Analysis of U.S. Insurance Industry Climate Risk Financial Disclosures for Reporting Year 2021

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For Reporting Year 2021

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Executive Summary

In 2010, the National Association of Insurance Commissioners (NAIC) introduced the "Insurer Climate Risk Disclosure Survey." This annual survey has been in place for over a decade, requiring insurers in participating states and territories to submit non-confidential information about their governance and management of climate-related risks. In 2022, the survey was revised to align with the Financial Stability Board's Task Force on Climate-related Financial Disclosure (TCFD) framework, an international climate risk reporting framework introduced in 2017. The revised NAIC survey was implemented in 2022, requesting insurers to complete information about the prior operating year or "reporting year" (2021).

This report presents an analysis of climate risk disclosures for the 2021 reporting year -- the first reporting year that uses the TCFD-aligned survey structure. The broad goals of the analysis are to summarize insurers' publicly disclosed efforts through 2021 to govern and manage their climate-related risks, and to examine how disclosures vary across insurers.

Since its 2017 introduction, an increasing number of companies (including insurers) release an annual TCFD report. Recognizing similar goals between TCFD reporting and the NAIC's original climate disclosure survey, and seeking to minimize redundancy for insurers, NAIC members modified their survey to align with the TCFD. The revised survey requires narrative responses across the TCFD's four pillars: (1) governance, (2) strategy, (3) risk management, and (4) metrics and targets. The TCFD-aligned survey is required from insurers licensed to write business in any participating U.S. state or territory if they have at least $100 million in direct premiums written in any line of business. For the initial 2021 reporting year and for future reporting years, the disclosure requirement may be satisfied either by completing the survey online via the California Department of Insurance's web portal, or by uploading a PDF of the insurer's completed TCFD report. All prior year responses are publicly available on the California Department of Insurance [website](#).

For the 2021 reporting year, nearly 450 unique climate risk disclosures were filed on behalf of over 1500 insurers[1]. Collectively, the disclosures contain over 5 million characters of text, which is equivalent to about 2000 single-spaced pages. As described in the disclosures, insurers' approaches to climate risk vary substantially in their breadth and depth. Some of the disclosures provide a broad discussion of how climate risk may affect various dimensions of the insurer's business, while other disclosures are relatively narrow in their discussion, focusing exclusively on one area (such as underwriting-related risks) while potentially neglecting to discuss other relevant areas (such as investment-related risks). Some insurers have highly developed governance and management approaches for addressing climate risks, while others have approaches that are less robust. Additionally, some insurers offer arguments as to why a particular aspect of climate risk doesn't affect their business model, and therefore doesn't necessitate changes to their governance and management of risk; however, the thoroughness of the supporting explanations of materiality assessment vary considerably. Evaluating and summarizing this diverse range of approaches is challenging – no single analytical method is entirely up to the task.

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[1] In many cases, insurer groups – consisting of two or more subsidiaries or component firms – submitted the same filing for each individual entity in the group. Thus, while the dataset includes over 1500 firm-level filings, there are only 446 unique filings.

To address this challenge, this report presents results from three separate analyses that are intended to complement each other: (1) a high-level qualitative scan to develop a general sense of each disclosure's strengths, weaknesses, key concepts, and approaches to climate risks, and how these characteristics vary by line-of-business; (2) a basic analysis that scores each disclosure's "risk awareness" and the insurer's progress in developing the technical capabilities needed to assess climate risks, and (3) a detailed scoring approach that assesses each disclosure's features against the TCFD's reporting framework[2]. These analyses were applied to a sample of 52 disclosures which collectively captures about 40% of the total premium volume of the universe of disclosures for reporting year 2021.[3] The sample consists of 16 health insurers, 16 life insurers, 16 P&C insurers, and 4 insurers whose primary business is neither health, life, nor P&C. The intent was to balance the sample across the three major lines-of-business.

Detailed results of the three complementary analyses are presented in sections 7, 8, and 9 of this report. High-level observations include the following:

- About 40% of the universe of 2021 disclosures contain less than 5000 characters of text, which is equivalent to two single-spaced pages[4]. Because the analysis focused on a sample rather than the entire universe, most of these short disclosures were not explicitly evaluated. However, within the sample, short disclosures were associated with insurers that have made little or no progress with publicly disclosed governance and management of climate risks, as well as insurers that claim their business model is inherently insulated from climate risks.

- The length and comprehensiveness of disclosures is positively correlated with the size of insurers, using total premium value as a proxy for size[5]. Consequently, while about 40% of the disclosures are less than 5000 characters, they collectively represent only 11% of total direct premiums.

- The analysis of the sample revealed a broad range of approaches to disclosing climate risk. Much of this variation appears to be driven by line-of-business, reflecting differences in the types of climate-related risks faced by health, life, and P&C insurers, and differences in the timeframes across which these risks are expected to unfold.

Observations with respect to health Insurers:

- 56% of health insurers in the sample of disclosures discuss climate-related risks to their investment portfolios, but only 13% report attempts to qualitatively or quantitatively assess or model these risks[6].

- 50% of health insurers in the sample discuss climate-related risks to underwriting and liabilities, but only 6% report attempts to qualitatively or quantitatively assess or model these risks. Some health insurers argue their ability to reprice insurance contracts on an annual basis effectively mitigates the potential impact of increases in loss experience on underwriting risks.

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[2] The term "risk awareness" refers to whether a filing discusses a broad range of potential climate risks, or whether it is myopic, focusing on just one area of risk to the exclusion of others. For example, a disclosure might focus solely on physical climate risks that could affect underwriting, while failing to discuss transition risks that could potentially affect their investment portfolio. A narrowly focused disclosure may imply that an insurer has a blind spot(s) that could lead to gaps in their approach to governing, managing, and analyzing climate risks.

[3] The method for constructing the sample is described in Appendix A, and the sample itself is presented in Appendix B. The detailed scoring approach analyzed 37 of the sample of 52 disclosures.

[4] 40% is an estimate based on an examination of about 80% of the universe of 2021 disclosures, as described in Appendix D. The disclosures excluded from this estimate consist of PDF files for which a character count could not readily be performed using a computer scan. Disclosures in PDF format are often relatively lengthy; therefore, it is possible that the 40% estimate is excessive, and that the true percentage is slightly lower.

[5] An online visualization of the distribution of file sizes is available here: https://tableau.soa.org/t/soa-public/views/DistributionsbyFilingSize_v2021_2/Graph

[6] An online visualization of this data across lines-of-business is available here: https://tableau.soa.org/t/soa-public/views/ResultsofBasicAnalysis_v2021_2/Graph1

- 56% of sampled health insurers cite risk management and strategies aligned with disaster planning and preparedness. This is likely due to the prevalence of owned and occupied physical real estate assets including hospitals and clinics.

- Overall, the climate-risk governance and management structures in the health sector appear limited compared to those in the P&C and life sectors on both the asset-side and liability-side of their balance sheets. Many health insurers argue that their exposure to climate risks is relatively small. Consequently, they require little or no adjustment to their governance and management to address these risks. However, most of the sample health insurers have disaster recovery plans to address the risk of severe weather; in addition, many of the disclosures discuss efforts to reduce GHG emissions.

Observations with respect to life insurers:

- About 70% of the sampled disclosures of life insurers specifically identify climate-related investment risks, and 56% report attempts to assess or model (either qualitatively or quantitatively) the potential impact of climate-related risks on their investment portfolios. These percentages rise to 96% and 90%, respectively, if the results of the analysis are weighted by premiums, revealing a positive correlation between the size of a life insurer and the probability of reporting that they have addressed climate-related risks in their investment portfolios.

- 50% of the sampled disclosures of life insurers identify climate-related underwriting risks, but only 13% state that they have assessed or modeled the potential impact either qualitatively or quantitatively. These percentages shift to 78% and 4%, respectively, if the results are weighted by premiums. Thus, while many life insurers disclosure that climate related risk can affect their underwriting risks, few report modeling or assessing the impact.

- Some life insurers argue that, with respect to the potential impact of climate related risk on their underwriting risks, it is necessary only to monitor overall mortality trends. According to these insurers, disaggregating mortality trends into climate versus non-climate factors is not necessary and may not be feasible. Multiple life insurers mentioned that any adjustments necessary for underwriting would take a long time to develop and could be tracked in general mortality and morbidity tables.

- Relative to health insurers and P&C insurers, life insurers were found least likely to encourage policyholders to manage climate-related risks.

- Overall, the life insurers (in the sample) focus their climate-related efforts largely on investment risks, with less emphasis on climate-related underwriting risks.

Observations with respect to P&C insurers:

- Relative to other types of insurers, P&C insurers were more likely to have established a governance framework to address climate-related risks, as well as a strategy and risk management process to assess and manage the risk. They were also more likely to have identified metrics and targets related to climate risks, opportunities, and business performance.

- About 80% of the sampled P&C insurers identify climate-related investment risks, and over 30% report having assessed or modeled (either qualitatively or quantitatively) the potential impact of climate-related risk on their investment portfolios. These percentages rise to 99% and 67%, respectively, if the results of the analysis are weighted by premiums.

- Nearly 90% of the sampled P&C insurers identify climate-related underwriting risks, and over 60% state they have assessed or modeled (either qualitatively or quantitatively) the potential impact. These percentages shift upwards to nearly 100% and 73%, respectively, if the results are weighted by premiums.

- Overall, P&C insurers demonstrate a high-level of the awareness of the potential impact of climate-related risk on both sides of their balance sheet, and have made significant progress assessing this impact, but with greater attention paid to underwriting risks than to investment risks.

Observations with respect to other types of insurers:

- Only 4.5% of the 2021 disclosures are associated with insurers for which the primary business is neither health, life, nor P&C. These insurers, categorized as "other," represent just 0.26% of total premiums.

- Each of the four "other" insurers included in the sample stated in their disclosures that their business is largely immune from the effects of climate related risk. Consequently, the disclosures discussed little about climate risks on the asset-side and the liability side.

Section 1: Background and Purpose

In 2010, the National Association of Insurance Commissioners (NAIC) introduced the "Insurer Climate Risk Disclosure Survey". This annual survey has now been in place for over a decade, requiring insurers in participating states and territories to submit non-confidential information with respect to their governance and management of climate risks. Initially, only insurers licensed in a U.S. participating state or territory with more than $500 million in direct premiums nationwide were required to participate, but over time this threshold was lowered to $100 million. For 2021 – the first reporting year for which the survey was aligned to the TCFD – the survey captured over 80% of the U.S. insurance market by premium volume.

For reporting year 2021, insurers were given the option of either completing the NAIC's narrative survey online or submitting their pre-compiled TCFD report. The revised survey requires narrative responses across the TCFD's four pillars: (1) governance, (2) strategy, (3) risk management, and (4) metrics and targets[7]. The participating states intend to use this TCFD-aligned structure going forward.

This report presents an analysis of the climate risk disclosures for reporting year 2021. The broad goals of the analysis are to summarize insurers' efforts thus far to govern and manage climate related risks and to examine how disclosures vary both across lines-of-business (LOB) and within LOBs.

For reporting years prior to 2021, there have been numerous efforts by researchers to evaluate insurers' climate risk disclosures. These efforts are summarized in Appendix J. In addition, in July 2023, Ceres and the California Department of Insurance released an analysis of disclosures for reporting year 2021. Ceres used computer-based approaches (machine learning and rules-based text mining) to process the entire universe of 2021 disclosures, providing indicator metrics for their alignment to TCFD recommendations. While the SOA did not coordinate its research of the 2021 disclosures with Ceres and the California Department of Insurance, the methods used in the two analyses are good compliments to each other. Ceres and the California Department of Insurance's computer-based approach facilitates the rapid analysis of the entire universe of nearly 450 disclosures, eliminating the need to restrict the analysis to a sample. In contrast, the SOA's approach involved human reviewers who focused on a sample of disclosures as opposed to the entire universe. However, human reviewers have the capacity to capture insights that could potentially slip under the radar of a computer-based approach[8]. Despite their different methodologies, the two studies produced broadly similar conclusions.

As a complement to the above-mentioned report produced by Ceres and the California Department of Insurance report, an additional report was released by Ceres under the title "Detailed Analysis of 15 Companies". As its name suggests, this report provides a highly detailed analysis of a sample of 15 disclosures. This sample was not randomly selected; rather, the members of the sample were identified in the primary analysis (described in the preceding paragraph) as demonstrating high levels of disclosure. Thus, this is a favorably biased sample that does not represent the universe as a whole; rather it has the narrow purpose of examining the strongest disclosure practices. This contrasts with the analysis presented subsequently in this report which uses a sample of 52 disclosures selected with stratified random sampling and analyzed using human reasoning rather than machine learning. The larger sample size and its randomized selection process may facilitate insights with respect to the universe of disclosures.

The actuarial profession has grown to be a central insurance company resource to help recognize climate risks and identify approaches to mitigate their impact. In November 2016, the SOA along with the American Academy of Actuaries, Canadian Institute of Actuaries, and the Casualty Actuarial Society, released the Actuaries Climate Index (ACI)[9], and helped emphasize the growing need to study the impact of climate risks to insured populations and financial security programs. In the years that followed, the SOA and its Society of Actuaries Research Institute have increasingly focused on climate risks through various research committees and professional development offerings.

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[7] The TCFD reporting framework is described in Appendix L.

[8] One could argue that the opposite is true as well: a computer-based approach has the capacity to capture insights that humans might fail to detect.

[9] https://actuariesclimateindex.org/news/actuaries-climate-index-launched-today-measures-changes-in-extreme-weather-events-and-sea-level/

In 2021, the Society of Actuaries Research Institute launched its Catastrophe and Climate Strategic Research Program with a wide range of projects and toolkits that study the impact of catastrophic weather events and changing climate patterns on the public and the insurance industry. A key focus of the research program has been to identify the use of the TCFD across insurance markets around the world, and the natural extension of the actuarial profession's role in leading the disclosure work within insurance companies. Some of the reports that have focused on climate risk assessments and TCFD reports are as follows:

Climate Risk Assessment and Scenario Analysis[10], which looks at frameworks that allow a smooth transition from a qualitative assessment to a quantitative analysis as entities mature in their understanding of climate risk. In this report, a case study on climate change impact on home prices is used to illustrate a Bayesian network iterative approach to building a model for scenario analysis.

Climate Change and Investments: Making the Process Transparent[11], which explores metrics and assessment tools used by insurance companies and asset management firms in the U.S. to measure the climate risk exposures in their investment portfolios and explain how they disclose the results. In addition, the report explores how insurance companies may be able to use similar climate risk assessment tools in Asset-Liability Management and Risk Management.

Climate Risk Analysis for Life and Health Insurance Companies[12], which covers key considerations related to climate risk analysis applied to life and health insurance companies through discussions with an industry expert panel. The panelists were selected to represent a wide and diverse array of opinions and were encouraged to contribute from their own work experience in areas such as insurance, reinsurance, state regulation, consultancy, meteorology, and climate finance.

TCFD Best Practices[13], which studies how insurers are responding to the TCFD framework used for climate disclosure practices, attempting to identify current practice and best and emerging practice.

Health and Hurricanes, Studying Disparate Health Impact of Extreme Climate Events, 2017-2020[14], which studies the effects of hurricanes on human health and whether there is a relationship between hurricanes and the observed prevalence of healthcare utilization or certain health conditions among the affected population, through a healthcare utilization dataset.

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[10] https://www.soa.org/resources/research-reports/2023/2023-climate-risk-analysis/
[11] https://www.soa.org/resources/research-reports/2023/climate-change-invest/
[12] https://www.soa.org/resources/research-reports/2022/climate-risk-analysis-life-health/
[13] https://www.soa.org/resources/research-reports/2022/tcfd-best-practices/
[14] https://www.soa.org/resources/research-reports/2022/health-hurricanes-impact/

Section 2: Climate Risks

The insurance industry has a long history of assessing and underwriting weather-related risks. However, climate change has introduced an additional layer of complexity to the analysis of weather-related risks.[15]

For many insurers, it is the tails of weather distributions – comprised of extreme, low-frequency events – that are the greatest concern because they can lead to property damage, destruction of crops, injuries, and deaths.[16] The low frequency of these events makes the assessment of risk inherently challenging. The changing nature of climate-related risks exacerbates the challenge of projecting losses (see Appendix F for a detailed discussion of this issue).

Insurers must grapple not only with the impact of changes to weather risks, but also the potential impact on capital markets.[17] Society's efforts to reduce its dependence on fossil fuels create "transition" risks that may affect the market value and rate-of-return of some investments -- for example, a coal-mining business that is compelled to cease operations due to lack of demand for its product.

Thus, "climate risks" can affect both an insurer's underwriting liabilities (through an increase in expected claims) and its assets (through transition risks in capital markets). For the remainder of this report, the term "climate risks" refers to all risks associated with a changing climate including ongoing changes in weather patterns and social and economic forces driving people to adapt.

Section 3: The Structure of the 2021 Climate Risk Disclosure

The purpose of the NAIC Climate Risk Disclosure is to help enhance transparency regarding how insurers manage their climate-related risks and opportunities, as well as provide a baseline supervisory tool to assess how climate-related risks may affect the insurance industry. The primary concern of state insurance regulators is to ensure that their regulated entities formulate strong risk management strategies to support financial stability, while also maintaining healthy insurance markets in which consumers have access to coverage. Because an imbalance can sometimes exist between these competing goals, and because the risk will be different based on the size and structure of the insurer as well as the type of coverage they provide, it is up to the insurer to identify, assess and manage their exposure to climate risks.

NAIC Climate Risk Disclosures are public documents that are filed annually, and are available for download via the California Department of Insurance (CDI) website:

> https://interactive.web.insurance.ca.gov/apex_extprd/f?p=201:1

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[15]The earth's climate has never been truly stationary. Rather, it has undergone many gradual changes across its long history, leading to periods in which the earth's average temperature has been significantly lower or higher than its present level. Various studies suggest that earth's average temperature and its climate have been relatively stable over the last several thousand years. However, temperature data collected across the last 100 years suggests that this period of relative stability has ended, and that the average temperature of the earth is now rising at a rate that is rapid relative to estimated rates-of-change for prior periods. There is no single, definitive study on this complex subject, but a good starting point for readers seeking more information is Wikipedia's entry for "temperature record of the last 2000 years", which provides a summary of the results of various key studies, and a discussion of the data, techniques, limitations, and accuracy of the temperature estimates. There are many detailed analyses of climate non-stationarity, including the following: Sarhadi et al., 2018, "Multidimensional Risk in a Nonstationary Climate: Joint Probability of Increasingly Severe Warm and Dry Conditions," Science Advances, 4(11), November 28.

[16] The TCFD guidance decomposes physical weather risks into two types: "acute" and "chronic". Acute risks are severe, infrequently occurring events such as hurricanes and floods. These risks are associated with the "tails" of weather distributions. But risk is not restricted to the tails of weather distributions. Over the long-term, changes in climate could potentially shift weather patterns such that "chronic" risks emerge; for example, frequently occurring heat waves that create persistent health risks and risks to crops.

[17]The literature is rather thin on the impact of climate change on capital markets; however, available evidence suggests that climate change -- or the perception of climate change -- can have real impacts on capital markets. For example, a relatively recent study in *The Review of Financial Studies* concludes that carbon-intensive firms underperform in capital markets during warmer weather (Darwin Choi Zhenyu Gao, and Wenxi Jiang, 2020, "Attention to Global Warming," *The Review of Financial Studies*, 33(3), 1112-1145). A 2019 article in the Journal of Applied Corporate Finance asserts that as (1) ESG issues and responsible investing have become mainstream concerns, (2) new responsible investment regulations and frameworks have been implemented, and (3) demographics shift capital market participants and stakeholders have been pressured to change their practices (Chris Pinney, Sophie Lawrence, and Stephanie Lau, 2019, "Sustainability and Capital Markets—Are We There Yet," *Journal of Applied Corporate Finance*, 31(2), 86-91)).

Only a few disclosures for reporting year 2022 were available when the research described in this report began (in April 2023). Therefore, this analysis focuses on disclosures for reporting year 2021. The term "dataset", in the context of this report, refers to all 2021 disclosures available via the CDI's website, and the term "filing" is used interchangeably with "disclosure".

While the dataset is housed by the CDI, the filings aren't solely for insurers that operate in California. Rather, the dataset captures the filing of any insurer that is licensed to operate in any of the participating states, subject to a direct premium threshold of $100 million. Insurers below this annual premium threshold are not required to file a disclosure but may do so voluntarily. For reporting year 2021, insurers could satisfy the disclosure requirements either by filing an NAIC Climate Risk Disclosure, or by filing a TCFD report. This report uses the term "climate risk disclosure" (CRD) to refer to either of these two types of disclosure.

Prior to the 2021 reporting year, the NAIC's CRD consisted of a series of mandatory Yes/No questions focused on various aspects of assessing, managing, and modeling the risks associated with climate change. For each question, in addition to a Yes/No response, insurers were asked to supply a supporting narrative.

For the 2021 reporting year, the structure of the NAIC survey was changed to improve its alignment with the TCFD. The intention is to use this structure going forward, although tweaks and adjustments could potentially be implemented. Under the revised structure, the mandatory set of Yes/No questions was eliminated, replaced by the TCFD-aligned structure which requires narrative responses in four major areas associated with climate risks: (1) governance, (2) strategy, (3) risk management, and (4) metrics and targets.

Although the mandatory questions were eliminated, a set of voluntary questions was established. These questions are intended to focus insurers' attention on specific climate-risk issues that are relevant to the insurance sector. This list of voluntary questions appears in Appendix E. The questions are the focal point of the analysis presented in Section 9.

Section 4: Data

For reporting year 2021, there are 1539 filings, as presented in Table 1. In many cases, insurer groups – consisting of two or more subsidiaries or component firms – submitted the same filing for each individual entity in the group. Thus, while the dataset includes 1539 firm-level filings, there are only 446 unique filings (see Table 2).

Some groups include firms or subsidiaries from more than one line-of-business (LOB). For this analysis, a group's "primary" LOB was defined to be the LOB with the highest firm or subsidiary count. For example, a group filing that covers 10 P&C subsidiaries and 2 life insurance subsidiaries would be classified as "P&C". Alternative classification approaches were examined – such as using premiums rather than firm count as the metric for determining the primary LOB – but this had little impact on the resulting classifications.

On average, each unique filing covers 3.5 firms or subsidiaries, as indicated in Table 3. About 50% of the filings are on behalf of a single firm or business entity.

Table 1
UNIVERSE OF CLIMATE RISK DISCLOSURES IN 2021

Line-of-Business	Filings	Net Assets ($Billions)	Premiums ($Billions)
P&C	877	2,447	684
Health	344	424	669
Life	276	7,958	509
Other	42	70	20
Total	1,539	10,900	1,882

Table 2
UNIVERSE OF UNIQUE CLIMATE RISK DISCLOSURES IN 2021, BY PRIMARY-LINE-OF-BUSINESS

Primary Line-of-Business	# of Unique Filings	Unique Filings (%)	Net Assets ($Billions)	Premiums ($Billions)
P&C	242	54.2%	3,505	758
Health	72	16.1%	463	678
Life	112	25.1%	6,919	440
Other	20	4.5%	12	5
Total	446	100.0%	10,900	1,882

Table 3
NUMBER OF FIRMS OR SUBSIDIARIES PER UNIQUE FILING, SEPARATELY FOR EACH PRIMARY LOB

Primary Line-of-Business	1 Firm	2 to 4 Firms in Group	5 to 9 Firms in Group	10+ Firms in Group	Total	Average # of Firms Per Filing
P&C	50.8%	32.6%	8.3%	8.3%	100.0%	3.8
Health	41.7%	33.3%	12.5%	12.5%	100.0%	5.0
Life	53.6%	36.6%	9.8%	0.0%	100.0%	2.1
Other	80.0%	15.0%	5.0%	0.0%	100.0%	1.4
Total	51.3%	33.0%	9.2%	6.5%	100.0%	3.5

Before designing an approach to analyze the disclosures, it is helpful to know the total size of the dataset, measured by the number of characters. Firms have the option of submitting their annual climate risk filing either as a PDF file, or by entering text into a web portal, whereupon the submitted data is saved as a text file. About 20% of the 446 unique filings were submitted as PDF files, while the remaining 80% were submitted in text form. It is a simple matter to count the characters in text files because they can easily be processed by a computer program. In contrast, counting characters in a PDF file is more challenging. One approach is to convert a PDF file into "Word" format and then use Word's capabilities to count the number of characters. This approach is easy to perform over a small number of files, but cumbersome to perform over a large number. Therefore, the size of the average PDF file was estimated using a random sample of 10 filings, and that estimate, in turn, was used to estimate the total size of the dataset. The estimated size of the dataset is about 5 million characters (see Table 4), excluding white space (blanks between characters). This is equivalent to about 2000 pages of text, assuming single-spaced lines using 12-point font.

Table 4
ESTIMATED NUMBER OF CHARACTERS IN DATASET, EXCLUDING WHITESPACE

	Text File Format	PDF Format	Total
# of fillings in dataset	350	96	446
# of fillings used to estimate avg number of characters	350	10	360
Average number characters	7,912	22,487	
Estimated total number of characters in dataset	2,769,200	2,181,239	4,927,952

Section 5: Selection of a Sample of Filings to Analyze

5.1 CHALLENGES POSED BY THE SIZE AND FORMAT OF THE DATA

The broad goals of the analysis are to summarize insurers' publicly disclosed efforts thus far to govern and manage climate-related risks, as described in the 2021 filings, to assess the progress of insurers using the TCFD framework, and to examine how filings vary both across lines-of-business (LOB) and within LOBs.

While these goals are straightforward, it is challenging to analyze the data due to its size and format. As indicated in Table 4, the dataset consists of approximately 5 million characters of text, which is equivalent to about 2000 single-spaced pages using 12-point font. From a resource and time-constraint perspective this material would be difficult for a small team of researchers to fully evaluate.

There are several possible approaches to address this issue:

1. Select a random sample of filings and task one or more researchers to read each filing in the sample, extracting key observations.

2. Design a computer program to scan the universe of filings, tracking the frequency of keywords, and attempt to draw some insights for each filing.

3. Use natural language processing (NLP), a form of artificial intelligence (AI), to scan the entire universe of filings, attempting to draw key insights from each filing.

A particularly appealing approach would be to employ all three of these techniques together. Using a random sample of filings drawn from the data universe, observations extracted via keyword searches and NLP could be "tuned" against observations made by human researchers. After tuning the processes to reduce error rates, computer-based analyses could then be applied to the entire 5-million-character dataset. Note that Ceres and the California Department of Insurance (2023) recently released an NLP-based analysis of the entire universe of disclosures, as well as a more detailed analysis of a sample of 15 companies that were identified as having strong disclosure practices.

5.2 THE BASIC APPROACH USED FOR THE ANALYSIS, AND JUSTIFICATION FOR THIS CHOICE

The research team tasked with preparing this report has no prior experience using NLP to analyze text databases. Furthermore, some of the language in the filings requires careful interpretation, and current NLP algorithms are known to generate results that are nonintuitive and difficult to interpret. Given these issues, the most logical approach determined for this project was to select a random sample of filings, and to read and process them using human reasoning as opposed to AI.

5.3 SELECTION OF SAMPLE

Given the estimated size of the dataset as described above and our determined approach, a sample of about 50 filings was judged to be a realistic goal for the research team to read and process. After considering various sampling options as explained in Appendix A, a decision was made to use a stratified random sample with 16 filings for each of the three primary LOBs (P&C, health, and life). Thus, 48 filings in total were selected. An additional 4 filings were selected from insurers outside of the three main LOBs, such as title insurance, bringing the total sample size to 52. By comparison, this sample is more than three times as large as the the sample used in Ceres' detailed report.

The methodology used to construct the sample is described in detail in Appendix A. Briefly, separately for each primary LOB, the insurers were ranked by size, using net assets as the proxy for firm size. After ranking the insurers, the first 12 members of each LOB's sample were selected randomly from the bottom 90% of the net asset distribution, while the remaining 4 members of the sample were selected randomly from the top 10%. Large firms

were oversampled because an initial exploration of the data revealed a positive correlation between firm size and the perceived quality of the filings. Oversampling of large firms ensured that the sample would contain enough filings of sufficient quality to extract positive illustrative examples. An additional rationale for overweighting the largest firms is that the resulting sample captures a larger share of the total market than it would using conventional random sampling.

Table 5 reveals that a small number of insurers in each LOB account for the lion's share of the LOB's total net assets. By capturing some of the largest firms via the sampling process, this ensures that the resulting sample captures a significant share of the total market.

Table 5

NET ASSETS OF THE LARGEST UNIQUE FILERS AS A PERCENT OF THE DATA UNIVERSE, BY LINE-OF-BUSINESS

	P&C	Health	Life	Other
Assets of largest unique filer as % of universe total	18.1%	11.7%	9.5%	49.1%
Assets of 5 largest unique filers as % of universe total	54.3%	47.1%	32.5%	90.9%
Assets of 10 largest unique filers as % of universe total	68.1%	74.6%	55.1%	100.0%

The first row of the total shows the net assets of the largest filer (in each LOB) as a % of total net assets computed across all filers in the same LOB. The second row is similar, but the top 5 largest filers are captured. The final row captures the top 10 filers.

5.4 METRICS DESCRIBING THE SELECTED SAMPLE OF FILINGS

Tables 6, 7, and 8 compare the selected samples against the universe of 2021 filings. The samples capture 6.6%. 22.2%, 14.3%, and 20% of the universe of unique filings for P&C, health, life and "other", respectively. However, due to oversampling of the largest firms, the samples capture a much larger share of total net assets: 38.9%, 45.1%, 36.3%, and 84.7%, respectively. Similarly, a large share of total direct premiums is captured: 28.4%, 47.7%, 38.4%, and 63.8%, respectively.

Table 6

THE UNIVERSE OF UNIQUE FILINGS, BY PRIMARY LINE-OF-BUSINESS

	P&C	Health	Life	Other	Total
Number of Filings	242	72	112	20	446
Total Premiums ($B)	758	678	440	5	1,882
Total Net Assets ($B)	3,505	463	6,919	12	10,900
Total Liabilities ($B)	2,289	297	6,524	9	9,119

Table 7

THE SAMPLE OF UNIQUE FILINGS, BY PRIMARY LINE-OF-BUSINESS

	P&C	Health	Life	Other	Total
Number of Filings	16	16	16	4	52
Total Premiums ($B)	215	323	169	3	711
Total Net Assets ($B)	1,363	209	2,511	10	4,093
Total Liabilities ($B)	852	144	2,385	8	3,389

Table 8

THE SAMPLE OF UNIQUE FILINGS AS A PERCENT OF THE UNIVERSE, BY PRIMARY LINE-OF-BUSINESS

	P&C	Health	Life	Other	Total
Number of Filings	6.6%	22.2%	14.3%	20.0%	11.7%
Total Premiums ($B)	28.4%	47.7%	38.4%	63.8%	37.8%
Total Net Assets ($B)	38.9%	45.1%	36.3%	84.7%	37.6%
Total Liabilities ($B)	37.3%	48.5%	36.6%	87.5%	37.2%

Section 6: Research Objectives and Methodology

6.1 CHALLENGES WITH RESPECT TO EXTRACTING KEY OBSERVATIONS FROM THE FILINGS

The broad goals of the analysis are to summarize insurers' publicly disclosed efforts to govern and manage climate-related risks, as described in the sample of 2021 filings, and to determine how filings vary both across lines-of-business (LOB) and within LOBs.

Insurers' approaches to climate risk (as described in the filings) vary substantially in their breadth and depth. It is useful to visualize the complex approaches described in the filings as three-dimensional structures, with the first dimension representing the range of climate risks that could potentially affect an insurer, the second dimension representing the four pillars of the TCFD (governance, management, strategy, metrics), and the third dimension representing the insurer's level-of-effort and thoroughness in addressing each risk/pillar combination.

The ideal system for "scoring" the dataset would accurately capture the full level of "3D" detail for each filing. In practice, this is difficult to achieve. In many filings, the narrative fails to offer the level of detail or clarity needed for a "3D" evaluation. In particular, the quality or level-of-effort of an insurer's approach can be difficult to quantify. It is easier to determine whether an insurer has a structure for governing climate risk than it is to assess the quality of the governance. In fact, as described in Appendix G, there are scoring challenges even if the analysis is reduced to a "2D" level by collapsing the third dimension -- which measures level-of-effort and thoroughness -- to a simple binary Yes/No assessment.

There are no simple remedies for these issues. Scoring challenges arise because the filings contain complex information that cannot easily be distilled down to a compact set of objective results, and because the filings sometimes lack the detail or clarity needed to clearly describe an insurer's approach to a particular risk/pillar combination.

6.2 TO ADDRESS THESE CHALLENGES, A THREE-PRONGED ANALYTICAL APPROACH WAS USED

To address the inherent weaknesses in any single approach for evaluating the filings, three separate and complimentary approaches were used to analyze the sample of filings:

(1) A high-level qualitative scan of the sample of filings to develop a general sense of their strengths, weaknesses, key ideas, and common approaches to the public disclosure of climate risks, and how these characteristics vary by line-of-business.

(2) A basic analysis that scores each disclosure with respect to "risk awareness" and progress in developing the technical capabilities needed to address climate risks. In the context of this report, the term "risk awareness" refers to whether a disclosure discusses a broad range of potential climate risks, or whether it is more narrowly focused on just one area of risk to the exclusion of others.

(3) A detailed scoring approach that totals each filing against the list of NAIC's voluntary questions (see Appendix E). The intention of these questions is to solicit details about how insurers are addressing each of the TCFD's four pillars.

The results of analyses 1, 2 and 3 are shared in sections 7, 8, and 9 of this report, respectively.

6.3 THE INFLUENCE OF LINE-OF-BUSINESS ON AN INSURER'S APPROACH TO CLIMATE RISKS

The potential business impact and timeframe of climate risk varies by line-of-business (LOB). For example, a P&C insurer that issues annual or semi-annual policies that cover the risk of natural disasters will have a different set of exposures and concerns compared to a life insurer that issues long-term policies that may have a relatively low near-term exposure. Of course, all types of insurers are potentially exposed to climate risks on the asset side of their balance sheets, but the level of exposure will be a function of several factors that vary by LOB. For example, the long-term nature of many life insurance products requires the build-up of substantial financial reserves, of which a

large share is typically invested in long-term bonds. The need for substantial financial reserves – and their investment in long-term instruments – heightens the importance of asset-side analysis of climate risks.

Because of differences across LOBs, this report strives to compare apples-with-apples, by assessing each insurer's filing relative to the filings of other insurers in the same primary LOB. However, even within a particular LOB, no two insurers have identical businesses. Insurers differ in the mix of products that they offer, the geographic areas in which they operate, and the size and scale of their business. Thus, a true "apples-to-apples" comparison – across perfectly identical businesses -- is not possible, given that no two insurers are identical. Nevertheless, placing each primary LOB in a separate analytical compartment is useful because it reduces differences in product lines within the subset of filings that are compared against each other.

Section 7: Results of the High-Level Scan of the Sample of Filings

7.1 OVERVIEW

To perform the high-level qualitative scan, an actuary in the SOA's research department read the 52 filings in the sample with the goal of assessing each filing's quality and completeness. While reading each filing, the actuary took notes that summarized key concepts and findings. Some of the issues captured in these notes are:

- Relative to other insurers in the same LOB, does the insurer's approach to climate risks appear broad or narrowly focused?

- What techniques are used to assess and model climate-related risks, and do these techniques specifically address the risks of climate change?

- If an insurer views a particular type of climate-related risk as immaterial, what logic, evidence, or analysis does the filing offer to support that view?

- If an insurer argues that climate related- risks are implicitly addressed through its existing processes, and that explicit analysis of climate-related risks is therefore unnecessary, what arguments are offered to support this view?

After processing the entire sample, frequently occurring approaches to climate-related risks were identified and summarized. Table 9 provides a high-level qualitative summary of the common characteristics of filings, separately for each primary line-of-business. Within each primary LOB, there is significant variation in the approach to climate risks; however, there are also common concepts and approaches. These shared features are the focus of Table 9. The results in this table are discussed in the next three subsections of the report.

Table 9

SUMMARY OF COMMONLY OCCURRING CHARACTERISTICS OF FILINGS, BY PRIMARY LINE OF BUSINESS

LOB	Liability Side of Balance Sheet	Asset Side of Balance Sheet	Other Risk Areas
Health	Minimal discussion of potential climate-related risk on underwriting performance. Many health insurers argue that the ability to reprice contracts on an annual basis mitigates the risks posed by gradual changes that may occur in population health.	Minimal discussion of the potential impact of climate risk on investments. Some health insurers state that they use a conservative approach to investing that minimizes risks, including climate risks.	Some health insurers (6 of the 16 in the sample) have quantified their scope 1 and/or 2 emissions. Most of the filings discuss the risks that severe weather poses to health care facilities, and some discuss their disaster recovery plans that can mitigate weather risks.
Life	Minimal discussion of the impact of climate risk on underwriting performance. Some life insurers argue that while it is necessary to monitor overall mortality trends, it is not necessary (or feasible) to disaggregate trends into climate and non-climate factors.	Climate risks to investment portfolios are frequently discussed in life insurer filings. Some life insurers are analyzing the carbon intensity of their asset portfolios and modeling the potential impact of transition risk on asset returns. Further, some have modified their investment strategies to mitigate the potential impacts of climate risk.	Most life insurers (9 of the 16 in the sample) have quantified their scope 1 and/or scope 2 emissions. Also, most of the filings report disaster recovery plans to mitigate weather risks that could potentially affect their operations.
P&C	The P&C filings display detailed information on the potential impact of physical risks on underwriting performance. Insurers are grappling with this issue in various ways, including efforts to improve their weather-risk estimation processes, increasing the rigor of their stress tests for extreme weather events, and the use of reinsurance and geographic diversification to manage risk.	The P&C filings provide a detailed assessment of the potential impact of physical risk on investment portfolios. Similar to many life insurers, some P&C insurers are analyzing the carbon intensity of their asset portfolios, modeling the potential impact of loss exposure on asset returns, and modifying their investment strategies to mitigate climate risks.	Most P&C insurers (9 of the 16 in the sample) have quantified their scope 1 and/or scope 2 emissions. Relative to health and life filings, P&C filings show less emphasis on operational risks, such as the risks that severe weather poses to their offices and data storage. 5 of the 16 filings in the sample discuss disaster recovery plans.

7.2 COMMONLY OCCURRING CHARACTERISTICS OF HEALTH INSURERS' FILINGS

Across the selected sample of filings, most health insurers view the potential impact of climate risk on their business as minimal, arguing that their business model – which typically involves insurance policies that can either be repriced and/or cancelled on an annual basis – provides the flexibility to incrementally reflect the impact of climate risk as it gradually unfolds across time:

> "As an HMO, [the] underwriting cycle is relatively short compared to life, property or casualty insurance carriers. We believe that since climate change impacts on [our] membership are relatively gradual, the chance for significant underwriting errors related to climate change is minimal."

> "Almost all of the Company's underwriting risk is subject to repricing on an annual basis. To the extent that climate change impacts the morbidity of the Company's policyholders, that impact would likely be long-term in nature, as one of several factors influencing inflation in health care costs. As such, any impact of climate change on policyholder morbidity would implicitly be considered in the Company's normal pricing and underwriting processes, without there being any need to explicitly identify climate change as the root cause of that morbidity change."

> "Our ability to reprice group contracts is a significant mitigant against climate change-related risks."

Some health insurers indicate that, absent a body of evidence or scientific analysis that identifies a statistical relationship between climate risk and population health, there is little need for an insurer to attempt such an analysis on its own:

"[The Company] has not adopted specific practices to identify climate change-related risks. There is no conclusive information currently available that addresses the effects of climate change on the status of a population's health. [The Company] works diligently to support members and communities affected by catastrophic events (such as wildfires and extreme heat) through a combination of flexible services (e.g., hotel rooms, air conditioners, air purifiers, etc.) and care management, but does not identify whether those catastrophic events are climate change-related in each instance."

Across the sample of health insurers, a common disclosure is that the effects of climate risk can be addressed as they gradually unfold.:

"The Company has concentrated its research and risk analysis on healthcare, consistent with its role as an MCO, and not climate change directly. The consequences of climate change, as they manifest as health conditions and risks for our members and employees, would subsequently be taken into account in the Company's planning and operations relative to those risks. Currently, the potential impacts of climate-related risk on the Company's business, strategy, and financial planning would be considered immaterial."

The potential impact of climate risk is not limited to underwriting risks and liabilities; rather, the asset-side of insurers' balance sheets could also be affected. It is possible, for example, that a transition to an economy that is less dependent on fossil fuels will reduce the rate-of-return for the fossil fuel industry and for other carbon-intensive industries. In some cases, assets might become liabilities – for example, a coal-mining facility might be compelled to close its operations due to a lack of demand for its product.

While climate risk has the potential to affect asset portfolios, only half of the health filings indicated that climate change could potentially affect their investment portfolios, and only one filing described an analysis of the potential impact of climate risk on the asset side of its balance sheet. Several health insurers stated that the short duration of their assets limits their exposure to climate risks:

"The Company's Investment Policy does not allow the Company to invest in securities with a weighted average maturity longer than 10 years and current fixed income portfolio average duration is approximately 3.6 years. Shorter durations reduce the Company's exposure to longer-term climate risks."

"The duration of the fixed income investments is short enough to enable the managers to adapt to government regulatory changes, which could create "stranded assets,' and would be the most immediate risk to the investments."

"With respect to its investment portfolio, the Company invests primarily in stable, short-term, low risk investments that are not exposed to material market risk generally, which would include climate-related risks."

Thus, across the sample of health insurers, the prevailing view is that climate risks will have little impact on either the asset-side or the liability-side of their balance sheets. This view, in turn, contributes to a subdued approach to the governance and management of climate risks. To the extent that health insurers are concerned about climate risk, the focus is primarily on operational risks, such as the risk of severe weather damaging a health care facility.

The climate risk governance structures in the health sector appear limited compared to the P&C and life sectors. In these two sectors, there are numerous insurers with a robust disclosure of climate risks, featuring well-developed climate risk committees and extensive processes for analyzing and modeling climate risks. This high level of tangible actions with respect to climate risks is largely absent from the sample of health sector filings that was examined for this analysis.

7.3 COMMONLY OCCURRING CHARACTERISTICS OF LIFE INSURERS' FILINGS

Like the sample of filings for the health sector, many of the filings examined in the life sector state that it is unnecessary to explicitly consider the impact of climate risks on underwriting performance because trends are already captured in their analysis of overall mortality/morbidity trends, and that decomposition of the analysis into climate versus non-climate factors is unnecessary:

"Specific to insurance product underwriting, to the extent impacts to ESG factors, including those related to climate change, have influenced past mortality and/or claim morbidity, those impacts may inherently be in our pricing factors (such as area/regional factors) which as our factors are derived from historical claims experience."

Similarly, some life insurers argue that their standard approach to stress-testing is sufficient to capture all factors affecting mortality, including climate risk:

"Our current mortality risk assessments involve scenario testing which helps to inform our capital adequacy over a twelve-month period. These scenarios do not reflect increases in mortality from specific causes, but inherently reflect elevated mortality experience which may be related to the impacts of climate change."

Thus, with respect to the liability side of their balance sheets, many health and life insurers in the sample share the view that climate related risks are adequately handled through their existing mechanisms for underwriting, pricing, and stress testing.

However, with respect to the asset side of their balance sheets, most life insurers place substantial emphasis on the potential impact of climate risk on their investment portfolios relative to other insurance LOBs. As reflected in the disclosures, many life insurers are making considerable efforts to govern and manage climate risk, including estimating the carbon intensity of their investments, projecting asset returns as a function of different climate scenarios, and adjusting their asset mix to improve the climate resilience of their portfolios:

"[Our] General Account investment portfolio (GA) identified oil & gas and utilities as our largest exposure to transition risk in the GA's public and private corporate bond portfolio. In partnership with our asset managers, we performed a qualitative assessment of transition risks in these sectors using three IEA scenarios (NZE, STEPS, SDS). The results of the assessment showed that impacts will vary across different sub-sectors with the oil & gas and utility value chain and different time horizons. To ensure portfolio resiliency and mitigate risks, the GA manages the tenor and duration of investments identified as most susceptible to transition risks. We have also focused on shifting investments in high transition risks sectors to issuers and sub-sectors that exhibit greater resilience."

"Using a sector-specific analysis of the investment portfolio, within the general accounts [we] assessed our asset portfolio against "green" and "brown" climate scenarios and identified 4% of potential areas of vulnerability mainly within bonds, conventional mortgages, real estate holdings and equity sectors. However, the inherent diversification of these investments limits our exposure to such vulnerabilities. For example, within bond holdings in potentially vulnerable sectors, we inherently maintain high quality holdings that are of shorter duration (less than 10 years) than the rest of the portfolio limiting our concentration risk to vulnerable sectors. Commercial mortgage properties are regionally diversified, and vulnerable properties have P&C insurance. In the U.S. separate hazard policies are required for commercial mortgage property in flood/hurricane zones. As a result of the analysis, we concluded that the balance sheet remains strong and resilient with respect to the climate scenarios. Meanwhile, the results have directly informed strategies to consider selectively trimming exposure in longer maturities, limits related to vulnerable industries and coverage of P&C insurance on vulnerable properties."

Health insurance contracts are typically repriced annually and cover a period of 12 months, while life insurance contracts typically have a much longer contractual period that necessitates the build-up of substantial financial reserves. These differences, in turn, may contribute to different approaches to the governance of climate-related investment risks.

7.4 COMMONLY OCCURRING CHARACTERISTICS OF P&C INSURERS' FILINGS

In contrast to the samples of life and health insurance filings, the sample of P&C filings contains extensive discussion of the potential impact of climate risk on underwriting and the liability side of insurers' balance sheets. This outcome is not surprising given that P&C insurers, unlike life and health insurers, offer products that cover property rather than people and therefore explicitly cover weather-related risks. Nearly all the P&C filings stress that shifts in weather patterns are already occurring, and that these shifts need to be factored into underwriting and long-term strategy.

Recognizing the challenge of estimating shifts in weather distributions, some insurers have reached out to consultants and academics (including climate scientists) for help, and some have asked third-party vendors of catastrophe (CAT) models for more insight into their approach to climate change. With respect to modeling hurricane risk, some P&C insurers are now using "climate-conditioned" event scenario catalogs that emphasize the upward trend in ocean temperatures:

> *"Specific to the hurricane peril, the major catastrophe modeling vendors have developed alternative event scenario catalogs associated with increased sea surface temperatures which some scientists might attribute to global warming. Elevated sea surface temperatures are important because hurricanes are fueled by the warmth of the ocean. These alternative event catalogs, therefore, represent a climate conditioned view of risk. This alternate view is used to assess the sensitivity of insured risk to elevated sea surface temperatures."*

Recognizing the inherent challenges of estimating the effects of potential changes in weather patterns, some P&C insurers have added greater range to their stress tests. In effect, this amplifies the weight of the tails of weather distributions:

> *"The Group is exposed to physical risks of climate change, including a potential increase in severe weather-related events. The stresses [that is, the stress-tests] include multiple 500-year events. The ERM Committees believe this approach is more meaningful/conservative than focusing only on thermal stress testing."*

Like health insurers, many of the P&C insurers in the selected sample indicate that the short duration of their policies (typically, 12-months) provides the flexibility to reprice risk to address gradual changes in loss trends:

> *"Since most property/casualty (re)insurance contracts have a duration of one year, we can adequately adjust the price and manage risk efficiently and effectively."*

> *"The Group protects itself against pricing risk in its P&C insurance policies in the coverage term, which is customarily written for one year and repriced annually to reflect changing exposures (increased possibilities of loss translate promptly into increased premiums). This reduces the climate change driven residual pricing risk significantly. As a result, a pricing risk stress is not warranted at this time."*

> *"To the extent that climate change was impacting the Company's policyholders for insured coverages, that impact would be considered in the normal pricing and underwriting process along with other loss trends, where these policies are typically written on an annual basis, allowing for regular adjustments of pricing and risk appetite. Therefore, we believe that climate change is implicitly addressed within our normal underwriting risk management process. To the extent that our catastrophe modeling vendor(s) considers climate change in their modeling software, our use of those modeling tools will provide us with current generally accepted considerations."*

In addition, the P&C filings frequently mention the use of re-insurance and geographic diversification to mitigate their weather-related underwriting risks. While these point to effective risk management strategies, they are not immune to inherent risk in repricing of reinsurance coverage, population growth and migration trends.

Like many life insurers (in the selected sample), and unlike most health insurers, most of the P&C filings reviewed demonstrate an awareness of the potential impact of climate risk to the asset side of their balance sheets:

> *"The Group could face Transition Risk if companies in the investment portfolio face sudden drops in asset values or increased credit risk as a result of the transition to a lower carbon economy."*

> *"The Company also has a diversified investment portfolio with holdings in a variety of industries. Some of these industries will transition to a low carbon economy more readily than others, and those that have not adequately prepared to transition may perform below expectations, which could adversely impact investment returns or company ratings."*

> *"Achieving a transition to a low-carbon economy requires fundamental changes to all parts of the*

economy. While limiting climate change to 2°C or below will lower physical climate risk, the technological and policy changes required to achieve this create their own sets of risks. Independent of the precise pathway, the transition could be disruptive, as significant asset price moves are required to shift resources to low-carbon technology on a global scale."

Some disclosures of P&C insurers not only display awareness of these investment-related climate risks, but describe efforts to quantify the risks:

"We recently engaged a third-party vendor to perform a climate risk analysis of the Company's investment portfolio. This analysis combined climate stress tests with stochastic modeling of possible future economic outcomes to help us better understand the possible impacts of various scenarios on our investment portfolio. These scenarios, put forth by the Bank of England in its PRA Exploratory Exercise from 2019 ("BoE 2019"), include (i) a short-term disorderly transition to a low carbon economy, (ii) a long-term orderly transition to a low carbon economy and (iii) a long-term increase in global temperatures by 4°C due to a failed climate policy. The climate stress tests use different return assumptions for various asset sectors and carbon intensive industries and consider both transition risk and physical risk at multiple time horizons based on parameters specified in the BoE 2019."

To mitigate the potential impact of climate risk on their investments, some P&C insurers (and some life insurers as well) discuss asset diversification, limits on investments in coal and oil-sands, investments in renewable energy, and shifts in asset allocation to reduce exposure to carbon-intensive industries. However, the P&C filings are not uniform in their attitudes towards investing in and underwriting the fossil fuel industry. Several of the filings in the sample argue that the global economy will remain heavily dependent on fossil fuels in the near-term, and that fossil fuels are necessary to make the transition to cleaner energy sources. According to these filings, it is critical for the insurance sector to remain productively engaged with the fossil fuel industry via the provision of underwriting services and as investors.

7.5 AN EXTENSION OF THE HIGH-LEVEL SCAN TO CAPTURE VARIATIONS WITHIN EACH LOB

The primary purpose of the "high-level scan" of the filings is to provide a simple summary of the common characteristics of each primary LOB (health, life, and P&C). These results were presented earlier in this section of the report. The high-level scan also identified some key differences within each LOB. These differences are summarized in Appendix H.

Section 8: Results of the Basic Analysis of the Sample

8.1 OVERVIEW

As described in section 6.2 of this report, a three-pronged approach was used to analyze the filings: (1) a high-level qualitative scan, (2) a basic analysis, and (3) a scoring method that totals each filing against the list of NAIC's voluntary questions. The purpose of the basic analysis – described in this section of the report -- is to assess the "risk awareness" demonstrated in each disclosure, as well as the disclosed level-of-effort with respect to developing the technical capabilities needed to assess each type of climate risk.

The term "risk awareness" refers to whether a filing discusses a broad range of potential climate risks, or whether it is narrowly focused, limited to one area of risk to the exclusion of others. This assessment process is necessarily limited to the content of each disclosure. In theory, an insurer could be fully aware of a broad range of potential climate risks, but their disclosure might focus solely on one risk area.

There is an important distinction to be made between an insurer who hasn't identified any risks versus an insurer that argues an identified risk is addressed in its existing risk management framework. The insurers that don't publicly discuss the potential risk create the impression that they haven't even considered it. In contrast, the insurer

who discusses the risk but concludes that it is immaterial has, at the very least, demonstrated an awareness of the risk.

Because identification of materiality of the range of climate risks is a critical first step in the development of an approach for governing and managing climate risks, the basic analysis focused on this issue. To frame the analysis, a simple risk taxonomy was used with only three categories of climate risks: (1) risks affecting an insurer's liabilities and/or underwriting; (2) risks affecting an insurer's investment portfolio; and (3) other risks, such as risks that can affect an insurer's daily operations or their reputation[18]. Each filing was reviewed with respect to each of these three risk areas. If the filing contained any discussion of a particular risk area, that risk area was scored as a "yes". In the absence of a discussion, that risk area was scored as a "no". To score a "yes", the discussion need not be lengthy; rather, a single sentence was considered sufficient. The absence of detail didn't preclude that an insurer was simply restating the question as a positive; rather, they were taken at their word that this was in fact true. The public nature of reporting was deemed critical to helping insurers learn from one another, however, a lack of specificity in response may be due to confidentiality concerns. The role of the public disclosure is to provide context for a state insurance regulator that may form the basis of deeper discussions with regulated entities.

In addition to risk awareness, the basic analysis evaluated whether the disclosures discuss any progress with respect to assessing and modeling each of the three risk areas. If the insurer indicated that they performed an assessment or modeling exercise that captured the possible impact of climate risk, they received a "yes" score. There was no requirement that the assessment or modeling process be clearly described, and there was no requirement that the qualitative or quantitative results of the process be shared in the filing. However, if it was unclear if the assessment or modeling exercise was for investments, liabilities, underwriting, or some other risk area, then a "no" score was recorded. Some filings described an indirect approach for modeling the effects of climate risk on underwriting performance: rather than attempting to directly model the changing climate, they introduced stronger stress-testing to roughly account for the additional uncertainty. These cases were scored as a "yes". Table 10 illustrates the scoring process for a hypothetical insurer.

Table 10
EXAMPLE OF THE BASIC ANALYSIS AS APPLIED TO A FICTIVE DISCLOSURE

Risk Category	Information from Disclosure	Awareness Score	Modeling Score
Assets	Describes potential climate-risks to assets, but no description of an effort to assess or model these risks.	Yes	No
Liabilities / Underwriting	Describes potential climate-related risks to underwriting and describes efforts to quantify these risks.	Yes	Yes
Other	No description of any risks aside from those that impact the insurer's investments and underwriting.	No	No

Although the focus of the basic analysis is risk awareness and risk modeling, the analysis also recorded if an insurer quantified their operational greenhouse gas emissions. This data was included in the analysis because it correlates with insurers' risk awareness and risk modeling – insurers with a higher level of risk awareness are more likely to quantify their emissions, and vice versa.

Like the high-level scan, the basic analysis was performed by an actuary in the SOA's research department. The same actuary performed each of these two analyses.

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[18] There are other possible taxonomies – for example, breaking climate risks into physical, transition, reputation, market, technology, and policy/legal. For this basic analysis, however, the division of risks into asset-related versus liability-related risks was a convenient approach.

8.2 RESULTS OF THE BASIC ANALYSIS

The tables that follow display the percentage of filings in the sample that earned a "yes" score. The tables include unweighted percentages, percentages computed by weighting the results by net assets, and percentages computed by weighting the results by direct premiums. In general, the weighted percentages exceed the corresponding unweighted percentages because there is a positive correlation between firm size and both risk awareness and progress with the assessment/modeling of climate risks. Table 11 includes all three climate-risk areas in the simplified risk taxonomy: risks to liabilities/underwriting, risks to assets/investments, and "other" types of risks. This data is presented in graphical form in Figures 1 and 2. Table 11 shows each of the three risk areas tabulated separately, while Table 12 considers whether an insurer scored a "no" for both asset and liability-related risks, or a "yes" for both, or a "yes" for just one of the two risk areas. In Table 12, the "other" risk category is excluded.

Table 11

RESULTS OF THE BASIC ANALYSIS: PERCENT OF FILINGS SCORING A "YES"

Line of Business	Climate Risk Awareness			Climate Risk Modeling			Disclose Emissions
	Liabilities	Assets	Other	Liabilities	Assets	Other	
Unweighted Percentages							
Health	50.0%	56.3%	56.3%	6.3%	12.5%	6.3%	37.5%
Life	50.0%	68.8%	75.0%	12.5%	56.3%	12.5%	56.3%
P&C	87.5%	81.3%	75.0%	62.5%	31.3%	12.5%	56.3%
Other	0.0%	0.0%	25.0%	0.0%	0.0%	0.0%	25.0%
Asset-Weighted Percentages							
Health	57.1%	51.1%	92.8%	18.6%	39.0%	18.5%	91.9%
Life	75.5%	97.1%	98.2%	6.9%	88.7%	6.9%	94.8%
P&C	99.9%	99.8%	95.1%	92.2%	89.3%	46.7%	97.2%
Other	0.0%	0.0%	58.0%	0.0%	0.0%	0.0%	58.0%
Premium-Weighted Percentages							
Health	51.2%	48.6%	88.6%	1.9%	29.5%	15.7%	87.1%
Life	77.7%	95.8%	97.2%	3.6%	90.0%	3.6%	92.3%
P&C	99.8%	99.5%	77.2%	73.3%	67.4%	25.9%	96.3%
Other	0.0%	0.0%	31.7%	0.0%	0.0%	0.0%	31.7%

Table 12

RESULTS OF THE BASIC ANALYSIS: PERCENT OF FILINGS SCORING A "YES"

Line of Business	Climate Risk Awareness			Climate Risk Modeling		
	Neither Assets nor Liabilities	Assets or Liabilities	Assets & Liabilities	Neither Assets nor Liabilities	Assets or Liabilities	Assets & Liabilities
Unweighted Percentages						
Health	31.3%	31.3%	37.5%	87.5%	6.3%	6.3%
Life	31.3%	18.8%	50.0%	43.8%	43.8%	12.5%
P&C	12.5%	6.3%	81.3%	37.5%	31.3%	31.3%
Other	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
Asset-Weighted Percentages						
Health	21.1%	49.6%	29.3%	61.0%	20.4%	18.6%
Life	2.9%	21.6%	75.5%	11.3%	81.8%	6.9%
P&C	0.1%	0.1%	99.8%	7.8%	2.9%	89.3%
Other	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
Premium-Weighted Percentages						
Health	20.2%	59.7%	20.1%	70.5%	27.7%	1.9%
Life	4.2%	18.1%	77.7%	10.0%	86.4%	3.6%
P&C	0.2%	0.3%	99.5%	26.7%	6.0%	67.4%
Other	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%

Figure 1

UNWEIGHTED PERCENT OF FILINGS SCORING A "YES" FOR RISK AWARENESS
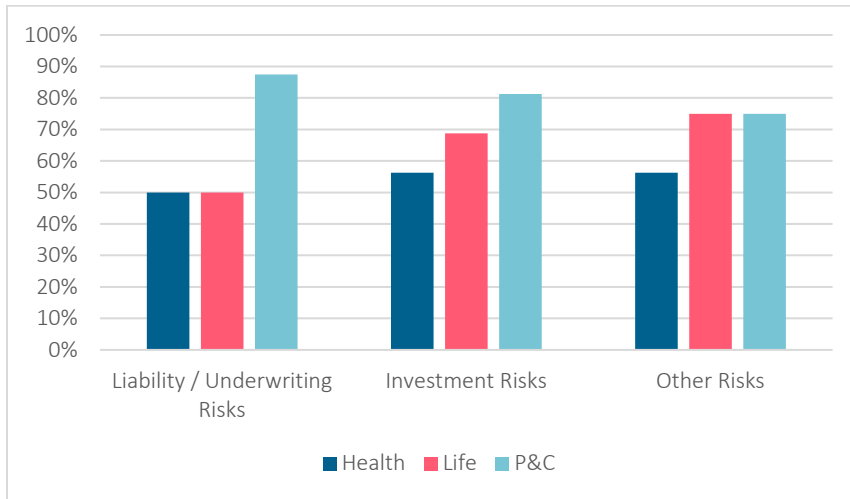

Figure 2

UNWEIGHTED PERCENT OF FILINGS SCORING A "YES" FOR THE ASSESSMENT OR MODELING OF CLIMATE RISKS
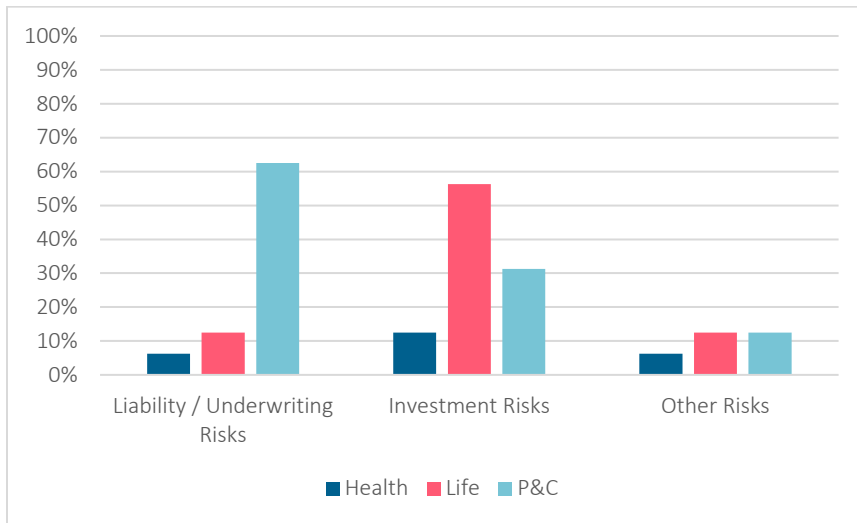
When examining the results, please keep in mind the following:

- The percentages reflect the sample rather than the universe of filings. Recall that the sample was constructed to overweigh the largest firms. Therefore, to the extent that filing quality is positively correlated with firm size, the average filing quality in the sample is greater than that of the whole universe (in other words, the sample is favorably biased).

- The standards used to score a "yes" were low. A "yes" was awarded if the filing exhibited a trace amount of climate risk awareness, or if it contained a faint hint of an assessment or modeling process for evaluating climate risk. The "yes" scores mask a broad range in the quality of the filings. A filing that contains a single sentence mentioning climate-related investment risks received the same score as a filing with a comprehensive discussion of the issue. As discussed in section 6 of this report, it is difficult to translate the quality of a filing into a numerical score. Quality is a function of the thoroughness, level of detail, and clarity of a filing. These characteristics cannot easily be quantified.

- The sample of "other" insurers consists of only 4 disclosures (for each of the other LOBs, the sample included 16 disclosures). The small "other" sample may be partly responsible for the fact that 0% of the selected insurers demonstrated awareness or modeling of either asset-side or liability-side risks.

Additional visualizations of these results are available online:

https://tableau.soa.org/t/soa-public/views/ResultsofBasicAnalysis_v2021_2/Graph1

The results indicate that the P&C sector displays the highest level of risk awareness, followed by the life sector, and then the health sector. With respect to the assessment/modeling of climate risks, the P&C sector tends to focus on liabilities/underwriting, while the life sector focuses on investments. In contrast to the life and P&C sectors, the health sector exhibits a low level of assessment/modeling activity. Recall from the high-level qualitative scan (section 7 of the report) that many of the health sector filings state that their business is inherently insulated from climate risks; this point of view, in turn, may contribute to a minimalist approach to the governance and management of climate risks.

8.3 THE PROBABILITY OF A "YES" SCORE INCREASES WITH BOTH FIRM SIZE AND FILING SIZE

The probability that an insurer scores a "yes" for climate risk awareness or climate risk assessment/modeling is positively correlated with net assets, premiums, and the size of the filing (measured in the number of characters). A simple approach for illustrating this relationship is to compare the median net assets, premiums and filing characters for the "yes" filings against the corresponding values for the "no" scores. This approach was used to compute the values in Tables 13, 14, and 15. Each value is the median computed across the "yes" scores divided by the median computed across the "no" scores. If a ratio is greater than 1.0, this suggests a positive correlation between size and the probability of a "yes" score. For most of the cells in the tables, the ratios are significantly greater than 1.0, indicating that the insurers scoring a "yes" are generally much larger than the insurers scoring a "no".

Table 13

MEDIAN NET ASSETS FOR FILINGS SCORING A "YES", DIVIDED BY MEDIAN FOR FILINGS SCORING A "NO"

Line of Business	Climate Risk Awareness			Climate Risk Modeling			Disclose Emissions
	Liabilities	Assets	Other	Liabilities	Assets	Other	
Health	5.8	0.8	14.9	16.1	21.6	16.0	39.1
Life	7.6	47.3	54.0	1.9	47.3	1.9	48.6
P&C	27.6	21.8	21.5	2.3	26.2	32.0	59.9

Table 14

MEDIAN PREMIUMS FOR FILINGS SCORING A "YES", DIVIDED BY MEDIAN FOR FILINGS SCORING A "NO"

Line of Business	Climate Risk Awareness			Climate Risk Modeling			Disclose Emissions
	Liabilities	Assets	Other	Liabilities	Assets	Other	
Health	3.9	0.4	10.6	1.9	15.1	15.9	15.4
Life	4.9	13.2	18.3	0.7	13.8	0.7	13.8
P&C	15.4	11.6	10.9	2.1	12.9	6.8	58.1

Table 15

MEDIAN CHARACTERS FOR FILINGS SCORING A "YES", DIVIDED BY MEDIAN FOR FILINGS SCORING A "NO"

Line of Business	Climate Risk Awareness			Climate Risk Modeling			Disclose Emissions
	Liabilities	Assets	Other	Liabilities	Assets	Other	
Health	1.6	1.0	1.4	1.7	1.5	4.5	2.2
Life	5.5	17.9	21.0	2.6	6.0	2.6	6.0
P&C	4.7	3.9	3.6	2.9	7.3	7.2	3.6

The numerators and denominators that feed into the ratios in the preceding tables are presented in Appendix I, as well as the results of an analysis in which a logit model was fitted to the data to estimate the probability of climate risk modeling as a function of filing size.

Section 9: Results of the Detailed Analysis

9.1 OVERVIEW

As described in section 6.2 of this report, three separate and complimentary approaches were used to analyze the sample of filings: (1) a high-level qualitative scan, (2) a basic analysis, and (3) a detailed analysis that assesses each filing against the list of NAIC's voluntary questions. This section of the report presents the results of the third component of the analysis under which the disclosures were assessed against the NAIC's list of voluntary yes/no questions (see Table 16, presented later in this section of the report). The voluntary questions are offered by the NAIC as guidance to help insurers complete the Climate Risk Disclosure. Mirroring the four pillars of the TCFD, the questions are grouped into four categories: governance, strategy, risk management, and metrics/targets. All else equal, the greater the number of "yes" answers to the questions, the more complete an insurer's disclosure relative to the four pillars of the TCFD.

A "yes" answer to a question indicates the presence of a particular characteristic. For example, with respect to the question "does management have a role in assessing climate-related risks and opportunities?", a "yes" indicates simply that management has a role. A "yes" answer does not distinguish between a disclosure that provides a detailed description of management practices, versus a disclosure that states that management has a role but offers limited supporting detail.

As discussed in section 6.2 of this report, it is challenging to objectively quantify the thoroughness and quality of disclosed governance and management practices. Therefore, this component of the analysis examines the presence or absence of TCFD disclosure features – as indicated by the yes/no answers -- rather than attempting to estimate their thoroughness. The same philosophy (of measuring the presence or absence of a characteristic) was used for the "basic" analysis appearing in section 8 of this report.

Because the NAIC questions are voluntary, most disclosures in the sample did not explicitly state "yes" or "no" answers. Therefore, for analytical purposes, answers to the questions must be inferred by evaluating the content of each disclosure. The inferred "yes" or "no" answers are referred to in the analysis below as "assessments".

The assessment process was performed by a team of 8 NAIC staff members. For the small number of sampled disclosures that explicitly provided yes/no answers, the reported answers were accepted at face value – that is, reviewers did not replace the disclosure's reported answers with their own assessments. Rather, the reviewer simply extracted the reported yes/no answers from the disclosure.

Because the assessment process was time-intensive and required input from multiple reviewers, the sample was reduced from 52 to 37 disclosures for this component of the analysis. Appendix B lists both the full sample of 52 disclosures used for the basic analysis and the subset of 37 disclosures used for the detailed analysis. The 37 disclosures consist of 12 from each of the three main lines-of-business (LOB), and one from the "other" category. Thus, for each major LOB, the sample was reduced from 16 to 12 disclosures. To perform this reduction, one disclosure of relatively high quality was discarded, one of medium quality, and one of relatively low quality (the assessments of quality were obtained from the other two components of the three-pronged analysis). The fourth and final disclosure to discard from each LOB's sample was selected at random.

9.2 RESEARCH METHODOLOGY

A team of 8 NAIC staff members reviewed the sample of 37 filings using a deductive content analysis approach to infer (or "assess") yes/no answers for each of the NAIC's voluntary questions. The review was performed in two stages: (1) an initial stage in which each member of the team independently assessed a common set of four filings, followed by a comparison and discussion of results, and (2) a primary stage in which the remaining 33 filings were divided amongst four sub-teams, each sub-team consisting of two researchers[19]. Three of the sub-teams evaluated eight filings, and the fourth sub-team examined nine filings.

The initial stage was, in effect, a form of calibration, ensuring that all reviewers shared a common understanding of how to objectively assess each filing. This common understanding, in turn, was applied in the primary stage of the analysis. A detailed description of the calibration process is provided in Appendix K.
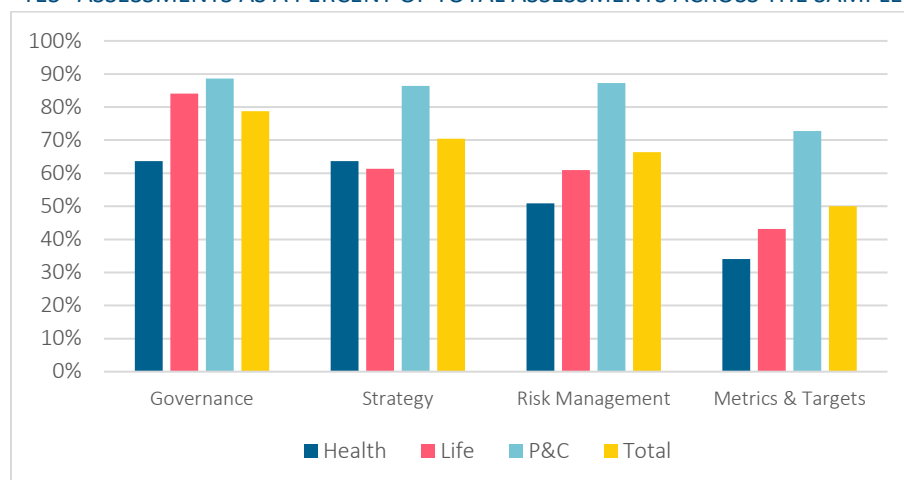
9.3 RESULTS

After completing the initial review focused on four filings, and agreeing upon a shared interpretation for each of the questions that was identified as unclear, the reviewers proceeded to the main stage of the analysis in which the remaining 33 filings were analyzed. These filings were divided amongst four sub-teams, each sub-team consisting of two reviewers. Three of the sub-teams evaluated eight filings, and the fourth sub-team examined nine filings.

The two members of each sub-team operated separately, each performing independent assessments of each filing. In addition to making a yes/no assessment for each question, the reviewers were required to extract the text from the filings that they used to formulate their assessment. After completing their individual analyses, the two members of each sub-team compared their assessments and attempted to resolve any differences. If a difference could not be resolved within a sub-team, the case was discussed by the entire team of eight reviewers. If the team as a whole was unable to arrive at an agreement, then the assessed value was set to "no".

Results of the primary analysis are presented in Figure 3, reflecting assessments across 33 disclosures (11 disclosures from each of the three primary LOBs). Because the initial phase of the analysis was solely for calibration purposes, the four disclosures used in that phase are not included in these results. Also, while the initial analysis included a disclosure from the "other" LOB, the primary analysis does not; rather, the primary analysis is focused solely on the three major LOBs: health, life and P&C.

Figure 3
"YES" ASSESSMENTS AS A PERCENT OF TOTAL ASSESSMENTS ACROSS THE SAMPLE OF 33 DISCLOSURES

These results reflect assessments across 11 disclosures in each line-of-business.

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[19] The initial review team included seven people. An additional person was added for the second round of review to create four teams, each with two members.

The results in Figure 3 are aggregated across the questions in each pillar. For example, there are 4 voluntary questions under the governance pillar, and there are 11 disclosures included in each LOB; therefore, in total, there are 44 opportunities for a "yes" assessment within each LOB. For the sample of health disclosures, there were 28 "yes" assessments, which equates to 64% (28 divided by 44). Note that the list of voluntary questions consists of 4 questions applicable to the governance pillar, 4 questions for the strategy pillar, 10 for risk management, and 4 for the metrics and targets pillar. Across the 4 TCFD pillars, the governance pillar achieved the highest percentage of "yes" assessments, while the metrics and targets pillar exhibited the lowest percentage. Relative to other lines-of-business, the P&C sector achieved the highest percentage of "yes" assessments, followed by the life sector, and trailed by the health sector.

In Table 16, the results are presented in disaggregated form: instead of totaling results across all questions in each pillar, results for each individual question are presented.

Table 16
"YES" ASSESSMENTS AS A PERCENT OF TOTAL ASSESSMENTS ACROSS THE SAMPLE OF 33 DISCLOSURES

Voluntary Question	Health	Life	P&C	Total
Governance				
Does the insurer have publicly stated goals on climate-related risks and opportunities?	36%	55%	55%	48%
Does your board have a member, members, a committee, or committees responsible for the oversight of managing the climate-related financial risk?	73%	100%	100%	91%
Does management have a role in assessing climate-related risks and opportunities?	73%	91%	100%	88%
Does management have a role in managing climate-related risks and opportunities?	73%	91%	100%	88%
Strategy				
Has the insurer taken steps to engage key constituencies on the topic of climate risk and resiliency?	45%	73%	73%	64%
Does the insurer provide products or services to support the transition to a low carbon economy or help customers adapt to climate risk?	45%	27%	91%	55%
Does the insurer make investments to support the transition to a low carbon economy?	73%	82%	82%	79%
Does the insurer have a plan to assess, reduce or mitigate its greenhouse gas emissions in its operations or organizations?	91%	64%	100%	85%
Risk Management				
Does the insurer have a process for identifying climate-related risks?	73%	82%	91%	82%
If yes, are climate-related risks addressed through the insurer's general enterprise-risk management process?	64%	82%	91%	79%
Does the insurer have a process for assessing climate-related risks?	64%	91%	100%	85%
If yes, does the process include an assessment of financial implications?	55%	91%	91%	79%
Does the insurer have a process for managing climate-related risks?	64%	82%	100%	82%
Has the insurer considered the impact of climate-related risks on its underwriting portfolio?	55%	45%	82%	61%
Has the insurer taken steps to encourage policyholders to manage their potential climate-related risks?	45%	9%	82%	45%
Has the insurer considered the impact of climate-related risks on its investment portfolio?	27%	82%	100%	70%
Has the insurer utilized climate scenarios to analyze their underwriting risk?	45%	9%	82%	45%
Has the insurer utilized climate scenarios to analyze their investment risk?	18%	36%	55%	36%
Metrics and Targets				
Does the insurer use catastrophe modeling to manage your climate-related risks?	18%	36%	82%	45%
Does the insurer use metrics to assess and monitor climate-related risks?	36%	55%	91%	61%
Does the insurer have targets to manage climate-related risks and opportunities?	36%	36%	64%	45%
Does the insurer have targets to manage climate-related performance?	45%	45%	55%	48%

These results reflect assessments across 11 disclosures in each line-of-business. The cells highlighted in yellow indicate questions where less than 50% of respondents answered yes.

The cells highlighted in yellow indicate questions where less than 50% of respondents answered yes. These present opportunities for advancements to be made by insurers. However, note that some questions may be more relevant for certain types of insurers. For example, encouraging policyholders to manage their climate-related risks or using scenario analysis for underwriting may be more difficult for life insurers given that customers are mobile, and ratings are not based on geographic region of the insured.

55% of life insurers have publicly disclosed at least one climate-related goal. Relative to other types of insurers, life insurers disclosed more climate goals related to investments which aligns with the fact that 82% reported making investments to support the transition to a low carbon economy. Many life insurers have processes for identifying and managing climate-related risks through their general enterprise risk management process and have considered the impact of climate-related risks on their investment portfolio. 91% reported having a process for assessing climate related risks including potential financial implications.

55% of P&C insurers disclosed at least one climate-related goal. The goals of P&C insurers varied, and included underwriting and investment strategies, emission reduction goals, or some combination. 100% of P&C insurers in the sample have plans to assess, reduce, or mitigate emissions, have a process for assessing and managing climate-related risks, and have considered the impact of the risk on their investment portfolio. 91% reported having metrics to assess and monitor their climate-related risks.

Only 36% of health insurers disclosed at least one climate-related goal. These goals are usually focused on assessing, reducing or mitigating greenhouse gas emissions in their operations.

Nearly all disclosures in the sample reported some form of governance with oversight of climate-related business risk. 91% of disclosures reported having a board member, members, or committee responsible for the oversight of managing climate-related financial risk. Many insurers added climate risk to an existing framework. In some instances, new structures were created, or cross-functional teams were formed. Responses included both bottom-up and top-down approaches and several included some combination of the two.

88% of respondents stated that management has a role in assessing and managing climate-related risks and opportunities. As noted in the discussion of the calibration phase of the analysis (see Appendix K), the term "key constituencies" was considered unclear by the review team, but many insurers have engaged with external organizations on the topic of climate risk and resilience (45% for health, 73% for life and P&C). Multiple P&C companies cited engagement with the Insurance Institute for Business & Home Safety, Build Strong Coalition and Habitat for Humanity regarding safer, more resilient building practices. Life insurers were more likely to cite opportunities to engage constituencies through social impact investing as well as engagement in renewable energy programs such as the Environmental Protection Agency (EPA) Green Power Leadership Club. Health insurers sited engagement with U.S. Health Care Climate Council, Practice Greenhealth, and collaboration with vendors and suppliers regarding both supply chain management and environmentally friendly products.

With respect to the strategy question regarding whether an insurer offered products or services to support the transition to a low carbon economy or help customers adapt to climate risk, the percentage of "yes" assessments was relatively low for life and health insurers (27% and 45%, respectively). Health insurers pointed to sustainable and energy-efficient hospitals and clinics, as well as installation of electric vehicle charging stations on healthcare campuses. Some health care companies cited post-disaster relief efforts to assist consumers in immediate impact zones by providing early access to prescription refills, waiving pre-approval processes, and providing access to care and hotlines for post-traumatic stress. Many P&C insurers (91%) mentioned mitigation discounts and consumer education regarding property resilience. Commercial insurers cited specialized risk mitigation services, underwriting limitations on coal and oil sands, and opportunities for underwriting expansion into renewal energy and utility providers. Few life insurers (27%) in the sample set had concrete examples for this question, but it is possible that this question isn't readily applicable to the life insurance business as discussed earlier in this report. The limited affirmative assessments to this question for life insurers were related to training and guidance for employees,

tenants, and the public, mostly related to sustainability and innovation. However, many life insurers did cite investments made to support the transition to a low carbon economy.

There were robust responses in the disclosures regarding plans to assess, reduce or mitigate greenhouse gas emissions in operations (100% P&C, 64% life and 91% health). This question was part of the original eight-question survey developed in 2010. Many insurers in all lines of business referenced shifts in office policies due to the COVID-19 pandemic as well as reductions in travel as a means for reducing emissions. Health insurers referenced improvements in energy efficiency for hospitals and clinics. Life insurers were the least likely to respond affirmatively to this question which may be attributable to the fact that they tend to have fewer brick and mortar locations than other insurer types.

All lines of business achieved a high percent of "yes" assessments for risk management questions regarding processes for identifying (91% P&C, 82% life, and 73% health), assessing (100% P&C, 91% life, and 64% health), and managing (100% P&C, 82% life, 64% health) their climate related risks. Many respondents explained that climate-risk was addressed in their overall risk management process (91% P&C, 82% life, and 64% health). Fewer life or health insurers had considered the impact on their underwriting portfolios (45% and 55% respectively) and very few had taken steps to encourage policyholders to manage their potential climate-related risks (9% and 45% respectively). Life insurers were less likely to use climate scenarios to analyze underwriting risk (9%); however, more had utilized scenario analysis for analyzing their investment risk (36%). Only 36% of health insurers are using metrics to assess and monitor climate-related risks, while 55% of life insurers and 91% of P&C insurers stated that they were tracking climate-related metrics.

Within metrics and targets, few life or health insurers (36% and 18% respectively) were using catastrophe models to manage climate-related risks while a significant number of P&C insurers reported using catastrophe models (82%). Among life insurers that were using models, they were mostly for investment analysis and owned assets, whereas P&C insurers use models for underwriting exposure analysis. More P&C insurers had targets (64% for managing opportunities and 55% for managing performance) while life and health insurers were less likely to have targets for managing opportunities (36% for both) or performance (45% for both).

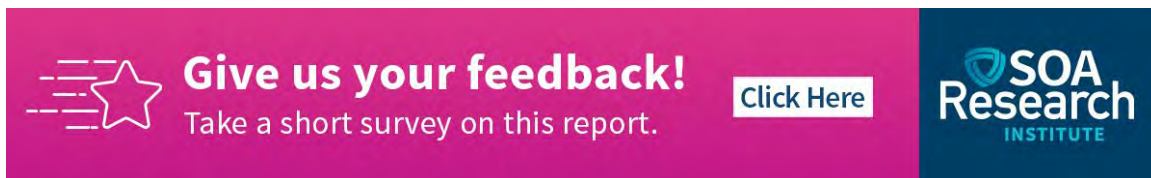## Section 10: Discussion of Results, and Considerations for the Future

The analysis of the 2021 NAIC climate risk disclosures revealed a broad range of approaches to climate risk disclosure. Some of this variation arises because insurers adopt governance and management approaches that are proportional to their unique exposure to climate risks. Compared to insurers with a high-level of assessed exposure to climate risks, insurers who assess their exposure as low tend to adopt a leaner governance and management approach. For example, many health insurers state, in their disclosures, that changes to population health from either climate or non-climate factors are automatically captured in the re-pricing of insurance contracts which typically takes place on an annual basis; therefore, in their view, no changes are required to their approach to underwriting. The argument that "no change is needed" to an insurer's existing approach isn't restricted to the health sector; to a lesser extent, it also appears in the life and P&C sectors. For example, regardless of line-of-business, an insurer might argue that its existing conservative investment approach is sufficient to mitigate the potential impact of climate change on the asset-side of its balance sheet.

The purpose of this analysis isn't to judge whether an insurer's approach to climate risks is indeed proportionate to their climate-risk exposure. It is reasonable to assume that insurers will not provide proprietary or highly detailed data in a publicly available disclosure. In fact, the disclosure is intended to provide state insurance regulators with a cursory overview of the insurer's climate risk management practices, setting the stage for more in-depth dialogue during an examination. For this reason, insurers are not judged on the length of the filings; however, given the complexity of the subject matter, the limited content found in some findings may point to a need for additional

consideration on the part of the insurer. For example, nearly 40% of disclosures are less than 5000 characters in length (about two single-spaced pages)[20].

While some of the filings offer a comprehensive disclosure of climate risks, many are more narrowly focused on one side of the balance sheet to the exclusion of the other. For example, a P&C insurer might focus exclusively on its underwriting risks, while a life insurer might focus exclusively on its investment risks. However, the most comprehensive disclosures address both sides of the balance sheet, irrespective of line-of-business.

Reviewing examples provided in research reports (including this report) and examining the public disclosures of other insurers could be beneficial for insurers with respect to identifying risks and assessing their own practices related to climate-risk governance, strategy, risk management, and metrics and targets. Insurance is a leading industry with respect to risk management, and the annual public disclosure process provides an opportunity for collective engagement, shared learning, and continual advancement.

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[20] 40% is an estimate based on an examination of about 80% of the universe of 2021 disclosures, as described in Appendix D

Section 11: Acknowledgments

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Appendix A: Construction of the Sample

Because the research was to be conducted primarily through a manual review, the sample size had to be selected with this constraint in mind. Given the estimated size of the dataset, a sample of 50 filings was judged to be a realistic goal.

Among the various research objectives is a comparison of the characteristics of filings both across LOBs and within LOBs. Therefore, it was necessary for the sample to contain enough filings from each LOB to provide a sense of the range of approaches to climate risk within each LOB. One possibility would be for the sample to reflect the distribution of LOB filing counts in Table 2. This would lead to sample sizes of 28 for P&C, 9 for health, and 13 for the life sector. While there is some logic to this approach, a sample of merely 9 filings for the health sector might not provide significant insight into the range of approaches (across health insurers) for governing and managing climate risk. It was decided, therefore, to use a sample of 16 for each of the 3 main LOBs. Thus, 48 filings in total were selected across the P&C, health, and life sectors. An additional 4 filings were selected from insurers whose business falls outside of the 3 main LOBs, bringing the total sample size to 52.

An initial exploration of the filings revealed a potential correlation between the size of insurers (measured using net assets) and the quality of the associated filings. In general, the largest insurers in each LOB appeared to have the strongest approaches to the governance and management of climate risks. Therefore, to ensure that the sample for each LOB contained enough filings of decent quality from which to extract positive examples and ideas, a decision was made to oversample the largest insurers. To this end, separately for each LOB, each filing in the data universe was ranked from smallest to largest by net assets. The first 12 members of each LOB's sample were selected randomly from the bottom 90% of the net asset distribution, while the remaining members of the sample were selected randomly from the top 10%.

An additional rationale for overweighting the largest firms is that large firms are likely to be of greater interest to regulators than the small firms. Suppose that two P&C insurers, "A" and "B", run similar businesses, and that each is doing a poor job governing and managing the risks of climate change. If "A" has a 10% market share while "B" has a "0.1%" market share, "A" is likely to be of greater concern to regulators than "B". Of course, regulators are concerned about all insurers, regardless of their size. However, if it is difficult to simultaneously monitor the climate-risk approaches of all firms, it makes sense to channel scarce resources towards monitoring the largest firms. This is analogous to the audit of tax returns by the IRS. Given scare auditing resources, it makes mathematical and economic sense for the IRS to oversample the tax filers with the largest revenue and/or income streams.

With respect to ranking firms by size, there are various alternatives which could have been used instead of net assets, such as net premiums written or market capitalization. Market capitalization was ruled out because this metric is readily available only for publicly traded firms. Premiums written is an option, but U.S. premium data could potentially be a poor proxy for the size of those firms that operate on a global scale. Therefore, net assets was judged to be a better proxy given that the sample contains insurers that operate solely within the U.S. as well as insurers that operate on a global scale.

Note that in addition to the three major LOBs (P&C, health, and life), the dataset includes a small number of filings from other LOBs, such as crop insurance and title insurance. Some of these "other" insurers are subsidiaries that are captured in the group filings of the three major LOBs. For example, a group filing might include five P&C subsidiaries and one title insurance subsidiary. In the context of our analysis, this group's "primary" LOB would be P&C. Out of a universe of 1539 individual firms or subsidiaries, only 27 "other" insurers operate independently of an associated insurer from a major LOB. Because the subset of stand-alone "other" insurers is quite small, it was not a focus of our analysis. However, for the sake of completeness, four "other" insurers were selected for analysis. As with the three primary LOBs, this sample was overweighted in favor of large firms.

Appendix B: The 52 Filings Included in the Sample

For the analysis presented in this report, a total of 52 climate risk disclosures were analyzed. These disclosures include both individual insurers, as well as insurer-groups that submitted filings covering two or more subsidiaries or entities. The sample of 52 is listed in the tables below. The financial data is for fiscal year 2021, obtained from table 287 in "S&P Capital IQ Pro". Specifically, net assets was obtained from field 113963, and direct written premiums was obtained by summing fields 122926 and 123436. Field 122926 corresponds to P&C and health premiums, while field 123436 corresponds to life insurance premiums.

Table B1

SAMPLE OF INSURERS WHOSE PRIMARY LINE-OF-BUSINESS IS HEALTH

	Name of Insurer or Insurer-Group	# of Firms or Subsidiaries Included in the Filing	Net Assets (Millions $)	Direct Written Premiums (Millions $)
1	Anthem Blue Cross Life & Health Insurance Company	44	42,590	89,529
2	Unum Group	7	38,851	6,027
3	Aetna. Inc a CVS Health Company	30	38,607	50,760
4	Cigna Group	11	38,099	30,989
5	Humana Health	14	20,082	69,798
6	Centene Corporation	29	13,890	34,564
7	Independence Health Group, Inc.	5	5,636	16,707
8	Emblem Health, Inc.	6	3,040	7,968
9	Bright Health Group, Inc.	12	2,415	2,599
10	PacificSource Community Health Plans	3	1,349	3,115
11	Boston Medical Center Health Plan, Inc.	1	1,039	2,937
12	Blue Cross & Blue Shield of Rhode Island	1	924	1,800
13	Geisinger Health Plans	3	850	3,202
14	CHA Holding Inc.	5	702	1,720
15	Select Health of South Carolina, Inc.	1	481	1,581
16	Group 1001	1	450	197
	Total	173	209,006	323,492

Table B2

SAMPLE OF INSURERS WHOSE PRIMARY LINE-OF-BUSINESS IS LIFE AND/OR ANNUITIES

	Name of Insurer or Insurer-Group	# of Firms or Subsidiaries Included in the Filing	Net Assets (Millions $)	Direct Written Premiums (Millions $)
1	PRUDENTIAL OF AMER GRP	5	660,097	44,200
2	Metropolitan Life Insurance Company	3	461,331	26,805
3	New York Life	5	406,492	34,670
4	Jackson Financial Inc.	2	322,242	20,001
5	Brighthouse Life Insurance Company	1	200,962	9,308
6	Voya Financial	3	146,918	2,043
7	Guardian Life Insurance Company of America	3	91,015	9,750
8	Empower Annuity Insurance Company of America	1	75,890	6,298
9	Sumitomo Life Insurance Group	2	50,105	5,211
10	Life Insurance Company of the Southwest	2	38,524	3,695
11	Mutual of America Life Insurance Company	1	28,283	2,373
12	Globe Life Inc.	6	21,576	3,794
13	Liberty Bankers Insurance Group	3	3,103	707
14	Assurity Life Insurance Company	1	2,661	199
15	The Baltimore Life Insurance Company	1	1,299	85
16	Puritan Life Insurance Company of America	1	272	48
	Total	40	2,510,770	169,189

Table B3

SAMPLE OF INSURERS WHOSE PRIMARY LINE-OF-BUSINESS IS P&C

	Name of Insurer or Insurer-Group	# of Firms or Subsidiaries Included in the Filing	Net Assets (Millions $)	Direct Written Premiums (Millions $)
1	Berkshire Hathaway Group of Insurance Companies	57	633,768	54,802
2	Nationwide Corp Group	31	292,250	38,637
3	Allianz Insurance Group	14	193,339	20,526
4	The Travelers Companies, Inc.	24	95,465	30,189
5	Progressive Insurance Group	38	64,243	48,149
6	Brookfield Asset Mgmt Reins Partners Ltd Grp.	4	27,355	4,086
7	The Cincinnati Insurance Group	4	23,405	5,868
8	Tokio Marine America Insurance Company	2	12,080	4,080
9	Arch Insurance Group	2	7,801	4,103
10	Amica Mutual Insurance Company	3	7,392	2,348
11	Argo Group International Holdings, Ltd.	1	2,353	822
12	Vermont Mutual Insurance Group	3	1,362	577
13	Canal Insurance Group	1	1,072	353
14	Palomar Specialty Insurance Company	1	484	322
15	Hereford Insurance Company	1	288	122
16	Aegis Security Insurance Company	1	214	177
	Total	187	1,362,871	215,161

Table B4

SAMPLE OF INSURERS WHOSE PRIMARY LINE-OF-BUSINESS IS NEITHER HEALTLH, LIFE, NOR P&C

	Name of Insurer or Insurer-Group	# of Firms or Subsidiaries Included in the Filing	Net Assets (Millions $)	Direct Written Premiums (Millions $)
1	Radian Guaranty Inc.	1	6,063	978
2	Essent Guaranty, Inc.	1	3,375	871
3	WCF National Insurance Company	1	569	121
4	DentaQuest Group	2	445	1,114
	Total	5	10,452	3,084

Appendix C: Financial Totals of the 2021 Filings as % of Entire Insurance Industry

Using S&P Capital Market Pro, the following metrics were totaled across the entire U.S. insurance industry for 2021: total net assets, total liabilities, and total direct premiums. These totals were compared against the corresponding totals computed across the insurers who filed climate risk disclosures, and across the subset of 52 filings that were used for the analysis.

Table C1

2021 TOTALS (BILLIONS $) ACROSS THE ENTIRE U.S. INSURANCE INDUSTRY

	P&C	Health	Life	Total
Total Direct Premiums Written	798	908	819	2,524
Total Net Assets	2,617	573	8,471	11,661
Total Liabilities	1,564	299	7,993	9,857

Table C2

2021 TOTALS (BILLIONS $) ACROSS ALL INSURERS WHO FILED CLIMATE RISK DISCLOSURES IN 2021

	P&C	Health	Life	Total
Total Direct Premiums Written	684	669	509	1,862
Total Net Assets	2,447	424	7,958	10,829
Total Liabilities	1,318	261	7,484	9,062

Table C3

2021 TOTALS (BILLIONS $) ACROSS THE 52 FILINGS USED FOR THE ANALYSIS IN THIS REPRORT

	P&C	Health	Life	Total
Total Direct Premiums Written	169	320	212	701
Total Net Assets	877	205	2,985	4,066
Total Liabilities	414	141	2,821	3,376

Table C4

TABLE C2 DIVIDED BY TABLE C1

	P&C	Health	Life	Total
Total Direct Premiums Written	85.7%	73.7%	62.2%	73.8%
Total Net Assets	93.5%	74.0%	94.0%	92.9%
Total Liabilities	84.2%	87.1%	93.6%	91.9%

Table C5

TABLE C3 DIVIDED BY TABLE C1

	P&C	Health	Life	Total
Total Direct Premiums Written	21.2%	35.2%	25.9%	27.8%
Total Net Assets	33.5%	35.7%	35.2%	34.9%
Total Liabilities	26.5%	47.1%	35.3%	34.2%

Appendix D: Distribution of Filings by Number of Characters

The basic analysis presented in section 8 of this report revealed a relationship between the size of filings and their level of risk awareness. The shorter a filling as measured by total number of characters, the more likely that it will present a myopic view of climate risks. Roughly speaking, filings below 5000 characters (about two single-spaced pages using 12-point font) are likely to have significant weaknesses. It makes sense, therefore, to examine the distribution of filings by number of characters. Of particular concern to regulators would be large insurers that have small risk filings (with respect to number of characters). Therefore, this appendix presents the two-dimensional distribution of filings by number of characters and by the size of the insurer, using net assets as the proxy for firm size. The results are presented separately for each LOB.

Firms have the option of submitting their annual climate risk filing either as a PDF file, or by entering text into an HTML input page, whereupon the submitted data is saved as a text file. About 20% of the 446 unique filings were submitted as PDF files, while the remaining 80% were submitted in text form. It is a simple matter to count the characters in text files because they can easily be processed by a computer program. However, it is more difficult to count characters in PDF files. We were unable to devise an automated process to perform this task (but perhaps other researchers might be able to devise a solution). Therefore, the results presented in this appendix do not include the entire universe of 446 unique filings. Rather, only the 372 filings are included. The filings that didn't make it into this analysis are those that are both in PDF format and are not included in the sample of 52 filings used for the analyses presented in this report.

Table D1 displays distributions tabulated across the aforementioned 372 filings. Each line-of-business (LOB) was separately tabulated. The filings were categorized into four groups that vary with respect to the number of characters in the filing. The table displays the percentage of the filings in each of these groups. In addition, the percentage of total firms, net assets, and premiums was computed for each of the four categories. For example, the first row of the table is interpreted as follows: 40.9% of health sector filings have fewer than 5000 characters, and these filings represent 19% of the total number of health sector firms, 12% of the health sector's total net assets, and 10.9% of the health sector's total direct premiums.

Table D1
DISTRIBUTION OF FILINGS BY NUMBER OF CHARACTERS (EXCLUDING WHITESPACE)

LOB	# of Characters	Filings	Firms	Net Assets	Premiums
Health	< 5000	40.9%	19.0%	12.0%	10.9%
Health	5,000 to 9,999	27.3%	17.0%	10.3%	10.3%
Health	10,000 to 14,999	16.7%	23.8%	16.5%	25.2%
Health	15,000+	15.2%	40.1%	61.2%	53.6%
Health	All	100.0%	100.0%	100.0%	100.0%
Life	< 5000	39.6%	28.3%	11.0%	15.7%
Life	5,000 to 9,999	28.1%	26.7%	17.2%	14.6%
Life	10,000 to 14,999	14.6%	18.7%	23.7%	24.4%
Life	15,000+	17.7%	26.2%	48.0%	45.4%
Life	All	100.0%	100.0%	100.0%	100.0%
P&C	< 5000	36.1%	18.0%	3.5%	6.2%
P&C	5,000 to 9,999	29.8%	18.2%	6.5%	11.0%
P&C	10,000 to 14,999	16.2%	19.7%	10.5%	20.5%
P&C	15,000+	17.8%	44.1%	79.5%	62.4%
P&C	All	100.0%	100.0%	100.0%	100.0%
Other	< 5000	73.7%	61.5%	40.5%	65.2%
Other	5,000 to 9,999	5.3%	3.8%	5.8%	12.1%
Other	10,000 to 14,999	5.3%	3.8%	4.6%	2.5%
Other	15,000+	15.8%	30.8%	49.1%	20.2%
Other	All	100.0%	100.0%	100.0%	100.0%

Table D2 shares the same structure as D1, but the results are display as counts rather than percentages of the total.

Table D2
DISTRIBUTION OF FILINGS BY NUMBER OF CHARACTERS

LOB	# of Characters	# of Filings	# of Firms	Net Assets ($Billions)	Premiums ($Billions)
Health	< 5000	27	56	41	54
Health	5,000 to 9,999	18	50	35	52
Health	10,000 to 14,999	11	70	56	126
Health	15,000+	10	118	208	268
Health	All	66	294	340	501
Life	< 5000	38	53	570	53
Life	5,000 to 9,999	27	50	892	49
Life	10,000 to 14,999	14	35	1,227	82
Life	15,000+	17	49	2,484	154
Life	All	96	187	5,173	339
P&C	< 5000	69	109	72	27
P&C	5,000 to 9,999	57	110	134	47
P&C	10,000 to 14,999	31	119	220	88
P&C	15,000+	34	267	1,655	270
P&C	All	191	605	2,081	432
Other	< 5000	14	16	5	3
Other	5,000 to 9,999	1	1	1	1
Other	10,000 to 14,999	1	1	1	0
Other	15,000+	3	8	6	1
Other	All	19	26	12	5

In general, the greater the size of the filing, the lower the probability of climate-risk myopia. As mentioned earlier, there is a high probability that a filing with fewer than 5000 characters will exhibit myopia. Figure D1 focuses on filings with fewer than 5000 characters. Using the health sector as an example, Figure D1 can be interpreted as follows: about 40% of health sector filings have fewer than 5000 characters; these filings represent about 20% of all health firms, 12% of the health sector's net assets, and 11% of the health sector's direct premiums. These findings imply that it is the smaller insurers that are most likely to filing short climate risk disclosures.

Figure D1
FILINGS WITH FEWER THAN 5000 CHARACTERS, EXPRESSED AS A % OF ALL FILINGS
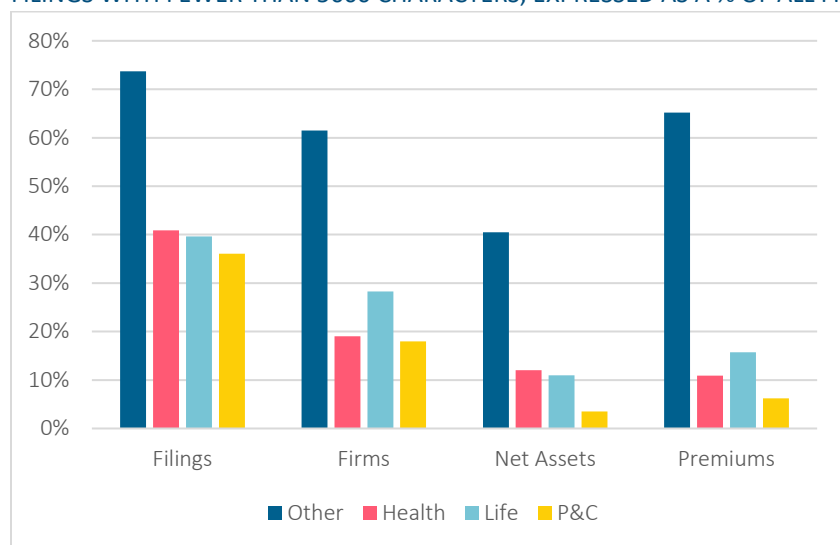
Appendix E: The NAIC Climate Risk Disclosure's Voluntary Questions

These voluntary questions are offered by the NAIC as guidance to help insurers complete the Climate Risk Disclosure. The questions are intended to focus on insurer's attention on specific climate risk issues that are of greatest relevance to the insurance sector. The document that lists these questions is available on the NAIC's website:

https://content.naic.org/sites/default/files/inline-files/2022ProposedClimateRiskSurvey_0.pdf

The list of close-ended questions is as follows:

Governance

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

Strategy

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

Risk Management

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

Metrics and Targets

- Does the insurer use catastrophe modeling to manage climate-related risks?
- Does the insurer use metrics to assess and monitor climate-related risks?
- Does the insurer have targets to manage climate-related risks and opportunities?
- Does the insurer have targets to manage climate-related performance?

# Appendix F: The Challenge of Quantifying Weather Risks in a Changing Climate

In general, it is the "tails" of weather distributions, comprised of extreme, low-frequency events, that are of concern to insurers. The low frequency of these events makes them inherently challenging to study, and to translate into estimates of risk. Climate change makes the challenge even greater.

Suppose that the annual probability of a powerful hurricane making landfall is 10%. Due to shifts in weather patterns, suppose that this probability rapidly rises to 15%. A rapid increase is not realistic, but it is a useful simplification for this illustration. Ideally, insurers would like to know of this increase immediately, as soon as it occurs, to avoid a situation in which risk is underpriced. In practice, however, this is not possible if one's approach is to look backwards in time at historical data. The best an insurer can do, using historical data, is to monitor new experience as it emerges, and to run statistical tests to assess whether the level of risk has changed. However, without many decades of data, it is difficult to determine if the risk-level has indeed increased.

To better understand this problem, it is useful to compare the probability distribution of the total number of hurricanes across a 20-year period, using p = 10% versus p = 15%, where "p" is the annual probability of a powerful hurricane making landfall:

Chart F1

A COMPARISON OF TWO PROBABILITY DISTRIBUTIONS FOR TOTAL HURRICANE LANDFALLS
ACROSS A 20-YEAR PERIOD, ASSUMING ANNUAL HURRICANE PROBABILITIES OF 10% AND 15%
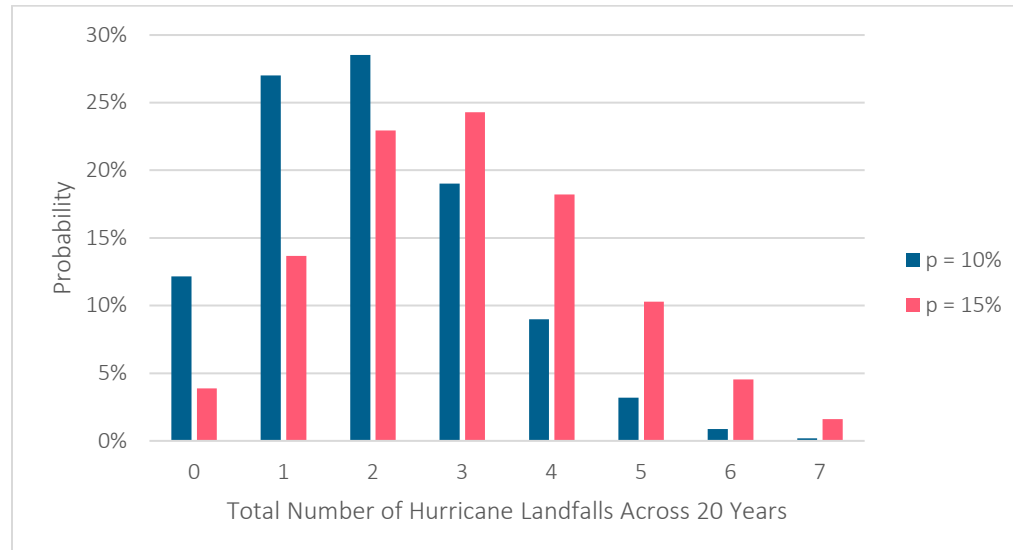
Assuming p is 10%, the expected number of hurricanes across a 20-year period is 2 (20 years * 10%). If p rises to 15%, the expected number of hurricanes rises from 2 to 3 (20 years * 15%). However, even if p remains at 10%, there is a 32% chance that 3 or more hurricanes will occur during a 20-year period. Similarly, if p shifts to 15%, there remains a 40% chance that 2 or fewer hurricanes will occur during a 20-year period. In fact, even across a 100-year period, there would be substantial overlap between the two probability distributions (see Chart 2). This overlap indicates that, even with 100 years of data, one could not be statistically confident that "p" has indeed increased relative to its baseline level of 10%.
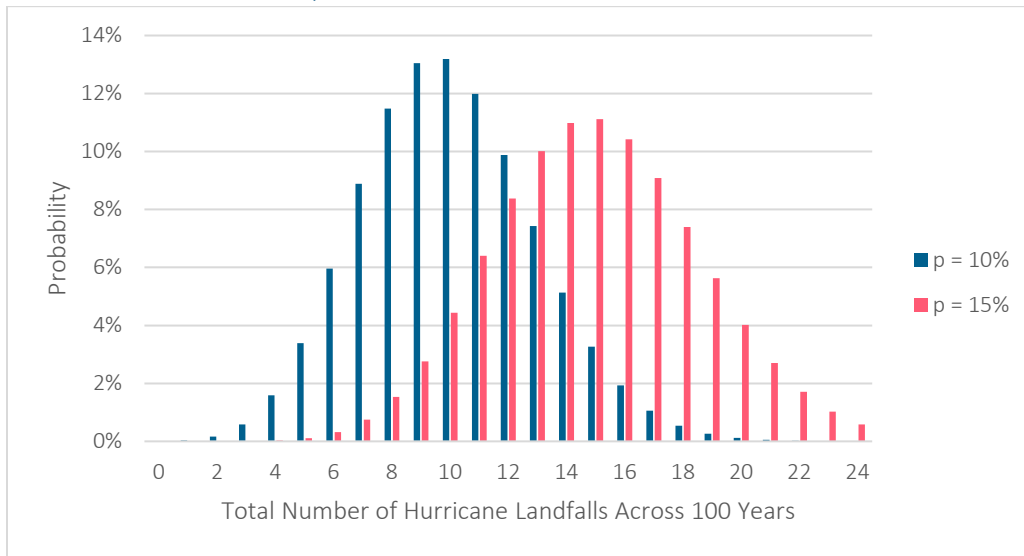
Chart F2

A COMPARISON OF TWO PROBABILITY DISTRIBUTIONS FOR TOTAL HURRICANE LANDFALLS
ACROSS A 100-YEAR PERIOD, ASSUMING ANNUAL HURRICANE PROBABILITIES OF 10% AND 15%

Thus, the randomness of Mother Nature complicates our efforts to estimate the probability of low-frequency events, and to estimate if this probability is changing across time. This isn't simply a problem that will affect risk estimation in the future. It affects the present as well. Kerry Emanuel, an atmospheric scientist at MIT who holds a doctorate in meteorology, specializes in hurricane physics, and is a member of the U.S. National Academy of Sciences, stated in a 2022 lecture[21] on hurricane risks that historical data from "the past 50-150 years is a poor guide to the present owing to the fact that climate change has already occurred."

Given this issue, Emanual suggests (in the 2022 lecture cited earlier) that sophisticated, carefully calibrated physics-based weather models offer a means to estimate the effects of climate change on both the present and future level of low-frequency weather risks. Of course, models are simplifications of reality. They are not reality itself. Consequently, their results are subject to uncertainty. However, to some extent, this uncertainty can be measured by comparing results from many different models against each other, as Emanuel explains in his lecture.

Using physics-based weather models, it is possible to estimate past, present and future probabilities of low-frequency weather events. An excellent example of this type of analysis is presented in Emanuel's paper "Assessing the Present and Future Probability of Hurricane Harvey's Rainfall"[22].

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[21] Minutes 25 and 26 of a lecture entitled "Hurricanes and Climate Change", delivered at the 2022 conference of the Society of Catholic Scientists): https://www.youtube.com/watch?v=XQF4mccVizk

[22] https://www.pnas.org/doi/10.1073/pnas.1716222114

Chart F3

RETURN PERIODS OF STORM TOTAL RAIN AT HOUSTON

Extracted from "Assessing the Present and Future Probability of Hurricane Harvey's Rainfall" by Kerry Emanuel, PhD
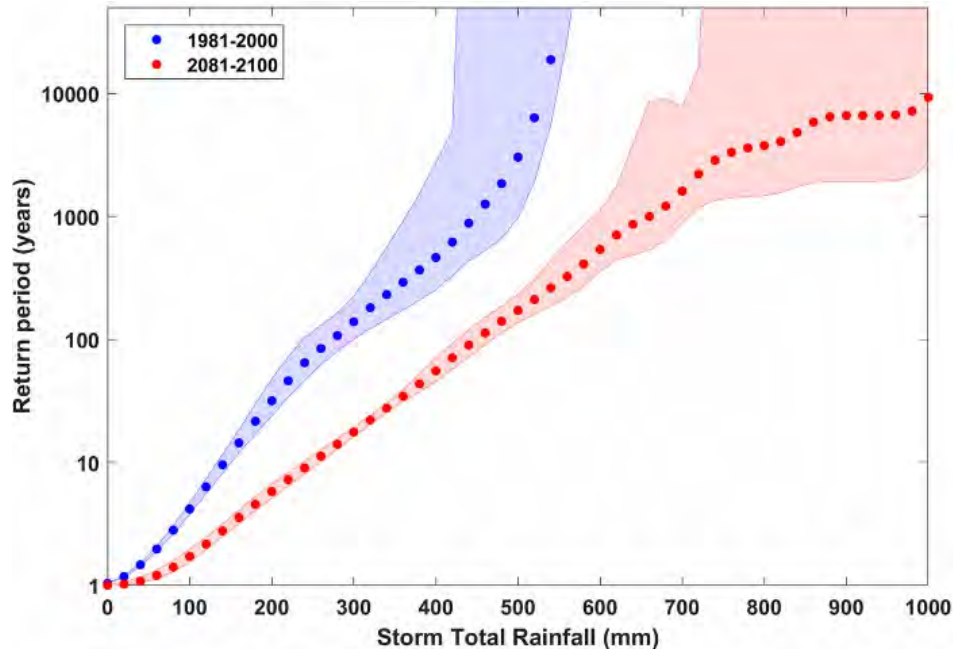
Return periods of hurricane total rainfall (millimeters) at the single point of Houston, Texas, based on 3,700 simulated events each from three global climate analyses over the period 1980–2016. The dots show the three-climate-set mean and the shading shows 1 SD in storm frequency, remapped into return periods.

Using an "ensemble" of 6 different physics-based models, each developed by a different research group, Emanuel analyzed the risk of heavy rainfall in Texas. This risk was estimated under the climate conditions that existed from 1981 to 2000, as well as under the conditions that are expected to exist between 2081 and 2100 assuming unmitigated growth of greenhouse gas emissions. The results are summarized in Chart 3. Emanuel estimates that the probability of a rainfall event in the state of Texas of the same magnitude as Hurricane Harvey "was about 1% in the period 1981–2000 and will increase to 18% over the period 2081–2100 under Intergovernmental Panel on Climate Change (IPCC) AR5 representative concentration pathway 8.5", and "if the frequency of such event is increasingly linearly between these two periods, then in 2017 the annual probability would be 6%, a sixfold increase since the late 20th century." According to this analysis, the estimated return period for a 20-inch rainfall event in Texas decreased from 100 years in the 1990s to merely 17 years in 2017. Obviously, there is uncertainty to these results. Some of this uncertainty was captured by using numerous models developed by different research groups.

The point of this discussion is not to advocate for the usage of physics-based computer models or to criticize the retrospective statistical analysis of historical weather data, but rather to call attention to some of the risk-estimation questions and challenges that climate change presents to the insurance industry.

Appendix G: Challenges Distilling Key Observations from Each Filing

A researcher tasked with reviewing a filing must weigh the "evidence" offered in the filing against the specific criteria they wish to measure or the question that that wish to answer. As an example, consider the following question from the NAIC's list of voluntary questions: "does the insurer have a process for assessing climate-related risks?" Suppose the reviewer's task is to score this question as either a "Yes" or "No". To illustrate the challenge of answering this question, consider the following fictive (but realistic) examples of insurers' approaches to assessing climate-related risks:

Table G1

ILLUSTRATIVE EXAMPLES OF INSURERS' PROCESSES FOR ASSESSING CLIMATE-RELATED RISKS

Fictive Example	Summary of the Insurer's Process for Assessing Climate-Related Risks
1	The filing indicates – without a supporting argument -- that its business model is inherently well-insulated from climate risks, and, consequently, no new processes are needed to assess climate risks. Rather, existing processes are sufficient.
2	The filing indicates – with a convincing argument -- that its business model is inherently well-insulated from climate risks, and, consequently, no new processes are needed to assess climate risks. Rather, existing processes are sufficient.
3	The filing indicates that the same process used for assessing all other emerging risks is applied to climate risks, but the process isn't described.
4	The filing indicates that the same process used for assessing all other emerging risks is applied to climate risks, and the process is described. However, it isn't clear to the reviewer how the general emerging-risk process can be successfully applied to climate risks. No outputs of the assessment are shared.
5	The filing indicates that the same process used for assessing all other emerging risks is applied to climate risks, and the process is described. However, it isn't clear to the reviewer how the general emerging-risk process can be successfully applied to climate risks. Nevertheless, the filing shares some qualitative estimates of the insurer's exposure to climate risks.
6	The filing indicates that the insurer has established an assessment process specifically for climate-related risks. However, this process isn't described.
7	The filing indicates that the insurer has established an assessment process specifically for climate-related risks. The process is described, but it is quite narrow in its scope – for example, it may be aimed solely at reputational risks associated with its operational greenhouse emissions, without any consideration of investment risks or underwriting risks.
8	The filing indicates that the insurer has established an assessment process specifically for climate-related risks. The process is described and appears to cover a broad range of risks areas (investments, liabilities, underwriting, operational). However, with respect to physical weather risks, the process appears no different from what would be expected for a stationary climate – that is, there is no evidence that the insurer has considered the potential impact of shifts in weather distributions.
9	The filing indicates that the insurer has established an assessment process specifically for climate-related risks. The process is described and appears to cover a broad range of risks areas (investments, liabilities, underwriting, operational). While the process appears comprehensive, the filing offers no outputs from this process which could serve as evidence that the process is indeed operational.
10	The filing indicates that the insurer has established an assessment process specifically for climate-related risks. The process is described and covers a broad range of risks areas (investments, liabilities, underwriting, operational). The filing shares some basic outputs of this process – for example, an assessment of whether climate risks are material or immaterial in the short, medium, and long-term.
11	The filing indicates that the insurer has established an assessment process specifically for climate-related risks. The process is described and covers a broad range of risks areas (investments, liabilities, underwriting, operational). The filing shares quantitative outputs of the process, such as the potential impact of climate change on the insurer's earnings.

The realistic examples in Table G1 raise a few questions with respect to the scoring process:

- How much evidence is needed to validate the existence of a process for assessing climate-related risks? If an insurer states that they have a process, is their statement sufficient proof? Is a description of the process required? Must the process appear to be satisfactory or robust in the judgment of the reviewer? Must the description of the process be accompanied by outputs from the process, to validate that the process does indeed exist?

- Should a general process that is aimed at all emerging risks – as opposed to specifically at climate risks – be scored as a "yes"?

- How should the scoring process deal with an insurer that makes a convincing argument that they do not require any new processes to address climate-related risks?

- How should the scoring process deal with a process that appears myopic, such as a process that is focused solely on reputational risks from operational greenhouse gas emissions?

Regardless of the approach used for translating the narratives in the filings into Y/N answers, the scoring process will result in a significant loss of information because the distinction between the various approaches illustrated in Table G1 will be lost. Alternatively, the scoring process could attempt to capture these different approaches – for example, by categorizing each filing into one of the 11 categories listed in Table G1. However, this would lead to an increase in the complexity of the analysis and might also increase the role played by the reviewer's subjectivity (because some of the distinctions across the 11 categories require subjective judgement).

In addition to reviewers' subjectivity, a second layer of subjectivity arises with respect to the staff members of the insurers who are tasked with writing responses to the survey questions. Individual "A" employed by insurer "X" might have a different interpretation of "process" and "assessment" compared to individual "B" employed by insurer "Y". Even if the two insurers, "X" and "Y", have similar approaches to climate risk, author "A" might answer "Yes" to the survey question, while author "B" might answer "No".

There are no simple remedies for these issues. Scoring challenges arise because the filings contain complex information that cannot easily be distilled down to a compact set of objective results.

What is critical is that researchers do not lose sight of the forest while attempting to categorize and count the trees. Scoring the granular elements of a filing is a useful exercise, but it is the big picture that is of greatest importance. Roughly speaking, the big picture boils down to two key issues:

- Are insurers aware of the full range of climate-related risks that they face? Or are they myopic, failing to recognize one or more key risks?

- Are insurers actively developing the expertise and capabilities needed to address the risks associated with climate change?

With respect to these key issues, there is no single, "correct" way to analyze the filings. Consequently, it makes sense to use multiple approaches and multiple reviewers and/or consulting firms, each independently tasked with performing a review, and each with the freedom to develop their own approach to the analysis.

Appendix H: Extension of the High-Level Scan to Capture Variations within Each LOB

The primary purpose of the high-level qualitative scan of the filings was to provide a bird's eye view of the filings, capturing the frequently occurring characteristics of each primary LOB (health, life, and P&C). These results were presented in section 7 of the report. The high-level scan also identified some key differences within each LOB. These differences are summarized in this appendix.

To provide a rough sense of these differences, the filings in each LOB were categorized into three groups, and the common characteristics of each group were then summarized. The three groups correspond to three different estimated levels-of-effort with respect to understanding and addressing climate risk: (1) relatively low effort, (2) medium effort, and (3) relatively high-effort (LOE). LOE was estimated using a simple formula that considers several factors, including whether an insurer has quantified their scope 1, 2, and/or 3 emissions, the breadth or narrowness of their risk awareness, and their efforts to assess and model climate risks.

KEY DIFFERENCES IN FILINGS WITHIN THE HEALTH SECTOR

Tables H1 and H2 provides a rough summarization of the variations in health sector fillings identified during the high-level qualitative scan.

Table H1
ROUGH CATEGORIZATION OF HEALTH INSURANCE FILINGS INTO THREE GROUPS,
CORRESPONDING TO DIFFERENT LEVELS-OF-EFFORT WITH RESPECT TO ADDRESSING CLIMATE RISKS

Group	Common Characteristics
Relatively Low Effort	• Indicates that climate risk is immaterial to the business, sometimes without offering a rationale, or arguing that the ability to reprice contracts on an annual basis provides adequate insulation against gradual climate changes. • Myopic: displays a narrow view of climate risks, sometimes failing to explicitly discuss any type of climate risk. • Indicates that climate risks are "implicitly" or "holistically" analyzed (as opposed to explicitly analyzed). • No effort to enhance climate expertise via workshops, seminars, consultants, or climate experts. • No mention of disaster recovery program. • Has not quantified its emissions.
Medium Effort	• Has a structure for governing climate risks, but the flow of information and analyses into that structure falls short of the leading filings. • Shows limited awareness of the range of climate risks. For example, may consider operational risks, but fails to consider risks to liabilities or financial assets. • Has a disaster recovery program. • Has quantified its scope 1 and 2 emissions.
Relatively High Effort	• The board's responsibilities include the oversight of climate risks, and the board receives climate-related analyses and information on a regular basis. • Demonstrates an awareness of the potential impact of climate risk across multiple dimensions of its business. • Has engaged consultants, academics, or external partners to expand its climate risk expertise. • Has made some efforts to assess the impact of climate risks on its business; however, these efforts are generally quite limited compared to many insurers in the P&C and life sectors. • Has a disaster recovery program. • Has quantified its scope 1 and 2 emissions.

Low, medium, and high levels-of-effort are expressed relative to other health insurers, rather than relative to insurers of all types.

Table H2

METRICS DESCRIBING THE HEALTH INSURERS IN EACH OF THE THREE GROUPS

Group	# of Filings	% of Filings	% of Filings, Weighted by Assets	% of Filings, Weighted by Prems.	Median Assets ($M)	Median Premiums ($M)	Median # of Characters in Filing	Median # of Firms in Filing
Low Effort	9	56%	8%	12%	924	2,599	7,602	3
Med. Effort	3	19%	28%	32%	20,082	30,989	15,000	11
High Effort	4	25%	64%	56%	38,792	42,662	39,000	29

While most of the health filings in the sample fall into the "relatively low effort" category, there is a correlation between level-of-effort and the size of the insurer. Consequently, if the filings are weighted by each insurer's total annual premiums, then 56% of the sample falls in the "relatively high effort" group. In addition, note that a correlation exists between level-of-effort and both the size of the filing (measured in number of characters), and the number of firms included in the filing (recall that many of the filings are group filings that span multiple subsidiaries).

When interpreting the percentages in Table H2, keep in mind that they are percentages of the *sample*, as opposed to percentages of the universe of filings. Recall that the sample was constructed to overweigh the largest firms. Therefore, to the extent that filing quality is positively correlated with firm size, the average filing quality in the sample is greater than that of the whole universe (in other words, the sample is favorably biased).

KEY DIFFERENCES IN FILINGS WITHIN THE LIFE SECTOR

Tables H3 and H4 provides a rough summarization of the variations in life sector fillings identified during the high-level qualitative scan.

Table H3

ROUGH CATEGORIZATION OF LIFE/ANNUITY FILINGS INTO THREE GROUPS, CORRESPONDING TO DIFFERENT LEVELS-OF-EFFORT WITH RESPECT TO ADDRESSING CLIMATE RISKS

Group	Common Characteristics
Relatively Low Effort	Similar characteristics as observed for the "relatively low" category of health insurers: • Myopic view of climate risks. • Climate risk is viewed as immaterial to the business, often without offering a rationale, or arguing that existing processes are sufficient to address the gradual impact of climate change. • No explicit governance of climate risks, or governance appears superficial and anemic. • Has not quantified its emissions.
Medium Effort	• Has a structure for governing climate risks, but the flow of information and analyses into that structure falls short of the leading filings. • Is monitoring the exposure of its investments to climate risks. • Has made a basic effort to assess how climate change could potentially impact its investment portfolio, but this effort doesn't include a forward projection of asset performance under different global warming and transition scenarios. • Limited awareness of the potential impact of climate risks on its liabilities and/or argues that the risks are negligible. • Has a disaster recovery program. • Has quantified its scope 1 and 2 emissions.
Relatively High Effort	• The board's responsibilities include the oversight of climate risks, and the board receives climate-related analyses and information on a regular basis. • Has performed a qualitative and/or quantitative analysis of potential impact of climate change on its investments using clearly described warming scenarios. • Offers some discussion of how liabilities might be affected by climate change; in general, however, believes that the impact on liabilities will be relatively small compared to the potential impact on assets. • May perform mortality stress tests that indirectly capture the potential effects of climate change. • Has a disaster recovery program. • Has quantified its scope 1 and 2 emissions.

Low, medium, and high levels-of-effort are expressed relative to other life/annuity insurers, rather than relative to insurers of all types.

Table H4

METRICS DESCRIBING THE LIFE/ANNUITY INSURERS IN EACH OF THE THREE GROUPS

Group	# of Filings	% of Filings	% of Filings, Weighted by Assets	% of Filings, Weighted by Prems.	Median Assets ($M)	Median Premiums ($M)	Median # of Characters in Filing	Median # of Firms in Filing
Low Effort	6	38%	3%	4%	2,882	453	3,800	1
Med. Effort	5	31%	48%	39%	200,962	9,308	33,000	2
High Effort	5	31%	49%	57%	91,015	9,750	37,000	5

Like the health sector filings, the life sector filings exhibit a high correlation between level-of-effort and the size of the insurer. Consequently, if the filings are weighted by each insurer's total annual premiums, then 57% of the sample falls in the "relatively high effort" group. Like the health sector filings, a correlation exists between level-of-effort and both the size of the filing (measured in number of characters), and the number of firms included in the filing (recall that many of the filings are group filings that span multiple subsidiaries).

KEY DIFFERENCES IN FILINGS WITHIN THE P&C SECTOR

Tables H5 and H6 provides a rough summarization of the variations in P&C sector fillings identified during the high-level qualitative scan.

Table H5

ROUGH CATEGORIZATION OF P&C FILINGS INTO THREE GROUPS,
CORRESPONDING TO DIFFERENT LEVELS-OF-EFFORT WITH RESPECT TO ADDRESSING CLIMATE RISKS

Group	Common Characteristics
Relatively Low Effort	Suffers from one or more serious weaknesses: • The filing is so short that it fails to provide any meaningful information. • Claims that its business is insulated from climate-change risks but offers little or no explanation. • There is no description of how climate risks are assessed and analyzed. • Does not quantify its emissions.
Medium Effort	• Governance and management of climate risks is uneven: for example, the insurer might do a good job governing and modeling the potential impact of climate change on its underwriting, with little or no attention paid to the potential impact on its investment portfolio. • Has quantified its scope 1 and 2 emissions or is in the process of quantifying its emissions.
Relatively High Effort	• Governance of climate risks is vigorous and active. • Demonstrates an understanding of the potential impact of climate risks on both sides of the balance sheet. • Stress tests both assets and liabilities using well-defined climate scenarios. • Thorough discussion of risks and strategies for addressing climate risks. • Has quantified its scope 1 and 2 emissions.

Low, medium, and high levels-of-effort are expressed relative to other P&C insurers, rather than relative to insurers of all types.

Table H6

METRICS DESCRIBING THE P&C INSURERS IN EACH OF THE THREE GROUPS

Group	# of Filings	% of Filings	% of Filings, Weighted by Assets	% of Filings, Weighted by Prems.	Median Assets ($M)	Median Premiums ($M)	Median # of Characters in Filing	Median # of Firms in Filing
Low Effort	6	33%	7%	26%	1,217	465	6,400	2
Med. Effort	5	28%	2%	5%	7,801	4,080	18,500	2
High Effort	5	28%	91%	69%	193,339	30,189	88,000	24

Like the health sector and life sector filings, the P&C sector filings exhibit a high correlation between level-of-effort and the size of the insurer. Consequently, if the filings are weighted by each insurer's total annual premiums, then

69% of the sample falls in the "relatively high effort" group. Like the other two sectors, a correlation exists between level-of-effort and both the size of the filing (measured in number of characters), and the number of firms included in the filing (recall that many of the filings are group filings that span multiple subsidiaries).

Appendix I: Additional Tables for the Basic Analysis

The purpose of the basic analysis – described in this Section 8 of the report -- is to score each insurer's "climate risk awareness" and their level-of-effort with respect to developing the technical capabilities needed to address each type of climate risk. For each type of risk, and separately for "awareness" versus "modeling", each filing in the sample was scored as a "yes" or "no" for three risk areas: liabilities/underwriting, investments (assets), and other risks. The key results were shared in Section 8.

The tables below contain additional information that was not shared in Section 8. Table I1 displays the median net assets for each insurer scored as a "yes", compared to the median net assets for each insurer scored as a "no". Table I2 displays median direct premiums, while Table I3 displays the median number of characters in the filings, excluding white space. In general, the medians for the "yes" scores are significantly larger than the medians for the "no" scores, suggesting that both the size firms and the size of filings are positively correlated with the probability of a "yes" score.

Table I-1

MEDIAN NET ASSETS ($MILLIONS) FOR INSURERS WITH "YES" SCORES VERSUS INSURERS WITH "NO" SCORES

Line of Business	Score	Climate Risk Awareness			Climate Risk Modeling			Disclose Emissions
		Liabilities	Assets	Other	Liabilities	Assets	Other	
Health	Yes	9,763	2,415	20,082	38,851	40,720	38,607	38,353
Health	No	1,670	3,040	1,349	2,415	1,882	2,415	982
Life	Yes	118,966	146,918	118,966	84,247	146,918	84,247	200,962
Life	No	15,693	3,103	2,201	44,314	3,103	44,314	4,139
P&C	Yes	17,742	23,405	17,742	15,603	193,339	318,060	64,243
P&C	No	643	1,072	825	6,721	7,392	9,940	1,072

Table I-2

MEDIAN PREMIUMS ($MILLIONS) FOR INSURERS WITH "YES" SCORES VERSUS INSURERS WITH "NO" SCORES

Line of Business	Score	Climate Risk Awareness			Climate Risk Modeling			Disclose Emissions
		Liabilities	Assets	Other	Liabilities	Assets	Other	
Health	Yes	11,367	3,115	30,989	6,027	47,778	50,760	42,662
Health	No	2,901	7,968	2,937	3,202	3,159	3,202	2,768
Life	Yes	7,481	9,308	7,259	2,919	9,750	2,919	9,750
Life	No	1,540	707	396	4,453	707	4,453	707
P&C	Yes	4,095	4,103	4,095	4,985	30,189	27,812	20,526
P&C	No	265	353	377	2,329	2,348	4,083	353

Table I-3

MEDIAN # OF CHARACTERS IN FILING FORF INSURERS WITH "YES" SCORES VERSUS INSURERS WITH "NO" SCORES

Line of Business	Score	Climate Risk Awareness			Climate Risk Modeling			Disclose Emissions
		Liabilities	Assets	Other	Liabilities	Assets	Other	
Health	Yes	14,024	12,573	15,000	22,000	17,683	56,000	19,000
Health	No	8,579	13,000	11,000	12,573	11,787	12,573	8,579
Life	Yes	35,500	34,000	33,500	32,850	34,000	32,850	34,000
Life	No	6,450	1,900	1,596	12,870	5,700	12,870	5,700
P&C	Yes	17,750	18,500	23,250	28,500	88,000	101,000	29,000
P&C	No	3,800	4,800	6,400	10,000	12,000	14,000	8,000

As an experiment, to explore the relationship between the probability of a "yes" score and the size of firms and filings, logit models were fitted to the data to estimate the probability of having a process for modeling climate-related investment risks. Using the R programming language, separate models were fitted for each of the three primary LOBs. The models share the following structure:

P = probability of having a process to assess or modeling climate-related investment risks
C = # of characters in filing, excluding whitespace, with a cap placed at 40,000 characters
$P = 1 / (1+e^{(-B)})$
B = intercept + coefficient * C

and both its intercept term and the coefficient were estimated to be significant at a 5% level. This equation generates the following probabilities as a function of the number of characters in a filing:

Table I-4
ESTIMATED PROBABILITY THAT A FILING WILL DESCRIBE A PROCESS FOR ASSESSING OR MODELING CLIMATE-RELATED INVESTMENT RISK, AS A FUNCTION OF THE NUMBER OF CHARACTERS IN THE FILING

# of Characters In the Filing	Health	Life	P&C
1,000	8.7%	12.5%	0.5%
3,000	9.1%	15.2%	0.8%
5,000	9.6%	18.4%	1.1%
10,000	10.9%	28.6%	2.9%
15,000	12.3%	41.5%	7.2%
20,000	13.9%	55.8%	16.6%
25,000	15.6%	69.1%	33.9%
30,000	17.5%	79.9%	57.0%
35,000	19.6%	87.6%	77.3%
40,000+	21.8%	92.6%	89.8%
Intercept	-2.379	-2.064	-5.405
Coefficient	2.76 * 10^-5	1.148 * 10^-4	1.895 * 10^-5

Note that using 12-point font, single spaced, there are about 2500 characters per page. Therefore, a filing with 10,000 characters is equivalent to about 4 pages. Also, the coefficients in the life and P&C models are statistically significant at level of 5%, but the coefficient in the health model is not statistically significant. Therefore, the health model lacks predictive power.

The results indicate, not surprisingly, that the shortest filings are the least likely to describe a process for assessing or modeling climate-related investment risk. This suggest that regulators should be particularly concerned about short filings, especially if they are filed by insurers with a large market share. However, the size of insurers and the size of filings are positively correlated; consequently, it isn't common for a large insurer to have a short filing.

Appendix J: Prior Studies of Insurers' Climate Risk Disclosures

Numerous studies have been conducted of insurers' climate risk disclosures. Some of these studies are summarized below.

Insurer Climate Risk Disclosure Survey Report and Scorecard, 2016 Findings and Recommendations[23]

In this report, using data collected from six participating NAIC states from year-end 2014, Ceres assessed the quality of insurer responses across five core themes and assigned quality ratings to the 148 participating companies, which represented just over 70% of the industry based on direct written premium. 16 percent earned a top rating, though nearly two-thirds of the industry received ratings in the lowest 2 categories. Large insurers had strong improvements compared to past surveys with key increases related to their governance activities. Health insurers generally ranked low in the ratings.

Assessment of and Insights from NAIC Climate Risk Disclosure Data[24]

In November 2020, the NAIC's Center for Insurance Policy and Research (CIPR) published a report studying data from the Insurer Climate Risk Disclosure Survey for year-end 2018 and included nearly 1,200 companies. The report noted that identification and engagement on climate risks was continuing to increase, but few insurers were taking large steps to incorporate climate risk analysis into their investment strategies. The report noted that additional opportunities exist to bring the survey tools and techniques into alignment with other risk disclosure reporting. Using statistical analyses, the report also indicated that companies who were required to respond were significantly more active on disclosures related to topics like emissions and having an investment strategy when compared to companies who were not required to file the survey.

Climate Risk Disclosure Survey Analysis[25]

In 2020, the American Academy of Actuaries published information stemming from the NAIC CIPR's report and data from the 2018 year-end survey. The main conclusions focused on the lower amount of integration for insurance companies to provide broad detail on how climate risk is used in their investment strategies. The report encouraged the NAIC Climate and Resiliency Task Force to facilitate broader responses from industry and to provide additional guidance to companies and internal company staff who are tasked with completing future survey responses.

2022 TCFD Status Report: Task Force on Climate-Related Financial Disclosures[26]

In recent years, the Financial Stability Board has issued annual reports to indicate the trends across various international markets and industries on the utilization of the TCFD reporting structure. The most recent report was released in October 2022, and gives deeper details on the trends in the worldwide insurance industry. Use of TCFD in the insurance industry worldwide has now reached over 40%. Key components of the TCFD most used by insurers are disclosing how strategy risks and opportunities are contemplated, and the use of climate risk management being a key part of integration into overall risk management.

Where is the U.S. Insurance Industry on Climate Change?[27]

This article by Shivaram Rajgopal from Columbia Business School in Forbes Magazine outlines trends in TCFD reports by U.S. companies and theorizes that the short-term nature of P&C policies may influence the amount of analysis being done to assess climate risks. Comparisons are made between large European P&C carriers and large U.S. carriers, with U.S. companies focus being more basic in comparison.

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[23] https://www.ceres.org/resources/reports/insurer-climate-risk-disclosure-survey-report-scorecard
[24] https://content.naic.org/sites/default/files/cipr-report-assessment-insights-climate-risk-data.pdf
[25] https://www.actuary.org/sites/default/files/2021-01/20201204_CRFD_Survey_Analysis_to_NAIC.pdf
[26] https://www.fsb.org/2022/10/2022-tcfd-status-report-task-force-on-climate-related-financial-disclosures/
[27] https://www.forbes.com/sites/shivaramrajgopal/2022/11/10/where-is-the-us-insurance-industry-on-climate-change/?sh=1e4827251293

Ceres Webinar Series: the ABCs of TCFD Reports for Insurance Companies

Through the summer and fall of 2022, Ceres, in conjunction with the United Nations Environment Program Finance Initiative (UNEP FI) presented a series of webinars that were designed to provide more information for the U.S. insurance industry on moving from the traditional NAIC survey towards completing the new TCFD. The series covered the variety of risk identification and reporting involved in the TCFD framework.

Appendix K: The Calibration Phase of the Detailed Analysis

As described in section 6.2 of this report, three separate (and complimentary) approaches were used to analyze the sample of filings: (1) a high-level qualitative scan, (2) a basic analysis, and (3) a detailed analysis that assessed each filing against the list of NAIC's voluntary questions. The detailed analysis was performed in two stages: (a) an initial stage in which each member of the team independently assessed a common set of four filings, followed by a comparison and discussion of results, and (b) a primary stage in which the remaining 33 filings were divided amongst four sub-teams, each sub-team consisting of two researchers. The initial stage was, in effect, a form of calibration, ensuring that all reviewers shared a common understanding of how to objectively assess each filing. This common understanding, in turn, was applied in the primary stage of the analysis.

The initial stage of the analysis of the NAIC disclosures was performed by seven team members, each of whom independently assessed a common set of four filings. In addition to formulating yes/no assessments for each of the 22 voluntary questions, each team member extracted passages from the reports that they felt supported their assessments. The team's yes/no assessments for the initial stage appear in table M1[28].

As indicated in Table M-1, there was a high level of agreement across the reviewers with respect to their assessments. There are 88 "cells" in the table, corresponding 22 questions for each of four disclosures. For 90% of these cells, the reviewers' assessments were in perfect agreement with each other. For eight cells, however, there was lack of consensus. These cells corresponded to the following five questions:

- Has the insurer taken steps to engage key constituencies on the topic of climate risk and resiliency?
- Does the insurer provide products or services to support the transition to a low carbon economy or help customers adapt to climate risk?
- Does the insurer make investments to support the transition to a low carbon economy?
- Does the insurer have targets to manage climate-related risks and opportunities?
- Does the insurer have targets to manage climate-related performance?

The team discussed these five questions and concluded that they were less clearly worded compared to other questions. Their ambiguity contributed to the lack of consensus across the reviewers' assessments. In addition, it was determined that some questions are more relevant for certain types of insurers, creating confusion when attempting to apply the question to a different type of insurer.

A few of the strategy questions were challenging due to vague terminology. For example, with respect to the question "has the insurer taken steps to engage key constituencies on the topic of climate risk and resiliency?", the term "key constituencies" caused confusion because it lacks specificity. It was unclear to reviewers if "key constituencies" should include internal stakeholders such as employees and shareholders, or if it should only include external stakeholders. The most robust responses included working with external stakeholders to educate people on the impact of climate risk, supporting legislative action, and internal efforts to educate staff in line with climate risk management strategies. Providing additional guidance to insurers may lead to more robust responses for this question.

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[28] The initial analysis included two additional coding options beyond "yes" or "no". The additional options were "in progress" and "unclear". Through discussions of the results of the initial stage, the team decided that "in progress" should be mapped to "yes", and "unclear" should be treated as "no". "In progress" was used by the coders if insurers specified that an initiative was in its early stages. After some discussion, it was decided that the company's progress toward the initiative was less relevant to this analysis than the fact that the insurer had contemplated it and had made some progress. "Unclear" was frequently used where insurers failed to clearly address a particular question; however, since they did not clearly indicate that they were working on the initiative, the team decided that unclear cases should be coded as "no" answers. It was decided that if a particular question was not addressed, it likely meant the insurer had not yet contemplated that activity and therefore had nothing to report and should therefore be coded as a "no" answer.

Table M1

INITIAL STAGE: ASSESSMENTS OF 7 REVIEWERS WHO INDEPENDENTLY EVALUATED 4 DISCLOSURES

Voluntary Question	P&C	Health	Life	Other
Governance				
Does the insurer have publicly stated goals on climate-related risks and opportunities?	7 No	7 Yes	7 Yes	7 No
Does your board have a member, members, a committee, or committees responsible for the oversight of managing the climate-related financial risk?	7 Yes	7 Yes	7 Yes	7 Yes
Does management have a role in assessing climate-related risks and opportunities?	7 Yes	7 Yes	7 Yes	7 Yes
Does management have a role in managing climate-related risks and opportunities?	7 Yes	7 Yes	7 Yes	7 Yes
Strategy				
Has the insurer taken steps to engage key constituencies on the topic of climate risk and resiliency?	5 Yes, 2 No	5 Yes, 2 No	7 Yes	2 Yes, 5 No
Does the insurer provide products or services to support the transition to a low carbon economy or help customers adapt to climate risk?	3 Yes, 4 No	5 Yes, 2 No	7 No	7 No
Does the insurer make investments to support the transition to a low carbon economy?	2 Yes, 5 No	7 Yes	7 Yes	7 No
Does the insurer have a plan to assess, reduce or mitigate its greenhouse gas emissions in its operations or organizations?	7 Yes	7 Yes	7 Yes	7 Yes
Risk Management				
Does the insurer have a process for identifying climate-related risks?	7 Yes	7 Yes	7 Yes	7 Yes
If yes, are climate-related risks addressed through the insurer's general enterprise-risk management process?	7 Yes	7 Yes	7 Yes	7 Yes
Does the insurer have a process for assessing climate-related risks?	7 Yes	7 Yes	7 Yes	7 Yes
If yes, does the process include an assessment of financial implications?	7 Yes	7 Yes	7 No	7 Yes
Does the insurer have a process for managing climate-related risks?	7 Yes	7 Yes	7 Yes	7 Yes
Has the insurer considered the impact of climate-related risks on its underwriting portfolio?	7 Yes	7 Yes	7 No	7 Yes
Has the insurer taken steps to encourage policyholders to manage their potential climate-related risks?	7 No	7 No	7 No	7 No
Has the insurer considered the impact of climate-related risks on its investment portfolio?	7 Yes	7 Yes	7 Yes	7 No
Has the insurer utilized climate scenarios to analyze their underwriting risk?	7 Yes	7 No	7 No	7 No
Has the insurer utilized climate scenarios to analyze their investment risk?	7 No	7 No	7 No	7 No
Metrics and Targets				
Does the insurer use catastrophe modeling to manage your climate-related risks?	7 Yes	7 No	7 No	7 No
Does the insurer use metrics to assess and monitor climate-related risks?	7 Yes	7 Yes	7 Yes	7 Yes
Does the insurer have targets to manage climate-related risks and opportunities?	7 No	7 Yes	2 Yes, 5 No	7 No
Does the insurer have targets to manage climate-related performance?	7 No	5 Yes, 2 No	7 Yes	7 No

The cells highlighted in yellow indicate questions where the team members did not achieve a consensus with respect to their assessment of the disclosure.

The question "does the insurer provide products or services to support the transition to a low carbon economy or help customers adapt to climate risk?" also raised some concern amongst the reviewers. In particular, the question appeared more suitable for P&C insurers than for other types of insurers. The disclosures of P&C insurers discussed various products and services including mitigation discounts, risk management consulting, and consumer education. For other types of insurers, however, the disclosures offered a more limited discussion of this issue. Very few life insurers were able to affirmatively respond to this question in a manner that the review team found to be reasonable. Some life insurers responded about their investment consulting services, but it was unclear if this should be interpreted as a "yes" assessment (with respect to providing a product or service). Some creative responses from health insurers include descriptions of energy efficient or LEED certified hospitals and clinics, rooftop gardens, composting and electric vehicle charging stations. Additionally, post-disaster products and services

were sometimes included, such as access to early prescription refills, suspended prior authorization requirements, and post-disaster assistance, counseling, and crisis intervention.

The question "does the insurer make investments to support the transition to a low carbon economy?" generated discussion across the review team about what constitutes an "investment". Some life insurers discussed the allocation of a portion of their asset portfolios to facilitate the transition to a low-carbon economy. These cases were viewed by the reviewers as satisfying the criteria for a "yes" assessment. However, some insurers described preliminary efforts to study their asset allocations with respect to climate risk, often hiring external consultants to aid in this effort, leading to a discussion as to whether these preliminary steps should be interpreted as an investment. In contrast to other types of insurers, health insurers often have extensive brick-and-mortar assets (such as hospitals and outpatient offices), and many of their disclosures describe efforts to enhance the energy efficiency of these facilities and mitigate the risk of weather-related disasters. The review team discussed whether this type of effort should be considered an investment for the purpose of rendering a yes/no assessment.

With respect to targets for the management of climate-related risks, opportunities, and performance, the review team found it challenging to render yes/no assessments. Questions arose from the review team when insurers pointed to existing key performance indicators without identifying their relationship to climate risk. Some of the narrative in the disclosures led reviewers to believe that insurers had targets that were either undisclosed or under consideration. Some insurers pointed to targets related to underwriting for specific industries or seeking out emerging investment opportunities. Many insurers included targets related to operational efficiency.

Appendix L: The Four Pillars of the TCFD

The TCFD reporting framework[29] consists of four key "pillars" focused on climate-related risks: governance, strategy, risk management, and metrics and targets. Each firm's disclosure should provide a detailed discussion of each of these four areas. Ideas covered in these areas are as follows:

GOVERNANCE

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

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

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

STRATEGY

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

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

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

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

RISK MANAGEMENT

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

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

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

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

METRICS AND TARGETS

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

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

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

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

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[29] tcfd-2022-overview-booklet.pdf (bbhub.io)

About The Society of Actuaries Research Institute

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