GOVERNANCE - NARRATIVE

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

A. *Describe the board and/or committee responsible for the oversight of climate-related risks and opportunities.*

The Liberty Mutual Holding Company Inc. (LMHC) Board of Directors 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. The Board engages Liberty Mutual Investments (LMI), Global Risk Solutions (GRS), US Retail Markets (USRM), the Office of Sustainability, the Enterprise Risk Management (ERM) group, and our Finance teams in discussions around the business landscape and climate strategy. The Chief Risk Officer and Chief Sustainability Officer provide annual briefings to the Board.

The LMHC Board Risk Committee (BRC) is responsible for overseeing and assuring that we maintain adequate policies, controls and practices within our enterprise risk management (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. On a quarterly basis, the BRC reviews heat maps and risk dashboards and receives detailed briefings on specific ERM key risks.

The LMHC Board Governance and Sustainability (G&S) Committee provides strategic oversight and performance evaluation of our sustainability practices and priorities. The G&S Committee also oversees corporate governance disclosures, including but not limited to, the Company's annual Sustainability Review and Corporate Governance Annual Disclosure. In its first year, the G&S Committee, which includes membership from the Risk, Investment, Audit, and Compensation Committees of the LMHC Board of Directors, met four times. From holding briefings with our Chief Sustainability Officer, Liberty Mutual 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, working closely with the Chief Sustainability Officer, the Chair of the Climate Council, and the ERM 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 we are 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.

At the management level, we have created governance structures that support accountability through:

Executive Leadership Team: Led by the CEO, this team has management-level responsibility for overseeing Liberty Mutual's strategic response to climate change. The Chief Sustainability Officer presents to this team quarterly on sustainability and climate-related risks and opportunities and to facilitate strategic discussion and coordinate activities across different departments and stakeholders toward our sustainability goals.

ESG Executive Committee: A small group of senior executives responsible for overseeing the implementation of our sustainability and climate strategy. Chaired by the 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.

Climate Council: Chaired by a senior member of the Office of Sustainability, the enterprise-level Climate Council oversees implementation of our climate strategy. The council ensures ongoing assessments of climate-related risk remain coordinated across business lines and functions.

Enterprise Risk Management (ERM): Liberty Mutual's ERM function is responsible for overseeing and monitoring risk, including climate-related risk, on an ongoing basis. ERM 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. Climate-related risk is assessed at an enterprise-level and within each business unit. This effort is led by the ERM function and is coordinated through the ERM committee governance structure, which includes the ERM Executive Committee, ERM Operating Committee, Catastrophe Underwriting Risk Committee, Emerging Risk Committee, and business unit ERM committees.

Liberty Mutual has a catastrophe modeling Research and Development (R&D) team which includes climate and atmospheric scientists, engineers, and other catastrophe modeling experts. The team is charged with evaluating catastrophe models and shaping Liberty Mutual's view of risk including work to understand and assess climate-related risk. This team works closely with the Office of Sustainability and has membership on the Climate Council.

Liberty Mutual Investments (LMI): As stewards of Liberty Mutual's capital, LMI's mission is to grow and preserve that capital in support of the organization's goals. In support of this mission, LMI's approach to assessing climate-related risk is driven by a robust governance structure enabling senior leaders across the entire platform to guide strategic decisions. In 2023, LMI created the new Head of Impact and Sustainable Investment Strategies role to further drive our approach to integrating sustainability across the portfolio as well as lead the execution of our impact investing strategy.

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 GRS and USRM. In November 2022, GRS created a new role – Global Leaders, 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. In April 2023, the GRS Sustainability Team was re-positioned to report directly into the Office of Risk and Office of Underwriting, with the team now responsible for owning ESG risk factors. 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. 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.

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, ERM 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.

GOVERNANCE – CLOSED ENDED QUESTIONS

- Does the insurer have publicly stated goals on climate-related risks and opportunities? **YES**
- Does your board have a member, members, a committee, or committees responsible for the oversight of managing the climate-related financial risk? **YES**
- Does management have a role in assessing climate-related risks and opportunities? **YES**
- Does management have a role in managing climate-related risks and opportunities? **YES**

STRATEGY - NARRATIVE

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

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

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. The systems-level climate scenario analysis explores 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. The portfolio-level climate scenario analysis covered Liberty Mutual's Investments over five-, 10- and 15-year time horizons. Data limitations and business strategy constrain realistic portfolio-level analytics to a time scale that doesn't exceed 15 years.

Through Liberty Mutual's scenario analysis exercise we have 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 risks 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 policy makers seek to reduce macroeconomic and other transition-related stresses on their economies.

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 the global level will be required to ensure 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.

Physical risk

At Liberty, we use a range of techniques to handle the range of uncertainty associated with various physical hazards. For risks that have a reasonably clear direction and magnitude, such as sea level rise, we use defined scenarios and time frames (such as those produced by NOAA for sea level rise in the US). For risks that have a clear direction but not magnitude (such as, we know that the risk will increase in the future but it is unclear how much), we run sensitivity exercises to identify potential areas of change or impacted portfolios (for example, we run temperature sensitivity tests on wildfire accumulation risk). Finally, for risks where both the direction and the magnitude of impact are unclear, scenarios provide little planning value (such as Atlantic hurricane frequency). In these cases, we use a method of reverse stress testing, where rather than a single scenario, we test a wide range of plausible impacts, and use this to identify downstream effects on various business segments or geographies for monitoring.

B. Describe the impact of climate-related risks and opportunities on the insurer's business, strategy, and financial planning.

Liberty Mutual has taken several actions to address the insights identified through our enterprise-wide climate scenario analysis exercise 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. 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. Liberty Mutual has focused on bolstering our own research and capabilities on the energy transition. 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 levels.

Refining our climate strategy to clarify our role in the energy transition and provision of services to support the transition to a low-carbon economy. 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 are best suited to engage to manage and reduce risk for our customers.

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

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 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 risks – and emerging risks – for our customers, our business and broader global understanding.

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.

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

We are experts in risk and as risk managers, we help our customers deeply understand a risk and how to manage it, giving them confidence to achieve their goals. We recognize that new and alternative solutions are needed to achieve a low-carbon economy. We aim to help clients manage their own climate risks by offering underwriting, risk management identification offerings, and products focused on sustainability solutions.

We leverage data and analytics to better understand the potential impacts 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 risk. 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.

Recent innovations in our products and services include:
WeatherReady is a new feature on our Liberty+ digital value-added services platform. 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.

Liberty Mutual won an E&S Insurer Innovation Award for creating the “first to market” insurance solution focused on carbon sequestration. 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.

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. 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.

Liberty Mutual has advanced alternative solutions through underwriting by offering cross-line support on one of the largest hydrogen facilities in the Middle East. Liberty Mutual works with governmental agencies on insurability of technology and enabling sustainable growth with existing networks of hydrogen and carbon capture. Liberty Mutual engaged in an early partnership on a world-scale project in Australia to support sustainable electricity.

At Liberty Mutual Investments (LMI), we believe catalyzing innovation and accelerating the deployment of new technologies is crucial to addressing climate change. Relative to peers, LMI has a higher focus on venture capital and early-stage investments within our alternative assets’ portfolio. This is enhanced by our dedicated Energy Transition & Infrastructure (ET&I) team that has historically emphasized innovative climate-related opportunities. In addition to the more than $1.2 billion in renewable energy-generation investments across LMI’s fixed income and alternative investments, our ET&I team has invested more than $400 million in earlier stage energy transition opportunities (i.e., renewable and alternative fuels, waste-to-energy, and circular economy) and strategic investments in climate technology.

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

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 promoting more resilient building practices through our relationship with the Insurance Institute for Business and Home Safety (IBHS). In partnership with BuildStrong Coalition, Liberty Mutual served as a voice in both educating members of the United State Congress and encouraging action on key legislative proposals, including: The Resilient America Act, The SPEED Recovery Act and The Community Disaster Resilience Zones Act. We also engaged 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.

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 climate change. We are engaging with local and federal government agencies to exchange views about risks associated with emerging technologies.

We are exploring how we can leverage philanthropy and Liberty Mutual's Foundation to better support our customers during the climate transition. 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.

C. Describe the resilience of the insurer's strategy, taking into consideration different climate-related scenarios, including a 2 degree Celsius 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. 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 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. Specific actions we are 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 through our approach to investments, underwriting and risk advisory services. We are expanding our capacity to both address what is 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 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. Our aim is to keep insurance affordable and accessible. We are advocating for resilient infrastructure to minimize climate risk at a systems level.

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.

Mitigating emissions in our operations: We believe that every individual and organization must do their part to reduce emissions and support the energy transition. 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. 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.

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.

STRATEGY – CLOSED ENDED QUESTIONS

- Has the insurer taken steps to engage key constituencies on the topic of climate risk and resiliency? **YES**
- Does the insurer provide products or services to support the transition to a low carbon economy or help customers adapt to climate risk? **YES**
- Does the insurer make investments to support the transition to a low carbon economy? **YES**
- Does the insurer have a plan to assess, reduce or mitigate its greenhouse gas emissions in its operations or organizations? **YES**

RISK MANAGEMENT - NARRATIVE

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

A. *Describe the insurers' processes for identifying and assessing climate-related risks.*

This section expands on the recent steps we have 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. We are also beginning to look into climate liability risk as its own risk category.

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. 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. Climate modeling for the kind of extreme physical hazards that are most material to the insurance industry is still in the early development stage, and the reliability of climate data differs by peril, geography, and time horizon. 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.

- **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 are used 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. More recently, we've enhanced our identification and assessment of climate-related physical risks associated with Liberty Mutual's investment portfolio by combining our in-house catastrophe modeling expertise with our unique investment perspective and asset management goals.

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.

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 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.

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.

Liberty Mutual continues to leverage climate scenarios from the NGFS, as they provide clear and customizable insights depicting different low-carbon futures. 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 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.

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.

Portfolio-level Analysis – Investments
Our 2021 climate scenario analysis found the overall climate-related transition risk associated with our portfolio holdings to be 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. Since our portfolio-level analysis in 2021, we have tailored the analysis to jurisdiction-specific, portfolio-level climate stress tests to comply with global regulatory reporting requirements. These more granular portfolio-level analyses have informed additional insights for identifying and assessing climate-related transition risks associated with our portfolio holdings. As we evolve and improve our portfolio-level climate scenario analysis, our goal is to further embed insights into our overall approach to integrating sustainability into the investment process by providing investors with an expanded information set to aid investment research, support portfolio returns and lessen volatility over time. We are also exploring new pilots to directly model physical

catastrophe risks in our investment portfolio, as physical risk is a known limitation of climate value at risk analyses that focus on transition risk only for investment portfolios.

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

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 that the amount of capital at risk does not exceed these thresholds. By using both loss simulation models and 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.

Liberty Mutual Insurance (LMI) regularly monitors a variety of risk measures including climate-related risks through a robust risk-management architecture. This includes both detailed security specific analysis of material factors as well as reviewing aggregate exposures across sectors and industries. There is additional risk modeling around climate transition and physical risk, as described above.

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.

Utilizing 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.

Managing transition risk through business integration

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. 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 insurer's overall risk management.***

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, ESG Executive Committee and the 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 corporate group 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. The ERM Executive Committee and the Risk Committee of the Board of Directors each convene quarterly.

The scope of Liberty Mutual's 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.

Our scenario analysis exercise leveraged research and scenarios from the Network for Greening the Financial System (NGFS). The climate scenarios used for our systems-level assessment, from the NGFS included:

Divergent Net-Zero

- Transition risk stress test
- Assumes net-zero CO2 emissions by 2050 and limits warming to 1.5°C
- Assumes considerably high transition risks, due to quickened energy transition pace and policy variation, but overall results in the lowest physical risks

Delayed Transition

- High policy risk stress test
- Assumes global annual emissions do not decrease until 2030, strong policies needed to limit warming below 2°C
- Assumes new climate policies are not introduced until 2030 and policy action differs across countries and regions

Below 2ºC

- Low policy risk stress test
- Assumes net-zero CO2 emissions by 2070 and limits warming to 1.7°C
- Assumes that globally coordinated climate policies are introduced immediately, resulting in relatively low physical and transition risks

Nationally Determined Contributions (NDCs)

- Physical risk stress test
- Assumes continued progress towards a moderate climate ambition resulting in a steady decline in emissions and warming of ~2.5 – 3°C
- Assumes moderate to severe physical risks, lower transition risk

In September 2022, NGFS published the third iteration of climate scenarios, updating the scenarios with timely developments, including country-level climate commitments made at the 2021 United Nations Climate Change Conference (COP 26) and the latest data for Gross Domestic Product (GDP) and population. We compared V2 and V3 scenarios to understand how these updates might impact results of our scenario analysis exercise. 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. We incorporated additional observations from NGFS's third iteration into our analysis.

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.

For our portfolio-level analysis, we opted to use a proprietary tool that leveraged four 1.0 NGFS scenarios using the most up-to-date third-party data to test how Liberty Mutual's investment portfolio would perform under different scenarios. These scenarios included accelerated, orderly, disorderly, and no action scenarios.

RISK MANAGEMENT – CLOSED ENDED QUESTIONS

- Does the insurer have a process for identifying climate-related risks? **YES**
  - If yes, are climate-related risks addressed through the insurer's general enterprise-risk management process? **YES**
- Does the insurer have a process for assessing climate-related risks? **YES**
  - If yes, does the process include an assessment of financial implications? **YES**
- Does the insurer have a process for managing climate-related risks? **YES**
- Has the insurer considered the impact of climate-related risks on its underwriting portfolio? **YES**
- Has the insurer taken steps to encourage policyholders to manage their potential climate-related risks? **YES**
- Has the insurer considered the impact of climate-related risks on its investment portfolio? **YES**
- Has the insurer utilized climate scenarios to analyze their underwriting risk? **YES**
- Has the insurer utilized climate scenarios to analyze their investment risk? **YES**

METRICS AND TARGETS – NARRATIVE

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

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

Liberty Mutual's catastrophe management strategy is guided by principles that ensure catastrophe exposures remain within acceptable levels of risk tolerance. In addition, we make sure that pricing incorporates all costs associated with catastrophe risks and earns acceptable, risk-adjusted returns. These strategies are implemented through regular monitoring of catastrophe exposures via metrics such as average annual loss ("AAL"), probable maximum loss ("PML") and conditional tail expectation ("CTE"), which is a measure equivalent to tail value at risk ("TVaR").

The process for reviewing and managing catastrophe risk utilizes multiple internal and external tools at the business unit and enterprise level, allowing management to make business decisions that keep the company within established risk tolerances. These tools, when used together, provide the company with a comprehensive understanding of the catastrophe risk exposure across the enterprise.

Liberty Mutual rigorously manages its natural catastrophe exposures through its Enterprise Risk Management program, utilizing the latest loss simulation models from third-party catastrophe modeling firms, along with proprietary modeling processes. As part of its natural catastrophe modeling and exposure management, Liberty Mutual incorporates the most up to date scientific advances in the estimation of the Company's natural catastrophe loss exposure.

The Company closely monitors changes to the frequency and severity of weather-related natural catastrophes, as well as changing demographic patterns (e.g., coastal migration) which could increase potential exposure to climate risk.

Liberty Mutual has a catastrophe modeling Research and Development (R&D) team which evaluates the catastrophe models for alignment with Liberty Mutual's view of risk. In particular, the team considers a range of event frequency and severity assumptions beyond those embedded in standard models and builds bespoke views using Liberty Mutual's historical data, third party tools, input from expert consultants and new scientific research and technologies. The R&D team also regularly participates in industry and academic conferences to stay current with the latest scientific understanding of climate change.

The table below provides the probabilities that estimated catastrophe losses from a single hurricane or earthquake event, occurring in a one-year timeframe, will equal or exceed the indicated loss amounts after reinsurance and net of tax, based on the company's view of risk using proprietary and third-party catastrophe models as of December 31, 2022. Estimated losses comprise claims and allocated claim adjustment expenses (but excluding unallocated claim adjustment expenses), net of reinsurance recoveries and reinstatement premiums.

Likelihood of Exceedance (Occurrence)[1]	Dollars (in millions) North America		Percentage of total policyholders equity as of 12/31/2022[2] North America	
	Hurricane Net	Earthquake Net	Hurricane Net	Earthquake Net
1 in 50 Year PML (2.0%)	802	709	2.9%	2.6%
1 in 100 Year PML (1.0%)	1,096	876	4.0%	3.2%
1 in 250 Year PML (0.4%)	2,342	1,184	8.6%	4.3%

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

2 The percentage of total policyholders' equity is calculated by dividing the indicated loss amounts by the total policyholders' equity less unrealized gains and losses on certain investments in debt securities, net of tax and related deferred acquisition costs, as of December 31, 2022.

Table 1 below details estimated ultimate catastrophe losses, net of reinsurance and inclusive of reinstatement premium, incurred in accident years 2020, 2021 and 2022 as of December 31, 2022. Table 2 shows the estimated ultimate catastrophe losses as initially reported for those accident years in Liberty Mutual's MD&A. Additionally, subsequent favorable development, which represents the difference between the initial reported loss and the current estimated ultimate, is displayed. Table 3 details the estimated ultimate catastrophe losses by major geographic region.

Liberty Mutual defines a catastrophe as natural events, civil unrest or terror events exceeding $25 million in estimated ultimate losses, including loss adjustment expenses, net of reinsurance, and before taxes, aggregated across the business for both U.S. and international events. Catastrophe losses, where applicable, include the impact of accelerated earned catastrophe premiums and earned reinstatement premiums.

Liberty Mutual recognizes that catastrophe modeling continues to evolve, and available models reflect varying levels of maturity and sophistication. As a result, Liberty Mutual regularly evaluates and incorporates the most up to date scientific advances in the estimation of the Company's natural catastrophe loss exposure.

The Company closely monitors changes to the frequency and severity of weather-related natural catastrophes, as well as changing demographic patterns (e.g., coastal migration) which could increase potential exposure to climate risk.

Table 1: Estimated Ultimate Catastrophe Losses, Net of Reinsurance and inclusive of reinstatement premium, by Accident Year evaluated as of December 31, 2022. (in $ millions)

Peril Category	Accident Year 2022	Accident Year 2021	Accident Year 2020
Tornado, Hail, and Wind	1,900	1,239	1,143
Winter Storm	756	904	43
Tropical Storms/Hurricanes	631	686	590
Typhoons/Europe Floods	111	405	–
Wildfires	21	155	351
Earthquake	–	–	–
Other[3]	151	–	132
Net Catastrophe Losses[4]	**3,552**	**3,176**	**2,258**

Table 2: Estimated Ultimate Catastrophe Losses, Net of Reinsurance and inclusive of reinstatement premium, by Accident Year evaluated as initially reported. (in $ millions)

Peril Category	Accident Year 2022	Accident Year 2021	Accident Year 2020
Net Catastrophe losses as originally reported at the end of each accident year	3,552	3,057	2,523
Favorable development in subsequent calendar years	—	119	(265)

Table 3: Estimated Ultimate Catastrophe Losses by Region, Net of Reinsurance and inclusive of reinstatement premium, by Accident Year evaluated as of December 31, 2022. (in $ millions)

Region	Accident Year 2022	Accident Year 2021	Accident Year 2020
North America	3,150	2,984	2,258
Europe	309	405	—
Latin America	—	—	—
Asia Pacific	111	—	—
Net Catastrophe Losses[4]	**3,552**	**3,176**	**2,258**

3 Other Category includes losses for Ukraine Invasion in AY 2022 and Minneapolis Civil Unrest in AY 2020
4 Net Catastrophe Losses include recoveries on the Global CAT Aggregate cover

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

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. Under the policy, we expect to have completely reduced our exposure to these limited remaining assets by year-end 2023.

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.

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

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.

ENVIRONMENT	2022	2021	2020
Total scope 1 and 2 CO2e emissions[3] (MTCO2e)	69,766	78,057	83,673
Scope 1 CO2e emissions[3,5] (MTCO2e)	29,236	29,699	27,266
Scope 2 CO2e emissions[3,5] (MTCO2e) location based	40,530	48,358	56,407
Scope 2 CO2e emissions[3] (MTCO2e) market based	36,791	44,760	56,917
Scope 3 CO2e emissions[6] (MTCO2e)	29,518	8,638	9,691

C. Describe the targets used by the insurer 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.

METRICS & TARGETS – CLOSED ENDED QUESTIONS

- Does the insurer use catastrophe modeling to manage your climate-related risks? **YES**
- Does the insurer use metrics to assess and monitor climate-related risks? **YES**
- Does the insurer have targets to manage climate-related risks and opportunities? **YES**
- Does the insurer have targets to manage climate-related performance? **NO**