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GOOGLE/ALPHABET CEO SUNDAR PICHAI WG02 ON HIS CAREER, HIS WORLD-SHAPING COMPANIES, AND THE FUTURE OF TECHNOLOGY

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GLOBAL WARNING

Regardless of positions on policy or science, more business leaders are considering the effects of climate change on their bottom lines and long-term financial health.

Wharton experts and alumni weigh in on adaptation efforts designed to cope with disasters, protect worldwide supply chains, and build investor confidence. *By Janine White*

Illustrations by Henry McCausland

ACT ON CLIMATE.

Someone wrote those words in the snow near a helicopter landing spot in Davos during the World Economic Forum in January. While activists called out business leaders for inaction on global warming, in-depth panels and hallway conversations buzzed about the issue of climate change. In the annual WEF Global Risks Report, climate action failure and extreme weather topped a survey of decision-makers' concerns. Before touching down in Davos, BlackRock CEO Larry Fink echoed those sentiments in his influential annual letter to chief executives: "From Europe to Australia, South America to China, Florida to Oregon, investors are … seeking to understand both the physical risks associated with climate change as well as the ways that climate policy will impact prices, costs, and demand across the entire economy." To put an even finer point on what he sees as a "fundamental reshaping of finance," Fink wrote, "The evidence on climate risk is compelling investors to reassess core assumptions about modern finance."

Streams of data and analysis released near the time of WEF underscore Fink's notice that no matter what your politics may be, sea-level rise, increasingly intense storms, fatal heat waves, and droughts are threatening businesses and global financial systems. Financial analysts from S&P Global noted that 60 percent of companies in the S&P 500 Index have "assets that are at high risk of at least one type of climate-change physical risk." McKinsey researchers highlighted infrastructure and supply chain weaknesses with real-world examples: In 2018, Hurricane Maria took out 90 percent of cell-phone towers in Puerto Rico, and in 2017, record temperatures of 118 degrees grounded dozens of flights in Phoenix, Arizona.

CEOs and risk managers already dealing with cyberattacks, technological disruption, and the coronavirus are increasingly concerned with bottom-line impacts of climate change beyond the loss of assets. Customers may shift away in favor of other, "greener" products. Investors and creditors might side-eye a seeming failure to be prepared. There are future regulations to think about—what if you have to pay a carbon tax? On top of all that, if you don't think long-term, you could miss out on new opportunities that this changing world presents.

Climate risk adaptation may mean the difference between a company that's prepared to meet these challenges and one that goes under. In January, the *Wall Street Journal* declared PG&E's Chapter 11 filing—it faces hundreds of lawsuits connected to devastating Northern California wildfires—the "first climate-change bankruptcy" but "probably not the last." Robert Gibbins W92, founder and CIO of Autonomy Capital, an investment management firm with $5 billion-plus in assets, can easily enumerate an abbreviated list of the financial concerns related to climate change and corporations: Among them, he says, are the availability of insurance, municipal credit, and the viability of certain energy sectors. He predicts that shifts away from carbon will precipitate bankruptcies in the auto industry and beyond. "We are fast getting to a point where people who didn't move, thinking they were being prudent, are finding out that they don't have a future," Gibbins says, "because they already got far enough behind the technological curve that they can't really catch up."

> **"People who didn't respond are finding out they don't have a future," says Robert Gibbins W92.**

Recognizing that today's business leaders are looking for new tools and models to help them implement adaptation, the Wharton Risk Management and Decision Processes Center restructured into five research labs in fall 2019, including the Climate Risk and Resilience Lab. "The center has been doing work touching on climate for many years—looking at the physical impact of climate, extreme events, natural disasters, how you prepare for them, how you finance them," says Carolyn Kousky, executive director of the Risk Center. "There is increasing demand for this type of work." (PG&E's bankruptcy is one example. In an era with more frequent megafires, companies may find that a century-old state regulation, such as one assigning responsibility for damage caused by an equipment spark, suddenly has an unforeseen consequence.)

In the private sector, too, Wharton alumni are exploring best practices for climate-change adaptation—not to be confused with mitigation, which deals with the reduction of greenhouse gases to slow global warming. "Cutting down emissions will give us more time for adaptation, but it won't stop climate change," says Paul Chan WG98, who founded consulting company Climate Decision, which assesses flood-related risks for clients. (To date, flooding has been the costliest natural disaster in terms of dollars.) "We have to also apply adaptation."

HUMAN NATURE MEETS MOTHER NATURE

Since founding the Risk Center 35 years ago, co-director Howard Kunreuther has been examining how human beings grapple with all sorts of catastrophes. The title of his 2017 book, *The Ostrich Paradox: Why We Underprepare for Disasters*, alludes to a popular misconception about how the bird supposedly mirrors our typical response to dire warnings like those issued by the scientific community about climate change. "We bury our head in the sand with respect to events that we perceive as having a low probability of occurrence in the near future, while ostriches do not," says Kunreuther, who co-authored the book with Risk Center co-director and Wharton professor Robert Meyer. "They know how to prepare for disasters."

However, Kunreuther has observed a growing awareness that could lead to proactive adaptation. "There's no question, certainly in the last few years, that people are recognizing that temperatures are rising and there are impacts of sea-level rise and global warming and more intense hurricanes and flooding and wildfires," he says. "Firms are also realizing that. The challenge is: Are there ways to develop strategies so people will recognize that there are things that need to be done now? And it's hard to do that with climate change because we have systemic biases."

Among the biases that hinder us: myopia and optimism. *The future is blurry. And anyway, what are the chances something will happen to us now?* Kunreuther

cites two ways for the private sector to overcome those oh-so-human traits: stretching time horizons so that individuals reflect on the likelihood of a serious disaster in the next 30 years rather than next year; and scenario planning/analysis, such as providing worst-case scenarios for what could happen in the future.

The Risk Center's work on the concept of stretching time horizons and what drives people to purchase or pass on flood insurance shows how timing influences how people think about risk. In a paper on their experiments, Kunreuther and his co-authors wrote, "Companies and individuals tend to underprepare for rare, catastrophic events because they ignore small probabilities and fail to appreciate how risk accumulates." The researchers told one group of subjects that the probability their homes would be flooded was one percent a year. A second group was presented with a *cumulative* probability over a stretch of 30 years—26 percent, in this case—which also happens to be a common length of a home loan. Even though the probability happens to be the same, there's more demand for insurance among members of the second group, Kunreuther says. "There's a statistically significant difference. And the group given the cumulative probability would also be willing to pay more for that insurance." Even with business pressures to act myopically, the nonlinear way in which climate-change effects are worsening means decision-makers need to consider risk in the long term, Kunreuther maintains.

Scenario planning can also help solidify exactly which climate-change-related threats a company is facing. "You can say, 'Look at what might happen with respect to sea-level rise by a certain amount,' and people are likely to pay attention to these consequences," Kunreuther says. "Combining the scenario analysis with stretching the time horizon might actually help people begin to recognize that this is something that can be very severe and can happen with a much higher probability than people realize."

The industry-led Task Force on Climate-Related Financial Disclosures, convinced that scenario analysis is critical, has created a how-to guide. Consulting companies are an analytical source, too. For example, risk managers in the semiconductor sector could look to the January 2020 McKinsey report, which offered: "For semiconductors, the probability of an event with the magnitude of what is today a one-in-100-year hurricane, with the potential to disrupt semiconductor manufacturing, occurring in any given year in the western Pacific, is projected to double or even quadruple by 2040." The consulting firm predicts that would mean "months of lost production" and revenue losses "as high as 35 percent."

"Companies are preparing for the unlikely but possible catastrophic event," says professor Michael Useem.

At Concordian, a consortium that analyzes the connections between financial value and climate-change responses, CEO Shally Venugopal W05 looks for climate-change-fueled patterns around the world. "At the asset level, you're doing this real-options analysis," she says. "Under different scenarios, what are the options that you have, and what is the most effective investment decision under those scenarios?"

Who, exactly, is doing the scenario planning depends on the leadership team. Michael Useem, professor and director of the Center for Leadership and Change Management, says there are companies that now consider risk management and risk readiness and resilience when making promotions. One of the banks that he and Kunreuther spoke to for their 2018 book, *Mastering Catastrophic Risk: How Companies Are Coping With Disruption*, looks for employees who have "proven that they can step forward and face a crisis and get through it without losing their composure," he says. "You don't want somebody in the middle-to-top ranks who can't think about risk and is not going to be resilient during a very stressful crisis."

Weather events like the severe flooding in Bangkok, Thailand, in 2011, which slowed the auto and electronics sectors, and the heat wave in Europe in summer 2019 are prompting boards of directors to get more hands-on with risk planning, too, according to Useem. Looking at voluntary disclosures on climate risk from nearly 7,000 companies in 2018, the nonprofit CDP (formerly the Carbon Disclosure Project) found 73 percent confirmed that they "have board-level oversight of climate-related risks."

"Directors are asking top management, 'Let's think where we are five, 10 years out. Could we be in a floodplain? Could what we sell people suddenly be of less interest?'" says Useem. "Companies are designating a chief risk officer. They're preparing for the extremely unlikely but possible catastrophic event." While many companies have historically set aside one meeting a year to take a long view, "Strategy, deliberative thinking, is now being put on the agenda for every meeting," he says.

Venugopal says that companies can draw on past business cases for broader climate-change adaptation related to societal responses, such as concerns over the cattle industry's contributions to global warming. "We do have some history and success of understanding that, hey, the last time consumers shifted away from wanting to buy full-fat to low-fat, this is what happened," she says. "We can do the same thing: Consumers are moving away from meat; this is what could happen to our bottom line. Or: The last time we had environmental regulations, this is what happened, and we can predict in the short run what might happen. Climate change's physical impacts are going to increase over time but over a long time frame, whereas many of these societal responses in some industries can start impacting people even today."

THE BOTTOM LINE

As individual investors and investment firms rethink where they're putting their dollars amid climate change, companies will need to be deliberative about accounting for risk, sometimes in uncomfortable ways.

"The reality is that what's required is a high-level reorganization of the way we are incentivized to produce and consume and also how we organize our economic structures," Gibbins says. "That's not a message that many people want to hear." Asked by *Forbes* about his frequent attendance at scientific conferences, Gibbins said, "Climate change is something we have to include in every single analysis, every investment." (He feels so strongly that he's producing *Signal*, a documentary about his firm's "search for the science and the financial implications of the science of climate.")

Witold Henisz, a Wharton management professor and director of the Wharton Political Risk Lab, sees a promising path to confronting the corporate costs associated with climate change in the Task Force on Climate-Related Financial Disclosures. Since 2017, the TCFD has been making recommendations for how companies can voluntarily disclose their climate-related financial risk publicly. "There's enormous interest right now in the financial community in trying to understand what is at risk and who is at risk and how should we be moving our money, whether we just intrinsically care about climate or whether we're worried about write-downs and impairments," Henisz says.

Making this kind of disclosure mandatory by law in corporate financial reporting—France has already done so—would enshrine the process while protecting companies, Henisz says. Today, if one business voluntarily gives a full accounting of stranded assets while its main competitor remains mum, there's no way to make a fair comparison of balance sheets. "The idea that we could have certain minimal standards for data disclosure, such as what is your sensitivity to a two-degrees scenario, and that every company should have to work through that, would be an important step forward," Henisz says.

Passing mandatory disclosure requires political will that may not be on the U.S. horizon, but decision-makers may find value simply in internal reflection. Henisz says Walmart offers a sound business case of the benefits: "One of the biggest negative impacts Walmart was having on the environment was all the packaging materials that they would throw away. There were enormous disposal costs. They forced their suppliers to use less packaging and more efficient packaging. This is a big plus for the environment, but it was also a big plus for Walmart." When the company launched its sustainable-packaging efforts, it anticipated $3.4 billion in savings.

Strategizing for adaptation also requires figuring out what business partners are doing to adapt. "It's not only looking at your own assets; it's looking at your suppliers' assets and understanding whether they sit in floodplains or whether they're in a coastal area that's likely to be inundated," Henisz says. "It's really going through the full 'all of our assets, all of our revenue streams, all of our costs, what would happen *if*.'"

Venugopal of Concordian thinks another benefit of accounting for climate risk along TCFD recommendations is that companies will be ready when mandatory disclosure does occur. "We're reaching a tipping point where governments, investors, and companies are all going to realize that they have to do this," she says. "If you believe in climate change, you have to believe in the disclosure at some point, because as a shareholder in any company or if I loan money to any company, I am going to want to know: Have they thought about this giant elephant in the room? And if you haven't, what am I doing investing in your company?"

"If you haven't thought about climate change, what am I doing investing in your company?" says Shally Venugopal WO5.

TRACKING THE STORMS

Companies striving to better adapt to climate change have an increasing number of tools to support them. "The firms in the climate-information space have been exploding in the past couple years," Kousky says. Everyone from the top consulting firms and catastrophe modelers to startups are, she says, "providing weather and climate data, tools, analytics, to advise different sectors of the economy."

Paul Chan says much of the data he uses at Climate Decision is in the public domain—topographic and elevation data measured by the USDA, for example. "All the tools that we use are open-source, but the idea is how to integrate them to make them useful for businesses and to create societal benefits," says Chan, who has a PhD in climatology. With a team that includes hydrologists, oceanographers, and geographic information system experts, Climate Decision can conduct property vulnerability assessments. Chan gives the example of a bank he's met with that had 100 branches flooded during Hurricane Katrina.

At Concordian, Venugopal is working on a project related to stranded assets. "It may be the case that [companies] have already made some bad decisions … about where to place their assets, and [they will] lose value and depreciate over time," she says. "The more interesting piece of it is, we should start thinking about these new paradigms for our new investments and making capital expenditures in the places where we can ensure that value is preserved." Concordian also combines geospatial analysis with environmental factors to run scenarios resulting from land-use change—based on location and profitability, should you close your mill or factory or make an adaptation investment to protect it?

"This type of analysis and getting the data, especially if you're talking about developing countries, is a huge mountain to climb," Venugopal says. "It is time-consuming, but I certainly think it's worth it in this day and age."

WHARTON'S CLIMATE ACTION

Companies lagging on adaptation action most definitely aren't alone. "I think that adaptation is still a neglected child," Chan says. According to the Climate Policy Initiative, 2018 saw $546 billion in climate change investments around the world. However, through 2017 and 2018, only about five percent of this type of finance that CPI tracked went to adaptation, while most of the balance went to mitigation.

Kousky and Kunreuther both say the Wharton Risk Center is a "neutral forum" where the private sector can engage in collaborative assessment and learning. With the Climate Risk and Resilience Lab in particular, Kousky says, "We're excited to launch climate work at Wharton in the first serious way."

Kunreuther's research has shown, he says, that "companies that are most successful in dealing with catastrophic risk are the ones that use other companies' experiences to help guide their own thinking and build on that. And it may not even be the experience of a company in their own industry."

Even as projections about climate change worsen along with storms and droughts, Kousky seeks optimism in the work, such as the Risk Center's partnership with the Kleinman Center for Energy Policy, the Faculty Senate, and the Penn Program on Regulation to publish Climate Risk Solutions. In 2019, the initiative presented 30 policy-focused climate adaptation and mitigation ideas from Penn professors working in fields from law to design. This year, the Risk Center plans to publish 20 solutions for managing climate risks from undergraduate and graduate students.

"The science around this is alarming," says Kousky. "And yet, when we did Climate Risk Solutions, there were so many good ideas, and they're targeted at all different scales. There's still so much we can do at other levels, that private companies can and are doing, that state and local governments can do, that universities can do." She doesn't want to minimize the real challenges of politics and institutions that are slow to change, she says, but "we need to adapt to climate change. We just need to do it."

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