2024

Task Force on Climate-Related Financial Disclosures Report

Liberty Mutual INSURANCE

Introduction

This report follows the recommendations provided by the Task Force on Climate-Related Financial Disclosures (TCFD). It is structured around four thematic areas: governance, strategy, risk management and metrics and targets.

1A. Welcome letter

We are pleased to present our annual TCFD report, offering an overview of our climate activities over the past year.

In 2024, significant developments in the global geopolitical and socio-economic landscape shaped the climate conversation. After years of policies prioritizing a global economic transition to a net zero world, we saw a shift toward a pragmatic discussion acknowledging the need for more nuanced action that allowed for multiple transition pathways toward a decarbonized future. The debate on the efficacy of reporting and emissions measurement as a barometer of progress was met with the realities of the impact of current policies on market competitiveness and cost to consumers.

At Liberty, these debates have had little impact on our climate actions as our climate strategy is closely aligned with our core purpose of supporting clients with risk identification, risk mitigation and risk transfer. Throughout the year we have continued to prioritize projects that would support the integration of climate consideration into our business strategy and decision-making. These include:

- Refining our approach to climate resiliency, focusing on the built environment and need for resilient infrastructure, community action and gaining broader support from other stakeholders for climate resiliency funding and action (see page 17);
- Continuing research and investment in enhancing our modeling capabilities. For example, building a bespoke portfolio-level transition risk model that leverages NGFS data (see page 25) and advancing new insights on high-priority perils including hurricane frequency, flood, and wildfire risk (see page 25);
- Sharing our expertise on managing physical climate risk through the publication of a Physical Climate Risk Management Framework;
- Hosting through our Climate Transition Center, the Geneva Association's Climate Change and Environment Conference (held for the first time in the US) that helped facilitate industry-wide conversation on the climate; and
- Expanding our Climate Activation Program globally with new leadership participation, tailored sessions to engage product leaders and developing new content and online training modules (see page 19).

In 2025, we see the world moving in a disorderly transition, with each region and country pursuing its own policy and strategy. As the world experiences increased physical climate risk, we anticipate and welcome shifts in the policy conversation toward a greater need for climate resiliency. Having built a relevant strategy for our business, we will continue to execute against this strategy and are ready to support our customers globally, wherever they are in their transition journey.

Francis Hyatt
Chief Sustainability Officer

Leonid Rasin
Executive Vice President,
Chief Actuary and Chief Risk Officer

Rakhi Kumar
Senior Vice President of Sustainability
Solutions and Business Integration;
Chair, Climate Council

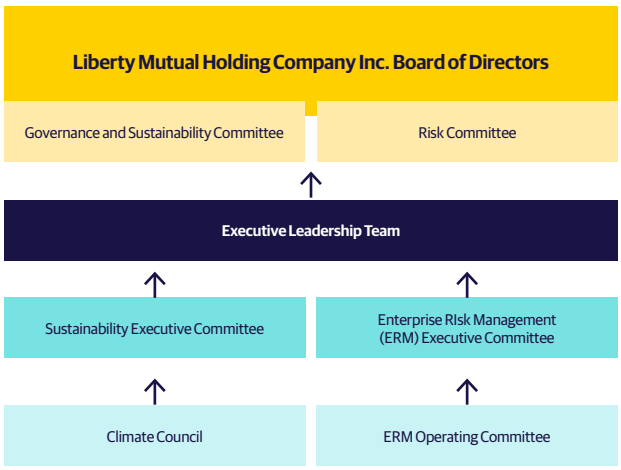
Governance

We continue to enhance our governance structure to support communication, collaboration and effective decision-making, ensuring that climate-related financial risks and opportunities are understood by our Board of Directors and across every level of our business.

2A. Describe the Board's oversight of climate-related risks and opportunities

At Liberty Mutual, the Board of Directors oversees the ongoing development of our enterprise-level business strategy and the management and implementation of our climate strategy, with specific responsibilities for oversight, implementation and operationalization delegated to the Risk Committee and Governance and Sustainability Committee. Our governance structure is detailed below, in Graphic A .

Graphic A. Liberty Mutual's governance structure for climate-related risk and opportunity



Roles and responsibilities for these groups are detailed on page 6-8.

Liberty Mutual's senior leadership and subject matter experts provide updates to the Board on risk and sustainability-related matters, including climate risk. These updates include annual briefings from the Chief Risk Officer (CRO) and Chief Sustainability Officer (CSO) and regular updates from experts across Liberty Mutual Investments (LMI), Global Risk Solutions (GRS) and US Retail Markets (USRM).

- Our former CEO continues to serve as Chairman of the Board and Chair of our Governance and Sustainability (G&S) Committee. The G&S Committee and Risk Committee have designated climate-related responsibilities and oversight as detailed below. A full breakdown of our Board of Directors and its Committees can be found on our corporate website.

Governance and Sustainability Committee

The Governance and Sustainability Committee provides strategic oversight and performance evaluation of our sustainability practices and priorities, including climate-related topics. As part of its duties, the Committee considers current and emerging sustainability trends and makes recommendations to the Board of Directors for approval as appropriate. It oversees corporate governance disclosures, including the annual Purpose and Impact Report and Corporate Governance Annual Disclosure. The G&S Committee includes membership from the Risk, Investment, Audit and Compensation Committees of the Board of Directors, allowing for representation and interconnectivity across the Board.

In 2024, the G&S Committee met four times and received updates on a broad range of topics, including the evolving sustainability and climate landscape, our climate resiliency initiatives, Climate Transition Center priorities, the expansion of the Climate Activation Program (CAP), progress toward our commitment to reducing Scope 1 and Scope 2 greenhouse gas (GHG) emissions by 50% from 2019 baseline by 2030, and other climate-related metrics and targets.

Risk Committee

The Board Risk Committee (BRC) also has an important role in climate-related oversight. The BRC is responsible for overseeing and reasonably assuring that Liberty Mutual maintains adequate policies, controls and practices within our Enterprise Risk Management (ERM) framework to continuously identify, measure, manage and mitigate critical risks. In 2024, the BRC met four times and conducted quarterly reviews of risk indicators and received updates on ERM key risks, including those related to climate.

2B. Describe management's role in assessing and managing climate-related risks and opportunities

Liberty Mutual continues to evolve our sustainability-related governance and organizational structure to ensure that we have the best system in place to collaborate and act on climate-related risks and opportunities.

Liberty Mutual's CEO and President serves as the executive sponsor for sustainability priorities. He works closely with the Chief Sustainability Officer (CSO), Chair of the Climate Council and Enterprise Risk Management and Public Affairs teams to stay informed and engaged on climate-related issues. Regular briefings equip the CEO and President to drive our climate strategy and risk management efforts forward and ensure that we're taking meaningful steps to promote climate action and mitigate risk.

We maintain a climate-related governance structure across the enterprise and businesses to enable coordination in assessing and managing climate-related risks and opportunities. Our governance structure includes the Sustainability Executive Committee, Climate Council, Enterprise Risk Management (ERM) Executive Committee, ERM Operating Committee, Global Risk Solutions ERM Committee, US Retail Markets Climate Council and LMI Investment Committee.

In addition, we have a management structure overseeing the teams in charge of implementing our climate strategy. It comprises the Executive Leadership Team, Office of Sustainability, corporate ERM function, GRS ERM function, USRM Chief Experience and Strategy Officer and LMI's Head of Impact and Sustainable Investments.

Climate-related governance structure

At the enterprise level

- **Sustainability Executive Committee:** Sets global standards and guidelines across Liberty Mutual and develops recommendations and plans to address emerging risks and opportunities. The committee includes representation from senior members of strategic businesses such as Liberty Mutual Investments (LMI), Global Risk Solutions (GRS) and US Retail Markets (USRM), and functions such as ERM, Investor Relations, Finance, Strategy, Legal and Public Affairs. In 2024, the Committee met five times to discuss topics such as our climate resiliency initiatives and strategic priorities. It also received updates about the Climate Transition Center activities.
- **Climate Council:** This cross-functional group is responsible for advancing the company's climate strategy and overseeing the Climate Transition Center. It aids in information exchange on emerging climate-related issues and advances internal climate-related policy and business initiatives.

  The Council, which includes members from all businesses as well as the Office of Sustainability and ERM, Public Affairs and Finance, meets monthly to assess strategic progress and suggest adjustments. Climate Council members contribute to annual climate-related reporting and form sub-groups for specific issues. Monthly sessions covered regulatory impacts and opportunities, global and regional public policy landscape, geopolitical considerations, improvement to our risk management framework, including our initial views on nature-related frameworks and tools and climate reporting. Members also discussed our climate resilience initiatives, the expansion of the Climate Activation Program, the Climate Transition Center's vision and priorities and our enterprise climate strategy.
- **ERM Executive Committee:** Chaired by Liberty Mutual's CEO and President, has oversight responsibilities to define organization-wide ERM roles and responsibilities, establish accountability, guide the ERM implementation process, establish group-wide risk tolerances, approve risk mitigation plans and monitor ERM effectiveness. This Committee comprises executive leaders responsible for businesses and corporate functions.
- **ERM Operating Committee:** Chaired by the Chief Financial Officer, the ERM Operating Committee prioritizes issues and develops recommendations and actionable contingency plans for review by the ERM Executive Committee. Furthermore, the ERM Operating Committee maintains processes to aggregate,

Liberty Mutual's businesses

We offer a wide range of insurance products and services, including personal, automobile, homeowners, specialty, reinsurance, commercial multiple-peril, workers' compensation, commercial automobile, general liability, surety and commercial property. Liberty Mutual substantially conducts its business through:

Global Risk Solutions (GRS)

Our commercial business, GRS, offers a wide array of property, casualty, specialty, surety, and reinsurance products and services across the globe and is formed by four business functions: (i) Liberty International Insurance, (ii) Liberty Mutual Reinsurance, (iii) North America Specialty and (iv) Global Surety (together referred to as 'GRS' throughout this report).

US Retail Markets (USRM)

Our retail business, referred to as USRM throughout this report, provides Personal Lines and Small Commercial Lines products to millions of individuals and small businesses in the United States. USRM's goal is to leverage cutting-edge data, analytics and people's expertise to offer great prices and exceptional products to our customers.

Liberty Mutual Investments (LMI)

LMI is the investment firm for Liberty Mutual Group. With deep expertise in fixed income, equity and alternative strategies, LMI invests more than $100 billion of long-term capital globally across its integrated platform. LMI has a clear purpose: to drive economic growth, build enduring businesses side-by-side with our partners and generate superior risk-adjusted returns that secure Liberty's promises.

evaluate and manage group-wide exposures. This Committee comprises officers and employees directly managing risks that have the potential to materially impact the financial or operational viability of the company.

At the business level

- **GRS ERM Committee:** Chaired by the GRS President, the GRS ERM Committee is responsible for overseeing the GRS risk management strategy. It fosters a unified understanding of GRS's risk profile, implements robust processes for aggregating risks, and monitors key risk sources, including climate-related risks. By ensuring a consistent approach to risk management across our global business, the Committee strengthens GRS's resilience and strategic decision-making. The Committee meets quarterly and includes representatives from GRS leadership team, segment senior leaders and the Office of Underwriting.
- **USRM Climate Council:** Facilitates a common understanding of and enables discussion about climate risks and opportunities specific to the retail market business. The USRM Climate Council maintains connectivity across functions on actions taken within the retail business and/or Liberty to mitigate climate-related risks. The Council meets quarterly and has representatives from USRM senior leaders and the Office of Sustainability.
- **LMI Investment Committee:** Established by Liberty Mutual's Chief Investment Officer, it oversees our approach to investment governance. The committee comprises LMI leaders collectively representing the management of all LMI investment activities. LMI's embedded approach to integrating sustainability ensures that an expanded information set of material factors is available to inform strategy and capital allocation across LMI's portfolio.

Climate-related management structure

At the enterprise level

- **Executive Leadership Team:** Chaired by the CEO and President, the Executive Leadership Team manages Liberty Mutual's strategic response to climate change risks and climate strategy. The team receives quarterly reports and, when necessary, additional timely updates on sustainability and climate-related risks and opportunities. These reports and updates facilitate strategic discussions and permit us to coordinate activities across departments and stakeholders to achieve sustainability goals.
- **Office of Sustainability:** Headed by the CSO directs the enterprise sustainability strategy and ambition to promote resilience and inclusive growth. Our climate strategy is a fundamental part of the overall sustainability approach, and the team aligns climate-related efforts across the company, gathers and oversees climate data and disclosures and facilitates climate-related strategic engagement and informed decision-making across the enterprise. The CSO also chairs the Sustainability Executive Committee, with a senior office member chairing the Climate Council.
- **Corporate ERM function:** Led by the Chief Risk Officer, coordinates group-wide ERM activities. These include identifying, assessing, and monitoring risks, establishing risk policies and providing risk insights. The Chief Risk Officer also chairs the Catastrophe Underwriting Risk Committee (CatCo), which oversees catastrophe underwriting risk across the organization, and the Emerging Risks Committee (ERC), with responsibilities for emerging risks that may materially threaten Liberty Mutual's operations, financial results, objectives and strategic priorities.

At the business level

- **GRS Sustainability Team:** Led by the GRS Head of Sustainability, this team informs GRS's climate strategy, aiming to both manage climate-related risks and pursue opportunities that accelerate a more sustainable future for both Liberty and our customers. Additionally, the GRS Sustainability team coordinates GRS aspects of climate-related reporting, education and engagement, in alignment with the enterprise climate strategy.
- **USRM Chief Experience and Strategy Officer:** Coordinates the integration of climate risks and opportunities within the retail business.
- **LMI's Head of Impact and Sustainable Investments:** Drives LMI's approach to integrating sustainability across the portfolio and leads the execution of our impact investing and tax credit investing mandates.

Strategy

We leverage the latest science to continue to advance our understanding of the actual and potential impact of climate-related risks and opportunities and have developed a climate strategy to drive action and integration across our business, and to enhance resilience and readiness for our company, customers and communities.

3A. Describe the climate-related risks and opportunities the organization has identified over the short-, medium- and long-term

We adopt a pragmatic, science-based approach to identifying and analyzing the climate-related risks and opportunities impacting Liberty Mutual's business. We analyze system-level insights alongside a portfolio-level assessment in the short-, medium- and long-term. As climate-related science evolves, we continue monitoring scientific developments and refining our processes for identifying and managing climate-related physical and transition risks. We aim to leverage the latest, credible and peer-reviewed sources to understand better the scientific, social, economic and technological trends embedded in climate models and to identify interconnections, understanding feedback loops and dynamic behavior.

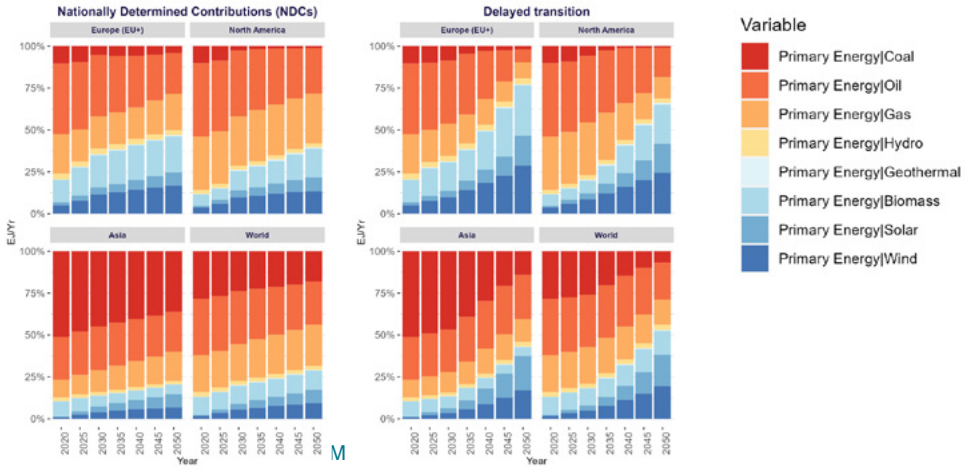
Our systems-level approach combines modeling's scientific conclusions with macro factors such as GDP impacts, population trends, geopolitical dynamics and governmental climate policies. We consult various models, including the Network for Greening the Financial System's (NGFS) integrated assessment to synthesize the system-level inputs. We also updated our physical risk scenarios for chronic risk to align with the Intergovernmental Panel on Climate Change (IPCC) Coupled Model Intercomparison Project Phase 6 (CMIP6) data. Further details of our analysis on transition and physical risks, including an analysis of acute physical risks and mitigation strategies, can be found in the Risk Management section (see page 21).

Our analysis has identified different trends, risks and opportunities over the short-, medium- and long-term, highlighting the need for a pragmatic approach that recognizes regional realities. Some of the key insights derived from our analysis are:

- Global climate policy alignment will be challenging due to varying national economic needs, and regional coordination will be key. The pace of policy progress will depend on individual economies' readiness to transition from fossil fuels. NGFS models suggest a continued mix of energy sources, including fossil fuels, renewables, and other low-carbon alternatives, in the short-, medium- and long-term. (See Figure 1).
- Distinctive regional and sector-specific pathways for the energy transition are likely, as climate transition and physical risks will uniquely impact each economy. Policymakers may take steps to alleviate the regional impact on their economy, resulting in diverse approaches to policy development across regions.

Figure 1. Primary energy mix

Primary energy mix is an important indicator for the pace and scale of the transition across regions, as energy consumption across sectors is currently the main driver of emissions. Across society, we heavily depend on energy to power our day-to-day activities, from transportation to electricity for homes and businesses. The mix and scale of "primary energy," as referenced in the NGFS graph below, indicates how difficult the transition may be for specific regions.



Source: NiGEM Model with GCAM 6.0 Inputs, NGFS V4.0

- The transition to a net-zero economy depends on adopting and enforcing global and regional climate policies, regulations and agreements. Uncertainty about government policy actions and their implementation timelines can impact local and global economies.

Analyzing these external dynamics is essential for understanding short-, medium- and long-term risks and opportunities. It is also important to consider the strengths and limitations of the tools and models in place today and acknowledge that defining stringent time horizons for climate risks, while helpful, requires a flexible approach that allows for the integration of evolving views.

Given the unique characteristics of physical and transition risks, we assess each using different models and time horizons, as detailed in Tables 1 and 2.

Table 1. Short-, medium- and long-term climate-related physical risks and opportunities

	Short-term	Medium-term	Long-term
Time Horizon	0-10 years	10-25 years	25+ years
Considerations	Aligned with near-present physical risk hazards	Physical risks are more likely to exceed the scope of catastrophe modeling	Emissions scenario uncertainty drives uncertainty in physical hazards, and catastrophe models are less likely to include sufficient events to manage the tails of physical hazards
Tool/Process	Cat Models + Climate Expertise	Risk assessments supplemented with: 1. Assumptions about emissions pathways 2. Explicit parameter testing to capture the sensitivity of changes in perils to ongoing changes in chronic risk	Risk assessment supplemented with qualitative approaches
Risks	Climate-related physical risks add volatility to annual catastrophe losses manifesting in different ways, such as: • Intensification in the hydrologic cycle, with extreme rainfall driving flash floods and higher evaporation contributing to wildfire risk • More severe hurricanes • Rising sea levels boosting storm surges	Physical risks are more likely to exceed historical bounds with increasing frequency, including a rise in the likelihood of "gray swan" events from extreme weather strikes in areas lacking experience and preparation Increase in the potential for material disruption of major financial markets derived from physical events	
Potential Opportunities	Increasing demand for effective climate-related services from clients and the public, emphasizing advancing climate resilience	Improve geographic diversification as market conditions change by proactively identifying regions where our portfolios are less sensitive to variations derived from increasing physical risks	

Table 2. Short-, medium- and long-term climate-related transition risks and opportunities

	Short-term	Medium-term	Long-term
Time Horizon	0-5 years	5-15 years	15+ years
Considerations	Aligned with near-current market conditions	Transition risk increases in uncertainty due to technological advancement	Risks are likely to exceed the bounds of historical experience
Tool/Process	Climate Expertise + Data Analytics on Topics of Interest and Economic / Policy Modeling, Integrated Assessment Model Outputs may be used to assess areas of policy or economic sensitivity in the near term	Integrated Assessment Models + Climate Expertise	Integrated Assessment Models + Climate Expertise
Risks	Potential portfolio disruption derived from differing regulatory requirements across jurisdictions Challenges in portfolio accumulation management in fast-changing industries consistently appear to be the top risks in the near term in NGFS scenario modeling	Transition risks will likely accelerate following some disorderly transition variation, and market disruptions associated with policy uncertainty will continue The mid-transition—the period between early adoption and full integration of new technologies—increases uncertainty as policy risk is particularly high. Some technologies will need policy support, some might lack cost competitiveness, and some might face a lack of funding	There is a greater potential for geopolitical disruption that may affect business operations Industry supply chains will reorganize as global commodities rise or fall in value depending on the maturation or shift of technologies
Potential Opportunities	Integration of climate transition risk assessment into other forms of client advisory services	Opportunity to pilot test new policies that support green upgrades in buildings, alternative transit systems, and industrial processes, among other opportunity areas. When identifying opportunities, modeling outputs must be evaluated against costs vis-a-vis different technologies, scalability, and consumer preferences Identify growing sectors that are positioned to drive potential premium growth	

Understanding global shifts in the energy transition and climate policy. Q&A with Viji Rangaswami, Senior Vice President, Chief Public Affairs Officer

Q: 2024 was a watershed year for global climate policy. What are the key shifts your would highlight?

In my view, changes in the thinking related to climate policy began much before 2024. Supply chain disruptions during the COVID-19 pandemic highlighted the economic vulnerabilities of nations. At the same time, the Russia-Ukraine conflict brought some countries' security and energy dependencies to light and created inflationary pressures globally. These macroeconomic and geo-political factors laid bare tensions between climate policy and countries' legitimate security and economic growth needs.

Today, when evaluating and developing climate policy, many governments are shifting towards approaches that promote proven, profitable, market-ready and cost-effective technologies and supportive policies – such as direct support – for nascent, unproven technologies that show promise. Finally, there is increased emphasis on climate adaptation and resiliency, which will drive policy decisions in the coming years and a greater discussion of policies to promote insurance access.

Q: Can you discuss the policy shift to climate resilience or adaptation? Why now and what will it look like?

With the increasing severity and frequency of many natural catastrophes or weather-related events, we are entering a period where economic and climate resilience will be a growing focus. We believe we will start seeing jurisdictions worldwide place greater emphasis on resilient building from a policy and funding perspective. The insurance industry is very supportive of this shift, as we have known for some time that investing in resiliency saves lives, property, and money. Every $1 spent on building climate resiliency, such as the latest building code requirements, saves $11 in rebuilding costs[1], yet less than 5% of climate-related investments are spent on climate resiliency.[2]

Q: How do the policy shifts and increased focus on climate resilience impact Liberty's climate strategy and activities?

When we set up our Climate Transition Center in 2022, we adopted a systems-level pragmatic approach to understanding climate-related matters impacting our business. Consequently, we built a strategy that is closely tied to our core economic function of risk identification, risk mitigation, and risk transfer—one that is agnostic of economic and political or policy cycles.

By focusing on advancing data and discovery, supporting the adoption of renewable and decarbonization solutions, and advocating for greater climate resiliency—the three pillars of our climate strategy—we have built a strategy that is relevant for our business and our customers globally. It allows us to support our customers within their contexts, wherever they are in their transition journey.

From an enterprise perspective and given the evolving policy landscape, we expect countries to address climate policy differently. We believe that a one-size-fits-all policy approach is not appropriate, given the differences in economic and regulatory environments of jurisdictions.

Our expertise in assessing and understanding risks within each unique region or jurisdiction is at the core of Liberty's approach. We have strong governance structures, such as the Climate Council, to support and guide our efforts. This allows us to support policymakers and clients in addressing challenges and developing strategies that promote resilience in the face of evolving global conditions.

[1] National Institute of Building Sciences.(2019). Natural Hazard Mitigation Saves.
[2] Climate Policy Initiative. (2023). State and Trends in Climate Adaptation Finance.

3B. Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy and financial planning

As a global property and casualty (P&C) insurer, we provide insurance coverage for both retail and commercial customers. To serve all our customers and their communities, we have developed a comprehensive climate strategy closely tied to our purpose – that of a risk expert - helping clients identify, mitigate and transfer risk. We review our strategy periodically against risks and opportunities that may arise from shifts in the macro-economic and geopolitical landscape, technological advances made towards a decarbonized future and insights from our scenario outputs. Ultimately, our objective is to support our clients and advance action and dialogue on the transition to a low-carbon economy in three ways:

- **Advance data and discovery:** Helping manage climate risk and advancing global understanding and conversation on data and risk discovery and application.
- **Support the adoption of renewable and decarbonization solutions:** Accelerating innovative solutions that promote the adoption of renewables and decarbonization through customer risk advisory, underwriting and investments.
- **Support and advocate for greater climate resiliency:** Driving engagement and support for climate resiliency efforts while leveraging our expertise to strengthen the built environment and bolster individual / community preparedness.

Advance data and discovery

At Liberty Mutual, we recognize the importance of reliable and accessible data and are committed to advancing climate and energy transition-related data accessibility and quality for our business, our customers and our industry.

Property and casualty insurers look at climate risk differently than other financial service companies. We are experts in using science and data to understand physical risks – particularly natural catastrophe risks that could impact our customers' assets. We use these data insights to assess risk, and based on that expertise, we tend to have a better understanding of how natural catastrophe risks are changing and evolving due to climate risk. This gives us a unique perspective to help the insurance industry understand the various financial and economic impacts of climate risk. We continue to deepen our

Liberty Mutual's Climate Transition Center

The Liberty Mutual Climate Transition Center was founded in 2022 to provide a (re)insurance perspective in the global climate discussion. The Climate Transition Center highlights our systems-level, pragmatic, differentiated approach to support the understanding of physical and climate transition risks and opportunities in the global economy through research and published materials. It also brings together stakeholders, including regulatory bodies, customers, partners and peers to share knowledge and expertise.

From an initial focus on advancing a collective understanding of transition risks we have expanded our proprietary research and discussions to physical risk and resiliency.

- We published "Uncovering the Complexity of Physical Climate Risk: Insights from the Insurance Sector". Drawing on our global property and casualty insurer expertise, this paper aims to equip and empower risk managers and organizations with the knowledge needed to mitigate and manage physical climate risks. It proposes a simplified physical climate risk management framework for understanding exposure, perils, evidence and materiality so companies can appropriately prioritize physical risk for their portfolio.
- We hosted the Geneva Association's annual Climate Change & Environment Conference in Boston, the first time the event had been hosted in the US. The event featured discussions and presentations from industry leaders, experts and academics, exploring the challenges of increased physical climate risk, how to address the financing gap for building climate resilience and decarbonizing the economy, and the role of policymakers, individuals and households in supporting broader climate objectives.
- We expanded our Climate Risk Data 101 video series with our Head of Catastrophe R&D, reinforcing the need to advance climate data and tools for greater resiliency as a response to mitigate physical risk. The videos focus on topics such as insurance and climate data, climate risk models, existing gaps in climate data and tools and climate adaptation and infrastructure.
- We advocated developing and enforcing resilient building codes to strengthen communities against extreme weather. Our Head of Catastrophe R&D emphasized the benefits for households and communities from resilient building codes while dispelling the myth that resilient measures are costly for homeowners and communities on a webinar co-hosted by BuildStrong America and the Climate Transition Center on FEMA's Building Resilient Infrastructure and Communities Program.

Read more about the Climate Transition Center.

understanding of physical and emerging risks through research projects and partnerships, as detailed in the Risk Management section (see page 21), expanding on our work around hurricane frequency, flood and wildfire risk.

As climate science continues to evolve, we recognize the need for continued education, partnership and information-sharing to collaborate on advancing climate data and to ensure that good data is accessible to all. We do this by:

- **Contributing to research and frameworks:** Liberty Mutual continues to explore ways to drive more effective use of climate data in the private sector with our academic partners. We remain engaged in a partnership with consortia of the Massachusetts Institute of Technology (MIT), including the MIT Climate & Sustainability Consortium (MCSC), the MIT Energy Initiative (MITEI) and the MIT Center for Energy and Environmental Policy Research (CEEPR). We also started sponsoring a master's student at the University of Reading to investigate the historic and likely future closures of London's Thames Barrier in response to severe wind and rainstorms.
- **Engaging with the scientific community:** Our researchers collaborate on best practices to translate climate data to applied risk problems from the insurance sector's perspective with government agencies such as NOAA (National Oceanic and Atmospheric Administration) and NASA (National Aeronautics and Space Administration) and expert organizations. We regularly send delegates to scientific conferences to keep up to date on emerging climate research, this year included participation at the American Geophysical Union (AGU), the American Meteorological Society (AMS) and the European Geophysical Union annual meetings. Climate change is a key focus for these meetings, covering topics related to Liberty Mutual's own areas of interest, including event attribution, changes in flood risk, integrating climate models and catastrophe models, emerging perils like post-wildfire debris flows and other impacts of anthropogenic and natural climate drivers. We were also represented at groups such as the Royal Meteorological Society's Insurance Special Interest Group and Newcastle University's Extreme Weather Forum.
- **Insurance sector engagement:** We actively collaborate with industry bodies like the American Property Casualty Insurance Association (APCIA) and Institute of International Finance (IIF) to provide feedback on proposed legislation and regulatory frameworks, informed by data, and to align on climate scenario analysis and climate risk metrics for our industry. We also engage with regulators, supervisors, and regulatory standard-setting associations such as the National Insurance Commissioners (NAIC) and the International Association of Insurance Supervisors (IAIS) to inform the climate risk workstream, sharing our approach to climate scenario analysis and modeling. By engaging in strategic partnerships and collaborations, we have advanced our collective understanding of climate data and modeling.

Support the adoption of renewable and decarbonization solutions

As countries transition their economies toward decarbonization, we are evolving our team, our products and our investments to respond to the risks and opportunities posed by the transition and continue to provide leading risk advisory services to our customers wherever they are on their sustainability journey.

Renewable and decarbonization solutions in our insurance business

We proactively discover and mitigate new risks and opportunities and invest in enhanced data and analytics to better understand risk and support our clients as they transition toward a low-carbon future. We have been training underwriters, broker relationship managers and client relationship managers in new energy technologies for which our clients need coverage. Paired with our support for our customers, we embed climate risk training initiatives, such as our Climate Activation Program (see page 19), within the business to further empower our underwriters to navigate emerging challenges and opportunities.

We are developing new products in response to growing renewable energy capacity and decarbonization initiatives across multiple regions. This year, we provided Power Purchase Agreements (PPA) and Performance and Advance Payment bonds to enable battery energy storage systems and renewable energy projects in different geographies. In Spain, for example, we supported the country's largest wind farm, which generates 324MW of power and includes a 50km transmission line capable of supporting 1GW of renewable energy. In transitioning countries such as Norway and the Netherlands, we provided decommissioning guarantees that allow the safe removal of infrastructure and the restoration of seabeds. Our reclamation guarantees allow for the closure of legacy operations and the rehabilitation of land, and we continue to cover site pollution liability and environmental protection through the US Environmental Liability group's Contractors and Environmental Legal Liability product (CELL).

Furthermore, we undertook a Surety Pilot - a detailed exploration of our surety clients' evolving transition risk landscape and emerging need. We surveyed clients engaged across various industries and regions and identified areas for further engagement and product development.

To support our retail customers in transitioning to a low-carbon economy, we have introduced an innovative Electric Vehicle (EV) policy with a mandatory, non-premium-bearing endorsement to help customers insure their vehicles. This policy offers comprehensive protection tailored to the unique risks of EV ownership, such as coverage for chargers, roadside charging and towing to charging stations.

Strategic investments

With knowledge and networks spanning more than 40 years of private market investing, powerful insights derived from an integrated platform, and a single client focus, Liberty Mutual Investments (LMI) innovates with world-class partners as it invests up and down the capital stack to compound capital for Liberty. LMI has a clear purpose: drive economic growth, build enduring businesses side-by-side with its partners and generate superior risk-adjusted returns that secure Liberty's promises.

LMI's culture and dedication to disruptive innovation has yielded financial success and positioned the company at the forefront of major shifts in technology and industry trends. Through partnerships and networks, LMI identifies and supports secular trends, investing across the value chain and capital structures in high-potential opportunities that address critical global issues.

One way LMI achieves this is through its dedicated Energy Transition & Infrastructure (ET&I) team, which is charged with capitalizing on discrete trends within the infrastructure landscape. By focusing on sectors undergoing transformation, the ET&I team positions capital to catalyze innovation and unlock value.

For example, the ET&I team participated in Fervo Energy's $244m Series D equity round, a company whose mission is to leverage innovation in geoscience to accelerate the clean energy transition by providing cost-effective, reliable geothermal energy. The partnership helps unlock their next growth phase, deploying proven technology adapted from the oil and gas industry to deliver carbon-free energy by developing utility-scale geothermal power, an important element of the energy transition.

This is one of many ET&I investments in emerging energy solutions, a large sector poised for dramatic growth in revenue and profitability that will help LMI generate compelling, risk-adjusted returns. In addition to the more than $1.5 billion in renewable energy-generation investments across LMI's fixed income and alternative investments, the ET&I team has invested approximately $1 billion in emerging energy transition opportunities and strategic investments in climate technology. LMI's ability to invest across different sources of finance allows tailored solutions that meet the specific needs of projects, ensuring their success and sustainability.

Collaborating and engaging through Global Risk Solutions (GRS)

To scale the transition and provide the confidence and trust needed in the evolving market, we partner with insurance market stakeholders, partners and our peers to further our understanding of climate risks, opportunities, new technologies and early involvement in large-scale renewables projects. We are also actively involved in industry association working groups relating to sustainability, climate and the transition to a lower-carbon economy.

We are members of the Sustainability Committees and Climate Risk Committees of the International Underwriting Association of London (IUA) and Lloyd's Market Association (LMA). Our leaders are part of Lloyd's ESG committee and Lloyd's Council and Committee. Through these forums we have the opportunity to work through issues facing the market in collaboration with peers and partners for the best outcomes, to advocate and collaborate on regulatory and strategic sustainability topics and to better understand best practices in the market.

As a member of the Geneva Association, we highlight insurance's role in better understanding risks and building a more resilient economy and society. We undertake collaborative and rigorous research to help the industry proactively respond to risks and opportunities posed by climate change. We contributed to the Geneva Association's two-part research series on how insurers can facilitate the commercialization of climate tech. The first report, "Climate Tech for Industrial Decarbonisation: What Role for Insurers?" examines the climate tech landscape and highlights how critical it is to engage with re/insurers from the early stages of climate tech projects. The second, "Bringing Climate Tech to Market: The Powerful Role of Insurance", focuses on how the insurability of climate technologies can be enhanced and presents an "Insurability Readiness Framework" applicable to green hydrogen and carbon management.

We continuously engage with our clients to advance the understanding of risks and opportunities derived from sustainability, including climate change. In 2024, we created a European Energy Transition Client Panel, bringing together clients from across the energy value chain to explore the risks and challenges they face throughout their respective transition journeys and identified opportunities for co-creation of solutions. We also hosted a roundtable with a group of sustainability and risk professionals across a variety of industries in the UK to discuss some of the issues that businesses face in managing their environmental impact, including nature and biodiversity.

The role of surety bonds in global infrastructure and the energy transition Q&A with Nate Zangerle, Chief Underwriting Officer, Global Surety

Q: What are surety bonds and how do they help mitigate risk?

Surety bonds are legally binding agreements between the contractor or developer (principal), the project owner or beneficiary (obligee), and the surety provider. Through these agreements the surety provider assures the project owner that the project will be completed on time and according to specifications, enabling the project owner to proceed with confidence.

Q: Surety bonds lend themselves to what kind of projects?

Surety bonds are an especially useful risk mitigation tool for large infrastructure projects, particularly those with complex supply chains, those supported by public funding or investors who require assurance that projects will be completed, and those with high technical complexity or uncertainty.

Liberty Mutual is one of the largest surety bond providers globally. We are seeing surety and guarantee products establish a foothold internationally. In a decade, our ex-US business has grown from just $25 million to $380 million.

Q: Are there any differences between surety bonds and regular insurance products?

Surety bonds and insurance both offer protection, but they address risk mitigation differently. Unlike traditional insurance, which involves assessing claims and issuing payments, the surety claims team steps in to resolve issues and ensure that the project is completed. If we need to step in, we identify and contract with engineers, accountants, and lawyers, and provide financing, or take other actions to ensure project completion. For example, in a solar project, we provided financial support to the company, enabling its completion. We then worked on reimbursement once the project was finished.

Q: How can surety products help customers as they transition towards a lower carbon economy and build climate resiliency?

Surety bonds play an important role in enabling the energy transition by providing financial assurance and risk mitigation for a wide range of energy transition projects. The pre-qualification of contractors or developers, which is a key function of surety bonds, provides highly beneficial support for unproven or innovative technologies, where there may be higher execution risk involved. Our bonding process includes a thorough technical assessment, evaluating the technology's feasibility, the contractor's expertise, proof of concept and momentum, and a close monitoring of the project's progress.

Through this process, we have supported multiple innovative but potentially high-risk projects such as the construction of biogas facilities for agricultural waste management, the construction of biodiesel and ethanol plants and the completion of battery storage projects. We are also proud to be part of multiple resiliency projects, including the East Side Coastal Resiliency project in Manhattan, aimed at reducing flood risk due to coastal storms and sea level rise through a 2.4-mile-long flexible flood barrier. The project will improve waterfront open spaces and access for more than 110,000 residents.

Support and advocate for greater climate resiliency

We have long focused on climate resiliency (often known as adaptation), which reduces the vulnerability of insured assets to climate-related risks and ensures the long-term viability of our business. We define climate resiliency as the ability to prepare for, adapt to, and recover from the physical impacts of climate change. This focus presents a growing opportunity to develop insurance products and services that drive business growth, reduce exposure and create customer value.

In 2024, we established a cross-functional working group within the Climate Council to examine the evolving external dynamics and opportunities on climate resiliency and refine our approach. The working group affirmed the following three priority pillars for the company:

1. Infrastructure and built environment: Focus on the impacts of climate change on physical infrastructure and property.
2. Community resilience: Focus on individual and community-scale resiliency for better preparedness for natural hazards and disasters.
3. Stakeholder engagement and support for resiliency: Focus on public-private stakeholder engagement to create continued momentum around resiliency and the macro-level factors that can impact progress.

Infrastructure and built environment

The impact of extreme weather events on physical infrastructure and property is growing, increasing the risk to businesses and homeowners. To address these challenges, we offer solutions that enhance preparedness and help minimize damage.

On the retail side, for example, we offer proactive prevention, addressing risks early to reduce the frequency and severity of claims. WeatherReady on Liberty+ is a digital platform that provides advice, recommendations and tools to enable homeowners to care for their homes, guiding customers on how to build resilience against severe weather. In 2024, we introduced new features, including four pre-season email series focused on resilience-building for wildfire, hurricane, hail and cold weather seasons. These custom guides help homeowners perform preventative maintenance before storms, giving them the tools to safeguard their properties. Since launching, WeatherReady has seen significant engagement, with 20,000 policyholders participating in 2024 and more than 4,000 climate resilience-building actions being taken.

Community resilience

Strengthening community resilience to weather and climate-related challenges is essential because it helps protect value. A resilient community can better withstand and recover from extreme weather events, reducing financial losses and maintaining economic activity.

We leverage our technical expertise and combined resources to help low-income communities access federal disaster preparedness and recovery funds. One example is our partnership with SBP, a national disaster recovery and resilience organization. SBP's Capacity Building for Community-Based Resilience program focuses on guiding communities accessing federal mitigation funds, which often go to larger cities. Through the partnership with Liberty Mutual, the program has expanded to Massachusetts and West Virginia.

The Liberty Mutual Foundation plays an important role in our resiliency initiatives. We have forged partnerships with more than 30 organizations specializing in nature-based solutions, climate resilience, sustainable infrastructure and skill development to prepare low-income, vulnerable individuals for green jobs. In 2024, we awarded 27 climate resiliency grants representing more than $3 million, allocated to efficiency upgrades in housing units and enhancing skills training for green jobs, among other resiliency efforts.

Parametric insurance solutions are also key to our climate resiliency approach. They provide businesses with faster recovery support, minimize disruption and help them bounce back more quickly from natural hazards and climate-related disasters. In 2024, we won the Parametric Insurer of the Year' Award as we launched two innovative initiatives. We developed a market-first parametric solution that strengthens community resilience by protecting Kenyan coffee farmers from climate physical risks. In partnership with Sprout, Inc. and Kenyan insurer Britam, we created a product that uses satellite data to monitor rainfall. The solution provides automatic payouts when trigger levels are met, ensuring farmers receive compensation quickly and efficiently.

Stakeholder engagement and support for resiliency

In addition to developing products and solutions and advocating for more community measures, it is important to keep climate resiliency in the broader climate conversation, which typically focuses on mitigation. As Liberty Mutual has always seen it from a "both/and" perspective, we regularly engage in external discussions to foster dialogue and support by highlighting the importance of climate resiliency for businesses and communities beyond decarbonization efforts.

Through the businesses and the Climate Transition Center, we advocate for and invest in advancing climate analytics and modeling, building a more localized understanding of the impacts of climate change to better serve individual customers and communities. For example, we promoted the development and enforcement of resilient building codes to strengthen communities against extreme weather (For further details (see page 14).

We also participate in multiple discussions and workshops. Our Chief Sustainability Officer joined an Arsht-Rock Resilience Center panel during New York Climate Week's Resilience Day to help educate community leaders on how insurance can be a partner in understanding resilience and resiliency solutions. We also continued to bring the insurance industry perspective and expertise around physical climate risk and the importance of climate resiliency to larger financial sector conversations, such as the Institute of International Finance (IIF) and BloombergNEF.

We are promoting climate resilience and enhancing sustainability among our employees through education and empowerment. We continue to expand the Climate Activation Program, providing foundational climate-related education to all business leaders.

3C. Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios including a 2C or lower scenario

As outlined in Strategy and Risk Management, we analyze a range of scenarios that help us assess the potential impact of transition and physical risks on the global economy and our operating environment. Our pragmatic, systems-level, business-led climate strategy is designed to remain effective across various potential climate-related scenarios. In a high-physical-risk world, our focus on resiliency and related activities positions us to support our policyholders in preparing for, adapting to, and recovering from the physical impacts of climate change. In a high-transition scenario world, we provide leading risk advisory services and respond to opportunities by understanding the complexities of the transition and decarbonization journey. In all scenarios, our strong use of data and science allows us to comprehend the pace of change and make informed decisions.

In addition to our strategy, we are implementing practices that enhance resilience through business integration, innovation and a well-informed and skilled workforce.

Focus on business integration and innovation

Business integration is key to our sustained resilience and to operationalize our strategy. Liberty Mutual is continuing to evolve our business structure to best meet the needs of our customers and the market. We are proud to have developed robust sustainability and risk governance structures that have evolved to ensure we collaborate and bring the right expertise to each risk amidst business changes. Our emphasis on a sustainable underwriting risk framework and addressing sensitive topics underscores our commitment to managing risks today while assisting customers in navigating opportunities for a more sustainable future.

The Office of Sustainability also continues to partner with the GRS Sustainability Team, the USRM Climate Council and other business leaders to ensure that Liberty Mutual's climate strategy is reflected within individual business strategies. As detailed further in Risk Management, our Enterprise Risk Management team also continues to advance research in partnership with our business to ensure that our products and services are informed by the latest science and available data.

Continued learning through Climate Activation Program

Investing in employee education and engagement equips our people with the expertise needed to understand the complexities of the energy transition and support customers. A key initiative in our talent management strategy is the Climate Activation Program (CAP), designed to develop the knowledge and capabilities needed for employees to consider climate-related factors in their day-to-day work.

Launched in 2023, CAP aims to build a comprehensive understanding across Liberty Mutual of the various climate-related risks—physical, transition and litigation—and their potential impact on the insurance industry, our business and our customers.

The program highlights how climate change impacts different aspects of our business. Content is delivered through tailored modules and training sessions adapted for different levels and geographies within the company.

This program solidifies individual understanding and empowers action, by focusing on:

- **Making connections between policy and geopolitics on climate transition pathways:** Participants engage with real-world examples and data, transforming abstract concepts into tangible realities.
- **Promoting cross functional learning:** Collaborative discussions foster deeper comprehension and facilitate the development of shared solutions.
- **Identifying how individuals can play a role in supporting the transition:** Clarifies how each employee contributes to Liberty Mutual's climate goals, fostering a sense of ownership and responsibility.
- **Moving beyond compliance:** Emphasizes leveraging climate challenges to gain a competitive advantage, promoting proactive and strategic action.
- **Accessing resources and support:** Directs participants to available tools and expertise within Liberty Mutual, empowering them to tackle climate challenges effectively.
- **Personal learning journeys:** CAP encourages ongoing knowledge acquisition and champions climate action within each individual's area of expertise.

In 2024, more than 100 new participants from GRS leadership and functional teams took part in CAP. New content was developed by climate and risk experts in the Enterprise Risk functions in collaboration with GRS Sustainability. Sessions were tailored for each of the GRS Global Product Boards

(across property, casualty, credit, and financial lines) to engage product leaders across the business, working with them and identifying which climate-related risks were most relevant to and a priority for them, resulting in actionable steps to address those risks. We also converted the material into a series of online training modules to be launched across GRS in 2025.

CAP seeks to translate learning into concrete action by establishing ownership of climate knowledge, building on our strategy pillar, "Support and advocate for greater climate resiliency" (see page 17).

Risk Management

As a property and casualty insurer, risk management is at the core of our business. By focusing on both physical and transition risks, our organization identifies, manages and monitors ongoing and potential impacts on our business.

4A. Describe the organization's processes for identifying and assessing climate-related risks

As a property and casualty insurance company, our business involves identifying, evaluating and managing risk. We are committed to helping our policyholders understand and assess significant risks, including those related to climate change.

Liberty Mutual has twenty-seven Enterprise Risk Management (ERM) key risks grouped into seven categories. These risks are defined and organized in a way consistent with how we view and manage risks across the organization:

1. Capital/Economic
2. Market
3. Catastrophe (CAT) Underwriting
4. Attritional Underwriting
5. Credit
6. Operational
7. Talent

Climate change is a cross-cutting risk impacting different areas of an organization's risk profile. As such, climate-related risks are considered in terms of how they may manifest within and across Liberty's risk categories rather than being pulled out as a separate and standalone risk.

While climate-related physical and transition risks may affect multiple of these categories and key risks, CAT Underwriting — specifically covering natural catastrophes — presents the most significant potential for severe realized financial loss within a calendar year.

In assessing how climate-related risks affect the seven key risk categories, Liberty Mutual is aligned with the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD) and considers physical and transition risks as key drivers of financial impact for climate-related risks. In addition, given the potential financial impacts for property and casualty insurers, we view climate-related litigation, which the TCFD considers a source of transition risk, as a separate driver.

Table 3: Climate-related risk definitions and examples

Physical	Transition	Litigation
Physical risks resulting from climate change can be event-driven (acute) or longer-term shifts (chronic) in climate patterns	Transitioning to a lower carbon economy may entail policy and legal, technological and market changes to address mitigation and adaptation requirements related to climate change	Claims, lawsuits, or other legal disputes that may arise from or relate to climate change
Examples	**Examples**	**Examples**
• Acute: Increased severity of extreme weather events such as hurricanes or floods • Chronic: Long-term shifts like sea level rise or chronic temperature changes	• Policy: Litigation risk, policies related to carbon pricing or energy efficiency • Technology: Emerging technologies like renewable energy, battery storage and carbon capture • Market changes: shifts in supply chain and demand for certain commodities, products and services	• A party's alleged contribution to climate change • A party's alleged failure to prepare for, respond, or adapt to physical, legal, economic, or social consequences of climate change • Laws, regulations, and legal duties related to climate change

Updating climate scenario analysis

Our approach to climate-related scenario analysis is described in the Strategy section (see page 9). As part of this, we regularly update our climate scenario framework to reflect emerging insights and risks.

In 2023, we updated our climate scenario framework to include four of the seven scenarios published by Network for Greening the Financial System (NGFS) including Net Zero 2050, Delayed Transition, Fragmented World and Nationally Determined Contributions (NDCs). We've chosen to concentrate on these four scenarios due to their diverse transition narratives and impacts, offering realistic routes for an orderly or disorderly shift to a low-carbon economy, and illustrating potential outcomes if global climate goals are not achieved.

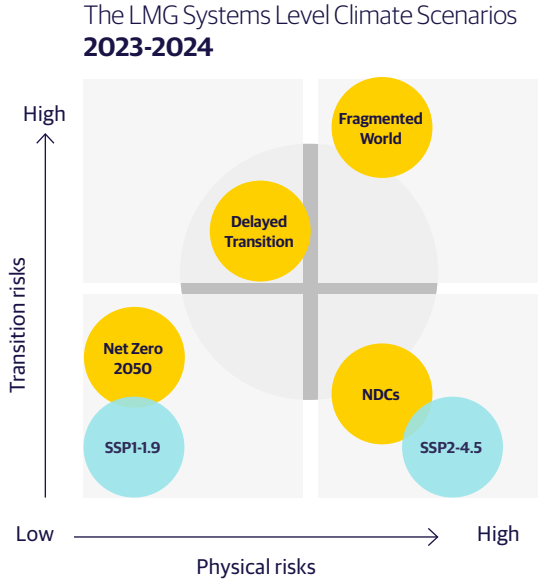
Our analysis focuses on systems-level results from two "stress scenarios" that reflect policy temperature ambitions below 2°C: Delayed Transition and Net Zero 2050. The Delayed Transition scenario depicts the impacts of minimal global coordination and delayed climate ambition, while the Net Zero 2050 scenario reflects a pathway developed through ambitious and coordinated climate policies and targets.

We continue using our insights from our 2023 analysis as the NGFS scenarios did not change from v4.0 to v5.0. We used the NGFS updates (v5.0) in physical risk modeling (see page 28).

Figure 2. Liberty Mutual Climate Scenario Framework

High Transition Risk	High Transition & Policy Risk	High Transition & High Physical Risk	High Physical Risk
Policy Temperature Ambition: 1.4°C	**Policy Temperature Ambition:** 1.6°C	**Policy Temperature Ambition:** 2.3°C	**Policy Temperature Ambition:** 2.6°C
Net Zero 2050	**Delayed Transition**	**Fragmented World**	**Nationally Determined Contributions (NDCs)**
Emissions reach zero around 2050, giving at least a 50% chance of limiting global warming to below 1.5°C by 2100. Assumes **ambitious climate policies are introduced immediately and high technological innovation**. Carbon dioxide removal (CDR) is used but kept to the minimum possible.	Transition and physical risks are higher than in the Net Zero 2050 scenario. Assumes global emissions do not decrease until 2030. Strong policies are then needed to limit warming to below 2°C. **Policy action is not introduced until 2030**, and the level of action differs across countries and regions based on currently implemented policies. CDR is assumed to be very low.	Assumes delayed and divergent climate policy ambition globally, leading to **elevated transition risks** in some countries and **high physical risk** everywhere due to the overall ineffectiveness of the transition. Countries without net zero targets **follow current policies**, while other countries achieve theirs partially (80% of target).	Assumes that only currently implemented policies are preserved. Emissions continue to increase until 2080, leading to about ~2.5 – 3°C of warming. Assumes **moderate to severe physical risks, lower transition risk**.
SSP1-1.9	**RCP-SSP Mapping to NGFS Scenarios**		**SSP2-4.5**
A very low emission scenario, CO_2 emissions peak around 2050, following a decline that becomes negative in 2100. Global average surface temperature increase of 1.0° to 1.8°C by 2100, with a best estimate of 1.4°C.	SSP1-1.9 Maps to the Net Zero scenario temperature ambition SSP2-4.5 Maps to the NDCs scenario temperature ambition		An intermediate emission scenario, CO_2 emissions continue around current levels until 2050, then decrease but do not reach net zero by 2100. Global average surface temperature increase of 2.1° to 3.5°C by 2100, with a best estimate of 2.7°C.

Sources: Scenario framework based on the NGFS 4th scenario vintage and IPCC 6th Assessment.



Note: NFGS Framework used as foundation. Graphics for illustrative purposes only

Approach to identifying and assessing physical risk

Identifying and assessing extreme physical risks are core functions for Liberty Mutual. We take a data-driven approach and ensure our data is aligned with the latest and most robust research available. We follow a four-pillar approach to enable continuous progress toward capturing and quantifying climate risk to our organization:

1. **Prioritize by science and materiality.**
   We assess risks from climate change using a science-based prioritization framework that evaluates the material impacts on our insurance portfolio, focusing on the most significant threats to the business. Liberty Mutual's high-priority property risks are hurricanes, floods and wildfires (See Advancing research on high-priority perils on page 25). Beyond these, we monitor science on other risks, such as extreme temperatures, tornadoes, hail, extratropical storms and winter storms, to prepare to act should their risk and impact change.

2. **Invest in data quality to differentiate from peers**.
   Assessing the characteristics of our underlying exposure data often requires substantial investments. High-quality location information is critical to catastrophe management, particularly for high-resolution perils like floods experiencing climate-related risk changes. We continually invest in upgrading our understanding of hazards affecting our business.

3. **Focus on sub-perils that drive loss.**
   Since not all hazard changes lead to material loss impacts, we focus our analysis on the specific components of hazards that drive the losses. For example, although all hurricanes have the potential to be destructive, in the US, losses have historically been driven by major (Category 3+) storms. Therefore, stress testing and frequency adjustments can focus on this smaller subset of storms with the greatest financial impact.

   This targeted approach helps us:

   - Identify which components of climate hazards cause the most damage.
   - Determine where more research on risk drivers is needed.
   - Prioritize perils for specific action.

4. **Develop actionable metrics for business.**
   We convert climate risk analysis into actionable business strategies. Insights gained from understanding physical risks are used to update the risk tools we rely on to make business decisions. This helps ensure our climate work directly shapes our overall approach to risk management.

   We continue to review the impact of climate change on near-term physical risk within our catastrophe model validation framework and implement any findings across our business through:

   - The Liberty View of Risk Framework.
   - Our standardized catastrophe modeling process.
   - Financial reporting, updated at least twice yearly.

Chronic physical risk

In 2024, Corporate and GRS business functions collaborated to evaluate emerging risks linked to chronic physical hazards, beginning with a preliminary exercise focused on enhancing our understanding of the potential implications of an extreme heatwave scenario. One of those risks is the increase in global temperatures, a clear and immediate physical risk associated with climate change, that is expected to result in more frequent and severe heat wave events.

This scenario examines property risks while considering other types of insurance, such as workers' compensation and liability. Plausible physical scenarios paired with qualitative descriptions of how events might unfold allow us to evaluate whether policy terms adequately address these risks, analyze the potential impact of similar past events or comparable situations and assess how risks might accumulate across different policies.

In addition to direct impacts, overlaying chronic physical risks on acute hazards allows us to assess sensitivity to slowly varying hazards. Chronic and acute physical risks are not independent, as chronic changes affect the frequency and severity of acute events. For example, temperature sensitivity tests feed into the wildfire accumulation tests, sea level rise influences the frequency and severity of storm surges and sunny day flooding, and changes in rainfall increase flash flooding or affect wildfire seasonality.

Physical risks in our investments

In assessing climate-related physical risks within Liberty Mutual's investment portfolio, we are working to combine our in-house natural catastrophe modeling expertise with our unique investment perspective and asset management goals.

This approach leverages our physical risk modeling expertise from the insurance side of the business to pilot guidance datasets encompassing Liberty Mutual's key perils which can be used to augment traditional data sources that are used within investment portfolio management. By incorporating a more comprehensive understanding of physical risks across our investment portfolio, we have taken an initial step toward ensuring that our investment portfolio is well-positioned for future physical climate impacts.

Advancing research on high-priority perils

We continue to invest in research on high-priority perils, to ensure that the best available data inform our risk management tools. In 2024, we advanced new insights on hurricane frequency, flood and wildfire risk to shape our current models.

Hurricane frequency

We continued to partner with Colorado State University to reevaluate our perspective on hurricane frequency in the US. In addition to incorporating last century's climate variability into our catastrophe model, this year we conducted new and expanded reviews of international tropical cyclones, such as the Australian tropical cyclone, Caribbean hurricane and Japan typhoon. This includes assessing the quality of the historical record, evaluating available scientific literature and identifying gaps in the treatment of sub-perils to prioritize for further review.

Flood risk

Our analysis of peer-reviewed literature revealed changing flood risk across Europe in observed data and climate model projections. As a result, we adjusted our model using frequency adjustment factors that are now integrated into the Liberty View of Risk for Central European floods. In 2024 we completed exercises on flood risk accumulation in Canada and Malaysia and refreshed our view of US hurricane precipitation.

We have identified international floods as a fast-emerging hazard, and one of the most material climate hazards in our international book of business. We have prioritized this peril for further research in 2025, supported by a new flood modeling partnership with both current and forward-looking data products.

Wildfire risk

We continue to enhance our wildfire risk tools to assess exposure in areas prone to catastrophic-scale wildfires, particularly those driven by wind. By incorporating meteorological factors like wind and climate-driven vegetation changes, we have enhanced our capabilities in managing portfolio-scale wind-driven wildfire risk. New sensitivity tests capturing marginal risk to temperature changes identify expanded risk accumulations for wind-driven wildfire to US residential and commercial portfolios. In addition to supporting portfolio management and strategy, this research highlights public policy risk in state markets that may experience rapid change with small temperature changes, as well as opportunities to improve casualty underwriting and risk engineering strategies.

Approach to identifying and assessing transition risk

Liberty Mutual's approach to identifying and assessing climate-related transition risks combines systems and a portfolio-level approach.

Systems-level approach

We assess macroeconomic, policy and legal, reputational, and technological risks (with regional and sector insights) over 5, 5-15-, and 15-plus-year time horizons, recognizing that quantitative approaches do not yield meaningful insights between 30- and 50-year time horizons. In 2023, we updated our enterprise climate scenario framework to reflect the updated NGFS scenarios, as referenced in the Strategy section (see page 10).

Portfolio-level approach

Underwriting

In 2024, we designed and delivered a new approach to supplement our top-down systems-level transition risk assessment which focused on country-level impacts for our underwriting portfolio.

We ran several country-level pilots to produce detailed industry sector exposure data mappings to climate-relevant sectors. Using industry classification codes, we grouped sectors based on Climate Transition Exposures, created Climate Policy Relevant Sectors (CPRS) and assigned NGFS variables for scenario analysis. We used two NGFS Scenarios, Nationally Determined Contributions and Net Zero 2050, and mapped transition risks to Climate Policy Relevant Sectors. This approach allowed us to identify scenario impacts across different sectors, highlight risk accumulations and detect business growth opportunities.

The methodology effectively scans for when some component of the energy transition is already underway. For example, suppose a technology scales up or down consistently across multiple scenarios. It suggests that an economic transition is happening and that the technology in question is relatively insensitive to policy risk. However, substantial volatility between scenarios suggests a reliance on policy or technology assumptions.

Paired with scenario analysis, we identified combinations of geographies and sectors that are expected to grow or shrink, presenting business opportunities or risks to future revenue. In addition, we were able to identify segments where we may be either overexposed to risk or underexposed to growth sectors, allowing us to protect against excessive risky accumulations and strategically prepare to scale up in growth areas through training exercises, relationship building in sectors identified as an opportunity, or investing in tools to improve underwriting capabilities.

The role of risk engineering in the energy transition Q&A with Ian Robb and Arthur Delargy, Global Risk Engineering.

Q: Risk engineering is unique to the insurance industry. What is risk engineering and what role do you play in the insurance process?

Risk engineering is a crucial function within Liberty that is integral to our risk assessment process. We are a highly specialized team of engineers with broad industry and sector knowledge that provides expertise to underwriting, actuarial and exposure management teams. Our involvement in the insurance process spans the entire risk assessment process, from initial evaluation to ongoing operations. We work closely with our underwriters in assessing, managing, and mitigating risk in projects and recommend risk mitigation measures to enable underwriting while minimizing exposure.

Q: How does this process help customers?

We help our customers by identifying and assessing project risk quality and providing advice on mitigating and managing risks. By engaging early in the insurance process, we can help identify potential risks and suggest mitigation strategies before a project begins. This helps our policyholders avoid situations that could delay work and ensure a successful, long-term outcome. For example, when evaluating construction projects, we help identify where information is missing or incomplete, enabling clients to develop necessary materials, such as constructability reports and modularization studies, and addressing key considerations like warranties and guarantees for new equipment. For operational risks, we attend site surveys, providing our clients with guidance on industry best practices and making recommendations to improve risk quality. We also run loss prevention seminars tailored to client occupancy and needs, focusing on lessons learned from industry losses.

At Liberty, we take the time to get to know our clients' businesses, needs, strategic priorities and challenges. We focus on their desired results to deliver a risk management program that helps their businesses achieve continuous improvement.

Q: What makes Liberty's risk engineering program so successful?

We use best-in-class risk assessment tools and loss databases as well as proven and emerging technologies for risk mitigation. Our data-driven approach leverages detailed historical data on past incidents, claims and key contributors to losses. Our loss databases are especially valuable in situations where operational performance or loss history is limited, helping bridge the gap between uncertainty and insurability. For example, loss data and risk mitigation measures for the chlor-alkali industry can be extrapolated for green hydrogen production.

Q: One focus area of our climate strategy is supporting the adoption of renewable and decarbonization technologies. Could you tell us what is the role of the team in this activity?

Our specialized team works on risk engineering processes in different technologies across the energy spectrum. In traditional oil, gas and power generation, we work with clients upgrading assets to reduce GHG emissions through energy efficiency initiatives, flare gas recovery, electrification, enhanced leak detection and data analytics to optimize machinery health and asset reliability. We provide insights into these technologies to help identify risks, optimize asset reliability and reduce operational inefficiencies. We have also been underwriting risks for energy transition technologies, such as battery energy storage systems (BESS), wind and solar for several years. Risk profiles for these technologies are continually evaluated, even for the more established renewable and decarbonization technologies, due to the potential for unexpected losses.

Proprietary tools, industry frameworks and specialized knowledge enable us to ensure that risks are properly managed as new technologies continue to evolve and scale. We build our expertise through continuing education and upskilling. We also collaborate with insurance industry associations such as the Geneva Association, to develop industry-wide frameworks to evaluate the insurability of technologies.

US power grid vulnerability and the impacts of climate change risks

The impacts of climate-related physical, transition, and litigation risks continue to affect the US power grid, with the effects amplified as climate change progresses. Grid stability is very important for business as power outages can lead to direct losses, business interruption and property damage. The damage may act as a loss multiplier by aggravating the community-scale impacts of a natural disaster or by contributing to supply chain disruptions.

Liberty Mutual previously assessed the influence of power grid vulnerability on the organization's operations and potential impact pathways to underwriting portfolios in 2021. To enhance our understanding of this emerging risk, particularly in relation to our portfolios and policy holders, we conducted further quantitative research on power grid vulnerability in 2024. We examined the influence of climate-related variables, such as extreme cold, on outage severity and frequency in conjunction with aging infrastructure.

The insights generated from this research have produced power grid vulnerability maps, which will enable us to identify key areas for catastrophe modeling, stress testing and casualty risk. We are currently exploring adjusting loss potential in areas where power outages are known to lead to increased damage, as current models poorly capture this hazard. Additionally, this research will inform our understanding of emerging climate-related litigation risks associated with critical infrastructure, as well as highlight opportunities where grid investments would be particularly beneficial.

Investments

In 2021, we conducted a climate scenario analysis which found that climate transition risk has low impacts on Liberty Mutual Investments' (LMI) portfolio holdings over the near term, and it increases moderately over a 15-year time horizon. Notably, these results assume that there is no active management of the portfolio over a 15-year period. LMI actively manages our portfolio and seeks to reposition it over time to address evolving climate risks.

Since our seminal portfolio-level analysis in 2021, we have tailored the analysis to jurisdiction-specific portfolio-level climate stress tests to comply with local regulatory reporting requirements. Our approach computes climate stress profit and loss annually based on updated NGFS scenarios. We utilize an external vendor's climate stress models and data in this exercise, covering public corporate bonds and equity, which focuses on scenario-conditioned carbon price to imply transition risk. We process illiquid investments' climate risk by proxying to public equivalents.

These more granular portfolio-level analyses have informed additional insights for identifying and assessing climate-related transition risks associated with our portfolio holdings. We also continue to research ways in which we can advance our climate risk analytics capabilities.

Understanding climate-related litigation risks

In 2024, we continued to share updates on climate-related litigation developments, along with our framework for addressing climate-related litigation through our risk management and sustainability governance structures.

Given the rapid increase in climate litigation, raising awareness about external developments associated with it and advocating for prioritization of work on climate-related liability is important. That is why climate-related litigation is a featured topic in our Climate Activation Program. In sessions with business leaders, we analyzed trends, drivers, types of litigation risk and potential impact on our businesses.

Using the same methodology described in our portfolio-level approach on page 25, we are developing portfolio exposure methods to identify policies with higher potential exposure to litigation risk. By leveraging the Climate Policy Relevant Sectors framework, we are extending the original transition risk assessment methodology to include climate litigation risk. This will feed into potential cases in scenario development.

4B. Describe the organization's processes for managing climate-related risks

We believe that insurance is a force for good and serves a dual role as both a mechanism for risk transfer and risk signaling. We understand the dynamic environment and are risk-aware rather than risk-averse. This belief shapes the way we proactively manage risks by using catastrophe models, integrating risk management into our business and monitoring emerging risks.

Insights from catastrophe models

We conduct assessments to evaluate the vulnerability of our portfolios, geographic locations, business divisions and product segments to natural disasters like hurricanes, earthquakes and severe weather phenomena. To manage the potential adverse impact of catastrophes, whether natural or man-made, on our underwriting and financial results, we employ a strategy that incorporates diverse modeling techniques, stringent underwriting controls and strategic reinsurance placements. This involves analysis of historical weather data and an assessment of the vulnerability of our assets and operations to such events.

Our primary tool for assessing the potential financial impact of natural catastrophe-related risks is catastrophe modeling. We utilize the latest catastrophe loss simulation models from reputable third-party specialists like Verisk Extreme Event Solutions and Moody's Risk Management Solutions, in addition to internally developed modeling and analysis tools, supplementing them regularly with up-to-date scientific information on severe weather perils and our own loss experience.

For the acute risks that are captured in catastrophe models, we apply a flexible toolbox of strategies depending on the level of confidence in forward-looking impacts on the peril. Where confidence is highest, such as sea level rise, we run forward-looking scenarios. For example, a project examining the effects of sea level rise on storm surge in our portfolios used NOAA's Intermediate sea level scenario to project coastal flood risk out to 2035 and 2050. However, for many of our hazards, uncertainty is higher within scenarios or time frames prior to 2050. In those cases, such as hurricane frequency, we leverage alternative approaches, such as reverse stress testing, that allow us to identify and monitor a wide range of impacts to our book of business, rather than relying on a single point estimate or range from a scenario. In between these two extremes, sensitivity testing by systematically varying a climate-relevant peril like temperature or rainfall can help identify which segments of the Liberty Mutual portfolio may be exposed to marginal changes in risk – meaning, which is the next risk to accumulate.

Catastrophe loss simulation models play a crucial role in our underwriting process, aiding in the development of risk selection guidelines and contributing to the establishment of pricing differentials for individual risks and program rate structures. We integrate the output from these models into our ongoing risk management efforts, ensuring an effective management approach for our natural catastrophe exposure portfolio.

At Liberty Mutual, we establish both gross and net tolerances for natural catastrophe risk, managing both direct underwriting exposure and group-wide retention of risk. Occurrence tolerances help manage exposure concentration related to a single large event, while aggregate tolerances manage the potential exposure to an accumulation of losses from various events throughout the year.

Utilizing measures such as Probable Maximum Loss (PML) and Conditional Tail Expectation (CTE), which are Value-at-Risk (VaR) and Tail Value-at-Risk (TVaR) measures, respectively, we assess and model our natural catastrophe exposures. These assessments are conducted semi-annually, with modeled losses

The use and limitations of NFGS scenarios for assessing and managing physical risks

Liberty Mutual uses the Network for Greening the Financial System (NFGS) scenarios as a key tool to explore forward-looking transition risks, as shown in this report. However, the models in these scenarios traditionally do not represent physical risk with enough specificity or severity for the physical hazards that are most important to insurance markets. Liberty Mutual supplements NGFS with various stress and sensitivity tests of physical risk using catastrophe models and in-house hazard accumulation tools.

NGFS v5.0 includes a substantial update to the underlying modeling methodology for assessing the economic impacts of physical risk, which validates our view that physical risk has historically been substantially underestimated in prior versions. In addition to the impacts associated with mean temperature, the NFGS v.5.0 includes temperature variability, total annual rainfall, the number of wet days and extreme precipitation[3].

While the physical impacts of climate change have substantially improved in the most recent NGFS update, the insurance sector is most interested in perils that are either in early development in integrated assessment modeling or are still completely excluded. Therefore, we will continue to supplement the view of physical risk from the various low transition risk scenarios with sensitivity testing in catastrophe models.

[3] Kotz, M., Levermann, A. & Wenz, L. The economic commitment of climate change. Nature 628, 551-557 (2024).

evaluated relative to respective tolerances. We monitor and evaluate the limits for specific exposures, such as regional-level exposures, and, when necessary, develop mitigation plans to align with tolerance levels and address adverse trends. As part of our ERM program, we can conduct stress testing to facilitate understanding of the capital or liquidity impacts of various deterministic stress scenarios or combinations thereof, ensuring that our current portfolio adheres to established tolerances.

Managing the accumulation of climate-sensitive risks

Physical risk

Frequency adjustments are often used in global climate regulatory exercises. These adjustments modify how often certain climate-related events (like floods or storms) are expected to occur over time, helping risk managers plan. However, many climate-related physical hazards that directly impact the insurance industry have very large uncertainty bounds even in the medium-term, limiting the utility of single-frequency adjustments. Liberty Mutual manages this uncertainty by creatively applying accumulation exercises driven by sensitivity tests on climate-related hazards.

For example, in 2024, we greatly expanded our assessment of wind-driven wildfires to include temperature-driven climate impacts. Wind-driven fires account for a small portion of the burn area in the western US. Still, they are responsible for the vast majority of the damage, including several of the most destructive fires in recent years – notably, the Tubbs, Camp, Marshall, Lahaina and LA fires.

The Marshall Fire in Colorado was an example of a wind-driven event that occurred under climate conditions that may have been more unusual in the past. High winds in the affected area are not uncommon, but it is unusual not to have snow cover on the ground in Colorado in December. To explore the sensitivity of wind-driven fire to temperature changes, we built onto our hazard product, combining susceptible vegetation with high wind susceptibility. We tested how often fire weather changes during high wind events with increasing temperatures in 1°C, 2°C and 3°C steps.

The analysis of wind-driven wildfires highlights which areas are susceptible to climate-driven risk today and produces marginal risk accumulations within our own book of business to identify new communities at risk in the future. This information helps to inform portfolio planning so we can grow strategically and protect against surprises. Furthermore, comparing changes in state-level risk trajectories helps us understand where state insurance markets may come under wildfire-related pressure in the future.

Transition risk

Liberty Mutual is expanding the strategy used for physical risk accumulation management to transition risk through pilot portfolio exercises. Identifying sectors exposed to transition risk or opportunity and calculating accumulations helps us track climate exposure in underwriting. In addition, estimating market shares can flag both risk and growth opportunities.

Managing risk through integrating climate-related issues in the underwriting process

Insurance protects and prepares for the unexpected through keen risk awareness and mitigation. In our commercial business, we've been entrusted to insure the most complex assets globally and the most influential enterprises sustaining local communities. We are embedding sustainability, including climate issues, into our decision-making processes and underwriting strategy to ensure we remain a stable, adaptive insurer, always risk-aware and looking ahead. Being proactive will keep us ahead of the evolving risk landscape, support the development of a robust portfolio with improved business performance, and better position us to help our customers de-risk their business and build resilience.

Managing risks in our investments

Our foremost responsibility is ensuring liquidity and solvency, allowing Liberty Mutual to honor claims reliably and consistently. We manage financial reserves with discipline, rigorously assessing risk and maintaining a diversified portfolio that seeks to deliver compelling, risk-adjusted returns and expand underwriting capacity over time. By adhering to these principles, we create a stable foundation that supports long-term resilience and drives growth.

Beyond this essential role, we proactively evaluate how our investments intersect with broader challenges. For example, we consider how emerging climate-related risks may influence our portfolio and the broader markets. Integrating forward-looking risk assessments into our decision-making allows us to balance fiduciary responsibilities with a commitment to long-term sustainability and impact.

4C. Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management

Through Liberty Mutual's Enterprise Risk Management (ERM) framework, we consider the impact of climate-related risk at both the enterprise level and within our businesses.

Liberty Mutual's ERM approach emphasizes the identification and quantification of material exposures, effective communication and management of these exposures throughout the company, and the development and implementation of strategies to mitigate identified risks when deemed necessary.

Strong governance underpins the ERM process. The ERM Executive Committee, chaired by the CEO and comprising leaders responsible for businesses and corporate functions, holds responsibility for overseeing the development of systems to aggregate, evaluate and manage group-wide exposures across the organization and provides guidance on the implementation of ERM.

The Board of Directors, through its Risk Committee, also oversees the ERM framework, ensuring adequate policies, controls, and practices are in place to identify, measure, manage, and mitigate critical risks, including climate-related risks.

Senior leaders responsible for sustainability, impact and risk management within the businesses are represented on the Climate Council and the Sustainability Executive Committee. Their participation helps integrate climate-related risks into business strategies.

The Corporate ERM function, led by the Chief Risk Officer, is responsible for group-wide ERM reporting, conducting stress testing and scenario analysis, facilitating the ERM committees and coordinating ERM initiatives across the businesses.

A more detailed overview of Liberty Mutual's ERM function is included in the Governance section (see page 5).

Metrics & Targets

Liberty Mutual is committed to being open and accountable about how we evaluate and manage climate-related risks and opportunities. We use a mix of financial and non-financial metrics to assess our underwriting, investments, and operations and disclosures are guided by established frameworks like TCFD and SASB (specific to the insurance industry), as well as regulatory requirements and industry comparisons.

5A. Describe metrics used by the organization to assess climate-related risks and opportunities

At Liberty Mutual, we understand the importance of clear metrics and targets in evaluating and advancing our climate strategy and supporting the energy transition. These tools provide a foundation for tracking progress, identifying opportunities and managing risks as we navigate the challenges of a changing climate. We regularly update our climate metrics, aligning them with industry standards, new regulations, strategic objectives and best practices while maintaining our annual TCFD data reporting.

Energy transition investments

In 2024, Liberty Mutual Investments (LMI) managed approximately $101 billion in capital across global fixed-income and private investments, including asset classes such as private equity, venture capital, real estate and private credit. The asset allocation framework considers several factors, including capital growth, sufficient liquidity and risk minimization.

For over a decade, LMI has invested in the global transition to a low-carbon economy. In addition to over $1.5 billion invested in traditional renewable energy generation, we are increasingly focused on investing in emerging energy transition solutions and have now invested approximately $1 billion in emerging energy transition opportunities and climate technology, as shown in Table 4.

Table 4
Energy Transition Investments (in $ millions)

	2024	2023	2022
Total investments in renewable energy[4]	1,506	1,231	1,274
Total investments in energy transition solutions[5]	1,009	810	388

[4] In 2024, fixed maturities and public equities of US$443 million, LP, LLC and other equity method investments of US$789 million and unfunded commitments of US$275 million were included. In 2023, fixed maturities and public equities of US$383 million, LP, LLC and other equity method investments of US$583 million and unfunded commitments of US$265 million were included. In 2022, fixed maturities and public equities of US$461 million, LP, LLC and other equity method investments of US$446 million and unfunded commitments of US$368 million were included.

[5] Includes unfunded commitments of US$506 million (2024), US$358 million (2023), US$247 million (2022).

Environmental risk exposure metrics

Liberty Mutual employs comprehensive environmental risk exposure metrics. These metrics are crucial to understanding the exposure to potential climate-related losses. In evaluating our exposure to climate risk, we closely monitor changes in the frequency and severity of weather-related natural disasters and shifts in our insured portfolio to understand the company's climate risk. These factors along with a range of assumptions beyond those embedded in standard models (using Liberty Mutual's historical data, third party tools, new scientific research and technologies and input from expert consultants) enables us to build a custom modeled view of loss – the Liberty View of Risk.

We regularly monitor catastrophe exposure through metrics such as Probable Maximum Loss (PML). This metric, among others, enables us to assess vulnerability and exposure to climate-related risks, allowing for proactive refinement of risk strategies.

Table 5 provides the probabilities that estimated catastrophe losses from a single hurricane or earthquake event, occurring in a one-year timeframe, will equal or exceed the indicated loss amounts after reinsurance and net of tax based on the Liberty View of Risk using proprietary and third-party catastrophe models as of December 31, 2024. Estimated losses comprise claims and allocated claim adjustment expenses (but excluded unallocated claim adjustment expenses), net of reinsurance and reinstatement premiums.

Table 5

Probabilities that estimated catastrophe losses from a single hurricane or earthquake event, occurring in a one-year timeframe, will equal or exceed the indicated loss amounts after reinsurance and net of tax based on the company's view of risk using proprietary and third-party CAT model as of December 31, 2024.

Likelihood of Exceedance (Occurrence)[6]	Dollars (in millions) North America		Percentage of total policyholders equity equity as of 12/31/2024 North America[7]	
	Hurricane Net	Earthquake Net	Hurricane Net	Earthquake Net
1 in 50 Year PML (2.0%)	1,062	748	3.3%	2.3%
1 in 100 Year PML (1.0%)	1,154	985	3.5%	3.0%
1 in 250 Year PML (0.4%)	1,443	1,312	4.4%	4.0%

[6] The probabilities in the table represent the likelihood of losses from a single event equaling or exceeding the indicated loss amount in a one-year timeframe. The 1 in 100-year PML refers to a 1% chance of a loss equaling or exceeding the indicated amount. Also, the modeled loss represents the single event occurrence perspective and does not reflect the aggregation of multiple events that can occur in a single year timeframe.

[7] The percentage of total policyholders' equity is calculated by dividing the indicated loss amounts by the total policyholders' equity less unrealized gains and losses on certain investments in debt securities, net of tax and related deferred acquisition costs, as December 31, 2024.

The data in Tables 6-8 refers to the actual or estimated losses from multiple events from 2022-2024. Table 6 shows the estimated ultimate losses from natural disasters evaluated as of December 31, 2024. Table 7 shows the estimated ultimate losses as initially reported after 12 months for the individual accident years. Additionally, subsequent developments which represent the difference between the initial reported loss and the current estimated ultimate is displayed. Table 8 provides a breakdown of the estimated ultimate catastrophe losses by major geographic regions.

Liberty Mutual defines a catastrophe as a major event—whether it's a natural disaster, civil unrest, or a terror-related event—that results in estimated losses of more than $25 million. This includes both the costs of the losses themselves, and the expenses related to adjusting the claims, after accounting for reinsurance and before taxes aggregated across the business for both US and international events. The losses also include the impact of accelerated earned catastrophe premiums and earned reinstatement premiums where applicable.

Table 6

Estimated Ultimate Catastrophe Losses, Net of Reinsurance and inclusive of reinstatement premium, by Accident Year evaluated as of December 31, 2024 (in $ millions)

Peril Category	Accident Year 2024	Accident Year 2023	Accident Year 2022
Tornado, Hail and Wind	2,370	4,050	1,655
Winter Storm	366	177	690
Tropical Storms/Hurricanes	837	99	403
Floods	171	72	103
Wildfires	146	133	8
Earthquake	-	126	-
Other[8]	-	30	737
Net Catastrophe Losses[9]	**3,890**	**4,688**	**3,585**

Table 7

Estimated Ultimate Catastrophe Losses, Net of Reinsurance and inclusive of reinstatement premium, by Accident Year evaluated as initially reported after 12 months (in $ millions)

Peril Category	Accident Year 2024	Accident Year 2023	Accident Year 2022
Net Catastrophe losses as originally reported after 12 months	3,890	4,685	3,552
Development in subsequent calendar years	-	3	33

Table 8

Estimated Ultimate Catastrophe Losses by Region, Net of Reinsurance and inclusive of reinstatement premium, by Accident Year evaluated as of December 31, 2024 (in $ millions)

Region	Accident Year 2024	Accident Year 2023	Accident Year 2022
North America	3,719	4,291	2,602
Europe	60	173	891
Latin America	38	-	-
Asia Pacific	-	68	103
Other[10]	74	156	(11)
Net Catastrophe Losses[11]	**3,890**	**4,688**	**3,585**

[8] Other category includes losses for Ukraine invasion in AY 2022 and Sudan Conflict in AY 2023.

[9] Net Catastrophe Losses include recoveries on the CAT aggregate cover in AY 2022.

[10] Other region includes losses related to the Sudan Conflict (AY 2023), Turkey/Syria earthquake (AY 2023) and United Arab Emirates floods (AY 2024). Ukraine invasion is included in the Europe region.

[11] Net Catastrophe Losses include recoveries on CAT aggregate covers in AY 2021 and AY 2022.

Catastrophe modeling continues to evolve, and available models reflect varying levels of maturity and sophistication. Because of this, we regularly evaluate the models and incorporate the latest scientific advances in the estimation of our natural catastrophe exposure.

Operational footprint

Liberty Mutual tracks and manages operational carbon footprint, focusing on improving efficiencies in areas such as real estate, fleet management, and business travel to reduce emissions, while also enhancing waste management practices.

Building operations

We continue to make our buildings more efficient by focusing on reducing energy consumption and optimizing our real estate portfolio.

Table 9
Energy Consumption

	2024	2023	2022
Electricity (MWh)	89,558	104,914	114,883[12]

Our Boston headquarters was awarded the First Place 2024 American Society of Heating, Refrigerating and Air Conditioning Engineers Technology Award in recognition of outstanding achievement in the design and operation of energy efficient buildings. Our Boston headquarters has also received Energy Star certifications.

Our London office has a certification of "Excellent" rating from BREEAM which also includes a life cycle assessment and green energy supply. It has an ISO 14001 demonstrating our dedication to reducing our environmental impact - helping us manage waste, conserve resources, and lower carbon emissions. The building also has ISO 50001 certification that ensures we are optimizing energy use throughout the building, lowering energy consumption, and making our operations more sustainable.

We have offices certified as Green Mark Platinum Buildings and are listed in the Green Mark Buildings Directory in Singapore.

In Australia we select high-efficiency buildings that have National Australian Built Environment Ratings System (NABERS) ratings for our operations.

In China and Malaysia, we lease buildings that are LEED certified.

In Hong Kong we lease a Green Building Council Platinum building.

Waste reduction and recycling[13]

We are taking action to lessen our environmental footprint by reducing waste generated across our operations. Specific actions include:

- Printing conservation: Through Liberty Mutual's Print$mart initiative (which captures printing activities both in-office and through remote work), total printed page volume in 2024 was 92% lower than 2012 levels. As a result, these efforts have equated to employees conserving over 23 million gallons of water, saving 27,588 trees, and reducing GHG emissions by over 3,200 metric tons.
- Furniture reuse: We donated over 225 short tons of office furniture, which had a fair market value of over $1.3 million to local social service agencies, nonprofits and schools.
- Landfill diversion: With most employees back in an office, our centralized waste programs in US-owned buildings have diverted significant waste from landfills. As employees are asked to sort waste into bins for recycling, compost and landfill bins, we're fostering a conscious disposal culture. In 2024, we diverted 112 metric tonnes of compost and 146 metric tonnes of mixed-recycling from our US-owned facilities as well as 137 metric tonnes of electronics and 2,665 metric tonnes of office paper from our global operations.

Fleet[14]

Around the world we work to ensure claims adjusters and other employees are mindful of their carbon emissions by using fuel efficient vehicles. For our US fleet our impact in 2024 (from 2023 levels) includes:

- 24% decrease in gallons consumed
- 27% reduction in CO2e emissions

[12] Previously reported electricity consumption of 126,027 was adjusted as a result of improved data availability.
[13] Data provided by third party vendor partner.
[14] Data provided by third party vendor partner.

5B. Describe Scope 1, Scope 2 and, if appropriate, Scope 3 Greenhouse Gas (GHG) emissions, and related risks

Greenhouse gases (GHG) stemming from the utilization of fossil fuels stand as the primary catalyst for climate change. Our ongoing commitment involves actively contributing to the reduction of our environmental footprint by diminishing our reliance on these GHG-emitting resources and meticulously monitoring our progress. At present, we systematically measure and disclose data on both Scope 1 and Scope 2 GHG emissions. Additionally, we track two categories of Scope 3 emissions, namely waste generated from operations (Category 5, pertaining to US owned and operated facilities) and emissions resulting from business travel (Category 6).

Table 10
Scope 1 and Scope 2 GHG Emissions[15]

Scope 1 CO2e emissions (MTCO2e)	
2024	22,717
2023	30,162
2022	29,236
Scope 2 CO2e emissions (MTCO2e) location based	
2024	30,641
2023	36,474
2022	40,530
Scope 2 CO2e emissions (MTCO2e) market based	
2024	24,128
2023	31,731
2022	36,791
Total Scope 1 & 2 CO2e emission location based (MTCO2e)	
2024	53,358
2023	66,636
2022	69,766
Total Scope 1 & 2 CO2e emission market based (MTCO2e)	
2024	46,845
2023	61,893
2022	66,027

Table 11
Scope 3 GHG Emissions

Scope 3, Category 5 emissions (MTCO2e)[16]	
2024	675
2023	402
2022	399
Scope 3, Category 6 emissions (MTCO2e)[17]	
2024	42,442
2023	45,838
2022	29,120
Total Scope 3 CO2e emissions (MTCO2e)	
2024	43,117
2023	46,240
2022	29,519

[15] We have engaged Ernst & Young LLP, an independent third party, to provide limited assurance over our Scope 1 and Scope 2 LBM and MBM metrics for fiscal year 2024 under the attestation standards of the American Institute of Certified Public Accountants. See the Independent Accountants' Review Report for more information.

[16] Scope 3, Category 5 – Emissions from Waste Generated in Operations for U.S. owned and operated facilities.

[17] Based on data availability from third party providers. Reported Category 6 emissions represents emissions for over 85% of the global employee population.

5C. Describe targets used by the organization to manage climate-related risks and opportunities and performance against targets

In 2024, we achieved a 20% reduction from 2023 levels, resulting in a cumulative 56% reduction from the 2019 baseline, achieving the 50% reduction in Scope 1 and 2 emissions target ahead of schedule. We will continue to contribute towards a low-carbon future as we aim to further reduce Scope 1 and 2 emissions by 65% from 2019 levels by 2030.[18]

To fulfill our GHG reduction objectives, we have and continue to actively reduce our operational carbon footprint through the reduced consumption of greenhouse gas emitting resources. This includes enhancing operational efficiencies, identifying renewable energy opportunities across our real estate portfolio and leveraging key learnings from 2020 to increase emission reduction rates during the return-to-office transition. Furthermore, we have adapted and reimagined our offices to support the evolving workplace dynamics to support our employees globally as they connect and collaborate in hybrid, in-office or work from home environments. This adaptability plays a crucial role in our overall reduction of GHG emissions. Our commitment to sustainability remains steadfast as we work towards a resilient and environmentally responsible future.

[18] For a comprehensive review of the Company's GHG emission, please refer to Liberty Mutual's Greenhouse Gas Emissions Disclosure Policy.

Contact us

For questions or comments regarding this report, please contact:

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Except where noted, the information covered in this report highlights our performance and initiatives in fiscal year 2024.

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