Munich Re Group's climate-related disclosure

> GRI 103-1/-2/-3; 201-2

Munich Re is a pioneer in analysing the consequences of climate change in the financial services and insurance sector. For more than 40 years, it has dealt with climate change and the related risks and opportunities for the insurance industry.

In the 1970s, as part of geo-risk research activities within the company, Munich Re began investigating the causes behind increasingly costly losses from weather-related natural catastrophes. Over the years, the complexity of the issues became increasingly clear as scientific advances were made.

Today, we are part of a comprehensive scientific network that gives us access to the latest findings on climate change and this ensures a high level of quality for our analyses. The different findings from these analyses are consolidated on an ongoing basis and translated into relevant recommendations for the Munich Re Group as well as for our clients.

The following section on climate change represents Munich Re Group's integrated climate-related disclosure. Content and structure follow the recommendations of the Task Force on Climate-related Financial Disclosure (TCFD) in addressing our governance, strategy, risk management as well as metrics and targets with regard to climate change.

Governance

The management of risks and opportunities arising from climate change is an integral component of Munich Re's strategy. All material issues relating to climate are decided on Board of Management (BoM) level and dealt with on management level at various departments across Munich Re Group.

Board of Management and Supervisory Board

At least once a year, Munich Re's Supervisory Board is informed about material sustainability topics on the basis of our **combined non-financial statement** within the annual report (p. 57).

Climate-related governance at Munich Re Group (simplified)

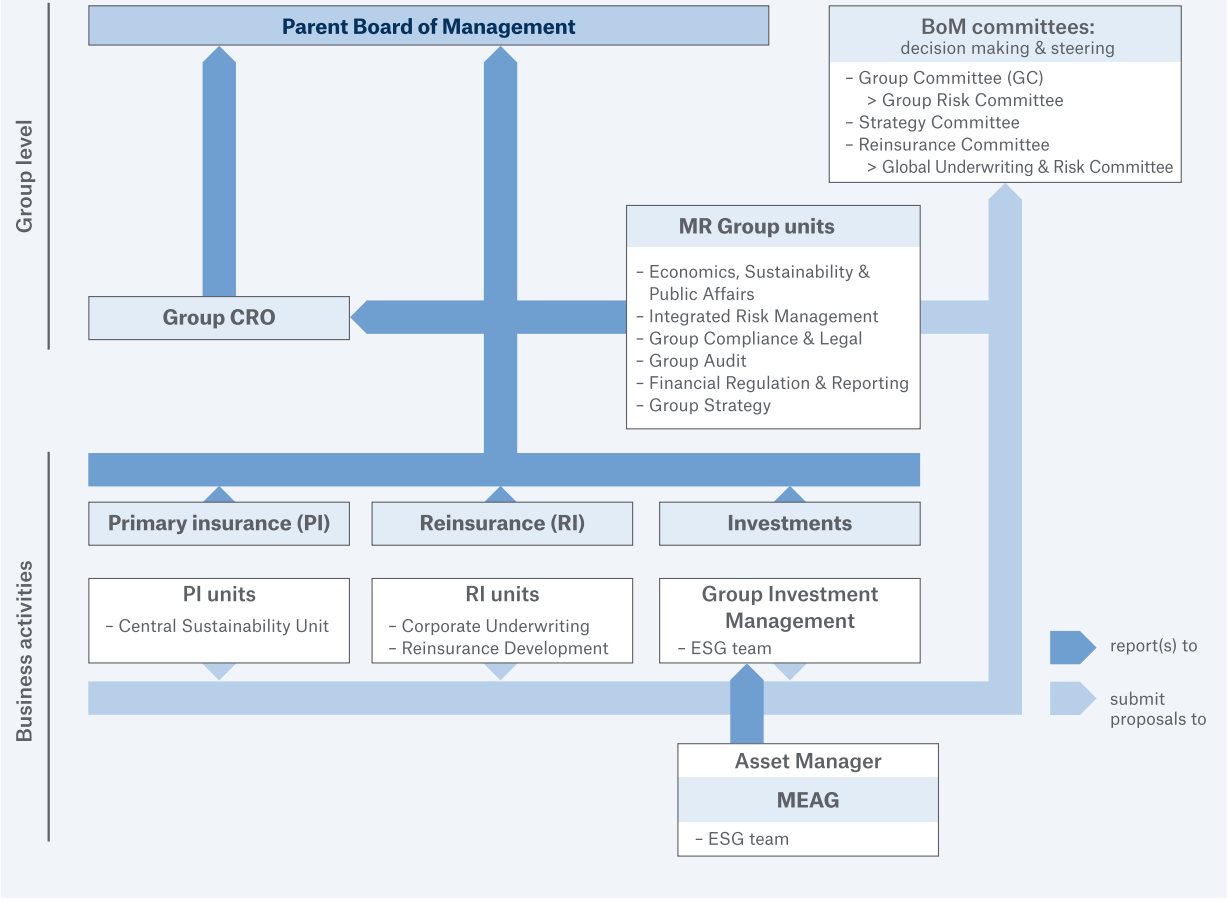

Figure 1 provides an overview of the governance of strategically relevant climate change-related aspects at Munich Re Group.

The BoM and its respective committees regularly discuss and decide on material topics such as our climate and decarbonisation strategy, research and business collaborations, net-zero ambition, natural catastrophe (nat cat) risk management and new solutions for clean/green tech, among others.

Detailed BoM submissions are prepared for each discussion. These include defined objectives, budgeting, deliverables and KPIs. Depending on the subject, the whole BoM or respective BoM committee decides on these topics.

In terms of frequency, the BoM is informed about all existing projects, activities, progress, or current developments on a routine basis. In addition, it is updated on strategic projects, proposals, new activities and initiatives, innovations, or new or unexpected developments as the need arises.

In FY2020, ESG- and climate change-related topics were discussed on six occasions at meetings of the Supervisory Board and its committees and on 31 occasions (of which 14 had an explicitly environmental/climate reference) at meetings of the BoM and related committees on BoM level.

Management level

Munich Re's Board of Management is supported by dedicated climate change experts in various central and business divisions and departments. These include Munich Re's Chief Climate and Geo Scientist (Climate Change Solutions Development); the Head of Research Climate Risks and Natural Hazards (Corporate Underwriting, on behalf of the Integrated Risk Management division), as well as MR's leading expert for leading expert for liability and insurance law, including climate liability.

The implementation of action is steered and monitored at management level. Multi-disciplinary project teams are deployed to steer strategic plans such as Munich Re's climate strategy and monitor progress and targets.

The assessment of risks and the development of climate-friendly/clean tech products and risk solutions is integrated into the different business units and departments, including Munich Re Group's Green Tech Solutions department, or our US subsidiary Hartford Steam Boiler, etc. (see graphic). With the growing importance of climate change-related topics, the number of employees it involves has grown continuously in recent years, so that numerous specialists in central and business units Group-wide are now dealing with particular aspects of climate change, decarbonisation, nat cat and renewable energies/clean solutions.

Central communication structures have been established to ensure reporting lines and communication across the different business units and project teams. Regular meeting formats such as our Group-wide "Climate@MR" series ensure the exchange of information across the Group.

On the asset side, our Group Investment Management (GIM) and our asset manager MEAG are responsible for all investment-related climate change topics. An ESG Investment Committee was established to discuss and decide on the implementation of the ESG investment strategy.

In 2021, ERGO implemented a central sustainability unit bundling functions of corporate responsibility, environmental management and sustainable product development support, in order to strengthen ESG integration and sustainability-related activities within the primary insurance.

Managing climate and sustainability risks & opportunities (responsible units and steering tasks)

MR Group units

Economics, Sustainability & Public Affairs (ESP)
- Group-wide ESG strategy and guideline competence for sustainability topics
- Support business units in implementation of ESG strategy

Integrated Risk Management (IRM):
- 2nd line of defense, risk management and reporting

Financial Regulation & Reporting (FRR):
- ESG risks reporting as part of the combined non-financial statement of Munich Re Group

Group Investment Management (GIM) ESG team
- Responsible for Group-wide integration of ESG investment strategy
- Incorporating ESG criteria to develop strategic asset allocation and tactical asset allocation

Group Compliance & Legal
- Compliance advisory, management system & investigation, regulatory & commercial law, corporate services, data protection

Group Audit
- 3rd line of defense, cooperates with the key functions Group Compliance, Integrated Risk Management and the actuarial function.

Reinsurance (RI) units, incl. leading experts

Business units
- 1st line of defense: Business planning, underwriting & pricing, risk & opp evaluation, P&L management

Reinsurance Development (RID)
- Center of Competence (CoC) for Climate Change/ leading expert climate change
- Climate adaptation- and mitigation-related solutions

Reinsurance Corporate Underwriting (CU)
- 1st line of defense
- Nat cat risk modelling/leading expert nat cat
- Physical & transition (incl. litigation) risks
- Scenario development; carbon footprinting evaluation

Primary insurance units (PI) – ERGO Group

Sustainability unit
- Coordination and implementation of sustainability within ERGO Group
- Guidance of ERGO underwriting community
- Reporting & monitoring, incl. carbon footprinting evaluation
- Sustainable product development

Asset manager MEAG

MEAG ESG team & portfolio management teams
- Structured investment process to implement ESG strategy
- Identify innovative asset types w.r.t. sustainable investing
- Active engagement
- Regular reporting about ESG integration progress & activities

Strategy

Since 2008, Munich Re has a holistic climate strategy in place, which has been continuously evolved since then. In December 2020, we went one step further with the full integration of our new decarbonisation strategy into the Munich Re business strategy Ambition 2025. Our Group-wide objective is to contribute to achieving the Paris Agreement target of limiting global warming to well below 2°C.

Therefore our strategy is based on three core elements comprising comprehensive climate risk management, ambitious decarbonisation targets and the provision of risk-transfer solutions aimed at adapting to and mitigating climate change (see graphic below). These elements span our liability side as well as assets and own operations. Furthermore, we leverage our knowledge across our global partnerships in the climate sphere, including **UNEP FI PSI** and **PRI**, **AOA**, **Climate Action 100+**, **ClimateWise**, **Geneva Association**, **GDV**, **CRO Forum**, **MCII**, etc.

Our decarbonisation strategy is an integral part of our overall climate strategy and circles around three core domains: assets, liabilities and our own emissions. As part of Munich Re's Ambition 2025, we introduced a series of bold targets for our pathway towards further decarbonising our business until 2050, with 2025 marking the first important milestone on this journey.

Munich Re Group climate strategy

	Assets	Liabilities	Own operations
Comprehensive climate risk management	– Climate risk management on both assets and liabilities: > Physical risks > Transition risks > Reputational and ESG risks > Litigation risks		– Improving operational emissions and efficiency
Ambitious decarbonisation targets	– Total: net-zero (2050) – Thermal coal: full exit (2040)	– Oil & gas: net-zero (2050) – Thermal coal: full exit (2040)	– Carbon-neutral since 2015 – Net-zero emissions by 2030 – 100% green electricity by 2025
Innovative climate solutions	– Investing in low-carbon technologies and green innovations – Green bond issuance	– Climate risk analysis services – Risk transfer solutions for climate mitigation & adaptation	– Project "Tackling Climate Change Together"

Initiatives & partnerships

– Global partnerships for collaborations and innovation towards climate-friendly solutions
– Providing our expertise as a public voice to advocate for climate action and resilience

By 2050, we want to achieve:
Assets:
– Net-zero across our investment portfolio by 2050, which is underlined by our membership in the Net-Zero Asset Owner Alliance (AOA)

Liabilities (facultative, direct and primary (re)insurance business):
– Net-zero in the (re-)insurance of oil and gas production by 2050
– A full exit from thermal coal-related (re-)insurance by 2040

Own operations:
– Net-zero emissions across our own operations by 2030

This builds on the existing steps we have already undertaken:
Assets:
– Since 2018 we have divested from companies generating more than 30% of their revenue from coal extraction or electrification.
– Since 2019 we have divested from companies generating more than 10% of revenues from oil sands.

See chapter ↘ **responsible investments**, for further information on our asset management activities.

Liabilities (facultative, direct and primary (re)insurance business):
– Since 2018 we have not (re)insured new coal-fired power plants or new coal mines, with possible exceptions in countries where more than 10% of the population lacks access to electricity. In such countries, cases are analysed on the basis of clear criteria. No such exceptions have been made since 2018.

– Since 2019 we have not (re)insured new and existing oil sand sites and new and existing oil sand-related infrastructure.

Own operations:
– Since 2015 we have been carbon neutral.

For a more detailed view on our methodology and our milestones for these targets in coming years, refer to the section metrics and targets below.

Strategic risks and opportunities

Of particular strategic relevance are the risks and opportunities associated with the consequences of climate change in the coming years and decades. Therefore, in the following section, we take a closer look at the time horizons, the specific risks material to our business model, and our strategic response to the potential impact of climate risks. A description of how we identify, analyse and manage climate risks is provided in the risk management section.

Business opportunities arising from climate change are reflected in our suite of climate solutions which are presented in more detail in the chapter ↘ **corporate responsibility in insurance business**.

Climate change risk drivers

As a globally operating company Munich Re needs a global view on its risk landscape. There are different types of climate-related risks affecting our company and business, which are monitored and evaluated by specialised departments and which are integrated into Munich Re's risk management system.

In line with the TCFD recommendations we differentiate physical, transition and liability risks through which climate change can affect value drivers of our business and our financial performance.

Physical risks – acute and chronic

According to climate science and our own analyses, climate change already contributes to changes in hazard incidence in regions with substantial insurance exposure (e. g. increase in days with high maximum temperature level, leading to more frequent large wildfire events).

Over the coming decades, further changes in climate-related hazard incidence (increased severity and frequency) in regions with substantial insurance exposure are expected (driven by both anthropogenic and natural climate variability). Examples include: more high-intensity landfalling tropical cyclones in regions with high coastal exposures, more heavy precipitation events and large river flood events, and more frequent storm surge events due to future sea-level rise. In the remote future, higher losses from strong European winter storms are also expected.

In terms of acute and chronic risks, a clear-cut difference is often difficult to make in practical terms. For instance, rising sea levels (chronic) is aggravating flooding from storm surge (acute), and more intense heatwaves (acute) are intertwined with increasing average temperature levels/global warming (chronic), etc.

Other factors influencing risk are the existence of natural catastrophe vulnerability-reducing strategies (e. g. improvements of building codes), and the maintenance of risk diversifying potential across continents and regions.

Transition and liability risks

Market and technology
In coming decades, developments in technology, systems and associated markets (e. g. smart and digital technologies for steering various systems more efficiently regarding energy and resource consumption, as well as further upscaling of renewable energies, and steering toward low-carbon products and services) will in some sectors gradually or possibly even disruptively change the characteristics of insured assets, businesses and processes.

The above will foster new product designs that make new risk assessment approaches necessary for technologies and processes without a pre-existing record of damage and loss. As a result, we expect risks involved with the transition to a low-carbon economy to affect our underwriting business.

Policy and legal risks
In terms of current and emerging regulation, Munich Re monitors risks of non-adequate anticipation of changes in policies and regulatory requirements due to the need to mitigate greenhouse gas emissions, e. g. affecting carbon-intensive sectors.

In the legal sphere, as a reinsurance company, we specifically consider the risk of potential liabilities in the context of climate change. This pertains to the impacts that could arise if parties who have suffered damage due to the effects of climate change seek compensation for their losses. Some of these claims may only arise years or even decades in the future, but have the potential to hit carbon extractors and emitters – and, if they have liability cover, their insurers – considerably.

One example of a potential driver of claims related to climate change (indirect climate liability) is the introduction of limits for greenhouse gas emissions or possible duties to inform/report/disclose the amount of greenhouse gases produced by a product or service.

Another example would be a stricter interpretation of the standard of care/due diligence expected of private or public entities or professionals who have the duty to take preventive measures to avoid/minimise damage caused by the consequences of climate change.

Finally, changes to building codes to prevent or minimise damage by extreme weather events could increase costs involved in rebuilding damaged/destroyed buildings covered by liability or property insurance.

A fundamental change in regulation or court decisions could also result in successful claims based on damage caused by the consequences of greenhouse gas emissions as such (direct climate change liability), e. g. rising sea-levels. Even if such claims continue to be unsuccessful, they can lead to substantial defence costs in the US.

Liability related to indirect climate liability is likely to increase in the future. Possible scenarios in this context include, for example:
- Claims based on non-compliance with regulation (e. g. failure to warn or inform), such as shareholder litigation based on financial losses resulting from fines triggered by such misconduct.
- Accusations of misleading consumers/the public/legislation/courts by “green washing” to manipulate buying habits.

Reputation
Reputational risks stem from risks tied to changing customer or community perceptions of an organisation’s contribution to or detraction from the transition to a lower-carbon economy.

Climate change time horizons

Munich Re considers 2021–2023 the short-term, 2024–2032 the medium-term and 2033–2060 the long-term as time horizons for the assessment of climate change-related risks and opportunities. In climate research, we also look at the remote future (2060–2100) to some extent but, since it is a distant horizon, it is not explicitly considered across the business and its investments.

Understanding changing risk levels decades ahead is relevant more from a strategic point of view, than from the perspective of current insurance business practices. Reinsurance covers are renewed on an annual basis, so risk management and (re)insurance cover can be adapted as hazards impacted by climate change over the years.

The following table summarises relevant risk drivers, their potential impact as well as Munich Re’s response to identified risks.

Risks issue	Time frame, likelihood, magnitude of impact and potential (financial) impact			Response (strategic, financial planning)
Physical: acute & chronic				
Tropical cyclone Example: Atlantic hurricane	**Time frame:**	**Likelihood:**	**Magn of impact:**	– Munich Re has a vigilant risk management system in place, capable of detecting and responding to changes in hazard and risk (see details in section risk management). – Annual renewal of most (re)insurance covers allows for high flexibility in adapting risk management and (re)insurance cover conditions over time. – Munich Re's adaption and mitigation measures (see risk management section) also contribute to the prevention of increasing physical risks.
	Medium-term	Likely	High	
	Potential (financial) impact:			
	Increased insurance claims liability, e. g. €6.3bn VaR for Atlantic hurricane (200yrs return period).			
Extra-tropical cyclone Example: Winter storm Europe	**Time frame:**	**Likelihood:**	**Magn of impact:**	
	Long-term	Likely	High	
	Potential (financial) impact:			
	Increased insurance claims liability, e. g. €2.9bn VaR for winter storm Europe (200yrs return period).			
Severe convective storms Example: Severe convective storms USA	**Time frame:**	**Likelihood:**	**Magn of impact:**	
	Short-term	Likely	Medium	
	Potential (financial) impact:			
	Increased insurance claims liability, e. g. €500m–1.5bn (estimated range), VaR for thunderstorm USA (200yrs return period).			
Wildfire Example: Wildfire USA	**Time frame:**	**Likelihood:**	**Magn of impact:**	
	Short-term	Very likely	Medium-high	
	Potential (financial) impact:			
	Increased insurance claims liability, e. g. €500m–1.5bn (estimated range), VaR for wildfire USA (200yrs return period).			
Rising sea levels and associated risks such as increased storm surge events	**Time frame:**	**Likelihood:**	**Magn of impact:**	
	Long-term	Virtually certain	High	
	Potential (financial) impact:			
	Increased insurance claims liability. No estimate due to high uncertainties to date.			
Physical risks for MR Group premises	**Time frame:**	**Likelihood:**	**Magn of impact:**	– Business-driven risk management and business-continuity plans on a Group-wide and local level apply at all Munich Re Group locations.
	Short-term	More likely than not	Low	
	Potential (financial) impact:			
	Decreased asset value or asset useful life leading to write-offs, asset impairment or early retirement of existing assets. No detailed analysis due to limited likelihood and low magnitude of impact.			

Risks issue	Time frame, likelihood, magnitude of impact and potential (financial) impact			Response (strategic, financial planning)
Transition risks				
Policy & legal, current and emerging regulation	**Time frame:**	**Likelihood:**	**Magn. of impact:**	– Comprehensive monitoring and analyses of developments in liability claims, insurance regulation and court decisions. – Continuous assessment of emerging legal regulation, e. g. through interactions with regulatory authorities. – Integration of ESG- and climate change-related issues in MR's own policies and guidelines, e. g. Responsible Investment Guideline.
	Medium-term	Virtually certain	Medium-low	
	Potential (financial) impact:			
	No case where liability has been successfully established to date, but potential transaction costs, due to arising coverage disputes and the absence of a loser pays rule in the US. Indirect climate liability: Insurance claims virtually certain to increase.			
Technology & market	**Time frame:**	**Likelihood:**	**Magn of impact:**	– Decarbonisation strategy – Innovation strategy for sustainable/climate/clean solutions (adaptation and mitigation) – Asset Mgmt.: Expanding ↘ **investments in renewable energy and infrastructure projects**.
	Current until long-term	Virtually certain	Too early to estimate	
	Potential (financial) impact:			
	Large transition risk for certain (carbon-intense) industries; other industries and sectors might transform more gradually. Corresponding opportunities might buffer or compensate the risk.			
Reputation	**Time frame:**	**Likelihood:**	**Magn of impact:**	– ↘ **Reputational Risk Committees** (RRCs) in each field of business. – ↘ **Own Operations**: Group-wide environmental and climate protection strategy including company activities and employee engagement. – ↘ **Procurement guidelines**, including environmental criteria – Constant dialogue with sustainability-oriented rating agencies and investors – rewarded with very good ratings and rankings.
	Current	Medium to low	Medium-high	
	Potential (financial) impact:			
	Munich Re reputation due to positive/negative judgments of our activities, strategies and measures by our stakeholders.			

Risk management

Our climate change-related risk management is closely aligned with our approaches and measures described in the strategy section (see above).

Munich Re Group adopts a strategic approach to climate change risks, which potentially affect the value drivers within the global risk and asset landscape covered by the Group.

Munich Re's Group Chief Risk Officer (CRO) is responsible for organising and implementing an adequate risk management system at Group level. Risk management functions at the respective business units report to the CRO. This includes all climate change-related risks. In managing risks related to climate change, we draw on the expertise of our scientists, specialist underwriters, lawyers, economists, risk managers and actuaries in a company-wide risk management process. Climate change-related risks are monitored, evaluated and integrated into Munich Re's risk management system and involve several methodical steps:

Identifying and assessing physical climate risks

In terms of physical risks, Munich Re was one of the first insurers to identify climate change risks as being relevant for the insurance industry. For over four decades, Munich Re has been monitoring and analysing these risks in cooperation with experts in all relevant areas of science worldwide. In order to identify and detect climate change impact on nat cat risk and associated lines of business early, Munich Re has long since interwoven risk management with climate science, not only by employing highly qualified climate scientists for risk assessment and modelling purposes, but also by participating in science initiatives, initiating and conducting collaborative projects with scientific facilities or publishing research projects in peer-reviewed journals (e. g. **Project ARCS**, **CAFÉ**, **ClimXtreme**). Topics range from internal climate variability, such as El Nino/La Nina, to climate change impacts of severe convective storms (hail, thunderstorm gusts) or winter windstorms and floods in Europe.

However, scientific research into climate change is complex and the political and regulatory environment in which we operate is developing fast. As a result, we remain vigilant with regard to the identification/evaluation of new and changing risks. If new findings in climate research or actual claims development necessitate adjustments in risk assessment, we are able to make these changes promptly because most of our covers are renewed on an annual basis.

The impact of climate on natural catastrophe risk (climate change or internal climate variability) is accounted for in risk assessment on the basis of:

- Monitoring of changes in meteorological/hydrological drivers of loss events over time in a region, including analyses that check for a causal link to increasing greenhouse-gas concentrations (climate model-based attribution) or internal climate variability.
- Monitoring of concomitant changes in peril-specific nat cat losses over time, normalised to current levels of destructible wealth. The normalisation procedure removes the signal of economic growth over time, which per se would cause losses to increase even in the absence of any climate impact.

Modelling and steering of physical risks

Given a detected change on the loss side concomitant with detected changes on the weather hazard side caused by climate change or internal climate swings, such results on changes in loss distribution properties over time are included in the risk assessment, risk management and pricing processes. This means, they are included in our risk modelling. Within the internal model, we account for changing climate conditions mainly via model assumptions that are set around frequencies/severities of weather-related hazards. In particular, we:

- Reflect the changing hazard condition in the risk assessment models per region.
- Apply strict accumulation control according to regional budget scenarios/limits, limiting exposure.
- Diversify peak risk from nat cat globally.
- Retain balance between losses, administrative costs, risk-based capital costs on the one hand side, and premiums earned on the other, allowing for profitability.
- Incorporate climate change-related risks in underwriting policies.
- Invest in tools and models, data and science (e. g. collaboration with the European Severe Storms Laboratory; MR's own NatCatSERVICE, Location Risk Intelligence Platform, etc.).

Regarding physical risks associated with climate change, all time horizons apply: short-, medium- and long-term. Short-term effects of climatic variability are primarily taken into account in weather risk- and property business, while medium- to long-term climate variability, e. g. the impact of the Atlantic Multidecadal Variability on Atlantic hurricane activity is important in context of property risk.

Future projections of changing physical risk levels related to natural catastrophes for some decades ahead are relevant in strategic terms, although substantial uncertainty is still involved in most cases. On the other hand, overconfidence in what is already known by climate science has to be avoided too. Munich Re's risk assessment is adjusted to the level of increasing risk in the tail and frequency portions of the loss distribution.

Specialised modellers of Munich Re have developed projections of future hazard activity levels based on state-of-the-art climate model runs, as part of our SAFIR platform (Spatial Analytics for Insurance Risks). SAFIR is a platform for geospatial data and applications to share natural hazard risk data within our company (internal solution).

Our internal natural hazard risk data is also utilised on the asset side. Particularly for our infrastructure investments, physical climate risks are integrated into the due diligence process of every investment decision.

Identifying, assessing and responding to transition risks and opportunities

As described in the governance section above, numerous experts from various disciplines at Munich Re are concerned with the impacts of climate change. In addition to physical risks, transition risks are also identified and thoroughly analysed. This includes the analysis of policy impacts on markets and risks. Internal working groups have been set up to share findings between divisions/departments and to develop strategic responses. At the interface of our strategy and risk management, strong focus regarding transition risks lies on the development of innovative solution concepts for ESG- and climate risks. This opens up new business opportunities, thereby responding to the need for adapted insurance products, which include adequate risks assessment by Munich Re's professional expertise. This also includes investment in R&D, e. g. models and data, as well as cooperation with scientific bodies.

Relevant measures in response to transition risks are also part of our comprehensive climate risk management solutions outlined below. For more information about climate-related solutions please see chapter ↘ **corporate responsibility in insurance**.

Climate Risk Management: our solutions for clients & investors

Mitigation
Actions to reduce emissions

Enable a low carbon economy

- Risk transfer solutions for green and low carbon technologies to improve bankability and investability *(e. g. energy efficiency technology insurance; renewables & energy storage performance).*
- Issuance of a Munich Re green bond *(eligible projects include e. g. renewable energy, clean transport and green buildings).*

Adaptation
Management of unavoidable climate change risks

Understand climate change

- Awareness-building for insurance and industry clients and external stakeholders *(e. g. client seminars; public campaigns such as "Re | store people's lives").*
- Historical nat cat data for risk assessment and analysis *(e. g. NatCatSERVICE).*

Measure climate risk

- Forward-looking and analytics tools to integrate climate risks in our clients' strategy and portfolio analysis *(e. g. Location Risk Intelligence Platform).*

Manage climate risk

- Risk transfer solutions and services to enable our clients to actively manage their climate-related risks and increase climate resilience *(e. g. nat cat (re)insurance for industry clients, financial institutions and sovereigns; parametric weather and agro-risks insurance).*

Scenario analysis

The recommended use of climate-related scenario analysis under the TCFD framework aims at understanding strategic implications of climate-related risks and opportunities and at informing stakeholders about the respective practices.

Munich Re uses qualitative and – to account for the substantial uncertainties involved – a degree of quantitative climate-related scenario analysis to inform our business strategy. When it comes to assumptions on future greenhouse gas concentration development, we reflect the Representative Concentration Pathway (RCP) scenarios (RCP1.9, 2.6, 4.5 and 8.5) outlined by the Intergovernmental Panel on Climate Change (IPCC) in its Fifth Assessment Report as well as its Special Report on Global Warming of 1.5°C.

In terms of the underlying socio-economic assumptions for possible pathways towards a net-zero economy, we assess the Shared Socioeconomic Pathways (SSP), which will also be integrated in the upcoming Sixth Assessment Report of the Intergovernmental Panel on Climate Change expected later in 2021.

Our Climate Ambition 2025 builds upon earlier single decisions (such as guidelines for how to deal with thermal coal) and integrates them in a holistic framework encompassing all emissions attributable to our business activities, i. e. our assets, provided insurance, as well as our own operations. The IPCC's Special Report on Global Warming of 1.5°C served as a central source providing both scenario narratives and emission pathways. It underlines the imperative to reach global peak emissions soon but also the likely long-term necessity of carbon removal technology innovations to achieve net-zero emissions by 2050.

Munich Re has employed qualitative scenario analysis since it is difficult to disentangle the fundamental implications of climate change impacts from a multitude of other factors that will change and collectively challenge Property and Casualty (P&C) insurance business in the future. Our position is fully in line with the IPCC report: Climate change is interwoven with many factors, partly influencing or even aggravating each other.

Equally important are questions on how entire regional markets will evolve, in particular:

- How much insurance capacity will be available (for instance for hurricane wind-related property insurance in Florida)?
- Will the tendency towards increasingly moderate soft market – hard market – cycles observed over recent decades continue?
- And will risk mitigation through climate change adaptation be fostered under the imprint of future catastrophes?

These factors will, among others and along with changing frequencies and intensities of the hazard, combine to imprint Munich Re's P&C business and will shape the response by the business and risk management. Hence, qualitative scenarios also have to address insurance markets and their mechanisms as a framework for an individual company's response.

Portfolio analysis (insurance)

As part of our strategic considerations, Munich Re began analysing the CO_2 footprint for underwriting portfolios in early 2019. And, with other leading (re-) insurers, we have actively participated in the CRO Forum working group on carbon footprinting in underwriting portfolios, which aimed to develop a footprinting methodology for insurance portfolios (the **final report** of the working group has already been published). At the same time, we formed an internal project group led by our Corporate Underwriting unit in October 2019 to test the newly developed footprinting methodology for practical application and have since been analysing parts of our insurance portfolio.

The methodology proposed by the CRO Forum (the "Weighted Average Carbon Intensity" or WACI method), specifically adjusted to insurance needs, first had to be tested for its applicability for insurance portfolios, as there is no established standard on the market to date. The CRO Forum's working group identified and described numerous shortcomings and challenges in its final report that make it considerably more difficult to apply a footprinting methodology to the overall

(re)insurance portfolio (e. g. due to data availability, quality, granularity, and matching between internal underwriting systems and external emission data bases, etc.). This is already true for any carbon footprinting using relative KPIs (like WACI), but even more so for any approaches using absolute quantitative KPIs. Further research will be necessary in the future, but the methods developed so far are at least suitable for hotspot analyses.

The internal Munich Re project is of strategic importance and continued to run in 2020 and beyond to inform on and substantiate our continuously evolving climate and decarbonisation strategy (Ambition 2025) – referred to above. For thermal coal-related business as well as for the oil and gas production we developed quantitative emission KPIs which are used for steering our related emissions.

Portfolio analysis (investments)

On the asset side, we conducted an extensive analysis of our equity and fixed income portfolio regarding Scope 1 and 2 emissions as well as regarding transitional and physical risks in 2020. This included absolute emissions, weighted average carbon intensity and CO_2 intensity per invested million Euro. We formulated our strategy and targets for 2025 for the coal and oil and gas sector on this basis. In addition, we have done a first analysis regarding Scope 3 emissions for our equity and fixed income portfolio. Nevertheless, data quality is not sufficient to incorporate Scope 3 emissions into our quantitative reduction targets at this time.

For alternative investments, internal physical climate risk data from Munich Re climate experts is integrated into the due diligence process of every investment decision. Furthermore, MEAG is currently calculating the carbon footprint of the real estate portfolio.

Munich Re Group Ambition 2025 and beyond

	Assets Financed CO_2 emissions	Liabilities Insured CO_2 emissions (primary, direct, facultative)		Own CO_2 emissions from operational processes
Today	**No investment in companies with** ▪ >30% revenue thermal coal ▪ >10% revenue oil sands	**Thermal coal** No insurance for new coal mining, powerplants, related infrastructure[2]	**Oil and gas – exploration and production** No insurance for new and existing oil sand sites, related infrastructure[2]	**Reducing our direct impact** ▪ Carbon neutral since 2015 ▪ Reduction by 44% per employee since 2009
2025	**Total**[1] **-25% to -29% emissions**	**-35% emissions**[3]	**-5% emissions** Utilising the expertise of HSB Solomon	**-12% emissions** per employee of Munich Re Group
	Thermal coal[1] **-35% emissions**			
	Oil and gas[1] **-25% emissions**			
2050	**Total** **Net-zero** by 2050	**Full exit** by 2040	**Net-zero emissions** by 2050	**Net-zero emissions** by 2030
	Thermal coal **Full exit** by 2040			

[1] Based on sub-portfolio of equities, corporate bonds and real estate at the end of 2019.
[2] Minor expectations apply such as sites in countries with <90% electrification rate.
[3] "Produced tonnes of thermal coal/MW insured" used as proxy for emissions: base year 2019.

Metrics and targets

Through our Ambition 2025, we have set ourselves specific milestone targets up until 2050, with 2025 marking a crucial first milestone (see graphic).

An important factor in our decarbonisation strategy is to distinguish between the concepts of carbon neutrality and net-zero. In order to genuinely decarbonise the world, we need to reduce our emissions as much as possible and remove the rest from the atmosphere.

We believe our commitment to net-zero across the three pillars of assets, liabilities and our own operations will help promote new and sustainable ways of removing CO_2 from the atmosphere. For more information about net-zero please see chapter ↘ **environment**.

Assets

By 2025, we will reduce absolute greenhouse gas emissions in our investment portfolio relating to listed equities, corporates and real estate by 25–29%, before achieving net-zero emissions by 2050. We have also set specific sector targets for thermal coal (reduction of 35% CO_2e) and oil and gas (25% CO_2e).

Through our investments, we want to promote the use of new technologies to avoid greenhouse gas emissions. In total, Munich Re has invested around 1.4% of its assets under management in renewable energies and green bonds.

In 2020, invested capital (equity and debt) in renewable energies was approximately €1.6bn and should steadily increase over the next few years to €3bn. Investments in green bonds amounted to approximately €1.85bn. These investments have the potential to mitigate climate change.

In 2020, over 80% of our investments were invested sustainably (of the €220bn in investments that are relevant for calculating the sustainability ratio). We calculate this by applying a series of sustainability criteria for each asset class.

To strengthen our commitment to positive impact further, Munich Re was the first German insurer to issue a green bond in 2020 to invest in climate-friendly projects in accordance with our **Green Bond Framework**. Find more information in chapter **↘ responsible investment**.

Going forward, we will regularly report on progress including metrics and targets related to our net-zero ambition and our AOA membership.

Liabilities

On the liability side, over the next five years, we will reduce greenhouse gas emissions from coal and oil and gas underwriting by 35% and 5%, respectively (facultative, direct and primary (re)insurance business).

Reducing the carbon footprint in our underwriting portfolio requires an elaborate carbon footprinting methodology to measure the net emissions (gross emissions minus carbon removal and storage) of coal as well as oil and gas. Apart from the initial methodological approaches of the CRO Forum (see above), neither methodological standards nor comprehensive emissions data sets exist for individual industries. This is why we are currently developing our proprietary footprinting methodology based on the sector-specific expertise of our subsidiary HSB Solomon. This allows us to rely on a consistent methodology to report on our progress regarding our decarbonisation target over the coming years.

Own CO_2 emissions

As part of our new climate ambition we will further reduce our emissions by 12% per employee by 2025 compared to 2019 and ultimately become net-zero across our operations by 2030.

We use our internal environmental management system to measure our progress and to assess the influence our activities have on climate and the environment. We calculate carbon emissions on a yearly basis from our consumption of energy, paper and water, business travel, and generation of waste. This calculation was independently validated by an external audit company since 2015. Find more details at the end of this document.

In 2012, we introduced a standardised, internal environmental management system (EMS) for all Group locations. Munich Re Group has been carbon-neutral since 2015.

For detailed information regarding our environmental management system (EMS) and our emission reduction measures and targets please refer to the chapter on **↘ environment**.

For detailed information about our CO_2 emissions (Scope 1, 2 and 3) please refer to the **↘ key figure section**.

Remuneration

The remuneration system for the Board of Management includes an overall performance assessment that takes ESG criteria into account. This explicitly includes Munich Re's climate ambition covering assets, liabilities and own emissions.

Find more information on the **board's remuneration system**.