The hidden cost of delaying climate action for West Coast insurance markets

A first-ever regulator stress test of investment portfolios using PACTA and 1-in-1000 transition risk tools.

California Department of Insurance

Washington Office of the Insurance Commissioner

Oregon Department of Consumer and Business Services - Division of Financial Regulation

About the Report

This report describes an analysis of the investments of insurers licensed in three Pacific coast U.S. states – California, Oregon, and Washington. It describes the exposure of these investments to fossil fuel and clean, low-emission technologies, the alignment of these investments with a set of future climate scenarios, and the impacts that could arise to profitability of these portfolios in the event of a rapid disorderly transition to meet the goals of the 2015 Paris Agreement.[1] The analysis and results here represent the first climate stress test by U.S. state insurance regulators. The intent of this report is to understand the position of insurers operating in the contiguous Pacific coast states relative to the transition to a low carbon economy, and to demonstrate the utility for companies and regulators of new tools for forward-looking climate risk assessment. It represents just one step in the California Department of Insurance's long-term strategy for employing and promoting forward-looking climate risk assessments for the insurance sector. It also represents an important collaboration between U.S. state insurance regulators.

The data for this analysis was generated by RMI, which stewards the Paris Agreement Capital Transition Assessment (PACTA) tool, and Theia Finance Labs (formerly 2 Degrees Investing Initiative Germany), which developed the 1-in-1000 TRISK climate stress testing framework.

Authors/Contributors

Kara Voss, Ph.D., Climate Finance Specialist, California Department of Insurance

Rabab Charafeddine, Climate Risk Specialist, California Department of Insurance

Ope Oyewole, Science Fellow, California Council on Science and Technology

Mike Peterson, Deputy Commissioner for Climate and Sustainability, California Department of Insurance

Oregon Department of Consumer and Business Services – Division of Financial Regulation

Washington State Office of the Insurance Commissioner

RMI and Theia Finance Labs

Reviewers

Jay Bruns, Senior Climate Policy Advisor, Washington Office of the Insurance Commissioner
Antonio Buller, Analyst, Theia Finance Labs
Jakub Červenka, Research Manager, Theia Finance Labs
Brian Fjeldheim, Senior Policy Advisor, Oregon Division of Financial Regulation
George Harris, PACTA for Banks Lead, RMI
Ted Lamm, Senior Research Fellow, UC Berkeley Center for Law, Energy, & the Environment
Sarah LaMonaca, Principal, RMI
Daisy Pacheco, PACTA for Supervisors Lead, RMI

Release: February 2024

[1] See The UNFCCC Paris Agreement: https://unfccc.int/files/essential_background/convention/application/Probability of defaultf/english_paris_agreement.Probability of defaultf

Table of Contents

Executive Summary

Climate resilience is a sprint to understand the risks and a marathon to address them. The earlier we understand, the earlier we can plan, and the better the outcome for the public. In this report, we focus on some of the climate risk scenarios that insurance companies may face in the next three decades. Scenario planning is the essential next step to sustainable insurance markets. Three key principles are true, but the ultimate outcomes from these principles for the insurance sector remain uncertain:

1. The Paris Agreement, signed by 195 parties in 2015, sets emissions reduction targets that must be met to avoid the worst consequences of climate change
2. Certain changes in local and national economies are already evident. Among many ongoing shifts with economic consequences: Washington has set a target of zero-carbon power generation by 2045, Oregon has emission reductions goals of at least 45% below 1990 emissions levels by 2035 and 80% by 2050, in addition to commitments to stronger building codes and energy efficiency standards; California has targets for 300,000 zero-emission heavy duty trucks by 2029, and numerous other initiatives working towards the goal of being carbon neutral by 2045.
3. Further economic shifts will occur, but the speed and abruptness of change are uncertain.

Shifting insurance company strategies and shifting financial markets can create challenges and opportunities. An initial challenge for each sector of the economy is to be forward-looking, and design the scenario planning tools necessary to moderate disruption to local, state, and national economies striving to align with the Paris Agreement. Insurance companies that evolve to meet the needs of a transition towards zero-carbon energy and low-carbon technology will position themselves for growth opportunities.

Why the insurance sector?

For the insurance sector, planning for climate risks includes risk management across each part of an insurance company's business. Each company has a portfolio of policies, insuring businesses or individuals or governments, and promoting risk reduction among those policyholders is essential. Insurance companies also have operations and risk management tools that can be further aligned with climate scenarios to ensure sustainable practices. However, this report focuses on the categories of investments that insurance companies hold as a backstop to ensure their ability to pay future claims.

How does this report advance scenario planning?

Understanding the risks that climate change poses to the insurance sector, and the opportunities that arise from a transition to a low-carbon economy, is critical to maintaining reliable insurance markets. Insurance is a substantial part of the U.S. economy, representing about 2.6% of Gross Domestic Product (GDP).[2] Insurance companies invest the proceeds of the premiums that they collect from people and businesses, making them some of the largest institutional investors in the U.S. with approximately $8.2 trillion in cash and invested assets reported in 2022.[3] As some of the largest institutional investors,

[2] See Insurance Sector's Share of Gross Domestic Product (GDP), 2018-2022; Insurance Information Institute: https://www.iii.org/publications/a-firm-foundation-how-insurance-supports-the-economy/driving-economic-progress/contribution-to-gdp

[3] See NAIC Capital Markets Special report: Growth in U.S. Insurance Industry's Cash and Invested Assets Declines to 1.3% at Year-End 2022

insurance companies can be exposed to climate risks and are also well positioned to take advantage of opportunities to invest in low-emissions technology.

This work represents the first ever regulator-run climate stress test of U.S. insurers and the first financial regulator use of the 1-in-1000 TRISK analysis, a climate stress testing tool. The analysis focuses on a subset of insurance companies' investments – those held in the form of corporate bonds, which represent the largest single tranche of insurer investments, and listed equities (stocks) for medium- to large-sized insurers licensed in California, Washington, and Oregon – summing to $2.29 trillion in assets under management. This report also represents a follow-up to the California Department of Insurance's prior climate scenario analysis, which was published in 2019 and used the Paris Agreement Capital Transition Assessment (PACTA) tool.

The Paris Agreement recognizes that if substantial actions are not taken to reduce greenhouse gas emissions, impacts in the form of damages to physical structures, human lives and livelihoods, ecosystems, and supply chains will continue to balloon, with consequences throughout local, national, and international economies.[4] At COP28 in 2023, the parties to the Paris Agreement formally agreed to transition away from fossil fuels in energy systems. While this call fell short of a "phase-out", leaving the door open for some carbon-intensive sources, it was an important signal of what is to come for global energy systems. The development of defined scenarios for future climate change and climate action with corresponding pathways for technology development in those scenarios, provide powerful tools for the assessment of the forward-looking view of risks and opportunities for investment portfolios. Investment portfolios vary in the magnitude of their exposure to sectors that are anticipated to undergo major changes due to climate change, and portfolios with heavy investments in sectors that either rely on fossil fuels, or are highly exposed to climate risks, may face financial consequences. At the same time, businesses are not static and those that have stated plans to align their business with scenarios that lead to a low-carbon future may be better positioned to withstand these changes. These complementary measures of exposure and alignment can allow companies and supervisors to assess, compare, and track climate risks to investments.

Scenario Analysis and Climate Stress Testing Approaches

Financial analysis and risk tools are central to the role of insurance regulators. The PACTA tool provides a visualization of exposure of investments to climate-relevant sectors and how the forward-looking production plans of investee firms within an investor's portfolio align with the economic changes that would be required to meet a defined scenario for slowing or halting climate change. It compares what needs to happen in sectoral decarbonization pathways determined through climate scenarios, with financial actors' exposures to companies in climate-relevant sectors. It is open source and makes scenario analysis readily accessible for a range of stakeholders. PACTA uses a five-year time horizon for forward looking production plans. The PACTA tool is available for individual use by asset owners through a free-to-use web browser application, as well as for the benefit of financial regulators for larger analysis through partnership with RMI.

[4] See The UNFCCC Paris Agreement: https://unfccc.int/process-and-meetings/the-paris-agreement

The 1-in-1000 TRISK Climate Stress Test developed by Theia Finance Labs estimates the additional costs for the financial sector when climate action by companies is delayed. The climate stress testing analysis uses the exposure and forward-looking plans of investee companies, as represented in the PACTA output, and climate financial scenarios until the year 2050 to test the impact that a transition shock scenario would have on the portfolio's earnings. The transition shock scenario is a situation of sudden transition policy change in which companies within defined climate-relevant sectors are, in a specific year, required to change production to align with a target climate scenario, and compensate for any production that was out-of-alignment in previous years. The model also may introduce a carbon tax which puts additional production cost shocks on high-carbon emitting firms' profits. The analysis uses asset level data to project transition impacts on the profitability of publicly listed firms in climate-relevant sectors in terms of probability of default and expected losses for corporate bonds, and relative net present value change for listed equities.

Two firms with the same current emissions today could face different transition risks based on their forward-looking production plans and adaptive capacity. Investors, in turn, require a clear understanding of those differing risks to make informed forward-looking decisions. While many central banks and supervisors rely on historical and projected carbon emissions as a proxy for transition risk, the PACTA Analysis and 1-in-1000 Climate Stress Test approaches account for firm-specific forward-looking production plans. These plans are provided by Asset Impact, which collects the forward-looking information from companies' business intelligence, public strategic planning documents, and annual reports. Firms that are planning to transition to sustainable technologies will likely be less vulnerable to policy or demand-driven shocks that require rapid phase down of high-emitting technologies, regardless of their current or historical carbon emissions. Additionally, firm-specific forward-looking plans can help investors strategically invest in firms that are supporting the transition to a clean energy economy, rather than employing sector-wide divestment. This is important, given that firms belonging to traditionally high carbon sectors, such as the energy sector will need access to low-cost capital to finance their transition to a clean economy while expanding capacity to meet demand.[5]

Table 1. Climate scenarios are used to represent pathways (of energy, technological change, development, emissions, etc.) implied by current polices or leading to achievement of specific climate goals and targets. The following scenarios were used in the PACTA and 1-in-1000 TRISK analysis:

Representing Current Policies		**Representing Goals and Targets**	
Scenario	Analysis	Scenario	Analysis
IEA WEO Stated Policies Scenario (STEPS) v2021	PACTA, 1-in-1000	IEA WEO Announced Pledges Scenario (APS) v2021	PACTA
NGFS GCAM Current Policies v2021	1-in-1000	IEA WEO Sustainable Development Scenario (SDS) v2021	PACTA, 1-in-1000
NGFS REMIND Current Policies v2021	1-in-1000	IEA WEO Net Zero Energy by 2050 (NZ 2050) v2021	PACTA, 1-in-1000
JRC Current Policies v2021	1-in-1000 (Auto only)	NGFS GCAM Below 2 Degrees Scenario v2021	1-in-1000

[5] The Cost for the Financial Sector if Firms Delay Climate Action

		NGFS REMIND Below 2 Degrees Scenario v2021	1-in-1000
		JRC 1.5°C-Uniform v2021	PACTA, 1-in-1000 (Auto only)

Included Investments

The makeup of insurer investment portfolios is driven by the insurance business model. Insurers invest the premiums they receive from their policyholders in longer-term, mostly fixed income, assets in order to have resources available to pay future claims. This analysis focuses exclusively on the corporate bond and listed equity (stock) holdings of insurers licensed in California, Oregon, and Washington earning over $100M in national premium which, in total, represents $2.29 trillion in assets under management. Insurance companies hold a large variety of other asset types, including municipal bonds, U.S. treasury and other sovereign bonds, mortgage-backed securities, cash and cash equivalents, among other assets. However, corporate bonds are the largest single tranche of insurer's investments. According to research by the National Association of Insurance Commissioners, in 2022 corporate bonds comprised 56% of U.S. insurers' bond holdings, and bonds comprised 62.3% of U.S. insurers' cash and invested assets.[3] Common stocks represented the second largest single tranche of U.S. insurers' investments, contributing 13.2% of total cash and invested assets. The breakdown between asset classes varies by insurer line of business. In this analysis, the breakdown of insurers' investments is presented as a fraction of only those investments included in this analysis.

Highlights from the Results

PACTA Scenario Analysis Results

Overall, the exposure results show that P&C, Life, Health, and Fraternal insurers operating in California, Oregon, and Washington have significant appetite for investment in transition technologies such a renewable power capacity production, which is likely to grow in alignment with state and federal investments, and also have significant exposure to transition risks through their investments in fossil fuel extraction and fossil fuel-based power production, including gas power. Insurers had more exposure to oil & gas extraction than the market benchmark, which is commonly used as a comparison for financial performance.

Insurers' corporate bond portfolios display very different exposure to climate-relevant sectors than their listed equity portfolios, with more exposure to climate-relevant sectors in bond portfolios than in listed equities. This is particularly important for the insurance sector, given that insurers' portfolios are often weighted towards bonds. However, there are distinct differences between the composition of the assets included in this analysis for different types of insurance business. For example, Life insurers' assets included in the analysis are almost entirely (nearly 90%) corporate bonds while P&C insurers hold a more even mix of corporate bonds (39%) and listed equities (57%).[6]

Within corporate bonds the share of portfolio-associated production from renewables, hydropower, and nuclear made up more than a third of the total from power capacity production across all insurer

[6] Asset-class breakdowns are presented as a percent of only those assets included in the analysis (corporate bonds and listed equities), and does not include other asset types. For more comprehensive information on U.S. insurer asset breakdowns see NAIC Capital Markets Special Report: Growth In U.S. Insurance Industry's Cash and Invested Assets Declines to 1.3% at year-end 2022

peer groups. Life, P&C, and Fraternal insurers has a higher fraction of their portfolio-associated production in renewables than the market benchmark.

Exposure of investments to fossil fuel extraction varies widely between insurers. No aggregate insurer group (Life, P&C, Health, Fraternal) has more than 4.5% of their analyzed corporate bond portfolio and 2.5% of their analyzed listed equity portfolio exposed to fossil fuel extraction. However, some individual insurers have up to 95% and 30% exposure in their analyzed corporate bond and listed equity portfolios, respectively.

Life insurers have the most value invested in the oil & gas extraction sector ($150B) and the power sector ($100B), based upon the analyzed investments. P&C insurers have the smallest share of their listed equity portfolio value in oil & gas extraction (~1%) but this still amounts to $6 billion in assets. P&C insurers have very little of their portfolio invested in coal extraction. P&C has significant exposure to fossil-based power production (~5% of portfolio value amounting to $4B). Another upwards of $6 billion of their investments are in steel and cement production.

Investee companies are not static. The forward-looking plans of insurers' investee companies indicate a ramp up of zero-carbon technologies (e.g., renewable power, electric cars), but not at a pace that is aligned with what will be required to meet the needs of a timely transition to a low-carbon economy in accordance with the Paris Agreement or to meet the pathway implied by the policies in place in 2021. Moreover, the forward-looking plans of insurers investee companies in climate-relevant sectors are generally misaligned with even the least ambitious policy scenarios. While these plans generally show a slowing of fossil fuel-related production they do not bend the curve sufficiently to align with the Paris Agreement, which indicates exposure to transition risk in the event of rapid climate action towards this goal.

However, the analyzed insurers' investments in coal power capacity are generally in companies that are planning for a decline in production that aligns with a sustainable development scenario. This is critical given that coal power production faces early and steep declines in the scenarios that meet the goals of the Paris Agreement.

For many sectors (oil power, oil extraction, coal mining), the plans of the companies associated with the aggregate portfolio of insurers are not aligned even with the current energy and climate policies that were implemented in 2021, implying exposure to transition risk even in the absence of any additional collective climate action, including those caused by changes in policy, societal preferences, market factors, or technological advancement.

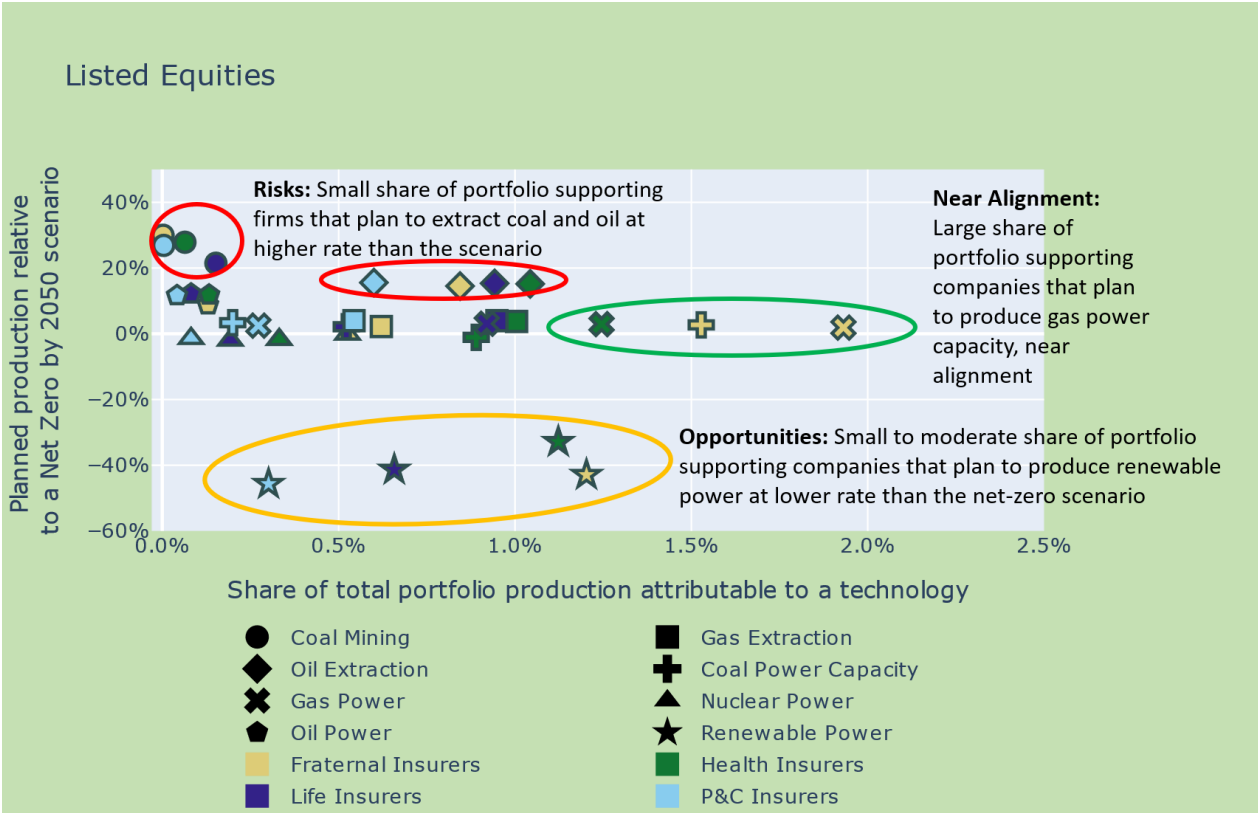


Figure 1. Summary of PACTA analysis results showing how much of the production associated with the listed equity portfolios is from a given technology (x-axis) and how planned production of each technology compares to what would be required for a Net Zero by 2050 scenario from the International Energy Agency 2021 World Energy Outlook (y-axis). The aggregate portfolios for each line of business are shown in colors and the technologies are indicated by symbols. Technologies towards the right in the figure are those that the investments in the portfolio are supporting heavily. Those technologies towards the top of the figure are ones where the planned production is too great to align with the Net Zero by 2050 scenario. Those technologies towards the bottom of the figure are those for which production would need to increase significantly from what is planned in order to meet the demands of a Net Zero by 2050 scenario.

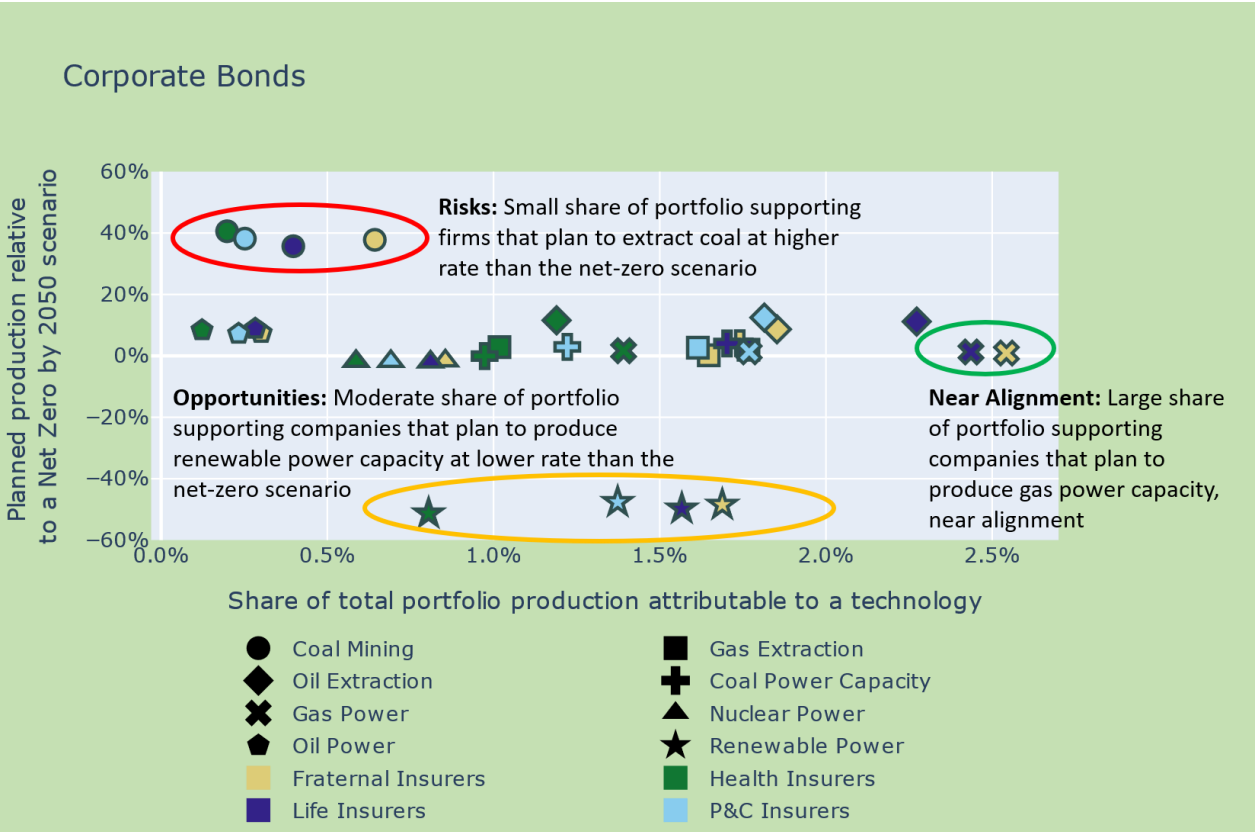


Figure 2. Summary of PACTA analysis results showing how much of the production associated with the corporate bond portfolios is from a given technology (x-axis) and how planned production of each technology compares to what would be required for a Net Zero by 2050 scenario from the International Energy Agency 2021 World Energy Outlook (y-axis). The aggregate portfolios for each line of business are shown in colors and the technologies are indicated by symbols. Technologies towards the right in the figure are those that the investments in the portfolio are supporting heavily. Those technologies towards the top of the figure are ones where the planned production is too great to align with the Net Zero by 2050 scenario. Those technologies towards the bottom of the figure are those for which production would need to increase significantly from what is planned in order to meet the demands of a Net Zero by 2050 scenario.

For most technologies/sectors the production plans of insurers' investee companies were similar to the plans of the investee companies of the market benchmark. Exceptions to this were found for nuclear power technology and in electric vehicle technology, where the market benchmark displayed greater growth in these clean technologies as compared to insurers' investments. This indicates that insurance companies' investment portfolios are associated not only with less electric vehicle and nuclear power production than what is implied in any climate action scenario, but that they are also behind the market in leveraging these investment opportunities.

1-in-1000 Climate Stress Test Results

The 1-in-1000 TRISK Climate Stress test estimates the additional costs to the financial sector when climate action by companies is delayed. The stress test considers a scenario in which companies associated with an investment portfolio are subject to a sudden transition policy shock, in a specified "shock year", which compels them to transition their production from a baseline scenario (a projection of current production plans into the future) to meet a target scenario (a projection of how production would need to change for the company to contribute its share to meeting the target set through the

Paris Agreement). The 1-in-1000 model may also subject the firms to a carbon tax shock associated with the scenario that places additional financial pressure on high carbon-emitting firms. This transition shock scenario reflects the concept that pathways to achieving the targets set forth in the Paris Agreement are not static, as they involve keeping to a specific budget of emissions. The pathway to remaining within that budget becomes more difficult and costlier the longer actions to reduce emissions are delayed.

The results show that there are significant impacts to insurers' bond portfolios even with a transition that begins as early as 2026, indicating a disorderly (or disruptive) transition. In addition, each year that the transition is delayed leads to more significant negative impacts to the profitability of insurers' investments. A delayed onset of the shock transition from the benchmark (business-as-usual) to the target (net-zero emissions by 2050) scenario, generally yields greater probability of default, more value loss, and more transition risk, because of the growing divergence of the production volumes under the baseline and the target scenarios and because there would have been more time where production was out of alignment prior to the shock that must be compensated for to remain within the emissions budget. That would require more abrupt changes throughout the economy, creating potentially significant changes for investors both through heightened risks and increased opportunities.

Of all scenario providers and pathways tested, the largest increases in probability of default for the bonds in the covered insurers' portfolios in the shock scenarios were for coal extraction-related bonds followed by oil & gas extraction. These ranged from just over 10% to near 50% depending on the shock year and scenario. Shock year (timing of transition) had a greater effect on the result than the specific transition details of a given scenario, indicating that delaying the transition would result in increased costs regardless of the pathway chosen for decarbonization on the stated timeline.

While there were significant increases in the probability of default for fossil-fuel based elements of the power sector in the transition shock scenarios, these were accompanied by decreases in the probability of default for renewable power, leading to only small decreases in creditworthiness in the shock scenarios for the power sector as-a-whole. Therefore, it is important for transition risk assessments and resulting decisions to consider separately the different technologies in the power sector to reflect that some technologies in the sector present risks in the event of sustained climate action while others represent opportunities for new investment.

The average probability of default is not necessarily representative, as some firms in the portfolio have much greater probabilities of default for oil & gas, automotive, or coal related assets while others show minimal impact. This supports tailored strategies such as targeted engagement with individual high-transition risk firms in the portfolio, rather than sector-based divestment, for improving the transition risk profile of the aggregate portfolio. That said, the efficacy of these strategies is somewhat dependent on the onset and speed of transition. When a transition is begun early (2026), there is significant variation in the level of financial impact different firms. However, when the transition onset significantly delayed (2036) the impacts to firms are both larger and impact more firms, limiting the efficacy of investment strategies that rely on firm-specific action.

Expected losses for analyzed bonds (related to coal, oil & gas, power, and automotive sectors) within insurer's portfolios under all scenarios are large, and losses increase dramatically the longer the transition is delayed. Across the coal mining, oil & gas, power, and automotive sectors the aggregate expected losses on bonds range from $7 to 28 billion, depending on the pathway, with a shock transition in the year 2026 but more than double to range between $14 and near 40 billion if the transition is

delayed by just eight years (to 2034). This is on scale with the 2017 California wildfires which cost an estimated $22.7 billion in losses. This indicates that the annual impact of delaying the transition can be billions of dollars.

Early onset of the transition shock (2026) resulted in expected losses around $5-7 billion for Oil & Gas under most scenarios, with the exception of the WEO global scenario which reflected expected losses above $10 billion with a 2026 shock year. Considering a later (2034) onset of the transition shock, expected losses increased to between $9 and $16 billion for most scenarios, and over $20 billion for the WEO global scenario.

Expected losses for power sector-related bonds within insurer's portfolios under all scenarios are also large, ranging from around $2 billion dollars to over $25 billion dollars depending on the onset of the transition shock and scenario. Early onset of the transition (2026) resulted in expected losses around $2-10 billion for power. Considering a later (2034) onset of the transition, expected losses increased to between $4 and $25 billion, with the WEO North America and NGFS REMIND scenarios reflecting much higher losses than the NGFS GCAM or WEO global scenarios.

Expected losses for coal are relatively low (<$1 billion), because these assets make up a relatively small portion of insurers' portfolios, and auto sector-related losses are even less significant.

The relative value changes for listed equities associated with fossil-fuel related sectors are dramatic for all shock scenarios. Coal related assets (both extraction and coal power) lose in excess of 80% of their value due to the transition shock, for all shock years considered. However, it's worth noting that these assets makeup a relatively small fraction of insurers' portfolios. Gas power related assets, which makeup a large fraction of insurer's assets, experience greater than 40% decreases in value in the NGFS GCAM and WEO global scenarios and over 80% in the NGFS REMIND and WEO North America scenarios. Oil power capacity assets and ICE vehicle related assets lose between 60 and 90% of their value depending on which shock year is chosen. Impacts to gas and oil extraction are very scenario dependent, with the NGFS REMIND showing decreases in value between 15% and 30% but most other scenarios showing value decreases between 60% and 90%. Coal extraction-related assets also have relative value losses close to 100% in the GCAM REMIND scenario.

In contrast, renewable-related power and automotive sector investments gain significant value in the shock scenarios reflecting opportunities for investment. Electric vehicle-related assets gain nearly 40% increases in value, hybrid vehicle investments experience value increases over 50% (although these assets are not common in insurer's portfolios). Renewable power experiences value increases over 20%. This reinforces the opportunities that decarbonization presents for investment in clean energy and zero emission automotive technology.

Introduction

In 2022, the California Department of Insurance launched the first "Sustainable Insurance Roadmap" to guide a holistic strategy towards developing a sustainable insurance market and building resilient communities.[7] This roadmap, a partnership with the UN Principles for Sustainable Insurance, includes scenario analysis as a critical tool to provide information for transparency and financial oversight.

Scenario-based climate risk analysis exercises utilize a hypothetical storyline of the future to illustrate the preparedness of an organization or market to respond to that scenario.[8] This class of exercise can be as descriptive as thinking through how an organization would respond to a narrative. However, it is now more often a data-heavy analysis of the exposure of a business or market to climate-related risks. These analyses can be designed to address short, medium, and/or long-time horizons and can address different types of risks:

> **Physical risks** are "the possibility that the economic costs of the increasing severity and frequency of climate-change related extreme weather events, as well as more gradual changes in climate, might erode the value of financial assets, and/or increase liabilities."[9]
>
> **Transition risks** can arise from the technological, market, and policy changes needed to adjust to a low carbon economy and their effects on the value of financial assets and liabilities. Depending on the nature, speed, and focus of these changes, transition risks may pose varying levels of financial and reputational risk to organizations.[10]
>
> **Liability risks** may "arise when parties are held liable for losses related to environmental damage that may have been caused by their actions or omissions."[11]

Long-term CDI Goals in Conducting Scenario Analysis

In conducting scenario analysis, the California Department of Insurance aims to:

1. Build understanding of and capacity for climate risk analysis tools, including climate stress testing and scenario analysis, within the department and within insurance companies
2. Motivate insurers to consider the impact of climate risk on their business
3. Understand the position of the California insurance market as-a-whole, with respect to climate risks of all types
4. Improve the quality of insurer responses to the annual NAIC Climate Risk Disclosure Survey[12]

---

[7] See California Department of Insurance & UN Principles for Sustainable Insurance (2022) California Sustainable Insurance Roadmap

[8] See Berkeley Law CLEE (2023) Looking Forward: A Guide to Climate Risk Scenario Analysis Design for California's Insurance Regulator

[9] See Financial Stability Board (2020) Implications of Climate Change for Financial Stability

[10] See TCFD (2017) Recommendations of the Task Force on Climate-Related Financial Disclosures

[11] See Bank of England (2015), The impact of climate change on the UK insurance sector, which distinguishes three types of legal risks: failure to mitigate, failure to adapt and failure to disclosure.

[12] See Ceres and the California Department of Insurance (2023) Climate risk management in the U.S. insurance sector.

5. Complement the department's other efforts in this area including the fossil fuel and green bond investment database[13], annual climate risk disclosure survey[14], and climate-smart insurance products database[15]

In order to make progress towards these goals, the department has undertaken an initiative on scenario analysis and stress testing of insurers' 2021 year-end investment portfolios, the results of which are described in this report. Contemporaneously, the department has been thoughtfully designing a long-term strategy to continue implementing scenario-based climate risk analysis into the future.

The results of this analysis of insurers' 2021 year-end investment portfolio have been developed through new California Department of Insurance partnerships with innovative third-party analytics providers RMI and Theia Finance Labs (formerly 2-Degree Investing initiative), and with western U.S. state insurance regulators from Oregon and Washington. The analyses and conclusions presented are derived from use of 1) the Paris Agreement Capital Transition Assessment (PACTA) tool for measuring exposure of investment portfolios to "climate-relevant" sectors and alignment with recognized decarbonization pathways, as well as 2) the 1-in-1000 TRISK tool for climate stress testing of investment portfolios. The PACTA analysis represents insights for a relatively short time-horizon (5-years) and is based upon the announced plans of the companies associated with insurers' listed equity and corporate bond holdings. This short time horizon and concrete basis for projections means that these results are decision-relevant for insurance companies' investment strategies, including for informing investor engagement. The 1-in-1000 TRISK analysis extends this time horizon 20 years beyond these production plans (to 2046) using defined scenarios.

Simultaneously, CDI is considering a long-term strategy for future scenario analysis exercises informed by recommendations developed through partnership with the UC Berkeley Center for Law, Energy, and the Environment and consultations with experts and financial regulators from around the world. The recommendations from this work can be found in the report "Looking Forward: A Guide to Climate Risk Scenario Analysis Design for California's Insurance Regulator".[8] The report also includes a primer on the many options for scenario analyses and stress testing exercises available and the considerations that must be made in choosing an exercise.

This analysis is the first use of the 1-in-1000 TRISK climate stress testing tool by a financial regulator and builds on a history of the California Department of Insurance pioneering innovative tools for climate-related financial risk analysis. In 2019, California was the first insurance regulator in the world to utilize PACTA.[16] The 2019 analysis, which was conducted on insurers' 2017 year-end investment portfolios, included the 679 insurers operating in California with over $100 million in written premiums.

The PACTA tool and TRISK Climate Stress Testing framework can help financial institutions meet their reporting requirements. In coordination with a bipartisan group of states through the NAIC, California is administering an annual Task Force on Climate-Related Financial Disclosures (TCFD)-aligned survey to

[13] See 2018-2019 Climate Risk Analysis https://interactive.web.insurance.ca.gov/apex_extprd/f?p=260:1
[14] See NAIC Climate Risk Disclosure Survey https://www.insurance.ca.gov/01-consumers/180-climate-change/ClmtRskDsclsrSrvy.cfm
[15] See Climate Smart Insurance Products Search https://interactive.web.insurance.ca.gov/apex_extprd/f?p=142:1
[16] See California Department of Insurance Scenario Analysis https://www.insurance.ca.gov/01-consumers/180-climate-change/ScenarioAnalysis.cfm

insurers licensed in participating states. Insurance companies are instructed to report on scenario analysis and may use results from PACTA for this purpose. In 2023, the California Department of Insurance in partnership with Ceres released a report summarizing and analyzing responses to the NAIC Climate Risk Disclosure Survey and found that approximately 20% of the responses included some information related to climate scenario analysis or climate stress testing.[12] The department aims to increase the number of companies reporting information on scenario analysis through demonstration of accessible tools for implementation.

Transition Risk and Investment Practices

Economic Transition

While insurance in the U.S. is regulated at the state level, insurance companies, as major investors in both domestic and international securities and assets, are exposed to national and global trends in financial markets which are inextricably linked to developments in climate and energy.

The 2023 International Energy Agency (IEA)'s annual World Energy Outlook (WEO) indicates that, under current policies, global demand for each of the fossil fuels is projected to peak before 2030.[17] Coal use under this scenario declines within the next few years, while rising electric vehicle sales cause a decline in oil demand which plateaus in the mid-2030s before declining slightly towards mid-century. This would represent a global decoupling of GDP growth from fossil fuel growth, as these have been linked since the industrial revolution.

Although fossil fuel demand has been strong in recent years, the rate at which new assets that use fossil fuels are being added to the energy system has already slowed, while deployment of low-emissions alternatives has increased.[17] Examples of a growing adoption of low-carbon technologies are measurable in major sectors of the global economy. [17]Sales of internal combustion engine (ICE) cars are well below pre-COVID pandemic levels.[17] Worldwide additions of coal- and natural gas-fired power plants have halved, at least, from earlier peaks.[17] In many European countries and in the United States, sales of heat pumps now outnumber sales of residential gas boilers.[17]

Under current policies and existing trends, with no policy changes to meet existing multi-national climate goals, the IEA estimates that global fossil fuel demand would be met without any increase in oil and gas investment over the next decade. This is in stark contrast to the opportunities for investment in growing clean energy technologies, where renewables are projected to contribute 80% of new power capacity by 2030 even under current policies, with no additional climate action.

The U.S. Inflation Reduction Act of 2022 has paved the way for unprecedented investment in a clean energy economy. The 2022 WEO projected that under current policies, clean energy investment would grow by over 50% ($2 trillion) by 2030.[18] In 2023, the WEO report indicates that investment in clean energy already has grown by 40% since 2020. In 2023 one in 5 cars sold was electric, up from one in 25 in 2020. Under current policies, the WEO projections indicate that by 2030, half of new U.S. car registrations will be electric.

Worldwide energy generation is growing. However, the increase in renewable energy generation is projected to outpace growth in total electricity generation, driving down the contribution of fossil fuels

[17] See International Energy Agency World Energy Outlook 2023
[18] See International Energy Outlook World Energy Outlook 2022

for power generation.[17] While the recent energy crisis in the aftermath of COVID-19 and the Russian invasion of Ukraine pushed up utilization of existing coal power assets, it has not brought higher investment in new coal assets, and the WEO projects a decline in coal.

Natural gas markets are set to significantly change beginning in 2025 due to an unprecedented surge in new LNG Projects, expanding supplies.[17] Projects that have started construction or taken final investment decision are set to add additional liquefaction capacity equal to almost half of today's global LNG supply with more than half of the new projects located in the United States and Qatar. However, global gas demand has slowed considerably since the 2010s and is set to continue contraction in the long-term, leading to potential surplus of LNG.[17]

While climate change impacts are strengthening the humanitarian case for transition, the economic case for mature clean energy technology has also grown. Russia's invasion of Ukraine, intensifying a global energy crisis, and past and present conflicts in the Middle East are reinforcing the value of national and regional energy security. In addition, the cost of clean energy production has been steadily decreasing, which increases the appeal for transitioning to clean energy sources.

Green Financial Products

Options for green financial products have grown dramatically since 2008, when the World Bank issued its first green bond. The total size of the green bond market was $2.2 trillion by the end of 2022, with 2,457 issuers from 85 countries.[19] Sustainability-linked bonds, transition bonds, and sustainability bonds contribute an additional $898 billion to the size of the market. Annual green bond issuances reached a peak of $522.4 billion in 2021 representing a 75% increase on 2020. While the green bond market saw a decrease in bond issuances in 2022 due to rising inflation, war in Ukraine, a global energy crisis and lingering effects of the COVID-19 pandemic, the green bond market fared better than the overall fixed equity market which suffered a 25% decrease. The U.S. represents the largest source of green bonds in the world – with issuances of $64.4 billion in 2022. Globally, corporate issuers accounted for 54% of green bond issuances in 2022.

Novel investment vehicles for funding climate adaptation have also grown in recent years. The Climate Bonds Initiative[20] is in the process of developing a Climate Resilience Taxonomy in order to stimulate growth in the market for financial instruments that build resilience through investments that reduce the direct physical impacts of climate change (e.g., flood barriers) and/or the vulnerability of people and ecosystems. The initiative aims to develop clear definitions and rules for the designation of resilience bonds, to allow for a pipeline of investible projects. Resilience bonds present an opportunity for insurers to invest in projects that reduce climate risks to communities which can improve the health of insurance markets.

Sustainable Investment Strategies

Institutional investors have an array of strategies available for sustainable investing. These options include[21]:

1. Corporate engagement and shareholder action

[19] See Climate Bonds Initiative Sustainable Debt Global State of the Market 2022
[20] See Climate Bonds Initiative Taxonomy
[21] See Global Sustainable Investment Alliance Global Sustainable Investment Review 2020

2. Sustainability themed investing
3. Positive/best-in-class screening
4. Impact/community investing
5. Negative/exclusionary screening
6. Environmental, Social, and Governance integration
7. Norms-based screening

Each of these investment management strategies are not equal in their impact on the conditions and risks in global and local economies. Exclusionary screening may reduce the carbon footprint of an investment portfolio. However, if shares of the excluded high-carbon investee company are subsequently purchased by another investor, then the strategy has not resulted in a true decrease in greenhouse gas emissions in the real economy. Recent research has shown divestment to be effective only under specific conditions, such as when it is a coordinated action by a large number of institutional investors.[22]

Investor engagement can influence the plans of investee companies to genuinely shift them towards a low-carbon economy. Investor engagement can involve the exercising of shareholder rights, direct engagement with investees, collaborative engagement in conjunction with other investees, and policy advocacy to change business operating conditions.

Still, there is very limited evidence available on which to evaluate how different sustainable investment strategies, and combinations of strategies, impact greenhouse gas emissions in the real economy.[21]

Insurers and Asset Managers

A National Association of Insurance Commissioners Center for Insurance Policy and Research (CIPR) special report found that 49% of U.S. insurers reported outsourcing to an unaffiliated investment manager as of year-end 2017.[23] Small insurers, with cash and invested assets less than $250 million, accounted for 64% of the outsourced investment management and Property & Casualty insurers accounted for 67% of those small insurers who outsourced. Of the insurers that outsourced their investment management, 31% reported outsourcing at least half of their total assets.

Asset management companies are advancing in their capacity for, and knowledge of, sustainable investing practices. In a recent analysis by the California Department of Insurance and Ceres that analyzed the 2021 TCFD-aligned Climate Risk Disclosure Survey Responses from U.S. insurers found that many of the reports described utilizing asset management companies for their investment strategies and most of these described some strategy that their asset manager is employing for incorporating climate risk information.[12]

About PACTA

The Paris Agreement Capital Transition Assessment (PACTA) tool, under the stewardship of energy transition non-profit RMI, is a free, open-source resource for asset-based company level analysis of an

[22] See Kölbel, Heeb, Paetzold & Busch (2018) Can Sustainable Investing Save the World? Reviewing the Mechanisms of Investor Impact. Organization & Environment. Available at: https://doi.org/10.1177/1086026620919202

[23] See NAIC & CIPR Capital Markets Special Report: U.S. Industry Outsourcing to Unaffiliated Investment Managers

investment portfolio's exposure to climate-relevant sectors and alignment with climate policy scenarios. Any company or individual may upload a portfolio to an online portal and see automatically generated metrics and figures reflecting the portfolio contents.[24]

The PACTA analysis measures the exposure of a portfolio of companies to "climate-relevant" sectors at the timestamp of the portfolio and the forward-looking "alignment" of a portfolio with a given scenario given the 5-year production plans of the companies within it. Here the climate-relevant sectors are oil & gas extraction, coal mining, power capacity, automotive manufacturing, aviation, and industry (steel and cement). In the context of PACTA, the term alignment is understood to refer to a quantitative comparison, based on forward-looking metrics, of the performance (production capacity) of a portfolio of company investments when compared to a production trajectory anticipated or required by a climate change scenario for a climate-critical economic activity.

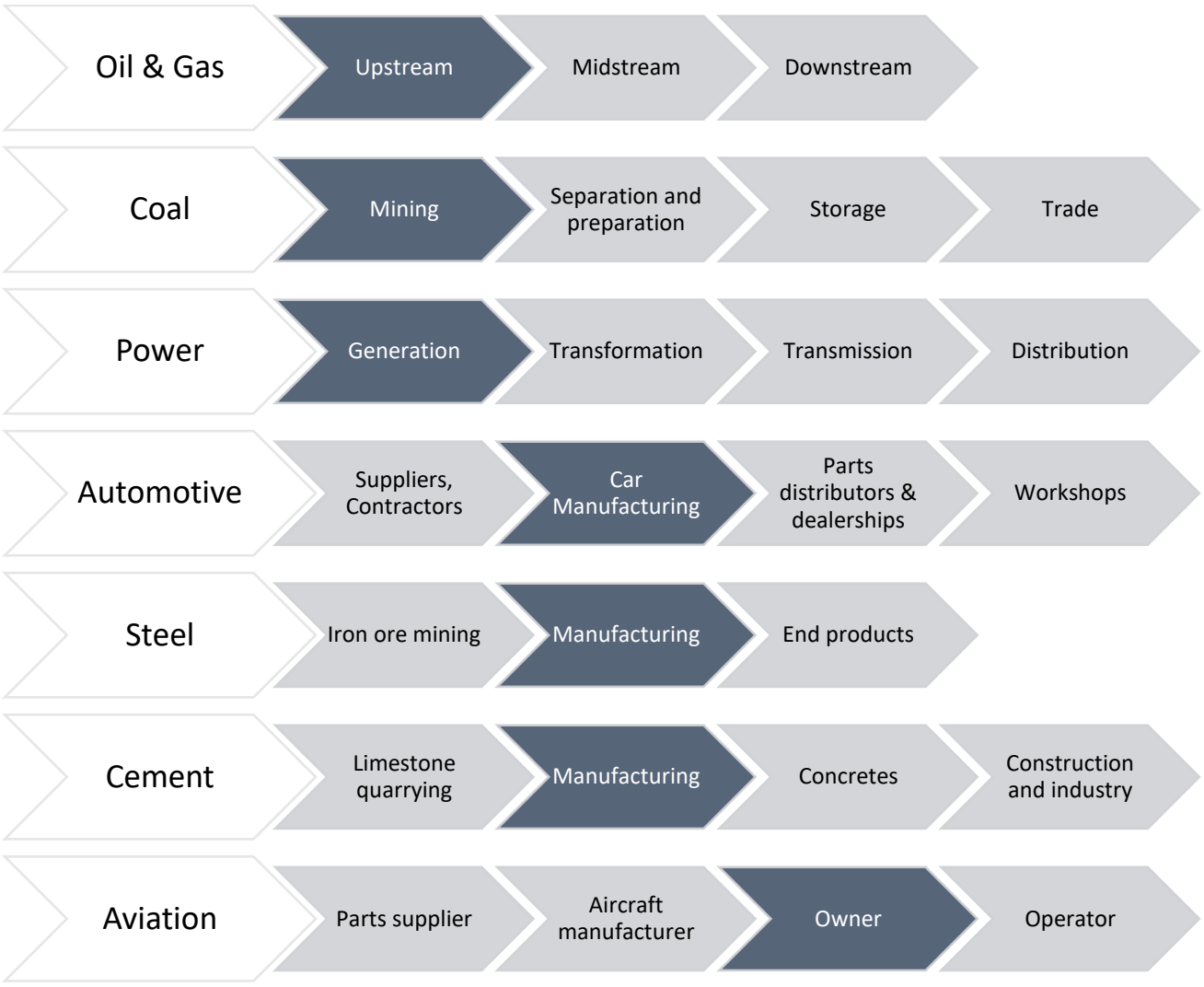


Figure 3. Infographic of segments of sectors capable of inclusion in the PACTA analysis. SOURCE: Adapted from Aiming Higher: PACTA Climate Test Switzerland 2022.

[24] Access at https://pacta.rmi.org/

These methods present insights that reflect the current status and available 5-year plans of companies within the portfolio, making this information decision-useful in the short term. Investors actions such as engagement and reweighting of portfolios will impact the result of this analysis.

About the 1-in-1000 TRISK Climate Stress Test

The 1-in-1000 is a research venture dedicated to climate financial stress testing under the aegis of Theia Finance Labs (formerly known as 2° Investing Initiative Germany).[25] The goal of the 1-in-1000 is to help enhance the resilience of the supervisory authorities, central banks and the whole financial system to climate and nature-related risks.

To achieve its goal, the 1-in-1000 team develops methodologies and supporting software for the 1-in-1000 Model Suite, a comprehensive climate financial stress testing framework for assessing the financial cost of climate transition, physical, litigation and nature-related risks. Since 2023, the 1-in-1000 is a part of a shared research initiative between Theia and the University of Oxford Sustainable Finance Group.

The 1-in-1000 TRISK is an asset-level, bottom-up, microeconomic climate transition risk stress test, as well as an open-source and free of charge software application that enables users to estimate the transition risk of financial portfolios (as well as analyze specific companies). 1-in-1000 TRISK uses the PACTA alignment approach to construct multiple scenarios of varying climate ambition on company level until the year 2050 and calculate the financial risk associated with late and sudden transition. It also relies on dynamic, forward-looking data, using 5-year production plans. The methodology measures transition risk on financial asset level as well as on aggregated portfolio indicators. The portfolio composition is assumed to be static for the horizon of the stress test.

Climate Scenarios

Climate Scenarios describe possible future states of the climate and the economy under different assumptions about future greenhouse gas emissions, energy use, and other factors. These scenarios can be provided by many different sources. This analysis uses scenarios from three scenario providers who each use different models to develop their scenarios: the International Energy Agency (IEA), the Network for Greening the Financial System (NGFS), and the European Commission JRC, which is only used for the automotive sector analysis.

The IEA scenarios are used in both the PACTA and in the 1-in-1000 TRISK Climate Stress test results presented in this report. The International Energy Association (IEA) relies on their Global Energy and Climate (GEC) Model to run scenarios and develop sector-specific trajectories for technology change. The GEC Model is a partial equilibrium model meaning that some elements, including economic growth, demographics, and technological changes, are prescribed and must be input to the model based on assumptions, while others, such as energy supply, demand, and transformation (generation/distribution/storage) evolve within the model.[26] The GEC Model produces sector-specific pathways for how the energy system will change to meet the specifications of a given scenario, and it does this in a framework of cost minimization considering technical, economic, and regulatory

[25] Find out more at https://theiafinance.org/ and 1in1000.com
[26] See Global Energy and Climate Model Documentation - 2022

constraints tailored to each sector. The model produces outputs for 26 world regions, including a North American region.[26]

The IEA, through their annual World Energy Outlook (WEO) analysis, has developed a range of scenarios using the GEM model, each representing one possible pathway for energy system change (or maintenance) to meet a specific climate policy target or scenario. Those used in this analysis are from the 2021 version of WEO and, in order of implied emissions reductions, include[27]:

1. **IEA WEO Stated Policies Scenario (STEPS)** which represents a pathway that is implied by the current climate and economic policies currently being implemented, without assuming that governments will reach all announced goals.
2. **IEA WEO Announced Pledges Scenario (APS)** which assumes all aspirational climate targets that have been announced by governments are met on time and in full, including long-term net zero and energy access goals.
3. **IEA WEO Sustainable Development Scenario (SDS)** which stabilizes global temperature below 2 degrees Celsius above preindustrial levels (1.65C), achieving the Paris Agreement targets, while achieving universal access to modern energy by 2030 and reducing air pollution.
4. **IEA WEO Net Zero Energy by 2050 (NZ 2050)** which maps a narrow but achievable pathway to achieve net-zero CO_2 emissions by 2050 and keep global mean temperature from rising more than 1.5 degrees Celsius above preindustrial levels with no overshoot and without relying on emissions reductions outside of the energy sector, alongside universal access to modern energy by 2030.

Since this analysis uses the 2021 versions of the WEO scenarios, the scenarios represent the 2021 point-in-time view of current policies (STEPS), announced pledges (APS), and pathways to achieving the Paris Agreement (SDS, NZ 2050). Since 2021, there has been considerable progress on transitioning the economy and policies have been enacted towards this goal, including the U.S. Inflation Reduction Act. These post-2021 changes are not represented in the current analysis.

The Network for Greening the Financial System (NGFS) scenarios are used only in the 1-in-1000 TRISK Climate Stress Test results presented in this report. While the IEA scenarios are only designed to be used with a single model (the Global Energy and Climate Model), for the NGFS scenarios there are several options for which model is used. These options are Integrated Assessment Models (IAM) that represent how human development and societal choices affect each other and the natural world including climate change, and each one functions differently with different assumptions. The NGFS scenario results presented in this report use either the GCAM or the REMIND IAM.[28]

REMIND (version REMIND MAgPIE 3.0-4.4) is a general equilibrium model which allows it to model changes in consumption, economic growth, and demand for energy in response to climate policies without being given prescriptive inputs for these variables. It is comprised of three main components – a macroeconomic module, an energy system module, and a climate system module. The macroeconomic module dynamically represents economic growth and international trade, and the energy system module includes a detailed representation of energy supply and demand. REMIND is designed to have "perfect foresight" and maximize welfare in the scenario. This means that when making a "decision" at a

[27] See International Energy Agency World Energy Outlook 2021 Annex B: Design of Scenarios
[28] See NGFS Climate Scenarios Database Technical Documentation V3.1

given time step, the model is aware of the decisions that were made in prior time steps and resulting state of the world *and* is aware of the decisions and state of the world in all the remaining time steps in the model run. For each time step, it will make a decision that maximizes welfare for the entire model run. REMIND represents the world in 12 regions.[28]

Because of its features of "perfect foresight" and optimization of welfare rather than cost minimization, the REMIND model may favor technology pathways that have high upfront costs (e.g. closing a coal power plant early even if it is still profitable) if those actions lead to better economic welfare by the end of the model time horizon. This may lead to larger impacts to balance sheets in the 1-in-1000 climate stress tests where production plans do not align with these anticipatory changes.

GCAM (version GCAM Model 5.4) is an integrated assessment model (IAM) that runs as a partial equilibrium model of the land and energy use sectors and is designed to make projections that minimize cost of the transition in the model.[28] This means that the model requires prescriptive inputs for certain variables, such as economic growth and energy demand, and then models how markets evolve to balance supply and demand over time. From this, it can produce projections for variables such as technology change and technology costs over time in the scenario used. The model's output for a given point in time can only take information from the past, as represented in the model. This means that after the model solves for each time-period, the model then uses the resulting state of the world, including the consequences of decisions made in that period, and then moves to the next time step and performs the same exercise. When making that "decision" it is not aware of what decisions will be made in future time steps. The GCAM model represents the world in 32 regions.[28]

Since the GCAM model makes decisions that balance supply and demand for a given time step while minimizing costs, the technology pathways it represents will not be "anticipatory". If a technology is profitable and allowable in the scenario at a given time step it will remain in the mix in that time step, even if retaining it at that time turns out to be detrimental to welfare or costly by the end of the model time horizon. This means that for certain highly polluting technologies the 1-in-1000 climate-stress test results may show lower impacts to balance sheets as technology changes may be delayed.

The NGFS has developed a range of scenarios that can be used in combination with any of its integrated assessment models, with each scenario/IAM combination representing one possible pathway for energy system change (or maintenance) to meet a specific climate policy target or scenario. Those used in this analysis, in order of implied emissions reductions, include[28]:

5. **Current Policies**, where existing climate policies remain in place, but there is no strengthening of ambition level of these policies. This is used as the benchmark scenario in the 1-in-1000 results and is the analogue to the IEA STEPS scenario.
6. **Below 2 degrees (B2DS)** represents a scenario in which there are immediate gradual emissions reductions leading to net-zero in 2070 and aims to stabilize the climate at 1.7 degrees Celsius of warming above preindustrial levels. This is used as the target scenario in the 1-in-1000 results.

The NGFS scenarios include certain drivers of physical risk that affect the macroeconomic variables in the model, which indirectly affect the results of the Transition Risk Model. However, these impacts do not include all sources of risk, such as low probability high-impact events, sea-level rise, extreme events, and societal changes like migration and conflict. The damages under these scenarios are expected to be underestimates, especially for areas that have low capacity to adapt to climate change impacts.[28]

For the automotive sector, the Joint Research Center (JRC) Global Energy and Climate Outlook (GECO) 2021 scenarios are used which develop global and sectoral pathways towards a deep decarbonization of the energy system to limit warming to below 2 degrees Celsius by the end of the century.[29] These scenarios include direct modeling of mobility changes and are therefore appropriate for use for the automotive sector. The JRC GECO scenarios are produced using the partial equilibrium model POLES-JRC and the general equilibrium model JRC-GEM-E3 that covers interactions between the global economy, the energy system, and the environment. POLES-JRC simulates the energy sector, including direct modeling of energy prices and supply and demand adjustments by world region. The model decomposes the world into 54 individual countries and 12 residual regions. The JGR-GEM-E3 model represents actions of firms, households, and governments and how those impact international trade for 22 regions and the 27 EU member states. The JGR-GEM-E3 model uses the energy balances and GDP growth rates from the POLES-JRC model as input and is developed to produce output that ensures alignment with those energy and GDP variables.[29]

The scenarios used from the Joint Research Center are[29]:

1. **Reference**, which is the analogue to the "current policies" scenarios from other providers and represents a world where existing policies remain in effect and no additional energy or climate policies are enacted.
2. **Net Zero 2050,** also called 1.5C**,** which is a decarbonization scenario designed to limit global temperature increase to 1.5C with a set global carbon budget that results in a 50% probability of not exceeding the 1.5 Celsius warming limit in 2100. A single carbon price (for all countries and sectors) is included that increases rapidly over time and this is the driver of emissions reductions.

Climate scenarios encompass a diverse range of potential future trajectories for the Earth's climate system. These scenarios often span different levels of climate ambition, including contrasting a business-as-usual or status quo scenario with a sustainable development path. They provide a comprehensive spectrum of potential outcomes, particularly concerning the energy sector, and are typically generated using integrated assessment models (IAMs). However, dependent on the provider, scenarios can largely vary, even when comparing these with a similar level of climate ambition. Differences are mostly driven by different calibrations of IAMs, as discussed earlier in this section, and assumptions made about future developments, like the extent of Carbon Dioxide Removal.

Use of scenarios in 1-in-1000

The scenarios generated by providers such as NGFS or IEA are complex, with many variables representing the economic and societal changes resulting from the represented actions. For the purpose of the 1-in-1000 TRISK climate stress test, these complex scenarios are distilled into three components that are fed into the stress testing program:

1) Production over time for each sector and technology;
2) Technology unit costs over time for each sector and technology; and
3) Carbon tax over time (optional)

[29] See European Commission JRC Global Energy and Climate Outlook 2021: Advancing towards climate neutrality.

A given firm's responsibility in implementing the requisite changes in production to meet given target climate scenario is determined by its market share (share of production for that sector/technology).

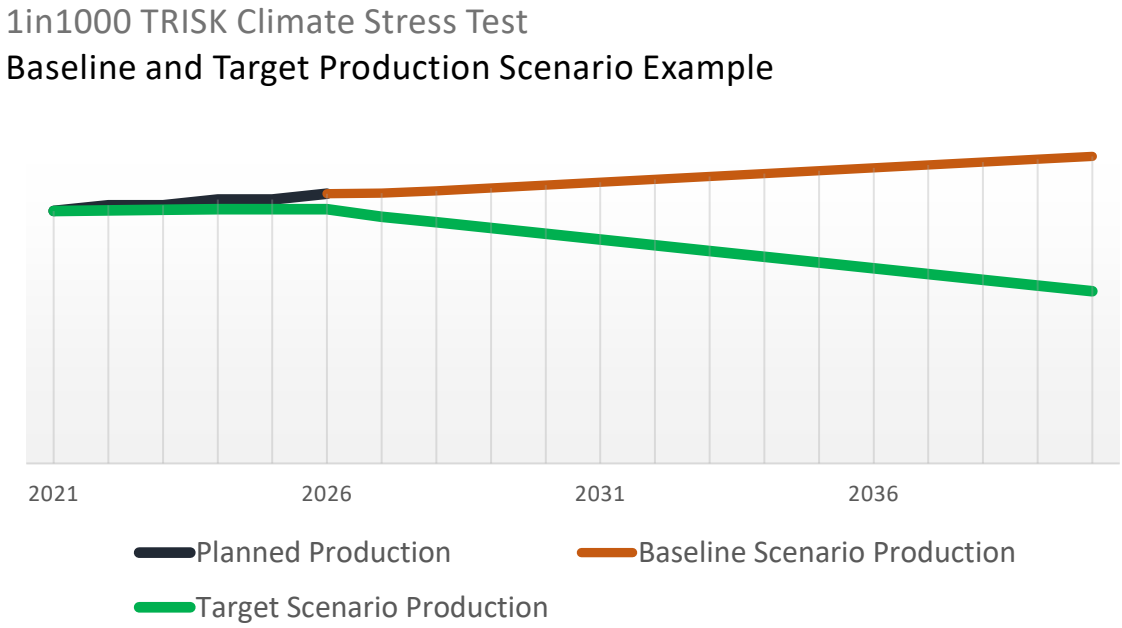
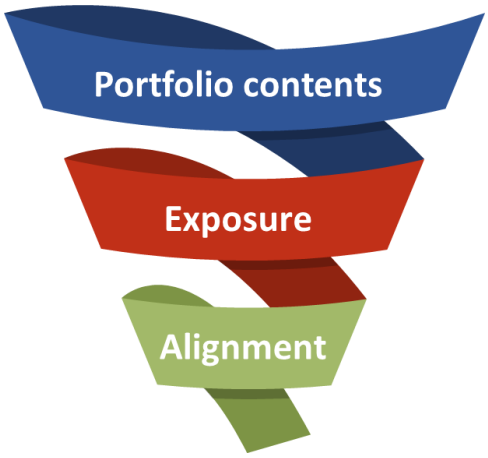


Figure 4.Schematic of planned production, baseline, and target production as used in the 1in1000 TRISK Climate Stress test. In this example, planned production and baseline production exceed what is allowable in the target scenario.

While the framework accounts for the three drivers of a transition shock, i.e., demand changes, technological change and policy-induced carbon pricing, these are modelled in isolation. There is no interaction mechanism between scenarios in the model that represent the potential compounding and amplifying nature of the risk drivers.

A Guide to the PACTA Results



Portfolio contents – The PACTA analysis covers corporate bonds and listed equities within the portfolio of interest. Investments in funds will be incorporated into the analysis of corporate bonds and listed equities. Other asset classes (e.g., Sovereign bonds) are not covered by the PACTA analysis. The PACTA output begins with metrics describing the asset classes held by the asset owner.

Exposure – PACTA maps the investments in the portfolio to production by the investee firms and their subsidiaries in certain climate-relevant sectors. It then attributes those units of production to the portfolio. The exposure metrics indicates what share of that attributable climate-related production is associated with each climate-relevant technology at the time stamp of the portfolio. Portfolios with higher exposure to coal, oil, gas, and other high emitting sectors may face greater

transition risks as collective climate action (via changes in policy, preferences, or economic drivers) is taken to reduce emissions.

Alignment – The alignment metrics utilizes 5-year forward looking production plans of the climate-relevant sector firms held within the portfolio to represent how the production associated with the portfolio will change. These projections are then compared with several scenarios for decarbonization. Comparison of existing plans with these scenarios allows one to understand how well-aligned or mis-aligned the portfolio is with each scenario. Portfolios that are best aligned with a net zero scenario would face the least disruption in the case that policy or societal forces required their investments to contribute towards deep reductions in greenhouse gas emissions. Alignment results are generated for the power, fossil fuel extraction, and automotive sectors. They are not generated for steel, cement, or aviation as the technology pathways are not yet well defined in the climate scenarios for these sectors. RMI and Theia Finance labs continue to develop their tools and add additional technology pathways as they become well defined.

Asset Types Primer

Investments can take the form of a variety of asset types. Those discussed in this report are corporate bonds, listed equities, and funds.

Corporate bonds are a debt obligation in which investors who purchase the bond are lending money to a company issuing the bond and the company makes a legal commitment to pay interest on the principal and, in most cases, return the principle after a specified amount of time when the bond has "matured"[30]. When you purchase a bond, you do not own equity in the company and will receive the same interest and principal on the bond regardless of how profitable the company becomes. In the event that the company encounters financial difficulty, it still has an obligation to make timely payments of interest and principle. A risk to the bondholder is that if the company fails to make those timely payments, the company will default on its bonds ("default risk"). The *probability of default* is a key risk metric for bonds.

Listed equities are stocks in publicly listed companies, meaning that they entitle the owner to a proportion ("share") of the company's assets and profits equal to how much stock they own. The stocks of publicly listed companies are traded on exchanges, such as the New York Stock Exchange or the Nasdaq. Shareholders can directly benefit from the profitability of a company as they can be paid a distribution of the company's earnings in the form of dividends. Owning stock gives the shareholder the right to vote in shareholder meetings.

Funds can take many forms, but generally allocate money from investors into a variety of assets that may be all of the same type or may be of multiple types. Funds may be comprised of corporate bonds, listed equities, and/or many other types of assets.

Participation and Coverage of the Analysis

This analysis covers Life, Health, Property & Casualty, and Fraternal insurance companies licensed in California, Oregon, and Washington with over $100M in direct written premium, representing in total

[30] See SEC Office of Investor Education and Advocacy. Investor bulletin: What are corporate bonds?

768 insurance companies' listed equities and corporate bonds portfolios.[31] This included 653 insurers licensed in California, 711 licensed in Oregon, and 715 licensed in Washington. Portfolio information is derived from insurance companies' annual filings that are made available through the NAIC. Only the corporate bond and listed equity holdings of insurers were included in this analysis. Research from the NAIC indicates that corporate bonds and listed equities together account for approximately 40-50% of U.S. insures' portfolios.[3]

In total, $2.29 trillion in holdings were analyzed using the PACTA methodology --- $450 billion in listed equities and $1.84 trillion in corporate bonds. In total, $401 billion of this value was invested in climate-relevant sectors. Other assets (E.g., sovereign bonds) were not included in the analysis. The PACTA methodology for analyzing listed equities and corporate bonds also analyzes funds: a look-through is done using a financial database and each fund's listed equities and corporate bonds are attributed to the portfolios as indirect ownership of assets.

For the analysis, insurance companies were separated into four peer groups based upon their line of business (Life, Health, Property & Casualty, Fraternal) and their holdings were combined into four aggregate portfolios for analysis.

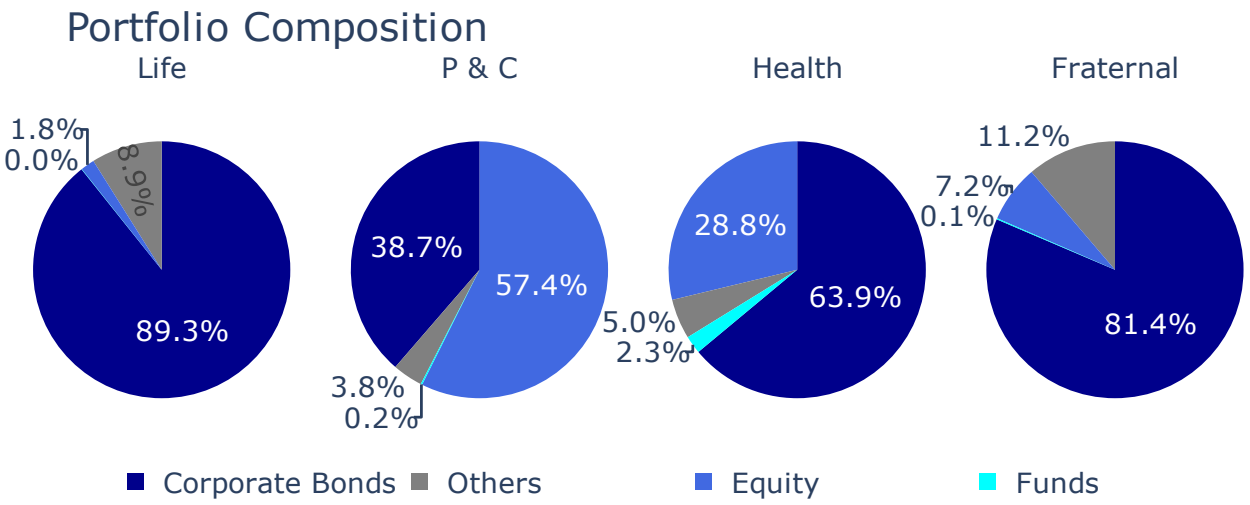


Figure 5. PACTA Results. Distribution of analyzed assets into asset types (Corporate Bonds, Listed Equity, Funds, Others) for each peer group aggregate portfolio (Life, P&C, Health, Fraternal).

For all peer groups, more than 89% of the total value of the analyzed portion of insurers' aggregate portfolio is allocated to listed equities and corporate bonds. Nearly 3% of the included value of the aggregated portfolio of Health insurers is allocated to funds, which are also analyzed as indirect ownership of corporate bonds or listed equities. Other insurer groups have less than 1% of their portfolio value invested in funds. Life and fraternal insurers have most of their portfolio invested in corporate bonds, while P&C insurers are more evenly split between corporate bonds (39%) and listed equities (~57%). Life insurers may be incentivized to hold longer maturity assets, such as bonds, given

[31] Companies with no reported corporate bond or listed equity investments were excluded.

their lengthy policy terms compared to P&C insurers.[32,33] However, the size of the company can also strongly factor into the distribution of assets between listed equities and bonds.[34]

For all peer groups, the sectors covered by PACTA (climate-relevant sectors) make up around 6-12% of the included value of all the participating financial institutions assets in listed equities and 10-23% of the value in corporate bonds. This is similar to other international jurisdictions for equities, but the exposure is greater than other international jurisdictions for corporate bonds. For comparison, when the PACTA methodology has been used in other jurisdictions for analysis of financial institutions (not just insurers), Swiss financial institutions showed exposure of 8-15% in both assets, Austria showed exposure of 8-17%, Liechtenstein showed exposure of 10-30%, and Norwegian financial institutions showed exposure of 7-11% for both assets.[35] The peer group with the least exposure to PACTA sectors in equity is P&C, at just over 6%. All other insurer types had more exposure within listed equities (just over 10%). Life insurers have the second most exposure to PACTA sectors within their bond portfolio (>20%) which is notable given that corporate bonds make up most of their holdings. They also have the most exposure to PACTA sectors within listed equity, but this represents only a small fraction of their portfolio value (<2%). In total, P&C, Life, Health, and Fraternal insurers have over $401 Billion invested in PACTA sectors, with 93% in the form of corporate bonds, and 7% in the form of listed equity. Fraternal insurers, while the smallest in number of companies and in assets under management, have the highest share of their bonds in PACTA sectors (>20%). Health insurers had similar levels of exposure to PACTA sectors within their listed equity as compared to their bond portfolios, while all other insurer types had higher exposure in their bonds than in their listed equities.

[32] See Gründl, Dong, & Gal (2016) The evolution of insurer portfolio investment strategies for long-term investing. OECD Journal: Financial Market Trends.
[33] See Leung & Fliegelman (2022) Rising Interest Rates Help Insurers, but Market Volatility Poses Risk to Some. Office of Financial Research Blog.
[34] See Property & Casualty and Life Investment Review: Stable Allocations in a Shifting Landscape - AAM Company
[35] See Aiming Higher: PACTA Climate Test Switzerland (2022)

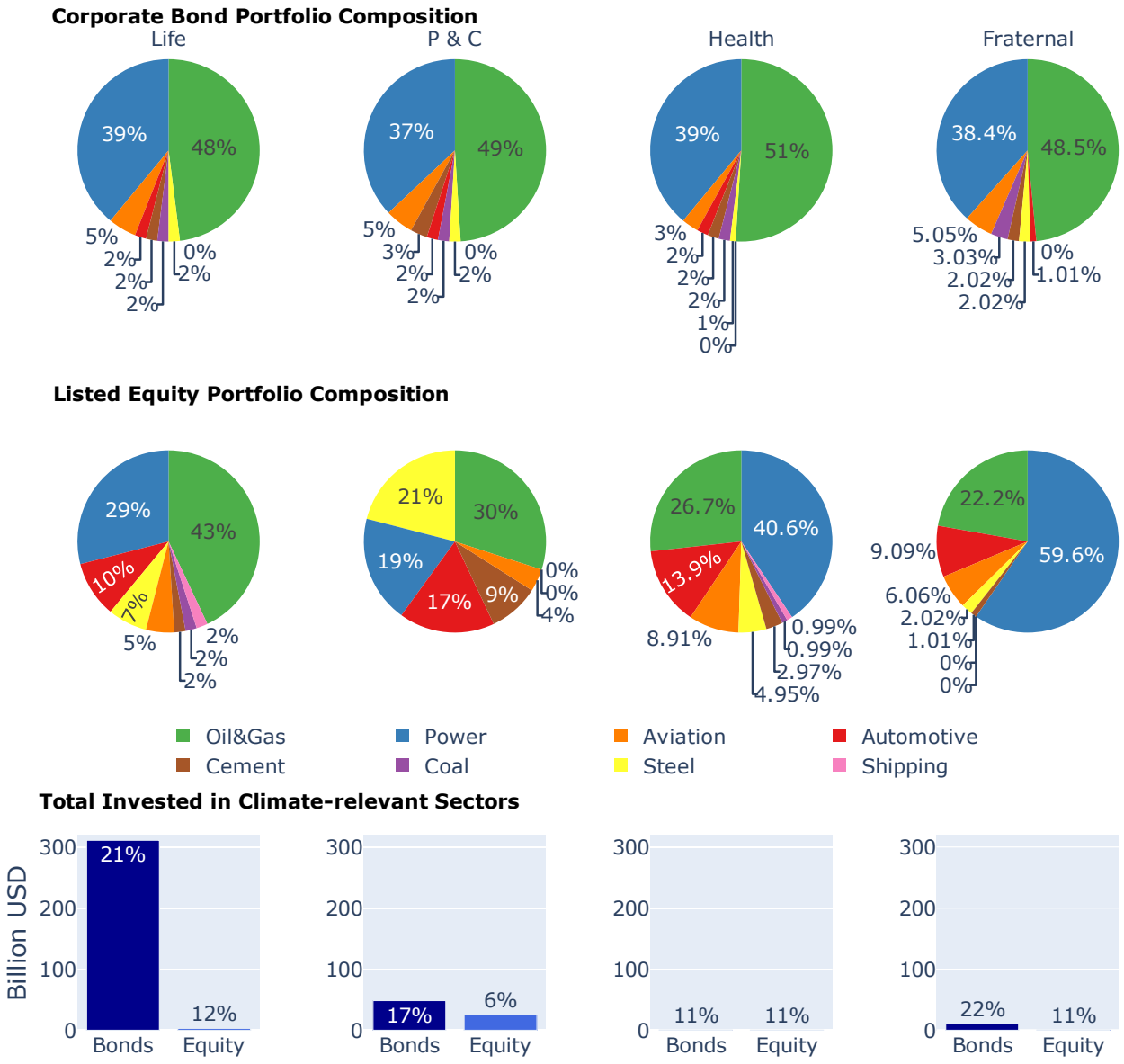


Figure 6. PACTA results. Top row: Distribution of analyzed corporate bond portfolio value invested into climate-relevant sectors, for each insurer peer group (Life, P&C, Health, Fraternal). Middle row: Distribution of listed equity portfolio value invested into climate-relevant sectors, for each insurer peer group. Bottom row: Total investment in climate-relevant sectors in corporate bonds and listed equities for each peer group.

Investments related to oil & gas or coal extraction and power capacity production are responsible for the majority of insurers exposure to PACTA (climate-relevant) sectors within bonds across all peer groups (~85%). The distribution of this exposure between sectors is broadly similar across peer groups for corporate bonds, with approximately half the exposure coming from Oil & Gas extraction, around 40% coming from power capacity and the remaining 10% split between the other sectors. It's worth noting, however, that about a third of the exposure to the power sector is from renewables, hydropower, and nuclear. Given that there are large differences in the assets under management (AUM) value invested in bonds for the different lines, there are still large differences in the impact on the

market. Life insurers, although similar to other lines in the distribution of their assets between sectors, exert much more power over the market with nearly $150 billion invested in bonds related to the oil & gas extraction sector, and over $100 billion invested in the power sector. In contrast, no other line has more than $25 billion in bonds invested in each of these sectors. Notably, all insurer peer groups (Life, Health, P&C, and Fraternal) had more of their exposure attributable to oil & gas extraction than the market comparison (iShares Global Corp Bond ETF). All insurer groups also had less exposure to the automotive sector than the market comparison.

Within listed equities, the distribution of exposure between sectors substantially varies between peer groups, but oil & gas or coal extraction and power capacity still account for half or more of their exposure to PACTA sectors. For Life insurers, those sectors represent almost 75% of total exposure to PACTA sectors in equity portfolios. However, again it is important to note that equities represent only a small fraction of Life insurers' holdings leading to less than $3 billion invested in these sectors. P&C insurers have the least exposure within their equities attributable to power capacity, and much more of their exposure attributable to steel and cement production than the other lines (and much more than the market comparison). This is significant given that P&C insurers have much more of their assets under management invested in listed equities, as compared to other lines. In total, P&C insurers have over $6 billion invested in oil & gas extraction, and over $4 billion invested in power capacity. Over $6 billion of their investments are in steel and cement production. As with bonds, all lines have less exposure to the automotive sector than the market comparison.

Climate Alignment of Listed Equities and Corporate Bonds

The PACTA method is based on forward-looking production and capacity data of industrial activity in the following climate-relevant sectors (hereafter, called PACTA sectors): oil and gas extraction, coal mining, power installed capacity, automotive manufacturing, aviation, steel, and cement. PACTA is designed to allocate macroeconomic goals (Paris Agreement goals) to microeconomic agents (firms). The analysis covers insurance companies' listed equities and corporate bonds and includes a comparison to a market benchmark – ETF from iShares core S&P 500 ETF for listed equities and Bank of America Investment Grade Bonds for corporate bonds.

The portfolio attribution of production linked to listed equities and corporate bonds is made using the portfolio weight approach, which attributes the company's production to the portfolio based on the size of the investment into the companies relative to investments into other companies in the same sector.

Power

According to the Intergovernmental Panel on Climate Change (IPCC), virtually full decarbonization of the power sector is needed for countries to meet the Paris Agreement's target of stabilizing global temperature to 1.5 degrees Celsius above preindustrial levels, and well below 2-degrees Celsius of warming.[36]

The electric power sector currently accounts for over 30% of global and 25% of U.S. carbon dioxide emissions.[37] In the NGFS' net-zero by 2050 scenario, power capacity would double when compared with today's numbers and about 95% of the electricity generated would come from zero-carbon energy

[36] See IPCC Special Report: Global Warming of 1.5 °C. Summary for Policymakers
[37] See U.S. EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021

sources.[28] This transition will require significant infrastructure and technology investments in power generation, the power grid, and energy storage. It is also important to note that decarbonization of the power sector is central to net-zero goals as this allows other sectors to electrify their operations.

Current US Electricity Decarbonization Progress and Goals

According to the U.S. Energy Information Administration (EIA), in 2023 an estimated 22% of U.S. electricity generation came from renewable sources, and other 19% came from nuclear power generation.[38] The sum of generation from these zero-emission sources (40%) rivals that from natural gas, which contributes to 42% of electricity generation. Electricity generation from coal has dropped from 23% in 2021 to an estimated 16% in 2023, in just two years.

The U.S. currently aims to achieve 100% carbon pollution-free electricity or a net-zero power grid by 2035. According to analysts, this would reduce economy-wide energy-related greenhouse gas emissions by 62% relative to 2005 levels in 2035 (amounting to 2.4 Gt).[39]

The U.S EIA in its most recent outlook projects that U.S. energy-related CO_2 emissions will drop 25% to 28% below the 2005 level by 2030.[40] For context, the U.S. Nationally Determined Contribution (NCD) submitted as part of the Paris Agreement calls for a target of 50% to 52% of net greenhouse gas emissions below the 2005 level by 2030.

Transition Risks and Asset Stranding in the Sector

The risk of stranded assets in this sector is high for fossil fuel-related power production if ambitious climate policies are put in place. A McKinsey & Company analysis showed that in the power sector alone, about $2.1 trillion worth of assets could be stranded by 2050 under the net-zero by 2050 scenario of the NGFS, 80% of which would be fossil-fuel power plants in operation today and 20% from new assets that are built in the future, primarily gas power plants.[41]

The costs of renewables have dropped significantly and since 2018, they've accounted for most new power-generation capacity. Renewables are also essential in national greenhouse gas (GHG) reduction plans. However, flexibility and reliability of renewable energy sources are barriers that must be addressed through integrated power systems. In the short term, reaching 50 to 60% decarbonization of the power sector would not be difficult given the lower costs of renewable energy. It would however take concerted effort to reach 100% decarbonization of this sector, especially with storage and demand issues.

Opportunities

Decarbonization of the world's energy system in order to slash emissions and prevent the worst consequences of climate change requires enormous investment in clean energy. While public capital is actively being deployed to address these needs, including through the recent Inflation Reduction Act, public capital is insufficient to meet the needs of the growing clean energy sector and private capital is

[38] See U.S. Energy Information Administration Short-Term Energy Outlook STEO November 2023
[39] See NREL Examining Supply-Side Options to Achieve 100% Clean Electricity by 2035.
[40] See U.S. Energy Information Administration Annual Energy Outlook 2023
[41] See McKinsey & Company (2022) The net-zero transition: What it would cost, what it could bring.

critical. There is a large potential for institutional investors, including insurers, to leverage opportunities to finance the transition that is already underway.[42] Investments in clean energy technologies are particularly suitable for the long-term investment horizons of institutional investors. Clean energy projects can offer stable (not subject to fuel price volatility) and predictable cash flows (when backed by long-term contracts with investment grade counterparties), often with inflation protection (e.g. with indexed tariffs). The lifespan for wind and solar projects can typically be around 25 years, with manufacturer warranties, long-term contracts with power purchasers, and government support. Finally, they are often income streams with low correlation to the returns of other investments. All of these characteristics present enormous opportunities for investment by insurance companies.

As the sector races towards decarbonization, there are a variety of investment opportunities available, including new technologies to be deployed, infrastructure such as storage, transmission, pipeline networks, and generation capacity along with growing demand for renewable energy.

Beyond generation

While this analysis focuses exclusively on investments in power generation, there are significant opportunities for investment in other segments of the power sector. Transmission bottlenecks can stymy development of renewable energy projects particularly as many of the sites most favorable to generating renewable energy are often significant distances from energy consumption endpoints. The recent National Transmission Needs Study from the U.S. Department of Energy indicated that significant additional transmission deployment will be needed as soon as 2030 to accommodate the future power grid.[43] Investments in transmission and distribution are critical to a low- or zero-carbon future. In its roadmap for the global energy sector reaching Net Zero by 2050, the EIA projects that a huge increase in investment in expansion and modernization of electricity networks is needed. Annual investment would rise from $260 billion on average in recent years to around $800 billion in 2030 remaining at that level through 2050.[44] This includes capital investment, but these capital investments would be partly compensated by lower operating expenditure as clean technologies are characterized by lower operating costs.

Recent events may not be reflected in this analysis

This PACTA analysis uses the IEA WEO scenarios and portfolio data from the year 2021. Since that time, the energy sector has seen large shifts associated with the global energy crisis initiated, in part, by the Russia-Ukraine conflict and the aftermath of the COVID-19 pandemic. These changes are not reflected in the scenarios or data used in this analysis.

Portfolio Contents

The power sector is the source of the second largest share of exposure to PACTA (climate-relevant) sectors within corporate bonds, across peer groups. Within listed equities, power capacity was the largest source of exposure for Health and Fraternal insurers.

[42] See OECD (2012) The Role of Institutional Investors in Financing Clean Energy.
[43] See U.S. DoE (2023) National Transmission Needs Study
[44] See IEA (2021) Net Zero by 2050: A Roadmap for the Global Energy Sector.

Exposure

The PACTA analysis presents exposure to specific technologies in a sector as a share of the total climate-related production attributable to the portfolio. The use of production values in high and low carbon technologies reflects how the portfolio is exposed to the real economy across high and low carbon technology. This is in contrast to looking at financed emissions which change based on the financial valuation of the asset without any change in the real economy. The meaning of "production" in this analysis is specific to the sector. In the case of the power sector, production refers to installed capacity of the energy-producing technology.

Life insurers, for whom corporate bonds represent a vast majority (90%) of their portfolio-associated production, hold the second largest share of their bond portfolio in power capacity (7%), second only to Fraternal insurers.

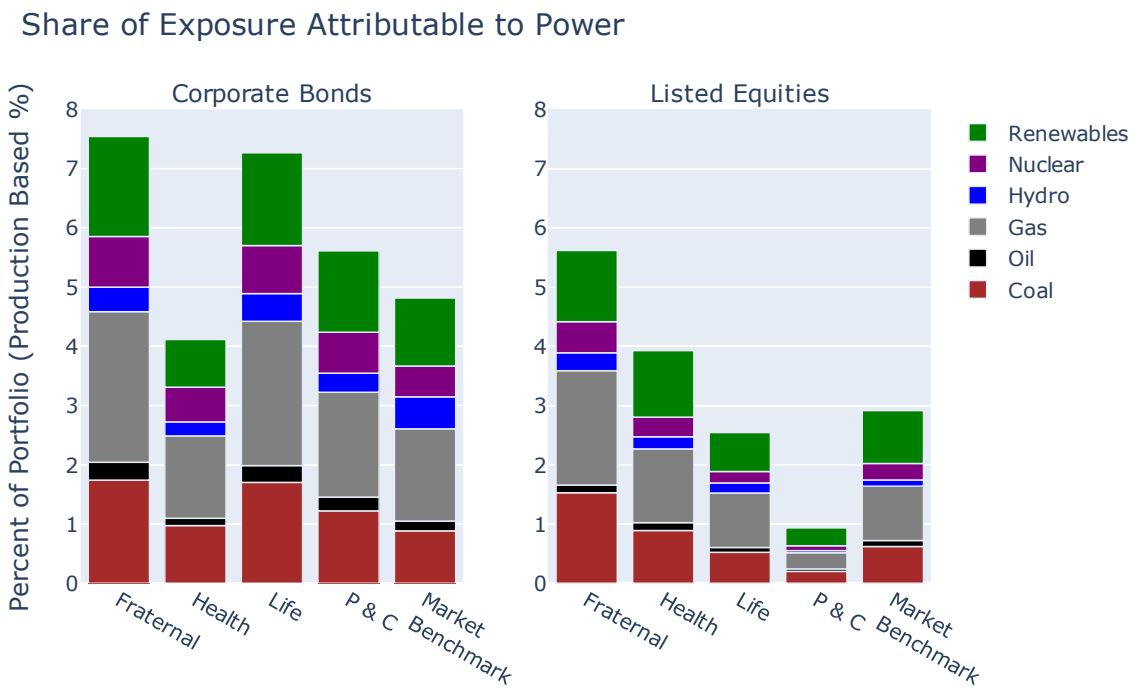


Figure 7. PACTA results. Share of total portfolio-associated production (within asset classes of corporate bonds and listed equities) that can be attributed to each technology within the power sector.

Within corporate bonds and across peer groups, the share of portfolio production associated with renewables, hydropower, and nuclear made up more than a third of the total invested in power capacity.

P&C insurers, who hold a relatively even mix of bonds and listed equity, have around 5.5% of their corporate bond portfolio-associated production and only 1% of their listed equity portfolio in power capacity. For all lines of business, these were primarily investments in gas power capacity, secondarily in coal power capacity, and tertiarily in renewable power capacity. Representation of oil-based power capacity was minimal. **Life, P&C, and Fraternal insurers had a higher fraction of their corporate bond portfolio invested in renewables than the market benchmark**.

This exposure to the power sector is similar to what was found for swiss financial institutions in a recent PACTA analysis – for these institutions exposure ranged from 2 to 5% of the aggregate portfolio-associated production.[35]

Health and Fraternal insurers all had much more exposure to each fossil fuel power production technology (coal, gas, oil) in their listed equities than the market benchmark. Within listed equities, the share of the portfolio-associated production invested in coal power capacity varied widely between peer groups with the P&C portfolio having a share of 0.2% and the Fraternal insurers having a much larger share of 1.53%.

Within corporate bonds there was consistently a greater fraction of the portfolio related to power capacity than listed equities. Investments in coal power within listed equities were greater than the market benchmark for all insurer peer groups and ranged from 0.97% for Health insurers to 1.7% for P&C and for Life insurers.

Alignment

Alignment results were relatively similar between peer groups and are therefore shown at the aggregate, rather than peer-level, for the remainder of this analysis.

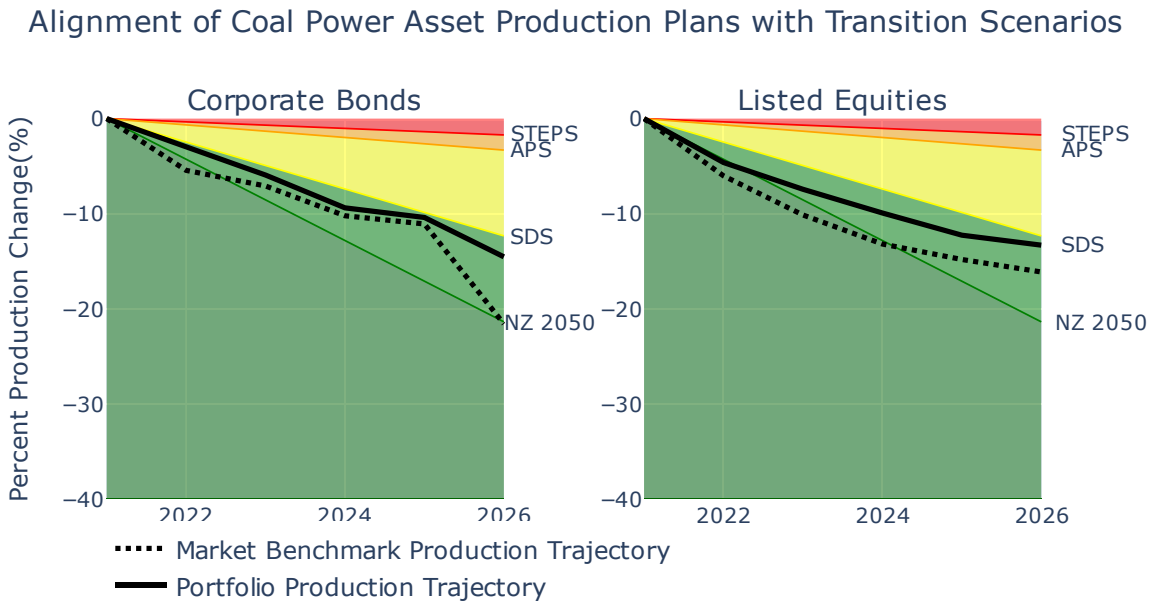


Figure 8. Alignment of the planned coal power capacity attributable to the aggregate portfolio for each asset class (solid black line), with the production amount allowable in each scenario from the International Energy Agency World Energy Outlook (shaded areas; green shaded areas align with more climate action, red shaded areas align with no additional climate action). The market benchmark portfolio is shown with a dashed black line.

The forward-looking plans of the coal power production company assets held by insurers through their corporate bond portfolios and listed equity portfolios are aligned with a sustainable development scenario. These companies plan to ramp down coal power capacity between 2021 and 2025 by over 12%. However, they still are not keeping pace with the market benchmark which at certain times in the 5-year production trajectory aligns with the net zero by 2050 scenario.

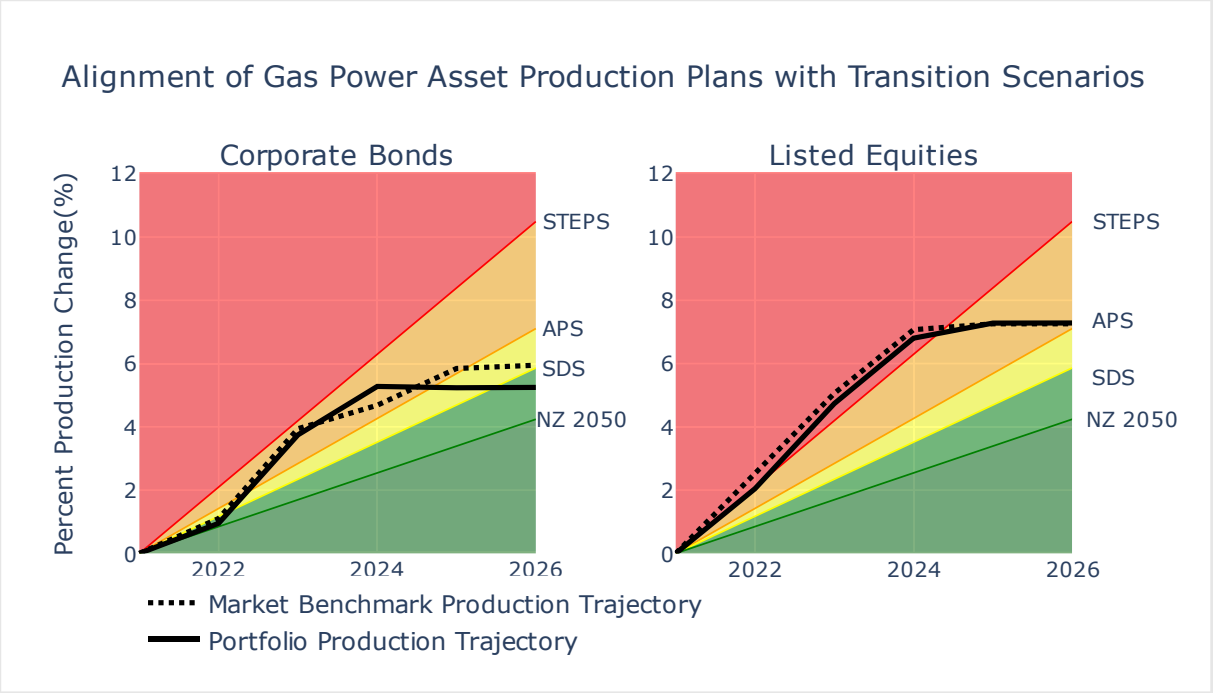


Figure 9. Alignment of the planned gas power capacity attributable to the aggregate portfolio for each asset class (solid black line), with the production amount allowable in each scenario from the International Energy Agency World Energy Outlook (shaded areas; green shaded areas align with more climate action, red shaded areas align with no additional climate action). The market benchmark portfolio is shown with a dashed black line.

In order to stabilize climate in an orderly way, gas power production is considered a transition technology, and, as a result, the IEA net zero and sustainable development scenarios still allow for a small increase in production in the short term. For gas power capacity, in order to align with any of the scenarios companies would be required to increase gas power capacity between 2021 and 2026 only by a small margin (<5%). **The companies associated with insurers corporate bond holdings plan to align with this production trajectory in the near (2021-2022) and the long (2026) term, but have intermediate plans to increase capacity above what is prescribed by the scenarios in 2023 through 2026.** However, they are slightly closer to aligning with the decarbonization scenarios than the market benchmark. The companies associated with insurers listed equities plan to increase gas power capacity by too large of a margin to align with any of the stated scenarios, at least until 2024.

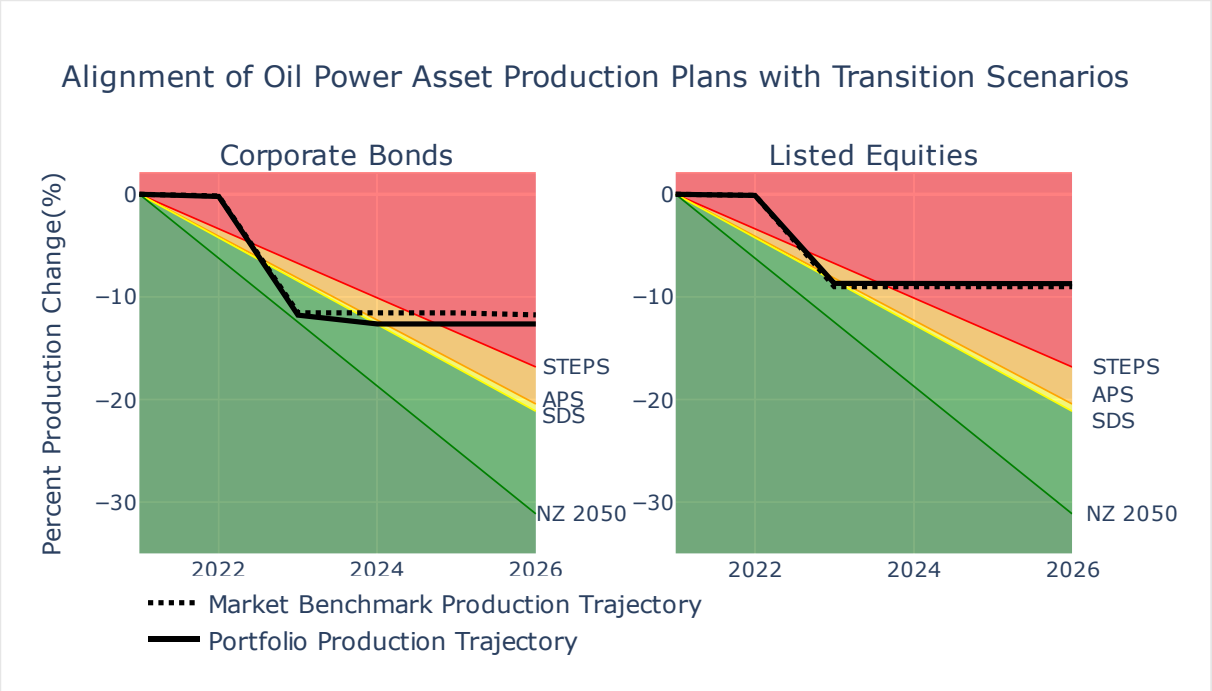


Figure 10. Alignment of the planned oil power installed capacity attributable to the aggregate portfolio for each asset class (solid black line), with the production amount allowable in each scenario from the International Energy Agency World Energy Outlook (shaded areas; green shaded areas align with more climate action, red shaded areas align with no additional climate action). The market benchmark portfolio is shown with a dashed black line.

In order to align with a net zero by 2050 scenario, oil-based power capacity companies would need to cut installed capacity by 30% by 2026. Even current policies in place imply at least a 15% reduction in oil-based power by 2026. The companies associated with insurer's corporate bond portfolio plan to decrease oil-based power capacity by 10% by 2023, bringing them into alignment with the sustainable development scenario for a brief period, but are not projected to decrease production further in the following years, which brings them back out of alignment by 2025. This pattern is also evident in insurer's listed equities. Recall, however, that oil power capacity represents a relatively small share of insurers portfolio-associated production, across lines of business

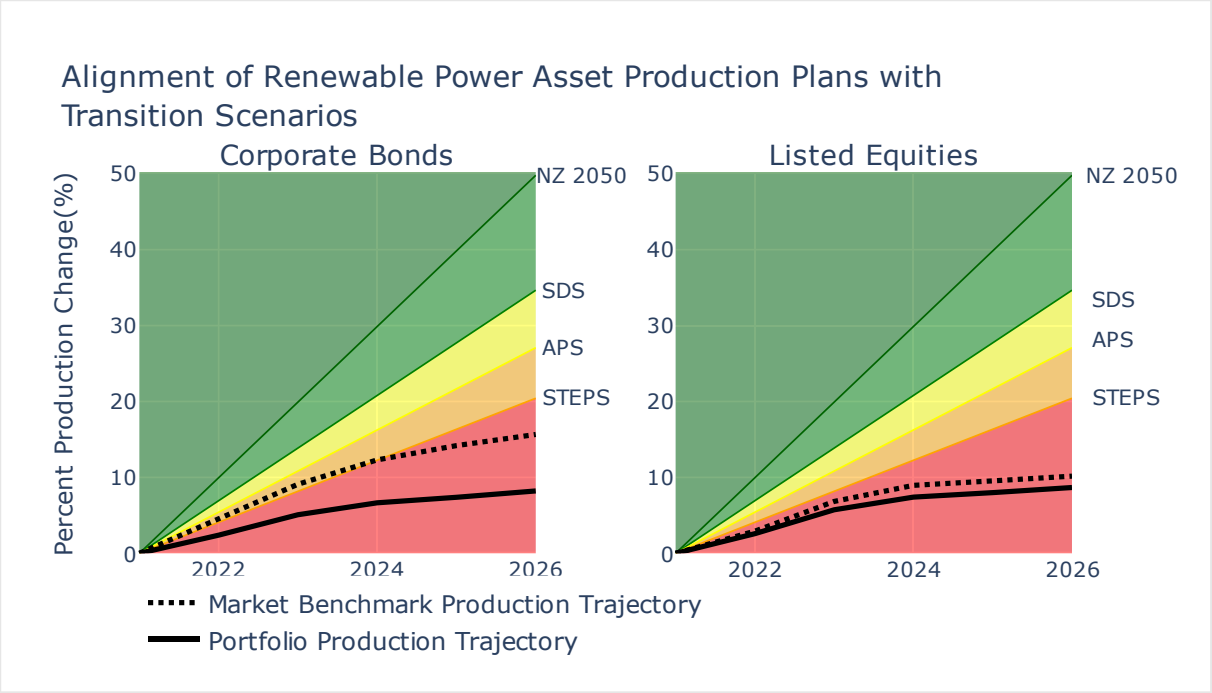


Figure 11. Alignment of the planned renewable power capacity attributable to the aggregate portfolio for each asset class (solid black line), with the production amount allowable in each scenario from the International Energy Agency World Energy Outlook (shaded areas; green shaded areas align with more climate action, red shaded areas align with no additional climate action). The market benchmark portfolio is shown with a dashed black line.

Aligning with a net-zero by 2050 scenario would require companies to implement an ambitious increase in renewable power installed capacity by 50% by 2026. The companies that insurers have partial ownership of, through their corporate bonds and listed equities, do not have plans that keep pace with this ramp-up in renewables. These companies only plan to increase renewable installed capacity by around 8% by 2026 for both corporate bonds and listed equities.

The companies associated with insurers' corporate bond portfolio plan to decrease nuclear power installed capacity until 2026, despite the fact that any scenario for decarbonization relies on maintaining or slightly increasing nuclear capacity as a transition power source. The companies associated with insurer's listed equity portfolios plan to marginally increase nuclear power capacity until 2023 but then plateau production through 2026.

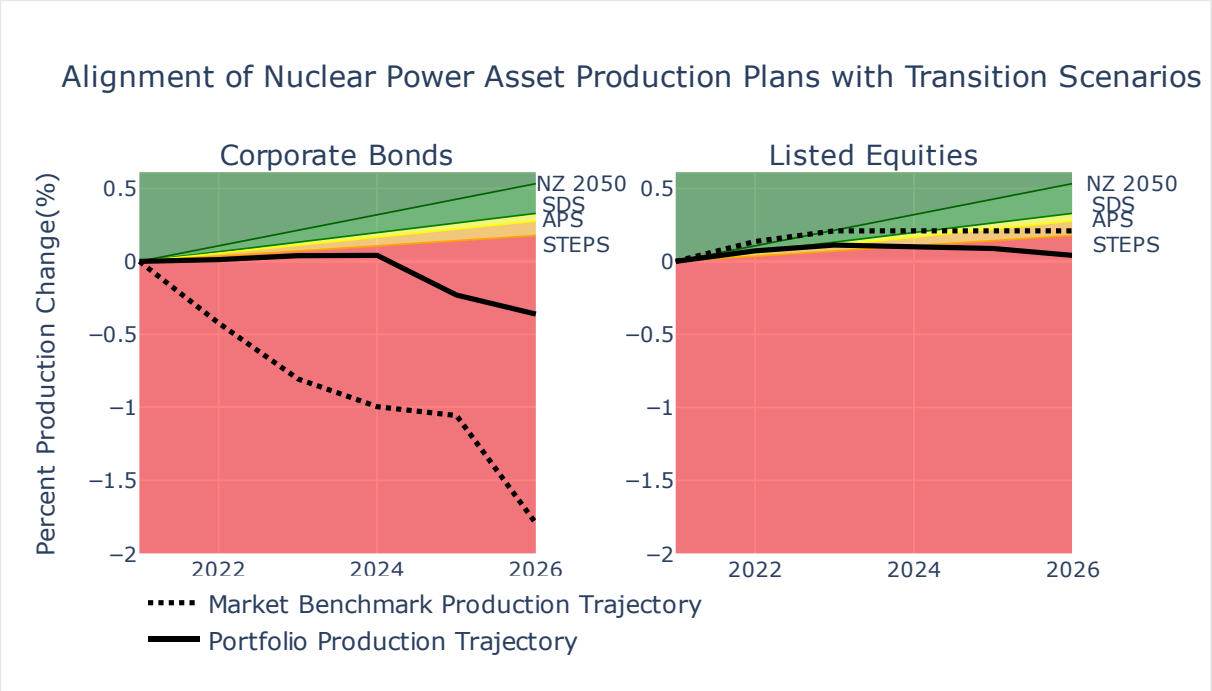


Figure 12. Alignment of the planned nuclear power capacity attributable to the aggregate portfolio for each asset class (solid black line), with the production amount allowable in each scenario from the International Energy Agency World Energy Outlook (shaded areas; green shaded areas align with more climate action, red shaded areas align with no additional climate action). The market benchmark portfolio is shown with a dashed black line.

Automotive

The electric car market is undergoing remarkable growth driven by factors like heightened consumer interest, supportive government policies, industry commitment, and improved vehicle performance.[45] In 2022, over 26 million electric cars were on the roads, marking a 60% increase from the previous year and a five-fold surge from 2018.[46] Projections by the International Energy Agency (IEA) suggest that nearly one in five new car sales in 2023 will be electric, with California leading the way, as one in every four new cars sold in the last quarter were zero-emission vehicles, surpassing its electric vehicle sales target two years ahead of schedule.[46]

Government Policies Fueling EV Demand

Numerous states and nations have set policies to phase out internal combustion engine car sales. In the United States, the Infrastructure Investment and Jobs Act, signed into law in November 2021[47], allocated $7.5 billion for a nationwide charging network, focusing initially on a network of 500,000 fast chargers along highways by 2030.[48] It also invested significantly in upgrading the power grid, expanding domestic

[45] See U.S. Bureau of Labor Statistics Beyond the Numbers (2023) Charging into the future: the transition to electric vehicles.

[46] See IEA Global EV Outlook 2023 Trends in electric light-duty vehicles.

[47] See The White House Fact Sheet (2021) The Bipartisan Infrastructure Deal Boosts Clean Energy Jobs, Strengthens Resilience, and Advances Environmental Justice

[48] See NPR Federal money is now headed to states for building up fast EV chargers on highways. September 27, 2022.

battery production, and incentivizing EV adoption through tax credits.[49] State-level policies provide incentives, including rebates and zero-emission vehicle (ZEV) programs requiring auto manufacturers to meet quotas for battery-electric or plug-in hybrid-electric vehicles.[50] California has an aggressive roadmap aiming for 100% ZEV sales by 2035 and Washington state law requires all new cars registered in the state to be electric by 2030.[51] Oregon aims to reach 90% ZEV sales by 2035.

Transitioning Away from Internal Combustion Engines
All major climate scenarios aiming to limit global warming below 2°C foresee the phasing out and eventual elimination of internal combustion engine (ICE) cars. Battery-electric vehicles are expected to replace ICE cars, with sales increasing from the current 5% to nearly 100% by 2050 or even earlier, as the ICE vehicle stock is gradually phased out. Notably, gas-hybrid vehicles are now categorized under ICE in IEA and JRC scenarios, while plug-in hybrid technology forms a separate hybrid category.

In addition, to their Net Zero Emissions by 2050 Scenario, two scenarios from the IEA, Stated Policies and Announced Pledges, can inform current outlooks. These scenarios are rooted in announced policies, aspirations, and market trends up to the first quarter of 2023. The Stated Policies Scenario (STEPS) reflects existing policies and measures, alongside objectives legislated by governments worldwide. The Announced Pledges Scenario (APS), built on government targets exceeding existing policies, projects a global EV fleet of nearly 250 million by 2030, only about 5% higher than the STEPS scenario.[17] This momentum in EV adoption suggests that targets are increasingly within reach. Projected sales of EVs based on stated policies and market trends are aligning more closely with countries' ambitions, reducing the policy implementation gap compared to previous years.[46]

Reducing Oil Dependency
The growing EV fleet is poised to significantly reduce oil consumption, which presently accounts for over 90% of total final consumption in the transport sector. Globally, the projected EV fleet in 2030 is expected to displace over 5 million barrels per day (mb/d) of diesel and gasoline in the STEPS and nearly 6 mb/d in the APS. This represents a substantial reduction from the 0.7 mb/d displaced in 2022, highlighting the potential for decreasing oil dependency through EV adoption.[53]

Electricity Demand and Grid Decarbonization
The global EV fleet consumed approximately 110 TWh of electricity in 2022, equivalent to the Netherlands' current total electricity demand.[53] Although EV electricity consumption is relatively low, careful planning of electricity infrastructure, peak load management, and smart charging is essential as the EV fleet size grows and power sector decarbonization expands.

Portfolio Contents

The automotive sector comprised a very small portion of insurers' corporate bond value (~2%) and under 17% of insurers' listed equity portfolio value. Within corporate bond portfolios, all insurance company peer groups have a similar share of their investments in PACTA sectors in the automotive

[49] See Department of Energy Press Release (2022) Biden Administration Announces $3.16 Billion from Bipartisan Infrastructure Law to Boost Domestic Battery Manufacturing and Supply Chains.
[50] See Center for Climate and Energy Solutions (C2ES) U.S. State Clean Vehicle Policies and Incentives.
[51] See California Air Resources Board Press Release (2022) California moves to accelerate to 100% new zero-emission vehicle sales by 2035.

sector. In listed equities, there is more variation with P&C insurers having the largest share of their climate-relevant investments contributed by the auto sector.

Exposure

The PACTA analysis presents exposure to specific technologies in a sector as a share of the total climate-related production attributable to the portfolio. The use of production values in high and low carbon technologies reflects how the portfolio is exposed to the real economy across high and low carbon technology. This is in contrast to looking at financed emissions which change based on the financial valuation of the asset without any change in the real economy. The meaning of "production" in this analysis is specific to the sector. In the case of the automotive sector, production refers to auto manufacturing.

All peer groups of insurers have less than 0.3% of their corporate bond portfolio-associated production within the light-duty automotive sector. The benchmark portfolio has around 0.5% of its production attributable to the light-duty automotive sector. The vast majority of these corporate bond automotive investments are in ICE vehicles, with electric and hybrid vehicles representing under 0.02% of portfolio-associated production in all cases.

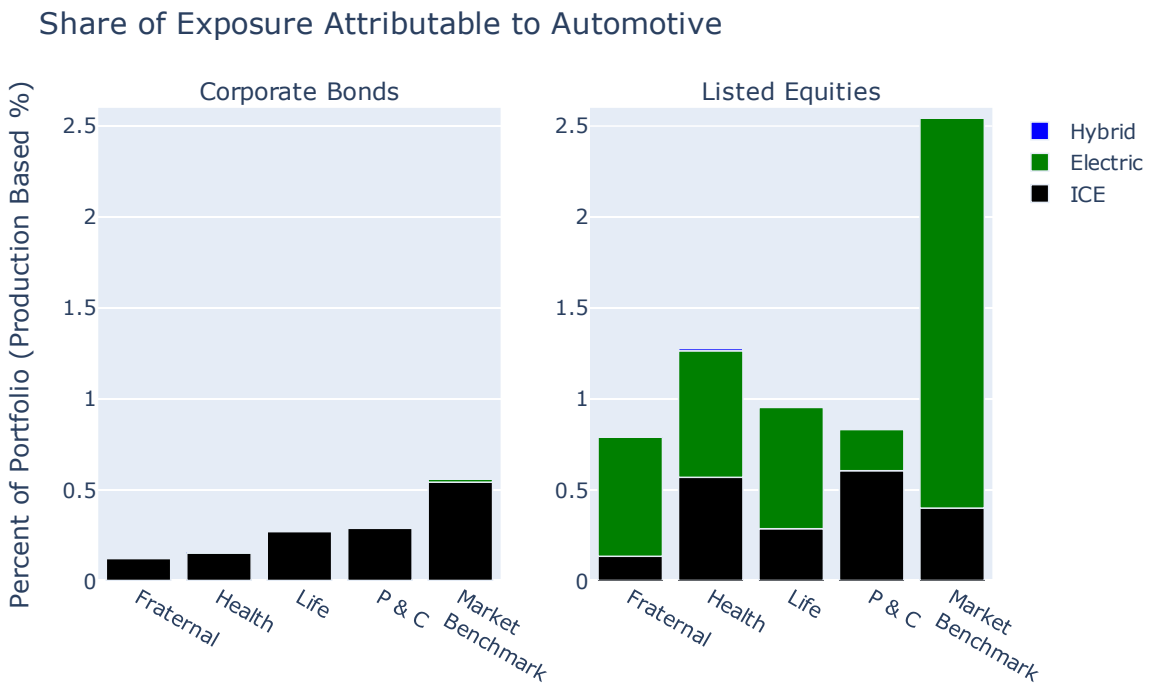


Figure 13. PACTA results. Share of total portfolio-associated production (within asset classes of corporate bonds and listed equities) that can be attributed to each technology within the automotive sector.

Within listed equity holdings of insurance companies, the share of portfolio-associated production invested in the light-duty automotive sector is higher (~1%), and the share invested in electric and hybrid vehicles is much more substantial. **The aggregate listed equity portfolios for Life, Health, and Fraternal insurers are associated with more electric vehicles (>0.6% of portfolio-associated production) than in ICE vehicles (0.13 to 0.57% of portfolio-associated production).** However, these insurer peer groups hold only a small share of their total portfolio value as listed equity to begin with.

P&C insurers, who hold a relatively even mix of listed equity and corporate bonds, lag behind in this transition with more of their portfolio value in ICE vehicles than in electric vehicles. This differentiates them from the benchmark portfolio which has much more exposure to the auto sector overall and is primarily invested in electric vehicles.

Alignment

The forward-looking plans of light-duty vehicle production companies partially owned by insurers through their corporate bonds and listed equities are not aligned with a net zero by 2050 scenario. In order to align with a net zero by 2050 scenario, light-duty vehicle manufacturing companies would plan to phase down ICE vehicle production by over 25% by 2026 and phase up plug-in hybrid vehicle and electric vehicle production by over 3% and around 30%, respectively. Instead, the companies associated with insurer's corporate bonds and equities plan to increase ICE vehicle production by 20% in 2022 and only slightly decline production after 2023. They plan for only a small increase (<10%) in electric vehicle production. This contrasts with the market benchmark for listed equities, which projects a more than 40% increase in electric vehicle production by 2026, which is more ambitious than the net zero by 2050 scenario. They also plan for almost no change in plug-in hybrid vehicle manufacturing but this represents such a small portion of the portfolio that the figures are not shown in this report. **This result indicates that the companies that insurers are invested in through their listed equities are significantly behind the curve when it comes to electric vehicle production.**

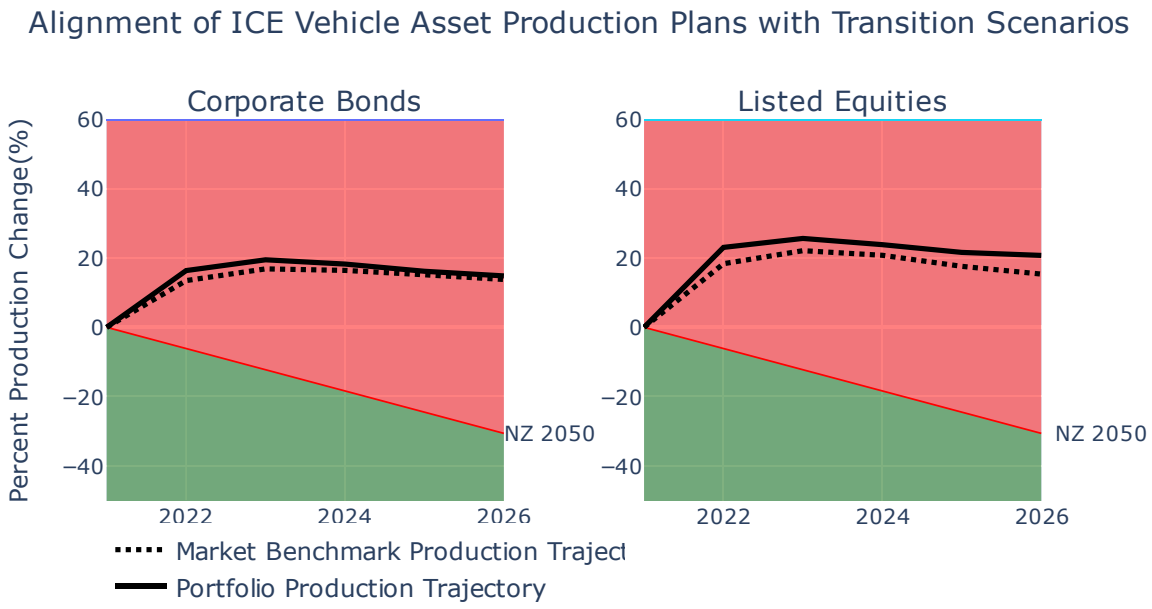


Figure 14. Alignment of the planned Internal Combustion Engine (ICE) vehicle production attributable to the aggregate portfolio for each asset class (solid black line), with the production amount allowable in each scenario from the International Energy Agency World Energy Outlook (shaded areas; green shaded areas align with more climate action, red shaded areas align with no additional climate action). The market benchmark portfolio is shown with a dashed black line.

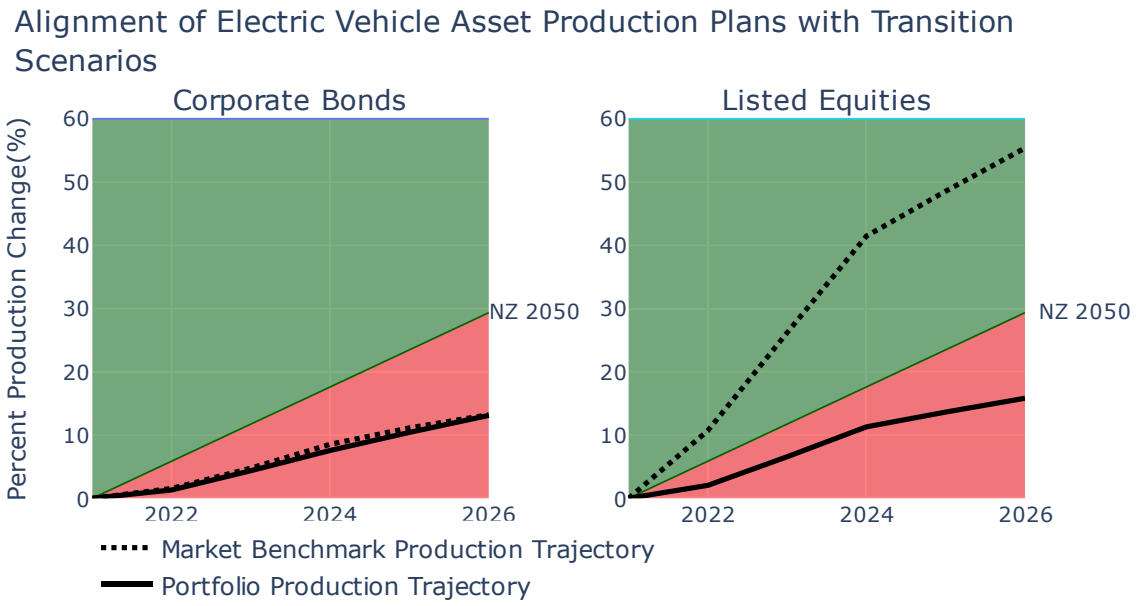


Figure 15. Alignment of the planned electric vehicle (EV) production attributable to the aggregate portfolio for each asset class (solid black line), with the production amount allowable in each scenario from the International Energy Agency World Energy Outlook (shaded areas; green shaded areas align with more climate action, red shaded areas align with no additional climate action). The market benchmark portfolio is shown with a dashed black line.

Oil & Gas Extraction and Coal Mining

According to the U. S. EPA, fossil fuel combustion accounted for 73% of total U.S. greenhouse gas emissions and 92% of U.S. anthropogenic CO2 emissions in 2021. Recent analysis of insurers in the California market indicates that both P&C and life insurers are still heavily invested in fossil fuels. In 2019, the sector invested $536 billion in fossil fuels with the top 16 U.S. insurers owning 50% of these assets.[52] Of these investments, according to the Ceres report, life insurance companies had 3.02% and 0.09% assets under management (AUM) invested in oil & gas and coal, respectively, while P&C companies had 2.7% and 0.18%, respectively. Note that the PACTA results are presented as a fraction of the analyzed (corporate bond or listed equity) value invested in climate-relevant sectors while the Ceres results were presented in relation to total assets under management (AUM).

Oil & Gas Extraction

Various points of the oil and gas extraction process contribute to the high carbon emissions in this sector. Upstream processes, which are the focus of PACTA, are the most carbon intensive, especially for complex reservoirs, for example those that are viscous, in deep or ultra-deep water, compartmentalized, or require high pressure and temperature.[53] Other factors that contribute to high emissions in this sector include the size and age of the facility. These pieces of the process would contribute to the Scope 1 and 2 direct and operational emissions of oil & gas extraction companies. The PACTA methodology

[52] See Ceres, ERM, & Persefoni (2023) The Changing Climate for the Insurance Industry.
[53] See McKinsey & Company (2019) Toward a net-zero future: Decarbonizing upstream oil and gas operations.

focuses on the demand side of the oil & gas extraction sector, which would fall under Scope 3 emissions, as proxied by production values.

Regarding oil demand, road transport now accounts for roughly 45% of global oil demand, far more than any other sector, and the remarkable growth in electric vehicle sales is now impacting demand for oil in road transport.[17] Sales of gasoline and diesel cars have already seen their peak in 2017, and sales of EVs have increase from 4% of global car sales to 18% in 2023, indicating that the largest source of oil demand may decline in the near future.[17] The 2023 WEO projects that under current policies, road transport will no longer be a source of oil demand growth by the end of this decade.

Oil demand for petrochemicals, aviation and shipping continues to increase through to 2050 under current policies, but not enough to offset the reduced demand from the road transportation sector, leading to a peak and plateau in oil demand before 2030.[17]

The power and building sectors are today's biggest consumer of natural gas, but these sectors have already seen the peak in natural gas capacity additions for power plants and space heating boilers, reducing demand sufficiently that the WEO 2023 projects a peak in gas demand before 2030. While capacity additions are projected to slow, and natural gas demand in the power sector is projected to decline, global installed capacity of natural gas power is still projected to slowly expand over time. While there was a rebound in natural gas demand in 2021 instigated by the global energy crisis, demand in 2022 was below pre-pandemic levels.[17]

Coal Mining

The 2023 WEO report projects that under current policies, coal demand is set to fall within the next few years, reflecting declines in capacity additions of coal-fired power plants and coal-fired iron and steel production. For developed nations, coal demand already peaked in 2007. China, the world's largest coal consumer, is headed for a peak in coal use by the mid-2020s under current policies according to the WEO. Coal fired power capacity additions peaked at 45% in 2006 and have since declined to only 11% of new capacity additions in 2022.[17]

Methane Emissions from Operations

Methane is responsible for approximately 30% of the rise in global temperatures since the Industrial Revolution, and the energy sector (including oil, natural gas, coal, and bioenergy) is a critical contributor to this – accounting for nearly 40% of the methane emissions from human activity.[54] However, there is enormous opportunity for slashing these emissions. Around 70% of the methane emissions from fossil fuel operations could be reduced with existing technologies including leak detection and repair as well as upgrades to leaky equipment. Methane emissions from coal mines could be reduced through recovery and utilization, and by flaring or oxidation technologies. The IEA estimates that between 40 and 80% of methane emission from oil and gas operations could be avoided at no net cost currently because the outlays for the abatement measures are less than the market value of the additional gas that is captured.[54] The IEA also states that that stopping all non-emergency flaring and venting is the single most impactful measure that countries can take to reduce methane emissions from oil and gas

[54] See IEA Global Methane Tracker 2023

operations, as current flaring practices are leading to incomplete combustion resulting in emissions. In scenarios that limit warming to 1.5°C, methane emissions would need to fall by 30% to 60% by 2030.[54]

State and Federal Emissions Reduction Targets

The U.S. has set targets for reducing greenhouse gas emissions by 50-52% below 2005 levels by 2030 and achieving a net-zero emissions economy by 2050. California has set a more ambitious goal of 2045 for achieving carbon neutrality in the state. Both Oregon and Washington are members of the Regional Net-Zero Northwest that outlines their paths to net-zero carbon emissions by 2050. The United States is one of around 150 countries that are part of the Global Methane Pledge, which aims to reduce methane emissions from human activity by 30% from 2020 levels by 2030.[55] At COP 28 in 2023, the Biden Administration announced finalized standards to sharply reduce methane and other pollutants from the oil and natural gas industry.[56]

Recent events may not be reflected in this analysis

This PACTA analysis uses the IEA WEO scenarios and portfolio data from the year 2021. Since that time, the energy sector has seen large shifts associated with the global energy crisis initiated, in part, by the Russia-Ukraine conflict and the aftermath of the COVID-19 pandemic. These changes are not reflected in the scenarios or data used in this analysis. However, future iterations may capture such major changes in economic and policy environments.

Portfolio Contents

Fossil fuels (oil, gas, and coal extraction) are the primary source of exposure to PACTA sectors within insurers' corporate bond portfolios and either the primary or secondary source of exposure (depending on the line of business) within equity portfolios.

Exposure

The PACTA analysis presents exposure to specific technologies in a sector as a share of the total climate-related production attributable to the portfolio. The use of production values in high and low carbon technologies reflects how the portfolio is exposed to the real economy across high and low carbon technology. This is in contrast to looking at financed emissions which change based on the financial valuation of the asset without any change in the real economy. The meaning of "production" in this analysis is specific to the sector. In the case of the fossil fuel sector, production refers to upstream production for oil & gas and mining for coal.

Investments in fossil fuel extraction (coal, gas, and oil) represent between 2 and 5% of insurers' aggregate corporate bond portfolio-associated production and 1-2% of insurers' aggregate listed equity portfolio. This is similar to a recent PACTA analysis of Swiss financial institutions, in which around 3% of corporate bonds and 1% of listed equity portfolios were exposed to fossil fuels. Life insurers are the peer group with the highest share of their corporate bond portfolio-associated production related to oil and gas (nearly 4.5%), which is notable given that corporate bonds represent 90% of their investments. P&C insurers, which have around 40% of their portfolio invested in corporate bonds, have a greater share of their portfolio-associated production related to oil and gas extraction than the market benchmark, but a

[55] See U.S. Dept. of State: Global Methane Pledge: From Moment to Momentum

[56] See U.S. EPA Press Release; Biden-Harris Administration Finalizes Standards to Slash Methane Pollution, Combat Climate Change, Protect Health, and Bolster American Innovation

smaller share invested in coal mining than the market benchmark. However, for listed equities which make up nearly 60% of their portfolio, P&C insurers have the smallest share of their portfolio-associated production related to oil & gas and virtually none in coal mining. Health insurers, who hold mostly corporate bonds but also a significant share of listed equities, show contradicting trends in each as they hold the smallest share (compared to other lines) of their corporate bonds portfolio exposed to oil and gas extraction but the greatest share of their listed equities in these sectors.

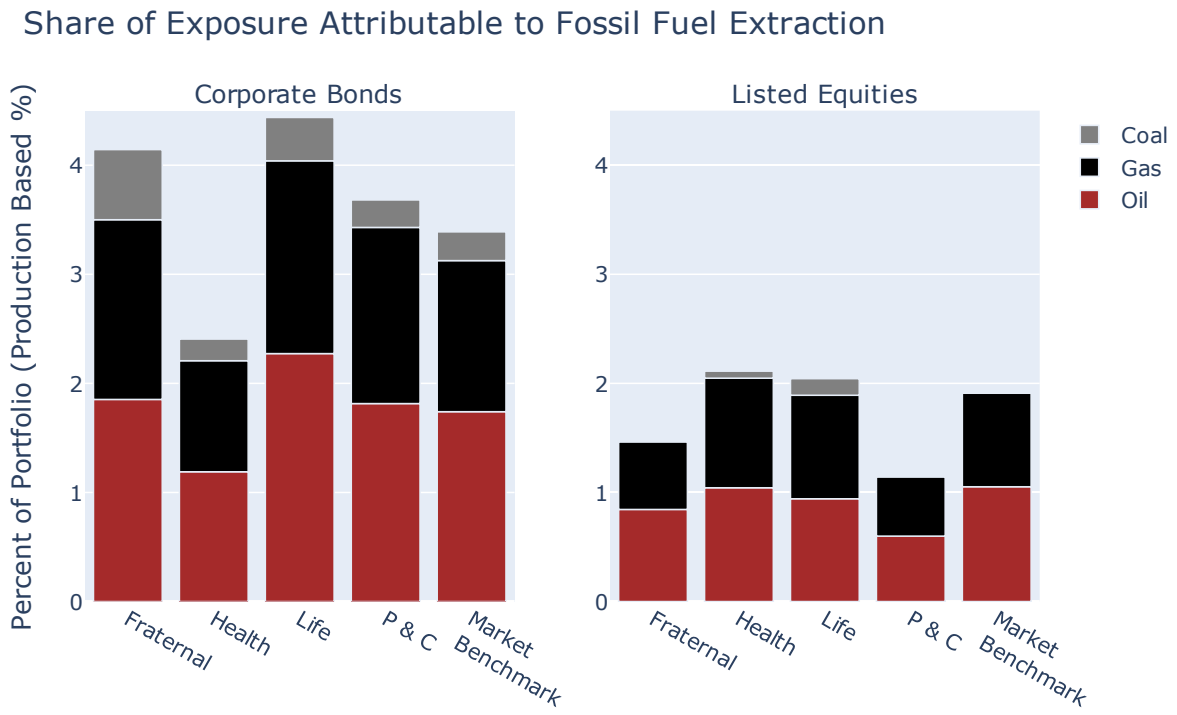


Figure 16. PACTA results. Share of total portfolio-associated production (within asset classes of corporate bonds and listed equities) that can be attributed to each technology within the fossil fuel sector.

Within listed equity, P&C and fraternal insurers, similar to the market benchmark, have almost none of their equity portfolio exposed to coal. However, Life and Health insurers do have some exposure to coal extraction within their listed equity holdings. For both asset types and all peer groups, the contribution of oil & gas extraction to the portfolio production is comprised of an almost even share contributed from oil and from gas.

No aggregate insurer group (Life, P&C, Health, Fraternal) has more than 4.5% of their corporate bond portfolio and 2.5% of their listed equity portfolio-associated production from fossil fuels. However, some individual insurers have up to 95% and 30% exposure in their corporate bond and listed equity portfolios, respectively.

Considering that fossil fuels will have to be significantly phased out in the medium term to reach climate goals, having high exposure to their production in a fixed-income portfolio may pose additional risks from the potential devaluation of assets under climate scenarios that predict peak demand before 2030 and a decline in demand in key market segments, such as the automotive sector.

Alignment

The forward-looking plans of oil, gas, and coal extraction company assets held by insurers are misaligned even with the least ambitious climate scenario, across lines of business. The most ambitious net zero by 2050 (NZE 2050) scenario would require declines in coal, gas, and oil production each year between now and 2026 (and beyond). The least ambitious scenario, representing the existing climate policies that are currently stated (STEPS), imply a slight reduction in coal but still increases in gas and oil (around 5% by 2026). However, between 2021 and 2026 the companies in which insurers have ownership through their corporate bond portfolios plan to significantly increase production of oil, by over 10%, and coal, by over 30%.

The forward-looking plans of gas extraction company assets held by insurers are misaligned in the near-term with scenarios where climate change is mitigated, but become aligned with a sustainable development scenario in 2025 because of a decline in gas extraction. These companies planned to increase gas production by 3% through 2022 prior to a plateau of production through 2023, a decline through 2025 and a stabilization thereafter.

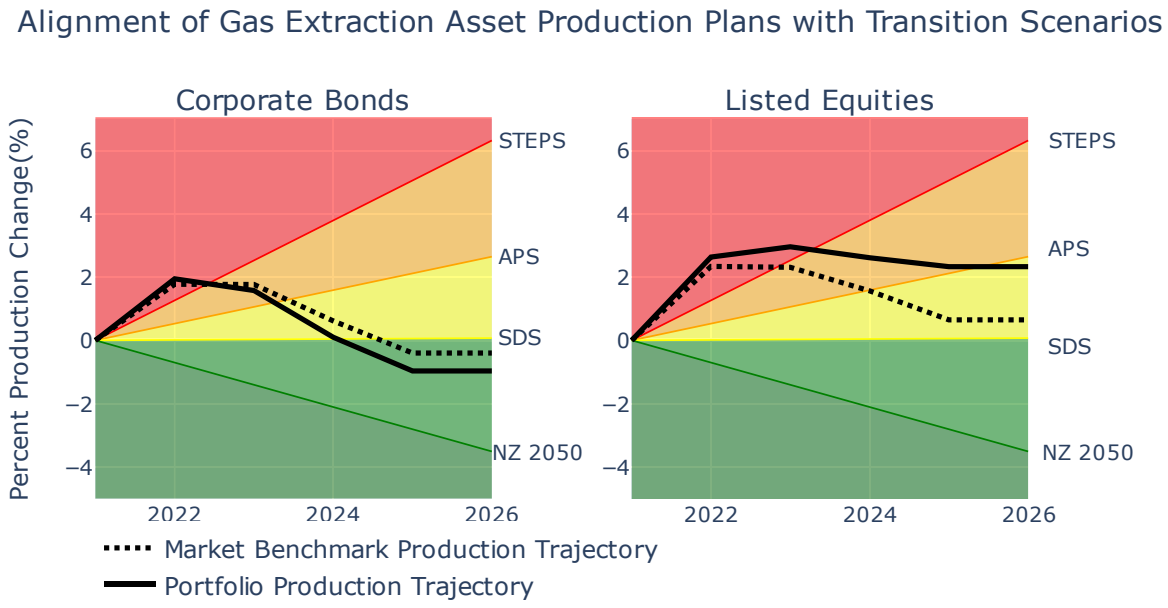


Figure 17. Alignment of the planned gas extraction attributable to the aggregate portfolio for each asset class (solid black line), with the production amount allowable in each scenario from the International Energy Agency World Energy Outlook (shaded areas; green shaded areas align with more climate action, red shaded areas align with no additional climate action). The market benchmark portfolio is shown with a dashed black line.

The companies which insurers have ownership in through their listed equities also plan to increase oil production by almost 20% between 2021 and 2026. The associated coal companies plan to increase production of coal through 2024 before beginning a slight decline leading into 2026, directly aligned with the market benchmark. **The gas companies in which insurers have ownership share through their listed equities plan to increase production through 2022 with plateau through 2026. Eventually this**

aligns with an APS scenario, a scenario in which current country-level climate commitments are met but the Paris goal of keeping global warming below 2-degrees Celsius is not.

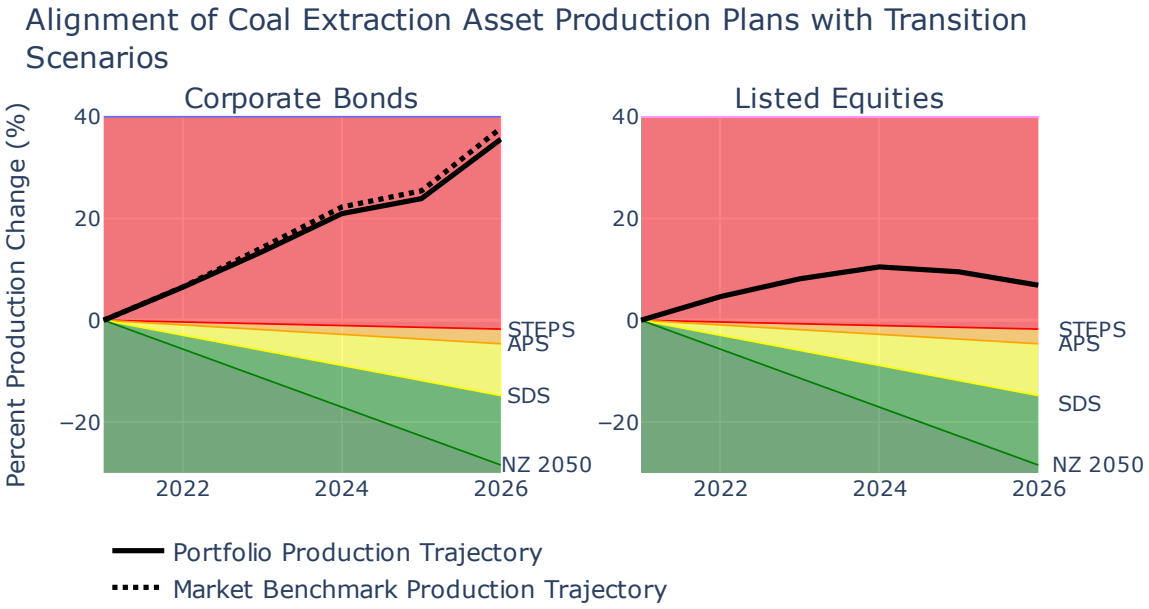


Figure 18. Alignment of the planned coal extraction attributable to the aggregate portfolio for each asset class (solid black line), with the production amount allowable in each scenario from the International Energy Agency World Energy Outlook (shaded areas; green shaded areas align with more climate action, red shaded areas align with no additional climate action). The market benchmark portfolio is shown with a dashed black line.

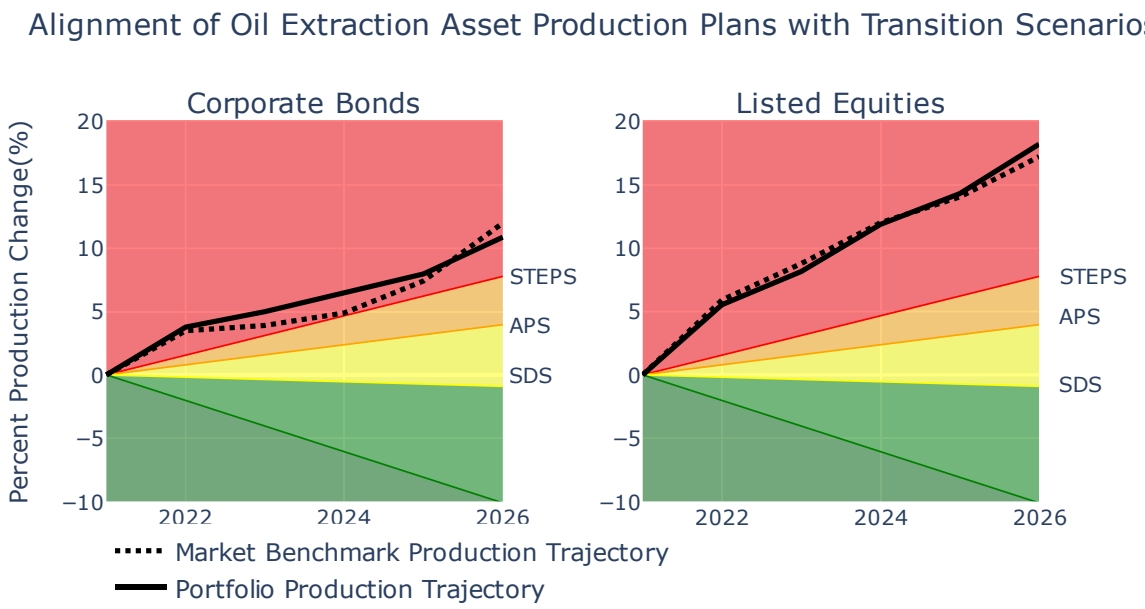


Figure 19. Alignment of the planned oil extraction attributable to the aggregate portfolio for each asset class (solid black line), with the production amount allowable in each scenario from the International Energy Agency World Energy Outlook (shaded areas; green shaded areas align with more climate action, red shaded areas align with no additional climate action). The market benchmark portfolio is shown with a dashed black line.

Steel

The steel sector accounts for roughly 4% of global CO_2 emissions. Steel is commonly produced in the United States using Basic Oxygen Furnaces that produce steel from iron ore with coal coke used as a reductant relying on combustible fuel energy, or via Electric Arc Furnaces that use an electrified process to produce steel from raw input materials of steel scrap or direct reduced iron. In 2018, 33% of crude steel was produced in the U.S. using a basic oxygen furnace, and 67% was produced using an electric arc furnace.[57]

Steel is considered a hard-to-abate sector. Although Electric Arc Furnace technology is considered the key to decarbonization of the steel sector, there are challenges with moving to 100% scrap-based steel making, including challenges with producing quality grades (flat and long steel products) and limits to prime scrap supply. There is also significant existing steel capacity (~20% more than demand) and a limited market for more expensive but less GHG intense materials. Despite this, U.S. steel emissions intensity has dropped by 17% since 2014, due to increased production from Electric Arc Furnaces, energy efficiency increases, and decarbonization of the electricity sector. More than 2/3 of the total GHG emissions reductions needed to get to net-zero in 2050 comes from improvements in energy efficiency and switching to low/no-carbon fuels and electrification.

Steel produced using an Electric Arc Furnace is associated with lower average carbon emissions than Basic Oxygen Furnaces regardless of the source material or power source. However, it is associated with

[57] See Oak Ridge National Laboratory DOE. Potential Decarbonization Strategies and Challenges for the U.S. Iron & Steel Industry.

significantly lower emissions when using steel scrap (842 kg-Co2/ton hot metal), as compared to when using direct reduced iron with coal or with gas power (1952 and 1395 kg-CO2/ton of hot metal, respectively).[58] Fortunately, roughly 70% of U.S. steel is produced from recycled scrap steel, making the U.S. steel industry one of the cleanest globally.

Under a business-as-usual scenario, steel is projected to grow by 30% by 2050 and according to the World Energy Outlook 2021, and the iron and steel sectors are one of the largest contributors to the ambition gap between the Announced Policies Scenario (APS) and the Net Zero Scenario (NZE).

Portfolio Contents

Steel accounts for 1.7%, 2.3%, 1.2%. and 2.2% of P&C, Life, Health, and Fraternal insurers' analyzed corporate bond investment portfolio value, respectively. However, the share of the portfolios supporting steel production is much greater for listed equities. For this asset class over 20% of the P&C portfolio value is supporting steel production. Life, Health, and Fraternal insurers' aggregate portfolios have 7.3%, 4.5%, and 1.8% exposure to steel production through listed equities, respectively

Exposure

The PACTA analysis presents exposure to specific technologies in a sector as a share of the total climate-related production attributable to the portfolio. The use of production values in high and low carbon technologies reflects how the portfolio is exposed to the real economy across high and low carbon technology. This is in contrast to looking at financed emissions which change based on the financial valuation of the asset without any change in the real economy. The meaning of "production" in this analysis is specific to the sector. In the case of the steel sector, production refers to steel manufacturing.

[58] See Fan, Zhiyuan, and S. Julio Friedmann. "Low-carbon production of iron and steel: Technology options, economic assessment, and policy." Joule (2021).

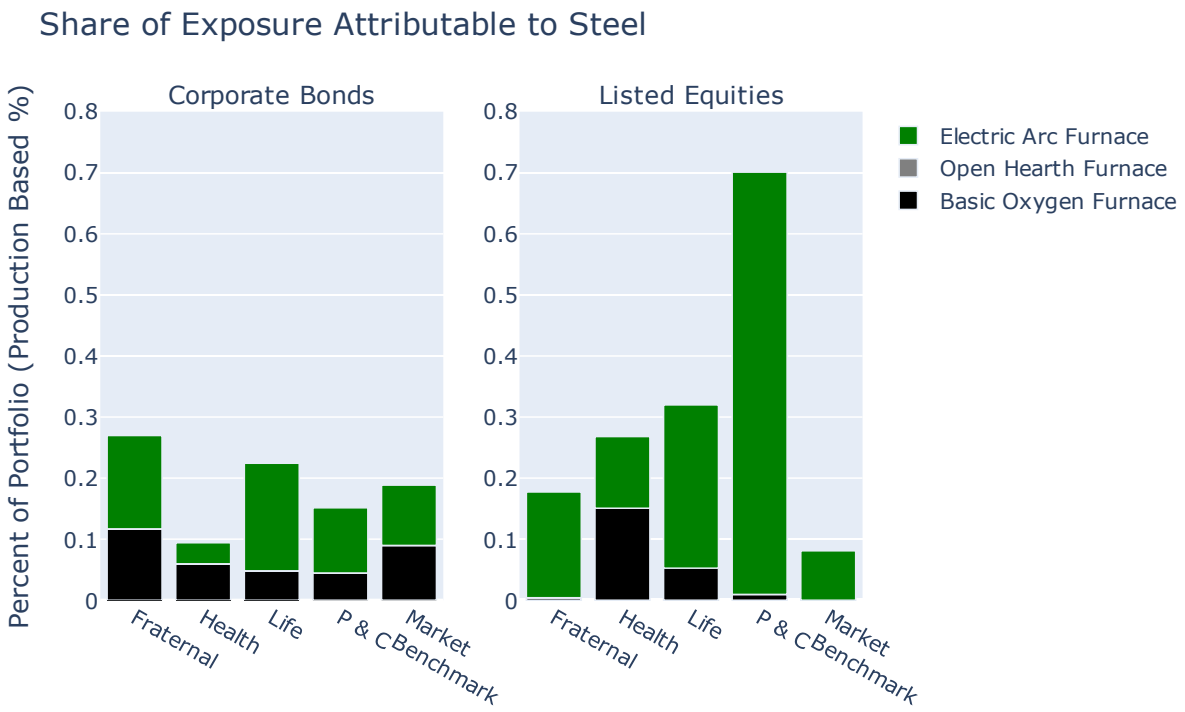


Figure 20. PACTA results. Share of total portfolio-associated production (within asset classes of corporate bonds and listed equities) that can be attributed to each technology within the steel sector.

Exposure of corporate bonds to the steel sector is less than 0.3% of portfolio-associated production for all insurer peer groups and is as low as 0.1% for health insurers' aggregate portfolio. Life and Fraternal insurers are still more exposed to the steel sector than the market benchmark (0.3%) for corporate bonds.

P&C insurers' aggregate listed equity portfolio is highly exposed (>0.7%) to the steel sector compared to the market benchmark and compared to the other insurer peer groups**. That being said, for all insurer peer groups and for the market comparisons, steel production is dominated by electric arc furnace technology which is the key technology for decarbonizing the steel sector as it draws upon secondary scrap steel and is considerably less energy-intensive than other common technologies. Almost all of the P&C insurer portfolio's investments in steel are using electric arc furnace technology.** A recent PACTA analysis of Swiss financial institutions also found that Swiss insurance companies' investments in steel were primarily in companies using electric arc furnaces while other types of institutions (pension funds, asset managers and banks) had steel-sector investments primarily in companies using (less efficient) basic oxygen furnaces. This highlights how coordinated state national action to reduce the greenhouse gas intensity of entire sectors can significantly impact the profile of institutional investors' portfolios.

1-in-1000 TRISK Climate Stress Test Results

The 1-in-1000 Climate Stress test results estimate the additional costs to the financial sector when climate action by companies is delayed. It does this by estimating the impacts to an investment portfolio's profitability, as measured in probability of default, expected losses, and value loss, that

would arise if the companies associated with the portfolio assets were forced in a specific “shock” year to quickly transition their production from a baseline business-as-usual pathway to a sustainable target pathway. The baseline and target scenarios are predetermined, and the shock year can be varied to estimate the costs that arise from delaying the transition.

The 1-in-1000 TRISK Stress Test Model uses the implied production pathways for each sector from two scenarios from each scenario provider, a baseline and a target scenario. Baseline refers here to a current policies scenario, where no ambitious climate action is taken, which in turn results in a large increase in global mean temperature at the end of the century. A target scenario implies that sustainable and immediate actions are taken to ensure the limitation of global warming to below 2°C. Baseline and target scenario pathways are then applied on each company that is associated with the portfolio to create a trajectory of asset-based production estimates, which in turn gives the basis for the financial risk estimates.

Baseline: The baseline scenario is constructed for each firm in a way that reflects the firm’s production plans. Firms are expected to follow their planned production across technologies and sectors over the period (2021 through 2026). After that, the firm follows the respective production change prescribed in a business-as-usual scenario (current policies scenario) for the remainder of the stress testing horizon (2026 through 2040). The current policies scenario reflects a baseline picture of how the global economy would evolve if governments and firms made no changes to their existing policies and announced forward-looking plans. Further, the firm will be faced with scenario-consistent technology production unit cost developments and carbon tax trajectories from the ’no transition’ scenario by the (NGFS, 2020). The resulting scenario reflects a narrative of firms producing according to their strategic plans, irrespective and with no foresight to the materialization of transition risks other than already reflected in their firms’ production plans.

Target: In order to construct a target scenario, we define a scenario that is aligned with future climate targets. This scenario prescribes the requisite production changes across sectors and technologies that are needed to transform the economy, comply with carbon budgets and achieve a Paris-aligned climate target of below 2° Celsius of warming.

Stress: In addition to baseline and target scenarios, a third **“late and sudden” shock transition scenario** is endogenously created. The shock transition scenario follows the baseline until the “Shock Year” which is the year when the stress event (rapid disorderly transition) is introduced. At this point, the shock transition scenario diverges from the baseline and shifts to align with the production in the target scenario, to comply with the climate targets and the carbon budgets set out in the target scenario while compensating for previous misalignment. In addition, there is an option to introduce a carbon tax shock which imposes additional production costs in the shock scenario for high carbon-emitting firms.

The production pathways that emerge from the baseline and late and sudden scenarios serve as the foundation for projecting cash flows. These projected cash flows can then be discounted to calculate the company's net present value for both situations. The model captures changes in profit margins due to comparative advantages of individual firms and incorporates the cost-savings present in transitioning to a green business model resulting from advancements in technological innovation. This reflects increased

profits for firms due to declining costs, for example -- decreased costs of electricity in low-carbon technologies for the energy sector.

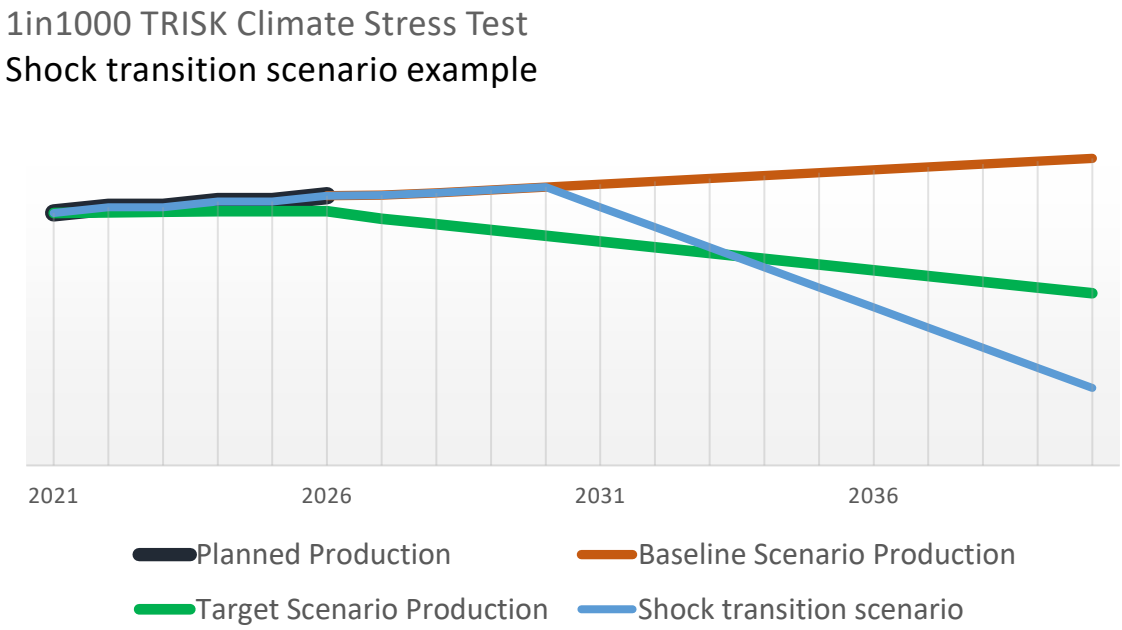


Figure 21. Schematic of the planned production, baseline production, target, and stress scenarios as used in the 1in1000 TRISK Climate Stress Test. In this representation, the shock year occurs in 2029.

The model features a limited representation of the firms' balance sheet, revenue, and cost structure. It assumes that the revenue of a firm is solely dependent on the future cash flows generated through its physical production infrastructure. For now, the model does not account for other revenue or income generated from other than the firms' core business.

Further, the model has limitations in terms of capturing firm-level adaptive capacity. Future research could expand the representation of mitigating measures on the impact on financial firm valuation via strategic financial adjustments (adjustment of the firm's debt, dividend pay-out or net profit margin).

While the transition risk metrics represent the strategic direction firms are taking through the representation of production plans, it is faced with limitations in fully capturing the adaptive capacity and shifts in companies strategies, the model mechanisms are currently set in a way that firms that have not yet built out, and are indeed not planning to build out sustainable technologies in the near future, miss out on the opportunity to capture market shares in an expanding market. This indirectly penalises firms that are climate laggards in some technologies, preventing them from catching up throughout the time horizon of the stress test.

The model accounts for a simple representation of the pass-through of additional policy-induced costs to the consumer, assuming that an increased price can be sold in the market without any demand losses.

Parameters Used in this Analysis

For this analysis, the baseline scenarios were, for each provider, those that represented a pathway based upon current policies with no additional ambition to halt climate change. The target scenarios selected were pathways that keep global mean temperature rise below 2 degrees Celsius above preindustrial levels, in alignment with the Paris Agreement. While most production scenarios used were developed to fit a global context (not tailored to a specific country context), the WEO IEA scenarios have an option to tailor the production scenario to North America. Both the global and the North American-tailored scenarios were used here.

Table 2. Scenarios used in the 1-in-1000 TRISK Climate Stress Test.

	Provider	IAM	Region	Baseline Scenario	Target Scenario	Temperature Ambition
1	IEA WEO	GEM	Global	STEPS	Sustainable Development	1.65°C
2	IEA WEO	GEM	North America	STEPS	Sustainable Development	1.65°C
3	NGFS	GCAM	Global	Current Policies	Below 2 Degrees	1.7°C
4	NGFS	REMIND	Global	Current Policies	Below 2 Degrees	1.7°C

Descriptive Statistics

The 1-in-1000 analysis was performed on the aggregate portfolios of insurers in California, Washington and Oregon with over $1 million in national premium, consisting of 4 different insurance business type sub-portfolios and the combined meta portfolio. The companies associated with the equity and bond holdings on the portfolios were matched to 1-in-1000 corporate production and financial data. The analysis relies on asset-based data from Asset Impact that allows mapping of the physical production infrastructure for each technology in most climate-critical sectors and the associated ownership structure to companies, based on the share of the physical production asset each company owns.

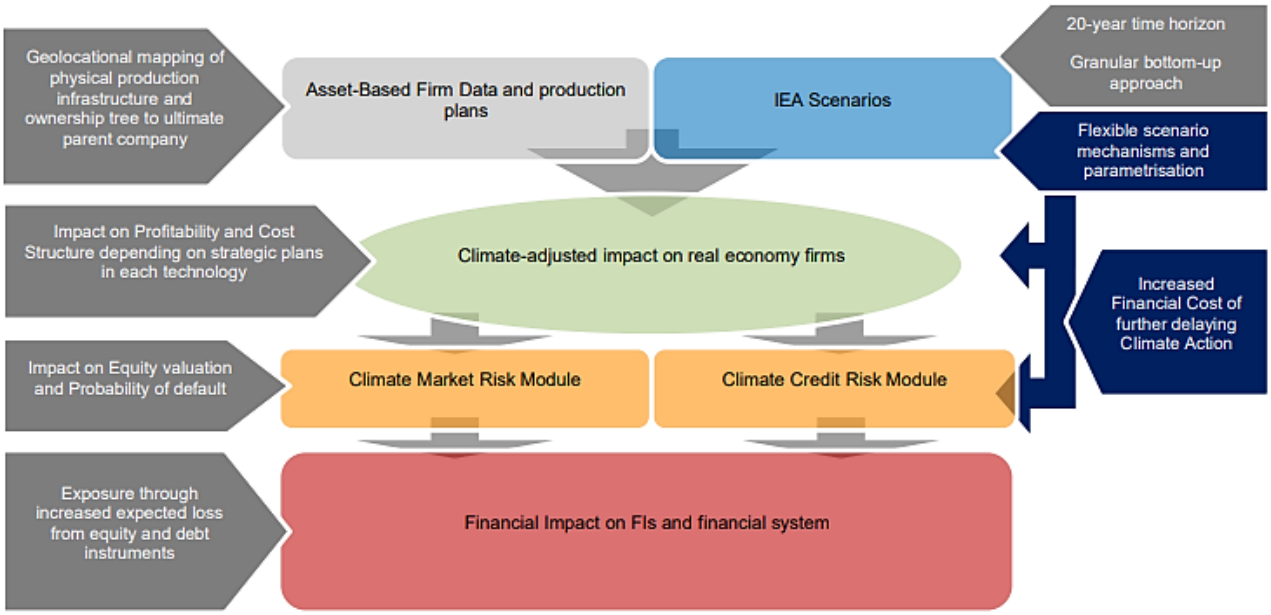


Figure 22. Schematic of the 1-in-1000 TRISK Climate Stress Test financial modeling. SOURCE: The Costs for the Financial Sector if Firms Delay Climate Action (2021).

Tables 3 and 4 show the unique companies associated with the Original Portfolio per insurance category and the unique companies that were in turn matched to data for the stress test.

Table 3. Number of unique companies associated with aggregate insurers' bond portfolio (Original Bond Portfolio) captured in the 1-in-1000 TRISK Climate Stress Test (Matched Bond Portfolio).

Bond Portfolio	Original Bond Portfolio	Matched Bond Portfolio	Match Rate
Fraternal	1321	392	29.674%
Health	1040	328	31.538%
Life	1731	489	28.250%
P&C	1639	459	28.005%
Meta	1767	494	27.957%

Table 4. Number of unique companies associated with aggregate insurers' the listed equity portfolio (Original Equity Portfolio) captured in the 1-in-1000 TRISK Climate Stress Test (Matched Equity Portfolio).

Equity Portfolio	Original Equity Portfolio	Matched Equity Portfolio	Match Rate
Fraternal	3267	1127	34.5%
Health	3272	1137	34.7%
Life	3547	1200	33.8%
P&C	3590	1227	34.2%
Meta	3674	1238	33.7%

Regarding the match rate, it is worth noting that the database exclusively encompasses only listed companies operating within the Coal, Oil & Gas, Power, or Automotive sectors for which there is both asset-level production data and public financial risk data. For the bond portfolio, the match rate is further limited by the lower availability of the bond maturity information, which had to be additionally sourced from Schedule D data.

The universe of firms considered in the TRISK analysis is dependent on the availability of data on asset-level forward-looking production plans of the considered firms which is dictated by the provision of this information by Asset Impact and Refinitiv Eikon which is, consequently, dependent on information reported by the firms. The assessment of both market and credit risk for financial institutions is dependent on either the data provided by corporations, or assumptions on companies that need to be accounted for in the absence of corporate-reported data. The financial data from Refinitiv Eikon includes company market cap, net profit margin, equity volatility and leverage ratio. This sort of data is available only for publicly listed companies. For companies that are not publicly listed and tracked on Eikon or are privately owned, the missing financial data is completed using average values of those missing input variables of companies in the same sector and country

Without accurate or complete corporate reported data, this can lead to significant variation in credit risk due to uncertainty from individual firms. This has been evident based on assumptions of production levels and shocks from reporting and non-reporting companies included in the stress test.

Equity holding exposures are aggregated to a company for each portfolio. On a company level, these are then matched to the stress test results. Absolute Value change per technology is calculated by applying the transition risk shock from the stress test results for the respective company business unit (i.e. company 'technology') to the respective technology portion of the company equity holding (this is derived by dividing the equity holding value by the share of the net present value of each company

respective business unit). Relative value change per technology is derived by summing up the company business unit value change per technology and comparing it to the initial company baseline exposure.

The Bond exposure data is provided by CDI from insurer's Schedule D filings, while the maturity data had to be sourced additionally from Schedule D data. The earliest maturity available was selected for each security and it was matched with the appropriate term on the Merton Model Probability of Default calculation. The matching is then performed on company ID and maturity.

Furthermore, we calculate weights that represent the production share for each sector for each company. These weights are applied for each company's total exposure to estimate sector specific exposure.

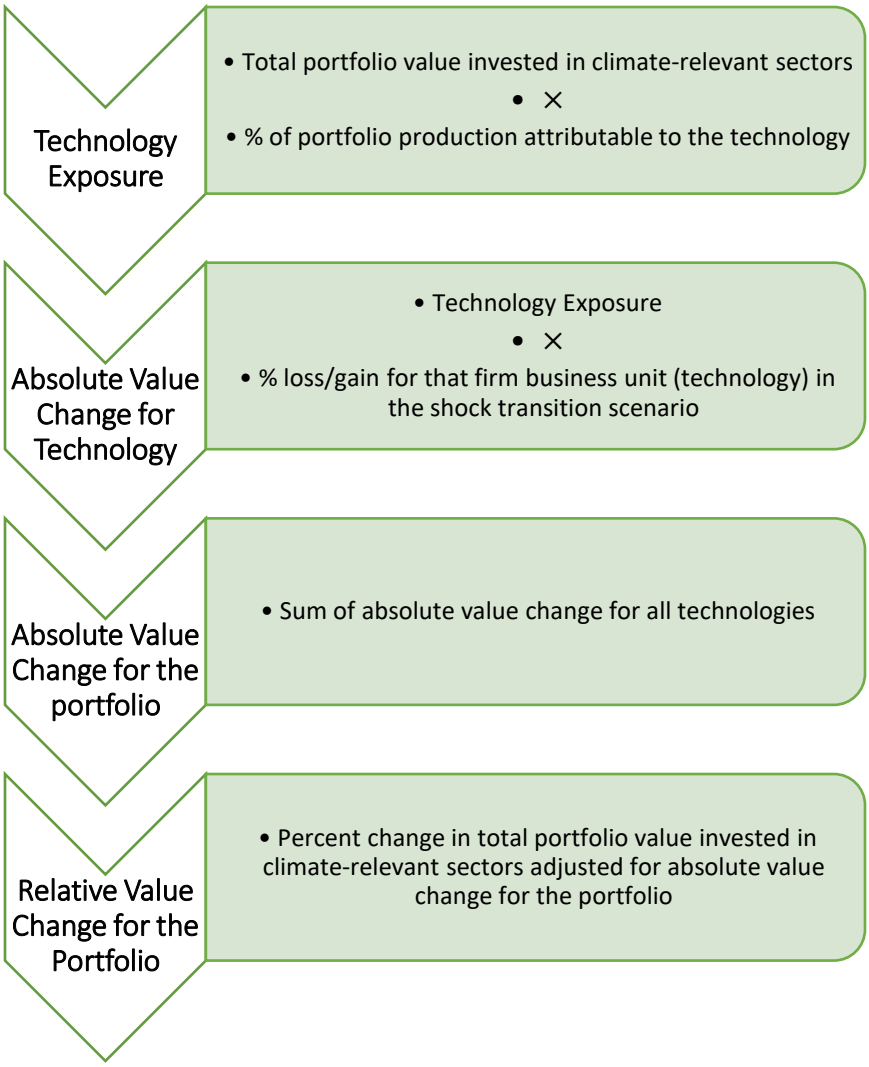


Figure 23. Schematic of 1-in-1000 TRISK Climate Stress Test metrics relationships.

Results

For each scenario group, meaning combination of scenario provider and specific factors such as region (e.g., WEO North America (NA)), Integrated Assessment Model (e.g., NGFS REMIND or NGFS GCAM), or carbon tax (GCAM Tax), three late-and-sudden scenarios were created using three possible years of onset of the shock transition scenario. The earliest onset of the shock transition (2026) was chosen because it is the final year of the planned production in the PACTA results. The second onset year, 2030, was chosen because this date is of significance for California climate policy – California state law sets a target of reducing emissions by 40% above 1990 levels by 2030. The final onset of a shock transition (2034) was chosen to create an even interval between shock years such that an annual change in the cost of delaying transition could be calculated. Using several potential years of onset of a shock transition allows for calculation of the year-on-year cost increase associated with delaying a transition,

reflecting the reality that remaining within the carbon budgets required to meet the Paris Agreement targets becomes more difficult and costlier the longer this transition is delayed.

Bond Probability of Default

Probability of default differences represent the increase (or decrease) in probability of default that result from the “late-and-sudden" shock transition scenarios as compared to the baseline scenario.

It should be highlighted that the TRISK-related changes in probability of defaults should be interpreted carefully, due to the context of longer time horizons. The probability of default does not represent a one-year probability of default as interpreted in the classical financial context. The probability of default changes incorporate the discounted shock that spans across the horizon of the stress test and hence do not represent the true probability of a firm defaulting today, but rather reflect the potential range and spectrum of a default given the manifestation of the transition. Hence, the probability of default change depends on the scenario itself, the strategic direction and potential misalignment of firms throughout the entire duration of the transition.

The different shock years represent the year of the late-and-sudden transition in which the production trajectory begins to be forced into alignment with the target scenario and is forced to compensate for any production that occurred before the shock year that was out of alignment with the target scenario. Greater probability of default differences in this case indicate greater transition risk.

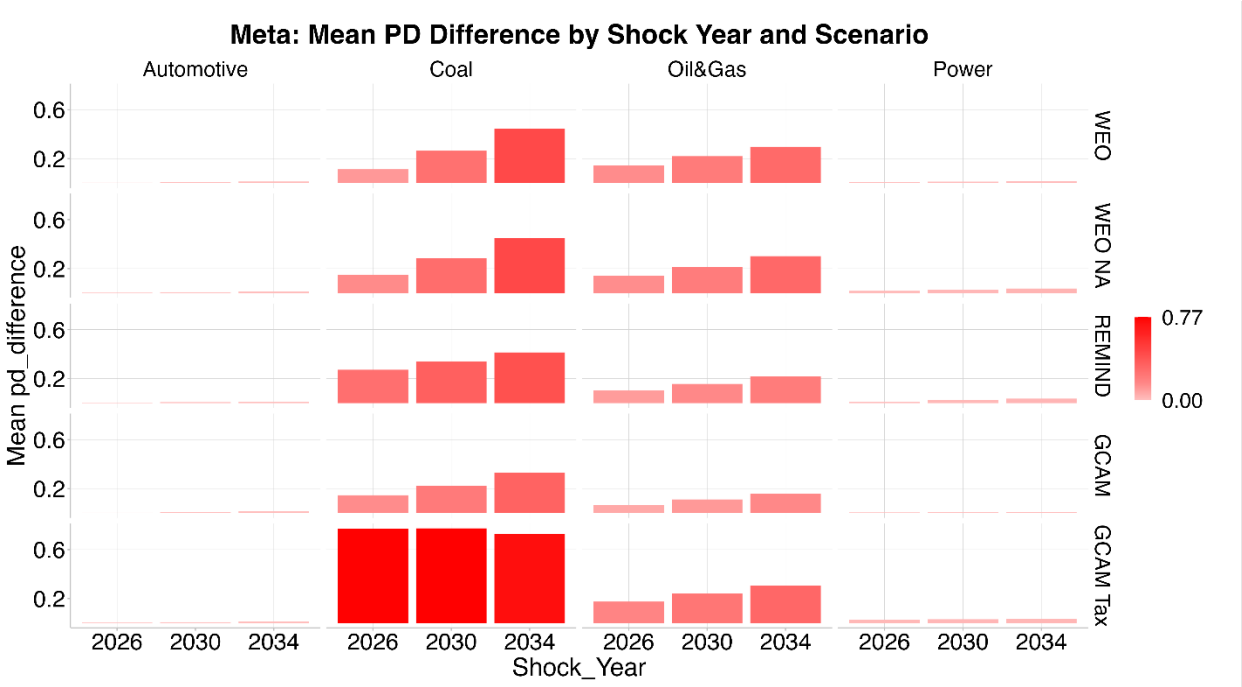


Figure 24. Mean difference in Probability of default for firms in the portfolio (between baseline and shock transitions scenarios), for each scenario model (IEA WEO Global, IEA WEO North America, NGFS REMIND, NGFS GCAM, and NGFS GCAM with carbon tax) and shifting onset of the shock transition (2026, 2030, 2034).

The results show that there are significant impacts to insurers’ bond portfolios even with a transition that begins as early as 2026, indicating a disorderly transition. In addition, each year that the transition is delayed significantly impacts the creditworthiness of insurer’s investments. A delayed

shock year generally yields greater increases in probability of default, and more transition risk, because there would have been more time where production was out of alignment (prior to the shock) that must be compensated for. The probability of default differences showed similar trends across all insurer peer groups, and so only the meta portfolio of all types of insurers is shown here.

The largest probability of default increases, indicating greater transition risk, in all scenarios were for coal extraction followed by oil & gas extraction. For coal-related bonds, the probability of default difference is over 40% with a 2034 shock year in the WEO scenarios and the NGFS REMIND scenario. The NGFS GCAM scenario shows generally lower probability of default differences as compared to the other scenarios, but still shows probability of default differences over 20% for coal-related bonds in all but the most proximate shock year. In the NGFS GCAM scenario with a carbon tax, the probability of default increase is up to 100% for all shock years, which is the upper bound allowable in the model. The carbon tax in the appears to impact coal much more than it impacts oil & gas. For oil & gas, the probability of default increases are near 20% in all scenarios and are greater for delayed shock years.

While there were significant probability of default increases for the fossil fuel-based elements of the power sector, these were balanced by probability of default decreases for renewable power, leading to small probability of default differences for the power sector as-a-whole. For the automotive sector, the probability of default increases are also small both due to the presence of ICE, hybrid cars, and EVs in the sample and because there are few bonds associated with the automotive sector in the portfolio.

Bond Probability of Default Distributions

The average of probability of default differences for all firms contributing to the production within the portfolio, which was shown in the earlier figure, may not be representative of individual firms within the aggregate portfolio. Therefore, its useful to look at a distribution of probability of default differences for

individual firms. This also demonstrates the value of targeted engagement with firms, as firms clearly have disparate impacts to the portfolio's overall transition risk.

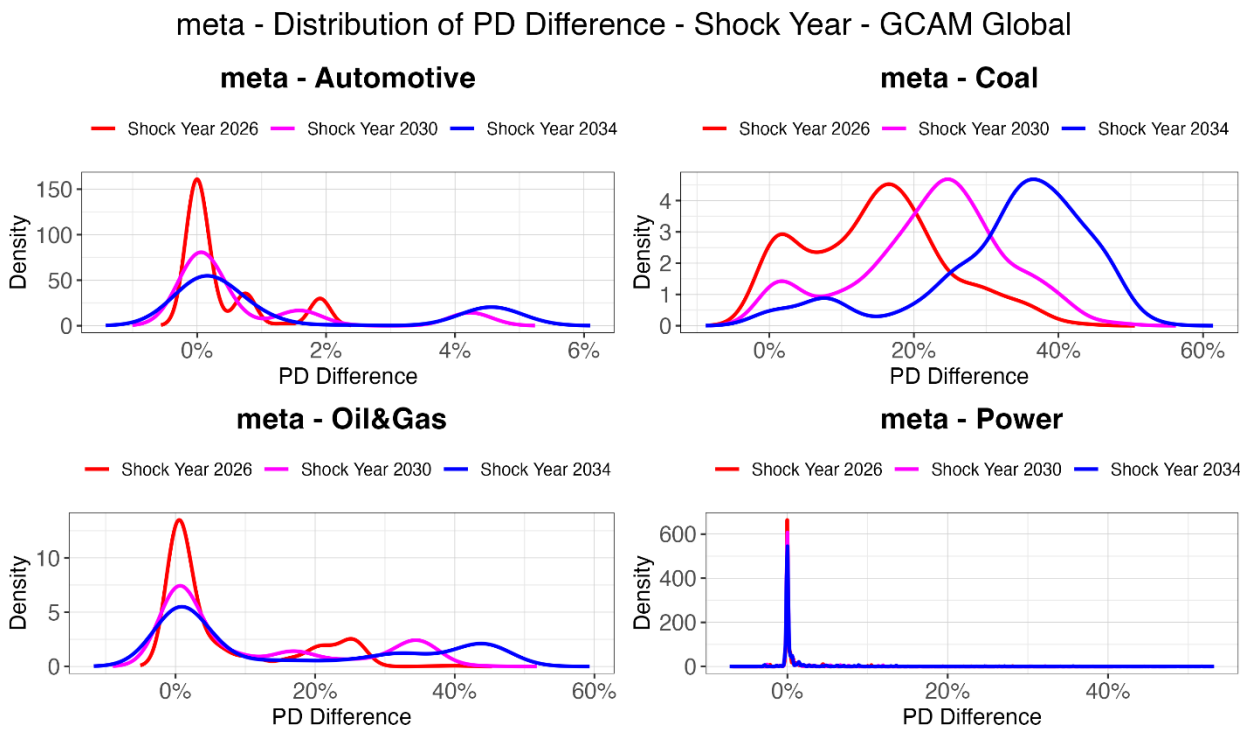


Figure 25. Distribution of Probability of default differences (between baseline and transition shock scenarios) for individual firms within the portfolio under the NGFS GCAM scenario model.

In the figure above, showing probability of default distributions for the NGFS GCAM scenario, it's clear that some firms diverge significantly from the average. While most firms within the portfolio show probability of default differences under 20% for coal with an early (2026) shock year, represented by the area under the red curve that is left of the 20% mark, there are examples of firms with probability of default differences exceeding 40% for coal-related bonds. When the shock year is delayed to 2034, the probability of default differences for most firms double to near 40%, and there are examples of firms with up to 60% probability of default differences.

For Oil & Gas, we can see from the distribution that most firms have probability of default differences that are near zero regardless of shock year. However, there are firms with probability of default differences between 20% and 60% at the high tail of the distribution that skew the average towards a higher probability of default difference. The probability of default differences for the power sector are concentrated near zero regardless of shock year, because positive probability of default differences related to fossil fuel power are compensated for by negative probability of default differences from renewable power.

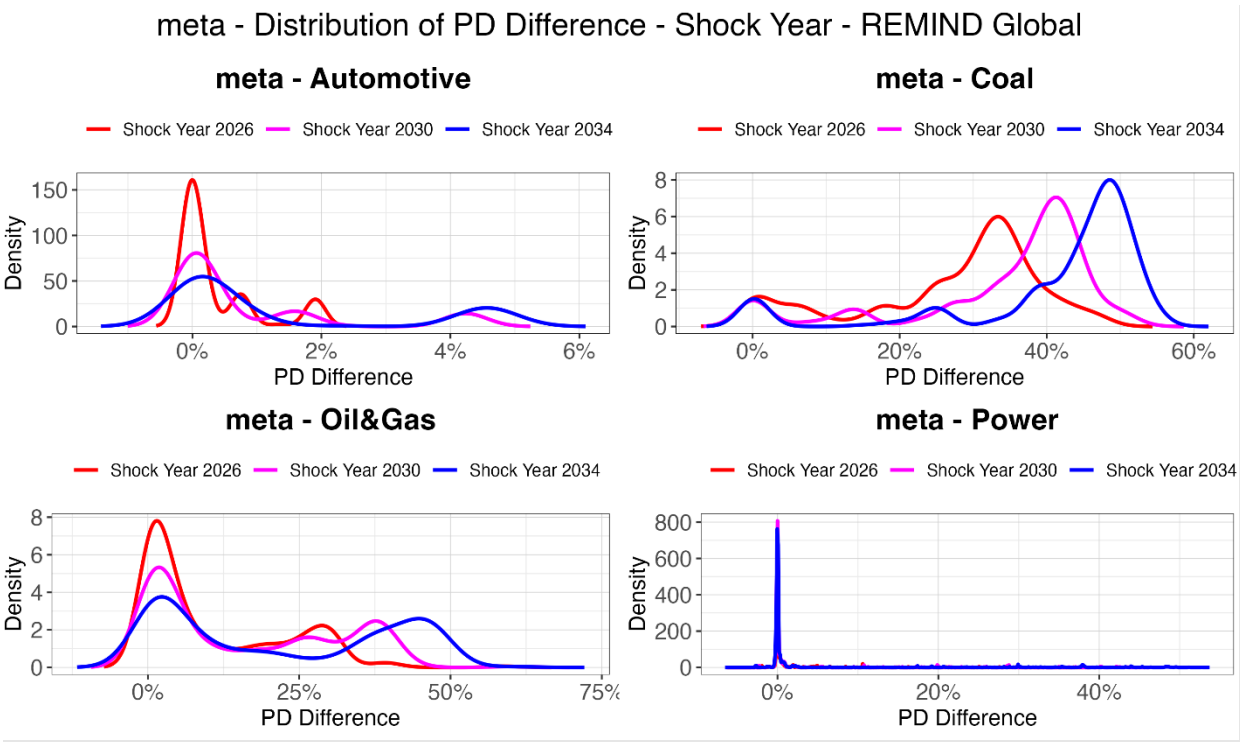


Figure 26. Distribution of Probability of default differences (between baseline and transition shock scenarios) for individual firms within the portfolio under the NGFS REMIND scenario model.

In the NGFS REMIND scenario, the probability of default differences are generally higher for most firms and for those at the tail of the distribution. Because of its features of "perfect foresight" and optimization of welfare rather than cost minimization, the REMIND model may favor technology pathways that have high upfront costs (e.g. closing a coal power plant early even if still profitable) if those actions lead to better economic welfare by the end of the model time horizon. This may lead to larger impacts to balance sheets in the 1-in-1000 climate stress tests where production plans do not align with these anticipatory changes.

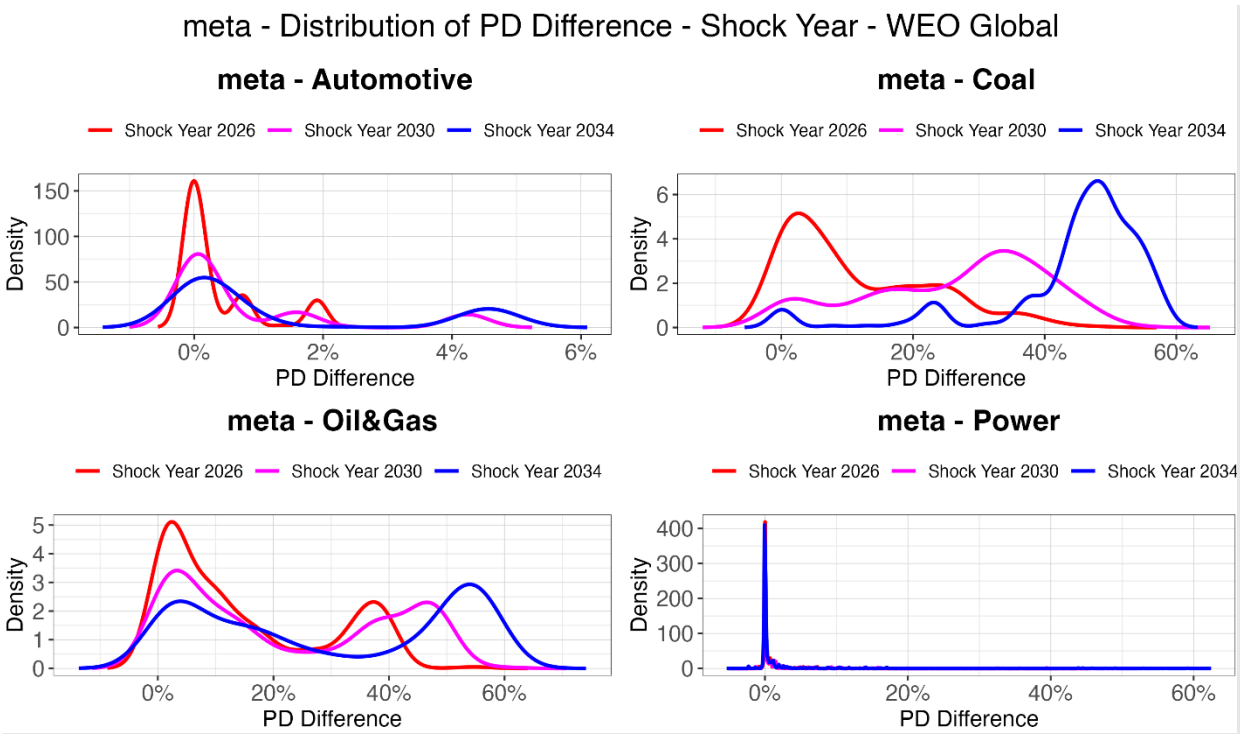


Figure 27. Distribution of Probability of default differences (between baseline and transition shock scenarios) for individual firms within the portfolio under the IEA WEO global scenario model.

The shock year has a much more pronounced effect on probability of default differences in the WEO global scenario than in the NGFS scenarios, with probability of default differences concentrated closer to 0% for coal with an early (2026) shock year, while concentrated between 40 and 60% for the latest shock year (2034). A similar effect is evident for Oil & Gas.

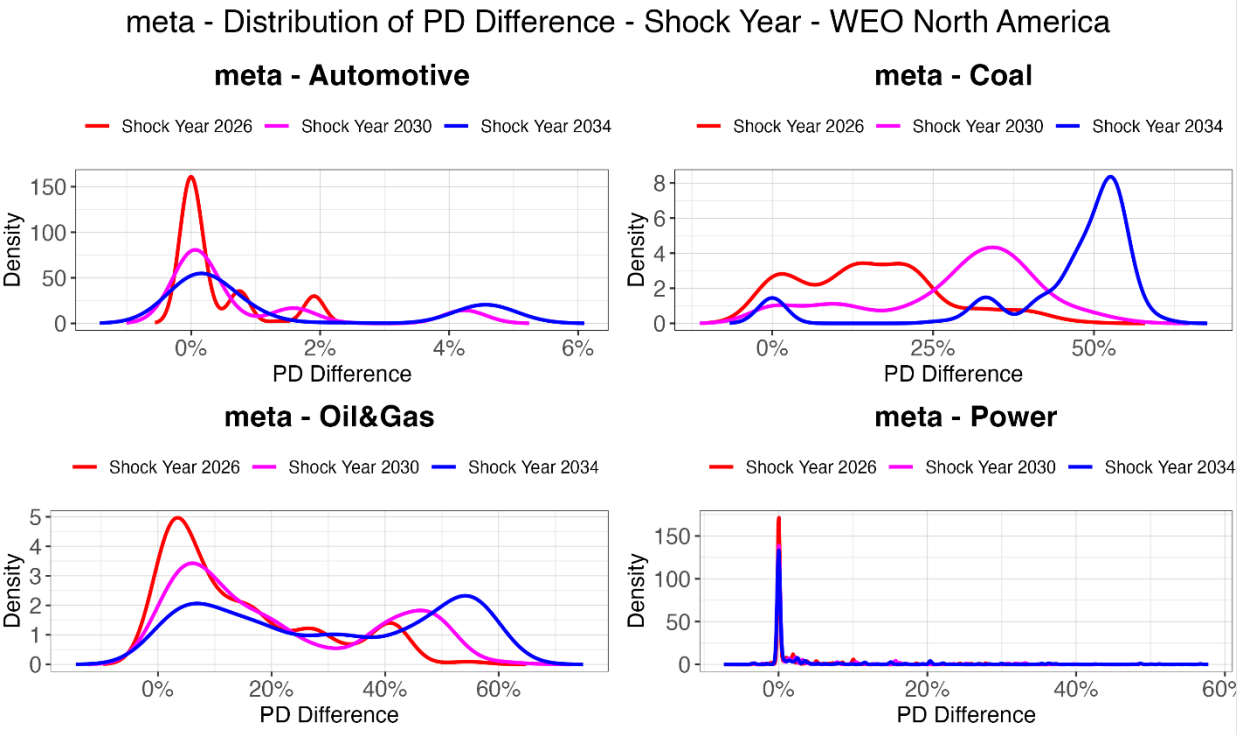


Figure 28. Distribution of Probability of default differences (between baseline and transition shock scenarios) for individual firms within the portfolio under the IEA WEO North America scenario model.

As compared to the WEO global scenario, the WEO North America scenario shows a much broader distribution of probability of default differences for coal (between 0 and 25%) in the 2026 shock year, but this concentrates towards 50% when the shock year is delayed to 2034. This indicates that with a relatively early transition, the impacts are very firm-specific with some firms experiencing little to no impact and some experiencing much larger impacts (up to and beyond 25% increases in probability of default). However, for the late transition (2034) nearly all firms experience significant losses. The distribution for oil & gas in the WEO North America scenario is very similar to the distribution in the WEO global scenario.

Expected Losses

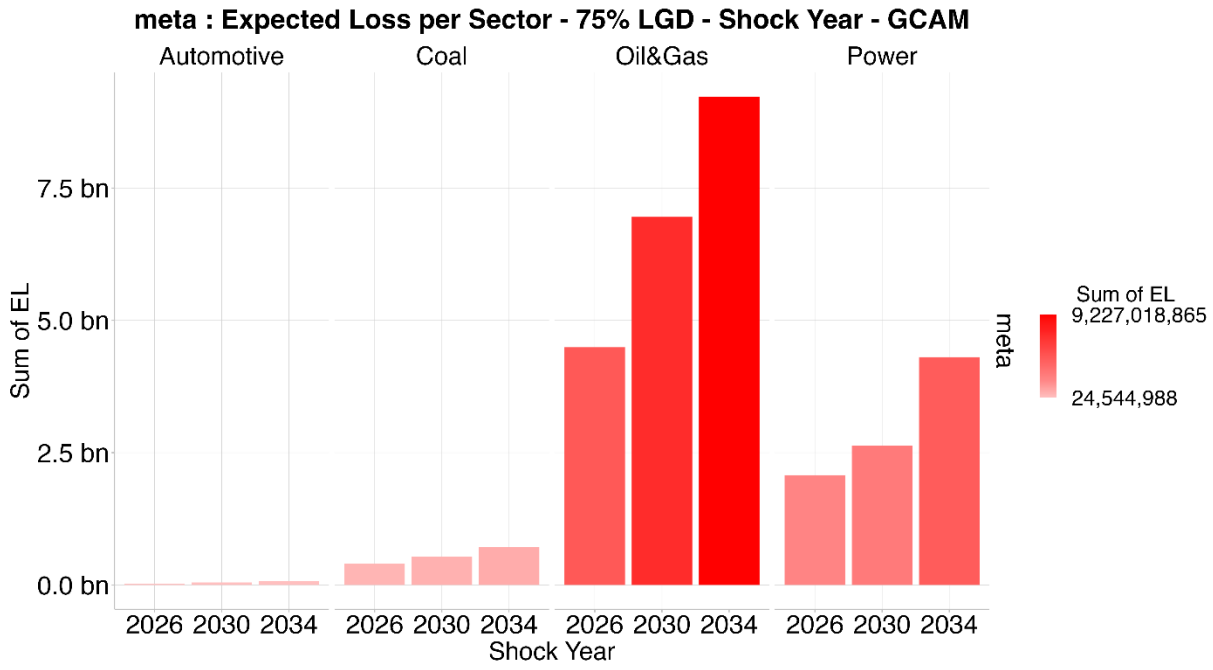


Figure 29. Expected losses on the portfolio's corporate bonds associated with four climate-relevant sectors in the shock transition scenario under the NGFS GCAM scenario model, with varying shock year (2026, 2030, 2034).

Expected losses, with loss given default (LGD) set at 75%, for oil & gas extraction-related bonds within insurer's portfolios considering the NGFS GCAM scenario are large, ranging from over $4 billion dollars with an early shock year (2026) to around $9 billion with a late shock year (2034). Expected losses for Power are still significant but less than for extraction, between $2 and $4 billion depending on the shock year. Expected losses for coal are lower, because these assets make up a relatively small portion of insurers' portfolios. Across the power, oil & gas, coal, and automotive sector, expected losses total to around $7 billion with an early (2026) shock year but more than double to over $14 billion if the shock transition is delayed to 2034.

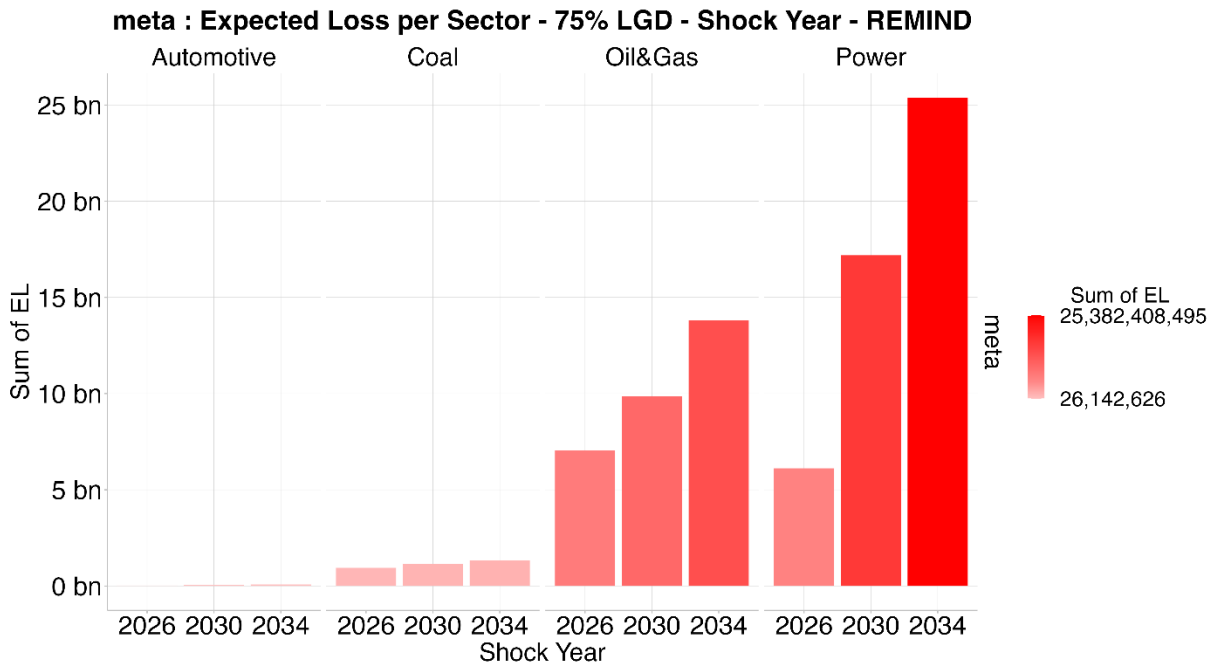


Figure 30.Expected losses on the portfolio's corporate bonds associated with four climate-relevant sectors in the shock transition scenario under the NGFS REMIND scenario model, with varying shock year (2026, 2030, 2034).

Expected losses for oil & gas extraction-related bonds within insurer's portfolios considering the NGFS REMIND scenario are even larger than for the NGFS GCAM scenario, ranging from over $6 billion dollars with an early shock year (2026) to near $14 billion with a late shock year (2034). In the NGFS REMIND scenario, the expected losses for power are even larger than what is reflected in the NGFS GCAM scenario for all but the earliest shock year. These ELs are over $17 billion with a 2030 shock year and over $25 billion with a 2034 shock year. Across the power, oil & gas, coal, and automotive sector, expected losses total to around $28 billion with an early (2026) shock year but rise to around $40 billion if the shock transition is delayed to 2034.

Because of its features of "perfect foresight" and optimization of welfare rather than cost minimization, the REMIND model may favor technology pathways that have high upfront costs (e.g. closing a coal power plant early even if still profitable) if those actions lead to better economic welfare by the end of the model time horizon. This may lead to larger impacts to balance sheets in the 1-in-1000 climate stress tests where production plans do not align with these anticipatory changes.

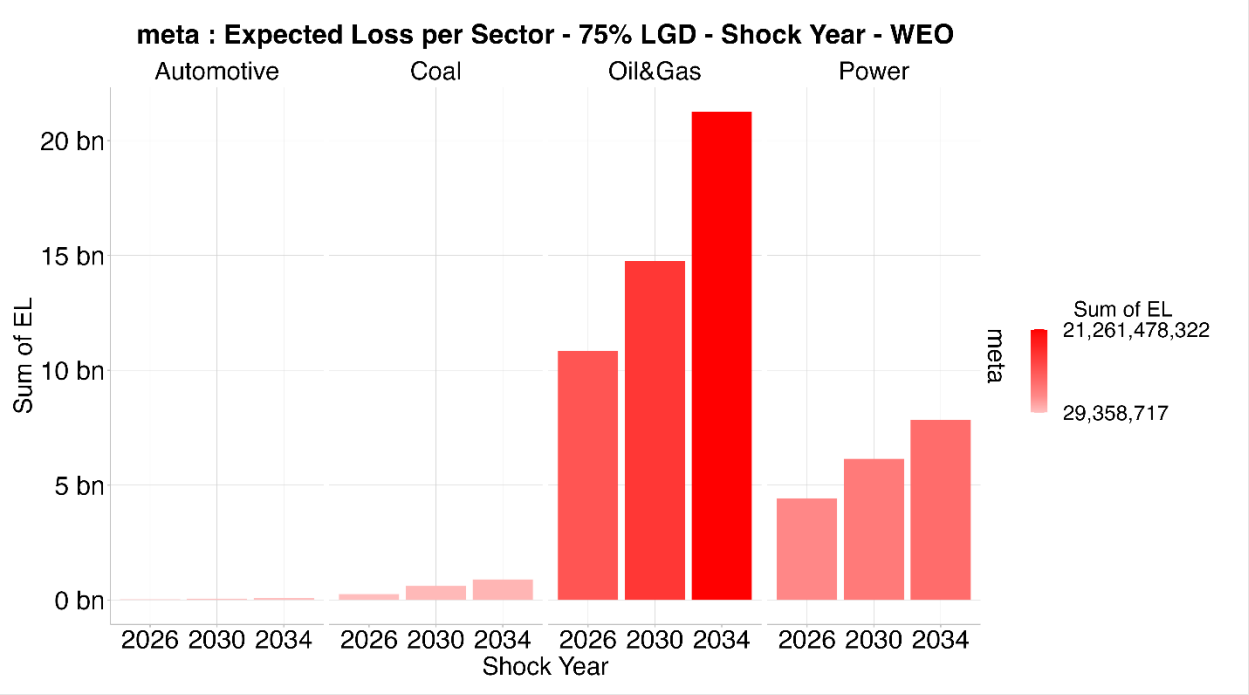


Figure 31. Expected losses on the portfolio's corporate bonds associated with four climate-relevant sectors in the shock transition scenario under the IEA WEO global scenario model, with varying shock year (2026, 2030, 2034).

The expected losses for oil & gas extraction in the WEO global scenario are larger than for either of the NGFS scenarios, ranging from just over $10 billion with a 2026 shock year to over $20 billion with a late (2034) shock year. The Els for the power sector are less than half of the losses in extraction in this scenario, but are still significant and are larger than the NGFS GCAM scenario -- falling between $4 and $8 billion. Across the power, oil & gas, coal, and automotive sector, expected losses total to around $15 billion with an early (2026) shock year but doubles to around $30 billion if the shock transition is delayed to 2034.

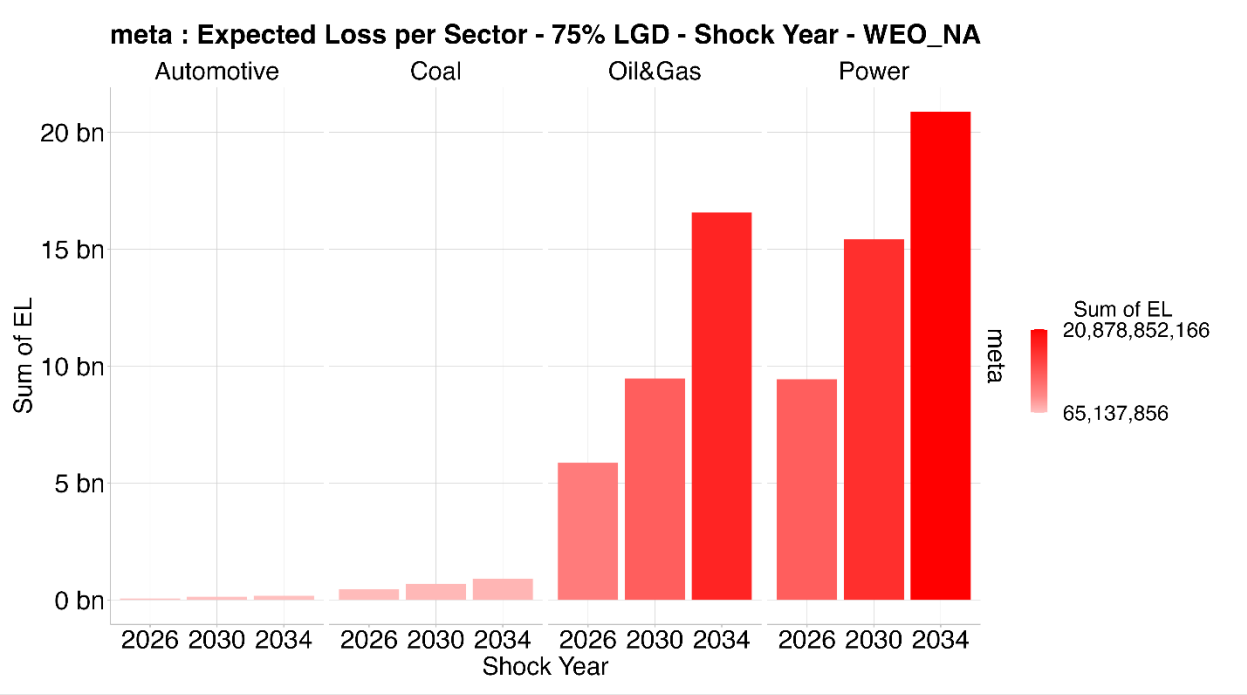


Figure 32. Expected losses on the portfolio's corporate bonds associated with four climate-relevant sectors in the shock transition scenario under the IEA WEO North America scenario model, with varying shock year (2026, 2030, 2034).

The expected losses in the WEO North America scenario look more similar to the NGFS REMIND scenario than to the WEO global scenario. The power sector-related assets comprise the greatest expected losses in this scenario, ranging from just under $10 billion for an early shock year (2026) to over $20 billion for a late shock year (2034). Oil & Gas extraction also sustain large losses that are very sensitive to the timing of the shock – ranging from just over $5 billion for an earlier shock to over $16 billion for a later (2034) shock year. Across the power, oil & gas, coal, and automotive sector, expected losses total to around $15 billion with an early (2026) shock year but more than double to around $38 billion if the shock transition is delayed to 2034.

Equity Value Changes

The relative value changes on exposure show the extent to which equity assets associated with each climate-relevant sector increase or decrease in value due to the late-and-sudden transition from the reference scenario (business-as-usual) to the target scenario (net zero by 2050). The different shock years represent the onset year of the shock transition in which the production trajectory begins to be forced into alignment with the target scenario and is forced to compensate for any production that occurred before the shock year that was out of alignment with the target scenario. Decreases in value in this case indicate greater transition risk. A delayed onset of the shock transition generally yields decreases in value for fossil-fuel related assets, and more transition risk, because there would have been more time where production was out of alignment (prior to the shock) that must be compensated for to remain within the necessary carbon budget.

For equities' relative value change there were similar trends across all insurer peer groups, and so only the meta portfolio of all types of insurers is shown here. However, it is worth noting that there are significant differences between insurer groups in the types of assets they hold, that lead to significant

differences in total value change, as evident in the PACTA results. For example, life insurers hold the vast majority (near 90%) of their investments as bonds and are therefore less affected by value changes in equities which make-up less than 2% of their overall portfolio. In contrast, P&C insurers hold over 57% of their assets as equities and health insurers hold over 28% of their portfolio value in equities.

Relative value change, NGFS global GCAM

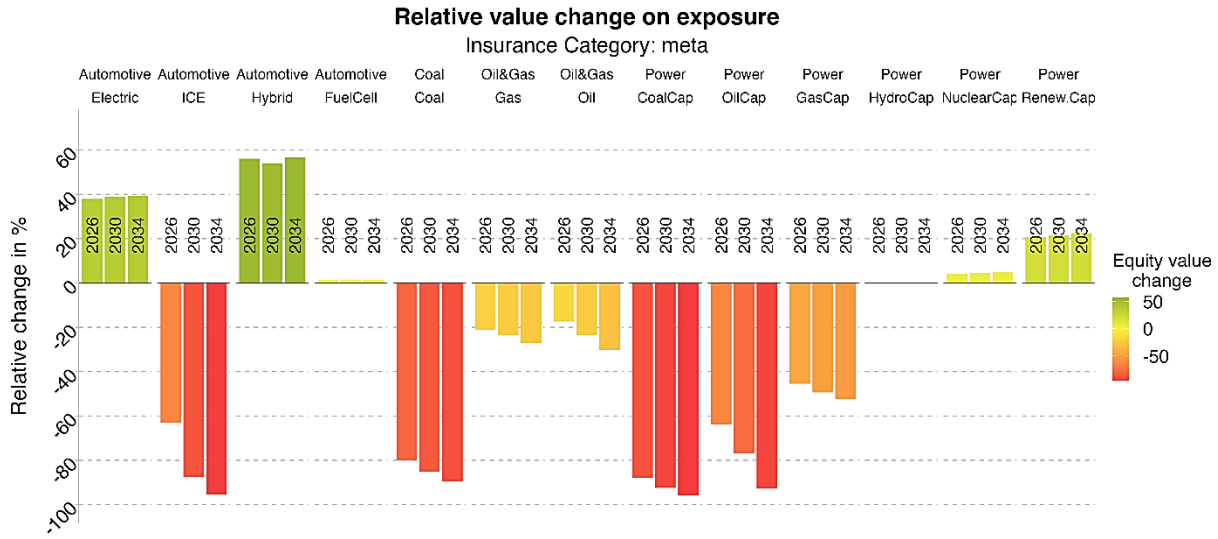


Figure 33. Relative value change on equities (in the shock transition scenario relative to the baseline scenario) using several shock years (2026, 2030, 2036) in the NGFS GCAM scenario model.

The relative value changes for listed equities associated with fossil-fuel related sectors are dramatic for the NGFS GCAM scenario shock. Coal related assets (both extraction and coal power) lose in excess of 80% of their value due to the transition shock, for all shock years considered. Gas power related assets experience greater than 40% decreases in value. Oil power capacity assets and ICE vehicle related assets lose between 60 and 90% of their value depending on which shock year is chosen. Gas and oil extraction see smaller, but still significant decreases in value – between 15 and 30%.

In contrast, renewable-related power and automotive sector investments gain significant value in the shock scenarios. Electric vehicle-related assets gain nearly 40% increases in value, hybrid vehicle investments experience value increases over 50% (although these assets are not common in insurers' portfolios). Renewable power experiences value increases over 20%.

Relative value change, NGFS global REMIND

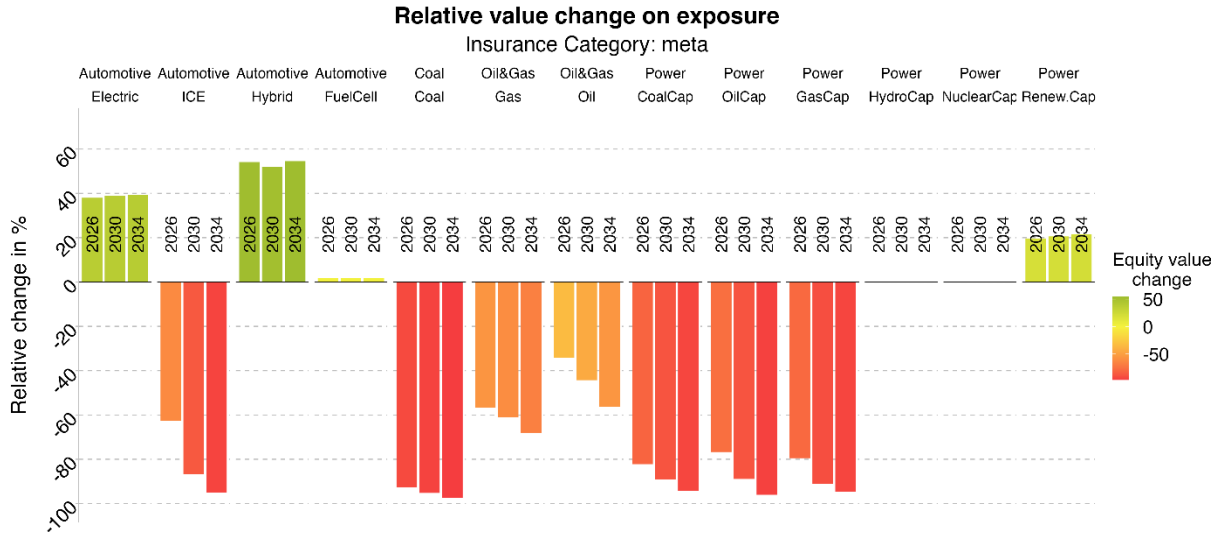


Figure 34. Relative value change on equities (in the shock transition scenario relative to the baseline scenario) using several shock years (2026, 2030, 2036) in the NGFS REMIND scenario model.

For most sectors, the results from the NGFS REMIND scenario are similar to the results in the NGFS GCAM scenario. However, the REMIND scenario shows greater value losses for gas extraction and gas power capacity assets than the GCAM scenario. In the REMIND scenario, losses for gas power capacity assets are equivalent to loses for coal and oil capacity. Losses for gas extraction assets in the REMIND scenario are more than double the losses for those assets in the GCAM scenario (near 60% versus near 20%). Coal extraction-related assets also have relative value losses close to 100% in the GCAM REMIND scenario.

Because of its features of "perfect foresight" and optimization of welfare rather than cost minimization, the REMIND model may favor technology pathways that have high upfront costs (e.g. closing a coal power plant early even if still profitable) if those actions lead to better economic welfare by the end of the model time horizon. This may lead to larger impacts to balance sheets in the 1-in-1000 climate stress tests where production plans do not align with these anticipatory changes.

Relative value change, WEO global

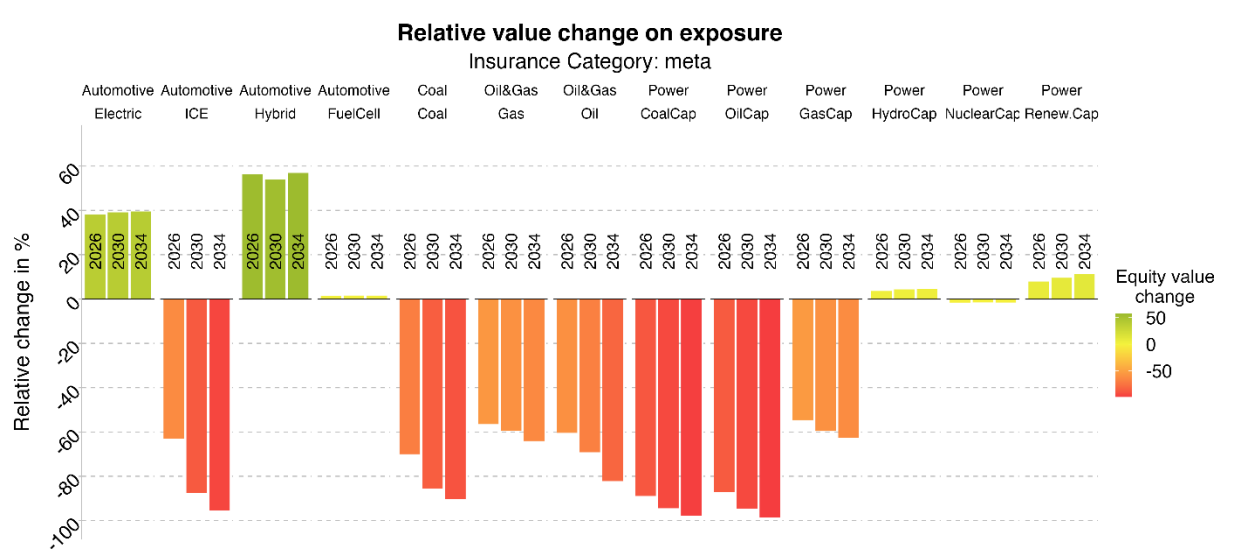


Figure 35. Relative value change on equities (in the shock transition scenario relative to the baseline scenario) using several shock years (2026, 2030, 2036) in the IEA WEO global scenario model.

The results, in terms of relative change in exposure, for the WEO global scenario are similar to the NGFS scenarios. Electric and hybrid vehicle-related assets increase in value upwards of 40%. ICE vehicle-related assets lose 60% to near 100% of value depending on the shock year that is enforced. Coal extraction assets lose around 80% of their value and gas assets lose around 60%. Relative value losses for oil assets are very sensitive to the choice in shock year, losing 60% of value with an early (2026) shock but over 80% with a late (2034) shock year. With a late shock year (2034) coal and oil power capacity assets lose near 100% of their value and gas power capacity loses 60% of value. In contrast, renewable, hydro, and nuclear power capacity-related assets gain value. The gains for hydro power capacity are greater in the WEO global scenario than in either of the NGFS scenarios.

Relative value change, WEO North America

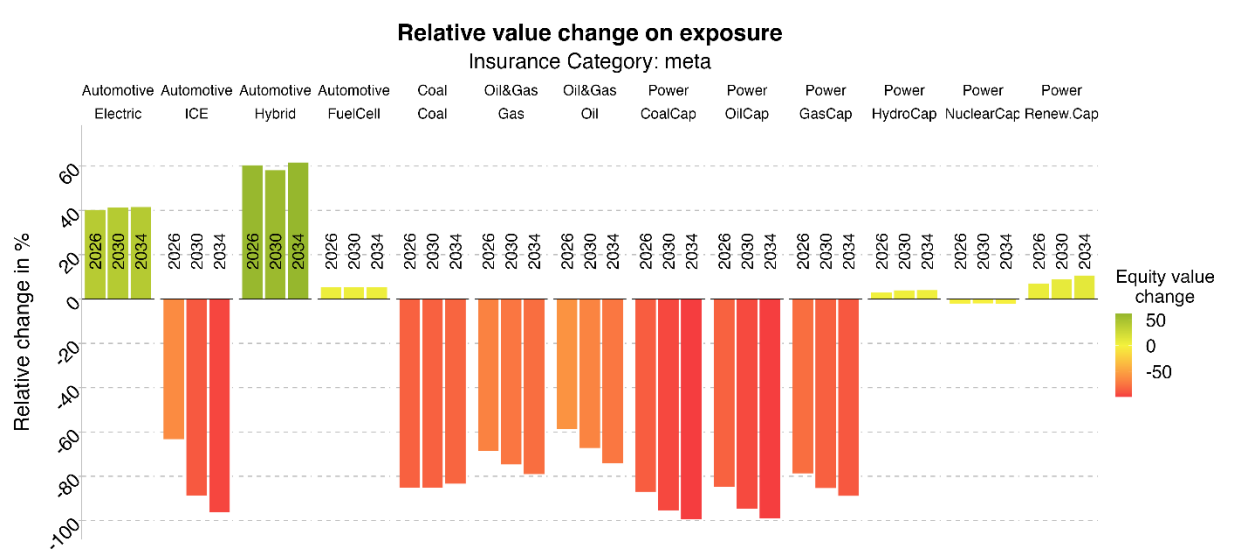


Figure 36. Relative value change on equities (in the shock transition scenario relative to the baseline scenario) using several shock years (2026, 2030, 2036) in the IEA WEO North America scenario model.

As compared to the WEO global scenario, the WEO North America scenario shows greater loses for gas extraction and for gas power related assets than in the global scenario. It also displays greater loses for coal extraction. Finally, as compared to the global WEO scenario, the North American scenario shows measurable increases in value for fuel cell vehicles that are not evident in any other scenario.

Conclusion and Next Steps

Unabated climate change over the long term poses an existential risk to the insurance sector in addition to disastrous consequences for individuals. Reducing greenhouse gas emissions is critical to preventing the worst consequences, including the intensification of extreme weather, and therefore critical to maintaining a reliable insurance market for policyholders. At the same time, meeting global goals for reducing emissions and combating climate change will require transformation of our economy in a way that will be disruptive for investors who do not keep pace with this transformation. Insurers, as some of the largest institutional investors, must manage these transition risks and insurance regulators, have a role to play in ensuring that these risks are managed appropriately to safeguard solvency.

With renewable and zero-carbon energy now contributing 40% of U.S. electricity, there has already been a marked shift and growing opportunity for investment in the technologies needed to meet the challenge of deep decarbonization. Fossil fuel investments have continued to yield significant returns in the last several years because of high fuel prices, but due to uncertainties over longer-term demand, costs, and pressure from investors and owners to focus on returns rather than production growth, only a small subset of the industry is spending more than pre-pandemic levels. According to the International Energy Agency (IEA), the majority of cash outflows are going to dividends, share buybacks, and debt repayment rather than new fossil fuel supply.[59] Projections from the IEA now indicate that a plateau of

[59] See IEA World Energy Investment Report 2023

fossil fuels may be in the near future, as soon as 2030, even with the current set of climate and energy policies that are in place, which would represent an unprecedented decoupling of GDP from fossil fuels.

The unprecedented scale and nature of the climate crisis and our lack of understanding of, or ability to forecast, how society and the environment will respond means that we cannot know exactly what the future will hold. However, scenario analysis and stress testing exercises such as this one can help illuminate the potential impacts to financial institutions from a variety of possible pathways in a way that can inform risk management and uncover opportunities.

This analysis represents just one step in the California Department of Insurance's long-term strategy for incorporating climate scenario analysis and stress testing into its supervision of California insurers and promoting the use of forward-looking climate risk management tools by insurers. It also represents a collaborative exercise within the U.S. through partnership with the insurance regulatory agencies from Oregon and Washington and inclusion of insurers operating in those states. The California Department of Insurance will continue to collaborate across state lines to promote responsible climate risk management and a sustainable insurance sector for years to come.

Annex I: the PACTA Methodology

The PACTA Methodology consists of several components. The quantitative part of it compares what needs to happen in sectoral decarbonization pathways determined through climate scenarios, with financial actors' exposures to companies in climate-relevant sectors. To do so, PACTA provides a five-year forward-looking, bottom-up analysis. It looks at the investment and production plans of companies, based on physical Asset-Based Company Level Data (ABCD), and consolidates that information to identify the transition profile of the companies and their related financial instruments. That way, PACTA can aggregate the production data to the portfolio level and compare that information to the production plans projected in different climate scenarios. The (mis-) alignment between the portfolio and these scenarios allows users to infer the potential exposure to transition risks and opportunities.

In total, the PACTA analysis consists of 3 components that aim to answer the following questions:

- **Exposure Analysis.** What is the current exposure of the portfolio to the economic activities that are most affected by the transition to a low-carbon economy?
- **Future Exposure Analysis.** How will the exposure of the portfolio change in the next five years, and how does it compare to a portfolio that is aligned with the Paris Agreement?
- **Scenario Analysis.** How aligned are the investment and production plans of companies in the portfolio with different climate scenarios and the Paris Agreement?

Further information on the methodology applied to answer those questions will be provided in the following sub-sections which will elaborate on the coverage, data inputs, allocation methods, PACTA metrics, and climate action analysis.

Coverage

The PACTA Methodology covers listed equity and corporate bond portfolios. The selection of asset classes covered by the methodology responds to the key role corporate issuers have in the transition to the low-carbon economy and the flexibility investors have to carry out different actions that allow

mitigation of portfolio-level climate-related risks and risks in the real economy. PACTA further not only covers single titles but also funds.

The PACTA methodology covers eight of the most carbon-intensive sectors in the economy (i.e., the sectors most exposed to transition risks) – oil, gas, coal, power, automotive, cement, aviation, and steel (the "PACTA sectors"). Together, they are responsible around 70% of the global CO_2 emissions. In each sector, PACTA focuses on the part of their value chain with the highest contribution in terms of CO_2 emissions. For example, in the oil and gas sector, the focus is on upstream activities related to production, while in the power sector, the focus is on power generation and related sources of energy.

Data inputs

To run the portfolio assessment, participants provide an input file containing security information for each portfolio to be analyzed. It includes the following information:

- Investor and portfolio names
- One ISIN per listed instrument (funds are identified by their ISIN. Securities in each fund are included in the analysis)
- The market value of the financial assets held in the portfolio
- The currency code corresponding to the market value
- A timestamp of the portfolio

Financial data is used to assign securities to its correspondent sector and link companies along the ownership tree (i.e. subsidiaries to parent companies). Financial data is also used to identify the composition of funds and allocate these assets to portfolios as indirect ownership – if the portfolio is exposed to funds. The financial data is sourced by FactSet.

For each sector covered in the analysis, PACTA sources data from the data provider Asset Impact (AI). In turn, AI sources its data from independent industry data providers that obtain data on individual assets in climate-relevant industries using a variety of research capabilities, including web scraping, desk research, and direct engagement with the industry. The asset-based company-level data covers more than 280,000 individual physical assets (e.g., individual power plants, oil fields etc.). The figure below shows the coverage of asset-level data relative to estimated global production figures—the global benchmark—for the power, oil & gas, coal, and automotive sectors.

Measuring alignment requires scenarios that explain what needs to happen in a sector to decarbonize. While climate change scenarios do not predict the future, they provide essential information to understand climate change, and the pathways projected to reach certain goals. In the efforts to tackle climate change, it is critical to understand what can and should happen to mitigate climate change. It is important to note that climate scenarios are built under different assumptions, and therefore can propose different courses of action to achieve climate targets.

In the interactive report available for each portfolio uploaded to the online PACTA tool, among the options for calculating and plotting the results, users can select between two methodologies - the Portfolio Weight Approach and the Ownership Weight Approach. These methodologies are used to attribute the physical assets of a company to the financial instrument or portfolio. The Ownership Weight Approach is only available for equity, and the Portfolio Weight Approach is available for both

bonds and equity. For this Meta report, it was decided to use the Portfolio Weight Approach for corporate bonds and for listed equities.

Portfolio Weight Approach. The Portfolio Weight Approach (PA) allocates the production of the physical assets of the companies based on the proportion that the company represents in the portfolio. Although bondholders have relevant bargaining power with the issuer, investors do not have decision-making rights, which is why the Ownership Weight Approach would not be suitable. As an example, let us assume there are two companies that compose a portfolio that are equally weighted, the Portfolio Weight Approach would attribute half of the production of the assets owned by the blue company and half of the production owned by the yellow company to the portfolio. Thus, two power stations from the blue company, and one power station from the yellow company.

Figure 37. Schematic representing the portfolio weight approach to attributing investee firm's production to the portfolio.

Portfolio weight approach

- Answers the following question: How exposed is your portfolio to different technologies?
- The portfolio weight approach is a representation of the investor's allocation choice and is inferred as a more risk-intuitive allocation rule
- Does not show "ownership" of technologies in the real world, but rather takes a risk-perspective focusing on the exposure to companies and technologies.
- Applicable to listed equity and corporate bonds.

As mentioned previously, in the individual interactive reports, users can choose the allocation methodology used in each of their charts, however, for this report, the portfolio approach was used for bonds and for equity.

As the explanations above show, even though both the Portfolio Weight Approach (PA) and the Ownership Weight Approach (OA) allocate physical assets to financial portfolios, they are based on different calculation methods. The OA approach allocates the "owned" physical assets of investors to their portfolio and thereby depicts production values from a real-world and macro perspective, while the PA allocates physical assets based on the weight of a company within the portfolio. I.e., the PA comes rather from a risk perspective of the individual institution. These differences reflect that both

approaches answer slightly different questions, based on the asset classes they are used for. While the ownership of listed equity allows attributing responsibility of physical assets to an investor and the investor has decision-making power based on their shares, the investment in corporate bonds do not allow the same level of engagement, which is why the PA rather reflects a risk-perspective on the exposure to the transition-related (mis-)alignment.

Annex II: the 1-in-1000 TRISK Methodology

The following methodology documentation is derived from the Annex of Baer, M., Kastl, J., Kleinnijenhuis, A., Thomae, J. and Caldecott, B. (2021) The cost for the financial sector if firms delay climate action.[60]

We define the transition risk of a financial institution i associated with a late and sudden scenario s relative to the baseline scenario b (See 'Construction of Scenarios'). Note that in our model we construct a set of scenarios that vary in the introduction of the shock year to estimate the changes in the financial cost stemming from delayed climate action. The transition risk (TR) of institution i gives the current value at time t of the dollar loss that it is estimated to suffer in transition scenario s relative to a baseline scenario b and is defined as

$$TR_i^{sb,t} = \sum_{a \in \mathcal{A}} TR_i^{sba,t} = \sum_{a \in \mathcal{A}} \sum_{j \in \mathcal{F}} TR_{ij}^{sba,t} \qquad (1)$$

where $TR_i^{sb,t}$ represents the dollar loss that i could suffer on its portfolio of assets of type $a \in \mathcal{A}$, where $\mathcal{A}$ is the set of assets. Further, $TR_{ij}^{sb,t}$ denotes the transition risk institution i faces in scenario s on its asset investments of type a in firm j, where $\mathcal{F}$ represents the set of climate-relevant firms in the real economy.

For this report, we assume that the equity value of the companies in our sample are held by financial institutions through direct shareholding. Hence, we construct a portfolio that holds the total of all current equity assets of climate-critical sectors, without further specifying the composition of individual financial institution portfolios. A change in the equity value of companies hence results in a loss for the financial sector of $TR^{sb,t}$.

Simultaneously we assume that the total outstanding debt of the companies are held by financial actors through debt instruments such as bonds and loans. Changes in the probability of default of said companies therefore translate into changes of the expected loss for the financial sector. Within this model set up, we can estimate the overall cost to the financial sector under different scenarios.

The TR of the financial sector ultimately hinges on the equity value in scenario x of each firm j that financial institutions have invested in. We model the transition-related impact, expressed as the difference in equity value of a real economic firm j under the baseline and a set of late and sudden

[60] Baer, M., Kastl, J., Kleinnijenhuis, A., Thomae, J. and Caldecott, B. (2021) The cost for the financial sector if firms delay climate action.

scenarios. More formally, we assume that Firm j's equity value at time t in scenario x is given by the sum of the discounted profit of firm j, i.e.

$$E_j^{x,t} = \sum_{v=t}^{T} \exp^{-r(v-t)} \mathbb{E}_t[\pi_j^{x,v}] \qquad (2)$$

Where $\mathbb{E}[\pi_j^{x,v}]$ gives the expected profits in scenario x at time v. For now, we assume that the equity market price each year is linearly dependent on the expected dividends that year. We further assume that dividends for a given year are proportional to the net profits of a firm for this year. Hence, we can estimate the net present equity value of the firm j based on its future cash flows. For now, we assume future profits are discounted at the risk-free rate (we set this equal to the 30Y US treasury yield. Note that in further applications, we aim to allow for a sensitivity test around the discount rate). Thus, the expected profits can be estimated as:

$$\mathbb{E}_t[\pi_j^{x,v}] \approx \sum_{y \in \mathcal{Y}} \sum_{h \in \mathcal{H}} P_{jyh}^{x,v} \times (NPM_j) \times p_{yh}^{x,v} \qquad (3)$$

Where $p_{yh}^{x,v}$ is the unit price of technology h in industry y in scenario x at time v as projected by the International Energy Agency (IEA), and where $\mathcal{H}$ represents the set of technologies and the set of industries (see Table 5).

Table 5. Set of industries and set of technologies represented in the 1in1000 TRISK Climate Stress Test.

Set of industries	**Set of Technologies**
Automotive	Electric, Hybrid, Internal Combustion Engine (ICE)
Oil & Gas Production	Oil, Gas
Coal Production	Coal
Power Production	Nuclear, Coal, Oil, Gas, Hydro, Renewables

Further NPM_j represents the scenario-independent and firm-specific net profit margin that can be used to derive the unit costs of firm j associated with producing technology h in industry y. $P_{jyh}^{x,v}$ gives the production amount of firm j of technology h in industry y in scenario x at time v. Oftentimes a firm j will be active only in one industry in which case the sum over $y \in \mathcal{Y}$ in the equation above contains only one element. The production level $P_{jyh}^{x,v}$ of a firm is assumed to be scenario specific. For instance, in the SDS by the IEA, coal companies are required to significantly lower their production level over time.

To estimate the financial loss from TR associated with the set of transition scenarios, we rely on a climate-adjusted market risk model and credit risk model to quantify potential price and market valuation changes for equity, as well as an increased likelihood of credit defaults for outstanding debt.

Market Risk

For the market risk, the TR financial institutions experience due to exposure to firms in climate-critical sectors through assets of type in $a = \{equity\}$ scenario s relative to baseline scenario b is given by

$$TR_{ij}^{sba,t} = E_{ij}^{s,t} - E_{ij}^{b,t}, \quad (4)$$

where denotes the equity value of financial institution investment in firm j under $x = \{s, b\}$ scenario and is given by

$$E_{ij}^{x,t} = \frac{u_{ij}^{t}}{u_{j}^{t}} E_{j}^{x,t}. \quad (5)$$

Hence, institution i's equity value in firm j is given by the current equity value of firm j in scenario x, $E_j^{x,t}$ times the number of equity shares i holds of firm j, relative to the total number of outstanding shares of firm j, . Equation (5) makes clear that institution i's equity investment in j changes proportionally to changes in the equity value of j, u_j^t. In this analysis we assume that the constructed portfolio holds the total number of outstanding shares of firm j to represent the overall financial sector exposure. Ultimately, the changes in market risk for financial institutions are derived by changes in the discounted cash-flows of climate-critical firms under a set of transition scenarios s relative to the baseline scenario b.

Credit Risk

For the transition-related credit risk, we adjust a structural Merton framework to accommodate for climate risks. We model the transition-related changes in credit risk through the application of a structural model which captures the probability of default for a firm based on the value of its assets and liabilities (Chatterjee, 2015). The basic idea is that a firm defaults if the value of its assets is less or equal to the debt of the firm.

To estimate the credit risk for debt financial instruments, including loans and bonds, it is crucial to model the probability of default. To do so, we rely on firm-specific inputs, including the evolution of the firm's equity value under a set of transition scenarios (described above), the default barrier as expressed in the default-free value of liabilities, time to maturity and the asset-value return volatility. More specifically, assuming log-normal asset returns of each firm $j \in \mathcal{F}$, the probability of default of firm j in scenario $x = \{s, b\}$ is, according to the Merton model (Merton, 1974) given by

$$PD_j^x = 1 - \mathcal{N}(DD_j^x) \quad (6)$$

where $\mathcal{N}$ is the cumulative standard normal distribution, and where the distance to default (DD) of firm j in scenario x is given by

$$DD_j^x = \frac{\log(A_j^{x,t}) + (\mu_j - \frac{1}{2}\sigma_j^2)\, T_j - log(L_j^t)}{\sigma_j \sqrt{T_j}} \quad (7)$$

Where u_j denotes the expected return of the assets of firm j (and can for simplicity be set equal to the risk-free rate r) and σ_j the volatility of j's assets. For now, we assume this is scenario independent. We

further assume these are time invariant. Further, T_j represents the average maturity of firm j's liability, which for simplicity, we set equal to 5 years, i.e. the average weighted maturity of syndicated loans in advanced and emerging markets as provided by the IMF (Chen et al., 2019). $A_j^{x,t}$ refers to the scenario-dependent asset value of the company and L_j^t represents the scenario-independent liabilities.

Hence, the transition risk that financial institution i experiences in assets of type $a = \{loans\ \&\ bonds\}$ in scenario s relative to baseline scenario b is given by

$$TR_{ij}^{sba,t} = \mathbb{E}_t[L_{ij}^{sa}] - \mathbb{E}_t[L_{ij}^{ba}] = (PD_j^s - PD_j^b) * LGD_{ij}^a * EaD_{ij}^{a,t} \quad (8)$$

where $\mathbb{E}_t[L_{ij}^{xa}]$ gives the expected loss under scenario $x = \{s, b\}$ given the available information at time t. It is given by the multiplication of the probability of default of firm j in scenario x times the loss given default (LGD) and the exposure at default (EaD) for institution i's investments in j in asset class a: ($PD_j^{x*} LGD_{ij}^{a,t} EaD_{ij}^{a,t}$). To analyse the credit risk for the loan channel, the expected loss is an essential metric for understanding the impact of climate risks on the loan portfolios of banks. Expected loss is the amount that a bank is expected to lose on its lending exposure in the normal conduct of business and in the current environment and hence for which it needs to make provision. Such a credit risk provision reflects the probability that a counterparty will default and the expected amount the bank will stand to lose. Transition risk in this exercise is measured as the change in expected loss under a set of delayed climate transition scenarios. For now, we assume that the LGD and EaD are not dependent on the scenario x. While the LGD is set to 0.6, the EaD in this analysis is set equal to the total outstanding debt of each firm j to capture the overall exposure of the financial sector.

Construction of Scenarios

Through Asset Impact we can leverage data on the current t_0=2021 production level of each of the climate-relevant firms $j \in \mathcal{F}$ in each industry y and each technology h, as well as the carbon intensity associated with the production in technology h. Let us refer to the actual production level of the firm j in industry y and technology h at time t_0 as $P_{ijh}^{t_0}$, where we have removed the scenario superscript x to signify actual production at time t_0.

Furthermore, Asset Impact has collected data from sector specific business intelligence data providers that gather from annual reports and other public sources the planned production levels of each firm in each climate-critical industry and each technology for the next 5 years, i.e., we have the following data on production plans: $P_{ijh}^{t_0}$,…, $P_{ijh}^{t_0+5}$. Based on this information, we construct the firm-specific planned production scenario for each technology h.

Given the long-time horizons of the Paris-aligned transition, we then continue the planned production of firm j with a current policies scenario, that represents a baseline picture of how global energy markets would evolve if governments made no changes to their existing policies and announced policy intentions. The combination of these two scenario components (i.e. the planned production and the current policies scenario) form our baseline scenario b. In other words, we assume that a firm produces according to its own technology-specific production plan on the physical production asset-level and then follows the current policies scenario.

We then construct our target scenario, namely the late and sudden shock transition scenario s. This scenario assumes that firms continue to produce according to the baseline scenario, until the introduction of a "climate action" shock, that shifts the production for firm j in each technology h onto a Paris-aligned path, to in aggregate comply with the production trajectories and carbon budgets described in the target scenario. The mechanisms of the model work in a way that reflect that the later such transition policies are implemented, the longer firms in climate-critical sectors remain misaligned with the target scenario, and the steeper a potential adjustment in production levels will be. Note that climate action in our model is not restricted to being dependent on strong government intervention, but that transition can also be driven by firms' strategic decisions. We therefore construct a continuum set of transition shock scenarios that vary by the introduction of the shock year. The later the introduction of the shock year, the longer firm j produces according to its planned production and baseline. In the model mechanics, such delayed climate action leads to a more abrupt and greater magnitude of impact to the firm's profitability to compensate for prior overproduction.

Leveraging off the inputs from the technology production trajectories and information on physical production infrastructure from Asset Impact, we can project production levels for a climate-relevant firm j ∈ $\mathcal{F}$, in scenarios $x \in \delta$ for products in industry $y \in \mathcal{Y}$ made of technology $h \in \mathcal{H}$. The scenarios also contain the estimates of product price $P_{yh}^{x,v}$ in the different scenarios.

Importantly, the scenarios specify how much production levels for an industry y, $P_{yh}^{x,t}$ as a whole will need to change over time away from carbon-intensive technologies h towards greener alternatives to be in line with the stated objective.

The scenarios provided by the IEA and NGFS do not specify firm-specific transition paths away from carbon-intensive production towards greener alternatives, but instead define them at the level of an industry. We therefore translate the industry-wide scenario to a firm-specific one by assuming that the requisite change towards green production in carbon-intensive production in an industry must be implemented by the firms in the industry according to their market share. Hence, the firm-specific requisite production levels $P_{jyh}^{x,t}$ per technology h in industry y at time t_0 under scenario x are given by its total market share in technology h at time t_0 as observed in data ($\frac{P_{jyh}^{x,t_0}}{P_{yh}^{x,t_0}}$) times the IEA industry-wide production level $P_{yh}^{x,t}$ in technology h:

$$P_{jyh}^{x,t} = \frac{P_{jyh}^{x,t_0}}{P_{yh}^{x,t_0}} P_{yh}^{x,t} \quad \text{, where} \quad P_{yh}^{x,t_0} = \sum_{j \in \mathcal{F}} P_{jyh}^{x,t_0}.$$

If a firm maintains its market share in a technology h over time, it can be seen from the equation above that a firm that has a smaller market share in green technologies today will be at greater transition risk tomorrow if its carbon-intensive technologies are subject to a phaseout according to the IEA or NGFS scenarios $P_{yh}^{x,t}$. In our model, misaligned firms will therefore not only be faced with higher transition risks, but also miss first-mover advantages in seizing new market shares of sustainable technologies.

Annex III: Companies Included

The table below includes a record of the companies that were included in this analysis along with their NAIC company codes, type of business, national premium, and which of the three states they were licensed in (L). The criteria for inclusion was insurers licensed in California, Oregon, or Washington earning at least $100 million in national premium. The analysis was performed on the corporate bond and listed equity investments reported for year-end 2021 through schedule D reporting.

Note that while some of the companies included here were also included in the California Department of Insurance's prior PACTA scenario analysis released in 2018/19, the results are not directly comparable due to differences in the cohort, changes in the data sources used by PACTA, and updates to methodologies.

Company Code	Company Name	Type	National Premium	California	Oregon	Washington
10014	Affiliated Fm Ins Co	P&C	$1,151,478,474	L	L	L
10030	Westchester Fire Ins Co	P&C	$774,647,364	L	L	L
10051	Lyndon Southern Ins Co	P&C	$753,810,848	N	L	L
10052	Chubb Natl Ins Co	P&C	$805,622,524	L	L	L
10054	Securian Cas Co	P&C	$357,690,813	L	L	L
10111	American Bankers Ins Co Of FL	P&C	$5,569,778,769	L	L	L
10120	Everest Natl Ins Co	P&C	$1,242,072,883	L	L	L
10123	Atrio Hlth Plans Inc	Health	$243,413,818	N	L	N
10127	Allied Ins Co of Amer	P&C	$283,693,801	N	L	L
10166	Accident Fund Ins Co of Amer	P&C	$830,658,882	L	L	L
10182	Geovera Specialty Ins Co	P&C	$236,658,351	L	E	E
10192	Progressive Select Ins Co	P&C	$3,247,559,630	L	N	N
10193	Progressive Express Ins Co	P&C	$1,004,068,989	L	N	N
10194	Artisan & Truckers Cas Co	P&C	$1,183,197,825	N	L	N
10200	Hiscox Ins Co Inc	P&C	$590,977,802	L	L	L
10212	Allmerica Fin Alliance Ins Co	P&C	$163,555,472	N	L	L
10243	National Continental Ins Co	P&C	$267,669,605	L	L	L
10336	First Acceptance Ins Co Inc	P&C	$135,193,734	L	N	N
10346	Employers Preferred Ins Co	P&C	$358,734,896	L	L	N
10391	Berkshire Hathaway Direct Ins Co	P&C	$217,667,030	L	L	L
10464	Canal Ins Co	P&C	$353,375,267	L	L	L
10510	Carolina Cas Ins Co	P&C	$367,934,933	L	L	L
10638	Proselect Ins Co	P&C	$269,704,553	L	L	L
10641	Endurance Amer Ins Co	P&C	$885,490,164	L	L	L
10642	Cherokee Ins Co	P&C	$260,402,610	L	L	L
10677	The Cincinnati Ins Co	P&C	$4,516,728,629	L	L	L
10683	Wawanesa Gen Ins Co	P&C	$583,245,089	L	L	N
10690	Allied World Natl Assur Co	P&C	$624,178,157	E	L	L
10723	Nationwide Assur Co	P&C	$140,371,645	L	L	L
10804	Continental Western Ins Co	P&C	$290,134,681	N	L	L
10815	Verlan Fire Ins Co MD	P&C	$114,731,066	L	L	L
10847	Cumis Ins Society Inc	P&C	$565,555,800	L	L	L
10855	Cypress Ins Co	P&C	$271,042,293	L	N	N
10872	American Strategic Ins Corp	P&C	$1,307,147,619	N	L	L
10885	Key Risk Ins Co	P&C	$130,913,920	L	L	L
10900	Preferred Employers Ins Co	P&C	$144,656,497	L	L	L
10914	Kemper Independence Ins Co	P&C	$250,838,015	L	L	N
10916	Suretec Ins Co	P&C	$104,028,331	L	L	L
10920	Alliance United Ins Co	P&C	$900,527,560	L	N	N
10921	CSAA Fire & Cas Ins Co	P&C	$186,003,162	L	L	L

10936	Seneca Ins Co Inc	P&C	$286,480,467	L	L	L
10945	Tokio Marine Amer Ins Co	P&C	$504,939,066	L	L	L
10970	Response Ind Co Of CA	P&C	$102,965,619	L	N	N
10974	Root Ins Co	P&C	$724,389,928	L	L	L
11000	Sentinel Ins Co Ltd	P&C	$1,206,198,262	L	L	L
11030	MEMIC Ind Co	P&C	$148,785,790	L	L	L
11118	Federated Rural Electric Ins Exch	P&C	$187,259,970	L	L	L
11126	Sompo Amer Ins Co	P&C	$553,991,116	L	L	L
11150	Arch Ins Co	P&C	$3,125,185,226	L	L	L
11185	Foremost Ins Co Grand Rapids MI	P&C	$2,726,245,576	L	L	L
11255	Caterpillar Ins Co	P&C	$488,801,556	L	L	L
11371	Great West Cas Co	P&C	$1,260,656,840	L	L	L
11523	Wright Natl Flood Ins Co	P&C	$747,383,810	L	L	L
11551	Endurance Assur Corp	P&C	$510,198,063	L	L	L
11555	Pacific Compensation Ins Co	P&C	$149,299,094	L	L	N
11630	Jefferson Ins Co	P&C	$915,777,217	L	L	L
11673	Redwood Fire & Cas Ins Co	P&C	$325,926,722	L	L	L
11770	United Financial Cas Co	P&C	$3,027,289,452	L	L	L
11843	Medical Protective Co	P&C	$691,718,779	L	L	L
11908	Mercury Cas Co	P&C	$189,834,838	L	N	L
11991	National Cas Co	P&C	$1,547,643,569	L	L	L
12130	New South Ins Co	P&C	$108,104,395	N	L	L
12177	Compwest Ins Co	P&C	$157,726,061	L	L	L
12193	Aetna Better Hlth of MI Inc	Health	$498,115,572	N	L	N
12262	Pennsylvania Manufacturers Assoc Ins	P&C	$533,967,373	L	L	L
12277	Health Plan of CareOregon Inc	Health	$216,994,856	N	L	N
12294	Southwest Marine & Gen Ins Co	P&C	$133,369,896	L	L	L
12304	Accident Fund Gen Ins Co	P&C	$414,066,587	E	L	L
12305	Accident Fund Natl Ins Co	P&C	$176,815,721	N	L	L
12360	Ocean Harbor Cas Ins Co	P&C	$330,296,247	L	N	N
12416	Protective Ins Co	P&C	$571,635,588	L	L	L
12502	DB Ins Co Ltd (US Branch)	P&C	$245,241,187	L	N	N
12521	Safeway Ins Co	P&C	$174,875,567	L	L	L
12536	Homeowners of Amer Ins Co	P&C	$335,046,871	N	L	L
12548	American Agri Business Ins Co	P&C	$2,571,826,432	L	L	L
12559	Trillium Comm Hlth Plan Inc	Health	$258,819,622	N	L	N
12567	Care Improvement Plus S Central Ins	Life	$2,568,948,188	N	L	L
12572	Selective Ins Co Of Amer	P&C	$905,484,933	L	L	L
12589	Loya Cas Ins Co	P&C	$172,701,879	L	N	N
12595	Pacificsource Comm Hlth Plans	Health	$405,952,724	N	L	L
12777	Chubb Ind Ins Co	P&C	$348,472,893	L	L	L
12831	State Natl Ins Co Inc	P&C	$1,029,711,598	L	L	L
12870	Sentruity Cas Co	P&C	$111,144,876	L	L	L
12873	Privilege Underwriters Recp Exch	P&C	$1,556,737,291	L	L	L
12944	Homeowners Choice Prop & Cas Ins Co	P&C	$352,450,036	L	N	N
12963	21st Century Ins Co	P&C	$419,133,068	L	L	L
13021	United Fire & Cas Co	P&C	$547,321,436	L	L	L
13056	RLI Ins Co	P&C	$766,327,521	L	L	L
13100	Omaha Ins Co	Life	$797,295,381	L	L	L
13137	Viking Ins Co Of WI	P&C	$378,347,400	L	L	L
13183	Eagle Life Ins Co	Life	$2,294,710,463	L	L	L
13188	Western Surety Co	P&C	$414,622,573	L	L	L
13234	Wilshire Ins Co	P&C	$127,819,975	L	L	L
13269	Zenith Ins Co	P&C	$613,640,472	L	L	L
13307	Lexon Ins Co	P&C	$100,214,874	L	L	L
13528	Brotherhood Mut Ins Co	P&C	$643,997,995	L	L	L
13544	California Capital Ins Co	P&C	$305,683,736	L	Q	N

13634	Essent Guar Inc	P&C	$870,855,616	L	L	L
13695	National Mortgage Ins Corp	P&C	$557,050,057	L	L	L
13714	Pharmacists Mut Ins Co	P&C	$174,370,483	L	L	L
13897	Farmers Mut Hail Ins Co Of IA	P&C	$913,896,594	L	L	L
13935	Federated Mut Ins Co	P&C	$1,486,798,703	L	L	L
13986	Frankenmuth Mut Ins Co	P&C	$769,397,752	N	L	L
14042	ASI Select Ins Corp	P&C	$128,543,975	L	N	N
14073	Amerigroup Washington Inc	Health	$1,153,063,869	N	N	L
14133	Qualitas Ins Co	P&C	$105,750,650	L	L	L
14137	GEICO Secure Ins Co	P&C	$1,746,408,122	N	L	L
14138	GEICO Advantage Ins Co	P&C	$2,455,209,950	N	L	L
14139	GEICO Choice Ins Co	P&C	$1,254,556,315	N	L	L
14184	Acuity A Mut Ins Co	P&C	$1,996,258,445	N	L	L
14354	Jewelers Mut Ins Co S I	P&C	$297,996,500	L	L	L
14494	Merchants Bonding Co a Mut	P&C	$105,133,761	L	L	L
14761	Mutual Of Enumclaw Ins Co	P&C	$402,653,109	N	L	L
14788	NGM Ins Co	P&C	$344,767,692	N	L	L
14907	Oregon Mut Ins Co	P&C	$206,811,234	L	L	L
14974	Pennsylvania Lumbermens Mut Ins	P&C	$304,751,872	L	L	L
14982	Penn Millers Ins Co	P&C	$174,054,222	N	L	L
15032	GuideOne Ins Co	P&C	$366,480,504	L	L	L
15082	Health Alliance NW Hlth Plan	Health	$113,911,610	N	N	L
15105	Safety Natl Cas Corp	P&C	$1,020,419,233	L	L	L
15130	Encompass Ind Co	P&C	$291,607,049	N	L	L
15203	Providence Hlth Assur	Health	$952,282,989	N	L	L
15350	West Bend Mut Ins Co	P&C	$1,640,150,466	L	L	L
15352	Coordinated Care of WA Inc	Health	$911,878,834	N	N	L
15377	Western Natl Mut Ins Co	P&C	$448,160,268	L	L	L
15539	CSAA Ins Exch	P&C	$2,882,321,315	L	N	N
15563	Clear Spring Prop & Cas Co	P&C	$254,171,191	L	L	L
15580	Scottsdale Ind Co	P&C	$316,322,325	L	L	L
15598	Interins Exch Of The Automobile Club	P&C	$3,663,474,483	L	N	N
15873	United Guar Residential Ins Co	P&C	$207,766,216	L	L	L
15884	Falls Lake Fire & Cas Co	P&C	$160,087,595	L	E	E
15954	AmTrust Ins Co	P&C	$308,992,869	N	L	L
16023	Lemonade Ins Co	P&C	$372,860,837	L	L	L
16024	Federated Reserve Ins Co	P&C	$204,040,485	N	L	L
16044	Everest Denali Ins Co	P&C	$207,523,810	L	L	L
16045	Everest Premier Ins Co	P&C	$274,485,376	L	L	L
16109	Starr Specialty Ins Co	P&C	$112,583,094	L	L	L
16187	Metromile Ins Co	P&C	$110,722,881	L	L	L
16217	National Farmers Union Prop & Cas	P&C	$155,305,735	L	L	L
16242	Aetna Better Hlth of WA Inc	Health	$251,352,006	N	N	L
16322	Progressive Direct Ins Co	P&C	$4,896,580,364	L	L	L
16535	Zurich Amer Ins Co	P&C	$7,349,510,410	L	L	L
16578	Stillwater Prop & Cas Ins Co	P&C	$183,334,466	L	L	L
16608	New York Marine & Gen Ins Co	P&C	$662,391,301	L	L	L
16624	Allied World Specialty Ins Co	P&C	$641,473,931	L	L	L
16691	Great Amer Ins Co	P&C	$3,051,150,853	L	L	L
16705	Dealers Assur Co	P&C	$281,232,017	L	L	L
17230	Allstate Prop & Cas Ins Co	P&C	$5,002,448,773	L	L	L
18023	Star Ins Co	P&C	$264,467,843	L	L	L
18058	Philadelphia Ind Ins Co	P&C	$3,575,433,437	L	L	L
18139	Peak Prop & Cas Ins Corp	P&C	$379,130,231	N	L	L
18279	Bankers Standard Ins Co	P&C	$806,666,228	L	L	L
18287	Assured Guar Municipal Corp	P&C	$260,150,865	L	L	L
18600	USAA Gen Ind Co	P&C	$5,041,302,399	L	L	L

18694	Great Midwest Ins Co	P&C	$192,258,573	L	L	L
18767	Church Mut Ins Co S I	P&C	$954,375,439	L	L	L
18961	Crestbrook Ins Co	P&C	$525,239,662	L	L	L
19038	Travelers Cas & Surety Co	P&C	$357,112,592	L	L	L
19046	Travelers Cas Ins Co Of Amer	P&C	$1,110,763,823	L	L	L
19062	Automobile Ins Co Of Hartford CT	P&C	$519,457,745	N	L	L
19070	Standard Fire Ins Co	P&C	$3,314,777,584	L	L	L
19100	Amco Ins Co	P&C	$898,129,698	L	L	L
19232	Allstate Ins Co	P&C	$5,379,019,878	L	L	L
19240	Allstate Ind Co	P&C	$2,890,858,603	L	L	L
19275	American Family Mut Ins Co SI	P&C	$3,898,219,103	N	L	L
19380	American Home Assur Co	P&C	$410,349,010	L	L	L
19399	AIU Ins Co	P&C	$384,629,182	L	L	L
19402	AIG Prop Cas Co	P&C	$1,550,770,536	L	L	L
19410	Commerce & Industry Ins Co	P&C	$181,531,124	L	L	L
19429	Insurance Co Of The State Of PA	P&C	$416,805,720	L	L	L
19445	National Union Fire Ins Co Of Pitts	P&C	$5,447,906,564	L	L	L
19488	Amerisure Ins Co	P&C	$321,978,455	N	L	L
19489	Allied World Assur Co US Inc	P&C	$666,501,907	L	E	E
19615	American Reliable Ins Co	P&C	$174,089,259	L	L	L
19631	American Road Ins Co	P&C	$323,420,362	L	L	L
19682	Hartford Fire Ins Co	P&C	$2,191,091,030	L	L	L
19720	American Alt Ins Corp	P&C	$529,505,529	L	L	L
19801	Argonaut Ins Co	P&C	$821,860,265	L	L	L
19879	Security Natl Ins Co	P&C	$557,608,920	L	L	L
19917	Liberty Ins Underwriters Inc	P&C	$3,560,336,101	L	L	L
19941	American Commerce Ins Co	P&C	$164,246,465	L	L	L
19976	Amica Mut Ins Co	P&C	$2,225,999,447	L	L	L
19992	American Select Ins Co	P&C	$550,442,888	N	N	L
20010	Acceptance Ind Ins Co	P&C	$119,801,660	L	L	L
20044	Berkshire Hathaway Homestate Ins Co	P&C	$447,364,602	L	L	L
20052	National Liab & Fire Ins Co	P&C	$902,811,397	L	L	L
20087	National Ind Co	P&C	$230,623,595	L	L	L
20095	BITCO Gen Ins Corp	P&C	$376,941,053	L	L	L
20117	California Cas Ind Exch	P&C	$302,064,416	L	L	L
20281	Federal Ins Co	P&C	$6,649,216,736	L	L	L
20303	Great Northern Ins Co	P&C	$1,310,595,164	L	L	L
20338	Palomar Specialty Ins Co	P&C	$321,769,712	L	L	L
20346	Pacific Ind Co	P&C	$628,198,017	L	L	L
20362	Mitsui Sumitomo Ins Co of Amer	P&C	$318,877,641	L	L	L
20370	AXIS Reins Co	P&C	$127,836,373	L	L	L
20397	Vigilant Ins Co	P&C	$406,799,583	L	L	L
20427	American Cas Co Of Reading PA	P&C	$716,606,725	L	L	L
20443	Continental Cas Co	P&C	$7,549,678,643	L	L	L
20478	National Fire Ins Co Of Hartford	P&C	$542,177,992	L	L	L
20494	Transportation Ins Co	P&C	$336,509,644	L	L	L
20508	Valley Forge Ins Co	P&C	$557,390,677	L	L	L
20516	Euler Hermes N Amer Ins Co	P&C	$432,385,652	L	L	L
20699	Ace Prop & Cas Ins Co	P&C	$3,498,938,793	L	L	L
20702	Ace Fire Underwriters Ins Co	P&C	$203,044,494	L	L	L
20990	Country Mut Ins Co	P&C	$1,902,295,665	N	L	L
21008	Country Pref Ins Co	P&C	$841,574,017	N	L	L
21105	North River Ins Co	P&C	$459,948,192	L	L	L
21113	United States Fire Ins Co	P&C	$1,462,435,962	L	L	L
21164	Dairyland Ins Co	P&C	$110,095,738	N	L	L
21172	Vanliner Ins Co	P&C	$227,057,511	L	L	L
21180	Sentry Select Ins Co	P&C	$873,715,056	L	L	L

21253	Garrison Prop & Cas Ins Co	P&C	$3,127,037,109	L	L	L
21261	Electric Ins Co	P&C	$229,571,070	L	L	L
21407	Emcasco Ins Co	P&C	$411,986,741	L	L	L
21415	Employers Mut Cas Co	P&C	$1,235,698,447	L	L	L
21458	Employers Ins Co of Wausau	P&C	$639,287,204	L	L	L
21482	Factory Mut Ins Co	P&C	$4,451,500,649	L	L	L
21636	Farmers Ins Co Of OR	P&C	$269,035,586	L	L	N
21644	Farmers Ins Co Of WA	P&C	$243,995,930	Q	N	L
21652	Farmers Ins Exch	P&C	$5,716,069,830	L	L	L
21660	Fire Ins Exch	P&C	$1,567,394,654	L	L	L
21687	Mid Century Ins Co	P&C	$2,555,895,539	L	L	L
21709	Truck Ins Exch	P&C	$1,348,671,378	L	L	L
21727	Progressive Universal Ins Co	P&C	$1,489,620,649	N	L	N
21784	Firemens Ins Co Of Washington DC	P&C	$191,792,541	N	L	L
21849	American Automobile Ins Co	P&C	$198,872,545	L	L	L
21873	Firemans Fund Ins Co	P&C	$1,003,982,936	L	L	L
22012	Motors Ins Corp	P&C	$213,216,940	L	L	L
22055	Geico Ind Co	P&C	$6,273,637,139	L	L	L
22063	Government Employees Ins Co	P&C	$6,445,688,277	L	L	L
22101	Grange Ins Assn	P&C	$161,636,876	L	L	L
22136	Great Amer Ins Co of NY	P&C	$161,232,064	L	L	L
22209	Freedom Specialty Ins Co	P&C	$303,273,658	L	L	L
22268	Infinity Ins Co	P&C	$921,945,977	L	L	L
22276	Berkshire Hathaway Specialty Ins Co	P&C	$1,570,029,176	L	L	L
22292	Hanover Ins Co	P&C	$1,634,595,745	L	L	L
22306	Massachusetts Bay Ins Co	P&C	$568,140,371	L	L	L
22314	RSUI Ind Co	P&C	$729,690,043	L	L	L
22322	Greenwich Ins Co	P&C	$890,612,538	L	L	L
22357	Hartford Accident & Ind Co	P&C	$683,052,314	L	L	L
22578	Horace Mann Ins Co	P&C	$229,201,778	L	L	L
22608	National Specialty Ins Co	P&C	$298,911,982	L	L	L
22667	Ace Amer Ins Co	P&C	$5,749,315,885	L	L	L
22683	Teachers Ins Co	P&C	$179,660,994	N	L	L
22713	Insurance Co of N Amer	P&C	$176,062,747	L	L	L
22730	Allied World Ins Co	P&C	$335,631,939	L	L	L
22748	Pacific Employers Ins Co	P&C	$149,034,514	L	L	L
22756	Horace Mann Prop & Cas Ins Co	P&C	$202,478,272	L	L	L
22772	Integon Ind Corp	P&C	$669,786,410	N	L	L
22837	AGCS Marine Ins Co	P&C	$497,071,088	L	L	L
22926	Economy Fire & Cas Co	P&C	$134,407,679	L	L	L
23035	Liberty Mut Fire Ins Co	P&C	$3,234,697,575	L	L	L
23043	Liberty Mut Ins Co	P&C	$2,857,638,128	L	L	L
23248	Occidental Fire & Cas Co Of NC	P&C	$680,430,605	L	L	L
23280	The Cincinnati Ind Co	P&C	$456,269,140	L	L	L
23396	Amerisure Mut Ins Co	P&C	$399,054,830	L	L	L
23418	Mid Continent Cas Co	P&C	$139,353,511	L	L	L
23434	Middlesex Ins Co	P&C	$311,705,796	L	L	L
23450	American Family Home Ins Co	P&C	$234,540,747	L	L	L
23469	American Modern Home Ins Co	P&C	$353,781,610	L	L	L
23574	Midwest Family Mut Ins Co	P&C	$225,956,669	N	L	L
23582	Harleysville Ins Co	P&C	$227,472,093	L	L	L
23612	Midwest Employers Cas Co	P&C	$275,699,535	L	L	L
23647	Ironshore Ind Inc	P&C	$256,246,122	L	L	L
23663	National Amer Ins Co	P&C	$219,091,969	L	L	L
23728	National Gen Ins Co	P&C	$225,620,132	L	L	L
23752	Ascot Ins Co	P&C	$295,842,857	L	L	L
23760	Nationwide Gen Ins Co	P&C	$1,827,051,257	L	L	L

23779	Nationwide Mut Fire Ins Co	P&C	$801,107,272	L	L	L
23787	Nationwide Mut Ins Co	P&C	$2,885,396,444	L	L	L
23809	Granite State Ins Co	P&C	$219,758,839	L	L	L
23817	Illinois Natl Ins Co	P&C	$124,014,462	N	L	L
23841	New Hampshire Ins Co	P&C	$646,609,044	L	L	L
24015	Northland Ins Co	P&C	$490,908,435	L	L	L
24066	American Fire & Cas Co	P&C	$352,527,202	L	L	L
24074	Ohio Cas Ins Co	P&C	$1,199,320,412	L	L	L
24112	Westfield Ins Co	P&C	$966,467,011	N	L	L
24120	Westfield Natl Ins Co	P&C	$304,786,655	L	N	L
24147	Old Republic Ins Co	P&C	$2,253,416,025	L	L	L
24252	Progressive Amer Ins Co	P&C	$2,734,725,913	N	N	L
24260	Progressive Cas Ins Co	P&C	$2,530,753,683	L	L	L
24279	Progressive Max Ins Co	P&C	$337,676,808	N	L	L
24341	Pemco Mut Ins Co	P&C	$498,446,630	N	L	L
24376	Spinnaker Ins Co	P&C	$473,954,026	L	L	L
24414	General Cas Co Of WI	P&C	$311,449,624	L	L	L
24449	Regent Ins Co	P&C	$104,859,211	L	L	L
24554	XL Ins Amer Inc	P&C	$1,216,356,790	L	L	L
24724	First Natl Ins Co Of Amer	P&C	$540,892,175	L	L	L
24740	Safeco Ins Co Of Amer	P&C	$3,357,429,828	L	L	L
24767	St Paul Fire & Marine Ins Co	P&C	$208,518,846	L	L	L
24988	Sentry Ins Co	P&C	$579,184,064	L	L	L
25011	Wesco Ins Co	P&C	$2,265,746,696	L	L	L
25054	Hudson Ins Co	P&C	$1,827,976,512	L	L	L
25089	Coast Natl Ins Co	P&C	$421,355,117	L	L	L
25143	State Farm Fire & Cas Co	P&C	$22,314,153,335	L	L	L
25151	State Farm Gen Ins Co	P&C	$2,938,386,899	L	L	L
25178	State Farm Mut Auto Ins Co	P&C	$40,624,420,247	L	L	L
25180	Stillwater Ins Co	P&C	$262,853,663	L	L	L
25186	Emc Prop & Cas Ins Co	P&C	$172,328,436	N	L	L
25224	Great Divide Ins Co	P&C	$317,658,293	L	L	L
25240	NAU Country Ins Co	P&C	$2,673,149,507	L	L	L
25321	Farmers Direct Prop & Cas Ins Co	P&C	$352,807,727	L	L	L
25402	Employers Assur Co	P&C	$185,749,977	L	L	N
25422	Atradius Trade Credit Ins Co	P&C	$119,954,658	L	L	L
25453	Nationwide Ins Co Of Amer	P&C	$1,619,266,557	L	L	L
25615	Charter Oak Fire Ins Co	P&C	$1,573,883,537	N	L	L
25623	Phoenix Ins Co	P&C	$1,310,761,417	N	L	L
25658	Travelers Ind Co	P&C	$2,025,102,061	L	L	L
25666	Travelers Ind Co Of Amer	P&C	$1,158,530,090	N	L	L
25674	Travelers Prop Cas Co Of Amer	P&C	$5,825,237,295	L	L	L
25682	Travelers Ind Co Of CT	P&C	$1,499,439,690	L	L	L
25712	Esurance Ins Co	P&C	$496,454,671	L	L	L
25844	Union Ins Co	P&C	$346,417,061	N	L	L
25895	United States Liab Ins Co	P&C	$636,333,309	L	L	L
25941	United Serv Automobile Assn	P&C	$9,231,481,698	L	L	L
25968	USAA Cas Ins Co	P&C	$7,851,049,993	L	L	L
25976	Utica Mut Ins Co	P&C	$304,873,263	L	L	L
25984	Graphic Arts Mut Ins Co	P&C	$180,769,585	L	N	N
26042	Wausau Underwriters Ins Co	P&C	$402,618,578	L	L	L
26077	Lancer Ins Co	P&C	$234,262,509	L	L	L
26093	Nationwide Affinity Co of Amer	P&C	$453,377,207	N	L	L
26247	American Guar & Liab Ins	P&C	$1,301,292,189	L	L	L
26298	Farmers Prop & Cas Ins Co	P&C	$1,490,929,017	N	L	L
26344	Great Amer Assur Co	P&C	$841,159,630	L	L	L
26379	Accredited Surety & Cas Co Inc	P&C	$421,063,620	L	L	L

26433	Harco Natl Ins Co	P&C	$311,169,467	L	L	L
26492	Courtesy Ins Co	P&C	$702,647,829	L	L	L
26565	Ohio Ind Co	P&C	$479,406,614	L	L	L
26581	Independence Amer Ins Co	P&C	$193,349,813	L	L	L
26611	Blackboard Ins Co	P&C	$127,886,448	L	L	L
26832	Great Amer Alliance Ins Co	P&C	$441,845,979	L	L	L
26905	Century Natl Ins Co	P&C	$172,782,190	L	L	L
26921	Everest Reins Co	P&C	$483,790,281	L	L	L
27120	Trumbull Ins Co	P&C	$1,212,632,238	L	L	L
27154	Atlantic Specialty Ins Co	P&C	$1,290,464,847	L	L	L
27553	Mercury Ins Co	P&C	$1,899,720,421	L	N	N
27847	Insurance Co Of The West	P&C	$899,009,749	L	L	L
28207	Anthem Ins Co Inc	P&C	$10,445,372,264	L	L	L
28223	Nationwide Agribusiness Ins Co	P&C	$1,367,542,168	L	L	L
28304	Federated Serv Ins Co	P&C	$275,515,264	L	L	L
28401	American Natl Prop & Cas Co	P&C	$961,278,991	L	L	L
28460	Sentry Cas Co	P&C	$165,516,591	L	L	L
28665	The Cincinnati Cas Co	P&C	$553,598,143	L	L	L
28746	Equity Ins Co	P&C	$138,382,875	L	L	L
28860	Clear Blue Ins Co	P&C	$526,721,167	L	L	L
28886	Transguard Ins Co Of Amer Inc	P&C	$181,337,157	L	L	L
28932	Markel Amer Ins Co	P&C	$1,091,032,400	L	L	L
29068	American Family Connect Prop & Cas I	P&C	$1,153,310,568	L	L	L
29157	United WI Ins Co	P&C	$391,729,127	L	L	L
29424	Hartford Cas Ins Co	P&C	$1,065,414,446	L	L	L
29459	Twin City Fire Ins Co Co	P&C	$1,763,540,443	L	L	L
29580	Berkley Regional Ins Co	P&C	$171,316,995	L	L	L
29599	US Specialty Ins Co	P&C	$897,385,923	L	L	L
29688	Allstate Fire & Cas Ins Co	P&C	$10,333,816,968	N	L	L
29742	Integon Natl Ins Co	P&C	$1,411,072,971	L	L	L
29858	Mortgage Guar Ins Corp	P&C	$1,118,379,521	L	L	L
29874	North Amer Specialty Ins Co	P&C	$339,785,347	L	L	L
29980	First Colonial Ins Co	P&C	$243,330,058	L	L	L
30104	Hartford Underwriters Ins Co	P&C	$1,483,884,256	L	L	L
30210	Esurance Prop & Cas Ins Co	P&C	$1,347,391,181	L	L	L
30830	Arch Ind Ins Co	P&C	$100,483,644	L	L	L
31003	Tri State Ins Co Of MN	P&C	$253,720,606	L	L	L
31119	Medico Ins Co	Life	$126,227,342	L	L	L
31135	Great Amer Security Ins Co	P&C	$158,180,117	L	L	L
31194	Travelers Cas & Surety Co Of Amer	P&C	$2,698,808,986	L	L	L
31325	Acadia Ins Co	P&C	$374,206,378	N	L	L
31348	Crum & Forster Ind Co	P&C	$107,571,347	L	L	L
31470	Norguard Ins Co	P&C	$545,189,456	L	L	L
31488	Integon Preferred Ins Co	P&C	$290,342,472	L	N	L
31534	Citizens Ins Co Of Amer	P&C	$802,537,890	L	L	L
31887	Coface N Amer Ins Co	P&C	$128,194,638	L	L	L
31895	American Interstate Ins Co	P&C	$254,526,783	L	L	L
31925	Falls Lake Natl Ins Co	P&C	$251,038,351	E	L	L
32603	Berkley Ins Co	P&C	$1,320,681,198	L	L	L
32620	National Interstate Ins Co	P&C	$605,967,123	L	L	L
33200	Norcal Ins Co	P&C	$269,227,126	L	L	L
33391	ProAssurance Ind Co Inc	P&C	$147,083,461	L	L	L
33499	Dorinco Reins Co	P&C	$119,208,693	L	L	N
33600	LM Ins Corp	P&C	$1,209,444,909	L	L	L
33723	Great Amer Spirit Ins Co	P&C	$171,033,102	L	L	L
33790	Radian Guar Inc	P&C	$978,291,045	L	L	L
33898	Aegis Security Ins Co	P&C	$177,355,708	L	L	L

34274	Central States Ind Co Of Omaha	P&C	$114,025,863	L	L	L
34339	Farmers Grp Prop & Cas Ins Co	P&C	$650,163,740	L	N	L
34487	TDC Specialty Ins Co	P&C	$229,678,861	L	E	E
34495	Doctors Co An Interins Exch	P&C	$710,772,622	L	L	L
34630	Oak River Ins Co	P&C	$117,260,407	L	L	L
34690	Property & Cas Ins Co Of Hartford	P&C	$852,753,020	L	L	L
34738	Arag Ins Co	P&C	$130,281,706	L	L	L
35076	State Compensation Ins Fund	P&C	$1,235,450,577	L	N	N
35157	Fair Amer Ins & Reins Co	P&C	$142,516,592	L	L	L
35181	Executive Risk Ind Inc	P&C	$171,799,446	L	L	L
35289	Continental Ins Co	P&C	$1,375,539,435	L	L	L
35300	Allianz Global Risks US Ins Co	P&C	$1,808,856,695	L	L	L
35386	Fidelity & Guar Ins Co	P&C	$164,948,833	L	L	L
35408	Imperium Ins Co	P&C	$258,731,709	L	L	L
35769	Protective Prop & Cas Ins Co	P&C	$120,510,043	L	L	L
36064	Hanover Amer Ins Co	P&C	$295,474,151	L	L	L
36137	Travelers Commercial Ins Co	P&C	$558,174,902	L	L	L
36161	Travelers Prop Cas Ins Co	P&C	$1,017,515,230	L	L	L
36196	Saif Corp	P&C	$521,964,312	N	L	N
36234	Preferred Professional Ins Co	P&C	$159,339,395	L	L	L
36307	Gray Ins Co	P&C	$101,137,078	L	L	L
36447	LM Gen Ins Co	P&C	$3,218,563,433	L	L	L
36781	FMH Ag Risk Ins Co	P&C	$229,063,538	L	L	L
36897	Manufacturers Alliance Ins Co	P&C	$151,476,918	L	L	L
37060	Old United Cas Co	P&C	$221,639,854	L	L	L
37257	Praetorian Ins Co	P&C	$380,944,973	L	L	L
37273	Axis Ins Co	P&C	$1,152,829,684	L	L	L
37478	Hartford Ins Co Of The Midwest	P&C	$828,251,166	L	L	L
37540	Beazley Ins Co Inc	P&C	$611,216,813	L	L	L
37621	Toyota Motor Ins Co	P&C	$176,921,887	L	L	L
37648	Permanent Gen Assur Corp	P&C	$552,664,434	L	L	L
37770	CSAA Gen Ins Co	P&C	$952,913,160	L	L	L
37834	Progressive Preferred Ins Co	P&C	$1,501,844,537	N	L	L
37850	Pacific Specialty Ins Co	P&C	$232,543,342	L	L	L
37877	Nationwide Prop & Cas Ins Co	P&C	$1,587,853,934	L	L	L
37885	XL Specialty Ins Co	P&C	$3,603,086,178	L	L	L
37923	GEICO Marine Ins Co	P&C	$371,855,278	L	L	L
38067	Economy Preferred Ins Co	P&C	$206,855,035	N	L	L
38130	Travelers Personal Ins Co	P&C	$2,479,426,999	N	L	L
38245	BCS Ins Co	P&C	$401,362,834	L	L	L
38261	Hartford Ins Co Of The Southeast	P&C	$177,616,586	N	L	L
38318	Starr Ind & Liab Co	P&C	$3,015,012,243	L	L	L
38342	California Automobile Ins Co	P&C	$1,216,819,141	L	N	N
38458	Genworth Mortgage Ins Corp	P&C	$983,801,285	L	L	L
38628	Progressive Northern Ins Co	P&C	$2,540,265,766	N	L	L
38660	MIC Gen Ins Corp	P&C	$253,205,436	L	L	L
38733	Alaska Natl Ins Co	P&C	$276,387,632	L	L	L
38776	SiriusPoint Amer Ins Co	P&C	$434,438,297	L	L	L
38911	Berkley Natl Ins Co	P&C	$559,383,471	L	L	L
38970	Markel Ins Co	P&C	$645,636,727	L	L	L
39012	Safeco Ins Co Of IL	P&C	$2,255,638,073	L	L	L
39152	Service Amer Ind Co	P&C	$258,329,802	L	L	L
39217	QBE Ins Corp	P&C	$1,515,629,660	L	L	L
39306	Fidelity & Deposit Co Of MD	P&C	$527,384,574	L	L	L
39616	Vision Serv Plan Ins Co	P&C	$1,388,740,783	L	L	L
39845	Westport Ins Corp	P&C	$1,203,058,327	L	L	L
39861	Golden Bear Ins Co	P&C	$167,251,865	L	E	E

40045	Starnet Ins Co	P&C	$355,358,952	L	L	L
40142	American Zurich Ins Co	P&C	$1,176,678,007	L	L	L
40169	Farmers Cas Ins Co	P&C	$469,646,213	N	L	L
40266	ARCH Mortgage Ins Co	P&C	$904,876,821	L	L	L
40436	Stratford Ins Co	P&C	$976,921,689	L	L	L
40517	WCF Natl Ins Co	P&C	$121,198,913	L	L	L
40649	Economy Premier Assur Co	P&C	$235,395,838	N	L	L
40703	Unitrin Safeguard Ins Co	P&C	$239,563,089	N	L	N
40738	Physicians Ins A Mut Co	P&C	$111,006,162	L	L	L
40827	Virginia Surety Co Inc	P&C	$1,520,403,752	L	L	L
41181	Universal Underwriters Ins Co	P&C	$463,268,065	L	L	L
41211	Triton Ins Co	P&C	$171,111,490	L	L	L
41343	HDI Global Ins Co	P&C	$521,424,657	L	L	L
41394	Benchmark Ins Co	P&C	$582,491,374	L	L	L
41424	Pennsylvania Manufacturers Ind Co	P&C	$119,173,228	L	L	L
41483	Farmington Cas Co	P&C	$160,394,898	L	L	L
41491	Geico Cas Co	P&C	$5,941,448,305	L	L	L
41840	Allmerica Fin Benefit Ins Co	P&C	$547,784,140	L	L	L
42285	Veterinary Pet Ins Co	P&C	$176,626,315	L	N	N
42307	Navigators Ins Co	P&C	$924,329,959	L	L	L
42376	Technology Ins Co Inc	P&C	$1,201,947,964	L	L	L
42390	Amguard Ins Co	P&C	$1,587,972,514	L	L	L
42404	Liberty Ins Corp	P&C	$1,734,800,696	L	L	L
42552	Nova Cas Co	P&C	$219,281,903	L	L	L
42579	Allied Prop & Cas Ins Co	P&C	$572,503,961	L	L	L
42587	Depositors Ins Co	P&C	$518,828,018	L	L	L
42617	MAG Mut Ins Co	P&C	$343,982,209	L	L	L
42722	American Modern Prop & Cas Ins Co	P&C	$1,036,851,655	L	L	L
42757	Agri Gen Ins Co	P&C	$485,536,327	L	L	L
42919	Progressive Northwestern Ins Co	P&C	$686,696,210	L	L	L
42978	American Security Ins Co	P&C	$1,249,943,088	L	L	L
42986	Standard Guar Ins Co	P&C	$347,759,165	L	L	L
42994	Progressive Classic Ins Co	P&C	$136,416,217	N	L	L
43460	Aspen Amer Ins Co	P&C	$549,023,308	L	L	L
43494	American Hallmark Ins Co Of TX	P&C	$183,797,336	N	L	L
43575	Indemnity Ins Co Of North Amer	P&C	$1,564,491,137	L	L	L
43630	Endurance Risk Solutions Assur Co	P&C	$248,838,786	L	L	L
43753	Republic Ind Co of CA	P&C	$119,175,860	L	L	L
44393	West Amer Ins Co	P&C	$521,630,473	L	L	L
47049	Community Hlth Plan of WA	Health	$1,193,334,590	N	N	L
47055	Kaiser Found Hlth Plan of WA Options	Health	$952,474,417	N	N	L
47098	Moda Hlth Plan Inc	Health	$593,981,157	L	L	L
47341	Delta Dental of WA	Health	$426,776,665	N	N	L
47350	Asuris NW Hlth	Health	$144,883,158	N	L	L
47570	Premera Blue Cross	Health	$4,028,712,160	N	N	L
48038	UnitedHealthCare of WA Inc	Health	$1,394,616,685	N	N	L
52633	LifeWise Hlth Plan of WA	Health	$208,479,483	N	N	L
53031	VSP Vision Care Inc	Health	$232,268,040	N	N	L
53902	Regence BlueShield	Health	$1,939,076,174	N	N	L
54933	Regence BCBS of OR	Health	$2,480,483,211	N	L	L
54941	Delta Dental Plan of OR	Health	$179,477,728	N	L	N
54976	Pacificsource Hlth Plans	Health	$992,038,653	N	L	L
56014	Thrivent Financial For Lutherans	Fraternal	$5,040,436,721	L	L	L
56685	GBU Financial Life	Fraternal	$485,633,159	L	N	N
56693	GCU	Fraternal	$311,631,768	L	N	N
56782	National Slovak Society Of The Usa	Fraternal	$271,061,920	L	N	N
57320	Woodmen World Life Ins Soc	Fraternal	$546,433,716	L	L	L

57541	Modern Woodmen Of Amer	Fraternal	$1,037,455,586	L	L	L
57657	Royal Neighbors Of Amer	Fraternal	$165,942,267	L	L	L
58033	Knights Of Columbus	Fraternal	$1,094,909,038	L	L	L
58068	Independent Order Of Foresters Us Br	Fraternal	$622,273,340	L	L	L
60052	Humana Benefit Plan of IL Inc	Life	$3,774,779,266	L	L	L
60053	Kaiser Permanente Ins Co	Life	$171,239,447	L	L	L
60054	Aetna Life Ins Co	Life	$37,490,963,261	L	L	L
60131	Regence Blueshield Of ID Inc	Life	$458,888,240	N	N	L
60142	TIAA Cref Life Ins Co	Life	$523,034,842	L	L	L
60176	SBLI USA Life Ins Co Inc	Life	$506,875,745	N	L	L
60183	S USA Life Ins Co Inc	Life	$902,914,759	L	L	L
60186	Everlake Life Ins Co	Life	$409,306,808	L	L	L
60216	Amalgamated Life Ins Co	Life	$110,868,623	L	L	L
60232	Lombard Intl Life Assur Co	Life	$859,311,018	L	L	L
60275	American Bankers Life Assur Co Of FL	Life	$275,318,356	L	L	L
60380	American Family Life Assur Co of Col	Life	$4,421,894,780	L	L	L
60399	American Family Life Ins Co	Life	$481,250,384	L	L	L
60410	American Fidelity Assur Co	Life	$1,439,161,590	L	L	L
60445	Sagicor Life Ins Co	Life	$962,286,231	L	L	L
60488	American Gen Life Ins Co	Life	$16,289,869,158	L	L	L
60518	American Hlth & Life Ins Co	Life	$274,092,466	L	L	L
60534	American Heritage Life Ins Co	Life	$1,012,926,469	L	L	L
60577	American Income Life Ins Co	Life	$1,404,997,849	L	L	L
60704	Wilton Reassur Life Co of NY	Life	$229,895,893	L	L	L
60739	American Natl Ins Co	Life	$2,633,464,638	L	L	L
60895	American United Life Ins Co	Life	$5,016,650,894	L	L	L
60984	Compbenefits Ins Co	Life	$557,000,713	N	L	L
61069	Anthem Life Ins Co	Life	$453,623,825	L	L	L
61115	Atlantic Coast Life Ins Co	Life	$1,014,577,679	N	L	L
61190	Auto Owners Life Ins Co	Life	$263,399,167	N	L	L
61239	Bankers Fidelity Life Ins Co	Life	$134,718,174	N	L	L
61263	Bankers Life & Cas Co	Life	$2,500,422,606	L	L	L
61271	Principal Life Ins Co	Life	$6,074,747,939	L	L	L
61301	Ameritas Life Ins Corp	Life	$3,794,535,536	L	L	L
61360	Reliastar Life Ins Co Of NY	Life	$255,581,192	L	L	L
61409	National Benefit Life Ins Co	Life	$198,631,568	L	L	L
61425	Trustmark Ins Co	Life	$395,949,531	L	L	L
61476	Boston Mut Life Ins Co	Life	$209,391,115	L	L	L
61557	Blue Shield of CA Life & Hlth Ins Co	Life	$231,173,687	L	N	N
61581	Capitol Life Ins Co	Life	$195,785,773	L	L	L
61689	Athene Ann & Life Co	Life	$22,510,113,119	L	L	L
61700	Renaissance Life & Hlth Ins Co of Am	Life	$166,633,621	L	L	L
61832	Chesapeake Life Ins Co	Life	$298,583,302	L	L	L
61883	ManhattanLife Ins & Ann Co	Life	$251,588,846	L	L	L
61999	Americo Fin Life & Ann Ins Co	Life	$880,831,719	L	L	L
62049	Colonial Life & Accident Ins Co	Life	$1,651,614,843	L	L	L
62057	Lincoln Life & Ann Co of NY	Life	$1,127,367,639	L	L	L
62065	Colonial Penn Life Ins Co	Life	$815,142,586	L	L	L
62146	Combined Ins Co Of Amer	Life	$966,571,690	L	L	L
62200	Accordia Life & Ann Co	Life	$796,506,026	L	L	L
62235	Unum Life Ins Co Of Amer	Life	$5,073,220,437	L	L	L
62286	Golden Rule Ins Co	Life	$1,712,518,428	L	L	L
62308	Connecticut Gen Life Ins Co	Life	$352,751,105	L	L	L
62324	Freedom Life Ins Co Of Amer	Life	$1,121,503,221	N	L	L
62413	Wilcac Life Ins Co	Life	$166,539,012	L	L	L
62510	Equitrust Life Ins Co	Life	$1,584,102,728	L	L	L
62553	Country Life Ins Co	Life	$509,566,430	N	L	L

62626	CMFG Life Ins Co	Life	$3,005,273,325	L	L	L
62825	Anthem Blue Cross Life & Hlth Ins Co	Life	$1,799,793,414	L	N	N
62863	Trustmark Life Ins Co	Life	$121,498,411	L	L	L
62944	Equitable Financial Life Ins Co	Life	$17,066,710,509	L	L	L
62952	SILAC Ins Co	Life	$3,808,128,922	L	L	L
63088	Farm Bureau Life Ins Co	Life	$656,013,213	N	L	L
63177	Farmers New World Life Ins Co	Life	$1,129,115,848	L	L	L
63258	Federated Life Ins Co	Life	$266,379,032	L	L	L
63274	Fidelity & Guar Life Ins Co	Life	$7,769,235,880	L	L	L
63290	Fidelity Life Assn A Legal Reserve L	Life	$168,931,250	L	L	L
63312	Great Amer Life Ins Co	Life	$5,797,655,105	L	L	L
63444	Accendo Ins Co	Life	$223,253,115	L	L	L
63967	Government Personnel Mut Life Ins Co	Life	$100,750,792	L	L	L
63983	United Heritage Life Ins Co	Life	$110,089,270	L	L	L
64017	Jefferson Natl Life Ins Co	Life	$1,400,773,518	L	L	L
64211	Guarantee Trust Life Ins Co	Life	$283,398,648	L	L	L
64238	Guaranty Income Life Ins Co	Life	$889,606,724	L	L	L
64246	Guardian Life Ins Co Of Amer	Life	$8,130,566,655	L	L	L
64505	Homesteaders Life Co	Life	$560,979,739	L	L	L
64513	Horace Mann Life Ins Co	Life	$625,123,119	L	L	L
64580	Illinois Mut Life Ins Co	Life	$109,709,279	L	L	L
64890	Berkley Life & Hlth Ins Co	Life	$462,876,507	L	L	L
64904	Investors Heritage Life Ins Co	Life	$468,229,070	L	L	L
65005	RiverSource Life Ins Co	Life	$6,818,698,525	L	L	L
65056	Jackson Natl Life Ins Co	Life	$18,773,140,084	L	L	L
65129	Kansas City Life Ins Co	Life	$292,900,555	L	L	L
65242	Lafayette Life Ins Co	Life	$594,545,234	L	L	L
65331	Liberty Natl Life Ins Co	Life	$612,122,081	L	L	L
65498	Life Ins Co Of N Amer	Life	$3,969,642,791	L	L	L
65528	Life Ins Co Of The Southwest	Life	$3,578,921,127	L	L	L
65536	Genworth Life & Ann Ins Co	Life	$1,067,548,552	L	L	L
65595	Lincoln Benefit Life Co	Life	$1,113,129,680	L	L	L
65676	Lincoln Natl Life Ins Co	Life	$26,891,195,955	L	L	L
65722	Loyal Amer Life Ins Co	Life	$297,103,579	L	L	L
65781	Madison Natl Life Ins Co Inc	Life	$149,808,965	L	L	L
65838	John Hancock Life Ins Co USA	Life	$21,154,582,978	L	L	L
65870	Manhattan Life Ins Co	Life	$180,650,684	L	L	L
65919	Primerica Life Ins Co	Life	$2,586,693,546	L	L	L
65927	Lincoln Heritage Life Ins Co	Life	$636,179,408	L	L	L
65935	Massachusetts Mut Life Ins Co	Life	$29,205,011,265	L	L	L
65978	Metropolitan Life Ins Co	Life	$24,290,022,781	L	L	L
66044	Midland Natl Life Ins Co	Life	$7,973,867,228	L	L	L
66141	Health Net Life Ins Co	Life	$1,074,711,504	L	L	L
66168	Minnesota Life Ins Co	Life	$8,509,851,859	L	L	L
66230	William Penn Life Ins Co Of NY	Life	$238,772,945	N	L	N
66370	Mony Life Ins Co	Life	$161,893,234	L	L	L
66427	Mutual Trust Life Ins Co a Pan Amer	Life	$214,528,199	L	L	L
66583	National Guardian Life Ins Co	Life	$930,317,970	L	L	L
66680	National Life Ins Co	Life	$537,839,885	L	L	L
66850	National Western Life Ins Co	Life	$748,384,999	L	L	L
66869	Nationwide Life Ins Co	Life	$13,821,761,788	L	L	L
66915	New York Life Ins Co	Life	$14,910,220,092	L	L	L
66974	North Amer Co Life & Hlth Ins	Life	$3,359,872,324	L	L	L
67091	Northwestern Mut Life Ins Co	Life	$17,868,319,804	L	L	L
67105	Reliastar Life Ins Co	Life	$3,227,528,431	L	L	L
67172	Ohio Natl Life Ins Co	Life	$837,970,262	L	L	L
67199	Old Amer Ins Co	Life	$100,434,651	L	L	L

67253	American Life & Security Corp	Life	$472,871,386	N	L	N
67369	Cigna Hlth & Life Ins Co	Life	$22,014,364,236	L	L	L
67466	Pacific Life Ins Co	Life	$13,291,642,880	L	L	L
67539	Pan Amer Life Ins Co	Life	$395,903,914	L	L	L
67598	Paul Revere Life Ins Co	Life	$165,320,262	L	L	L
67601	Unum Ins Co	Life	$133,387,030	L	L	L
67644	Penn Mut Life Ins Co	Life	$2,281,774,501	L	L	L
67784	Philadelphia Amer Life Ins Co	Life	$396,482,810	L	L	L
67814	Nassau Life Ins Co	Life	$290,536,686	L	L	L
67989	American Memorial Life Ins Co	Life	$671,597,671	L	L	L
68039	Athene Ann & Life Assur Co of NY	Life	$648,455,148	L	L	L
68136	Protective Life Ins Co	Life	$5,231,595,994	L	L	L
68195	Provident Life & Accident Ins Co	Life	$930,965,382	L	L	L
68209	Provident Life & Cas Ins Co	Life	$113,502,491	N	N	L
68241	Prudential Ins Co Of Amer	Life	$23,845,329,581	L	L	L
68322	Great W Life & Ann Ins Co	Life	$3,746,498,890	L	L	L
68357	Reliable Life Ins Co	Life	$120,367,610	L	L	L
68381	Reliance Standard Life Ins Co	Life	$2,476,581,371	L	L	L
68446	Oceanview Life & Annuity Co	Life	$1,621,084,161	L	L	L
68462	Reserve Natl Ins Co	Life	$167,318,923	L	L	L
68500	Continental Life Ins Co Brentwood	Life	$739,323,501	L	L	L
68543	Liberty Bankers Life Ins Co	Life	$553,301,690	L	L	L
68594	American Amicable Life Ins Co Of TX	Life	$176,540,602	L	L	L
68608	Symetra Life Ins Co	Life	$5,421,350,302	L	L	L
68675	Security Benefit Life Ins Co	Life	$3,887,321,503	L	L	L
68713	Security Life Of Denver Ins Co	Life	$771,355,242	L	L	L
68772	Security Mut Life Ins Co Of NY	Life	$387,505,833	L	L	L
68802	Sentinel Security Life Ins Co	Life	$966,720,738	L	L	L
68810	Sentry Life Ins Co	Life	$842,804,633	L	L	L
68985	Starmount Life Ins Co	Life	$273,613,121	L	L	L
69000	Northwestern Long Term Care Ins Co	Life	$811,854,521	L	L	L
69019	Standard Ins Co	Life	$7,393,827,252	L	L	L
69108	State Farm Life Ins Co	Life	$5,170,633,778	L	L	L
69116	State Life Ins Co	Life	$805,682,654	L	L	L
69345	Teachers Ins & Ann Assoc Of Amer	Life	$13,691,102,884	L	L	L
69396	Texas Life Ins Co	Life	$312,065,416	L	L	L
69663	USAA Life Ins Co	Life	$4,196,404,095	L	L	L
69744	Union Labor Life Ins Co	Life	$298,291,140	L	L	L
69868	United Of Omaha Life Ins Co	Life	$5,932,510,071	L	L	L
69892	United Farm Family Life Ins Co	Life	$136,634,286	L	N	N
69930	United Ins Co Of Amer	Life	$177,050,011	L	L	L
69973	United Life Ins Co	Life	$829,426,896	L	L	L
70025	Genworth Life Ins Co	Life	$2,633,761,304	L	L	L
70106	United States Life Ins Co in the Cit	Life	$2,641,193,511	L	L	L
70238	Variable Ann Life Ins Co	Life	$3,930,228,603	L	L	L
70319	Washington Natl Ins Co	Life	$734,734,938	L	L	L
70335	West Coast Life Ins Co	Life	$419,842,089	L	L	L
70408	Union Security Ins Co	Life	$139,595,303	L	L	L
70435	The Savings Bank Mut Life Ins Co of	Life	$354,022,226	L	L	L
70483	Western & Southern Life Ins Co	Life	$185,043,022	L	L	L
70580	Humanadental Ins Co	Life	$874,539,212	L	L	L
70670	Health Care Serv Corp A Mut Legal Re	Life	$43,329,816,574	N	L	N
70688	Transamerica Financial Life Ins Co	Life	$5,221,754,210	L	L	L
70815	Hartford Life & Accident Ins Co	Life	$5,409,157,684	L	L	L
70866	Everlake Assur Co	Life	$365,770,062	L	L	L
70939	Gerber Life Ins Co	Life	$1,044,195,975	L	L	L
71129	Dearborn Life Ins Co	Life	$594,157,820	L	L	L

71153	Talcott Resolution Life & Ann Ins Co	Life	$877,899,140	L	L	L
71161	Principal Natl Life Ins Co	Life	$1,126,566,987	L	L	L
71390	Puritan Life Ins Co of Amer	Life	$151,642,696	L	L	L
71404	Continental Gen Ins Co	Life	$203,312,024	L	L	L
71412	Mutual Of Omaha Ins Co	Life	$1,584,783,148	L	L	L
71420	Sierra Hlth & Life Ins Co Inc	Life	$21,391,193,077	L	L	L
71439	Assurity Life Ins Co	Life	$267,637,332	L	L	L
71480	Great Western Ins Co	Life	$217,770,953	L	L	L
71714	Berkshire Life Ins Co of Amer	Life	$660,888,350	L	L	L
71730	Continental Amer Ins Co	Life	$777,052,539	L	L	L
71854	AAA Life Ins Co	Life	$1,089,477,888	L	L	L
71870	Fidelity Security Life Ins Co	Life	$1,224,532,923	L	L	L
72052	Aetna Hlth Ins Co	Life	$472,391,789	N	L	L
72125	Physicians Life Ins Co	Life	$353,667,680	L	L	L
72222	Amica Life Ins Co	Life	$115,521,358	L	L	L
72850	United World Life Ins Co	Life	$705,020,722	L	L	L
73288	Humana Ins Co	Life	$28,799,122,359	L	L	L
73474	Dentegra Ins Co	Life	$729,282,173	L	L	L
73504	Lumico Life Ins Co	Life	$186,864,871	L	L	L
74780	Integrity Life Ins Co	Life	$373,337,526	L	L	L
76023	Columbian Life Ins Co	Life	$257,188,226	L	L	L
76112	Oxford Life Ins Co	Life	$412,937,537	L	L	L
76236	The Cincinnati Life Ins Co	Life	$408,149,443	L	L	L
77828	Companion Life Ins Co	Life	$755,101,197	N	L	L
77879	5 Star Life Ins Co	Life	$167,396,691	L	L	L
77968	Family Heritage Life Ins Co Of Amer	Life	$352,777,470	L	L	L
78077	Equitable Financial Life Ins Co of A	Life	$1,207,490,182	L	L	L
78700	Aetna Hlth & Life Ins Co	Life	$2,061,222,215	L	L	L
78743	New Era Life Ins Co	Life	$198,288,182	L	N	L
78778	Guardian Ins & Ann Co Inc	Life	$449,636,649	L	L	L
79065	Delaware Life Ins Co	Life	$2,728,588,574	L	L	L
79227	Pruco Life Ins Co	Life	$6,627,810,418	L	L	L
79413	UnitedHealthcare Ins Co	Life	$52,289,726,708	L	L	L
79987	Medico Corp Life Ins Co	Life	$159,069,791	N	L	L
80578	Physicians Mut Ins Co	P&C	$414,603,478	L	L	L
80624	American Progressive L&H Ins Of NY	Life	$844,608,148	N	L	N
80802	US Br Sun Life Assur Co of Canada	Life	$4,225,932,776	L	L	L
80926	Sun Life & Hlth Ins Co	Life	$261,092,860	L	L	L
80985	4 Ever Life Ins Co	Life	$182,080,017	L	L	L
81264	Nippon Life Ins Co Of Amer	Life	$303,177,674	L	L	L
82406	All Savers Ins Co	Life	$1,666,106,519	N	L	L
82538	National Hlth Ins Co	Life	$803,844,663	L	L	L
83607	Guggenheim Life & Ann Co	Life	$926,161,268	L	L	L
84174	ELCO Mut Life & Ann	Life	$222,023,941	L	L	L
84549	UnitedHealthcare Ins Co of Amer	Life	$2,508,923,713	L	L	L
85189	Western United Life Assur Co	Life	$428,605,156	L	L	L
85766	United Concordia Ins Co	Life	$754,148,634	L	L	L
86126	Members Life Ins Co	Life	$1,476,835,320	L	L	L
86231	Transamerica Life Ins Co	Life	$17,386,763,572	L	L	L
86509	Voya Retirement Ins & Ann Co	Life	$13,244,242,768	L	L	L
86630	Prudential Ann Life Assur Corp	Life	$4,995,339,851	L	L	L
87726	Brighthouse Life Ins Co	Life	$9,575,414,845	L	L	L
87963	National Teachers Assoc Life Ins Co	Life	$123,844,488	L	L	L
88072	Talcott Resolution Life Ins Co	Life	$1,221,658,848	L	L	L
88366	American Retirement Life Ins Co	Life	$386,921,563	L	L	N
88536	Protective Life & Annuity Ins Co	Life	$132,562,774	L	L	L
88668	Mutual Of Amer Life Ins Co	Life	$2,380,972,527	L	L	L

89206	Ohio Natl Life Assur Corp	Life	$431,381,010	L	L	L
90328	First Hlth Life & Hlth Ins Co	Life	$184,468,435	L	L	L
90557	Zurich Amer Life Ins Co	Life	$1,242,271,071	L	L	L
90611	Allianz Life Ins Co Of N Amer	Life	$14,840,016,201	L	L	L
91472	Globe Life & Accident Ins Co	Life	$999,606,394	L	L	L
91529	Unimerica Ins Co	Life	$307,351,415	L	L	L
91596	New York Life Ins & Ann Corp	Life	$13,412,082,294	L	L	L
91626	New England Life Ins Co	Life	$153,307,939	L	L	L
91642	Forethought Life Ins Co	Life	$8,002,918,118	L	L	L
92622	Western Southern Life Assur Co	Life	$3,010,868,977	L	L	L
92657	Nationwide Life & Ann Ins Co	Life	$5,568,623,455	L	L	L
92711	HCC Life Ins Co	Life	$1,795,464,726	L	L	L
92738	American Equity Invest Life Ins Co	Life	$3,664,121,099	L	L	L
92916	United Amer Ins Co	Life	$550,807,256	L	L	L
93262	Penn Ins & Ann Co	Life	$733,352,213	L	L	L
93432	CM Life Ins Co	Life	$1,056,330,102	L	L	L
93440	HM Life Ins Co	Life	$959,653,675	L	L	L
93548	PHL Variable Ins Co	Life	$374,685,356	L	L	L
93610	John Hancock Life & Hlth Ins Co	Life	$159,047,579	L	L	L
93629	Prudential Retirement Ins & Ann Co	Life	$900,810,266	L	L	L
93696	Fidelity Investments Life Ins Co	Life	$2,278,407,183	L	L	L
93734	Nassau Life & Ann Co	Life	$894,125,144	L	L	L
93742	Securian Life Ins Co	Life	$1,644,816,619	L	L	L
94188	Lifewise Assur Co	Life	$211,189,503	L	L	L
94250	Banner Life Ins Co	Life	$2,281,130,524	L	L	L
94358	USAble Life	Life	$268,158,260	L	L	L
95005	Providence Hlth Plan	Health	$1,060,577,086	N	L	L
95109	Aetna Hlth Inc PA Corp	Health	$3,510,824,779	N	N	L
95270	Humana Medical Plan Inc	Health	$12,921,021,451	N	L	N
95506	Oxford Hlth Plans NJ Inc	Health	$1,223,028,074	N	L	N
95540	Kaiser Found Hlth Plan of the NW	Health	$4,061,553,170	N	L	L
95672	Kaiser Foundation Hlth Plan of WA	Health	$3,101,835,028	N	N	L
95800	Health Net Hlth Plan of OR Inc	Health	$271,912,871	N	L	L
95831	Coordinated Care Corp	Health	$2,055,630,125	N	N	L
95885	Humana Hlth Plan Inc	Health	$2,206,340,461	N	N	L
95893	UnitedHealthcare of OR Inc	Health	$2,201,913,996	N	L	L
96270	Molina Hlthcare of WA Inc	Health	$4,613,053,290	N	N	L
97136	Metropolitan Tower Life Ins Co	Life	$4,850,864,997	L	L	L
97179	UnitedHealthcare Life Ins Co	Life	$464,225,758	L	L	L
97268	Pacific Life & Ann Co	Life	$586,681,736	L	L	L
97691	Life Of The South Ins Co	Life	$174,225,251	N	L	L
98205	Natl Foundation Life Ins Co	Life	$148,449,965	L	L	L
99775	Funeral Directors Life Ins Co	Life	$340,202,923	L	L	L
99937	Columbus Life Ins Co	Life	$311,183,035	L	L	L