

BUSINESS RISKS, OPPORTUNITIES, AND LEADERSHIP



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Businesses are taking a leadership role in responding to climate change. Corporate leaders see with increasing clarity the risks and potential opportunities presented both by climate change itself and by measures and policies to address it. In response, businesses are analyzing and disclosing risks, adopting internal goals, investing in solutions, and calling for the greater certainty that comes from clear, robust climate policy.

WHY BUSINESSES ARE TAKING ACTION

RISKS

Corporate leaders are responsible for paying attention to the full range of risks confronting their businesses, and climate change has become an issue that can no longer be ignored. As global professional services firm Marsh & McLennan Companies has observed: “Inside the boardrooms and C-suites of companies across all sectors, the discussion has shifted from the question of what impact their business could have on the environment, to how climate change will impact their business.”¹

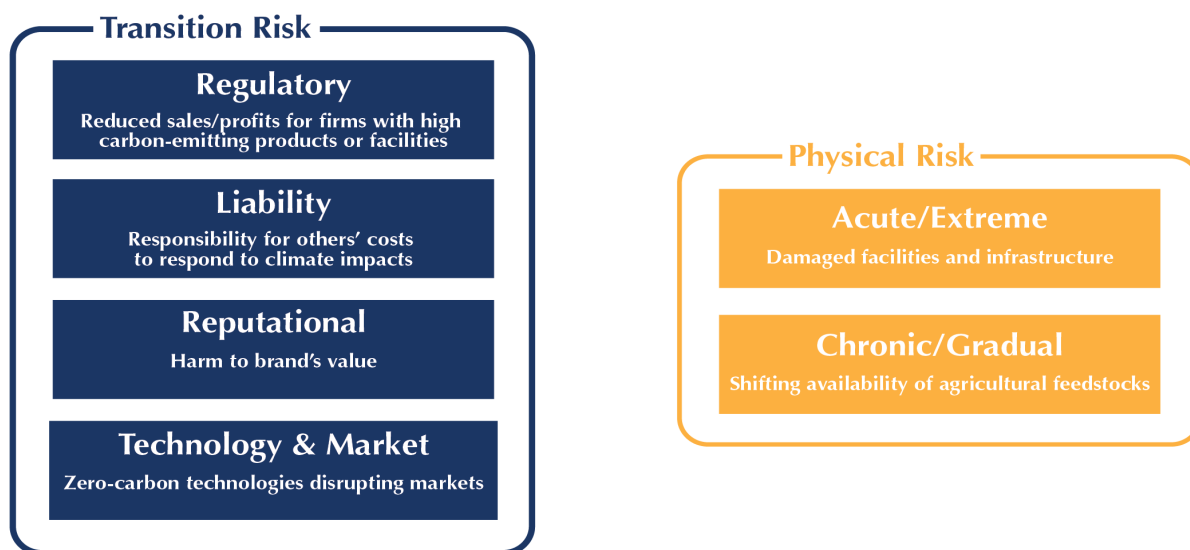
Climate risks can be grouped into two primary categories: physical risks (i.e., risks from climate change itself) and transition risks (i.e., risks from societal responses to climate change).

PHYSICAL RISKS TO BUSINESS

A decade ago, risks from the physical impacts of climate change were seen as future considerations. While the

future impacts of climate change are still important to consider, the window of concern has moved to the present, as climate impacts are already occurring. These impacts include damages and disruptions caused by powerful storms, wildfires, heatwaves, floods, droughts, and more.² Going forward, these types of extreme events are expected to become even more disruptive, as are impacts from sea-level rise, shifting weather patterns, and other more gradual developments. The 2018 National Climate Assessment made clear that “[m]any regions and sectors across the United States already experience significant impacts from climate change effects, and many of these effects are projected to increase. By the middle of this century, annual losses in the United States due to climate change could reach hundreds of billions of dollars.”³ Indeed, the World Economic Forum’s *Global Risks Report 2019* lists extreme weather events and the failure of climate change mitigation and adaptation as its top two risks in terms of likelihood and as among its top three

FIGURE 1: Categories of climate-related risks with examples.



Source: C2ES.

risks in terms of impact.⁴

Companies have always navigated a changing business environment, but now they face a changing physical environment as well. Climate change can affect their facilities and operations, supply and distribution chains, employees, and customers. Businesses have to consider cascading risks, such as disrupted energy and water supplies and failures of publicly funded and maintained infrastructure. Numerous sectors—from agriculture to apparel, from construction to electric power, from tourism to extractive industries (e.g., oil and gas, mining)—could see impacts on production schedules, resource and feedstock availability, operational costs, and more. For example, facilities and transportation infrastructure (e.g., roads, ports) could be damaged by extreme weather events, which could disrupt production, supply chains, distribution networks, and employee and customer mobility. Extreme weather events and shifting climatic conditions could affect the desirability of tourist destinations and the availability of agricultural feedstocks. Customer demand for goods could be affected by climate impacts (e.g., reduced demand for warm outerwear as winters warm). Dangerous heat stress caused by higher temperatures and humidity could cut outdoor labor capacity—particularly in the summer—in agriculture, construction, and extractive industries.⁵

Companies are feeling the effects of these kinds of

physical risks. For example, flooding in Mexico following torrential rains in the summer of 2018 forced Honda Motor Company to suspend operations at one of its assembly complexes—creating shortages of some engine parts, interrupting shipments to U.S. dealers, forcing the company to lower its sales outlook, and causing the company to take a \$450 million charge for lost sales and repairs to the factory.⁶ Global reinsurer Munich Re—which has noted the links between the worsening wildfires in California and climate change—identified the Camp Fire in California as the costliest natural disaster of 2018, with overall losses greater than \$16 billion (more than \$12 billion of which were insured losses, including many commercial losses).⁷ Not all climate impacts on businesses are so stark. For example, Cargill's salt sales in the second quarter of 2017 were down from the prior year due to lower sales of de-icing products after two mild North American winters.⁸ Cargill has also seen profits in its meat and grain operations decline in some recent quarters due to droughts in regions of the United States.⁹ Whether stark or subtle, these examples are not unique. C2ES has found that nearly all companies in the Standard & Poor's Global 100 Index have identified physical risks that climate change poses to their businesses.¹⁰

TRANSITION RISKS TO BUSINESS

Businesses face risks not only from the impacts of climate

change itself but also from society's responses to it and from the transition to a low-carbon economy. These transition risks fall into a few different buckets.

Regulatory risks: Policies and regulations designed to address the climate challenge are among the largest transition risks businesses face. The number of climate laws and policies around the world has increased twentyfold since 1997.¹¹ Most countries are working to meet their commitments under the 2015 Paris Agreement (though most are falling short),¹² and the countries of the world agreed to a “rulebook” establishing key implementation details for the Paris Agreement in December 2018 in Katowice, Poland.

In the United States, federal action on climate change seems unlikely in the near-term, though bipartisan climate bills have been introduced in Congress.¹³ States and cities are taking the lead in the absence of federal leadership. In 2017, California extended its economy-wide cap-and-trade program for another decade. That same year, the nine Northeastern and Mid-Atlantic states in the Regional Greenhouse Gas Initiative (RGGI)—Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont—further strengthened their cap on emissions from the electric power sector, and New Jersey and Virginia are poised to join RGGI soon. A similar group—Connecticut, Delaware, Maryland, Massachusetts, New Jersey, Pennsylvania, Rhode Island, Vermont, Virginia, and the District of Columbia—announced in December 2018 that it would be working collaboratively to develop a regional Transportation and Climate Initiative (TCI) to cap transportation emissions and invest proceeds from the program into cleaner transportation infrastructure.

Other measures that could create regulatory risk do not mandate reductions but still support the transition to a carbon-constrained economy. For instance, 29 states plus the District of Columbia have renewable portfolio standards that require a certain share of generation from renewable sources, with many states requiring 25 percent or more renewable generation by a target date.¹⁴ Dozens of cities, as well as a few counties and states, have committed to 100% renewable energy targets.¹⁵ With respect to transportation, the federal government provides a tax credit for electric vehicles, and California and several other states have adopted zero-emission vehicle (ZEV) requirements, in addition to other incentives such as rebates.

The effect of such policies on business operating

costs, the value of company assets, and the desirability of corporate products and services could be significant, especially for firms with large carbon footprints. For example, coal-heavy utilities face risks from policies designed to reduce greenhouse gas emissions from the electric power sector. Likewise, automakers could face risks from policies designed to accelerate adoption of zero-carbon vehicles. Ford, for instance, has stated that “[c]ompliance with ZEV rules could have a substantial adverse effect on our sales volumes and profits.”¹⁶

Liability and reputational risks: An additional category of risks emerging from responses to climate change involves legal liability and reputational damage. As the physical impacts of climate change on communities increase and measures to address climate change expand, companies seen as significantly contributing to the problem could face litigation – whether to force them to pay for damages, to force them to take action, or to seek penalties for misleading shareholders. Climate litigation is being pursued across the globe, with the most occurring in the United States. In 2017 and 2018, municipalities in California, Colorado, Maryland, New York, and Washington state, as well as the state of Rhode Island and a coalition of West Coast commercial fishermen, filed separate lawsuits against oil and gas companies seeking damages for costs they will have to incur to respond to climate change. Two state attorneys general—in Massachusetts and New York—have also launched inquiries into whether ExxonMobil deceived investors regarding the risks that climate change poses to the company.¹⁷ Any of these lawsuits, if successful, could have significant effects on corporate bottom lines.

Even if not successful, the lawsuits can also affect corporate reputations. As Michael Gerrard, director of the Sabin Center for Climate Change Law at Columbia Law School, has explained, “lawsuits, even if unsuccessful, can help shape public opinion.”¹⁸ Being seen as contributing to climate change and standing in the way of addressing it can affect perceptions of corporate brands. For instance, several companies, including Shell and Google, have left the American Legislative Exchange Council (ALEC)—a group that has actively opposed action on climate change—after pressure from climate advocates.¹⁹ Pressure campaigns have also led some Asian paper companies and global food companies to commit to no-deforestation pledges.²⁰ The reputational risks to companies are amplified by social media, through which information and perceptions can spread virally.

Technology and market risks: The transition to a low-carbon economy also creates risks related to technologies and markets. Government policies and growing customer awareness about climate change are combining with other forces to produce significant changes in the markets for products. Old systems and incumbent technologies face risks of disruption and displacement by newer, cleaner technologies. For companies to remain competitive, they will need to position themselves to succeed in the face of increased demand for climate-friendly technologies and services, though the timing and pace of technological development and deployment are often unknown. Market trends could shift from what is currently anticipated. For example, battery-electric vehicles represent only about 2 percent of current U.S. vehicle sales (about 1 percent if excluding plug-in hybrid vehicles),²¹ and some projections see that rising to 12 percent of sales in 2050,²² but U.S. electric vehicle sales also unexpectedly rose by more than 80 percent from 2017 to 2018, far surpassing expectations.²³ Contributing to the growing competitiveness of electric vehicles is the fact that the price for lithium-ion batteries dropped more than 70 percent between 2010 and 2017, from \$1000/kWh to about \$270, and could drop to about \$73/kWh by 2030.²⁴ If the costs of zero-carbon technologies fall faster than predicted and/or consumer demands for clean technologies are greater than anticipated, incumbent industries and technologies could be disrupted more quickly than some expect.

OPPORTUNITIES

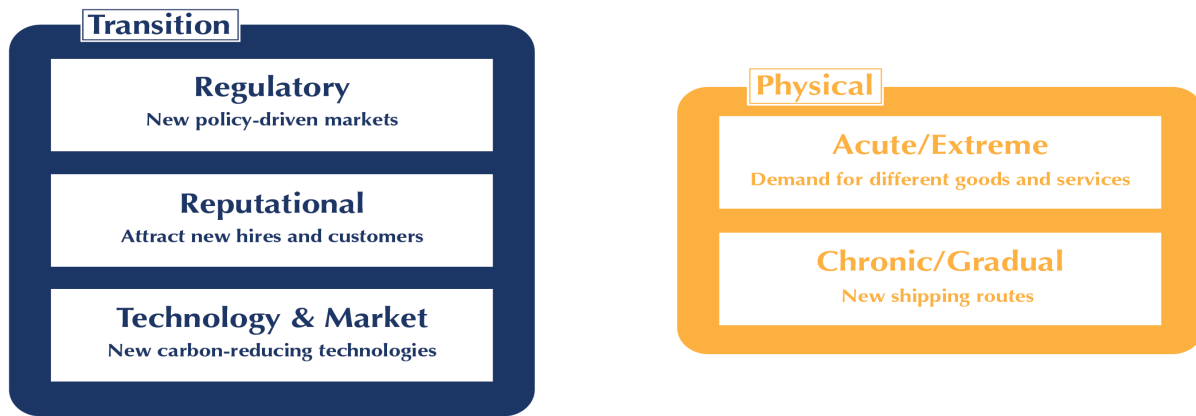
The flip side of risk is opportunity – and the opportunities from climate change fall into the same categories as the risks. The *physical* impacts of climate change, for instance, can create business opportunities in the form of new shipping routes (e.g., from an ice-free Arctic) and increased demand for some goods and services (e.g., air conditioners, drought-resistant crops). *Regulatory* measures to address climate change could create new markets. For example, several states have adopted energy storage targets that will spur markets for advanced storage technologies,²⁵ and the extension and expansion of the tax credit for carbon capture, use, and storage (CCUS) that Congress passed in 2018 is expected to spur more activity in that area.²⁶ Likewise, state procurement policies can create markets for low-carbon materials, such as the Buy Clean California legislation in 2017 that set standards for public works projects' procurement of construction materials such as steel and glass.²⁷ There are

reputational opportunities as well, as businesses that take action to address climate change can attract both consumers and employees. Studies have found, for instance, that three-quarters of millennials consider a company's social and environmental commitments when deciding where to work, and almost two-thirds will not take a job if a company does not have strong corporate social responsibility practices.²⁸ Millennials also appear to be willing to pay more for products and services from companies committed to positive social and environmental impact.²⁹ In terms of opportunity in *technology and markets*, companies can create new technologies that both help address climate change and create a competitive edge, such as technologies that convert captured carbon dioxide (CO₂) into useful products (e.g., concrete, fuels).³⁰ There are also competitive market opportunities from international efforts to address climate change. For example, analyses suggest that U.S. businesses could create 33,000 more jobs, realize almost \$39 million in additional economic output, and have more robust global exports if the United States ratifies the Kigali Amendment to the Montreal Protocol (to phase out refrigerants with high global warming potential).³¹

As the Kigali example illuminates, there are big markets to be found in responding to climate change. For example, advanced energy (including building efficiency, clean energy, energy storage, electric vehicles, and more) is a \$200 billion industry in the United States and a \$1.4 trillion one worldwide.³² Looking ahead, Bloomberg New Energy Finance foresees more than \$8 trillion being invested globally between 2018 and 2050 in wind and solar, an additional \$1.5 trillion going into other zero-carbon technologies such as nuclear and hydroelectric, and more than \$500 billion going into battery capacity.³³ There are big markets in climate resilience as well. For instance, growing awareness of climate impacts and increased deployments of distributed energy resources have led to growth in advanced microgrids – localized grids that can disconnect (or “island”) from the bulk power grid in case of disruption (e.g., due to a climate-related disaster) and provide power by relying on resources such as distributed solar, battery storage, fuel cells, and smart controls.³⁴ Installed microgrid capacity in the United States is expected to more than double from 3.2 GW in 2017 to 6.5 GW by 2022, driven by about \$12.5 billion in microgrid investment over that time.³⁵

Beyond the opportunities in providing new climate-friendly products and services, companies also have opportunities to boost profitability by reducing their own

FIGURE 2: Categories of climate-related opportunities with examples.



Source: C2ES.

emissions. For instance, steelmaker ArcelorMittal has saved more than \$257 million each year since 2006 in the United States by deploying a range of energy-saving measures at its facilities, from LED lighting to variable-speed drives to combined heat and power systems.³⁶ The more than 200 partners in the U.S. Department of Energy’s Better Buildings, Better Plants Program have realized

cumulative energy savings of more than \$5 billion.³⁷ Corporate renewable energy procurement can likewise help companies save money, locking in long-term energy costs that are less expensive than fossil fuels and eliminating the risk of power price volatility.³⁸ General Motors, for instance, saves \$5 million annually from using renewable energy.³⁹

ACTIONS BUSINESSES ARE TAKING

Leading businesses are taking action to respond to the range of climate-related risks and opportunities. For instance, C2ES’s Business Environmental Leadership Council (BELC) consists of 34 industry-leading, mostly Fortune 500 companies—representing sectors such as high technology, diversified manufacturing, oil and gas, transportation, utilities, and chemicals—that are focused on addressing the challenges of climate change and supporting mandatory climate policy.⁴⁰ Corporate leaders on climate, such as those in the BELC, are setting strong internal emission reduction goals and investing significant sums to reduce climate risks and seize opportunities. As DTE Energy Chairman and CEO Gerry Anderson has noted, “fundamentally addressing climate change is among our greatest responsibilities. Reducing our company’s carbon footprint and developing cleaner

sources of energy is a key priority for us. Over time, I suspect this work will also bring great opportunity.”⁴¹

Similarly, HP Chief Operating Officer Jon Flaxman has observed that “by taking climate action today..., we are helping minimize operational risks associated with a changing climate, and building a more resilient company that’s ready to serve our customers indefinitely in a low-carbon economy.”⁴² Recognizing that private-sector action alone is not enough, corporate climate leaders are also calling for robust climate policy.

INTERNAL GOALS

Many businesses have set internal emission reduction or clean energy goals to drive their decision-making and performance. Almost half of the 2016 Fortune 500 companies—and more than 60 percent of the

Box 1: Businesses face continuing pressure to disclose climate risks, opportunities, and strategies

Companies are facing growing pressure to disclose the risks and opportunities that climate change presents, as well as the strategies companies are using to respond to them. The pressure to disclose (and to act) is coming from shareholders, activists, consumers, and others.

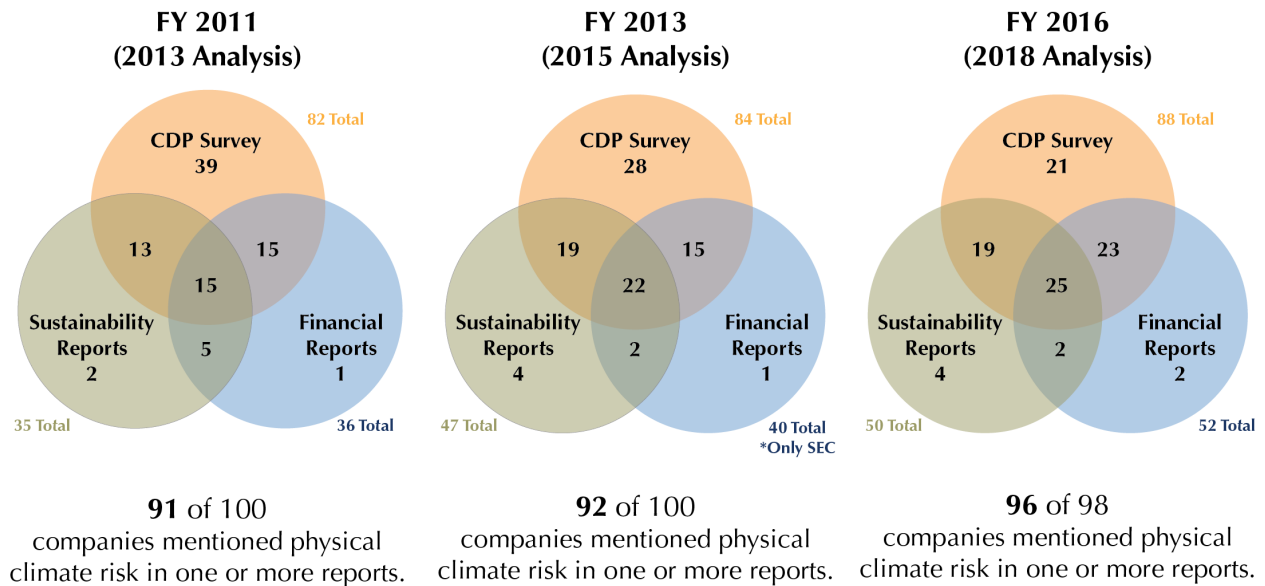
Investors, for instance, are increasingly realizing that climate change could affect the value of their investments and want companies to give them the information they need to make sound decisions. For example, in 2018 alone, dozens of climate-related shareholder resolutions were filed with companies in a range of sectors seeking reports on 2-degree Celsius analyses and strategies, greenhouse gas reduction targets, energy efficiency and renewable energy programs and goals, methane emission reduction targets, supply chain deforestation impacts, vehicle fleet greenhouse gas emissions and regulations, stranded carbon asset risks, and more.⁷⁰ Many of these resolutions were withdrawn after negotiations with the company yielded some sort of action commitment, while others went to votes at annual general meetings—where shareholder support for such proposals has been rising. In fact, in 2017, climate change risk disclosure resolutions received majority votes at ExxonMobil, Occidental Petroleum, and PPL Corp., and several other resolutions received more than 40 percent support.⁷¹ Similarly, more than 300 investors from dozens of countries, collectively managing more than \$32 trillion, have signed onto the Climate Action 100+ initiative to call on companies across the global economy with significant climate-related risks and opportunities to improve governance on climate change, reduce emissions, and strengthen climate-related financial disclosures.⁷²

Companies disclose information about climate-related risks and opportunities in a variety of places, including stand-alone corporate climate change reports, sustainability reports, annual reports, filings with the U.S. Securities and Exchange Commission (SEC), and responses to CDP (formerly known as the Carbon Disclosure Project) questionnaires. C2ES analysis shows that, with regard to disclosures of physical climate risks, the rate of corporate disclosure has been increasing (see *Figure 2*). Mentions of physical climate risk in SEC filings increased from 39 percent of companies in the S&P Global 100 in 2013 to 46 percent in 2016, while mentions in corporate sustainability reports increased from 36 percent in 2011 to 49 percent in 2013 to 55 percent in 2016. CDP responses also increasingly mention physical climate risks, with 93 percent acknowledging them in 2016, up from 87 percent in 2011. Of the 98 companies reviewed, 97 considered physical risks in at least one disclosure document in 2016.⁷³

There have been many guides for corporate climate risk disclosure in recent years, but one of the main drivers of climate-related disclosures across the Group of 20 leading industrial and emerging-market nations going forward will likely be the recommendations prepared by the Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD). The TCFD was formed in late 2015 to develop voluntary recommendations to help companies disclose decision-useful information that will enable financial markets to better understand climate-related financial risks and opportunities, including both physical and transition risks. In 2017, the TCFD issued its recommendations, focused on corporate governance, strategy, risk management, and metrics and targets. As of September 2018, more than 500 companies and other organizations had expressed their support for the TCFD.⁷⁴

In addition, companies with a presence in the European Union will soon face mandatory climate risk disclosure under new sustainable finance regulations put forth in 2018.⁷⁵

FIGURE 3: Corporate climate risk disclosure from 2011-2016.



Overall acknowledgment of physical climate risk across financial disclosure documents – CDP surveys, corporate sustainability reports, and financial reports (annual reports and filings with the SEC) – has increased in each update of C2ES’s *Weathering the Storm* research. *Weathering the Storm* reviews the financial disclosures of the companies in the Standard & Poor’s Global 100 index in 2012.

Source: C2ES.

Fortune 100—have set targets to reduce greenhouse gas emissions, improve energy efficiency, and/or increase the use of renewables.⁴³ As of January 2019, more than 500 companies around the world were taking science-based climate action—using the best available climate science to define their appropriate share of the reductions needed to limit warming to below 2 degrees C—and more than 160 have approved science-based climate targets.⁴⁴ In addition, more than 160 companies have made commitments to use 100 percent renewable energy.⁴⁵

Companies representing several different sectors are setting ambitious targets. For example, in the oil and gas sector, Shell announced in December 2018 that, in addition to its existing goals of reducing the carbon footprint of the energy products it sells by about 20 percent by 2035 and about 50 percent by 2050, the company would set specific reduction targets for

shorter 3-5 year periods starting in 2020 and would link those targets to executive compensation levels.⁴⁶ In the transport sector, global shipper Maersk announced in December 2018 a target of being carbon neutral by 2050,⁴⁷ while United Airlines committed in September 2018 to halving its greenhouse gas emissions by 2050 (compared to 2005 levels).⁴⁸ In the electric power sector, Xcel Energy announced in December 2018 a goal of providing 100 percent zero-carbon energy by 2050.⁴⁹ Companies committing to 100 percent renewables range from retailers (e.g., Ikea, Walmart) to insurers (e.g., Allianz, Swiss Re) to automakers (e.g., BMW, GM) to electronics companies (e.g., Apple, Sony) and beyond. Some companies are looking to go even further; Google, for instance, is aiming not only to buy enough clean energy to offset its energy use (which it has already achieved) but to directly power its operations with zero-carbon energy 24 hours a day, 7 days a week, in all locations.⁵⁰

INVESTMENTS & STRATEGIES TO REDUCE RISKS & SEIZE OPPORTUNITIES

Companies with leading climate strategies are also pursuing investments in risk management, emission reductions, and development of new climate-friendly products and services.

Many companies are taking action to reduce physical risks. Small businesses can increase their insurance coverage, adopt disaster recovery plans, and add on-site energy resources. Large companies are assessing the vulnerability of their assets in light of future climate conditions (including by utilizing international and federal climate research), adjusting existing business planning and risk management processes, implementing strategies to reduce risks, engaging with stakeholders, forming partnerships, and upgrading infrastructure and equipment. Mars, Inc., for example, developed a program to decrease water usage and improve farming methods by Asian and American farmers who provide the company with rice, thereby increasing resilience to future water stress.⁵¹ New Orleans-based utility Entergy, in the wake of Hurricane Katrina in 2005, rebuilt coastal transmission lines to withstand high winds, replaced wooden poles in transmission structures with concrete or steel, and elevated substation components in flood-prone areas.⁵² Companies are also planning to seize opportunities related to physical climate impacts. Unilever, for instance, is developing products (e.g., for laundry or cleaning) that work well with less water, recognizing that half of the global population is expected to live in water-stressed areas by 2025.⁵³

Many companies are also making investments in zero-carbon products and services and are taking actions to reduce emissions. Toyota, for instance, has been investing in gas-electric hybrid, plug-in hybrid, and hydrogen fuel cell vehicles (and the associated fueling infrastructure), as well as in efforts to improve energy efficiency and utilize renewables at its facilities.⁵⁴ Amazon has constructed assets that will generate more than 3.5 million megawatt-hours of renewable energy each year, has begun hosting large-scale rooftop solar arrays on fulfillment centers across the country, and is retrofitting its existing buildings to improve energy efficiency.⁵⁵ Indeed, corporate renewable energy procurement broke new records in 2018, with more than 6 gigawatts of corporate renewable deals made by about 40 different companies.⁵⁶ Investors are taking action as well. For instance, in December 2018, 15 financial institutions—including

Bank of America, JPMorgan Chase, and Wells Fargo—launched the U.S. Alliance for Sustainable Finance, which will work to help direct, mobilize, and increase private capital for climate-related financing.⁵⁷ The examples could go on and on.

SUPPORT FOR STRONGER POLICY

While the actions companies are taking are unquestionably important, many companies agree that voluntary action alone will not be enough to address the climate challenge. Recognizing both the necessity of government action and the substantial impacts that climate policy decisions could have on their companies, business leaders are engaging with policymakers to help influence those decisions. Many of these business leaders favor approaches that level the playing field among companies and spread responsibility for reductions to all sectors of the economy, such as through carbon pricing. They recognize that mandatory climate policies, if properly designed, are consistent with sound business planning and good corporate governance. Accordingly, they are making their voices heard in policy arenas at the state, regional, national, and international levels.

For example, in 2017, two dozen major U.S. companies signed full-page ads sponsored by C2ES that urged continued U.S. participation in the Paris Agreement for the good of the U.S. economy, and in late 2018, 17 companies signed onto a C2ES statement welcoming the progress made on the Paris “rulebook” in Katowice.⁵⁸ More than 2,100 businesses and investors have joined the We Are Still In coalition, pledging continued U.S. commitment to meeting the goals of the Paris Agreement.⁵⁹ More than 1,000 companies and investors have joined the World Bank’s calls for carbon pricing,⁶⁰ and more than 160 businesses from a range of sectors and regions have joined the Carbon Pricing Leadership Coalition convened and supported by the World Bank.⁶¹

At the national level, several businesses, including in the oil and gas sector, are founding members of the Climate Leadership Council, which advocates for policies that put a price on carbon and return all the revenues to the American people.⁶² Hundreds of companies and investors announced their support for the U.S. Environmental Protection Agency’s Clean Power Plan as it was being finalized in 2015,⁶³ and companies such as Google and Apple filed comments opposing EPA proposals to repeal it.⁶⁴ Many businesses, including local businesses, likewise submitted comments opposing the proposed

rollback of federal clean car standards.⁶⁵

Companies have been active at sub-national levels as well. For instance, in 2016, more than 90 companies and investors urged the governors of the RGGI states to strengthen the program.⁶⁶ Companies, likewise, encouraged California to extend its cap-and-trade program,⁶⁷ created a business alliance to push for carbon pricing in

Oregon,⁶⁸ lobbied for carbon pricing in Massachusetts,⁶⁹ and more.

At all levels of government, companies are supporting more ambitious climate policies. Effective climate policies give businesses more certainty for short- and long-term planning and investments and help them better anticipate regulatory risks and economic opportunities.

CONCLUSION

Businesses are taking action to address climate change, both within their companies and in the policy arena, in recognition of the substantial business risks and opportunities presented by climate change and society's responses to it. Increasingly, leading companies recognize that environmental protection and economic prosperity are not competing ideals, but, rather, are dependent on one another.

As the impacts of climate change grow clearer, the need for leadership to address the challenge grows ever greater. Many businesses are providing that leadership – boosting their own resilience to climate impacts while enhancing both their profits and their reputations by contributing to climate solutions. Even more private-sector leadership will be needed in the years ahead if the truly deep reductions in greenhouse gas emissions that

are necessary for avoiding the worst impacts of climate change are to be achieved.

The private sector cannot do it alone, however. Businesses rely on federal, state, and local government-funded infrastructure, government-funded research, and public policies that drive action. While state and city leadership on climate action has been essential, national and international businesses generally prefer the consistency of federal policy over a patchwork of subnational efforts. Getting the right federal policies in place can increase the likelihood of achieving deep emission reductions while growing the U.S. economy and making the United States a global leader in producing the climate-friendly technologies that will dominate markets in the 21st century and beyond.

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