

2022 Task Force on Climate-Related Financial Disclosures Report



Liberty Mutual.
INSURANCE

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Introduction

This report follows the recommendations provided by the Task Force on Climate-Related Financial Disclosures (TCFD) and is structured around four thematic areas that represent core elements of how organizations operate: governance, strategy, risk management, and metrics and targets.¹ It complements our 2022 Sustainability Review, 2022 Global Reporting Initiative (GRI) Index, 2022 Sustainability Accounting Standards Board (SASB) Report and additional disclosures available on our corporate website.

Welcome letter

We are pleased to present our third Task Force on Climate-Related Financial Disclosures (TCFD) report, which provides insight into our climate-related activities over the past year. Our climate journey was informed by strategic developments that included:

- Our commercial business establishing a dedicated Global Energy & Transition Risk team to support the adoption of low-carbon technologies
- The success of our innovative WeatherReady application launched by our retail business, which empowers our customers to build weather resiliency by recommending science-backed solutions, service providers and tools to track progress
- The launch of our Climate Transition Center, which serves as a platform to share our research on climate models and scenario analysis, and to support our advocacy efforts for increased resiliency and pragmatic climate policy
- The passing of the Inflation Reduction Act, which offers direct incentives for the development and adoption of emerging technologies, taking a different policy approach to the energy transition than other jurisdictions
- The adoption of an [environmental policy](#) based on the five aspirations that Liberty Mutual's Climate Council set in 2020 and that continue to influence our enterprise-level climate transition strategy

We further demonstrated our commitment to supporting the energy transition by focusing on our strength — identifying and underwriting risk. In 2022, we collaborated with Marsh to provide a first-of-its-kind insurance facility for the construction and start-up phases of hydrogen projects globally.² We sponsored the Hydrogen Transition Summit at the 2022 United Nations Climate Change Conference (COP27) in Egypt, to help advance a global discussion on hydrogen solutions and enabling technology for the hydrogen economy. More recently, we were honored with the 2023 E&S Insurer Innovation Award³ for our dedication to the energy transition and focus on carbon sequestration.

As part of our effort to understand and explore growing climate risks, we undertook a seminal assessment of the economic impact of increased heatwaves. We continued fostering a culture of sustainability and invested in workforce development through the deployment of climate literacy and education programs targeting different levels of management — from C-Suite and executive leaders to underwriters.

We started 2023 having clarified our climate strategy to focus on advancing data and discovery, supporting the adoption of new and alternative solutions and informing and advocating for adaptive solutions. We have a lot planned in the coming year and are confident that our ongoing commitments and actions are an important step in helping our customers and communities embrace today and confidently pursue tomorrow.

Daniel Hogan,

Executive Vice President and Chief Risk Officer

Rakhi Kumar,

Senior Vice President of Sustainability Solutions and Business Integration and Climate Council Chair

Governance

Disclose the organization's governance around climate-related risks and opportunities.

a.) Describe the Board's oversight of climate-related risks and opportunities.

At Liberty Mutual, we're committed to responsibly advancing the interests of our customers, employees and the communities we serve. Our Board of Directors lends their expertise to our Executive Leadership team, providing strong leadership that adheres to our values and aligns to Liberty Mutual's strategic direction.

The Board is responsible for contributing to the development of our enterprise-wide business strategy, and stays informed by regular updates from Liberty Mutual's senior leadership and from subject matter experts. To stay ahead of climate-related issues that could impact our operations, the Board relies on the Office of Sustainability and the Enterprise Risk Management (ERM) group. It engages Liberty Mutual Investments (LMI), Global Risk Solutions (GRS), Global Retail Markets (GRM) and our Finance teams in discussions around the business landscape and climate strategy.

The Board also relies on recommendations from its [Governance and Sustainability Committee \(G&S Committee\)](#), which provides strategic oversight and performance evaluation of our sustainability practices and priorities. The committee is comprised of the Chairman of the Board, the Lead Independent Director and no fewer than four additional independent members of our

Board of Directors. The Lead Independent Director coordinates feedback to the CEO on behalf of the independent directors regarding business issues and board management, and the Lead Independent Director and the other independent directors meet regularly without the CEO present.

In its first year, the G&S Committee met four times. From holding briefings with our Chief Sustainability Officer, Liberty Mutual Foundation President and VP of Community Investments, and our Legal team to discussions on Board governance, the committee's activities enable the Board's broader oversight of climate-related risks and opportunities.

b.) Describe management's role in assessing and managing climate-related risks and opportunities.

In 2022, Liberty Mutual's President assumed executive sponsorship for sustainability priorities, which included launching an effort to refine our enterprise sustainability strategy, as well as strengthening the integration of sustainability considerations into our decision-making processes. In this capacity, the President worked closely with our Chief Sustainability Officer, the Chair of our Climate Council and our Enterprise Risk Management and Public Affairs teams to stay informed and engaged on climate-related issues. Regular briefings equipped the 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.

Effective January 1, 2023, the President was also named CEO, an expanded role in which he continues to sponsor our sustainability priorities. Whether it's ensuring the success of our climate strategy and risk management efforts, highlighting the impact of our sustainability programs or demonstrating our commitment to transparency and accountability, the CEO is dedicated to strengthening and communicating our sustainability efforts.

We have designed our governance structure to promote cross-functional collaboration – enabling teams to share knowledge and expertise, coordinate efforts and drive effective action towards our climate risk goal. At the management level, we have created governance structures that support accountability through:

Sustainability governance structure



Governance

- **Executive Leadership Team:** Led by the CEO, this team has management-level responsibility for overseeing Liberty Mutual's strategic response to climate change. Notably, the Chief Sustainability Officer presents a comprehensive report to this team every quarter to provide timely updates on sustainability and climate-related risks and opportunities, and to facilitate strategic discussions and coordinate activities across different departments and stakeholders toward our sustainability goals.
- **ESG Executive Committee:** Established in early 2022, the ESG Executive Committee is a small group of senior executives responsible for overseeing the implementation of our sustainability and climate strategy. Chaired by our Chief Sustainability Officer and reporting to the Executive Leadership Team, the Committee is responsible for establishing overarching global standards and guidelines, developing recommendations and actionable plans to address emerging risks and opportunities and reviewing accountability metrics across the organization.
- **Office of Sustainability:** Led by the Chief Sustainability Officer and reporting to the Executive Leadership Team, the Office of Sustainability oversees integration of our climate strategy within Liberty Mutual. The Chief Sustainability Officer presents annually to the Liberty Mutual Board of Directors and separately to the Governance and Sustainability Committee, complementing other sustainability and climate-related presentations that the Board receives throughout the year.
- **Climate Council:** Established in 2020 and chaired by a senior member of the Office of Sustainability, the enterprise-level Climate Council oversees implementation of our climate strategy. The council ensures that our ongoing assessments of climate-related risk remain coordinated across business lines and functions. Additional insights into the council are included in the "Liberty Mutual's Climate Council" box on [page 6](#).
- **Enterprise Risk Management:** The Enterprise Risk Management (ERM) team is responsible for overseeing and monitoring risk, including climate-related risk, on an ongoing basis. To strengthen our climate-related analysis, ERM continues to invest in related technology and talent, including expanding our team of climate scientists, who analyze data to better predict how, when and where climate change will impact our operations.
- **Working Groups:** As needed, groups of cross-functional leaders across Liberty Mutual partner to ensure operational cross-coordination and management of specific climate issues. In 2022, this included the Global Climate Scenario Working Group.
- **Business-level:** Liberty Mutual's business-level leadership continues to strengthen expertise and accountability for climate-related risks. In 2022, Liberty Mutual expanded the role of our Senior Vice President for Sustainability Solutions to include Business Integration, partnering closely with leadership of our two business units, Global Risk Solutions (GRS) and Global Retail Markets (GRM). In November 2022, GRS created a new role — Global Leader, Energy & Transition Risk — to develop our global energy transition strategy and build a team dedicated to helping customers manage transition risk and promote solutions for emerging lower carbon-emitting technologies. We also continued to hire climate and atmospheric scientists in our business-specific research functions to ensure that the best available climate data is integrated into the daily decision-making of the organization. In January 2023, we announced a GRS Head of Sustainability, who reports to the GRS Chief Strategy Officer and will serve as the primary liaison for the business with the Office of Sustainability.
- **Country-level:** In addition to our governance at the holding-company level, Liberty Mutual has sustainability teams, or departments, located within many of our subsidiaries and branches that are domiciled outside the United States. Those teams are typically part of the subsidiary's compliance function and report to the boards of respective subsidiaries and branches. The sustainability teams, working with the Chief Sustainability Officer, Enterprise Risk Management team and the sustainability executives of their business unit, are responsible for monitoring regulations in their respective jurisdictions and overseeing any required measurement, reporting and disclosures.

By making sustainability and climate a core component of our management priorities, we foster a culture of responsibility and inspire employees across all levels to be a part of the solution. Our employees are an active part of our low-carbon journey, sharing best practices and participating in eco-conscious programs through internal employee sustainability groups, such as our Sustainable Environment Alliance (SEA) and Liberty Mutual IT (LIT) Green Scene. Our efforts to further develop our workforce and educate employees on climate risk and opportunity are detailed further in the Strategy section on [page 17](#).

Governance

Liberty Mutual's Climate Council

Our Climate Council has evolved to more effectively advance Liberty Mutual's climate strategy and implementation. The council initially met biweekly, but as our governance transitioned to better anticipate and address needs, we recognized the necessity of adapting its structure and cadence.

In July 2022, we restructured the committee, updated our charter and refined our membership to ensure that we were tapping into the expertise of our diverse business units and functions to further enable long-term success. The council includes representatives from our Office of Sustainability and our business units, investments, risk management, public affairs and finance functions. This diverse representation ensures that we are equipped to effectively address and manage climate-related risks and opportunities.

Given the progress we have made in our climate journey, we changed the cadence of council meetings from one-hour bi-weekly to 90-minute monthly meetings, providing the opportunity to engage in more meaningful dialogue and plan strategically for the future.

Today, the Climate Council is a model for effective governance and collaboration, seeking to:

- **Support** the development of climate-related policies and frameworks
- **Monitor, identify and share** knowledge of emerging climate issues, risks, opportunities and trends
- **Work** with business units to advance climate-related actions across the company
- **Coordinate** implementation of climate efforts across Liberty Mutual
- **Measure** progress and recommend adjustments as necessary

Our commitment to continuous improvement is essential in achieving our climate-related goals. By doing so, we can promote the long-term success of Liberty Mutual while also making a significant impact on our customers and stakeholders during our transition journey.

Strategy

Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy and financial planning where such information is material.

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

At Liberty Mutual, our evolving insights on climate-related risks and opportunities inform our business strategy, decision-making processes and overall operations. In 2022, we continued to build on our 2021 enterprise-wide climate scenario analysis exercise by supplementing our findings with new research and insights. Our seminal scenario analysis exercise leveraged research and scenarios from the Network for Greening the Financial System

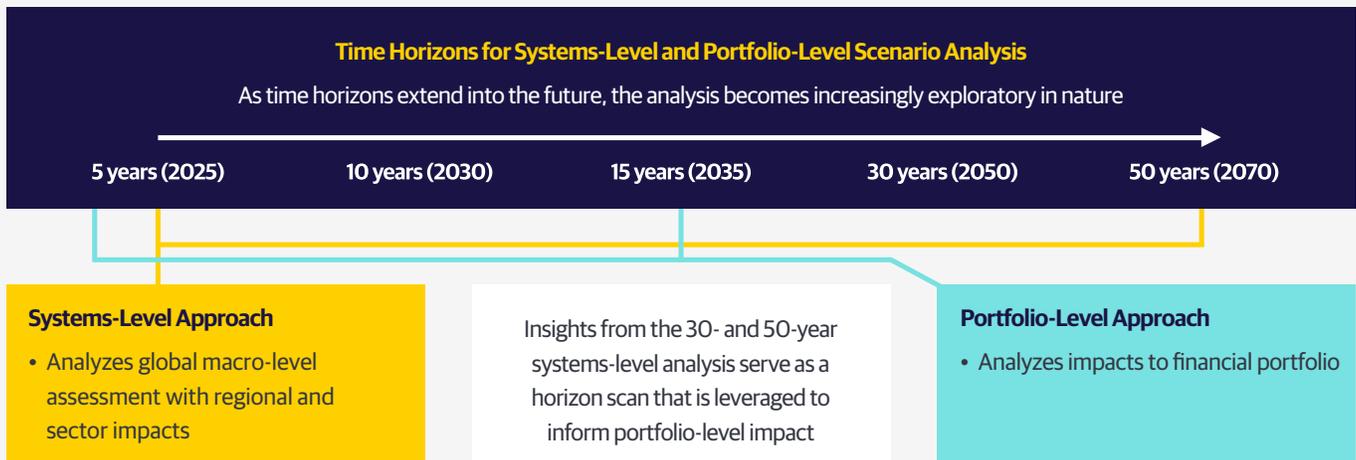
(NGFS) and combined a systems-level, top-down analysis with a portfolio-level, bottom-up analysis. Our approach is expanded on in our 2021 Task Force on Climate-Related Financial Disclosures (TCFD) Report and in the box below. In September 2022, NGFS published the third iteration of climate scenarios,⁴ updating the scenarios with timely developments, including country-level climate commitments made at the 2021 United Nations Climate Change Conference (COP26) and the latest data for Gross Domestic Product (GDP) and population.⁵ We incorporated additional observations from NGFS's third iteration into our analysis, and we continue to partner with business leaders to inform corporate strategy.

Our approach to climate-related scenario analysis

The scope of Liberty Mutual's two climate scenario exercises included:

- **Systems-level climate scenario analysis** exploring macroeconomic, policy and legal, reputational and technological risks (with regional and sector insights) over five-, 10-, 15-, 20- and 30-plus-year time horizons, recognizing that quantitative approaches do not yield meaningful insights between 30- and 50-year time horizons.
- **Portfolio-level climate scenario analysis** of Liberty Mutual's Investments over five-, 10- and 15-year time horizons. Data limitations and business strategy constrain realistic portfolio-level analytics to a shorter time scale of 15 years.

Combining a systems-level and portfolio-level exercise



Macro level policy insights from our systems-level analysis are detailed in the Climate Transition Center's Transitioning to a Low Carbon Economy publication.

TRANSITIONING TO A LOW CARBON ECONOMY

Strategy

Through Liberty Mutual's scenario analysis exercise we've identified that:

- **Policy is the most imminent source of transition risk and opportunity.** There are several economic risks that may develop as a result of climate policies, regulations and agreements at the global and regional levels arising from the transition to a net-zero economy. These risks include: clashes caused by divergent policy actions taken by different governments; the effects of policy actions on local economies and global trade; and the likelihood that implementation timeframes could vary between economies. Consequently, we expect that companies will have to continually assess and incorporate the risk associated with divergent public policies and will have to update transition plans to accommodate the evolving policy landscape.
- **Energy dependency will impact pace of transition.** All models within the NGFS modeling suite indicate that energy requirements will continue to rely on a mix of fossil fuels, renewables and other low-carbon energy sources. The pace and magnitude of policy developments will depend largely on an economy's readiness to transition from its current fossil fuel dependencies to a more balanced mix of fossil fuels and low-carbon energy sources.
- **Transition pathways will differ by country.** Our research shows that divergent, regional energy transition pathways should be expected, and that global policy development will vary depending on regional economy-specific needs, as policymakers seek to reduce macroeconomic and other transition-related stresses on their economies. For instance, developing countries are expected to require more time to transition to renewable energy due to their need for increased energy to spur industrialization. Additionally, these countries often face challenges, such as lack of institutional capacity and financial resources, which can hinder the rapid creation of necessary infrastructure for supporting renewable energy.
- **Regional policy coordination is key.** Regional-specific energy transition policies will impact the type of preferred renewable investment and strategy, challenging the prevalent one-size-fits-all approach to the energy transition. Given that countries will adopt different climate policy approaches to suit their economies, coordination at a global level will be required, to ensure that the differing approaches do not hinder global progress. Additionally, it is critical for global economic stability that the different sectors and countries adopt a coordinated, not common, approach to climate transition to limit economic shocks. For example, carbon pricing is a significant component of the climate transition policy in Canada, where industries

such as oil sands are helping to fund the country's emission reduction and economic transition.⁶ In the European Union, the green taxonomy does not consider activities related to funding or assisting the oil sands industry as supporting the transition. A coordinated approach would require the European Union to carve out an exception for Canadian oil sands given the carbon price imposed by the Canada government is part of its commitment to align with goals of the Paris Accord.

This past year, Liberty Mutual supplemented our analysis with additional research on energy mix and pace of transition by region. We looked at four scenarios showing the primary energy mix across the four regions, including two stress scenarios: Divergent Net Zero and Nationally Determined Contributions (NDCs), depicted in the "Energy mix and pace of transition" box on [page 10](#). These findings provide important insights into current and future energy system trends and dependencies by technology, including:

- Under all four scenarios, the transition models show that fossil fuels will not be eliminated as part of any region's energy mix.
- Rather the mix will change over time – with a mix of fossil fuels and renewable energy, and at a pace that reflects the region's energy supply and demand.
- Modeling shows that there is no single type of energy source that will dominate.
- Due to the differences in the energy mix, the timing and type of climate policy will vary across regions.

Informed by these insights, we recognize that building any transition plan is difficult and complex, and that Liberty Mutual's approach to climate transition must be an "and" conversation, taking into consideration a mix of both fossil fuels and renewables.

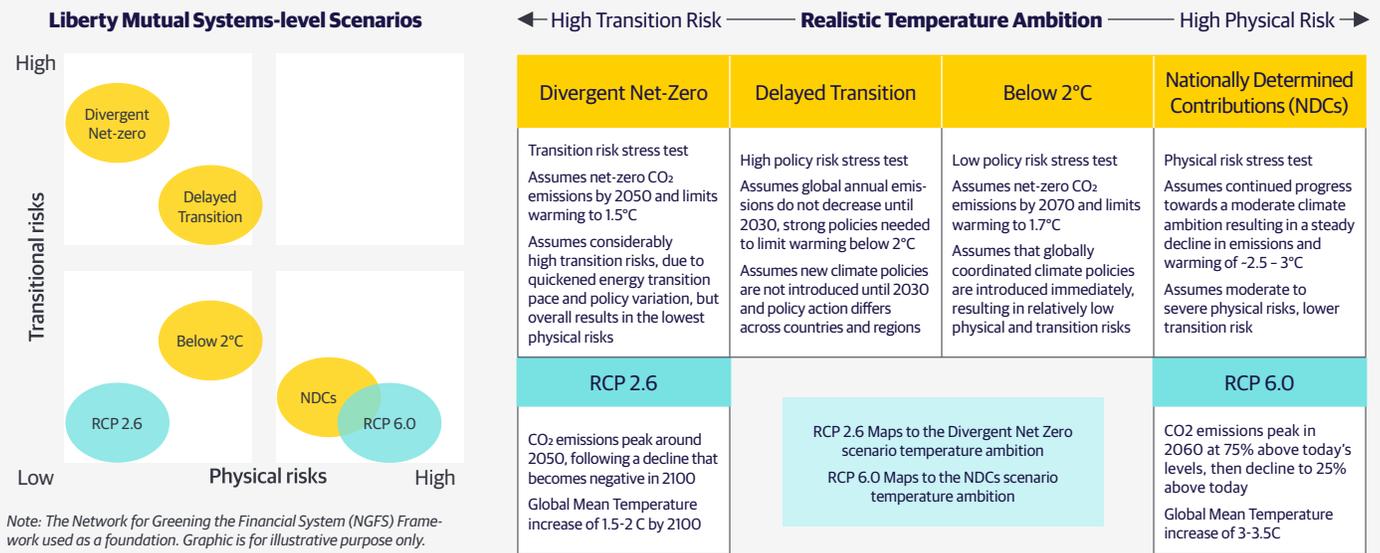
As the world transitions to a low-carbon economy, in order to build a transition pathway, we believe that it is critical to step back and look at the macro, global factors that make the transition so complex. We continue to take a systems-level approach⁷ that considers various elements that – combined with the scientific, social, economic and technological trends in climate models – can facilitate decision-making and true progress, and can be integrated into business strategy.

Our insights and understanding of climate-related risks and opportunities led to the development of Liberty Mutual's updated climate strategy and focus areas, detailed in Strategy – prompt B, beginning on [page 10](#). Additional insights on physical risk identification and research is included in the "Recent research initiatives assessing the impacts of climate change and physical risk" box on [page 25](#).

Strategy

Complexity of climate risk modeling and net-zero strategies

The visual below details the climate scenarios used for our systems-level assessment, leveraging data from the Network for Greening the Financial System (NGFS).



Our research has revealed that developing a transition plan is a challenging and intricate process. We have yet to gain a complete understanding of all the interdependencies that exist in the real world between society, the environment, policy and economics that must be managed during a climate transition. It is important to acknowledge that the ecosystem of climate and economic models that inform our view of transition risk are attempting to replicate highly complex interconnections with limited data to project a future we have yet to experience. Furthermore, we understand that these models are not without imperfections.

Nevertheless, these models do create value. They provide useful data detailing the realistic scale and pace of change across sectors and technologies. While the data is not probabilistic, it does provide enough information that can be combined with expert judgment and additional research to understand how risks and opportunities may manifest and differ from historical experiences. The information

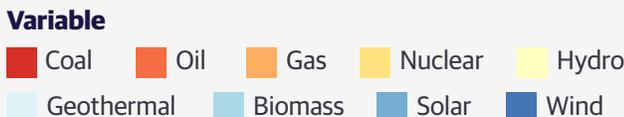
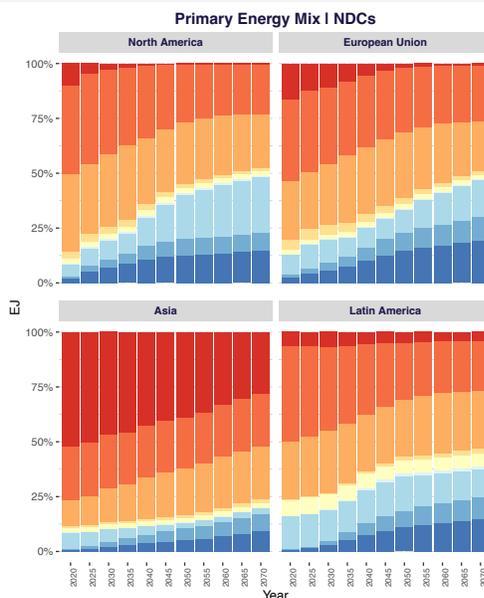
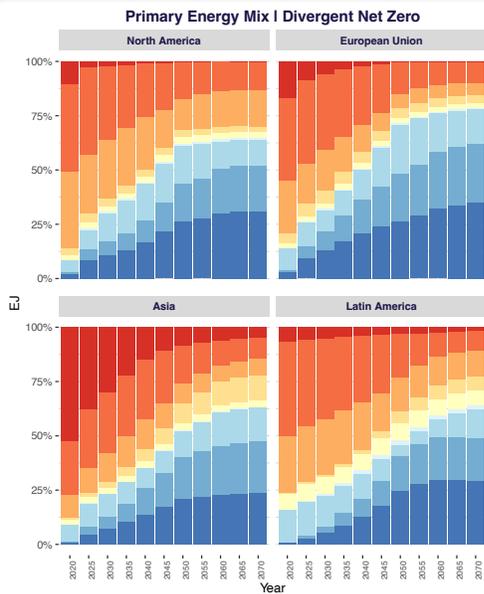
derived from integrated assessment models and resources like the NGFS are useful vehicles for challenging standard thinking about how systems in the world typically interact, and for catalyzing creative solutions to drive the transition forward in a pragmatic fashion.

But they do come with a note of caution — the NGFS itself states that “while significant research advances have been made recently, care should be taken in using the results, particularly at the most granular levels.”⁸ To achieve outcomes beyond being mostly heuristic in nature, it is necessary to conduct further research and coordinate efforts to enhance the modeling and analysis processes related to climate scenarios. The NGFS framework and models are leveraged by vendors to power portfolio-specific tools. However, based on 18 months of research, we believe that portfolio-level decisions should not stand alone. They must be supplemented by complementary analyses, such as top-down country-level analytics and qualitative horizon-scanning exercises that use expert judgment.

Strategy

Energy mix and pace of transition

These graphs represent two stress scenarios from the Network for Greening the Financial System (NGFS)'s third iteration of climate scenarios, and show that fossil fuels will not be eliminated as part of any region's energy mix.⁵ Additional findings from our analysis on energy mix will be published through the Climate Transition Center in 2023.



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

Liberty Mutual has taken several actions to address the insights identified through our enterprise-wide climate scenario analysis exercise and ongoing research and to continue to enhance our understanding of climate risk and opportunities. These efforts include:

- Strengthening our public affairs capabilities and cross-functional collaboration.** We recognize the need to be proactive in understanding and shaping climate-related public policy, and to integrate global policy considerations into our operations. This has resulted in Liberty Mutual increasing our own cross-functional collaboration, and expanding our engagement with policymakers and regulators, particularly pertaining to management of climate-related risks. The Public Affairs team works closely with the Sustainability and Enterprise Risk Management teams to inform the company's holistic understanding of transition risk and to ensure that the best available physical climate science informs public policy and advocacy. As a global property and casualty (P&C) insurer operating in 29 countries, we believe that we have an obligation to advance advocacy and understanding of risk and support for climate resiliency at the federal and state levels in the United States, as well as globally. In 2022, we hired a new Head of International Policy who brings valuable international expertise in sustainability operations and the energy transition.
- Expanding our research focus on understanding the energy transition.** In recognition that there will be a mix of different energy sources and that transition pathways will differ by country and region, Liberty Mutual has focused on bolstering our own related research and capabilities. We have hired key subject matter experts within the business, including a new role in our Global Risk Solutions (GRS) business – Global Leader, Energy & Transition Risk. We also launched the Climate Transition Center to conduct and amplify research focused on the energy transition.
- Increased participation in industry groups.** In service of our commitment to advance sustainable finance, Liberty Mutual joined the Institute of International Finance's Sustainability Policy Group, which provides a platform for collaboration with industry leaders to shape policy and drive progress toward a more sustainable future. This complements our participation in a number of other industry groups at the corporate and business level.

Strategy

- **Refining our climate strategy to clarify our role in the energy transition.** In 2022 and early 2023, Liberty Mutual continued to refine our climate strategy to ensure that we are doing our part to help our company and our customers better prepare for the ongoing energy transition. We identified three actions where we believe we are best suited to engage to manage and reduce risk for our customers, detailed in the “Liberty Mutual’s Climate Strategy and Focus Areas” box below. While our strategy and focus areas apply globally, we also recognize that climate-risks and impacts, including climate-related policy action, differs across geographies. For example, while the United States and European Union both advanced significant climate legislation in the past year, the legislation prioritized differing actions and pathways to reducing carbon emissions. Therefore we focus on coordination, instead of commonality – ensuring that our enterprise strategy and approach to supporting customers takes into consideration any differing priorities or outcomes.

These actions complement our ongoing efforts to embed sustainability and climate risk considerations into our day-to-day operations, as well as our evaluation of risk and investment decisions.

Liberty Mutual’s Climate Strategy and Focus Areas

Liberty Mutual supports our clients as they transition to a low-carbon economy and contributes to the transition by advancing the dialogue and action around the following three areas:

Advance data and discovery

Help manage climate risk and advance global understanding and conversation on data and risk discovery and application.

Support adoption of new and alternative solutions

Accelerate adoption of innovative technology and alternative energy solutions through risk identification for clients and customers, innovation, underwriting and investments.

Inform and advocate on adaptive solutions

Support and advocate for systems and policy solutions that advance resilience and promote sustainability at scale.

Advance data and discovery

Advancing data and discovery has always been core to our business and value proposition as a Property and Casualty insurer. Data supports our efforts to evolve our understanding of risk to manage exposure, price our products and solutions and provide counsel to clients. We recognize that there are gaps in the available climate data and understanding of probable outcomes. Our climate scenario analysis and ongoing assessment of risk reinforces the need to continue investing in furthering our understanding of physical risk – and emerging risks – for our customers, our business and broader global understanding.

In 2022, as global temperatures continued to rise, we undertook research to expand our understanding of the environmental and societal impacts of heatwaves. We prioritized this climate phenomenon as studies suggest exposure to excessive heat is the number-one driver of deaths from climate change – greater than any other weather-related event.⁹ Rising temperatures impact multiple facets of society, including workers in labor-intensive environments, elderly populations, lower socio-economic communities, power access, and food and water availability.

Our climate risk-management framework enables us to review and monitor connected hazards, which for heatwaves include:

- **Impacts on energy demands:** Prolonged periods of excessive heat can create energy demands that exceed available capacity, which can lead to power blackouts, increased equipment failure and business interruption.
- **Impacts on drought:** Excessive heat can also lead to drought, which can affect agriculture by significantly reducing crop yields, and in some cases, causing crop failure. Droughts can also affect livestock by reducing the availability of food and water, which can lead to decreased growth rates, lower production, increased animal mortality and higher incidence of diseases. Drought raises the likelihood of wildfires, with the potential for both increased insured property losses in the wildlife-urban interface and casualty claims.
- **Impacts on bodily injury claims:** Heatwaves can also have a significant impact on bodily injury claims. Excessive heat causes workers to be prone to accidents, dehydration, heatstroke and other heat-related illnesses. Extreme heat can affect judgment and decision-making ability, leading to increased risks of accidents and injuries. Medical costs associated with treating such incidents could be quite substantial.

Strategy

- **Impacts on lawsuits and liability risk:** The scope of the lawsuits that could arise from heatwaves have the potential to further increase the likelihood of related litigation brought by claimants who allege to have been injured or have had their property damaged as a result of exposure to extreme heat. Professions in predominantly outdoor industries, such as construction and utilities, are particularly vulnerable. Additionally, the scope of litigation extends to actions brought against governmental entities who are either accused of contributing to or failing to take sufficient action to protect citizens against the effects of climate change.

Informed by this research, Liberty Mutual is proactively assessing the lines of business, products and industries that we deem to be most exposed to heatwaves. We are also working with our clients to understand their exposure to these hazards, and where possible, mitigate the potential impacts. For example, Liberty Mutual collaborated with a client to perform gap assessments and develop actionable mitigants, which may include company policy enhancements or equipment alterations. This data has also informed conversations with customers, including transportation companies, about the impact of heatwaves in large urban centers, leading to risk mitigation at scale.

Due to the interconnectivity between hazards such as heatwaves, droughts and wildfires, we are undertaking scenario analysis to gain a better understanding of exposure, value-at-risk and business-continuity planning.

Through our involvement with associations, partnerships and the newly formed Climate Transition Center, we are sharing data and discovery findings, to help inform broader global understanding of climate risk and opportunity. Our Enterprise Risk Management team drives ongoing advancement of our understanding of data and modeling, expanded on in the Risk Management section of this report beginning on [page 18](#).

Support adoption of new and alternative solutions

At Liberty Mutual, we aim to support the adoption of innovative technologies and low carbon energy solutions through risk identification for clients and customers, innovation, underwriting and investments. We are experts in risk and use our unique insights and understanding to inform our customers, and to give them confidence to achieve their goals. We recognize that new and alternative solutions are needed to achieve a low carbon economy. We leverage our expertise — including our understanding of emerging

technologies — to support customers, providing insights and confidence into energy and alternative solutions, and helping our customers build and operationalize against their transition plans.

Risk identification for clients and customers

As risk managers, we have a storied history in playing the role of helping our customers deeply understand a risk and how to manage it. We find that once customers are able to grasp the challenges of a risk and options of how to mitigate these risks, they feel more secure in making decisions and taking action. This is the same approach we apply to supporting our customers as they navigate their own climate transition.

What is clear from our research is that building any transition plan is difficult and complex. The speed at which new technology innovations and alternative energy solutions are developed and adopted for climate transition may be slowed because of a lack of understanding around operational risks. Insurance can fill this gap through our risk management capabilities that go deep in comprehending and addressing the challenges of emerging solutions. This in turn gives customers (and potentially the broader economic ecosystem) more confidence in these solutions, which can accelerate their adoption.

We aim to help clients manage their own climate risks by offering underwriting, risk management identification offerings — such as WeatherReady, detailed in the “Equipping our customers to be WeatherReady” box on the [next page](#) — and products focused on sustainability solutions.

Innovation

To enhance customer resilience, we develop products and services that help our customers mitigate a range of existing and emerging risks, including climate-related risks. We use innovative product design to address climate risk and support the transition to a low-carbon economy. This includes providing insurance products and renewable energy coverage that offers protection against climate-related losses. We also provide liability protection to companies implementing sustainable practices.

We leverage data and analytics to better understand the potential impact of climate risk and energy transition on clients and to inform product design. This allows us to develop tailored insurance solutions that help our customers prepare for, mitigate and adapt to changing climate risks.

Strategy

Recent innovations in our products and services include:

- **Insurance solutions for alternative energy innovation:** We collaborate with leading global energy brokers to offer insurance solutions for a broad range of emerging energy transition technologies, including carbon capture and storage (CCS), battery energy storage systems (BESS) and hydrogen. We also provide third-party bodily injury, property damage and environmental coverage for operators of renewable energy businesses during construction and operational phases. Liberty Mutual's Ironshore Environmental group was recently recognized for insurance solutions to advance the energy transition, detailed in the "Recipient of the E&S Insurer Innovation Award" box below.
- **Eco-friendly Upgrade Endorsement:** We offer an optional endorsement that provides additional coverage after a covered loss to replace property with green alternatives and to provide payment for additional expenses for recycling debris and green recertification. This offering has been rolled out to Liberty Mutual homeowner customers in more than 10 states, with plans for further expansion. For commercial property policies, in a limited number of states, we offer a eco-friendly upgrade endorsement that increases the coverage amount available for costs associated with these upgrades.

Recipient of the E&S Insurer Innovation Award

In 2023, Liberty Mutual won an E&S Insurer Innovation Award for creating the "first to market" insurance solution focused on carbon sequestration — a process that provides the industrial sector an opportunity to mitigate potential emissions from some operations that may have limited or no pathways toward decarbonization. The insurance solution helps power and industrial plants and oil and gas companies protect themselves against environmental liability and financial loss associated with carbon sequestration projects.

Equipping our customers to be WeatherReady

WeatherReady is a new feature on our Liberty+ digital value-added services platform. Solaria Labs, Liberty Mutual's Innovation Incubator, partnered with the Office of Sustainability to launch this innovative feature. It is designed to empower and inform customers to build weather resiliency by providing them with science-backed advice that is sourced from our research partnership with the Insurance Institute for Business and Home Safety. WeatherReady also offers recommended solutions and service providers, as well as tools that customers can use to track their progress.

With WeatherReady, customers can now access expert knowledge and resources that help them prepare for and respond to weather events with confidence. Since its launch in May, it has rapidly become one of the most popular features on Liberty+. With WeatherReady, Liberty+ continues to demonstrate its commitment to providing innovative and impactful solutions that enable customers to protect themselves and their assets.



Strategy

Underwriting

In order to comprehend the growing complexity that our customers face when managing the energy transition, we take a holistic approach to analyzing risks throughout the product lifecycle and evolving risk landscape — as detailed further in the Risk Management section. With this lens, we can develop new products and services that cater to our customers' needs on every side of the product line and value chain as climate-related risks, and other risks, continue to evolve. For example, we have created a new team in the Global Risk Solutions Office of Underwriting to centralize resources and harness the benefits of a global customer-led strategy for the companies we want to insure.

We aim to be the go-to-partner for risk management. To achieve this goal, we bring together all of our teams, incorporating their existing and newly acquired expertise, to break down barriers. We lean into both opportunities and challenges with a view to where we can add the most value. Our goal is to maintain a high level of performance, even as we transform our overall energy portfolio, and to ensure that any new development or building is sustainable. We cannot solve the challenges of the energy transition alone. We are working in partnership with numerous stakeholders around the world, including our broker community, government agencies, technical providers and academia.

Some examples of how we have advanced alternative solutions through underwriting include:

- Offering cross-line support on one of the largest hydrogen facilities in the Middle East
- Becoming the leader of the first global cross-class hydrogen facility with Marsh²
- Working with governmental agencies on insurability of technology and enabling sustainable growth with existing networks for hydrogen and carbon capture
- Engaging in an early partnership on a world-scale project in Australia to support sustainable electricity

Underwriting hydrogen solutions

While there is high demand for new and alternative energy, many of these solutions are new to market and not well-understood. Liberty Mutual is supporting adoption of new and alternative solutions by leveraging our understanding of risk and our strength in underwriting risk to provide cover and counsel to these technologies.

Liberty Mutual's Global Risk Solutions (GRS) partnered with Marsh to offer the world's first-of-its-kind insurance and reinsurance facility, which provides up to \$300 million in capacity for green and blue hydrogen energy projects. Investment in hydrogen initiatives is estimated to be more than \$150 billion by 2025 as energy companies, governments and industries aim to reduce their carbon emissions.² The facility covers risks related to construction, operational phase property damage, marine cargo, business interruption, general third-party liability and contingent delay in start-up.

Investments

One of the ways that Liberty Mutual remains committed to supporting the energy transition is through Liberty Mutual Investments (LMI). As a long-term global investor, LMI's mission is to create capital that supports Liberty Mutual's purpose of helping people embrace today and confidently pursue tomorrow. LMI's approach to integrating sustainability aims to achieve strong investment results and reflects our belief that those results are enhanced by responsibly combining relevant material factors into the investment process.

At LMI, we believe that the global energy transition will have a significant positive impact on innovative, forward-thinking companies and investors. Given this belief and the broad set of opportunities and challenges, in 2020 we formalized a dedicated energy-transition strategy. Our energy-transition strategy is built at the intersection of our commitment to supporting the global energy transition, the positive market backdrop underpinning the robust investment environment and driving returns for our financial performance and capital growth goals.

Our approach seeks to uncover high-opportunity areas across the overall energy value chain and is informed by key energy transition trends and uncertainties. We then apply a rigorous due-diligence process and investment analysis in specific capital allocation decisions.

Strategy

We recognize that the scale and scope of the global energy transition is complex and not without risk. Informed by our research and analysis on the energy transition, detailed further in our response to the Strategy — prompt A, beginning on [page 7](#), we believe that at least for the immediate future, the world needs to retain some level of balance between energy generation from fossil fuels and from alternative energy sources. We are committed to a gradual energy transition that will lead to a greater use of alternative energy sources over time, while at the same time maintaining energy availability, stability and affordability.

In addition to the more than \$1.2 billion in renewable energy-generation investments across our portfolio, we have made more than \$388 million in selective investment commitments to partners and companies providing a broad range of solutions such as alternative fuels, energy storage, distributed generation, carbon capture utilization and storage, circular economy solutions, low-carbon building materials, fossil-free chemicals and fertilizers, early wildfire detection and many more. As an example of this approach, LMI participated in the Series B financing round for Omnidian, a data-driven solar operations and maintenance provider poised to both help enable and benefit from accelerating solar deployment.

Informing and advocating on adaptive solutions

Liberty Mutual is committed to promoting adaptive solutions and advocating for systems and policies that advance resilience and promote sustainability at a larger scale. We undertake a range of activities, including partnering to advance systems-level solutions, advocating for policy outcomes, knowledge-sharing with industry and stakeholders and leveraging philanthropy for community resilience.

Partnering to advance systems-level solutions

We are advocating for resilient infrastructure to minimize climate risk at a systems level. We continue to invest in critical research on effective adaptation measures by building practices through our relationship with the Insurance Institute for Business and Home Safety (IBHS). The IBHS FORTIFIED program has shown the benefits of stronger construction, and this year, IBHS released Wildfire Prepared Home standards to meet growing demand for protection from other perils.

Advocating for policy outcomes

In 2022, we continued our multi-partner engagement efforts to advance resiliency-related policy efforts and funding. In partnership with the BuildStrong Coalition, Liberty Mutual served as a voice in both educating members of the United States Congress and encouraging action on key legislative proposals, including:

- **The Resilient America Act** (passed the House in April 2022), which provides communities with additional resources to bolster mitigation and resilience before disaster strikes
- **The SPEED Recovery Act** (signed into law October 2022), which allows state and local governments to rebuild quickly after natural disasters by allowing more disaster-relief projects to qualify as small projects, enabling them to be approved for federal assistance under a simplified review process
- **The Community Disaster Resilience Zones Act** (signed into law December 2022), which helps underserved communities become more resilient to disasters and requires that the President maintain a natural hazard assessment program

A successful transition must acknowledge climate realities

Regions will have different transition pathways and transition at their own pace, and it is critical to ensure that the transition does not leave the financially vulnerable behind. Given this, stakeholders should understand the keys to a successful transition:

- **A pragmatic approach:** Models show that even under the most ambitious transition (achieving global net zero greenhouse emissions by 2050), multiple types of energy sources will be used, including fossil fuels. In light of that, policy should not be binary, and instead should:
 1. Take into consideration the need for a mix of both fossil fuels and renewables
 2. Recognize each region will have a different energy mix
 3. Reflect that a single type of energy source will not dominate
- **Increasing resilience to reduce risk profiles:** Any transition should be paired with increasing direct funding for adaptation and creating incentives that encourage more resilient construction, to better protect homes and communities. Infrastructure investments today must account for the increasing severity of expected future climate risk.
- **Extraterritorial climate policy could impede global progress:** Given climate policy will be tailored to different regional transition pathways, any extra territorial policy reach may ultimately inhibit economic growth, create economic instability and undermine the global transition.

Strategy

We also engaged directly with FEMA in support of the **Building Resilient Infrastructure and Communities (BRIC) program** — which provides funding in the form of risk-reducing, cost-effective mitigation grants to assist communities in building disaster resilience. We discussed methods for leveraging the BRIC Program to assist more underserved communities.

Knowledge-sharing with industry and stakeholders

Our Climate Transition Center (CTC) also uses proprietary research, data and insights and encourages cross-industry partnerships to advance the collective understanding of climate-related risks, impacts and resilience. The CTC aims to empower insurance professionals, customers, policymakers and decision-makers globally to adapt to and mitigate one of the biggest challenges of our time — climate change.

Additionally, we are engaging with local and federal government agencies to exchange views about risks associated with emerging technologies. This helps us collectively enhance our understanding and effectively monitor, support and regulate climate-related advancements.

Leveraging philanthropy for community resilience

We are beginning to explore how we can leverage philanthropy and Liberty Mutual's Foundation to better support our customers during the climate transition. To ensure a strong foundation for our climate-resiliency funding approach, we collaborated with philanthropic experts, connected with environmental funders and engaged with environmental nonprofit organizations. Our initial work focuses on planning and implementation grants for: nature-based solutions that build more climate-resilient communities; training and skills development for low-income, vulnerable and underrepresented youth and adults in environmentally friendly jobs; and developing resilient and sustainable infrastructure in low-income neighborhoods and communities of color. We have implemented initiatives such as YouthBuild, focused on providing educational and career opportunities in environmentally friendly jobs for young people in underserved communities around Boston.

Additional details on our climate resiliency-related philanthropic partnerships and our engagement with elected officials are detailed in our 2022 Sustainability Review.

 **2022 SUSTAINABILITY REVIEW**

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

To ensure that Liberty Mutual's business strategy is resilient to climate risk, our systems-level scenario analysis exercise considered four scenarios from the Network for Greening the Financial System (NGFS), including a Divergent Net Zero, Delayed Transition, Below 2°C, and a Nationally Determined Contributions (NDCs) scenario, detailed in the "Complexity of climate risk modeling and net-zero strategies" box on [page 9](#). This suite of scenarios allows us to explore the impacts of transition risk, physical risk and policy risk across our organization. Through this exercise and our ongoing research and analysis, it was clear to us that our business strategy must address adaptation and resiliency, support the energy transition and mitigate emissions from operations. These findings have informed our own organization's strategy, as well as how we engage customers, as detailed throughout this report. We will continue to monitor and refresh our climate scenario analysis and insights as additional data becomes available.

We leverage a toolkit of actions to enable our management of transition and physical risks for our own organization and for our customers. Specific actions we're taking to ensure that our climate strategy and business strategy remain resilient include:

- **Supporting innovation and energy technology can help mitigate the impacts of physical risks:** Through our review of the NGFS scenarios and other climate-related research, it is clear there is a need for support for new and innovative technology, as well as adaptive and resilient solutions to address likely physical risks. Our strategy and priority focus areas take this into account — as detailed in the question above — through our approach to investments, underwriting and risk advisory services. We are strengthening our business and expanding our capacity to both address what's to come, and to support our customers in their own transitions.
- **Informing adaptive solutions can help mitigate transition risks:** If adoption of new technologies is low, the impacts of physical risk will increase — for our customers and for society. We have made informing adaptive solutions a core part of our climate strategy, to help reduce risk associated with adopting these new technologies. We believe that Liberty Mutual has an opportunity to partner with governments and cross-industry partners to inform community-focused solutions, enabling customer resiliency and reducing both transition and physical risks.

Strategy

- **Advancing data will help drive resiliency:** We recognize that there are still gaps in the understanding of climate data and modeling. At Liberty Mutual, we believe we have an obligation to advance data and discovery — and to share these insights internally and externally — to ensure resiliency for our business and our world. We share more on our specific efforts in the Risk Management section of this report.
- **Mitigating emissions in our operations:** We believe that every individual and organization must do their part to reduce emissions and support the energy transition. As detailed further in the Metrics and Targets section, we continue to reduce our greenhouse gas (GHG) emissions and to advance our own measurement and reporting.

Alongside analyzing the implications to our book of business, we recognize that we need to continue to develop our workforce and educate our people about climate-related risk to ensure resiliency across the organization. In recognition that every member of society has a role to play in addressing climate change, we have prioritized climate education and literacy both internally and externally. We are advancing a culture that prioritizes climate awareness and education at every level, across our organization and for our customers.

In 2022, we designed our Climate Activation Program, which was rolled out in early 2023 to senior leaders and subject matter experts across the business. Consisting of three modules of in-person and virtual learning — detailed in “Further developing our workforce around climate-related risk and opportunity” to the right, these sessions initially target our top 300 most senior executives and will expand to a broader group of employees. The program is designed to create a consistent understanding of how a changing climate presents new risks and opportunities for our industry and provides examples of how our organization is well-positioned to make a difference as the world transitions to a low-carbon future.

We seek to drive awareness and alignment through this program by framing the big picture of climate change and sparking cross-Liberty Mutual dialogue to continue embedding an understanding of climate risk into the foundation of our business, as we have done for other key business risks. The aim of this program includes:

- Grounding everyone in a common understanding of the most relevant climate topics to Liberty Mutual
- Creating “ah-ha moments” for each learner to motivate engagement and inspire action

- Bringing the very best thought leaders, content and learning formats to educate engage and spark action from learners
- Starting conversations at Liberty Mutual on what we’re doing and other “must do(s)” within and across teams

Further developing our workforce around climate-related risk and opportunity

Designed in 2022 and rolled-out in 2023, the Climate Activation Program for senior leaders advances understanding and cross-functional collaboration on climate risks and opportunities. Our aim is to adapt and launch this program for employees across all levels.

Module 1

Climate change: What it means to us at Liberty Mutual

Module 2

Connecting across Liberty Mutual on initiatives underway & considering our path ahead

Module 3

Understanding my role in advancing climate at Liberty Mutual

CAPstone

Partnering with key stakeholders on climate

This complements our broader sustainability-related education efforts, detailed in our 2022 Sustainability Review.

 **2022 SUSTAINABILITY REVIEW**

Risk Management

Disclose how the organization identifies, assesses and manages climate-related risks.

a.) Describe the organization's processes for identifying and assessing climate-related risks.

This section expands on the recent steps we've taken to refine our understanding of climate-related risks, which we consider alongside other risk factors. In consideration of how climate-related risks may affect Liberty Mutual's key risk categories, we align our thinking with the Task Force on Climate-Related Financial Disclosures (TCFD) classifications of climate-related risks, namely physical and transition risks – the two main drivers of financial impact.

Building on the findings of the TCFD, the Network for Greening the Financial System (NGFS) has already started identifying the risk associated with emerging legal cases related to climate change for governments, firms and investors "climate liability risk" as a subset of physical and transition risks.¹⁰ Given the significance of this for the insurance industry and our customers, we are also beginning to look into climate liability risk as its own risk category.

Climate change risk categories

Physical Risks

Physical risks resulting from climate change can be event driven (acute) or longer-term shifts (chronic) in climate patterns.

Acute

Examples: Increased severity of extreme weather events

Chronic

Examples: Long term shifts like sea level rise or chronic heat waves

Transition Risks

Transitioning to a lower carbon economy may entail extensive policy and legal, technology and market changes to address mitigation and adaptation requirements related to climate change.

Policy and Legal

Examples: Litigation risk, policies related to carbon pricing or energy efficiency

Technology

Examples: Emerging technologies like renewable energy, battery storage and carbon capture

Market Changes

Examples: Shifts in supply chain and demand for certain commodities, products and services

Liberty Mutual has twenty-seven established Enterprise Risk Management (ERM) key risks, which are grouped into seven categories for the purpose of ERM reporting. These key risks are defined and organized in a manner that is consistent with how management views and manages risks across the organization.

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

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

Physical risk

To drive our research on climate-related physical risks, we rely on a data-driven approach backed by up-to-date climate science. Liberty Mutual's approach to assessing physical risk is based on four actions:

- **Prioritize by science and materiality:** Liberty Mutual focuses on physical risks that present the highest probability of affecting our current book of business. This means there must be clear evidence of climate impacts in present day, affecting the communities and perils where Liberty Mutual has the most exposure. As a result, we focus on examining hurricane, flood and wildfire risk – as detailed further in the "Prioritizing by science and materiality" box on [page 19](#). We monitor scientific literature for other perils, such as tornado, hail risk and extratropical windstorms – currently considered lower confidence perils, to ensure that we are prioritizing perils appropriately as the science develops.
- **Invest in data quality to differentiate from peers:** Many of the most rapidly emerging climate-driven perils are referred to as high-resolution or high-gradient perils, meaning that the risk varies widely on spatial scales as small as a single building. This includes water-related perils (i.e., flash floods, riverine floods, storm surges) and to a lesser extent wildfires. Liberty Mutual has invested in innovative geospatial analytics and partnered with data-science teams in the business, using advanced machine learning and remote sensing to ensure that we have the most accurate possible data to model these complex emerging perils.

Risk Management

- **Focus on sub-perils that drive loss:** Some climate-related hazards may change over time. However, determining if those changes will translate into losses requires a sophisticated understanding of the needs of the business. For example, increased temperatures have a strong correlation with increased burn area due to wildfires, but burn area has a weak relationship with wildfire-driven losses. Focusing on subsets of the peril that dominate loss (i.e., wind-driven fire, high-category hurricanes) allows us to derive scientific insights with the highest potential impact to the business.
- **Develop actionable metrics for the business:** When noting a change in hazard, we must also have a mechanism to integrate and cascade the information across Liberty Mutual's business. We describe climate-related loss impacts using the same metrics that we use for risk

tolerance. Translating climate risk into the common language used in catastrophe modeling and portfolio management produces concrete impacts that the business can use to drive decision-making.

To evaluate potential losses that may stem from a natural catastrophe, we look to occurrence and aggregate bases to account for risk related to a single extremely large event, and to provide guidance on individual years when losses from events of various sizes – small and large – may accumulate. For example, climate-related perils relating to natural catastrophe underwriting risk include hurricanes and secondary peril events – a category that Liberty Mutual terms "other catastrophe loss occurrences (OCLO)," which comprises higher-frequency, lower-severity events such as severe convective storms (i.e., tornadoes, hailstorms), wildfires and winter storms.

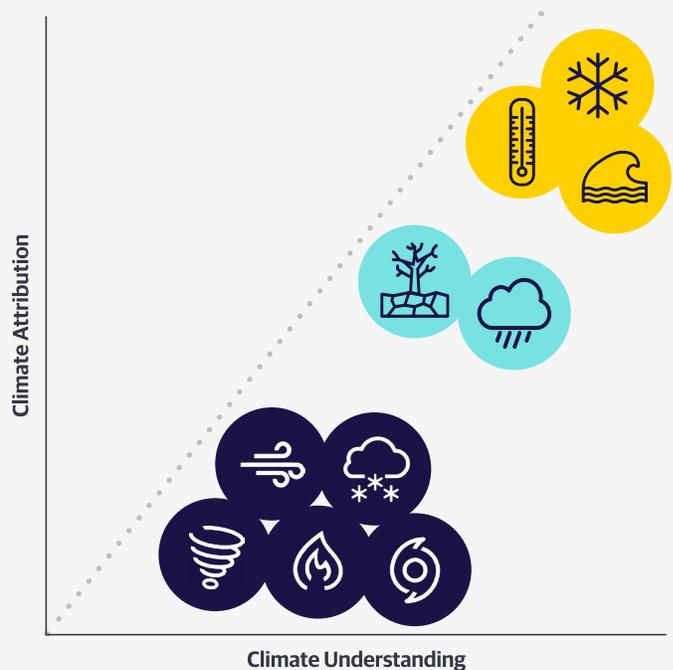
Prioritizing by science and materiality

We prioritize perils where we can use high-confidence climate impacts to say something meaningful about the potential influence to Liberty Mutual's book of business. This approach influences how we examine possible forward-looking changes in natural catastrophes and informed Liberty Mutual's decision to focus on tropical cyclone, flood and wildfire risk as our highest-priority climate-influenced perils.

The graph¹¹ to the right portrays acute weather events and their relationship to climate change based on both climate understanding – our understanding of how the physical processes that drive an extreme event will be affected by climate change – and climate attribution – being able to assign a likelihood of climate impacts to any particular event.

While many of the acute physical risks that most strongly affect an insured portfolio fall into a comparatively lower confidence bucket, we can apply what we know about the development of chronic perils like temperature, rainfall and sea level rise to drive improved understanding about important catastrophe risk perils like hurricanes, wildfires and floods. For example, sea level rise drives higher storm surges, extreme rainfall can increase flood risk (particularly urban flash flooding) and increased temperatures enhance evaporative demand, worsening droughts and wildfire risk.

Therefore, using chronic risk variables from climate models, such as temperature and precipitation, enables us to understand both geographically and temporally how different acute perils may be impacted.



KEY:

- High impact lower confidence catastrophe perils (i.e., severe convective storms, extra-tropical cyclones, extreme snow and ice, wildfires, tropical cyclones)
- Extreme rainfall (i.e., droughts, extreme rainfall)
- Extreme temperature (i.e., extreme heat, extreme cold, sea level rise)

Source: CarbonBrief

Risk Management

Transition Risk

To identify and assess transition-related risk, Liberty Mutual has leveraged our climate scenario analysis and supplemental research exercises to inform our business strategy and priorities. In 2021, Liberty Mutual conducted our seminal climate scenario analysis exercise, relying on a range of transition risk scenarios applied at a wide variety of time scales and granularity to identify potential economic risks associated with the climate transition.

Our 2021 climate scenario analysis exercise, led by the Enterprise Risk Management team and Office of Sustainability, is detailed further in the 2021 TCFD Report.

 **2021 TCFD REPORT**

Mitigating climate change is not just about transitioning the energy sector to lower-emitting sources. It is a complex socio-economic transition that requires a major overhaul of the entire global energy system. This transformation is unprecedented in both its scale and speed and will require a once-in-a-generation effort. Yet, the current approach to evaluating progress against climate change, particularly for financial companies, is overly focused on measuring and mitigating portfolio-specific emissions. To evaluate and disclose the potential business, strategic and financial implications of climate-related risks and opportunities across various horizons (short-, medium- and long-term time horizons), we utilize a climate-related scenario analysis that incorporates both a systems-level, top-down stress test and a portfolio-level, bottom-up stress test. This is detailed further in the “Our approach to climate-related scenario analysis” box on [page 7](#). This approach enables us to mindfully assess different dimensions of climate-related transition risks, supplementing the business-specific distributions of a portfolio test with the longer-term, horizon scanning approach of the top-down test.

Liberty Mutual continues to leverage climate scenarios from the NGFS, as they provide clear and customizable insights depicting different low-carbon futures. The NGFS uses a collection of data (i.e., economic, climate, energy, agricultural) to design a set of transition scenarios in partnership with climate experts and economists.⁸ The scenarios provide reference points for understanding climate change with consideration of upcoming policy and technology trends, as well as the various ways these trends could evolve in the future. These scenarios outline a range of physical- and transition-risk outcomes, providing insight into the challenges associated with climate change.

In 2022, to ensure that our understanding of transition risk remained current and to enhance our systems-level analysis and understanding, Liberty Mutual:

- Updated our energy systems insights with the most up-to-date NGFS resources
- Performed a model evaluation exercise between 2021 and 2022 NGFS data to understand the models' sensitivity to changes in assumptions, data and modeling techniques
- Enhanced our systems-level scenario analysis exercise by incorporating chronic physical risk data from the Intergovernmental Panel on Climate Change (IPCC) Representative Concentration Pathway (RCP) scenarios, using data from the Climate Impact Explorer — which aggregates RCP data from the Fifth Assessment Report of the IPCC

Our analysis, detailed further in the “Advancing our understanding of transition risk with the latest data from the Network for Greening the Financial System (NGFS)” box on [page 21](#), continues to be used to inform business strategies and solutions that address these risks and identify opportunities for growth. We find the physical-risk scenarios alone are helpful but not sufficient to address the acute physical risks that impact insurers specifically, so we supplement this approach with sensitivity testing in catastrophe models as described above. Also see the “Complexity of climate risk modeling and net-zero strategies” box on [page 9](#).

Analysis and findings from the exercises were shared and discussed with our Executive Leadership Team, management committees and business leaders to inform business strategy. We have also shared our approach externally to help educate peers and partners about our learnings and approach. Our process is outlined in greater depth in an article we published in the [Journal of Financial Transformation](#) in November 2022. Additionally, our overall macro-level findings were published as a 2022 Climate Transition Center white paper, titled “[Transitioning to a Low Carbon Economy](#).”

Risk Management

Advancing our understanding of transition risk with the latest data from the Network for Greening the Financial System (NGFS)

Liberty Mutual strives to use the latest data and research available. For our 2021 analysis, we used four scenarios for both our systems-level analysis and portfolio-level analysis. In September 2022, NGFS released a new set of scenarios – version 3 (V3). The 2022 updates to the NGFS scenarios include:

- Policy related updates, including commitments made at the 2021 United Nations Climate Change Conference in Egypt (COP26)
- Updates to Gross Domestic Product (GDP) and population growth projections
- Fiscal and monetary policy modeling changes
- Improved sectoral and technological models
- A new methodology to integrate acute physical risk

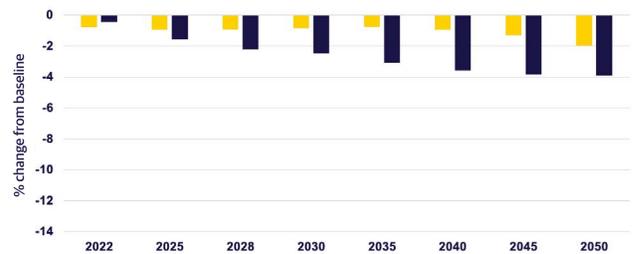
We compared V2 and V3 scenarios to understand how these updates might impact results of our scenario analysis exercise. The graphs on the right show the differences from this comparison. Key insights from our review include:

- Policy and fiscal modeling assumptions remain a major driver of year-to-year model volatility, underscoring our high-level insight that policy risk continues to be a primary lever affecting global transition risk pathways
- From a model risk management standpoint, there were significant variations between V2 and V3 data – demonstrating that our decision-making processes which leverage these models must plan for ongoing volatility
- Climate risk scenarios are best interpreted as directional, particularly at longer time horizons, with extreme care taken in situations that require more quantitative risk metrics
- Additionally, as we integrate climate scenario analysis more robustly across the enterprise, comparing versions of the NGFS scenarios and other climate tools allows us to document and compare annual assessments, creating a more robust process for model risk management

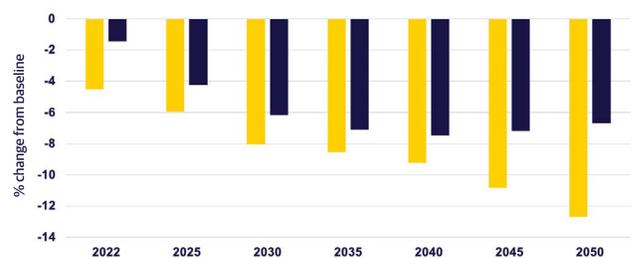
The results of our model comparison revealed that the NGFS model outputs were particularly sensitive to change. While the outputs from these models are still incredibly useful, their sensitivity to changes in assumptions and the nascent state of the modeling field itself means care should be taken when interpreting results.

KEY: V2 V3

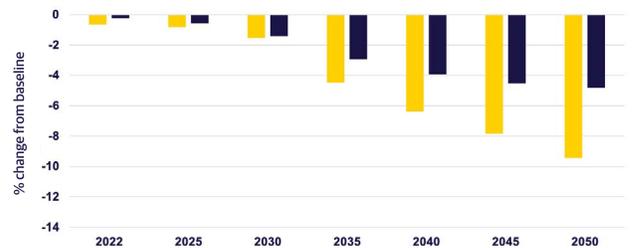
Below 2C | NiGEM GDP USA



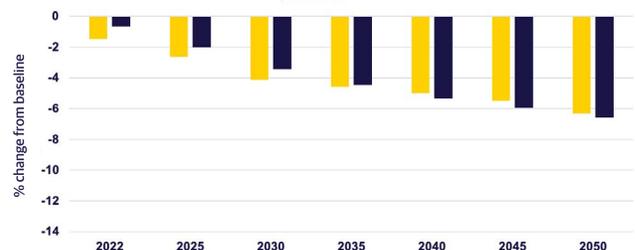
Divergent Net Zero | NiGEM GDP USA



Delayed Transition | NiGEM GDP USA



Nationally Determined Contributions (NDCs) | NiGEM GDP USA



Source: NGFS V3 Data, NiGEM Model Outputs with GCAM Model Inputs

Risk Management

Findings from our portfolio-level analysis

Our 2021 climate scenario analysis found the overall climate-related transition risk associated with our portfolio holdings to be quite limited. Across all scenarios we evaluated as part of this assessment, climate transition risk negligibly impacts Liberty Mutual Investment’s portfolio holdings over the near-term, and it increases moderately over a 15-year time horizon.

It is important to note that these results are based on the assumption that there is no active management of the portfolio over a 15-year period. With active management, Liberty Mutual would be able to reposition its portfolio over time to address evolving climate risks. While the “no action” scenario has no impact on the portfolio under this analysis, it is important to note that this should not be considered a desirable outcome, as it is likely to introduce significant climate-related physical risk over the long term.

We continue to monitor related developments and plan to update our portfolio level assessment periodically over the coming years. We continue to conduct jurisdiction-specific portfolio-level stress tests to comply with regulatory reporting requirements.

Portfolio-level scenario analysis key findings

	5 YEARS	10 YEARS	15 YEARS
Accelerated	Medium low risk	Medium low risk	Medium low risk
Orderly	Low risk	Low risk	Low risk
Disorderly	Low risk	Low risk	Medium low risk
No Action	Low risk	Low risk	Low risk

KEY:

■ Low risk	■ Medium risk
■ Medium low risk	■ Medium high risk
■ High risk	

Asset class level analysis key findings

ASSET CLASS	5 YEARS				10 YEARS				15 YEARS			
	Accelerated	Orderly	Disorderly	No Action	Accelerated	Orderly	Disorderly	No Action	Accelerated	Orderly	Disorderly	No Action
Investment Grade Bonds	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
High Yield Bonds	Low risk	Low risk	Low risk	Low risk	Medium low risk	Medium low risk	Medium low risk	Low risk	Medium risk	Medium low risk	Medium risk	Low risk
Public Equity	Medium low risk	Low risk	Medium low risk	Low risk	Medium risk	Medium low risk	Medium risk	Low risk	Medium high risk	Medium low risk	Medium high risk	Low risk
Private Equity	Low risk	Low risk	Low risk	Low risk	Medium low risk	Low risk	Medium low risk	Low risk	Medium risk	Medium low risk	Medium risk	Low risk
Structured Products (Non-Agency)	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
Private Credit	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	Medium low risk	Low risk	Medium low risk	Low risk
Natural Resources	High risk	High risk	High risk	Low risk	High risk	High risk	High risk	Medium low risk	High risk	High risk	High risk	Medium low risk
Leveraged Loans	Low risk	Low risk	Low risk	Low risk	Medium low risk	Medium low risk	Medium low risk	Low risk	Medium risk	Medium risk	Medium risk	Low risk

Risk Management

b.) Describe the organization's processes for managing climate-related risks.

Managing risk is core to Liberty Mutual's business. We recognize that physical, transition and liability risks could have a significant impact on our operations, financial performance and reputation, and consideration for these risks are embedded in our overall risk management strategy.

Our processes for prioritizing climate-related risks are designed to be dynamic and proactive, and are continually reviewed and updated as new information becomes available.

- We prioritize climate-related risks through a multi-step process that includes evaluating the materiality of the risks – considering factors such as the potential physical and transition risks from climate change, regulatory requirements and stakeholder expectations – and determining their impact on operations and financial performance.
- We assess the potential impact of climate change on underwriting, investment and operations by investing in and analyzing quality data, modeling scenarios and engaging with relevant stakeholders. The results of these assessments differentiate our decision-making process, enabling us to focus on sub-perils that drive loss and translate to actionable metrics for the business.

A vital function of our Enterprise Risk Management (ERM) group is establishing exposure and loss thresholds for natural catastrophe events and reasonably ensuring the amount of capital at risk does not exceed these thresholds. By using both loss simulation models, as well as historical loss trend data, Liberty Mutual can estimate losses for natural catastrophe events of various magnitudes and probabilities. This information is incorporated into strategic planning, pricing and reinsurance purchasing decisions.

Leveraging catastrophe models and research to manage physical risks

We assess the exposure of our portfolios, geography, business division and product segments to natural disasters such as hurricanes, earthquakes and severe weather events. Catastrophes, whether natural or man-made, have the potential to adversely impact underwriting and financial results. To manage our catastrophe exposure, Liberty Mutual incorporates a variety of modeling techniques, underwriting controls and reinsurance placements to effectively monitor and limit exposures. This includes an analysis of historical weather data and an assessment of the vulnerability of our assets and operations to these events.

Based on this analysis, we develop strategies to mitigate physical risks, such as implementing disaster response plans and transferring risk using insurance and reinsurance.

Catastrophe models are the primary tool that we utilize to assess the potential financial impact of natural catastrophe-related risk. Liberty Mutual uses the latest catastrophe loss simulation models from third party modeling specialists, such as Verisk Extreme Event Solutions and Risk Management Solutions, in addition to our own internally developed tools for modeling and analysis.

We supplement our models regularly to include the most up-to-date scientific information on severe weather perils, as well as our exposure data at the policy level. This allows for the most current assessment of natural catastrophe exposure. Output from these models is incorporated into the underwriting process and aids in the development of risk selection guidelines. In addition, catastrophe modeling is an important factor in establishing pricing differentials for individual risks, as well as setting program rate structures. These measures enable us to effectively manage our natural catastrophe exposure portfolio.

Severe catastrophes are incorporated into a stress testing regime, which Liberty Mutual performs regularly as a component of its ERM program. Stress testing facilitates understanding of the capital or liquidity impacts of various deterministic stress scenarios or combinations of scenarios. This allows Liberty Mutual to ensure that our current portfolio of exposures does not result in a capital or liquidity impact that exceeds established tolerances.

Liberty Mutual establishes gross and net tolerances for natural catastrophe risk to manage both direct underwriting exposure and group-wide retention of risk. Occurrence tolerances are utilized to manage exposure concentration related to a single large event. Aggregate tolerances are utilized to manage the potential exposure to an accumulation of loss from a mix of varied events throughout the year. Liberty Mutual sets tolerances and models exposure utilizing both Probable Maximum Loss (PML), which is a Value-at-Risk (VaR) measure, and Conditional Tail Expectation (CTE), which is a Tail Value-at-Risk (TVaR) measure. Both PML and CTE measures are used for assessing natural catastrophe exposures.

Natural catastrophe models are run quarterly, and modeled losses are then evaluated relative to respective tolerances. Limits for certain exposures (i.e., regional level exposures) are also evaluated and monitored on an ongoing basis by management. When appropriate, mitigation plans are developed to reduce exposures in excess of tolerance and/or to correct adverse trends.

Risk Management

Wildfire risk

Recent years have seen increased wildfire concerns across the industry with historically high insured property losses. The Exposure Management Team within Liberty Mutual's Enterprise Risk Management organization works collaboratively with catastrophe modeling teams in other business units to analyze North American wildfire and guide decision making to help the Company manage wildfire loss exposure.

Examples of such efforts include adopting the updated Verisk Extreme Event Solutions (EES) – formerly AIR – wildfire model in 2019, to complement other internally developed tools like wildfire hazard maps and underwriting preferences. These tools are set at a granular geographic level to provide more accurate and detailed information about the risks associated with wildfires. To continue these efforts, we validated the Verisk EES California wildfire model and reviewed the model in other key wildfire hazard states. Given wildfire's importance as an emerging climate peril, we now supplement the catastrophe modeling with a custom wildfire hazard layer built in-house, utilizing expert external data sources such as the USDA Wildfire Potential Hazard map as well as calibration with Liberty Mutual's own claims experience.

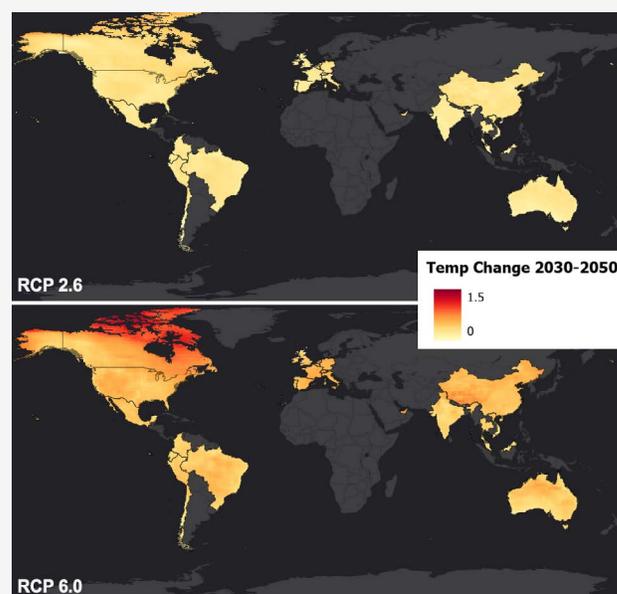
We will continue work to validate and incorporate additional modeling into underwriting and risk selection to meet exposure management imperatives with respect to emerging North American wildfire activity.

Severe convective storms

Severe convective storms – which involve losses from tornadoes, hail and straight-line wind – has been part of our proprietary Liberty Mutual View of Catastrophe Risk for several years. While individual events are not typically significant, the accumulation of loss from this combination of weather events regularly comprises a sizable share of our overall annual aggregate catastrophe losses. Verisk EES released an update to their Severe Convective Storm model in 2022, and Liberty Mutual has undertaken work through our Catastrophe R&D teams to evaluate this model. The Liberty Mutual View of Catastrophe Risk will be updated accordingly based on this work and our in-house claims history as part of our continuous reassessment of this risk. While we do not consider severe thunderstorms to be a peak climate peril, this model evaluation falls under our routine monitoring of perils with a weaker climate connection.

Capturing the impact of chronic physical risks

By examining how the average temperature and precipitation may change over time and across regions where Liberty Mutual operates, we can prioritize where we may need to focus specific research on how natural catastrophes may deviate from historical norms. The figure below portrays an outcome of our scenario analysis on chronic physical risk, specifically highlighting our work on global average temperature change.¹²



Source: Climate Impact Explorer Tool, Climate Analytics

Risk Management

Recent research initiatives assessing the impacts of climate change and physical risk

Liberty Mutual is committed to continually tracking and updating our view of hazards in responses to changes in both the built environment and climate, and clearly articulating where we see changes in losses as a result.

In 2022, we continued our efforts from 2021 to evaluate significant physical hazards in our business. Specifically, we undertook several new initiatives to better understand material physical climate-related risks that could affect our customers and our business. We conducted a thorough analysis of weather patterns, extreme weather events and long-term climate trends by monitoring and studying temperature, precipitation, sea level rise and other climate indicators. As a result of this analysis, we have determined that hurricane, flood and wildfire risks are highly material to Liberty Mutual's book of business and are scientifically credible based on near-term climate models.

HIGHEST RISK

Hurricane risk

Last year's reverse stress testing exercise helped us to prioritize geographies that may be sensitive to future changes in hurricane risk. This year, we are expanding that risk assessment by ensuring that past human-driven climate changes are sufficiently represented in our current model view. We are currently focusing on how past anthropogenic climate changes, like aerosol pollution, may have influenced our historical records of hurricane activity.

Flood risk

Floods are a fast-emerging climate-related peril, and we view data investments as a key differentiator for who can leverage opportunities in this market. In 2021, building on our intensive evaluation of water hazard models, we enhanced exposure data to make flood models more operational. By prioritizing investment in geocoding analytics, aerial imagery and machine learning, we strengthened our location analytics to manage this critical climate peril. As a result of the initial climate risk framework produced in the Liberty Specialty Markets business segment, we are undertaking an adjustment of Central European flood risk. Leveraging research from IPCC AR6 and other related academic papers, we will use this updated view to account for climate-related impacts in our current portfolio of business in that region.

In previous years, we partnered with stakeholders and investigated potential concentrations of property value and environmental liability risk. Further research from 2022 highlighted the importance

of critical thresholds for risk accumulation, often driven by infrastructure like levees and seawalls. Our Enterprise Risk Management and Public Affairs teams partnered to highlight the importance of infrastructure investments for coastal resilience.

We are exploring using our sea level coastal flood research to understand potential clash across multiple lines of business. Flooding does not just cause physical damage – it can also drive secondary impacts like environmental contamination, so we are working to tie together our property and casualty books for critical accounts to highlight loss mitigation opportunities.

Wildfire risk

We researched catastrophic wildfire-caused losses in recent history to supplement the wildfire hazard maps developed to support our underwriting functions in 2021. Wildfire has emerged as a physical hazard with a material climate-driven component in recent scientific research. However, the strongest relationship is between temperature and burn area, which has a poor relationship with loss potential. Therefore, to supplement our proprietary hazard maps, we are specifically researching wind-driven fires, which have led to catastrophic losses such as the Camp Fire in California and Marshall Fire in Colorado. Understanding high-risk wind regions can help manage current fire accumulations.

We are also conducting sensitivity tests on forward-looking temperature scenarios to understand how the drivers of the most catastrophic wildfires may change in the future.

EMERGING RISK

Power grid

Power grid and other infrastructure failures behave as a climate risk multiplier. It doesn't matter what the hazard is – infrastructure failures exacerbate the losses and enhance the duration of interruption, driving up time element and recovery costs. We are working in coordination with utility and power industries to advocate for a new tax credit designed to harden the nation's electric grid.

Our Enterprise Security and Business Continuity team is piloting solar-powered generators for internal operations and is exercising operating capabilities in power outage scenarios with internal and external partners.

Risk Management

Managing transition risk through business integration

Across this report, we detail the steps that Liberty Mutual takes to assess and manage transition risk. As a result of this work, we consider the potential impact of the transition to a low-carbon economy on our portfolios, geography, business division and product segments. This includes an assessment of the potential impact of changes in energy production and consumption patterns, as well as the impact of new technologies and business models. Based on this analysis, we develop strategies to manage transition risks, such as investing in renewable energy and low-carbon technologies and engaging with stakeholders to understand and manage the potential impact of these risks.

Informed by research and the rising number of climate-related litigation cases around the world, we are also beginning to look into liability risk related to climate change as its own risk category. Emerging liability issues have an increasing impact on underwriting policies and pricing given the rise in liability lawsuits that have been filed on climate change, novel theories of liability and supply chain liability. We are beginning to work with partners to understand the evolving impacts of climate-related liability risks to our customers, our portfolios and our business. This ongoing research and analysis will continue to inform our strategy to manage liability risk across different businesses and geographies – influencing how we invest in risk management systems, implement sustainability and governance best practices and transfer risk through the use of insurance and reinsurance.

Liberty Mutual also recognizes the importance of incorporating existing and emerging regulatory requirements into our risk management strategy. To ensure compliance with regulatory requirements, we have established a robust risk management framework that includes regular monitoring of changes to regulatory requirements and the development of internal policies and procedures. This framework includes conducting regular assessments of operations to identify potential regulatory risks and working with legal and compliance teams to develop and implement plans to mitigate these risks. We engage with regulators across markets to inform the development of appropriately prudent and pragmatic risk management regulation, and to ensure that our practices align with requirements. We also actively participate in industry associations and forums to share expertise.

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

Integration includes organizational structure and context. Read more about our accountability and oversight mechanisms, including further detail on the Climate Council, in the Governance section of this report.

GOVERNANCE

We assess climate-related risk at an enterprise-level and within each business unit. This effort is led by the Enterprise Risk Management (ERM) team and is coordinated through the ERM committee governance structure and Climate Council. Our internal risk management processes are aligned with our sustainability priorities and informed by our understanding of climate-related risks.

ERM at Liberty Mutual focuses on the identification and quantification of material exposures, the communication and management of the exposures across the company and the development and execution of strategies to mitigate identified risk where necessary. Liberty Mutual ensures the appropriate Liberty Mutual Holding Company Board oversight of the ERM program via our Board Risk Committee (BRC). The ERM Executive Committee, chaired by the CEO, has the responsibility of overseeing the development of a process to aggregate, evaluate and manage group-wide exposures across our organization. The committee also provides guidance on the implementation of ERM processes.

Risk Management

Enterprise Risk Management governance structure

Below is a visual representation of the reporting relationships among the committees that make up our ERM governance structure.



- Board Risk Committee (BRC):** The BRC is composed of no fewer than three independent Board of Directors members. It is responsible for overseeing and reasonably assuring that we maintain adequate policies, controls and practices within our ERM framework to continually identify, measure, manage and mitigate critical risks that could have a material impact on Liberty Mutual. The BRC also recommends protocols for full Board oversight where necessary. The BRC members and committee chair are elected by the full Board of Directors on an annual basis. On a quarterly basis, the BRC reviews heat maps and risk dashboards and receives detailed briefings on specific ERM key risks. The Chief Risk Officer and Chief Sustainability Officer provide annual briefings to the Board. In 2021, there was an additional session for the Board with a Liberty Mutual climate scientist.
- ERM Executive Committee:** Management oversight of ERM resides with the ERM Executive Committee, chaired by the CEO. The ERM Executive Committee meets every quarter to provide a high-level platform for communication and action across our business units and functions. The committee focuses on identifying and addressing significant and/or emerging risks in areas such as insurance, market, credit and operations. In addition to reviewing risk-related information and analysis, the ERM Executive Committee evaluates strategies to manage and mitigate potential loss events that may create risk exposures outside of the organization's defined tolerance and limit parameters.

The ERM Executive Committee has oversight responsibilities to define organization-wide ERM roles and responsibilities, establish accountability, guide the ERM implementation process, establish Liberty Mutual-wide risk tolerances, approve risk mitigation plans and monitor ERM effectiveness. The ERM Executive Committee maintains processes to aggregate, evaluate and manage group-wide exposures.

The ERM Executive Committee works closely with the ERM Operating Committee. As issues or risks are elevated by the ERM Operating Committee, it is the responsibility of the ERM Executive Committee to evaluate, mitigate and review contingency plans for these risks and exposures. The ERM Executive Committee also reviews ERM reporting materials on a quarterly basis and makes strategic and risk management recommendations accordingly.

- ERM Operating Committee:** The ERM Operating Committee is responsible for reviewing current and projected exposures, modeling and stress testing results for those risks that could have a material adverse impact on Liberty Mutual. ERM reporting materials, which include key metrics for ERM key risks, as well as any issues elevated by the Emerging Risks, Credit Risk, Catastrophe Underwriting Risk, Model Risk Management or Business Unit ERM Committees are presented quarterly to the ERM Operating Committee. The ERM Operating Committee prioritizes issues and develops recommendations and actionable contingency plans for review by the ERM Executive Committee. Further, the ERM Operating Committee maintains processes to aggregate, evaluate and manage group-wide exposures.

The ERM Operating Committee is chaired by the Chief Financial Officer and comprises officers and employees who are responsible for directly managing risks that have the potential to materially impact the financial or operational viability of Liberty Mutual. Committee members include key senior managers from both business units and various functional groups including Underwriting, Product, Claims, Investments, Finance, Reinsurance, IT, Actuarial, Sustainability, Talent and Legal.

Risk Management

- **Catastrophe Underwriting Risk Committee (CatCo):** The CatCo reports to the ERM Operating Committee and has oversight responsibilities for catastrophe underwriting risk across the organization. The Committee maintains a process to aggregate, evaluate, manage and mitigate group-wide catastrophe risk exposures, and oversees the process for allocating catastrophe risk capacity to Global Retail Markets and Global Risk Solutions. The CatCo works with the business segments and functional groups to develop potential mitigation plans where required.

The CatCo is chaired by the Chief Risk Officer and includes officers and employees who are responsible for directly managing or measuring significant components of catastrophe risk that could have a material adverse impact on our financial or operational viability. Committee members include senior managers from both business units and various functional groups including Underwriting, Product, Reinsurance, Exposure Management, Finance, Actuarial and Legal.

- **Emerging Risks Committee (ERC):** The ERC reports to the ERM Operating Committee and has oversight responsibilities for emerging risks – potentially significant, new or changing threats and/or vulnerabilities that have not been influential or important in the past but may be influential in the future – that may materially threaten operations, financial results, objectives and strategic priorities of Liberty Mutual. The ERC supervises processes to identify, evaluate, prioritize and monitor Liberty Mutual-wide exposures and responses to emerging risks. The ERC also determines which issues warrant coordinated action, escalates discussion topics and makes recommendations regarding emerging risks issues to the ERM Operating Committee and ERM Executive Committee.

While the ERC examines all identified emerging risks, the Committee's focus is on rapidly emerging or high impact risks. The Committee coordinates the development of contingency plans as directed by the ERM Operating and Executive Committees. The ERC is chaired by the Chief Risk Officer and its members include senior managers from both business units and various functional groups including Underwriting, Product, Claims, Investments, Finance, Reinsurance, IT, Actuarial, Sustainability, Enterprise Security and Business Continuity, and Legal.

In 2022, the ERC advanced understanding on heatwaves. A summary of this work can be found in the Strategy section.

 STRATEGY

- **Business unit ERM committees:** Business unit ERM committees are chaired by the business unit president, with membership that includes business unit heads of Underwriting/Product, Actuarial, Finance, Risk Management, Operations and other relevant functions or business segments. Committee membership will vary by business unit based on the unit's risk profile and organizational structure. Key points of continuity between the business unit and Group ERM committees are the business unit Chief Underwriting/Product Officers, Chief Financial Officers, Chief Risk Officers and Chief Actuaries, who serve as members of both their business unit ERM Committee and the group-level ERM Operating Committee.

Each business unit's ERM committee is responsible for the oversight of key risks that are of the greatest significance to their business unit and for the identification of any risks that are of sufficient materiality to warrant escalation to the Group ERM Operating Committee. Given the differing risk composition of each business unit, as well as the centralized management of certain key risks, the focus of the business unit ERM committees may differ from both the Group ERM committees and those of the other business units.

- **ERM catastrophe risk management governance:** Liberty Mutual has a mature catastrophe risk management discipline. Central to this discipline is an ERM-led catastrophe risk management governance system that derives natural catastrophe gross and net tolerances and limits at the corporate and business unit levels, based on the company's risk appetite, capital and planned earnings. Our ERM function maintains exposure databases and models losses for key perils, then reports on modeled losses relative to limits and tolerances on a quarterly basis.

We continue to grow our Catastrophe Research and Development (R&D) function, staffed by climate and earth scientists, engineers and analytical talent. In particular, the R&D team considers a range of event frequency and severity assumptions beyond those embedded in standard models and builds tailored model adjustments and analytical tools using Liberty Mutual's historical data, third party tools, new scientific research and technologies, and input from expert consultants. This allows Liberty Mutual to develop our own proprietary views of risk to prepare ourselves and our clients for a future in which the risk landscape may look very different from today – and to collaborate across industries and sectors, including with government, to share learnings and to collaboratively address gaps in data and the latest scientific understanding of climate change.

Metrics and Targets

Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.

Liberty Mutual continues to advance our commitment to transparency, measurement and disclosures. To learn more about our efforts:

[2022 SUSTAINABILITY REVIEW](#) [2022 GRI INDEX](#) [2022 SASB REPORT](#) [OUR SITE](#)

a.) *Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.*

Along with this report, Liberty Mutual published our second annual [SASB disclosure report](#), which details metrics used to measure environmental risk exposure, including probable maximum loss (PML) of insured products from weather-related natural catastrophes, and total amount of monetary losses attributable to insurance payouts from (1) modeled natural catastrophes and (2) non-modeled natural catastrophes by type of event and geographic segment (net and gross of reinsurance).

Measuring progress against our thermal coal policy

Liberty Mutual continues to uphold our global policy on thermal coal underwriting and investing. Liberty Mutual Investments has fully implemented the policy, formalized in December 2019, which stipulates that:

- Liberty Mutual will not make new investments in companies that generate more than 25% of their revenues from thermal coal mining or utility companies generating more than 25% of their electricity production from thermal coal
- Liberty Mutual will divest existing investments in companies that exceed this threshold by 2023, over this coming year

Since implementing the coal policy, we have reduced our overall exposure to coal-intensive investments (as defined in the policy) by more than 86%. Additionally, our coal-intensive holdings as of year-end 2022 are entirely comprised of bond investments.

We are also continuing to implement our coal policy across our underwriting portfolio, which stipulates that we will no longer accept underwriting risk for companies where more than 25%

of their exposure arises from the extraction and/or production of energy from thermal coal. Over the last several years, we have been phasing out coverage for customers that will not meet this threshold by the end of 2023.

As we continue to evaluate our policy on thermal coal against market conditions, we are comfortable that there are no material changes that need to be made.

Transitioning our investment portfolio

Liberty Mutual Investments manages Liberty Mutual Insurance Group's globally invested financial assets with a mission to deploy and create capital for our business on a sustainable basis. We have made measurable progress on advancing the energy transition through our investments. In 2022, Liberty Mutual Investments directly managed more than \$75 billion in fixed income investments and oversaw more than \$12 billion in private investments in asset classes such as private equity, real estate and direct lending funds and co-investments.

	2022	2021	2020
Total investments in renewable energy¹³	\$1,274 million	\$1,468 million	\$861 million
Total investments in energy transition solutions¹⁴	\$388 million	\$287 million	\$91 million
UNPRI signatory	Yes	Yes	Yes
Responsible investment policy	Yes	Yes	Yes

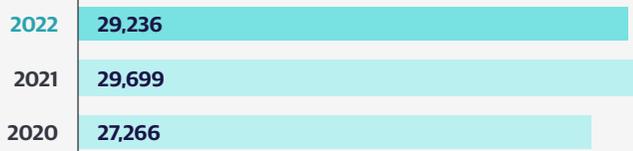
Metrics and Targets

b.) Disclose Scope 1, Scope 2 and, if appropriate, Scope 3 greenhouse gas (GHG) emissions and the related risks.

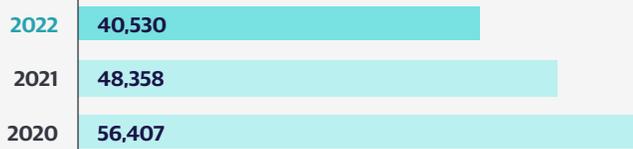
Greenhouse gases (GHG) from the use of fossil fuels are the driving factor contributing to climate change. We are continuing to do our part to reduce our own environmental impacts by reducing our consumption of these GHG-emitting resources and tracking our progress. We currently measure and report on Scope 1 and Scope 2 GHG emissions, and two categories of Scope 3 emissions: waste generated from operations (for US owned and operated facilities) and emissions from business travel. In 2022, there was an increase in Scope 3 due to business travel resuming following COVID-19 restrictions.

Measuring carbon emissions

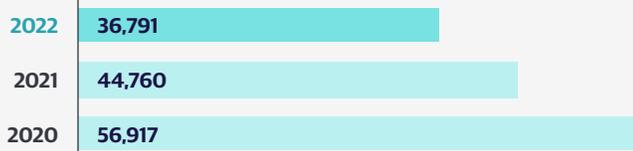
Scope 1 CO2e emissions^{15,16} (MTCO2e)



Scope 2 CO2e emissions^{15,16} (MTCO2e) location based



Scope 2 CO2e emissions¹⁵ (MTCO2e) market based



Scope 3 CO2e emissions¹⁷ (MTCO2e)



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

In 2021, Liberty Mutual announced a commitment to a 50% reduction of Scope 1 and 2 global greenhouse gas (GHG) emissions from 2019 levels by 2030, taking another step in our long-term strategy toward a low-carbon future. In 2022, we achieved a 43% reduction of Scope 1 and 2 global emissions compared to our 2019 baseline.

In June 2022, in compliance with the United Kingdom (UK) government's net zero plan, our UK operations announced a commitment to net zero by 2050, including scope 1 and 2 and specific categories of scope 3 set by the government. We are continuing to explore the implementation of further measures to reach this goal and to accelerate our decarbonization progress.

To reach our GHG reduction goals, we continue to decrease our operational carbon footprint by taking actions to increase operational efficiencies and identifying renewable energy opportunities across our real estate portfolio. We continue to use learnings from 2020 to increase emission reduction rates as we ramped up the return-to-office transition. We also continue to evaluate our office space portfolio as a number of employees across the global network continue to work from home or in a hybrid format, which is a factor in our overall reduction of GHG emissions.

Our employees' commitment to climate action

Beyond education, we hosted a 2022 Sustainability Challenge that offered participants the opportunity to engage in daily sustainability-related activities that supported their role at Liberty Mutual and personal life. Collectively, over 2,000 Liberty Mutual participants were able to measure their impact resulting in:



Reference notes

- 1 "TCFD Recommendations." Task Force on Climate-Related Financial Disclosures, <https://www.fsb-tcf.org/recommendations/>
- 2 "Marsh launches world's first insurance facility for green and blue hydrogen project risks." Marsh, <https://www.marsh.com/sg/about/media/worlds-first-insurance-facility-for-green-and-blue-hydrogen-project.html>
- 3 "Welcome to E&S Insurer Conference & Awards 2023." E&S Insurer Conference & Awards 2023, https://www.es-insurer.com/conference-awards-2023/?utm_source=listrak&utm_medium=email&utm_term=VIEW-THE-WINNERS&utm_campaign=Winners+announced%3a+E%26S+Insurer+Awards+2023#winner
- 4 "NGFS publishes the third vintage of climate scenarios for forward looking climate risk assessment." NGFS, <https://www.ngfs.net/en/communique-de-presse/ngfs-publishes-third-vintage-climate-scenarios-forward-looking-climate-risks-assessment>
- 5 "NGFS V3 Data, GCAM Model Outputs." NGFS, https://www.ngfs.net/sites/default/files/media/2022/11/21/technical_documentation_ngfs_scenarios_phase_3.pdf
- 6 "2030 Emissions Reduction Plan: Canada's Next Steps for Clean Air and a Strong Economy," Environment and Climate Change Canada. https://publications.gc.ca/collections/collection_2022/eccc/En4-460-2022-eng.pdf
- 7 Systems thinking involves several key components to provide a more holistic and comprehensive understanding of complex systems, including: Recognizing the interconnections between different parts of a system; Understanding the feedback loops and dynamic behavior that are at play within the system; and Recognizing the structure and scale of both systems themselves and the events that are related to them. "A Definition of Systems Thinking: A Systems Approach." Arnold and Wade, 2015, <https://www.sciencedirect.com/science/article/pii/S1877050915002860>
- 8 "NGFS Scenarios Portal." NGFS, <https://www.ngfs.net/ngfs-scenarios-portal/>
- 9 "Weather Related Fatality and Injury Statistics." National Weather Service, <https://www.weather.gov/hazstat/>
- 10 "Climate-related litigation: Raising awareness about a growing source of risk." NGFS, https://www.ngfs.net/sites/default/files/medias/documents/climate_related_litigation.pdf
- 11 "Tornadoes and climate change: what does the science say?," Carbon Brief, <https://www.carbonbrief.org/tornadoes-and-climate-change-what-does-the-science-say-2/>
- 12 Mean Air Temperature change between 2030-2050 compared to the reference period of 1986-2006. The top map represents changes in the RCP 2.6 scenario (aligned to a 1.5C pathway), and the bottom represents changes in the RCP 6.0 scenario (aligned to roughly a 3C pathway). Data is from the Climate Impact Explorer Tool from Climate Analytics, https://climate-impact-explorer.climateanalytics.org/impacts/?region=DEU&indicator=tasAdjust&scenario=h_cpl&warmingLevel=1.5&temporalAveraging=annual&spatialWeighting=area&compareYear=2030
- 13 In 2020, Liberty Mutual modified its definition of renewable energy to include only energy derived from solar, wind and hydro sources. 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. In 2021, fixed maturities and public equities of US\$506 million, LP, LLC and other equity method investments of US\$406 million and unfunded commitments of US\$556 million were included, while 2020 includes fixed maturities of US\$180 million, LP, LLC and other equity method investments of US\$288 million and unfunded commitments of US\$393 million.
- 14 Includes unfunded commitments of US\$247 million (2022), US\$221 million (2021), US\$74 million (2020).
- 15 Previously reported global GHG emissions were restated to include acquisitions finalized in 2022 and improved methodologies.
- 16 Figures represent global operations and include acquisitions finalized in 2022.
- 17 2022 and 2021 Scope 3 is limited to global commercial air and ground travel, including employee mileage and reimbursement for US and Canada only, and waste from U.S. owned and operated facilities; 2020 Scope 3 figures are limited to only commercial air and ground travel for U.S.-Based employees. Increase in Scope 3 due to business travel post-Covid.

Contact us

For questions or comments regarding this report, please contact Sustainability@LibertyMutual.com.

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This report contains forward-looking statements intended to enhance the reader's ability to assess the Company's future financial and business performance. Forward-looking statements include, but are not limited to, statements that represent the Company's beliefs concerning future operations, strategies, financial results, or other developments and contain words and phrases such as "may," "expects," "should," "believes," "anticipates," "estimates," "intends" or similar expressions. Because these forward-looking statements are based on estimates and assumptions that are subject to significant business, environmental, economic and competitive uncertainties, many of which are beyond the Company's control or are subject to change, actual results could be materially different.

The Company's forward-looking statements speak only as of the date of this report or as of the date they are made and should be regarded solely as the Company's current plans, estimates and beliefs. The Company assumes no obligation to update these forward-looking statements or the contents of this report following publication in any form or format. For a discussion of the Company's financial information, visit the Company's Investor Relations website at www.libertymutualgroup.com/investors.

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Except where noted, the information covered in this report highlights our performance and initiatives in fiscal year 2022. The inclusion of information in this report should not be construed as a characterization regarding the materiality or financial impact (or potential impact) of that information.

Unless the context otherwise requires, references in this report to "Liberty Mutual," "Liberty Mutual Group," the "Company," "we," "us," and "our" are to Liberty Mutual Holding Company, Inc. together with its direct and indirect subsidiaries.