (FEMA)'s flood insurance program is a notable example of the latter.

Climate change is upsetting this general equilibrium in some important ways.

Claims for climate-related damages (e.g., from flooding, wildfires, and other hazards) have increased markedly in recent years. In response, insurance companies have issued far more non-renewals of existing policies than in the past, and in fact have exited entire US states (e.g., Louisiana) due to severe losses on property and casualty insurance claims. In California, for example, non-renewals of existing policies increased to more than 235,000 in 2019 due to the extensive wildfires experienced there during the previous two years. In extreme cases, insurers may even resort to "bluelining," in which financial institutions deny services to specific neighborhoods deemed to be at high risk (Fredman, 2022). It is reasonable to surmise that climate change will pose substantial and growing financial risks for the insurance industry moving forward as climate-related severe weather events increase in magnitude and frequency in the years ahead (Neslen, 2019). Indeed, some have questioned the very effectiveness of insurance as a risk mitigation tool as it becomes increasingly clear that weather-related hazards are becoming less akin to low probability-high consequence events and more of a growing, longer-term trend (Asian Development Bank and Global Center on Adaptation, 2021).

Any erosion of insurance companies' income streams will have far-reaching consequences.

As important institutional investors themselves, insurance companies face the same threats to future positive returns on their invested assets as other major capital providers such as commercial and investment banks, pension funds, and mutual fund companies. Any substantial erosion of their ability to generate the income needed to continue to pay claims (and provide continuous assurance of such ability) would seriously undermine home ownership and a wide swath of commercial activity across the US economy, and presumably that of many other countries.

Implications

We all have a lot to lose.

Our changing climate requires substantial and decisive action to protect lives, property, livelihoods, and financial security across the world. In 2021, the US experienced 20 weather-related disasters that resulted in damages of more than $1 billion and killed, in the aggregate, nearly 700 people (NOAA, 2022). In the past few years, such damage costs have tripled, and now average almost $150 billion annually. We can expect more of the same, or worse, as GHG emissions continue to rise. Companies that are not prepared for the weather-related changes that are clearly becoming more frequent and severe put their employees at physical risk and expose their shareholders to the potential of severe financial losses. Given the widespread public ownership of corporate stocks and bonds in the US and other major capital markets, the absence of concerted efforts to prepare for a changing climate may jeopardize the ability of millions to retire, maintain their current lifestyle, and/or attain other life goals.

Corporate leaders must respond to this emerging existential threat.

Companies in all industries face large, uncertain risks to revenues, profits, and even continued operation. Corporate leaders must be prepared to address weather-related interruptions to business-as-usual on several fronts. Disasters may sever access to company property for long and uncertain periods of time, and delay incoming supplies of raw materials, parts, sub-assemblies, and other goods, perhaps indefinitely. Customers may face challenges of their own in gaining access to a particular company's products and services, whether through in-person shopping, online ordering, or on-site provision of services. Although some of the more obvious impacts would apply to manufacturing and industrial operations, service businesses will not be immune. Widespread electric power interruptions may limit both employees and customers from gaining access to company resources and infrastructure, especially if most are online. Moreover, companies may need to move production, storage, distribution, service, back office, and/or other operations to safer locations and may have trouble finding adequate alternatives without forcing out lower income populations from their housing. Such moves could result in substantial litigation and reputational risk. Accordingly, company executives would be wise to begin or expand the scope of any existing efforts to evaluate their resilience to a changing climate. As noted above, performing scenario analysis in accordance with TCFD guidance is a good start, but is insufficient to truly address the magnitude and scope of climate-related impacts on a company's operations and financial success. Importantly, as we discuss further in the next section, business leaders should not act alone, but rather leverage the informed opinion of stakeholders and expertise (on both mitigation and adaptation) available from insurers and other product and service providers.

Local government officials must ensure the resilience of key community assets.

Communities of all sizes may face physical damage or destruction, severe public health hazards, population loss, a declining tax base, and other serious or even existential threats. These risks are most certainly not limited to coastal areas, may arise from seemingly mundane changes or trends, and are increasingly likely to involve secondary impacts, including but not limited to the following:

- *Loss of public infrastructure (e.g., roads, bridges, power and gas lines)*
- *Lengthy or permanent interruption of vital public services (e.g., police, fire, EMS), and*
- *Closure of key local businesses and civic institutions (e.g., schools, churches).*

Towns and cities experiencing such impacts will not survive unless they have the wherewithal to quickly restore these cornerstones of any functioning community. Effective planning and decisive action, involving all community stakeholders, will be vitally important.

Investors must become more engaged.

Investors, particularly large institutions, as well as capital market-focused non-government organizations (NGOs), need to be active participants in efforts to shift economies and host societies to a more resilient posture. The climate adaptation efforts undertaken by portfolio companies and their effectiveness should become a regular component of periodic investment evaluations and dialogs between investment analysts and portfolio managers and company representatives. More generally, investors should actively seek opportunities to fund the many corporate, public sector, and hybrid (e.g., public-private partnership) projects and initiatives that will be needed to increase local resilience across the US and internationally.

It will take a village.

From the foregoing, it should now be obvious that the scale of the response needed, even at the level of a town or city, is too great to be addressed effectively by individual organizations, whether governments or corporations. Instead, what is needed is a multistakeholder effort, deployed at the local level but supported and perhaps guided by more centralized expertise and resources. State, county, and municipal officials would do well to identify and enlist the participation of major employers, health care providers, planning and engineering firms, nonprofit organizations, and concerned citizens to begin identifying and developing plans to mitigate the effects of likely climate-related hazards. For their part, federal government agencies (e.g., FEMA), organizations representing state officials (e.g., National Governors' Association) and major corporations (e.g., the Chamber of Commerce, National Association of Manufacturers), and the executives of multi-site corporations should convene discussions on how best to address the growing national (and international) threats posed by a changing climate. They also should individually and collectively help to accelerate delivery of facts, guidance, expertise, logistical and research support, and funding to local efforts to improve climate resilience.

What is Needed Now

In confronting a problem as large, complex, and important as a changing climate, it is easy to become confused, demoralized, and/or unsure of what to do first and where to invest one's efforts and resources. Clearly, there is much to be done, and many entities and people must play a role. With that said, we present the items in Table 1 as a reasonable place to begin. Table 1 concisely describes what we believe to be necessary initial steps as well as the rationale underlying our selection of these actions.

Table 1 - **Key Actions Required to Improve Climate Adaptation Effectiveness**

What	Why
Commit to Fairness Those with authority and influence must commit to develop and implement solutions that are fair – and perceived as such – by disadvantaged communities, both internationally and within individual countries.	***The poor and disadvantaged:*** • Did the least to create a changing climate because they consumed the least food, energy, other goods, and services • Are most vulnerable to sea level rise, flooding, severe storms, and heat waves • Have the fewest resources with which to adapt to climate change • Are often ignored or not heard ***Their interests must be protected* first, *otherwise:*** • Existing inequities will be magnified • Inequities = unfairness = not sustainable
Execute Binding Agreements with Real Teeth Global, enforceable agreements (treaties) to both limit further GHG emissions and promote and fund effective climate adaptation strategies are urgently needed, with particular focus on the most vulnerable.	• 25 years of meetings and voluntary action have not solved the problem, which is steadily getting worse • Reliance on more of the same and market mechanisms will not meet the need • This year's Egypt COP meeting provides another opportunity • The world's governments must not fail us—we are running out of time

Build Awareness and Capacity Investments in awareness-raising and capacity building are needed, so that people and organizations – from the local to the international level – understand the need for climate adaptation now, and have the tools and resources needed to take informed, collaborative action.	• The lack of awareness and acceptance in 2022 that we are in a climate crisis is both shocking and a real impediment to effective action • Federal, state, and corporate entities must accept and act on their responsibility to provide information, guidance, training, technical support, and funding nation-wide to the community level (e.g., through local governments)
Focus Equally on Adaptation We must achieve widespread acceptance that legitimate and effective climate action has two equal components, as established by the Paris Agreement — GHG mitigation and adaptation.	• Attention and resources devoted to climate adaptation must match those focused on mitigation • Leadership from trusted voices is needed at all levels to make the case for improved climate resilience • Public support will otherwise be difficult to marshal and sustain
Find the Limits of Risk Transfer Options Adaptation must be guided by greater clarity on the extent to which the US and international property and casualty insurance industry can and will continue to provide risk mitigation options to private property owners in the US and other developed economies as climate-related impacts (including disasters) increase in frequency and severity.	• Continued reliance on established means of outsourcing risk, such as insurance, is increasingly questionable • Property and casualty insurers are already considering how to limit their exposure to future disasters • No one should assume that as weather-related property risks increase that insurers will be willing to provide coverage • The absence (or exorbitant price) of property insurance would have disastrous impacts on real estate owners, sellers, and markets • Further study of this issue is urgently needed
Broaden Corporate Planning Senior corporate leaders must move away from insular, centralized corporate planning activities to inclusive, multi-stakeholder processes tasked with developing optimal adaptation approaches in specific locations.	• A change in mindset is needed within many corporate executive suites • Leaders will need to confront the reality that their own fence line (for facilities) and supply chain are no longer appropriate boundaries for analysis, planning, and strategy implementation • Deliberations should include major stakeholders to surface ideas and perspective and possible tactics and solutions, and build relationships that will be needed when disaster strikes • Facility level approaches should involve not only local employees but also municipal government, local nonprofits, service organizations, and technical experts

Develop New Models, Methods, and Relationships Corporate leaders must embrace a more collaborative mindset, develop new models and methods to fortify their businesses, and actively cultivate productive new relationships with community-level stakeholders in all locations in which they have a substantial physical or commercial presence.	• Traditional ways of doing business will not lead to success in adapting to a new climate • Particularly problematic issues in many companies are short-termism, misaligned incentives, internal silos and calcified bureaucracies, and antagonistic or otherwise unproductive relationships with external stakeholders • Over-emphasis on short-term financial results (exacerbated by investor demands) often obscures opportunities to build both physical and intangible assets that can yield future growth, build capability, and enhance resilience • Leaders should make judicious and responsible use of all forms of capital (financial, human, intellectual, natural, social and relationship, and manufactured) to create value for all company stakeholders (evaluating opportunities for deploying ecosystem-based adaptation (EbA) would be a good place to start) • Doing so will necessarily involve establishing and nurturing new relationships based upon trust and mutual respect • Leadership teams must create space for innovation, relax or modify existing internal investment criteria (e.g., hurdle rates), and actively encourage staff members at all levels to identify and capture opportunities to enhance resilience across the value chain
Accept Reality It is time to undertake serious, honest, and inclusive conversations about which communities/geographic areas to protect and enhance, and which to abandon.	• We do not and will not have the technology, resources, or funds to protect every community • Some areas in the US will almost certainly need to be depopulated and left behind, while other areas can be adapted and fortified • Public officials and corporate and community leaders will need to engage clearly and honestly in very uncomfortable conversations with their constituents • This transition will be painful, so effective leadership and funding will be essential
Define What to Measure and How Rapid development of and consolidation around meaningful climate adaptation metrics, measurement methods, and implementation tactics is a key enabling step to effective adaptation strategy development and execution.	• Climate adaptation is very complex and difficult to express, measure, and communicate • Experts must quickly develop and deploy meaningful adaptation metrics using a common framework • These outputs will help accelerate needed response actions, periodic evaluation, continual improvement, and progress toward climate resilience

Set Complete and Consistent Reporting Requirements Market participants and stakeholders on all sides require clear, consistent, and meaningful reporting requirements for publicly traded companies addressing both GHG mitigation and climate adaptation.	• Required corporate disclosure of climate-related risks and opportunities is evolving quickly • Most proposed changes focus on GHG emissions and do not adequately address adaptation • All interested parties should advocate for more extensive corporate climate adaptation activity, measurement, and disclosure • Climate adaptation is "material," so relevant regulatory bodies must ensure that companies with publicly traded securities report meaningfully, consistently, and regularly on their adaptation posture, activities, and progress
Improve Climate Change Reporting Investors, other stakeholders, and interested parties depend on high-quality corporate reporting and evidence of effective management of climate change impacts across the value chain. Companies must respond to these needs with meaningful and consistent reporting on a regular basis.	• Public companies will need to comply with regulatory requirements • Where regulatory requirements are incomplete, corporate disclosures should include current and future climate adaptation objectives, strategy, metrics, implementing tactics, and progress to date • There is a ready audience for this information, which can be viewed as evidence of a capable senior management and a well-run company
Leverage Investor Influence Investors need to play a catalytic role in focusing corporate attention on the urgency of climate adaptation, investing in businesses that develop new innovations that help address the climate crisis, and supporting multi-stakeholder initiatives to develop and execute adaptation strategies in specific locations.	• Corporations have responded decisively to growing investor expectations that they improve their management of sustainability issues • Investors should add climate adaptation to their agenda, and push forcefully for more comprehensive and consistent management of climate adaptation within their investment portfolio companies • Institutional Investors have a powerful voice and much to lose, and arguably would be breaching their fiduciary duty if they did not insist on regular, complete, and meaningful climate adaptation disclosure

In Table 2, we highlight the major societal actors that we believe should play leading and supporting roles in implementing these recommended high-priority actions. As is evident from viewing this table, multiple players in both the public and private sectors must actively participate in executing these activities if they are to be successful and move US and international markets and their host societies toward a more resilient and sustainable posture. Not shown, but also vitally important, will be engagement with interested NGOs, civic and cultural organizations, and the general public. Members of each can bring relevant perspectives, concerns, and to no small degree, expertise that can facilitate more rapid and lasting progress than might be possible otherwise.

Table 2 – **Key Actions and Responsibilities**

Vital Actions Needed Now	Public Sector				Private Sector				
	International	National	State	Municipal	Corporations	Industry Groups	Institutional/ ESG/SRI Investors	Insurers	Data Providers
Commit to Fairness	■	■	■	■	■	■	■	■	■
Execute Binding Agreements with Real Teeth	■	■	▫	▫	▫	▫	▫	▫	
Build Awareness and Capacity	■	■	■	■	▫	▫	▫	▫	
Focus Equally on Adaptation	■	■	■	■	■	▫	■	■	▫
Find the Limits of Risk Transfer Options		■	■		▫	▫	▫	■	
Broaden Corporate Planning			▫	▫	■	▫	▫	▫	
Develop New Models, Methods, and Relationships		▫	▫	▫	■	▫	▫	▫	
Accept Reality		■	■	■	▫	▫	▫	▫	
Define What to Measure and How	■	■	▫	▫	■	▫	■	■	▫
Set Complete and Consistent Reporting Requirements	■	■	■		▫	▫	▫	▫	▫
Improve Climate Change Reporting					■	▫	▫	▫	▫
Leverage Investor Influence	▫	▫					■		▫

■ Primary Responsibility ▫ Supporting Responsibility

A Call to Action

From the foregoing, it is clear that there is much work to be done and many people and entities will need to contribute. Many efforts are already underway, and they must be sustained and joined by others. We believe, however, that the private sector has unique resources and capabilities that must be brought to bear if the challenges posed by a changing climate are to be successfully overcome.

In particular, corporate executives and board members as well as ESG and mainstream investors have an opportunity to provide leadership on two crucial fronts:

- ***Effectively manage the greatest business risk of our time and preserve trillions of dollars in invested capital, and***
- ***Demonstrate that their stated commitments to sustainable operations, their employees, and their communities are real and of the utmost importance.***

More specifically, the leaders of institutional investors and forward-looking corporations should act now to adapt to the new normal of a changing climate. Readily available options that would leverage their unique capabilities and position include but are not limited to the following:

- ***Leading or vigorously supporting efforts to increase local, regional, and societal resilience,***
- ***Reviewing their asset portfolios, asset selection and risk management methods, and assumptions, and making updates and improvements where appropriate, and***
- ***Participating constructively in COP 27 adaptation discussions and other multilateral efforts to forge binding international agreements appropriate to the scale and severity of the climate crisis.***

We recognize that pursuing either of the first two options, as well as many of the activities shown in Tables 1 and 2 in any serious way will require the investment of significant time, effort, and other resources. It also is likely that in many organizations, making it happen will involve implementing an active change management process. In parallel, senior management must deliver a consistent, unwavering message that the organization is committed to building greater climate resilience and will remain so. As in any organizational change effort, such continual reinforcement is a necessary condition for success.

Regarding the third point, note that in our view, expanded legal requirements (treaties, regulations, and perhaps legislation) are a necessary part of the path forward. This position may elicit instinctive opposition from those who might be affected by any such new requirements. We encourage some further analysis, thought, and reflection before anyone so affected reacts adversely to what we propose. We suggest that active engagement and support, rather than passive resistance, or worse, active opposition, will be essential, so that difficult and contentious issues that affect us all are dealt with expeditiously and honestly.

Time is of the essence, and it is vitally important that corporate and other private sector interests and their public sector counterparts do not engage in the all-too-common slow-walk toward incremental change. Business-as-usual in this context often consumes years and countless professional hours expended by government officials, their staff, and contractors on one side, and attorneys, consultants, analysts, and other expert resources on the other. The stakes are simply too high for more of the same.

As discussed above, there also are many other important climate adaptation activities that private sector entities can lead or support. Indeed, such support will be an enabling condition for the US and other advanced economies to respond adequately to the challenges that lie ahead.

In addition, although providers of investment-relevant data to investors are not in a position to make decisions that directly affect corporate or community-level climate resilience, their work and pronouncements have often been influential in stimulating improvements in corporate performance and transparency. We encourage those providing data and/or ratings, rankings, and other judgments regarding corporate sustainability to use their voices and influence to help advance, at the least, the following crucial activities:

- ***Defining key climate adaptation metrics (what to measure and how) by providing constructive input to ongoing international metrics development efforts***
- ***Adoption of complete and consistent climate adaptation reporting requirements for public companies through active participation in public comment processes, listening sessions, and other opportunities to provide input***
- ***Improving both the breadth (to include both mitigation and adaptation) and depth of additional voluntary disclosure climate change disclosure by public companies by including more adaptation questions in periodic surveys administered to companies, raising adaptation in dialogs with company senior management, and expanding the scope of ongoing company-specific research to include climate adaptation and resilience issues, and***
- ***Providing investors with key insights, data, tools, and collaboration opportunities so that they can leverage their influence to bring greater boardroom attention to climate adaptation.***

Many companies across virtually all industries have made great strides in recognizing and responding to important environmental, health, and social issues in recent years. Many others have offered only anecdotes, promises, and platitudes. Businesses bring a rare and perhaps unique ability to create and incubate innovative ideas, approaches, and products and rapidly deploy them at scale. They must apply these talents to the problem of climate adaptation in large numbers and continue their efforts until we have greatly improved our resilience at every level of society. Our collective future security and prosperity depend on it.

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About Adaptation Leader

Adaptation Leader is a Section 501(c)(3) and IRS tax-exempt not-for-profit organization. We serve as a catalyst in bringing about more widespread, rapid, and effective implementation of approaches to climate adaptation, thereby improving organizational, community, and societal resilience and sustainability. Adaptation Leader brings together an interdisciplinary global team of experts to focus on adaptation and resilience solutions. Adaptation Leader is a trusted advisor, thought leader, and convener among all stakeholder groups in the domain of climate adaptation. We provide support to leaders of organizations — public sector, private sector and third sector — that want to plan and implement enhanced climate adaptation actions across their programs, products, and people. Adaptation Leader offers adaptation-focused strategic planning, research and research-based reports, educational and tactical workshops, and stakeholder convenings.

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