03 Climate change related disclosure

This chapter covers our proprietary investments as well as our insurance underwriting. As part of our commitment to transparency, we apply the recommendations of the G20 Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD). We strive to continuously enhance our climate change related reporting and business practices to drive best practice and we collaborate with and support others to do the same.

03.1 The global challenge and the role of Allianz

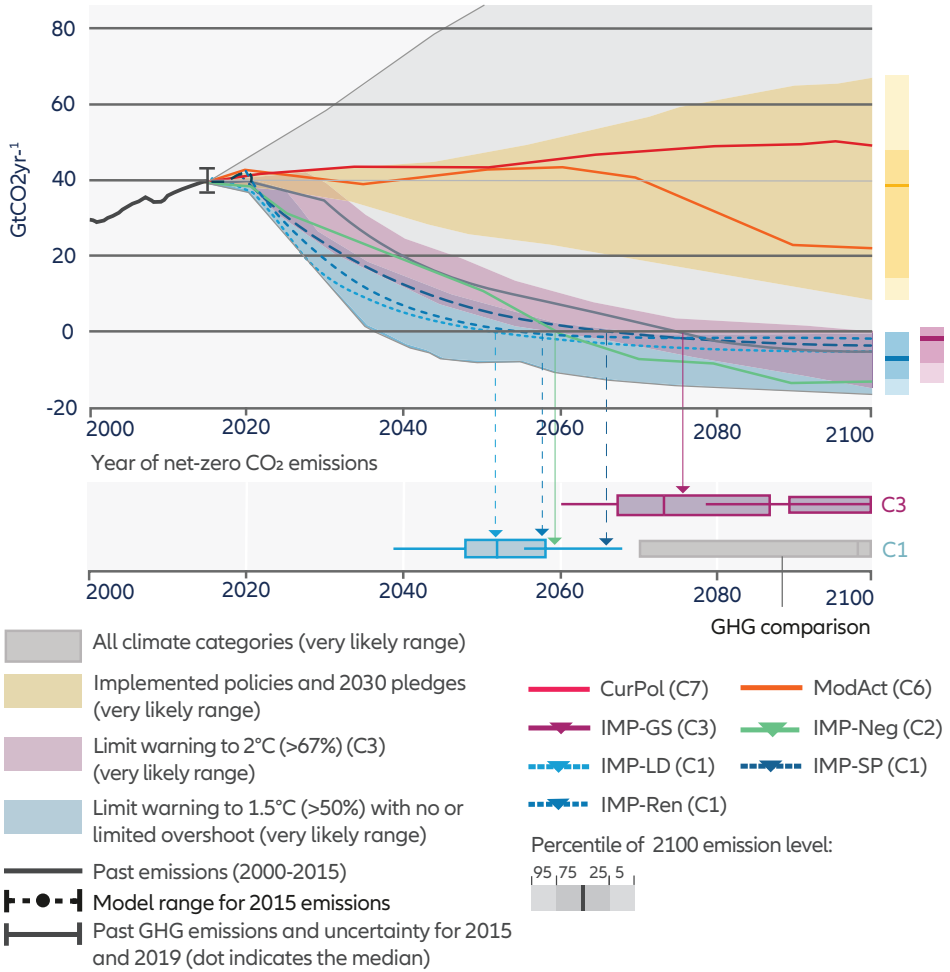
03.1.1 The net-zero challenge

Human-made climate change, one of the greatest global challenges of our time, has already caused far-reaching negative consequences and losses for nature and people, and various human and natural systems are being stressed beyond the limits of their adaptive capacity. Therefore, irreversible damage has already started to occur.

In order to stop these developments, the Paris Agreement of 2015 set the goal of limiting global warming to a maximum of 1.5°C by the end of the century. This results in a fixed carbon emissions budget, i.e. an upper limit for global emissions that may still be released. Including a small risk buffer for self-reinforcing climate change feedbacks or delays in the use of negative emissions, a maximum of roughly 300 billion tons of carbon emissions may be emitted worldwide to limit warming in 2100 to 1.5°C with a probability of 67 %.[1]

Based on modelled emission pathways from IPCC[2] (with an overview within figure 1) with little or no temperature overshoot of 1.5°C, emissions need to be halved every decade. But instead, in 2021, annual emissions reached a record level of 39 billion tons[3], so if current trends continue the budget will be exceeded way before 2030 and 1.5°C will be overshot. This increases the need for an even more rapid transition later on as well as the use of atmospheric carbon removal, i.e. negative emission solutions to bring back warming to 1.5°C by the end of this century.[4]

Figure 1: Global CO_2 emissions pathways (source: IPCC AR6)



1 Source: IPCC Assessment Report 6 Working Group I Table SPM.2.
2 Intergovernmental Panel on Climate Change.
3 Source: U.N. Emission Gap Report 2022.
4 Source: IPCC Assessment Report 6 Working Group III.

03.1 The global challenge and the role of Allianz

03.1.2 Our climate footprint

Allianz's Group Climate Change Strategy commits us to reach net-zero greenhouse gas (GHG) emissions by 2050 across our business in line with the 1.5°C pathway. This is translated into dedicated strategies and targets across our value chain emissions: Our business operations (scope 1, 2 and most material scope 3 emissions), our proprietary investments (scope 3 category 15 'financed emissions'), as well as our insurance underwriting (scope 3 category 15 'insurance-associated emissions')[1], for our business operations is even by 2030.

For insurance-associated emissions the methodology is currently been jointly developed by the Net-Zero Insurance Alliance and Partnership for Carbon Accounting Financials.

Proprietary investment portfolio carbon footprint

Both our listed equity and corporate bonds portfolios have undergone considerable changes in the past three years, characterized by the economic impacts of the COVID-19 pandemic, the war in Ukraine, and the first impacts of our portfolio steering towards the climate targets.

Since 2019, we achieved a reduction of absolute emissions by -35 % and are below our target of -25 % for 2024. Portfolio reallocations contributed -26 %p, overarchingly driven by intra-sector shifts to lower-emitting companies (i.e., inside utilities and manufacturing sector). Real world emission reductions by investee companies contributed -6 %p; the remaining effects can be attributed to a change in the denominator (EVIC). This shows that stronger short-term actions by investee companies on emission reductions are necessary.

In 2022, we added carbon footprint figures for parts of our real estate portfolio (direct and joint ventures), for our direct infrastructure equity portfolio (without co-investments) and for our sovereign portfolio, in total now covering 59.6 % of our investment portfolio. For further details about targets for infrastructure equity (direct) and real estate (direct/JV), please refer to section 02.2.2. Allianz is working with the AOA to finalize the methods for sovereign bonds as next asset class. We will set targets for this asset class within 12 months after the recommended methodology is released by the AOA.

Figure 2a: Allianz Group greenhouse gas emissions (mn tCO_2eq)

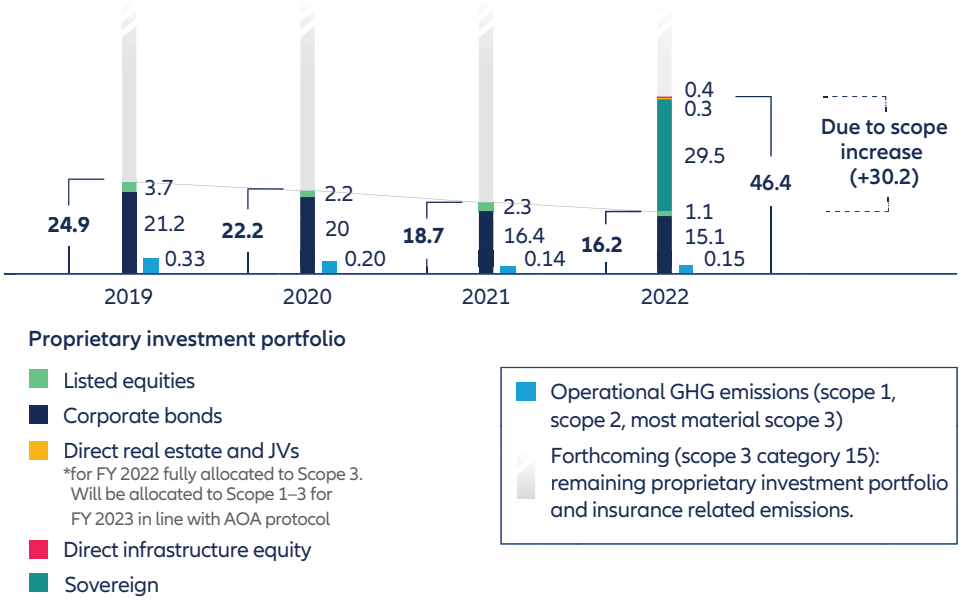
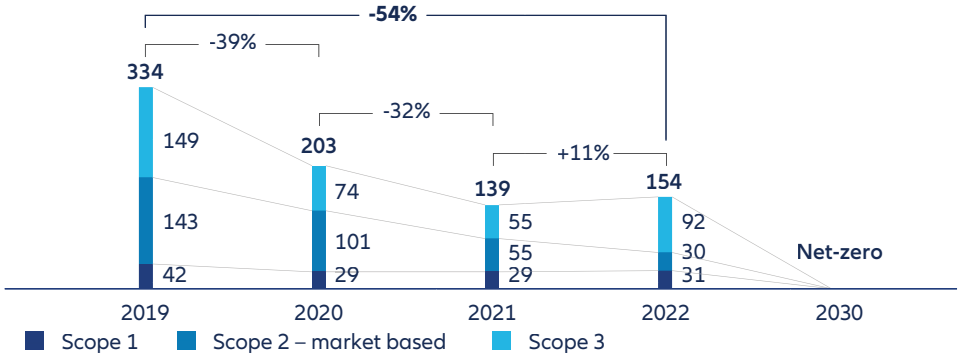


Figure 2b: Allianz Group operational greenhouse gas emissions (ktCO_2eq)



1 As per greenhouse gas (GHG) Protocol.

03.1 The global challenge and the role of Allianz

Table TCFD-1

Portfolio carbon footprint overview

Indicator	Components/Sub-indicators	Unit	2022	2021[1]	Δ y-o-y
Total	AuM	€ bn	701.1	849.2	-17.4%
	AuM covered with CF methodology	€ bn	418.2	246.3	69.8%
	Share of AuM covered with CF methodology	%	59.6	29.0	30.6%-p
	Carbon footprint absolute emissions	mn t CO_2e	46.3	19.1	142.2%
	Carbon footprint relative emissions	t CO_2e/€ mn invested	110.8	77.7	42.6%
Corporate bonds	Corporate bonds Portfolio AuM	€ bn	193.4	197.6	-2.1%
	Corporate bonds Share of total AuM	%	27.6	23.3	4.3%-p
	Corporate bonds Absolute emissions	mn t CO_2e	15.1	16.4	-8.0%
	Corporate bonds Relative emissions	t CO_2e/€ mn invested	78.1	83.2	-6.1%
	Corporate bonds Emissions data coverage	%	79.2	73.0	6.2%-p
Listed equities	Listed Equities, Portfolio AuM	€ bn	21.0	40.8	-48.4%
	Listed Equities, Share of total AuM	%	3.0	5.0	-2.0%-p
	Listed Equities, Absolute emissions	mn t CO_2e	1.1	2.3	-50.9%
	Listed Equities, Relative emissions	t CO_2e/€ mn invested	52.7	55.7	-5.3%
	Listed Equity Emission data coverage	%	95.0	97.0	-2.0%-p
Sovereigns	Sovereign, Portfolio AuM	€ bn	153.0	n/a	n/a
	Sovereign, Share of total AuM	%	21.8	n/a	n/a
	Sovereign carbon footprint absolute emissions	mn t CO_2e	29.5	n/a	n/a
	Sovereign carbon footprint relative emissions	t CO_2e/€ mn invested	192.6	n/a	n/a
	Sovereign Emission data coverage	%	99.7	n/a	n/a
Real estate	Real estate, Portfolio AuM	€ bn	43.0	n/a	n/a
	Real estate, Share of total AuM	%	6.1	n/a	n/a
	Real estate carbon footprint absolute emissions	mn t CO_2e	0.3	n/a	n/a
	Real estate carbon footprint relative emissions	kgCO_2e/sqm	33.0	n/a	n/a
	Real Estate Emission data coverage	%	60.6	n/a	n/a
Infrastructure	Infrastructure equity, Portfolio AuM	€ bn	7.7	7.9	-2.2%
	Infrastructure equity, Share of total AuM	%	1.1	0.9	0.2%-p
	Infrastructure equity carbon footprint absolute emissions	mn t CO_2e	0.4	0.4	-11.4%
	Infrastructure equity carbon footprint relative emissions	t CO_2e/€ mn invested	60.3	63.9	-5.7%
	Infrastructure equity Emission data coverage	%	83.3	87.0	-3.7%-p

The past three years showed why we believe that both absolute and relative indicators are necessary to measure the carbon performance of portfolios. Relative indicators are sensitive to changes in either direction in both company valuation and company sales, whereas absolute emissions are sensitive to strategic asset allocation shifts.

It should also be noted that our current emission Scope is 1 and 2 and does not consider emissions in the wider value chain of investees, which can be significant for many sectors. While data quality for Scope 3 emissions is still comparably low, there is merit in sector specific Scope 3 indicators and data to determine if companies and their products are on a pathway consistent with our 1.5°C ambition. We are working to develop these indicators also as part of our work with the AOA. We are also calling for harmonized carbon disclosure requirements across all three scopes of greenhouse gas emissions.

The detailed methodology and respective metrics for the carbon footprint can be found in section 01 of our Explanatory Notes.

1 Infrastructure equity asset class disclosed since 2022, but prior year numbers available. These numbers are included in the Total AuM for 2021. Hence, the total absolute emissions in Allianz Group Sustainability Report 2021 (18.7 mn t CO_2e). Please note that 2021 corporate bonds share of total AuM was restated.

03.1 The global challenge and the role of Allianz

03.1.3 Climate-related risks and opportunities

Climate change will materially affect global economies and Allianz's lines of business. The risks and opportunities emerging today will increase over the mid- and long-term. They include acute and chronic physical impacts on property and human health such as warming temperatures, extreme weather events, rising sea levels, intensifying heatwaves, droughts and potential changes in vector-borne diseases.

Risks and opportunities also result from the cross-sectoral structural change stemming from the transition to a low-carbon economy. These transition risks include the impacts of changes in climate policy, technology and market sentiment, and impact thereof on the market value of financial assets, as well as impact resulting from climate change litigation.

Impact on our business and impact of our business

Allianz Group is exposed to risks that are influenced by climate change in a multitude of ways. We are particularly impacted in two key ways through our core business activities, both of which can influence the ability of assets to generate long-term value:

1. As an insurer providing insurance policies, e.g. covering health impacts, property damage or litigation claims, and through changes in the sectors and business models we underwrite.
2. As a large-scale institutional investor with significant stakes in various economies, companies, infrastructure and real estate that might be affected by the physical impact of climate change and the transition to a low-carbon economy.

The largest risks in our risk profile are market risks, especially equity risk, credit and credit spread risks driven by assets backing long-term liabilities. P&C premium and reserve risks, resulting from natural and man-made catastrophes and from claims uncertainty, must be considered.

› **In section 03.4 we disclose different quantitative and qualitative assessments for physical and transition risks.**

As well as being impacted by climate change, the choices Allianz makes about how to conduct its business have an impact on climate change, e.g. by investing in or insuring activities which either cause or reduce GHG emissions. To manage potentially detrimental impacts on both climate and our business, we have committed to align our proprietary investment and insurance underwriting portfolios to 1.5°C climate scenarios.

Table TCFD-2

Exemplary illustration of climate risks translation

Risk category	Climate-related changes		
Physical	Acute	First-order hazard/risk Like extreme weather, heat stress, etc.	Second-order risk Like soil moisture deficit, coastal erosion etc.
	Chronic	First-order hazard/risk Like changing temperature patterns or rising sea levels, etc.	
Transition	Policy and legal		
	Technology		
	Market		
	Reputation		
Litigation	Litigation for (enabling) GHG/emissions/failure to mitigate, etc.		
	Litigation for insufficient disclosure, adaptation, etc.		

03.2 Strategies

Since 2005, the Allianz Group Climate Change Strategy has encouraged solutions for tomorrow's climate. It steers the uptake of climate-related risks and opportunities in our insurance and investment business. Regularly updated, it is overseen by the Sustainability Board.

Our strategy focuses on three areas: Anticipating the risks of a changing climate; Caring for the climate-vulnerable; and enabling the low-carbon transition. These strategy pillars are described in section 01.5 of this report.

The Allianz Group Climate Change Strategy commits us to reach net-zero greenhouse gas (GHG) emissions by 2050 across our business. This is in line with the ambitions of the Paris Agreement to limit global warming to a maximum of 1.5°C by the end of the century. Our priorities include quantitative emission targets for our portfolios, targeted restrictions of fossil fuel based business models, driving our systematic approach to investee engagement and policy advocacy, and implementing the TCFD recommendations.

We embed the management of risks and opportunities resulting from climate change in our overall business strategy. Measures include: developing and adjusting financial products and services; updating policies and processes; setting targets and limits; managing our operational climate footprint; and engaging with internal and external stakeholders.

Net-Zero Pledge and the Net-Zero Alliances

After the release of the landmark Special Report on Global Warming of 1.5°C by the Intergovernmental Panel on Climate Change (IPCC) in October 2018, we thoroughly reviewed the implications for our corporate response. As a result, we increased our ambition from 'well below 2°C' and committed to pursuing efforts to limit global warming to a maximum of 1.5°C by the end of the century. This is postulated as the upper ambition level of the Paris Agreement and the European Union's long-term climate strategy.

As a major outcome of incorporating the assessment of climate-related risks and opportunities into our business strategy, we co-founded the U.N.-convened Net-Zero Asset Owner Alliance (NZAOA) and Net-Zero Insurance Alliance (NZIA), thereby committing to setting long-term emissions reduction targets for our proprietary investment portfolio, insurance underwriting and business operations.

> **The NZAOA is explained in more detail in section 02.2 and the NZIA is explained in section 02.1.**

In 2020, Allianz set intermediate targets following the guidance of the NZAOA for the asset classes listed equity, corporate bonds and real estate. In 2021, we also set targets for infrastructure investments.

> **Our targets cover all four dimensions as described in the NZAOA Target Setting Protocol and are explained in detail in section 02.2.2.**

We furthermore plan to set targets for the insurance underwriting portfolio during the course of 2023, based on the NZIA Target Setting Protocol.

Managing transition risks

Fundamental to managing transition risks is an understanding of the pathways along which companies can, and should, develop their business models to align with 1.5°C. Allianz continuously conducts detailed analysis of energy-intensive sectors' emission profiles, prototypical decarbonization pathways and necessary technology shifts within sectors and companies.

As participant of the Glasgow Financial Alliance for Net-Zero (GFANZ) Allianz is leading the work on sectoral decarbonization pathways to enhance development, understanding and uptake. As part of this, we are also engaging with top-down and bottom-up modelers of those pathways.

We use the results for portfolio analysis, for risk management and to inform our engagement process and management decisions. Emissions footprints are used as a proxy for transition risks and are therefore covered in our decarbonization targets.

Phasing out fossil fuels

Allianz started to restrict financing coal-based business models in 2015. For defined coal-related activities, equity stakes have been divested, existing fixed income investments put in run-off and no new investments have been allowed since 2015. Since 2018, we do not offer insurance for individual coal infrastructure on a stand-alone basis and we require all companies across our P&C insurance and proprietary investment portfolio to fully phase out coal by 2040 at the latest. In 2021, Allianz released an update of its guideline on coal-based business models which defined even more ambitious thresholds from 1 January 2023

03.2 Strategies

and a clear pathway to further reduce thresholds in the future to fully phase out coal by 2040 at the latest.[1]

The goal of the coal restriction is to drive a transition away from coal globally. This also means we want to insure those companies with credible transition plans. Therefore, if companies fail to meet our criteria and thresholds, but they do present credible and public emission reduction targets to transition away from coal compatible with the scientific pathways of limiting global warming to 1.5°C and which is confirmed by independent third-party assessments on targets and performance, the Global Sustainability team will evaluate on a case-by-case basis if they can be exempted from our restrictions.

Furthermore, we will insure green energy projects/subsidiaries and invest in ring-fenced green assets of excluded companies which we assess to have a long-term strategy on coal phase-out in line with short-term reduction targets and are not building/planning new coal.

Our criteria are continuously tightened as explained in more detail in our public statement on coal-based business models.

In 2022, we received 50 coal-related requests from our operating entities to exempt clients from company-based restrictions related to both insurance and proprietary investment segments. Of these, 22 exemptions were granted, and 28 were not granted. Of those granted, 5 were 1.5°C exemptions, 4 were well below 2°C exemptions which led to a grace period of one year, and 13 were green exemptions.

In 2022, we introduced a targeted restriction for the oil and gas sector. As of 2023, direct investments in and single-site / standalone insurance of selected oil and gas projects are prohibited. This includes new oil and gas fields as well as oil pipelines and oil power plants. Further restricted are projects in the Arctic[2] and Antarctic regions, in the ultra-deep sea, as well as those related to extra-heavy oil and oil sands.

From the largest oil and gas producing companies we expect by January 2025 a thorough commitment to net-zero greenhouse gas emissions by 2050 across their full value chain. Largest oil and gas producing companies are defined as having more than 60 million barrels of oil equivalent production in 2020. These are estimated to represent approximately 85 percent of the hydrocarbon production of the oil and gas industry. These companies should ideally in addition align their operations and disclosure to the Climate Action 100+ Net-Zero Company Benchmark requirements, most notably the alignment of capital expenditures and corporate lobbying.

Also here, we will continue to support renewable/low-carbon energy projects with investments and insurance, to accelerate the transition towards net-zero aligned technologies.

Further details and definitions can be found in our public statement on oil and gas business models.[3]

Both guidelines are complemented by the existing approach for consideration of wider ESG aspects as described in the Allianz ESG Integration Framework.

See chapter 02.

Seizing on opportunities

Our business strategy includes systematically leveraging opportunities to finance a low-carbon and climate-resilient future, e.g. by investing in renewable energy, energy efficiency in real estate and electric vehicle infrastructure and by providing insurance solutions to protect against physical climate impacts and support low-carbon business models. For proprietary investments, the Allianz ESG Functional Rule for Investments provides the foundation for integrating climate-related issues. It comprises asset manager selection and systematic integration of climate and sustainability factors into our investment decisions.

Read more in our ESG Integration Framework.

We have strategically invested in low-carbon assets for over a decade. This includes renewable energy, certified green buildings and green bonds (see section 02.2). Our Sustainable Solutions program provides products and services that create shared value by improving people's lives and/or delivering a positive environmental impact. Allianz is one of the leading insurers of low-carbon technologies. As part of our Sustainable

1 As of January 2023, our threshold for the coal share in the company's respective business is lowered to 25 % and will be further reduced to 15 % as well as 5 % globally as of year-end 2025 and year-end 2029 respectively. Those thresholds have been derived from coal share in power generation in IPCC's no and low overshoot 1.5°C scenarios.

2 As defined by AMAP, excluding operations in Norwegian territories.

3 The phasing out of fossil fuels and scaling up of renewable energy also as per our investment targets (section 03.4) is also put forward by the U.N. HLEG report on net-zero commitments in recommendation 5.

03.2 Strategies

Solutions approach, we provide standardized and tailor-made insurance products and are insuring renewables in 70 countries.

We also aim to reduce the impacts of climate risks and incentivize preventive measures to increase customers' resilience and compensate for climate-related damages.

Examples include risk consulting services offered by AGCS, our active support of the InsuResilience Global Partnership and our work with the German Corporation for International Cooperation (GIZ) to pilot innovative insurance solutions in emerging and developing countries.

Active company dialogue, joining forces and targeted engagement

We actively engage investee companies and insurance clients using a variety of channels and formats. A key forum for engaging the 166 most carbon-intensive companies is Climate Action 100+ (CA100+), a collective engagement platform made up of more than 700 global investors responsible for more than $68 trillion in assets under management.

› **Our goals and actions in CA100+ are explained in section 02.2.**

AIM has a dedicated engagement function for proprietary investments and systematically engages with external asset managers on climate integration, climate risk management, proxy voting processes and public discourse.

In addition, our internal asset managers, AllianzGI and PIMCO, and our insurance entities are active stewards on climate-related matters.

› **For more details on our engagement approach please see sections 02.2 and 02.3.**

For voting records of AllianzGI, please refer to their overview web page.

We are joining forces with other asset owners in encouraging companies to implement transition pathways. Our participation in the Transition Pathway Initiative (TPI), CA100+ and the Principles for Responsible Investment (PRI) connects us with like-minded investors and offers opportunities for collaborative engagement. On decarbonization matters, the AOA strives to be the link between these existing engagement platforms, asset owners, target verification initiatives and tools and policymakers.

Addressing climate change in our own business operations

We rate impacts from climate change risks on the operations of the Allianz Group to be of limited materiality. The exposure of Allianz offices and data centers to locations at high risk of extreme weather events is contained and managed through risk mitigation measures as well as business continuity and disaster recovery plans.

The low carbon footprint of our operations makes us less prone to carbon price risk and we have committed to reduce it further.

› **See section 02.6.**

Forest protection to protect carbon sinks and biodiversity – our approach to carbon credits

In 2019, we committed to pursue efforts to limit global warming to a maximum of 1.5°C by the end of the century and aim for net-zero emissions by 2050. We have claimed our operations to be 'carbon neutral' since 2012. This has been achieved through investments in the protection of existing rainforests, maintaining significant carbon sinks and biodiversity while empowering the local population through job creation, provision of health care and education and preserving biodiversity.

Looking ahead, we believe the focus should be both on reducing emissions in line with science and protecting natural systems. We have set corresponding targets to reduce emissions in our investments and operations, see respective sections in chapter 02. Targets for insurance underwriting are expected to follow in 2023. Science has made clear that the 1.5°C target will require an upscaled removal of emissions from the atmosphere into technical and natural carbon sinks in the mid-term. The IPCC defines carbon neutrality as achieved when anthropogenic emissions of GHGs to the atmosphere are balanced by anthropogenic removals over a specified period. We support this understanding in the context of our net-zero commitment. Given our focus on our emission reductions and that we wanted to await the results of the United Nations HLEG Group's report on Net-Zero Commitments of Non-State Actors, we delayed our strategy development on carbon removal and associated net-zero offsetting to 2023.

03.2 Strategies

Partnerships, memberships and financial industry engagement

We actively contribute to specialized initiatives that focus on decarbonization, including:

1. The NZIA, NZAOA, UNFCCC Race to Zero Campaign and Science Based Targets initiative (SBTi) represent the commitment to decarbonize our operations, proprietary investments and P&C insurance underwriting. CA100+ coordinates the investor community engagement of 167 of the largest global corporates on climate matters and Allianz leads engagements.
2. The Transition Pathway Initiative (TPI) assesses the climate performance of corporates across a variety of sectors.
3. The G7 Investor Leadership Network (ILN) and Institutional Investors Group on Climate Change (IIGCC) serve as networks to share and develop best practice. Allianz is represented on the board of both.
4. Open Source Climate is a group of corporates to jointly build a 'pre-competitive layer' of modeling and data that is globally shared and accessible. Allianz is represented on the board.

Through our additional memberships, including The B Team and World Economic Forum (WEF) Alliance of CEO Climate Leaders, we encourage companies within our sector and beyond to step up and improve their climate strategies and climate disclosures, as well as develop our own. Furthermore, our Board member Günther Thallinger was appointed to the U.N. HLEG on Net-Zero Emissions Commitments of Non-State Entities which released their recommendations for necessary elements of net-zero commitments at COP27 in November 2022.

Allianz partners with international organizations to drive climate-smart investment and insurance. One example is the Sustainable Development Investment Partnership (SDIP) which aims to scale the use of blended finance in sustainable infrastructure investments in developing countries, an initiative coordinated by the WEF with support from the OECD.

We are an active member of climate-related industry associations and initiatives including the Munich Climate Insurance Initiative, Chief Risk Officer Forum, Global Innovation Lab for Climate Finance, Geneva Association, ClimateWise, RE100, EV100, and others.

> **For more details on stakeholder engagement see section 05.3.**

Advocating for strong climate policy

A supportive policy environment is crucial to ensure the viability of a socially-just transition to climate resilience and net-zero emissions. Without decisive action by governments, there will be insufficient frameworks and market incentives to bring down demand for emission-intensive products and to allocate capital in line with a 1.5°C trajectory. The private sector, including insurers, can play an important role in raising government awareness and making the business case for getting on track to deliver the Paris Agreement.

Asset owners like Allianz are in a unique position in the financing value chain, especially those setting themselves portfolio targets and therefore being dependent on change in policy and the real economy to achieve them. This is also the reason why we are working to contribute to transform the investment and insurance industry as part of our U.N.-convened net-zero alliances. In line with the U.N. HLEG report on net-zero commitments' recommendations 6 and 10, we are disclosing our main climate policy-related memberships (section above as well as 05.3.2 (membership list)) and our main net-zero related positions below.

In 2022, we continued to advocate for governmental policies in line with requirements of 1.5°C pathways, examples of our public advocacy, also driven via co-leading the policy work of the NZAOA, include:

- The NZAOA Statement on the Escalating Energy Crisis
- The NZAOA Position Paper on Governmental Carbon Pricing
- The NZAOA Call on Policymakers to Support Scaling Blended Finance
- The WEF Alliance of CEO Climate Leaders' Open Letter to COP27
- The joint letter by The B Team and the We Mean Business coalition COP27: All in for 1.5°C

We also advocate for:

1. Embedding 'net-zero by 2050' in short- and long-term governmental climate targets, climate strategies and emissions reduction plans, following latest climate science which requires at least halving emissions every decade in line with pathways of no or low overshoot of a 1.5°C temperature rise.

03.2 Strategies

2. Development of sector policies to promote a swift and just transition including the development of more granular short-, medium- and long-term zero carbon infrastructure plans.
3. Stringent carbon pricing to internalize the external costs of pollution, including a phase-out of direct and indirect fossil fuel subsidies.
4. Protection of nature and support for regenerative forestry and agriculture. Support for and redirecting of fossil-fuel related subsidies to scale up new technologies that will provide solutions in hard to abate sectors, e.g. carbon capture and storage and green hydrogen.
5. Promotion of mandatory assured climate disclosure, including transition plans, GHG emissions, associated reduction targets and alignment with 1.5°C trajectories, ideally internationally aligned.
6. Sustainable finance regulation that provides a defined, science-based and reliable framework via a common taxonomy of sustainability, clarification of asset managers' and investors' duties, inclusion of sustainability in prudential regulation, and enhanced transparency of corporate reporting.

Towards open source climate data, models and analytics

More and more financial institutions are committing to align their portfolios with the Paris Agreement. One of the main barriers they face is accessing trusted data and transparent analytical tools to quantify and act decisively on climate-related risk and opportunities. Current regulation and methodologies are not standardized enough and the market for data and tools is highly fragmented. To improve this, Allianz is supporting and contributing to advancing climate disclosures in a number of ways:

1. We are a member of Open Source Climate (OS-C), an initiative hosted under the Linux Foundation to enable like-minded companies to build a 'pre-competitive layer' of modeling and data that is globally shared and accessible. OS-C links company data, climate analytics (scenarios and stress tests) and scientific climate models in one platform, allowing for global collaboration on this exceptional data challenge which will accelerate innovation.
2. Allianz led the development of the prototype of a Portfolio Alignment Implied Temperature Rating tool in line with the TCFD's work on Portfolio Alignment, along with other large corporations like Amazon, Microsoft and Goldman Sachs. It will start with four sectors (Automotive, Oil and Gas, Steel and Utilities).

03.3 Targets

Our support for the net-zero transition is steered by our commitment to set science-based emission reduction targets and reach net-zero emissions by 2050 in our business operations, our insurance underwriting and our proprietary investment portfolio in line with the Paris Agreement's target of limiting global warming to 1.5°C. This already fulfills the recommendations 1 and 2 of the U.N. HLEG report on Net-Zero Commitment of Non-State Entities[1] and we will continue to advance our work on this. For emission-related targets, no offsetting credits were used.

Climate-related targets

Table TCFD-4

Targets and achievements: Climate Change Strategy

Topic	Objectives	Progress and actions 2022
Phase out of coal-based business models	• Fully phase out coal-based business models across our proprietary investments and Property & Casualty (P&C) portfolios by 2040 at the latest, in line with the 1.5°C pathway. • Engage with companies in proprietary investment as well as P&C portfolios to move away from coal. • Reduce threshold for coal-based business models for P&C insurance as well as investment portfolios from current 30% to 25% as of 31 December 2022.	For further insights into our divestments, please refer to our Group Sustainability Report 2022, chapter 04.
Transition away from oil and gas	• Targeted restrictions for oil and gas project investments and single-site P&C insurance as of 1 January 2023. • Expectations to companies with largest oil and gas production to commit to net-zero GHG emissions by 2050 by 1 January 2025.	Launch of oil and gas guideline.
Net-Zero Asset Owner Alliance	• Engage with policy-makers, regulators, sectors and companies. • Work across all dimensions of the Alliance commitment and Target-Setting Protocol • By 2023: Disclosure of quantitative joint NZAOA report.	Together with our partners at the NZAOA, we achieved the following: • Grew to 82 members across three continents with > USD 11 tn AUM. • Published 2nd version of the Target-Setting Protocol. • Conducted engagements with policy-makers, regulators, energy agencies, sectors and companies. • Published a number of position papers and statements. • Published 2nd NZAOA progress report.

1 Source: Report from the United Nations' High-Level Expert Group on the net zero emissions commitments of Non-State Entities.

03.3 Targets

Climate-related targets

Table TCFD-4

Targets and achievements: Climate Change Strategy continued

Topic	Objectives	Progress and actions 2022
Net-Zero Insurance Alliance	• We will actively contribute to the establishment of the U.N.-convened Net-Zero Insurance Alliance alongside other insurance firms around the world. • Transitioning all operational and attributable GHG emissions from its insurance and reinsurance underwriting portfolios to net-zero GHG emissions by 2050, consistent with a maximum temperature rise of 1.5°C above pre-industrial levels. • Launch of the NZIA Target-Setting Protocol is expected at the latest in January 2023. First individual intermediate targets for 2030 are expected to be released by mid-2023 at the latest.	Allianz co-founded the U.N.-convened Net-Zero Underwriting Alliance alongside other insurance firms around the world.

For the Climate-related targets for our business operations, please see section 02.6.

03.4 Strategy resilience, stress tests and climate scenario analysis

Climate change considerations are an integral part of our insurance and investment strategy.

We apply various quantitative and qualitative approaches to carry out climate stress testing and scenario analysis in consideration of the longtime horizons over which climate change may unfold and the high uncertainty over the direction of future climate and economic developments. Our objective is to foster risk awareness, build expertise in the assessment of financial risks from climate change, test our business strategy and inform risk management and business decision making.

We perform sensitivity and scenario analyses with time horizons up to 2050 and including scenarios ranging from 1.5°C to 4°C of average warming by the end of the century. We make use of internal models and external tools. While time horizons naturally differ depending on the lines of business under consideration, the range of scenarios we apply allows us to better assess the variety of risks and opportunities associated with climate change.

Table TCFD-5

Overview of climate scenarios applied by Allianz Group

Aspects covered	Scenarios used	Scenario provider
Transition and physical	Net-Zero 2050	Network for Greening the Financial System
	Below 2°C	
	Divergent Net-Zero	
	Delayed Transition	
	Current Policies	
Transition	97 C1 scenarios in Assessment Report 6 (no and low overshoot)	Intergovernmental Panel on Climate Change (IPCC) (building on a multitude of scenario providers)
Transition	Net-zero by 2050	International Energy Agency
	Sustainable Development Scenario	
	Beyond 2° Scenario	
	Stated Policies Scenario	
	2° Scenario	
Transition	One Earth Climate Model	University of Technology Sydney
Transition	RPS	Inevitable Policy Response
	FPS	
Physical	Representative Concentration Pathway (RCP) 2.6	IPCC
	RCP 4.5	
	RCP 6.0	
	RCP 8.5	

03.4 Strategy resilience, stress tests and climate scenario analysis

Table TCFD-6

Definition of time horizons

Short-term	Medium-term	Long-term
Up to three years	**Three – ten years**	**Ten+ years**
As defined, for instance, in our standard Top Risk Assessment process.	Needed for establishing solvency considerations and capital adequacy.	As, for instance, required for strategic decisions and transactions with investment horizons of several decades like real estate and infrastructure.

When we conduct analyses which assess 1.5°C scenario alignment, we adjust our scenario selection using guidance developed by the NZAOA which is focused on 1.5°C scenarios with no or low overshoot of 1.5°C of warming which limits the need to remove GHG emissions from the atmosphere in the second half of the century.

When conducting outside-in impact scenario analysis, we use a broader range of scenarios in terms of temperature outcomes and characteristics. Qualitative assessments are conducted to explore to what extent and across which channels climate change risks affect different aspects of our business, unconstrained by the still limited availability of quantitative models. As an example, we report results from our holistic qualitative climate change risk assessment in section 03.4.1 and an update to our survey based assessment for P&C retail business in the case study: 'OE level qualitative risk assessment for retail P&C'.

We deploy quantitative assessments for indicative sizing of our exposure to climate change risks. An integrated climate change stress test which has been developed to assess stress impacts at the level of our balance sheet is presented in section 03.4.2, applying scenario data provided by the Network for Greening the Financial System (NGFS) and the Intergovernmental Panel on Climate Change (IPCC). This stress test approach combines market stresses for both assets and liabilities as well as L&H and P&C underwriting stresses.

Complementary bottom-up modeling for the most relevant exposures provides insights into climate change risks at the level of individual investment or underwriting projects and may support contextualization of results from top-down analyses.

> **This is showcased in the carbon price stress test for listed equity and corporate bonds in section 03.4.3, a case study analyzing carbon price risks for real estate as well as the quantitative physical risk analysis for investments in section 03.4.4.**

Note that the analyses included in this report reflect our current approaches to climate change risk assessments. Prevailing methodological and data limitations as well as the high degree of uncertainty inherent in any long-term analysis may still limit decision-usefulness of some results. However, these approaches will change over time as climate scenarios evolve in line with research, developmental-stage methods improve further and industry best-practices emerge.

Table TCFD-7

Overview of business-related climate change risk analyses disclosed in this report

Objective	Name	Scope	Aspects covered	Section
1. **Economic and non-financial impacts**	Qualitative climate change risk assessment	Investments, insurance, operations	Transition, physical	03.4.1
2. **Economic impacts (top-down)**	Integrated climate change stress test	Investments, insurance	Transition, physical	03.4.2
3. **Economic impacts (bottom-up)**	Quantitative carbon stress test	Investments	Transition	03.4.3
4. **Economic impacts (bottom-up)**	Quantitative physical risk analysis for investments	Investments	Physical	03.4.4

03.4 Strategy resilience, stress tests and climate scenario analysis

Further examples of the application of scenario analysis include:

- Prospective and existing infrastructure assets undergo a thorough due diligence along evaluation criteria, considering an asset's GHG emissions and potential impact on capital expenditures and performance. Assets are required to have a clear and time-lined strategy showing how they will adapt to a decarbonizing world.
- Allianz Real Estate regularly conducts an energy and carbon performance overview of its direct real estate portfolio, including indicative decarbonization targets. Furthermore, Allianz Real Estate piloted the application of in house climate scenario analysis for investment portfolios. This work builds on internal underwriting tools to assess location-based physical climate risks and paves the way to use them on the asset side as well.

03.4.1 Qualitative climate change risk assessment

A holistic assessment of how climate change may adversely impact Allianz's risk profile over the short- to mid-term as well as long-term horizons has been conducted for all major relevant business areas using a consistent qualitative risk assessment approach. The comprehensive set of business-specific climate-change related risk drivers considered in this approach enables a detailed analysis of physical, transition and litigation risk impacts. This provides a sound basis for applying a risk-based prioritization towards the evaluation of mitigation effectiveness and management actions.

Methods, assumptions and limitations

The qualitative climate change risk assessment has been organized along business areas and risk transmission channels. Business areas are divided into Investments, Property & Casualty (P&C) Underwriting, Life & Health (L&H) Underwriting and Operations, with the Investment and Underwriting areas further broken down by asset class and line-of business, respectively. For risk transmission channels, we have considered climate change induced developments in terms of Technology, Policies and Regulations, Litigation, Human Behavior, and Physical Risk. At each intersection of a business area and a risk transmission channel, we have identified potential key risk drivers along with their potential short- to-mid-term and long-term impacts, based on a combination of desktop research and inquiry with subject matter experts.

Taking this as starting point, the assessment considers each key risk driver's impact on various business-area specific dimensions of financial and non-financial performance, cf. table 1, using a four-point rating scale ('strongly negative', 'negative', 'neutral' or 'positive'). The precise rating methodologies have been customized to each business area as

Table 1:

Qualitative climate change risk assessment: financial and non-financial assessment dimensions considered when rating risk driver severity, per business area.

Business area	Assessment dimension #1	Assessment dimension #2	Assessment dimension #3
Investments (by asset-class)	**Revenues**	**Costs**	**Asset value**
	Productivity	Direct costs	Changes in valuation
	Sales	Indirect costs	Damages and write-offs
	Demand	Capital expenditures	
P&C Underwriting (by LOB)	**GWP**	**Claims**	**Expenses**
	Insurability	Frequency	Administrative expenses
	Affordability	Severity	Acquisition expenses
	Policyholder behavior		Claims handling costs
			General expenses
L&H Underwriting	**Mortality and longevity**	**Lapse rate**	**Morbidity rate**
	Mortality	Lapses	Diseases and illnesses
	Longevity		Injuries
Operations	**Mitigation strategy**	**Complexity and management attention**	**Required investments**

03.4 Strategy resilience, stress tests and climate scenario analysis

well as calibrated against each other to ensure overall comparability. In addition, a materiality weighting has been applied for the investment and underwriting areas, considering relative contributions of each asset class and line-of-business to the overall investment or underwriting portfolio, respectively. Lastly, it should be noted that the risks are evaluated on an inherent risk basis, meaning the effect of Allianz-specific mitigation or adaption measures have not been taken into account.

The outcome of this exercise provides a high-level indication of how relevant a given key risk driver and risk transmission channel could potentially become for a given business area.

Results

A summary of some key observations derived from the qualitative risk assessment are provided below for each business area.

Property & Casualty

- **Transition risks** in general have been assessed as relatively more significant over the short-to mid-term horizon versus the long-term horizon, with the exception of legal risks within a limited number of LOBs. One supporting rationale is transitional developments related to climate change will need to be urgently realized over the next 5 to 15 years, which may represent a comparatively dynamic period of transition risk relevance for the P&C insurance sector, followed afterwards by a period of increasing stabilization. Alternatively, where developments are expected to play out over a longer-term, such as pathways towards full decarbonization, the respective policies and implementation plans will need to be well established over the short- to mid-term. At a more granular level, the assessment also demonstrates the expectation that climate change impacts will be quite diverse in severity, depending on the precise LOB and ESG Risk Transmission Channel. For example, for Technology Risks within the Aviation and Marine-Cargo LOBs alternative fuels may result in a potential net negative impact on claims in the short- to mid-term; whereas for other LOBs the net-impact of technology risks may not be as relevant.
- **Legal risk:** for most of the assessed LOBs there were no drivers identified within the risk transmission channel for Legal Risk. However, for those where applicable drivers were identified, these were consistently assessed as potentially significant. For the commercial Liability LOB this result includes consideration of climate change litigation developments. For the Energy & Construction LOB the assessment foresees litigation concerning the construction of upstream, mid-stream and downstream renewable energy infrastructure. For Financial Lines, increased legal exposures related to climate change disclosures serves as a potential risk driver. Lastly, looking forward, litigation related to greenwashing is projected to become a potentially relevant risk driver for multiple LOBs.
- **Physical risks:** amongst physical risks, acute physical risks over the short- to mid-term time horizon have been assessed as the most significant. While this result runs counter to the understanding that acute physical risks will only continue to increase in both magnitude and frequency, the presumption is over a longer-term time horizon adaptive measures will help blunt impact severity for Allianz. This includes both adaptive measures by external parties, such as regulations restricting or encouraging movement away from disaster prone areas, as well as mitigation measures by Allianz, such as improvements in the management of insurance risk concentrations and the pricing of insurance coverages.

L&H underwriting

- **LOB-specific risks:** for climate-change related risks to L&H underwriting, the assessment did not identify any overall macro conclusions for the business area. Rather, the potential impacts are very much specific to individual LOBs and ESG risk transmission channels. For example, within many of our life and health products, it is anticipated that physical risks will have a detrimental impact on morbidity and mortality rates driven by the effects from heatwaves, vector-borne diseases, drought or flood-induced food and freshwater scarcity, etc. However, the Allianz L&H portfolio is heavily weighted by longevity business which would mean L&H underwriting impacts are expected to be limited in the medium-term. In terms of consumer behavior, any mass movement towards more sustainable lifestyles, including environmentally friendly modes of transportation requiring more physical activity (e.g. biking, walking or public transportation) or nutrition (e.g. reduced meat consumption) is likely to result in positive underwriting impacts. These positive consumer behavior changes are likely to be further enhanced by supporting policy responses, such as the greening

03.4 Strategy resilience, stress tests and climate scenario analysis

of public urban spaces as a form of carbon capture and to combat high temperatures, or the expansion of public transportation and cycling infrastructure.

Investments

- **Transition risks:** overall, transition risks are viewed as relatively more material over the short- to mid-term, once again following the logic that much of the transition-related measures in response to climate change will need to be established over this time frame. During this period an increasingly confident sorting of the investee universe – in terms of both locations, sectors and individual companies – will occur on the basis of increasing transparency over those investees who stand to benefit from the opportunities or otherwise mitigate the risks related to climate change versus those investees which don't (i.e. based on either their inherent business model, such as coal-based business models, or a failure in strategic long-term planning). Enabling this sorting of the investee universe on the basis of investees' potential climate change risks will be one important outcome enabled by recently proposed climate change disclosure regulations, such as the EU's Corporate Sustainability Reporting Directive or TCFD-aligned rules recently proposed by the SEC. While climate change transition risks will also continue to impact investees over a longer-term, relatively speaking the greatest disjunction is predicted to occur in the medium-term.
- **Asset-class specific risks:** in addition to broad-based conclusions around overall transition and physical risks, the assessment also highlights more specific potential risk developments for each asset-class. For example, with respect to certain types of infrastructure investments, the assessment foresees a strong positive impact over both a short- to mid-term and long-term basis as governments around the world turn to public-private financing (PPF) and other forms of infrastructure-oriented subsidies to facilitate the transition to renewable energy and other climate change adaption or mitigation projects. Overall, internal analysis projects the listed equity and corporate bond asset classes as the most sensitive to climate transition scenarios. This is mainly because equity investments are directly affected by climate-related impacts and changing market expectations and resulting market valuation. In contrast, for a long-term investor like Allianz, impacts on debt investments would be felt first by a changing of spreads and to a lesser extent by impairment of debt service of assets.

Operations

- **Short to- mid-term risks:** over the short- to mid-term the most consequential climate-change related impacts for Allianz's own operations includes compliance with the quickly developing regulatory landscape, which increases Allianz's operational complexity – and by extension operational and legal risks – through the need to introduce new or modified processes, reporting and governance elements. Although these regulatory aspects are extensive, Allianz is confident in its ability to comply.
- **Long-term risks:** on a longer-term basis the assessment foresees increasingly significant climate-change impacts on our business operations from both physical risks and consumer/ human behavior risks (transition risk). On the physical risk side, rising temperatures, heatwaves, floods and other similar natural events may trigger disruptions to both IT and non-IT (e.g. personnel, office locations) operations. For consumer behavior, we anticipate that climate-considerations will play a relevant role in human resource management, for example in terms of attracting and retaining talent, constructively engaging climate change activism by employees, or addressing the need to re-skill or up-skill the climate change competencies of Allianz's workforce, Board of Management and Supervisory Board.

Risk response

Reflecting on the results in terms of potential risk responses, while there may be instances where new mitigation measures (e.g. processes, controls, strategies) specifically designed around climate change may need to be introduced, in many other cases the currently existing risk management processes should be sufficient.

For example, with respect to P&C underwriting, well-established techniques such as premium adjustments, changes in coverages, exclusions, expansions, or modifications to risk limits can all be employed. However, insofar as climate change will fundamentally alter insurance markets, the consequences are much more uncertain. This fundamental altering includes themes such as coverage affordability, the shrinkage of existing markets or the emergence of new markets, products or coverages encompassing difficult-to-price risks (e.g. similar to industry experience around the emergence of cyber insurance).

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Outlook

The qualitative risk assessment represents an extensive exercise that occurred throughout much of 2022. Using this basis, we are able to apply a risk-based approach to determine – against a very broad scope of potential climate change impacts on Allianz's business – which specific risks or areas of the business should be subjected to more sophisticated qualitative or quantitative scenario analysis. As an example, in 2022 we performed a bottom-up OE level qualitative risk assessment for the P&C retail motor and property LOBs. In terms of improving our understanding of climate change impacts on our business, this bottom-up OE assessment supports the top-down climate change qualitative risk assessment described above by providing a more nuanced, OE- and retail-business specific view of climate change risks within those two LOBs. This both serves as a means of validating and increasing the robustness of results from the top-down assessment, as well as allowing for a more OE or sub-segment targeting of potential risk responses. The following content elaborates on the results from this assessment.

Case study: OE level qualitative risk assessment for retail P&C

Given their business focus and flexibility, we consider qualitative approaches as suitable tools to identify risks and opportunities, as well as potential response options, from a strategic angle. They allow us to explore in principle a rich set of transmission channels and interdependencies that do not have to be hardwired from the outset. Here, we report on an extension of the survey-based assessment covering our major P&C retail lines of business that we launched in 2021 as part of our Group-wide climate change initiative which aims to identify and assess related risks and opportunities.

Methods, assumptions and limitations

The Network for Greening the Financial System (NGFS) provides six scenarios with differing levels of physical and transition risks. For the qualitative risk assessment, we have chosen the two 'extreme' scenarios of 'Divergent Net-Zero' and 'Current Policies' to present two clearly distinguishable development paths to the participants of the survey. 'Divergent Net-Zero' is characterized by ambitious and immediate, but rather un-coordinated climate policies. Under this scenario the net-zero target will be reached in 2050, with relatively low physical risks in comparison to scenarios with more severe global warming. However, these low physical risks will be accompanied by a lack of policy coordination across sectors, resulting in rather high transition costs that are further compounded by fast technological changes. The scenario 'Current Policies', on the other hand, assumes that only currently implemented policies are preserved, implying relatively slow technological change resulting in low transition risks, but high long-term physical risks due to global warming exceeding 3°C by the end of the century.

For this bottom-up qualitative risk assessment we have kept the scope of the exercise with regards to lines of business and time horizons unchanged, meaning participants were asked to give their assessments for the retail motor and property lines of business over two different time horizons (i.e. short- to mid-term 2022 to 2030 and long-term 2031 to 2050). However, we increased the granularity of the survey by focusing on our four largest European markets; France, Germany, Italy and UK.

In order to provide participants a better understanding of how the scenarios might affect the business environment we further augmented NGFS data with specific business drivers, such as the numbers of electric vehicles or targets for retrofitting buildings tailored to local markets. Finally, the risks and opportunities from climate change were assessed on a four-point scale based on qualitative criteria, including shrinking markets, higher claims, dwindling reinsurance capacity or changes that increase the market's susceptibility to disruption, while also considering efforts that need to be undertaken to adapt to a changing business environment. Ratings were established for volume and profitability impacts as well as overall consequences. The subsequent assessment of risk mitigation necessity considered whether effective mitigation is provided by business-as-usual risk management practices, such as re-pricing or reinsurance, or whether extraordinary measures such as a business-line exit need to be taken, and whether a strategy on how the business might respond to the risk has already been elaborated. Ratings are commented for proper contextualization of the survey participants' choices.

03.4 Strategy resilience, stress tests and climate scenario analysis

Assessments were performed in a workshop format with various participants from local P&C underwriting, pricing and claims areas.

Results

The following provides a summary of results from the local OE assessments.

Transition risks under the different scenarios can be further differentiated into three sub-categories: policy, technological and consumer preferences. All three will weigh on future premium growth and profitability in retail motor. Higher carbon prices in the 'Divergent Net-Zero scenario', for example, will translate into higher mobility costs. At the same time, we anticipate that significant public investments in public transport should increase the attractiveness, and thereby usage, of this means of transport. Consumers will react to these shifts by reducing car ownership and individual mobility. While modest in the short- to mid-term, these trends are likely to accelerate after 2030, translating into a negative outlook on business volumes in the long-run.

Survey respondents also confirmed that technological change will be a main driver for declining profits in motor retail business due to higher loss ratios. Although claims frequency might decline thanks to better technologies, this is more than offset by an increase in severity, meaning higher costs for repairs and spare parts. Over the long-term these developments should be reflected in pricing, such that the adverse technological impacts will become increasingly less material before ultimately achieving a state of neutral impact. In this respect, differences in survey responses reflect how advanced respondents see themselves with respect to insuring EVs, among other factors. Physical risks like extreme weather events are assessed as having only a minor impact on claims in the motor business in the 'Divergent Net-Zero scenario'.

While the 'Divergent Net-Zero' scenario is expected to have a clearly negative impact on the retail motor business the story is different for retail property, where the survey revealed mixed views. Here, an overall positive impact is expected, in particular for top-line growth, i.e. Gross Written Premium. The main drivers are new standards for buildings (the policy aspect of transition risks), which require corresponding insurance cover and offer new opportunities, but also increasing demand due to growing risk awareness, especially in markets with lower insurance penetration. Furthermore, increased natural catastrophes (NatCat)risks are likely to lead to a greater level of risk aversion or consumer desire for protection, which in turn will translate into higher premiums.

On the profitability side, the picture is more nuanced. More extreme weather events will lead to rising claims, but pricing and portfolio steering should be able to neutralize the impact on the bottom line. In this context, technical excellence was seen as a strong competitive advantage over the short- to mid-term by one respondent, supporting a rather positive view on profitability. For other respondents, however, higher claims associated with new building materials and technology as well as limitations around pricing adjustments (e.g. tacit renewals) lead to the assessment of a neutral or even negative impact on profitability. These differences in the assessments disappear over the long-term, where pricing is expected to be adapted, but serve to highlight the different market characteristics as well as the degree of uncertainty and divergent views on risk development, even amongst subject matter experts.

Turning to the scenario 'Current Policies', the assessments are mostly similar, albeit with transition impacts being viewed as generally less severe, especially over the short- to mid-term time horizon. As policies stay more or less unchanged, the trends of less individual mobility and more climate-efficient buildings will unfold more slowly. Therefore, the qualitative risk assessment expects almost no net change in the business environment until 2030. Only after this will the full impact of these trends be felt. Mixed views prevail for retail motor, where survey respondents weigh the various impacts from market growth, increasing physical risks and competition very differently. For retail property, most respondents assessed negative impacts on profitability from increasing physical risks and competition over the short- to mid-term, which served as the primary driver for the overall assessment result. Over the long-term, this is further aggravated by potential issues around insurability, reinsurance capacity and government intervention preventing proper price adjustments, with the exception of one response, which assigns a higher weight to increasing demand and acceptance of risk based pricing.

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Outlook

The survey-based qualitative risk assessment for local P&C retail business across four markets delivered valuable insights. Moving forward, further qualitative risk assessments will be performed through a step-by-step process for the most relevant P&C business portfolios, including further expanding the scope with regards to client segments and regions. Further development of the approach is also planned in order to better feed the results into business strategy and decision-making, both in terms of risk management and as well as the capturing of business opportunities (e.g., for product development, portfolio management and provision of risk consulting services). The implementation of the NZIA (Net-Zero Insurance Alliance) commitments and the respective reporting on Insurance Associated Emissions according to the PCAF (Partnership for Carbon Accounting Financials) Standard will lead to a better understanding of Allianz's carbon exposure and associated risks and opportunities in the underwriting portfolios.

1 Please refer to the NGFS website for further information.

2 Gasparrini et. al. (2017) Projections of temperature-related excess mortality under climate change scenarios, Lancet Planet Health 1(9):e360-e367.

03.4.2 Integrated climate change stress test

The following integrated climate change stress test results are intended to showcase our continuing efforts to build capabilities and capacities for quantitative climate change risk assessments and gain experience with sizing balance sheet exposures to climate change risks. In practice, this complements the holistic qualitative risk assessment with quantitative information for a limited set of risks and risk transmission channels.

The stress test covers both sides of the balance sheet by measuring asset- or liability-specific stress impacts, as well as their dependencies for a static balance sheet, for time horizon up to 2050. Impacts are estimated for market stresses, as well as L&H and P&C underwriting stresses, using NGFS/IPCC-scenario based data from various sources. All entities contributing to the Allianz Group's Solvency II model (i.e. both Allianz's internal model or standard model rules) are in scope of the assessment. The main focus of the current analysis is to provide a best estimate for losses on own funds; where relevant, tails of loss distributions may be considered in subsequent selective studies.

Methods, assumptions and limitations

For the current implementation of the integrated climate change stress test we chose three scenario narratives from the suite of NGFS reference scenarios, representing different levels of transition and physical risk. The 'Below 2°C' (B2D) scenario assumes an early and orderly transition to a low-carbon economy, with an unambitious policy target to limit global warming to below 2°C by the end of the century. In this scenario, policy action has limited impact on economic growth. The immediate but disorderly transition to net-zero in the 'Divergent Net-Zero' (DNZ) scenario entails an initial contraction of the economy, recovering to growth by 2050. Physical risks are negligible in both the B2D and DNZ scenarios over the 2050 time horizon. Accounting only for climate policies that were in place before 2019, the 'Current Policies' (CPO) scenario is characterized by limited transition risks and high physical risks which start to materialize over the second half of the century.

The market stress module uses macroeconomic and financial markets variables from the NGFS reference scenarios published in 2022 which mainly cover transition risk, but also reflect physical risk to some extent.[1] These scenario variables have been expanded to adapt sectoral and regional coverage to the Allianz asset and liability portfolios. For some asset classes simple proxy models are applied where suitable valuation factors are missing in the scenario data. The market stresses themselves are applied to both the assets and liabilities of in-scope entities, where a simplified approach is used to assess the mitigation of stress impacts due to policyholder profit-sharing.

Scenario variables used in the L&H and P&C underwriting stress modules are derived from hazard models which are contingent on the IPCC's Representative Concentration Pathways (RCPs) 2.6, 4.5, 6.0 and 8.5.

The L&H underwriting stress module considers country-specific projections for temperature-related excess mortality under RCP scenarios from a study by Gasparrini et al.[2] to assess biometric losses on best-estimate liabilities. Loss estimates for mortality, morbidity and longevity are obtained from respective scaled Solvency II standard model shocks, where excess mortality is used as a proxy for morbidity for lack of medical studies linking morbidity development to temperature changes, and the opposite effect as mortality is used for longevity.

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Impacts from extreme weather events are not taken into account for simplicity, i.e., net temperature increase is the sole hazard considered in the assessment.

Major drivers of climate change risks for P&C underwriting are acute physical risks, which materialize as increases in the frequency and severity of extreme weather events attributable to climate change. For the P&C underwriting stress module we hence focused on changes in best-estimate liabilities for NatCat risk exposures that result from relative increases of projected losses in climate change scenarios. The assessment relies on projections for Average Annual Loss under RCP scenarios for a selection of the most climate-change relevant country and peril combinations (i.e. inland flooding, excluding Australia, and tropical cyclone) from the Allianz Climate Change Risk Solutions (ACCRiS) project (section 02.1.3). The inclusion of further country and peril combinations is expected to increase the impact of the assessment. Note that no changes in best-estimate liabilities for windstorms in Europe are considered as scientific studies do currently not indicate a clear signal regarding an increase in climate change associated loss expectations for this peril.

To separate the impact of climate change risk from trend growth, stress levels are assessed relative to a baseline or counterfactual scenario, which are basically hypothetical variable pathways that would be expected in the absence of climate change. Furthermore, the calculation of stress impacts is based on instantaneous stresses on the static year end 2022 balance sheet, without adaptation or mitigation actions from Allianz and its business partners. In particular, internal measures such as contract repricing, deployment of reinsurance strategies, or portfolio steering have not been taken into account, as well as external measures such as public investment in flood defences. Impact estimates from the different stress test modules are integrated based on simple matching of global mean temperature pathways between NGFS and IPCC scenarios.

Impact estimates from the integrated climate change stress test rely on scenario data that is available and considered relevant as of the current point in time. Nevertheless, the magnitude of outcomes has to be taken with a pinch of salt when accounting for the significant uncertainties inherent to climate change modeling and the crucial role of assumptions in long-term projections. This notably includes the uncertainty and variation of scientific studies underlying the forecasted distributions of NatCat events, which we address by considering a broad body of scientific research as well as benchmarking of different models, and assumptions for the counterfactual scenario, which have a critical impact on results.

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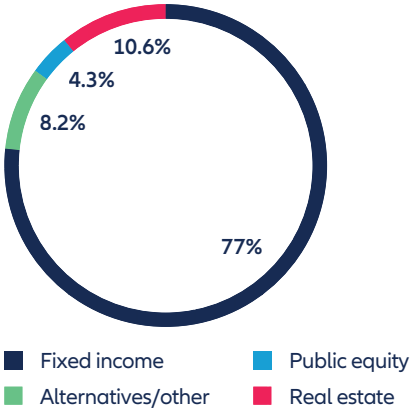
Asset allocation based on market value as of 31 December 2022

%



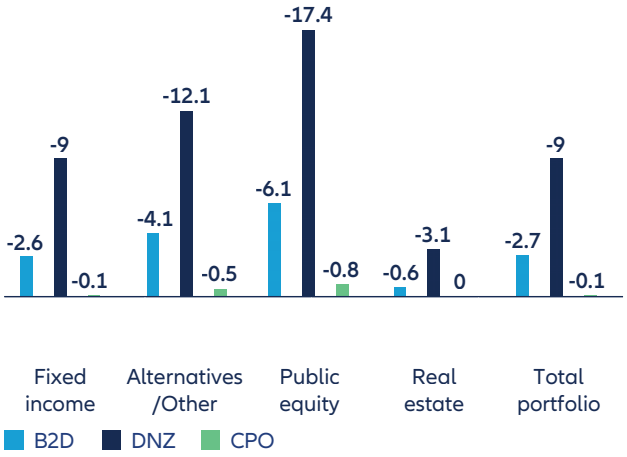
Results

Two key overarching observations may be derived from the assessment. First, over the time horizon until 2050, aggregate Own Funds impacts are largely determined by the different levels of transition risk in the scenarios, whereas impacts from physical risks are small in comparison, but gradually increasing. Second, market stress is the largest contributor to overall Own Funds impacts, exceeding the combined contribution from L&H and P&C underwriting stresses by a considerable margin.

Expanding upon the above general observations at the individual scenario level, we noted that the orderly implementation of the not too ambitious policy target in the B2D scenario comes with a low transition risk initially leading up to moderate losses in Own Funds, which then slowly revert back towards zero at the end of the time horizon. The DNZ scenario entails the most adverse impacts in comparison to the other scenarios. Own Funds losses are largest in the first years due to the immediate but uncoordinated implementation of the ambitious policy target, where especially a rapid phase out of fossil fuels puts pressure on economies. The economic recovery over time is more pronounced in this scenario as progress is made in transitioning towards net-zero emissions in 2050. Absent of stringent climate policy implementation stress impacts are negligible until late in the time horizon for the CPO scenario, where stress impacts from physical risk phase in. However, in the long-run this scenario is expected to entail material Own Funds losses as impacts from physical risks outweigh transition risk impacts.

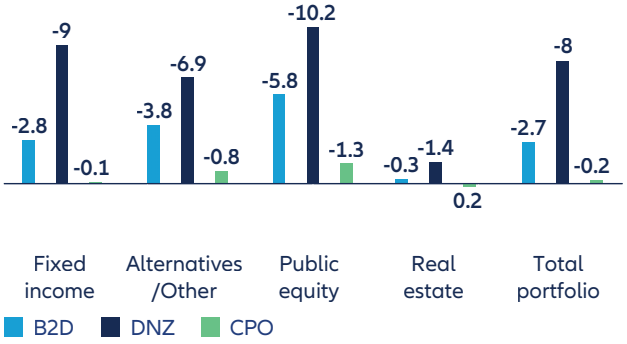
Market stress impact in 2025

%



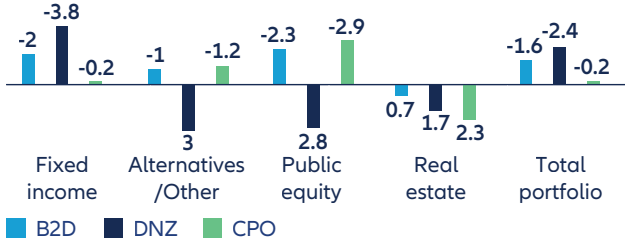
Market stress impact in 2030

%



Market stress impact in 2050

%



03.4 Strategy resilience, stress tests and climate scenario analysis

Market stress

Under the B2D scenario, in the first years of the time horizon the market value losses of the investment portfolio are determined by a decrease in equity prices, credit spread widening as well as increasing interest rates as compared to the baseline scenario, entailing around -2.7 % in market value losses. Recovery is led by improving equity and credit spread losses in Europe, whereas US markets remain under pressure until around 2040. By 2050, market value losses are mainly driven by interest rates which stay slightly elevated over the entire time horizon.

Stringency of climate policy implementation in combination with high sector and regional variability in the DNZ scenario entails severe economic consequences, expressed in considerably higher stress levels, leading to market value losses of the investment portfolio of around -9.0 % in 2025. As in the B2D scenario, equity and credit spread losses on the investment portfolio are driven by indirect policy effects on the overall economy rather than direct policy effects on fossil-fuel extraction, processing and power generation sectors, where investment exposure is limited. The trough of the economic crisis is passed after 2025, with steep recovery of equity prices and credit spreads turning losses into nominal gains by 2040. Overall impacts stay negative in the last decade of the time horizon, though, due to high interest rates.

Under the CPO scenario, the investment portfolio experiences only minor losses. Impacts from a loss of economic productivity due to global warming gradually increase, amounting to -0.2 % in 2050. Substantially more severe consequences across all asset classes are first materializing later in the century.

Considering market stresses on assets and liabilities in combination shows that overall impacts are predominantly determined by equity prices and credit spreads, partially mitigated by policyholder participation, whereas impacts from interest rates are largely offset by liabilities.

The present analysis shows that potential transition risk impacts may become material – particularly with respect to investments – in the event climate policy triggers a severe economic crisis, such as assumed in the extreme DNZ scenario. Under this scenario, while recent, specific measures such as the decarbonization of the investment portfolio will mitigate direct, potentially adverse consequences of climate policy, established mitigation measures including limiting and hedging equity and corporate credit exposures and proper asset-liability matching retain their relevance in terms of minimizing losses.

P&C underwriting stress

The impacts on total technical provisions at the end of the projection horizon (2050) are rather low in the transition scenario RCP 2.6 and reach several EUR 100 million in RCP 8.5. The scenarios RCP 4.5 and RCP 6.0 show impacts closer to the lower end of this range. As already outlined in section 02.1.3, these results are based on a limited number of peril models (flood and tropical cyclones) and on volatile climate change models. Therefore they are subject to change in the future.

In line with the baseline exposure, inland flooding in Germany and UK are among the main drivers for these impacts in all scenarios, with major divergence between the scenarios. Furthermore, losses from Australian tropical cyclones are seen to rise stronger in the near-term, with impacts moderating at some point in all but RCP 8.5. Impact from US tropical cyclones in 2050 is limited, given that the additional temperature increases in the Gulf of Mexico are not expected to further materially increase hurricane activity. Additionally, Allianz's exposure in areas stronger affected by intensity increases of US tropical cyclones is already limited, which further contributes to a low impact.

Overall, the absolute impacts are limited in comparison to Allianz's total own funds. However, these estimates are naturally subject to significant uncertainty, and furthermore are focused on the best estimate impacts contingent on the chosen RCPs. Especially for NatCat risks, tail events are also expected to change in frequency and severity from current levels, with single events posing the risk to have material impacts on Allianz's balance sheet. Stochastic considerations for tail events are hence a key point of focus for future development.

The identified signals and impacts from the ACCRiS project are used to support underwriting and pricing decisions, which will mitigate the shown effects. It is expected that actions of Allianz and other insurers will also further encourage policyholders and state administrations to apply mitigation measures like the change of building materials or the adjustment of flood protection.

03.4 Strategy resilience, stress tests and climate scenario analysis

L&H underwriting stress

Based on the current assessment, there are no material climate change impacts on L&H underwriting technical provisions for the Allianz Group up to the 2050 time horizon, with maximum impacts amounting to around EUR 60 million in the most extreme scenario RCP 8.5. Mortality impacts are the main driver of losses based on the climate change hazards considered, longevity offsets most of these impacts in all scenarios except RCP 8.5. In this scenario, mortality impacts exceed longevity impacts by around 40 % in 2050 due to no offsetting of higher heat-related mortality and lower cold-related mortality in Europe (excluding Southern Europe).

Morbidity impacts exceed mortality impacts only in RCP 6.0, a scenario characterized by an offset of a more pronounced number of cold-related deaths leading to lower net impacts as compared to RCP 4.5 which has less severe global warming. In terms of regional differences morbidity impacts tend to be greater for the Asian entities considered in the assessment due to a lack of offsetting from longevity risk which was more significant in other global regions.

The current approach is approximate and needs further refinement in order to better capture the morbidity risk impact especially for Asian entities.

Outlook

We will continue to work on improving the integrated climate change stress test, e.g. adding further scenarios and scenario variables to the analysis or refining valuation approaches.

03.4.3 Bottom-up quantitative carbon stress test for investments

Here we continue the reporting of carbon price risks for our investment portfolio using a bottom-up approach, focusing on listed equity and corporate bonds. This stress-test complements top-down approaches such as the one applied for the integrated climate change stress test presented in section 03.4.2. We see merit in a model which gives us full transparency on methods and parameters, is easy to implement and gives a first understanding of the evolution of potential climate impacts on our portfolio. It also provides opportunities to cross-check external methodologies and potentially develop more elaborate models going forward.

Methods, assumptions and limitations

Our approach uses effective carbon prices as a proxy for policy intensity, e.g. actual carbon pricing, energy-related subsidies and incentives, standards for energy efficiency and emissions.

The fundamental idea is that an increase in emissions price entails a decrease in earnings at the level of individual investee companies. This decrease in earnings can be translated into a stock market value loss based on price-to-earnings multiples. The model requires assumptions, for example on cost pass-through, price elasticities and regulatory easing (either explicitly or implicitly via effective carbon prices). These are kept simple for this version of the model.

Our starting point is the carbon footprint of listed equity and corporate bonds portfolios, as disclosed in section 03.1.2 using Scopes 1 and 2 emission figures. On this foundation, we apply carbon price shocks derived from the climate scenarios published by the Network for Greening the Financial System (NGFS) in 2021.

Under these scenarios, the magnitude of carbon prices materializing over the coming years is driven by the modeled intensity of policy action and other underlying scenario assumptions.

The model assumes instantaneous change of effective carbon prices applied to the portfolio, with no mitigation actions.

To re-emphasize, this version of our assessment focuses on listed equity and corporate bonds impacts only. It does not account for factors like different physical asset bases and resulting lock-ins, cost pass-through abilities, price elasticities or regulatory relief. It also does not yet differentiate between Scopes 1 and 2 emissions and, importantly, it assumes companies do not respond to climate policy trends such as governmental net-zero strategies by lowering their carbon exposure. These factors will be incorporated in future more elaborate versions of the assessment. The impacts for corporate bonds rely on a high-level estimate of the statistical relationship between the movements of a corporate bond's spread and the respective issuer's equity market value.

03.4 Strategy resilience, stress tests and climate scenario analysis

Results

Absolute emissions are concentrated in only a few sectors. At level 2 of NACE sector classification, for the listed equity portfolio the 10 sectors with the highest absolute owned emissions contribute around 77 percent to total absolute owned emissions in the proprietary portfolio, but only 27 percent to AuM. Sector concentration is similar in the listed corporate bond portfolio where the 10 sectors with the highest absolute owned emissions contribute around 83 percent to absolute owned emissions in the proprietary portfolio, but only 32 percent to AuM.

Consistent with analyses disclosed in previous years and with the scoping of this approach, our listed equity and corporate bonds portfolios show – within the current modeling framework and its limitations – sensitivities in those sectors.

Over the 2032 time horizon, the overall sensitivity of the listed equity portfolio stays contained in the 'Below 2°C' scenario, with market value losses between 2.1 percent to 3.8 percent depending on climate-economic model. The consequences of more stringent policy reaction and faster technology change are reflected in higher sensitivities under the 1.5°C-aligned 'Net-Zero 2050' and 'Divergent Net-Zero' scenarios, where market value losses go up to 8.1 percent to 9.8 percent in the disorderly 'Divergent Net-Zero' scenario. The carbon price sensitivity in the 'Delayed transition' scenario is now more pronounced relative to the 'Below 2°C' scenario as a consequence of one more year of delayed but ambitious policy action after the 2030 onset.

In addition to high emitting sectors and issuers, duration is another main driver of the carbon price sensitivity of the listed corporate bonds portfolio. The overall sensitivity is more than two times lower as compared to listed equity, with market value losses going up to 3.0 percent to 3.5 percent under the most onerous disorderly 'Divergent Net-Zero' scenario. This is mainly owing to the limited co-movement of corporate bond spreads and equity returns observed in historical timeseries data which is used in the model to translate sensitivities for listed equity into sensitivities for listed corporate bonds.

From 2021 to 2022, the numbers decreased for all scenarios except for the 'Delayed transition' scenario for equity as our equity and corporate bonds portfolio carbon footprint reduced, see section 03.1.2, where the impact on the corporate bonds portfolio is more pronounced due to a lower average modified duration in comparison to 2021.

Looking ahead to 2050, in the absence of adaptation or mitigation actions maximum carbon price sensitivities under the 'Divergent Net-Zero' scenario could increase by around two to more than three times as compared to 2032, depending on the climate-economic model.

Being aware of the limitations of our approach, the results are still leading us to the right follow-up questions to understand how carbon price increases can affect different sectors and which parameters of individual investee companies will lead to a non-uniform development inside a given sector as not all will be affected equally. This holds especially true as major carbon emitters are often exempted from carbon pricing schemes due to carbon leakage risks.

An example for a follow-up activity from this stress test is a deep-dive analysis for the European electric utilities sector undertaken in 2022, which identified a significant impact of the market specific power price-setting mechanism on stress test impacts. As a consequence of the 'merit order effect' (power plants are given priority based on their variable cost), gains or losses of individual electric utilities upon increase of the carbon price depend on their emissions intensity (driving individual unit costs) relative to the emissions intensity of the marginal power plant (driving uniform unit revenues), i.e. the power plant with the highest running cost contributing to fulfilment of total electricity demand. This stress test extension demonstrates that, for investment purposes, also the market design (i.e. carbon price pass-through to power prices) and further factors need to be considered next to the carbon footprint.

- **Another example is the analysis of impacts of regulatory driven carbon price increases on the direct real estate portfolio in Germany included as a case study.**

03.4 Strategy resilience, stress tests and climate scenario analysis

Figure 1: Carbon price sensitivity of the Allianz listed equity portfolio for effective carbon prices projected for 2032

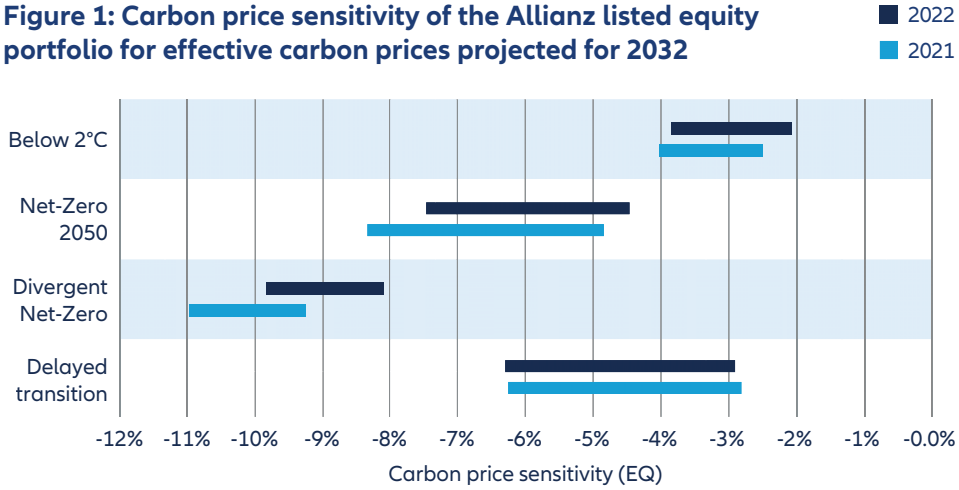
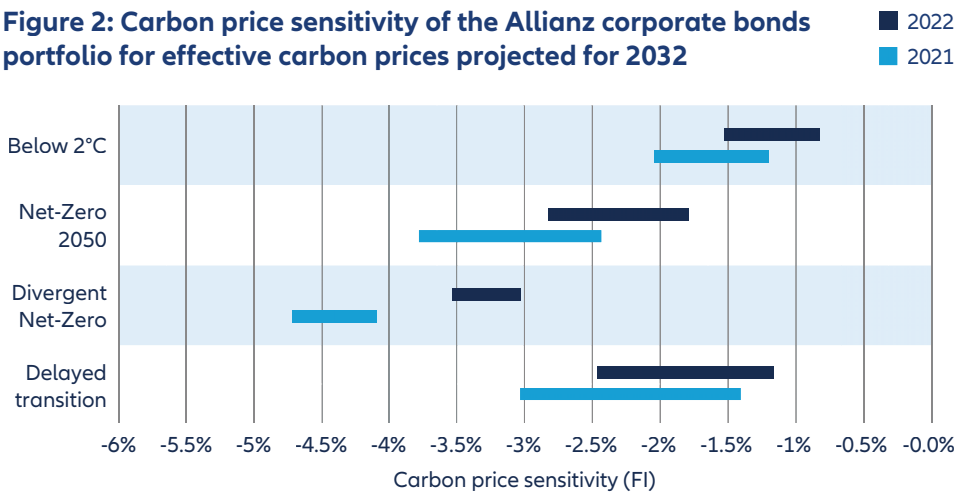


Figure 2: Carbon price sensitivity of the Allianz corporate bonds portfolio for effective carbon prices projected for 2032



Strategic response to identified carbon risks

The impacts of transition risk scenarios on investments discussed above appear to be manageable considering both the magnitude of projected losses and the time horizon over which they materialize. Moreover, the investment portfolios will not remain static. E.g., inter- and intra-sector asset allocation will be adapted dynamically to limit the identified carbon risk exposure. Effective mitigation, however, requires long-term action to align the portfolio with policy targets.

Reports like the U.N. Emission Gap Report show that the world is currently on a 2.7°C pathway meaning decisive and credible measures from all groups of actors are needed urgently. Our strategic response to carbon risks is our long-term commitment to decarbonize our investment and insurance portfolios to net-zero GHG emissions by 2050, consistent with a maximum temperature rise of 1.5˚C above pre-industrial temperatures.

As founding member to the U.N.-convened Net-Zero (NZAOA), we have set intermediary investment portfolio targets. The work of the NZAOA is done in collaboration and with a collective ambition, bringing together global investors, leading civil society, academia, and the leadership of the U.N.

The NZAOA remains the first and only group of financial sector global players to set 2025 interim targets across four areas: sub-portfolio targets (at asset class level); sector targets; engagement targets and financing targets. The purpose of these targets is to drive decarbonization of the real economy towards 1.5°C. (see section 02.2 on investment portfolio targets). With regard to target implementation, both the top-down and bottom-up approaches for investments included in this report support our view that sector pathways such as those being developed in the Glasgow Financial Alliance for Net-Zero and assessing companies transition plans along these pathways is the way to go as we want to finance the transition and not divest from high emitting sectors.

While increasing the resilience of our portfolio against transition risks over the short- to mid-term to some extent, our decarbonization strategy also contributes to limiting physical risks, which may materialize in our portfolio over the long-term.

03.4 Strategy resilience, stress tests and climate scenario analysis

Case study: Analysis of carbon price impacts on the German buildings sector

Since 2021, Germany is phasing in a national emissions trading system for the heating and transport sectors, complementing the European emissions trading system applicable to the energy sector, energy-intensive industry and air traffic within Europe. This also affects the buildings sector, putting a price on emissions from heating.

Fixed prices for emissions certificates are set by the government in the initial phase, and will gradually increase from EUR 25 per ton of CO_2 in 2021 to EUR 55 per ton of CO_2 in 2025.[1] In 2026, emissions certificates will be sold by auction within a corridor of EUR 55 per ton of CO_2 to EUR 65 per ton of CO_2, marking the transition to a cap-and-trade system where emissions prices are set by supply and demand. In 2022, a price of EUR 30 per ton of CO_2 has been set.

New draft regulation for the buildings sector in Germany foresees that CO_2 costs related to heating shall be shared between tenants and landlords. For residential assets, CO_2 cost sharing will be based on carbon intensity classes, deriving from actual heating-related energy consumption. For non-residential assets, CO_2 cost will be evenly shared by tenants and landlords, unless otherwise contractually prescribed.

Allianz Real Estate used the background of this draft regulation to analyze potential impacts on the direct held real estate portfolio in Germany assuming different carbon price scenarios including an extreme carbon price scenario. The already limited impact will be further reduced due to ongoing decarbonization efforts such as energy efficiency improvements and phasing out of fossil fuel-based heating systems.

03.4.4 Bottom-up quantitative physical risk analysis for investments

Methods, assumptions and limitations

Allianz strives to cover all physical assets in the investment portfolio in which we own an equity share of over 20 % with the ACCRiS method. This approach translates into an assessment of physical climate change risk for real estate assets, renewables (wind and solar parks) and infrastructure. Portfolio coverage currently stands at 81 % for real estate, 100 % for renewables and 52 % for infrastructure. For the majority of the Allianz investment portfolio the ownership in a corporation is less than 20 %.

An estimation of the impacts of climate change for inland flood and tropical cyclone, including identification of risk clusters, under the RCP 2.6, 4.5, 6.0 and RCP 8.5 scenarios in 2030 and 2050 was made for each individual real estate assets, wind park and photovoltaic solar plant. For some infrastructure investments owning lower risk subterranean assets such as fiber networks, a qualitative approach was performed which focused on for example, insurance coverage with regards to natural catastrophes or business interruption. In comparison to the standard approach taken for single location assets, such as real estate and renewables, different approaches which reflect the specificity of infrastructure investments were considered when determining the relative impact value on the business.

Results

The analysis for inland flood found that most real estate properties are at very low risk, i.e. 65 % of all real estate investments, under the baseline and future climate scenarios for the different time horizons. There exists a clear trend that inland flood risk will increase with higher emissions scenarios for those investments most at risk of inland flooding. Locations in Western Europe, especially in France, were identified as risk drivers as there is a noticeable difference in baseline frequency of flooding compared to 2030/2050.

The real estate analysis for tropical cyclone discovered that the majority of the proprietary investments are exposed to only very low risk, i.e. 84 %. In general, climate change is expected to amplify the tail risk due to an increase in the frequency of high-intensity tropical cyclones. Regions with historically low risk will see a higher frequency of tropical cyclones (northern US Atlantic coast and southern Australian east coast). While the difference between emissions scenarios is low in the short-term up to 2030, opposing influences and limitations in the ability of climate models to simulate tropical cyclones makes projections in the second half of the century increasingly uncertain.

1 The initially planned price increase for 2023 has been suspended due to the impacts of the Ukraine war on energy prices.

03.4 Strategy resilience, stress tests and climate scenario analysis

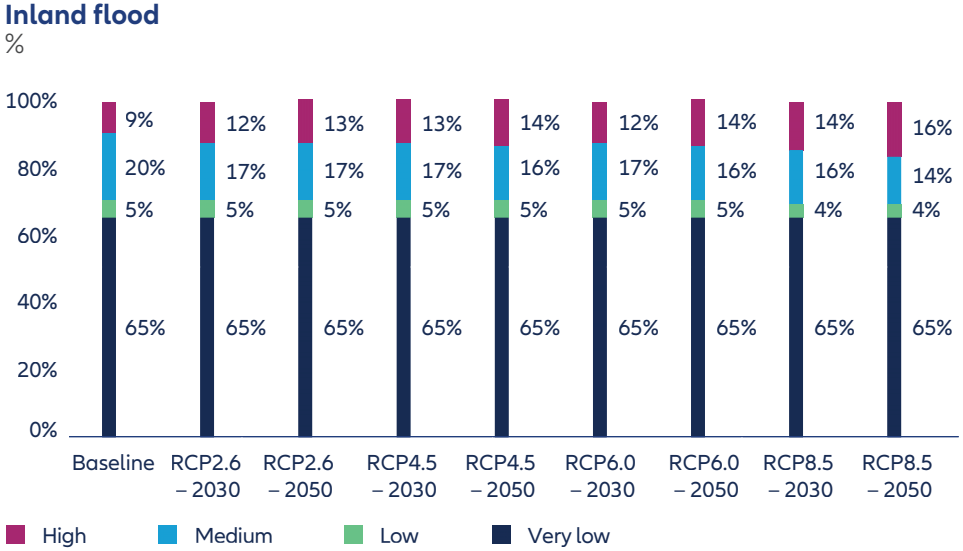
Analogously to the outcome for real estate investments, the majority of renewables are found to be at very low risk for inland flood under the baseline scenario. The increasing inland flood risk for higher emissions scenarios is mainly driven by locations in Europe, especially Germany. All wind and solar parks in Europe have a very low risk for tropical cyclone risk in the baseline scenario which remains stable over future years and scenarios. This is due to the fact that these locations are not inside of the tropical cyclone sensitive area. The renewable investments in the US however, show in the baseline scenario a low risk and a slightly decreasing trend of tropical cyclone risk in the future scenarios and years.

Outlook

The outcome of the ACCRiS analysis for investments enables informed investment decision making processes, optimizes future portfolio allocations accounting for climate change and allows for identification of asset locations where adaptation measures should be evaluated to ensure minimal impacts of future climate related natural catastrophes. Our next steps will be to work on direct (not via fund structures) debt which finances physical assets, e.g. mortgages, infrastructure debt and debt financing of renewables.

Table 2

Distribution (in % Market Value) of risk categories for inland flood under different scenarios and years for real estate direct investments



03.5 TCFD requirements mapping

TCFD recommendation	Respective SR22 section
1a) **Governance** board oversight	05.4
1b) **Governance** management oversight	05.4
2a) **Strategy** climate risks and opportunities identified over short/mid/long time horizon	03.1.3 and 03.4
2b) **Strategy** impact of climate risks and opportunities on business, strategy and financial planning	03.2
2c) **Strategy** Resilience of strategy under climate scenarios	03.4
3a) **Risk management** Processes for identifying and assessing climate risks	05.4
3b) **Risk management** Processes for managing climate risks	05.4
3c) **Risk management** How are these processes integrated in overall risk management	05.4
4a) **Metrics & Targets** Metrics used to assess climate risks & opportunities	03.4
4b) **Metrics & Targets** Carbon footprint scope 1+2+3	03.1.2
4c) **Metrics & Targets** Targets used to manage climate R&O's and performance against targets	03.3

05.4 Our expanded sustainability governance

05.4.1 Key bodies involved in sustainability governance

We are committed to clear and transparent governance principles. This extends to our governance of sustainability matters as we work to embed and deliver sustainable objectives across our global business and organization.

> See section 01.8.2

Group Sustainability Board

Ultimate responsibility for all matters relating to sustainability resides with the Board of Management of Allianz SE as the Group's parent company.

To support the Board of Management in its decision-making, Allianz SE established a dedicated Group Sustainability Board (known until January 2022 as the Group ESG Board). It is composed of members of the Board of Management of Allianz SE and Group Center heads and meets quarterly.

Members of the Group Sustainability Board in 2022:

Dr. Günther Thallinger (Chairperson)
Board Member of the Board of Management of Allianz SE, responsible for Investment Management, Sustainability

Dr. Barbara Karuth-Zelle
Member of the Board of Management of Allianz SE, responsible for Operations, IT and Organization (COO)

Dr. Klaus-Peter Röhler
Member of the Board of Management of Allianz SE, responsible for Insurance German Speaking Countries and Central & Eastern Europe

Christopher Townsend
Member of the Board of Management of Allianz SE, responsible for Global Insurance Lines & Anglo Markets, Reinsurance, Iberia & Latin America, Middle East, Africa

Dr. Andreas Wimmer
Member of the Board of Management of Allianz SE, responsible for Asset Management, US Life Insurance

Lauren Day
Head of Group Communications and Reputation (GCORE)

Hervé Gloaguen
Group Chief Compliance Officer

Line Hestvik
Group Chief Sustainability Officer

Aylin Somersan-Coqui
Group Chief Risk Officer

Allianz SE Supervisory Board Sustainability Committee

The Supervisory Board of Allianz SE is responsible for defining and assessing targets for the Board of Management. The Sustainability Committee of the Supervisory Board is responsible to advise on sustainability related target setting and assessment.

The Sustainability Committee has five members: three members are elected upon the proposal of the shareholder representatives and two upon the proposal of the employee representatives. The Chairperson of the Committee is also elected by the Supervisory Board.

Christine Bosse (Chairperson), Sophie Boissard, Gabriele Burkhardt-Berg (employee representative), Michael Diekmann, Frank Kirsch (employee representative)

Group Center Global Sustainability

Since 01 January 2021, responsibility for Allianz's sustainability agenda is led by the Global Sustainability function (Group Center).

The function is headed by the Chief Sustainability Officer (CSO) who reports to the Chairperson of the Group Sustainability Board.

Several Group Committees play an important role in Allianz's decision-making processes to embed Sustainability:

The Group Finance and Risk Committee oversees risk management and monitoring, including sustainability risk.

The Group Underwriting Committee monitors the underwriting business, its risk management and development of underwriting internal rules and strategies. This includes the integration of sustainability into underwriting processes.

The Group Investment Committee focuses on fundamental investment-related topics, including sustainability-related matters.

05.4 Our expanded sustainability governance

With the importance of climate and SDG 13 we have established a dedicated governance around our climate activities.

05.4.2 Climate governance

In 2021, we thoroughly reviewed our approach to identify and manage climate change risks and opportunities.

This review concluded that a program to develop and implement continuously improved tools, processes and disclosures – including appropriate governance structures – should be implemented from 2022 onwards.

The process is steered by a cross-functional group of senior executives at Group and OE levels. They include the Global Chief Risk Officer, Chief Sustainability Officer, Heads of Group Accounting and Reporting, Global Property-Casualty (P&C), Global Commercial, Center of Competence Life and Health and one of the Managing Directors of Allianz Investment Management.

Progress is reported to the Group Sustainability Board. The governance described refers to the status in the reporting year 2022.

Group functions

Addressing sustainability matters requires cross-functional collaboration and support across our global operations.

The Global Sustainability function includes a team dedicated to Climate Integration and is responsible for coordinating integration of sustainability and climate aspects into core investment, insurance and business operation activities.

It also acts as the secretariat of the Sustainability Board and meets regularly with its Chair. Further functions such as Group Risk, Global P&C, Global Commercial, Allianz Investment Management and Group Accounting and Reporting report on climate-related matters and support operating entities in integrating the Group's strategic approach and objectives.

Additional bodies and functions, such as Allianz Research, monitor and analyze market, technological and regulatory trends and developments and share insights.

Investment and insurance functions

Our key insurance operating entities, two major investment businesses (Allianz Global Investors and PIMCO) and investment management function (Allianz Investment Management) have well-established climate and sustainability teams.

At Allianz Investment Management (AIM), the Investment Management Board (IMB) oversees implementation of climate and sustainability strategy for our proprietary investment portfolio of € 701.1 billion. This includes regular updates, discussions and decisions on implementation, target-setting and compliance related to portfolio decarbonization targets and measures. Analyses of potential growth opportunities as well as asset stranding in climate scenarios and engagement on climate aspects are also regularly addressed.

Within AIM, climate and sustainability are steered at the IMB level with a Managing Director in charge of the implementation.

For our P&C insurance business, the ESG Business Services team located at Allianz Global Commercial & Specialty (AGCS) is responsible for developing, coordinating and supervising sustainability and climate-related governance.

> **For more details, see section 02.2.**

For more details, see Allianz ESG Integration Framework.

Climate competence

In addition to the governance mechanisms described above, we apply a variety of instruments to foster sustainability and climate competency at Board, senior executive and employee levels.

These include:

- Extensive reports and briefings for top management, translating climate science into business implications.
- Sustainability roundtables of investment functions.
- Trainings for employees, investment-related functions, underwriters and sales agents.
- Knowledge sharing with and upskilling of local sustainability colleagues.
- Conferences on sustainability topics which include Board member presentations; in 2022 we held two internal Sustainability Forums open to all employees.

05.4 Our expanded sustainability governance

05.4.3 Climate risk and opportunity management

The risks and opportunities posed by climate change require the use and regular review of a comprehensive framework to ensure it is properly addressed and applied.

Climate change risks and adaptation have been integral to our risk management process for many years and our approach continues to improve.

Processes and rules are codified mainly in internal corporate rules. Our risk management and adaptation processes and rules cover all insurance and underwriting-specific processes.

Climate risks are addressed as part of an overarching qualitative and quantitative risk reporting and controlling framework which includes three lines of defense:

- As a general principle, responsibility for the 'First Line of Defense' rests with business managers in the related Allianz Group undertaking. They are responsible for the risks taken and the returns from their decisions.
- The 'Second Line of Defense' consists of independent global oversight functions – Risk, Actuarial, Compliance and Legal. These support the Group Board of Management in defining the risk frameworks within which the business can operate.
- Group Audit forms the 'Third Line of Defense', independently and regularly reviewing risk governance implementation and compliance with risk principles, performing quality reviews of risk processes, and testing adherence to business standards, including the internal control framework.

Early warning indicators are monitored and regularly reported to senior management through risk dashboards, risk capital allocation and limit consumption reports to identify when climate aspects become material.

Supplemented by quarterly updates, senior management decides the risk management strategy and related actions.

A key tool is the Allianz Risk Capital Model which assesses natural catastrophe (Nat Cat) events for the upcoming year on subsidiary and Group level.

Another important instrument is the yearly Top Risk Assessment which helps to identify and remediate significant threats to financial results, operational viability, reputation and delivery of strategic objectives, regardless of whether they can be quantified or not. This includes immediate risks for the company and emerging risks which may arise from technological developments, new or changing environmental risks and socio-demographic changes.

Climate-related factors are included in Top Risk Assessments which are conducted at both operating entity and Group level. Relevant emerging risks are discussed by the Group Finance and Risk Committee or the Group Underwriting Committee.

Following that, underwriting opportunities or mitigation measures are implemented where necessary.

For more details on these risk management processes please refer to the Risk and Opportunity Report pages 100 to 120 of our Group Annual Report 2022.

05.4.4 Natural catastrophe risk governance

The Group-wide risk management framework is applicable to Nat Cat.

Very specific processes and rules apply to the management of Nat Cat risks due to the significance of relevance and potential exposure.

Main risk management processes covering physical climate change adaptation include pricing risks, portfolio management, exposure and risk management, risk consulting, claims handling and governance.

Each operating entity is responsible for controlling its exposure to individual catastrophes and for defining local reinsurance requirements based on local risk appetite and capital position. The respective cover is provided by Allianz SE or one of its subsidiaries.

At Group level, the Board of Management reviews and approves the risk appetite.

The reinsurance division is responsible for designing and implementing Group catastrophe protections within given exposure limits. These covers take various forms and aim to protect the Group against excessive losses from major natural catastrophes.

We measure, monitor and steer risk based on an approved internal model which quantifies the potential adverse development of own funds. All relevant P&C insurance and reinsurance portfolios are considered.

We use special Nat Cat modeling techniques which combine portfolio data (e.g. geographic location, characteristics of insured objects and their values) with simulated natural disaster scenarios to estimate the magnitude and frequency of potential losses. Where such models do not exist, we use deterministic, scenario-based approaches to estimate potential losses.

05.4 Our expanded sustainability governance

Experts at Allianz Reinsurance – including meteorologists, hydrologists, geophysicists, geographers and mathematicians – model around 50 Nat Cat scenarios for Allianz Group.

Data is captured using best-in-class standards to map a range of perils and regions. In past years, these were used to conduct stress-tests for floods in Germany as well as wildfires in the U.S. and Australia.

The results provide the basis for group-wide risk monitoring, risk limits and subsequent business decisions.

The top three perils contributing to Nat Cat risk for Allianz Group in the past four years were windstorms in Europe, floods in Germany and earthquakes in Australia.

We also conduct selected stress-scenario analysis on Nat Cat risks like hail or windstorms to be used in risk steering.

Nat Cat models are regularly updated according to the latest scientific information. We are continuously improving the inclusion of global Nat Cat hazard information, including climate, into underwriting decisions.

05.4.5 Climate and sustainability-risk governance

In addition to addressing climate-related risks as part of our overarching qualitative and quantitative reporting and controlling framework, a variety of corporate rules and processes foster integration of climate-related risks and opportunities.

The Allianz sustainability approach integrates climate- and sustainability-related considerations by applying Group-wide corporate rules and sustainability instruments across all underwriting and investment activities. This includes the Allianz ESG Functional Rule for Investments and the Allianz Standard for Reputational Risk and Issues Management which establish a core set of principles and processes for the management of reputational risks and sustainability issues within the Group.

All corporate rules are regularly updated to reflect newest insights and external developments. The publicly-available 4th report edition of the Allianz ESG Integration Framework increases transparency around internal processes and guidelines related to our sustainability approach. We also rely on external providers for data related to climate, sustainability and reputational risks.

As an additional layer, the Climate Integration team within Global Sustainability and the sustainability Task Forces ensure the early identification, measurement and business integration of risks and opportunities arising from physical climate change and the low-carbon transition.

Examples include regulatory activity around climate change and sustainable finance, integration of sustainability and climate considerations in business processes, and dedicated projects. Substantial topics are channeled to the Sustainability Board to inform their strategic decision-making.

Risk and opportunity considerations are supplemented by additional processes including:

- The annual Allianz Risk Barometer produced by Allianz Global Corporate & Specialty. This is a survey of corporate clients, brokers, industry trade organizations, risk consultants, underwriters, senior managers and claims experts, in total collecting more than 2,650 responses from 89 countries and 22 industry sectors. Climate change is ranked sixth. It is also linked to Nat Cat risks in third position, as a key risk to property business, and gains increasing importance in shaping emission-intensive industries in terms of transition risks. Business interruption is ranked second highest, behind cyber incidents, with potential triggers found in climate-related events.

  You can access the full Risk Barometer here.

- The Global Claims Review analyzes more than 470,000 claims in over 200 countries and territories. The latest Review from 2019 found windstorms as the only Nat Cat event to appear in the top 10 causes of loss. Natural catastrophes account for five percent of claims in number and 13 percent of total value of all claims. It represents some of the largest exposures to energy as well as property and engineering segments. Environmental and climate change-related liability issues are seen to potentially increase in future.
- Our partnership and memberships as described in section 05.3 facilitate early risk detection as well as access to industry discussions and best practice.
- Our regular materiality assessment ranks emerging sustainability and climate issues and opportunities according to their importance for our business and our stakeholders.

  > See section 05.3.

05.4 Our expanded sustainability governance

- Ongoing dialogue with internationally recognized non-governmental organizations (NGOs) provides ad hoc and scheduled exchanges on sustainability matters. The NGO dialogue is a forum for direct exchange of ideas and points of view designed to leverage NGO's expertise on climate and sustainability matters to support the development and implementation of internal policies, programs and plans. Allianz listens to the concerns of NGO partners and discusses potential solutions to address these concerns. We also jointly work on solutions like the NZAOA, where NGOs are partners.
- Ongoing dialogues with policymakers, regulators and academia on key economic, governmental, environmental and societal issues, including climate change, to anticipate arising developments and share opinions, knowledge and best practice.

For proprietary investments, the ESG Functional Rule for Investments provides the foundation for integrating climate-related issues.

05.4.6 Climate risk management process

Methods of adaptation to climate change risks form part of our overall risk management approach and apply to the whole value chain of our insurance operations, covering all business segments, lines of business, new business and in-force business. Relevance of climate change impact and need for adaptation vary across our portfolios.

Insurance-related processes

Product development, risk models and tariff calculations reflect expected claims from natural catastrophes, especially in Property, Engineering and Motor insurance.

In risk segments and lines of business where significant impact from climate change cannot yet be observed, risk patterns and their development are monitored closely (e.g. liability).

Coverages and terms and conditions are designed with respect to changing risk patterns, taking all relevant developments into account. Terms and conditions and tariffs provide incentives for customers to protect the insured assets against natural hazards and other climate-related risks, where relevant.

In distribution, consulting and advising customers on their risks, based on a thorough individual risk assessment, is an integral part of our sales strategy in retail and commercial business.

For our commercial business, the sales organization is supported by underwriters and risk engineers who provide specific advice to customers on protection and adaptation measures against all types of risk, especially Nat Cat and other climate change-related risks.

In underwriting, a thorough rules-based risk assessment is performed prior to any underwriting decision, either automated (mostly in retail business) or individually (mostly in commercial business).

Risk information is captured and stored in our database and linked to all relevant business processes. For Nat Cats, our Group Global Geographic Information System (GIS) combines single risk information with global natural hazard maps. This is key to managing risk exposure and accumulation risk.

We have established a limit system for each Nat Cat loss type at all levels of the organization, including Nat Cat limits at Group and operating entity levels.

In the commercial business, underwriters and risk engineers consult and advise customers on prevention measures and support them in adapting to changing risk patterns. Our re-insurance structure protects our capital base against volatility and impact beyond defined thresholds.

In portfolio management, regular performance assessments are conducted by operating entities and at least twice per year for all relevant portfolios together with the responsible Group Center of Allianz SE. Any departure from projected plans – including claims frequency and severity – is identified and action immediately taken.

As our policies are renewed on a yearly basis, actions can be implemented annually if necessary. Adaptation measures with regards to climate change risks comprise re-pricing actions, deductibles, changes in terms and conditions and even cancellation of policies where a sufficient premium for the risk cannot be obtained.

For further details, please refer to the Risk and Opportunity Report pages 100 to 120 of our Group Annual Report 2022.

05.4 Our expanded sustainability governance

Investment-related processes

Comprehensive climate risk management processes cover all major asset classes:

- Climate scenarios are analyzed by inter-departmental teams under the joint lead of the AIM Risk and Investment Analytics and AIM ESG teams.
- Both physical and transition risks are assessed based to a large extent on quantitative KPIs, making use of the climate stress-tests discussed.
- Risks are actively managed for the total portfolio, supported by our ESG scoring approach (see section 02.2.1.3).
- On physical risks, we seek to identify potential impacts on physical assets we own, as well as impacts on client or investee level and associated portfolios (see section 03.4.1).
- Maintaining active dialogue with asset managers and investee companies on climate strategies integrates into risk management framework.

Measures to manage our risks are based on two major levers:

1. Adapt asset allocation:

- Shift volumes towards zero carbon assets (mid-term).
- Increase exposure to companies leading the transition (all sectors).
- Increase of blended finance volumes.
- Reduce exposure to climate laggards per sector.
- Fossil fuel guidelines.

2. Enhance climate change readiness of existing assets:

- Broad engagement, bilateral dialogue and participation in global initiatives like CA100+ or IIGCC.
- Real Estate: Steer and align real estate portfolio with CRREM pathways (1.5˚C pathway).
- Reduce emissions in line with IPCC pathways for infrastructure portfolio.
- For physical assets with direct material ownership like real estate and infrastructure, dedicated asset-level adaptation plans are implemented based on thorough location-sharp physical risk assessments.
- The Allianz Climate Change Risk Solutions (ACCRiS) tool (see section 03.4.2) will be used for new acquisitions and for portfolio assessment.
- The energy sector is covered by the NZAOA-related sector targets for Utilities and Oil and Gas.
- Dedicated asset manager engagement is in place.

05.4.7 Allianz Group Sustainability Network

The wider sustainability network spanning the entire Allianz Group includes:

- Sustainability Leads responsible for coordinating and leading sustainability integration in their respective operating entities.
- Sustainability/ESG experts and centers of competence in group-level business functions (P&C, L&H, investments, asset management) as well as in our group centers (procurement, operations, etc.).
- Local Environment Officers responsible for managing the environmental footprint of our operations.
- Non-Financial Data Coordinators responsible for sustainability reporting.
- Corporate Citizenship Leads who drive social impact activities and partnerships.