CLIMATE TRANSFORMED

Physical Climate Risk: A Data-Driven Approach

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Rich Sorkin is the Founder and CEO of Jupiter Intelligence, a scientifically based analytics firm that assists larger global corporates to understand the impact of climate change through a data-driven approach and its potential consequences on their business, supply chains, customers, and assets.

Summary

We explore development in climate risk analytics and the data-driven approaches utilized by the world's largest organizations.
Watch the full discussion here.

Key takeaways

- The existing infrastructure worldwide was designed without considering the impacts of climate change. The tolerance limit of these physical assets has been crossed due to the changing environment. This has resulted in physical damage around the globe in the past few years. For instance, power failures due to winds taking down power lines or nuclear infrastructure getting shut down in France due to water being too warm for heating power facilities. Similarly, in Texas, the petrochemical sector remained down for several weeks in 2022 due to extremely cold weather.
- Trillions of dollars are at risk due to physical damage and loss, asset devaluation, and business disruption. Yet only 50% of the global top 200 companies have started incorporating climate risks into their decision-making process. About 70% to 80% of the Global 200 have not started the process meaningfully.
- Jupiter Intelligence (JI) has a framework to assess companies based on how they incorporate climate risks in their business strategy. The data is based on the latest and scientifically accepted modeling approaches across global climate models and perils, such as estimating wind impact, flooding, and temperature above or below a threshold.
- JI has two major categories of customers. One of them prioritizes understanding climate risks and how their peers manage them. The other category of customers has a pre-existing view regarding which issues they want to address first, mostly driven by a CEO decision or a huge loss of assets in the past years. There is also a third category, where customers build an asset, such as a power plant, and regulators require them to ensure it will continue to function for a longer duration due to its design and engineering.
- Due to the duration mismatch, i.e., one to two-year policies vs. a 30-year life cycle of an asset, insurance is not the answer. Many large companies, particularly in oil and gas, are self-insuring, implying that their climate data and the impacts on projects need to be cutting-edge.

Predicting Risk in a Changing Climate

The human body can tolerate a temperature fluctuation of 5°C. Similarly, our environment also has a tolerance limit. Recently, the world witnessed large banks collapse due to interest rates exceeding their designed tolerance limit. So, any system can potentially collapse if its designed tolerance limit is crossed. The existing infrastructure worldwide was designed without considering the impacts of climate change. The tolerance limit of these physical assets has been crossed due to the changing environment. This has resulted in physical damage around the globe in the past few years. For instance, power failures due to winds taking down power lines or nuclear infrastructure getting shut down in France due to water being too warm for heating power facilities. Similarly, in Texas, the petrochemical sector remained down for several weeks in 2022 due to extremely cold weather.

A problem at any point in the supply chain can impact the entire operation because it takes a few weeks to restore a facility. A few of the largest companies have taken a leadership role and have included climate change in their risk frameworks and operational decision-making. They are getting more advanced in incorporating climate change's physical and economic impacts into their daily operations, such as capital planning and risk management.

Trillions of dollars are at risk due to physical damage and loss, asset devaluation, and business disruption. Climate leaders can make decisions today to capitalize on the opportunities of tomorrow.

Climate leaders drive competitive advantage

Jupiter has a framework to assess companies based on how they incorporate climate risks in their business strategy. There are five stages of companies based on their understanding and using climate-related data in their decision-making processes.

Stage one, or novice stage businesses, have a beginner-level understanding of climate data and do not incorporate climate risks into their strategic priority.

Stage two, or intermediate companies, have the potential to integrate climate risks into strategic priorities. These companies are looking for data and guidance and do not completely understand climate risk impacts. Regulations in the past three years have compelled companies to integrate climate risks into their business strategies. Still, most companies do not view climate change's impact as a top priority, posing downsides from operational and competitive perspectives.

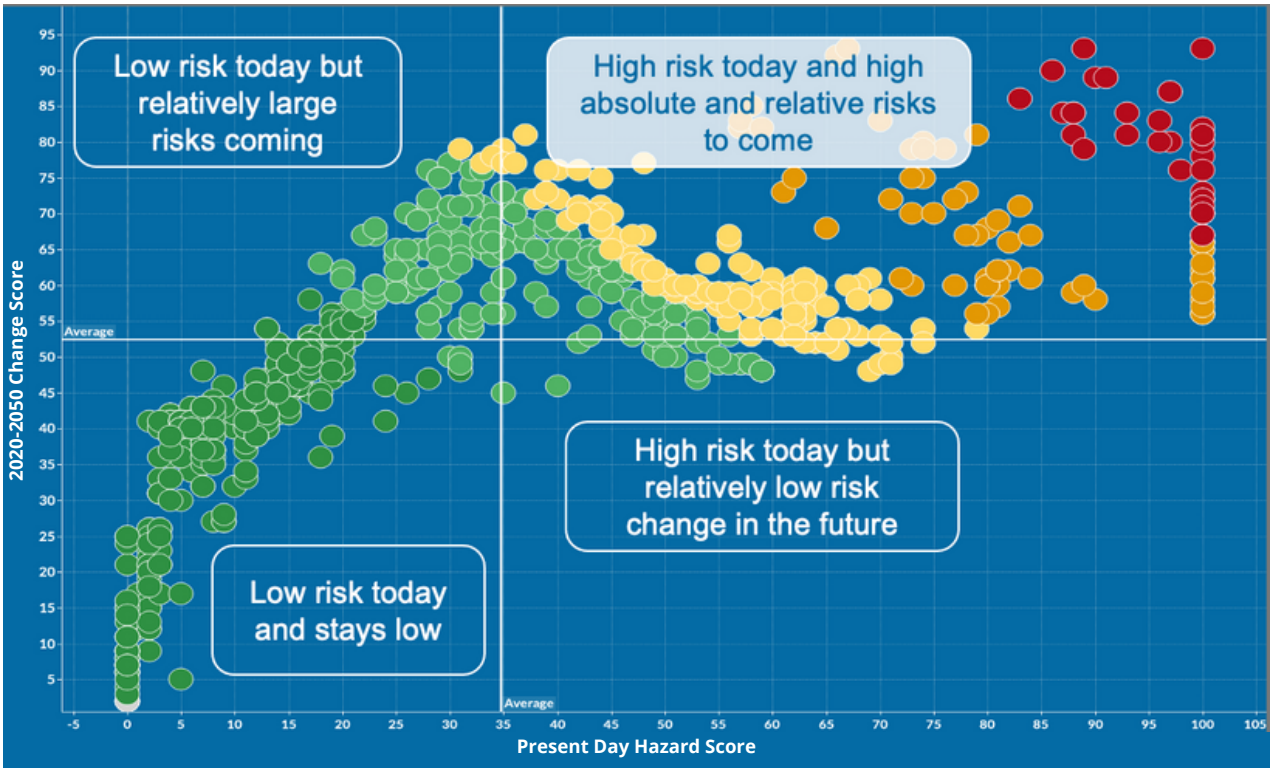
Stage three and four prioritize incorporating climate risks into their decision-making processes, and Jupiter works with such companies. Stage three, or committed companies, are data-focused but early in understanding climate impacts. However, they are aware of using climate data and are open to innovations.

Stage five, or advanced-level companies, leverage data in a well-defined way, where physical impacts of climate change, from operational and financial perspectives, are integrated into their decision-making. No company has reached stage five yet, but a few large companies will get there in the coming years. This is a category of cutting-edge data-driven companies, and reaching this stage is typically a 5-year journey. These businesses will have fully integrated climate risks into their strategies and, therefore, have a competitive advantage over other companies.

The core purpose of Jupiter Intelligence

Jupiter's mission is to advance global economic stability through climate resilience by turning sophisticated climate science into actionable data for organizations looking to strengthen their climate resilience and delivering it as a service.
Jupiter has an analytics platform that provides data as a service that customers can access based on their needs. The data is based on the latest and scientifically accepted modeling approaches across global climate models and perils, such as estimating wind impact, flooding, and temperature above or below a threshold. With climate change, the risk of these perils is increasing and accelerating quickly. Combining the world's most advanced climate models with machine learning, land use, and elevation data, JI models these perils across the globe through the end of this century. They have economic impact functions that address the various use cases and a growing library of these economic impact functions. There are 125 trillion data records, and all modelings are documented and explained.

How climate leaders are winning with Jupiter



Source: Taken from Rich's Sorkin's presentation for Physical Climate Risk: A Data Driven Approach

The entire portfolio of Jupiter Intelligence can immediately assess risks and uncertainty associated with their physical and financial assets due to the climate perils over the next 30 years. This feature allows their customers to stratify their assets into the following four categories:

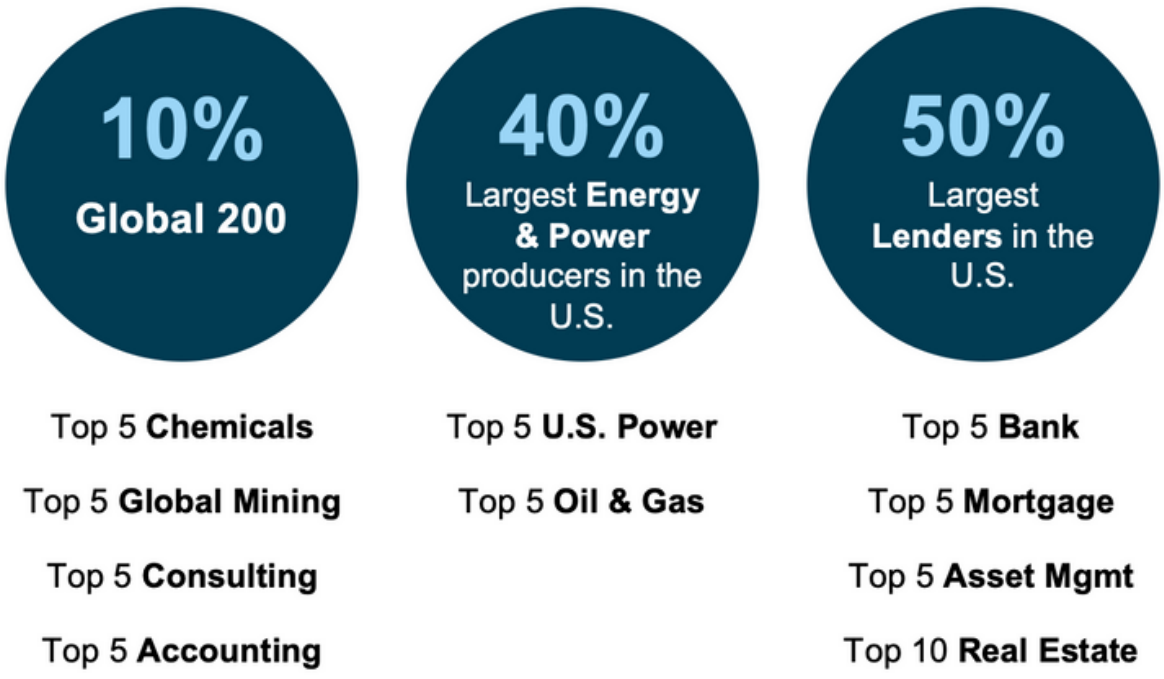
- Low-risk today that will stay low.
- High-risk today and is likely to get worse in the future.
- High-risk today but a relatively low-risk change in the future.
- Low-risk today that is becoming high-risk.

The asset with the current low risks and the potential of encountering higher risks in the future is the most sensitive type of asset because the owners of these assets do not expect disruption.
The risks can impact physical assets as well as financial assets due to a variety of different metrics, including business interruption. Jupiter's clients can manage the possible upcoming risks by leveraging the provided data. They can assess risk per peril, metric, or on a score basis. Even their largest customers consume only a small fraction of the 125 trillion data records. The data of Jupiter is updated once a year from the development perspective.

"The asset with the current low risks and the potential of encountering higher risks in the future is the most sensitive type of asset because the owners of these assets do not expect disruption." – Rich Sorkin

Jupiter works with the world's leading organizations

JI works with over 10% of the global 200 largest companies, including the chemical and mining industries. They work with 40% of the largest energy and power producers in the US and 50% of the largest lenders in the US. About one-third of their business works with value-added partners in consulting, accounting, architecture, real estate brokers, and other larger professional services. Jupiter offers customized solutions to their customers based on their enterprise requirements.



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Discussion

How many of the climate perils do you have in aggregate?

Climate perils include wind, flood, precipitation, hail, heat, cold, wildfire, and droughts. Each peril has various metrics attached to it. There are over 10,000 metrics per location. We define the use case for our customers, identify the assets they care about, and help them define the metrics among the perils. Our clients can work with us to either use an off-the-shelf score that aggregates all the risks or a custom score that measures risks associated with different metrics that might be more appropriate for their business.

What percentage of Fortune 1000 are Stage One companies?

50% of the global top 200 companies have started incorporating climate risks into their decision-making process and are categorized as Stage One companies. About 70% to 80% of the Global 200 have not started the process meaningfully.

How important is the insurance sector to encourage companies to leverage climate data for managing risks?

Mostly, insurance has an annual renewal cycle. Insurance prices are based on capital flows in and out of insurance and the inherent risks. When the capital flows out of insurance, prices go up, and as it flows back, they return to normal, completely unrelated to the underlying risks. This works well for the insurers because the price averages out over time, and they get good pricing on how the capital flows. Due to the one-year pricing, insurance is not a signal for loss prevention for the next 20 years, so a duration mismatch is a fundamental problem.
In the oil and gas industry, many large companies self-insure. Their self-insurance will be based on flying blind if they do not integrate climate risks into their own risk management. Insurance is crucial for helping companies to integrate climate risks even if the price is misleading. Many of Jupiter's partners provide services to help their customers understand the difference between the insurance they are getting and the risks they will face over time.

How do customers think about using data through different duration lenses?

Data usage through different durations varies depending on the business's nature or the assets companies try to protect. For instance, the average mortgage in the US is 30-year duration, but the whole average period for a mortgage is 7 to 12 years, depending on the economic conditions. A lender might look at 15 to 30 years. They look at 30 years to have a longer duration on their portfolio. However, the lender can get stuck if the mortgage gets refinanced or the sale of the asset is impaired in case the risk was not considered earlier, as the new lender or buyer will be factoring the risk in the transactions. So, typically customers can use data for 7 to 30 years. For highly expensive mission-critical assets that are greenfield operations, sometimes companies go longer than 30 years. Such companies might come

under petrochemical industries or hospitals. However, a small ratio of our customers is going beyond 30 years.

Insurance is a defective way of insuring longer-duration projects

Insurance policies are sometimes available for longer than a year and are more expensive because of the growing risk factors. Usually, insurance has a one-year rolling price. Companies need to develop insurance strategies for their supply chain while considering a period of 30 years because they have to protect not just the assets but also the whole infrastructure around them, including the workforce. In the global economy, most of the work is being done around supply chain resiliency. Mostly, a supply chain is insured while looking at the elements like geopolitical factors or economic stability, and the climate change risk is incorporated into the project.

Reasons for customers trying to understand climate risks

JI has two major categories of customers. One of them prioritizes understanding climate risks and how their peers manage them. The other category of customers has a pre-existing view regarding which issues they want to address first, mostly driven by a CEO decision or a huge loss of assets in the past years. There is also a third category, where customers build an asset, such as a power plant, and regulators require them to ensure it will continue to function for a longer duration due to its design and engineering.

Expensive solutions are available for large multinationals, but what options are available for smaller firms?

While assessing climate risks, the first major cost is analytics. The second expensive element is the internal capacity to understand the impacts of climate change from the data and act on it. Some of our customers have hired up to 20 experts to estimate the physical risks of climate change to understand all the process changes they need to make. They may also hire a large consulting firm that would charge three to five times more than the cost of our data to do the same function or guide the company through experts. The real big expense comes from not preparing for the existing impact. In the case of a single power facility, there is a $30 million increase in capital expenditure over a $1 billion build cost. Instead of changing a capital budget, a company might re-sequence it; for instance, in case of an existing risk, a business can retrofit its asset earlier at an inexpensive cost or sell them when it can get a good price. So, there are various ways of managing climate risks.

What kind of data do you collect for customers to evaluate the consequences to assets?

The most important data we collect is the location of a business. We require a substantial amount of information about the vulnerability of the assets depending on their type. Mostly our customers or their insurance brokers have this data available. Mapping out various locations within the supply chain is also crucial information we collect. We also leverage a significant amount of our development work and third-party data sources to not have to acquire it directly from our customers.

How do you take into account the risks that are not related to climate change, such as earthquakes?

We do not incorporate the earthquake itself. Earthquakes undersea triggers tsunami, and we factor them into our flooding protections if it causes sea levels to increase. Similarly, we do not incorporate fire eruption inside a building starting from a kitchen, but we help companies understand the risks associated with wildfire. Traditional insurance approaches can cover risks unrelated to climate change.

A real-world example of JI assessing a company's assets to protect from climate change

JI worked with a large US-based global bank around 2018. The bank was concerned about incorporating climate risks in their protection plan and interested in knowing about the solutions and vendors, but they had not decided on the process and time for implementation. JI consulted them regarding solutions and various use cases. In 2020, that bank incorporated all climate risks, including decarbonization and physical risks. They created teams in each area and categorized physical risk and its economic impacts under the risk management category. The bank had to hire a few other experts to define what they would be required to do and who to work with.
They did a pilot test with a small subset of their overall lending portfolio, starting from mortgages, then looked at several other consumer and commercial lending types on a relatively small scale. At that time, we had been working with them for a year, and we integrated into roughly six models they used in their regular risk assessments and decision-making. Over the next two years, we integrated into several hundred of their operational models and pricing and underwriting decision-making.

Impact of climate risk locations on Loan-to-Value (LTV) ratio

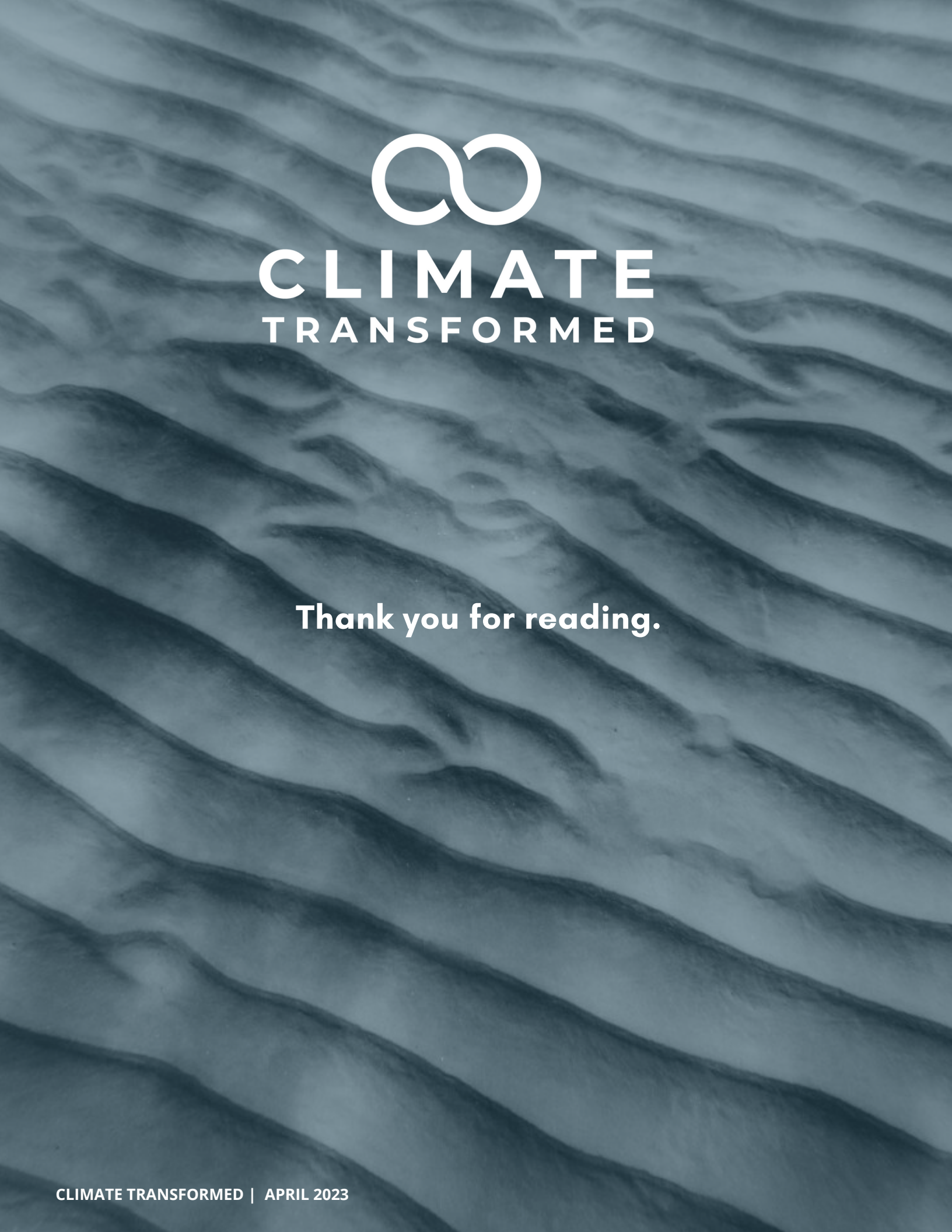
Lending is a regulated industry. Mostly, lenders are ahead of the regulators in thinking through the possible existing issues and defining the role of regulators. In the next five years, there will be places where companies will not be able to get the same insurance as today due to the different risk profiles in the future. In those circumstances, the lenders will require the borrowers to have insurance. So, some assets will be uninsurable and unlendable in a conventional sense. The banking and insurance regulators are trying to avoid this situation. Depending on the climate risks probability, there might be a difference in upfront fees, insurance requirements, LTV, and interest rates. Incorporating climate risks takes several years because these are complicated issues, and the banks have just started understanding the economics.

Available solutions for smaller companies that can not self-insure: How can insurance be provided to companies located in high-risk areas?

Big companies do not always win but have an advantage in scale and geography. Larger businesses spend costs to shape the regulatory environment, whereas smaller companies do not have these expenses. Services and financial instruments might emerge for smaller companies to navigate these issues.

Where will the data-driven approach lead us in the next 5 years?

We envision every entity, including consumers, taking climate risks into account while making decisions regarding asset acquisition or developing their business strategy. A mindset difference can be observed in executives from different generations. Executives in their forties or under that age are more concerned about climate risks than those in their fifties. In the next five years, we hope to see more executives taking the impacts of climate risks seriously. Currently, 50% of the companies in the Global 200 have designed systems to address the risks. In the coming years, many companies will be providing resiliency services regarding the actions to take once climate risks are understood. We believe in the private equity space; companies will make strategic decisions regarding repositioning themselves.



Thank you for reading.