

ZERO NET EMISSIONS GOALS: CHALLENGES FOR BOARDS

Hugh Grove^{*}, Maclyn Clouse^{**}

^{*} Corresponding author, School of Accountancy, University of Denver, Denver, the USA
Contact details: School of Accountancy, University of Denver, 2101 S. University Blvd., Denver, CO 80208, the USA
^{**} Reiman School of Finance, University of Denver, Denver, the USA



Abstract

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The major research purpose of this paper is to identify the challenges for boards of directors concerning their responsibilities to assess and track their companies' commitments to zero net emissions goals and performances. A major challenge for boards is to determine whether their companies are sincerely trying to reach zero net emissions or just doing greenwashing, i.e., just making commitments or pledges without any substantial subsequent performance. This literature-search research broadens previous research on companies' commitments to renewable energy (Grove & Clouse, 2021) to zero net emissions goal commitments and related boards' monitoring responsibilities, especially to avoid greenwashing. This study also extends previous research on climate change risks and opportunities (Grove, Clouse, & Xu, 2021) to develop and establish board challenges for zero net emissions goals with the following sections: overview of climate risk, current climate lawsuits and board risks, EU climate law, carbon inserts, carbon offsets, carbon credits for agriculture, climate disclosure metrics, global bank greenwashing, and conclusions. The International Organization of Securities Commissions Organization (IOSCO) includes 90% of the public market security regulators in the world and has established a working group that should establish climate disclosure metrics for public companies. Climate disclosure metrics are relevant and needed to help stakeholders, including boards, assess company climate performances, opportunities, and risks.

Keywords: Zero Net Emissions, Greenwashing, Boards of Directors

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1. INTRODUCTION

The environmentalist Al Gore is chairman of Generation Investment Management which issued a 2021 report drawing on more than 200 sources to highlight key tipping points in the shift to sustainability. Since 2015, the market has seen a 10-fold gain in new investments in environmental, social, and governance (ESG) funds but there is a growing unease about the low quality of some zero net emissions commitments because of the gap

between goals and actions, and the absence of guardrails for those companies using natural solutions, such as carbon offsets to meet climate pledges. This report estimated that 42% of environmental claims have been exaggerated, false, or deceptive and 53% of the Climate Action 100+ companies do not have appropriate short-term targets for zero net emissions. Concerning this rising threat of greenwashing, Gore commented: "The time for celebrating vague, distant goals on net zero has long passed. Investors now need clarity

over how companies will turn goals into actions. To limit global temperatures to 1.5 degrees Celsius, sustainability deployment rates must increase by five to ten times over the next few years for technologies like electric vehicles, solar, hydrogen, and wind power, as well as carbon capture and storage” (Quinson, 2021e).

Boards of directors need to play a greater role in the risk management function of their companies. Systematic risk is not just financial risk but now includes climate risk which cannot be diversified away, like financial risk. Current research found that companies with a strong environmental, social, and governance presence were more resilient during the pandemic crisis which indicates good potential for dealing with future crises and climate risk. Boards have a fiduciary obligation and duty of care to be informed on climate risks and make well-formed decisions (Ramani, 2021).

Related to risk management responsibilities for boards of directors, an emerging challenge for boards is to assess whether their companies are attempting to reach zero net emissions or merely greenwashing, i.e., just making commitments or pledges without any significant subsequent performance. Accordingly, the major research purpose of this paper is to identify board challenges and responsibilities to assess their companies’ commitments to zero net emissions goals and performances.

The structure of this literature-search research paper is as follows. Section 2 reviews the relevant literature. Section 3 has an overview of climate risk. Section 4 reviews current climate lawsuits and board risks. Section 5 summarizes the EU climate law. Section 6 discusses carbon inserts. Section 7 discusses carbon offsets. Section 8 elaborates carbon credits in agriculture. Section 9 summarizes climate disclosure metrics. Section 10 identifies global bank greenwashing. Section 11 has the conclusion of this research paper.

2. LITERATURE REVIEW

In this literature review, there were no research papers that addressed the major research question of this paper: *What are board of directors’ responsibilities for monitoring their companies’ commitments to net zero emissions goals and practices?* Several papers did discuss environmental issues, such as renewable energy commitments, climate change risk, green banking practices, corporate social responsibility (CSR) reporting, and related impacts on financial performance.

Grove and Clouse (2021) analyzed boards of directors’ responsibilities for monitoring their companies’ commitments to renewable energy, i.e., are companies and their boards making significant efforts, or just greenwashing. This paper argued that boards have corporate social responsibilities for renewable energy commitments, especially in response to activist investors, like BlackRock and State Street Global Advisors. It developed boards’ responsibilities for assessing renewable energy commitments and for monitoring any greenwashing by their companies with implications for corporate governance.

Grove et al. (2021) stated that management, boards of directors, investors, and stakeholders should be investigating climate change risks for their companies. For example, there may be increasing operating costs, such as higher compliance costs or increased insurance premiums, due to physical impacts of climate change and increasing water scarcity and reputational risks. However, there may also be climate opportunities, particularly focused on consumers, linked to increased revenue through demand for low carbon products, services and a better competitive position to reflect shifting consumer preferences. There may be opportunities linked to operations focused on reduced operating costs with efficiency gains.

Raghunandan and Rajgopal (2021) studied the Business Roundtable (BRT) companies that had signed the Statement of the Purpose of a Corporation when it was issued in August 2019. The research empirically tested whether these signatory firms exhibited superior treatment of employees and the environment relative to non-signatory peer firms within their industries. The research found that the signatory firms had higher rates of environmental and labor violations per various U.S. regulatory agencies. Also, these signatory firms had higher levels of carbon emissions. Thus, these BRT companies appear to be greenwashing their own various stakeholders with the acquiescence of their boards of directors.

CDP, a non-profit global organization based in the U.K, issued its 2019 Global Climate Change report which surveyed 6,937 companies, identified by region and industry (CDP, 2019). The largest region responders were Europe (1,813 companies), the United States of America (1,784 companies), China (750 companies), and India (710 companies). Of the 14 industries, the largest ones were manufacturing (2,312 companies), services (1,193 companies), materials (760 companies) and food, beverage & agriculture (689 companies). These companies reported general climate risks linked to increasing governmental climate policies, particularly greenhouse gas (GHG) pricing. However, they viewed the transition to low carbon as an opportunity, even though it could result in reduced demand for their products from market changes or consumer preferences, such as the switch towards electric vehicles, increasing reputational risks, and potential shifts in their costs of capital.

Gelmini and Vola (2021) investigated integrated reporting and environmental disclosures for the impact on natural capital where a new geological era, the Anthropocene, or the Age of Humans, has been entered. They analyzed the extent and type of information that can be provided on natural capital with integrated reporting and its efficacy to really enhance sustainability practices. Lahjie, Natoli, and Zuhair (2021) examined the impact of corporate governance on CSR. Their results showed that a lack of corporate governance in monitoring and supervisory mechanisms, as well as a high concentration of managerial ownership, can significantly contribute to low levels of CSR.

Dao and Nguyen (2020) investigated how corporate governance influenced firm performance with a meta-analysis of 251 studies covering almost

25,000 businesses in 37 published papers. They found statistical evidence that better corporate governance and more board independence significantly enhanced firm performance. Wukich (2020) investigated if the detriment to environmental disclosures because of CEO power was different for outcome versus intention-oriented disclosure characteristics in a sample of 2,200 U.S. publicly traded companies. This research found that powerful CEOs' suppression of the most comparable outcome-based environmental disclosures (effectiveness) was greater than the suppression of other environmental disclosures.

Malik and Yadav (2020) aimed to explain whether the declaration of sustainability ratings contributes to the stock market reaction in emerging markets. They showed that the announcement of sustainability ratings was not regarded by investors with a great deal of interest and there is inherent indifference to such news in these emerging stock markets. Longo and Tenuta (2020) assessed sustainability at different levels of environmental, economic, and socio-institutional detail, using the triple bottom line approach. A Sustainable Irrigation Index was built to monitor and assess the sustainability of irrigation activities and policies and was applied successfully in a case study.

Rainero and Modarelli (2020) showed a crucial role of CSR promotional activities as an anti-crisis solution during the recent COVID-19 pandemic, based on a sample of 208 respondents. Corporate reputation and image were enhanced. Arulrajah, Senthilnathan, and Rathnayake (2020) analyzed green information technology (GIT) practices in Sri Lanka banks by analyzing the relationships among GIT practices, environmental performances of banks (EPB), and employees' attitudes on GIT (EAG). They found that GIT practices had a positive relationship to and significant impact on EPB and a mediating partial role of EAG. Malsha, Arulrajah, and Senthilnathan (2020) did another Sri Lankan bank study which found a partial mediation role of employee green behavior in the relationship between green banking practices and banking sustainability performance.

Bonuedi, Ofori, and Simpson (2020) found that CSR reporting was used in correcting negative perceptions and stakeholder skepticism. However, there was very little information on the existence of mechanisms that promote the implementation of stakeholder management policies at the firm level. Firmansyah and Estutik (2020) found that environmental responsibility and social responsibility disclosures were negatively associated with tax aggressiveness. However, corporate governance failed to strengthen these negative influences. Ddamulira (2019) investigated how climate change impacts food production and the corporate governance challenges associated with managing such impacts. The study concluded that specific aspects of the prevailing climate change governance regime require major reforms, particularly the role of the state, corporations, and civil society, while other climate governance mechanisms need to be completely overhauled by the establishment of a new World Environment Organization.

3. OVERVIEW OF CLIMATE RISK

In June 2021, a new peak for global atmospheric carbon dioxide was reached: 419 CO₂ molecules for every million molecules of air, or parts per million (ppm). This year's peak appears to be the highest in as long as 4.5 million years. This continued accumulation of GHG is driving dangerous global heating around the world. The Scripps Institution of Oceanography pioneered this atmospheric measurement practice in 1958 and was joined by the National Oceanic and Atmospheric Administration in 1974. In 1958, atmospheric CO₂ was 316 ppm which increased to 340 ppm in 2000 and now to 419 ppm in 2021. Three centuries ago, before the beginning of the industrial age, geological records show 280 ppm. By burning fossil fuels, humanity has increased concentrations of this most important GHG by 50%. Ralph Keeling, a Scripps geochemist, said: "The ultimate control knob on atmospheric CO₂ is fossil fuel emissions. We still have a long way to go to halt the rise, as each year more CO₂ piles up in the atmosphere" (Roston, 2021).

Climate change is causing more frequent and intense weather events with related risks. The number of people forced to move within their own countries by climate disasters, primarily droughts, forest fires, hurricanes, floods, and typhoons, rose to the highest level in at least a decade in 2020, more than three times those displaced due to conflict and violence. In addition to sudden disasters, climate change is a complex cause of food and water shortages, as well as difficulties in accessing natural resources. People who migrated domestically due to climate change rose to 30.7 million (75%) of those uprooted within their borders, according to a report by the International Displacement Monitoring Centre. A record 55 million people had been forced to move at the end of 2020 with the number of climate migrants significantly underestimated, due to incomplete data (Lombrana, 2021a).

In May 2021, the U.S. Environmental Protection Agency (EPA) released a report detailing climate-related damage. The EPA used 54 climate change indicators, based on data from academia, nonprofit institutions, and other government agencies to reach the following conclusions. Heat waves are occurring about three times more often than they did in the 1960s. Extreme heat is the deadliest form of extreme weather in the U.S., causing more deaths on average than hurricanes and floods over the past thirty years. Also, air conditioners have doubled summer energy usage, adding even more GHG to the atmosphere. Coastal flooding is happening more often at all 33 spots studied up and down the Pacific, Atlantic, and Gulf coasts. In 2020, ocean heat reached its highest level in recorded history and the Arctic glaciers and Alaskan permafrost are being destroyed. Wildfire and pollen seasons are starting earlier and lasting longer. In summary, the EPA data details how the U.S. has entered the unprecedented territory, in which climate effects are more visible, happening faster, and becoming more extreme, suggesting disastrous times ahead if the U.S. and other industrialized nations do not act quickly to reduce global warming (Grandoni & Dennis, 2021).

The naturalist David Attenborough concurs with the conclusions of this EPA report and goes further, saying climate change is crime humanity has inflicted on the planet. He asks why society should have the prerogative to continue poisoning life on earth when there is still time for redemption. Sir David has been appointed as the People's Advocate for the UK's Presidency of the UN Climate Change Conference (COP 26), starting October 31, 2021, in Glasgow, Scotland (Visser, 2021).

What does "net zero" or "zero net" mean? For the planet, it is the point at which the levels of GHG in the atmosphere stabilize, ending the sharp increase in heat-trapping emissions since the industrial revolution that has brought the world to dangerous levels of global warming (Mackenzie, 2021). In May 2021, the International Energy Agency (IEA) issued a report, *Net Zero by 2050: A Roadmap for the Global Energy Sector*. (IEA, 2021) It stated that the world can reach net zero by 2050 and limit global warming to 1.5 degrees Celsius but only with monumental changes, summarized in four categories: zero net milestones, supercharged investment, behavioral changes, and driving innovation. There is selected zero net, global milestones every five years, such as the ones for 2050: 1) almost 90% of electricity generation globally will need to come from renewable sources with 70% from solar and wind; 2) more than 85% of buildings are zero-carbon-ready; 3) more than 90% of heavy industrial production is low carbon; 4) 7.5 gigatons CO₂ captured (Elliott, 2021).

There are selected annual supercharged investments for fuels, electricity, infrastructure, and end-use. The electricity investments are \$0.5 trillion for 2016-2020 and over \$1 trillion for 2021-2050 plus no new unabated coal plants, not using abatement technology, such as carbon capture and storage (CCS), and no new oil and gas fields approved for development. For behavioral changes, it is important that citizens adapt to new ways of doing things, learning from the COVID-19 crisis about home working and mask-wearing. For driving innovation, technological innovation will be an important part of meeting net zero goals with various technologies being on the market and under development. Faith Birol, the IEA executive director, said: "Much greater resources have to be mobilized and directed to clean energy technologies to put the world on track to reach net-zero emissions by 2050. The rebound in energy investment is a welcome sign and I am encouraged to see more of it flowing toward renewables" (Elliott, 2021; Mathis, 2021b).

For individual companies, many marketing departments have recently made zero net emissions commitments, possibly from fear of losing out (FOLO) or missing out (FOMO). What do such commitments mean from a business perspective? Boards need to evaluate exactly what such climate commitments mean to their companies and ask management-related questions, especially from a risk perspective. For example, is there a meaningful process for reaching a net zero goal? A long-term perspective is needed. Boards, senior management, shareholders, and stakeholders need to be educated about company climate goals. Do such goals include scope 1 (direct), scope 2 (indirect) and scope 3 (value or supply chain) GHG

emissions? Do they include carbon insets and/or carbon offsets? What is the difference and is greenwashing involved? Are ESG efforts and disclosures sufficient to avoid potential lawsuits? What are the reputational risks? Boards need to be educated so they can ask the right questions (Ramani, 2021).

Another climate risk practice for boards to pay attention to comes from a young portfolio manager, Nathan Hughes, whose \$600 million ESG fund invests in companies with sound sustainability practices. Nathan Hughes commented: "Companies cannot do greenwashing for too long. I think eventually you get found out. I think it is great to put out a zero net emissions plan for 2050, but the reality is the management team, and possibly myself, will not be around in 30 years, so it is important that there are near-term targets that are meaningful" (Ong, 2021).

Large asset managers, like BlackRock (\$9 trillion under management) and State Street (\$3 trillion under management), view climate change as systematic risk, both in the short and long terms. Thus, they state that board oversight is warranted, especially after the Paris Accord got investors' attention. Europe is way ahead of the U.S. in climate commitments and actions. It has a non-financial disclosure requirement for all European public companies and a Climate Law with goals for GHG and zero net emissions (Krukowska, 2021). The U.S. Securities and Exchange Commission (SEC) is now focusing on climate change and recently established a senior policy advisor position for climate and ESG (Kishan & Ramonas, 2021).

To help boards with climate risk management, in April 2021, the Sustainability Accounting Standards Board (SASB) issued its latest Technical Climate Bulletin which analyzed 72 industries for climate and systematic risk. There is also climate risk guidance in the Task Force on Climate-Related Financial Disclosures (TCFD) and Climate Action 100+ reports. Boards can use such information to develop scenario analysis for their companies, i.e., how company assets and business will be impacted by climate change events, like hurricanes, forest fires, and droughts. Short-term and long-term climate issues are becoming mixed. Long-term climate goals may be greenwashed, but short-term climate results may nullify such greenwashing efforts. A zero net commitment really needs senior management, mid-management, and board commitments to be workable (Ramani, 2021).

The current emissions reductions targets of the public companies that make up the primary equity benchmarks of the Group of Seven (G-7) countries imply an average temperature rise of 2.95 degrees Celsius (C), almost double the 1.5 degrees C target of the Paris climate agreement, according to research from the Science-Based Targets initiative (SBTi). This study calculated temperature pathways, predictions of future temperatures based on assumptions about GHG output per the targets these public companies have set between 2025 and 2035. The U.K. index and Canada's S&P/Toronto Stock Exchange 60 index both show the greatest amount of warming at 3.1 degrees C, just ahead of the U.S. S&P 500 index at 3 degrees C. Germany's Dax index shows the lowest amount of warming at 2.2 degrees C.

Alberto Carrillo Pineda, a member of the SBTi steering committee, said: “At 3 degrees Celsius of warming, the climate emergency will have become irreversible and will have a catastrophic human and economic impact in every country, on every continent. It will change life as we know it. Climate and environmental breakdown are the biggest health, economic, and social challenge of our time. It requires immediate action from the world’s largest companies” (Marsh, 2021).

“There is no Planet B,” said Leah Thomas, founder, Intersectional Environmentalist (Blumenstein, 2021). “The pandemic is a dress rehearsal for the climate crisis which is happening right now”, said Sophia Li, multimedia journalist (Blumenstein, 2021). IBM funded \$2 billion worth of super computers for a common interdisciplinary consortium of 10 global organizations to help develop a vaccine for the pandemic. Artificial intelligence and digital technology were used with virtual experiments to accelerate the scientific method. As a result, the typical vaccine development cycle of 14 years was compressed into less than 1 year. The same type of collaborative effort needs to be applied to climate change problems, especially with a commitment to share resources and technology globally. Technology can scale and help what nature is already doing with forests and soils capturing carbon emissions (Blumenstein, 2021).

4. CURRENT CLIMATE LAWSUITS AND BOARD RISKS

Boards need to pay attention to lawsuits related to climate change which may affect their companies and their own futures. There are currently 1,800 lawsuits related to climate change being fought in courtrooms around the world. The courts have become an increasingly successful arena for activists to hold governments, countries, and now individual companies to account over pollution and climate change. A recent ominous lawsuit by Milieudensie, the Dutch arm of Friends of the Earth, along with Greenpeace and 17,000 Dutch residents as co-plaintiffs, was filed against Royal Dutch Shell. On May 26, 2021, a Dutch court in the Hague ruled the company has to slash emissions 45% by 2030 and 72% by 2040, as opposed to the company’s goal of zero net emissions by 2050 (with a series of interim targets along the way). Such deep cuts included scope 3 emissions, a category that includes drivers burning Shell’s signature gas product and would require a rapid transformation of the company (Baazil, Miller, & Hurst, 2021; Wagner, 2021). The symbolism was inescapable. The Netherlands, famously built on land reclaimed from the sea, faces the immediate threat from a warming climate with rising ocean levels, caused by the burning of Shell’s own oil and gas products (Sengupta, 2021).

Although many countries, including the Netherlands, had signed the Paris Agreement on climate change, companies, such as Shell, were not part of this deal and so far, have not been bound by national pledges. That argument did not stop the Dutch presiding judge, Larisa Alwin, from stating that companies have a burden to shoulder too: “Companies have an independent responsibility,

aside from what states do. Even if states do nothing or only a little, companies have the responsibility to respect human rights” (Baazil et al., 2021). Jeannette Honee, a spokeswoman for this Dutch court, said: “The court understands that the consequences could be big for Shell. But the court believes that the consequences of severe climate change are more important than Shell’s interests. Shell’s policy intentions and ambitions largely amount to rather intangible, undefined, and non-binding plans for the long-term. Severe climate change has consequences for human rights, including the right to life. And the court thinks that companies, among them Shell, have to respect human rights. Shell’s climate policy is not concrete, has many caveats, and is based upon monitoring social developments, rather than the company’s own responsibility for achieving a CO₂ reduction” (Reed & Moses, 2021).

According to this summary by the Dutch court, Shell’s climate policy appears to be greenwashing. Shell’s total GHG emissions were 1.64 billion tons of carbon dioxide in 2019, around the same as Russia, the world’s fourth-largest polluter country. This lawsuit was the second recent one where a Dutch court has ruled that Shell’s parent company in the Hague was liable for environmental damages in other jurisdictions. In January 2021, a court of appeals said that Shell had a duty of care to prevent emission leaks in Nigeria (Baazil et al., 2021). These rulings could set a precedent for similar cases against polluting multinationals around the world. For example, Donald Pols, the director of Milieudensie, said: “We are already supporting other organizations to set up similar cases in their countries. This Royal Dutch Shell court case and verdict open a whole new approach to climate litigation and because of its success, it will be copied by other civil society organizations in the rest of the world” (Lombrana, 2021b).

Germany’s highest court recently ruled that the government’s 2019 climate law was incompatible with fundamental rights, a victory for the nine young German activists that filed the lawsuit and for the global youth climate movement. A week later, the German government announced it would speed up its transition to net zero greenhouse gas emissions by 2045 and cut emissions by 65% by 2030. These goals will force German companies, such as Volkswagen and Bayer, to implement massive emissions cuts over the next decade. In the industrial sector, the indicated reductions can only be achieved with massive decarbonization of industrial plants and processes. Given the lead times and investment cycles in this sector, these efforts must be initiated immediately. To help finance the transformation, the German government has proposed establishing a private fund that would take on debt without breaching constitutional limits on borrowing. There are increasing lawsuit risks for companies and their boards as activists are challenging private companies well beyond just the fossil fuel companies. Of the 1,727 climate cases recorded between 1986 and 2020, over 50% started after the Paris Agreement of 2015, challenging everything from greenwashing to financial risk disclosure (Jennen, 2021).

Activist shareholder proposals at companies’ annual meetings can also have similar risks as

climate lawsuits for companies and their boards. Chevron shareholders voted for a proposal to compel the company to reduce pollution by its customers, i.e., another challenging scope 3 emissions reduction directive, like the Shell court ruling. ExxonMobil shareholders ousted three of the twelve board directors seen as insufficiently attuned to the threat of climate change. This proxy fight campaign was led by Engine No. 1, a small activist hedge fund, which stated in a recent presentation: “A refusal to accept that fossil fuel may decline in decades to come has led to a failure to take even initial steps towards evolution, and to obfuscating, rather than addressing long-term business risk” (Crowley, 2021).

Although opposed by ExxonMobil which spent \$35 million against these board elections in a six-month proxy fight, this \$30 million campaign was successful because it was supported by the following large ExxonMobil activist shareholders: BlackRock, Vanguard, State Street, which are three of the world’s biggest fund managers, and California State Teachers’ Retirement System, California Public Employees’ Retirement System, New York State Common Retirement Fund, which are three of the four biggest pension funds in America, as well as BNP Paribas Asset Management, Fidelity Mutual Funds, and leading shareholder advisory firms, I.S.S. and Glass Lewis (Crowley, 2021). Ram Charan, a business advisor, summarized: “ESG cannot be hollow buzzwords. If investors are warning a company to take them seriously, directors better listen. Why did Exxon not think it was dead wrong?” (Sorkin, 2021).

BlackRock is the world’s largest asset manager with \$9 trillion under management. Its CEO, Larry Fink, has said in his last three annual letters to all public company CEOs that he sees climate change as a big threat and his firm has often used its enormous voting power to influence companies and frequently targeted directors. BlackRock voted against 255 directors in the period ended June 30, 2021, up from 55 a year earlier. It also failed to support 319 companies’ management for climate-related reasons, up from 53 in 2020 (Kishan, 2021).

In supporting the new climate-friendly Exxon directors, BlackRock said: “We are concerned about Exxon’s strategic direction which could benefit from the addition of new directors. The company’s directors need to further assess the company’s strategy and board expertise against the possibility that demand for fossil fuels may decline rapidly in the coming decades which could hurt the returns of Exxon’s shareholders” (Krauss & Eavis, 2021). This Exxon board upset result was a clear sign that company boards and leaders need to pay attention to ESG issues or suffer rebukes. Tensie Whelan, director of the New York University Stern Center for Sustainable Business, called this result “a pivotal moment for board accountability. Activist shareholders have traditionally taken on company executives over financial issues, not social issues like climate change. Shareholders are deeply concerned about the financial risks posed by climate change and increasingly willing to hold the board to account” (Sengupta, 2021).

Investor dissatisfaction with Exxon has largely focused on two issues that are becoming more

interlinked: climate change and financial performance. Exxon has envisaged a profitable, long-term future for fossil fuels and sees no point in investing in traditional renewable energy businesses. It also refuses to commit to targets to zero out emissions, unlike European rivals. Shareholders also went against Exxon and supported proposals for the disclosure of political and climate lobbying activities (Deveau & Wethe, 2021). On August 5, 2021, Exxon was suspended from the Climate Leadership Council, a pro-carbon tax group backed by conservation groups and some of the world’s largest corporations. The suspension comes just weeks after an Exxon lobbyist was secretly recorded by Greenpeace saying that the oil giant only voiced support for a carbon tax because it knew such a policy would be almost impossible to implement (Crowley & Natter, 2021).

Concerning such financial risks, ExxonMobil lost over \$20 billion in 2020, suffered a credit rating downgrade, might have to borrow billions just to pay its dividend, has seen its share price over the last decade produce a minus-30% return, and was booted from the Dow Jones Industrial Average (Friedman, 2021). This shakeup of ExxonMobil’s board of directors is a clear signal to corporate America that ambivalence and greenwashing will no longer be enough when it comes to addressing the climate crisis. Moody’s Investors Service said the shareholder vote, which cannot be appealed, likely presages similar results in future board elections at other U.S. oil companies. Andrew Behar, CEO of As You Sow, a corporate accountability nonprofit organization, commented: “Exxon’s current direction is premised on outdated assumptions about high oil prices, demand, and margins that are incompatible with the reality of climate change and the inevitable transition to renewable energy sources. All board directors should be on notice that if they do not fulfill their duty of independent oversight, their tenure will be challenged” (Quinson, 2021c).

Although not required, many of the world’s largest fund managers, including BlackRock, Vanguard, State Street, T. Rowe Price, and Neuberger Berman, have been publicly declaring their proxy votes. In 2021, there have been 203 environmental and social shareholder proposals (versus 173 in 2020), with the support of 34% of shares voted (versus 29% in 2020) and 29% of these resolutions earned majority support (versus 21 in 2020). Rob Du Boff, a Bloomberg Intelligence analyst, said: “The Black Rocks of the world are getting more aggressive about voting in favor of not only climate-related issues but also social measures” (Quinson, 2021d). From solely a financial standpoint, this trend makes sense, given the enormous investment flows into ESG funds. A huge \$112.5 billion poured into exchange-traded funds focused on ESG factors during the last 12 months. Jon Hale, global head of sustainable investing research at Morningstar, commented: “Big mutual fund managers are saying to companies. We want you to care not only about profits, but about people, the planet, and profits. For most of recorded history, most shareholders ended up backing the recommendations of the companies’ management. Not so much anymore” (Quinson, 2021d).

5. EU CLIMATE LAW

The European Climate Law was established by the European Union in April 2021. The goal of this law is a 55% reduction in net GHG emissions by 2030, compared with 1990 levels, and zero net emissions by 2050. This law makes climate goals legally binding with forthcoming rules and standards to overhaul the EU economy and impact major industries, such as transportation and energy production. The major parts of this EU legislative package are summarized as follows (Krukowska, 2021):

- strengthening and expanding the EU carbon market and setting more ambitious national targets in sectors not covered by the emissions cap-and-trade program;
- increasing renewable energy and energy efficiency targets;
- further development of alternative fuels infrastructure;
- higher taxation on most polluting fuels;
- full-fledged scheme for hydrogen certification;
- measure to impose a carbon price on some imported goods or use the Carbon Border Adjustment Mechanism;
- restoring European forests;
- curtailing the import of products that drive deforestation or global forest degradation.

Boards of EU companies may use this new EU law to help monitor and assess their companies' climate strategies and activities.

6. CARBON INSERTS

Carbon inserts occur when an organization invests in sustainable practices within its own supply chain to reduce its scope 3 GHG emissions versus carbon offsets where an organization pays for projects to capture GHG emissions emitted somewhere else. Carbon inserts support the implementation of practices, often through tree-planting and agroforestry projects, that sequester carbon, promote climate resilience, protect biodiversity, and restore ecosystems. Carbon inserting represents actions taken by an organization to fight climate change within its own value chain in a manner that generates multiple positive sustainable impacts. Carbon inserts projects provide a much more holistic approach than carbon offsets because they consider more than just carbon sequestration, but the entire ecosystem as well as the communities and farmers. Some carbon inserts organizations, such as the PUR Project, work with third parties to verify and audit their projects ("Carbon inserting explained", 2020).

Boards of directors need to understand and monitor the differences between carbon inserts and carbon offsets, especially for possible greenwashing. For example, not the Royal Dutch Shell board, but the Netherlands advertising watchdog, the Advertising Code Committee, ruled on August 26, 2021, that a Royal Dutch Shell advertising campaign that said its customers can offset the carbon emissions from their fuel purchases was misleading, i.e., carbon inserts for Shell's scope 3 GHG emissions by the customers in its supply chain. The Shell commercial was misleading because it gave the impression that its

customers can achieve carbon-neutral driving by paying only 1 extra euro cent per liter of gasoline. Shell said it would use the proceeds to plant trees and re-absorb carbon dioxide from the atmosphere, i.e., carbon offsets. However, it could not prove it was fully offsetting such carbon emissions as part of its zero-net emissions pledge by 2050, i.e., greenwashing (Hurst & Baazil, 2021).

A company can take direct responsibility for the carbon emissions in its own supply chain by using carbon inserts to improve its sustainable management practices. Carbon inserts can help make a company's supply chain more resilient, improve the quality of its raw materials, and its customers' carbon usages but they are limited by their very nature since they only address scope 3 indirect emissions from a company's supply chain, like raw material sourcing. They do not address scope 1 direct emissions that a company directly controls, like manufacturing and customer services, or scope 2 indirect emissions from the energy that the company buys.

A major example of scope 1 emissions management is United Airlines, which pledged to become carbon green, not just having zero net emissions, by 2050 without relying upon any carbon offsets. United Airlines has the longest history of using Sustainable Aviation Fuel (SAF) of any U.S. airline. SAF emits up to 80% less lifecycle carbon emissions than conventional jet fuel and is the fastest and most effective way United is reducing its emissions. United has invested heavily in SAF for more than a decade. In 2020, it renewed its contract with World Energy, agreeing to purchase up to 10 million gallons of cost-competitive SAF, and has invested more than \$30 million in SAF producer Fulcrum Bio Energy, which remains the single largest investment by any airline globally in a SAF producer (United Airlines, 2020).

A major example of scope 2 emissions management is Amazon which is the world's biggest corporate buyer of green power to reduce the company's carbon footprint. As of June 2020, Amazon sourced 42% of its global energy needs from renewables. In April 2021, it signed a deal to buy one gigawatt or more of green power. Amazon will use the power from wind farms, solar parks, and batteries to run its global operations. The series of deals in the U.K., Sweden, Spain, the U.S., and Canada will add more than 1.5 gigawatts of capacity to Amazon's network of green power supplies. All the projects are new developments that will take a couple of years to start generating power. They include 350 megawatts from a wind farm off the coast of Scotland, 258 megawatts from a wind farm in northern Sweden, and 100 megawatts of solar power in California with an additional 70 megawatts from an attached battery facility. Jeff Bezos, Amazon's retiring CEO, said: "We expect to power all of Amazon with renewable energy by 2025 and we are committed to having net-zero emissions by 2040". In his last annual CEO letter before he moves to the executive chairman position, he said: "Create more than you consume" (Mathis, 2021b).

Another major example of scope 2 emissions management is Google whose goal is to become carbon-free by 2030 with all its data centers and offices be powered around the clock by carbon-free electricity. AES, an international electricity company

and power plant developer, agreed to supply Google with renewable energy to power its data centers in Virginia. The deal will result in the construction of 500 megawatts of solar, wind, small-scale hydroelectric, and battery storage projects and supply will begin in 2021. The ten-year supply contract is the first of its kind to provide 90% carbon-free electricity on an hourly basis (Chediak, 2021).

Scope 3 emissions management examples include Burberry, a UK-based luxury fashion clothing and accessories company that has partnered with the PUR Project to create and implement regenerative farming practices for Burberry's Australian wool producers. The project works at the farm level to improve carbon capture in soils, improve watershed and soil health, reduce dryland salinity, and promote biodiverse habitats. Another example is Ben and Jerry's ice cream company, a subsidiary of Unilever, a UK-Dutch food company. It has financed an Uganda project which helped small-scale vanilla farmers build intercropped agroforestry systems to improve and diversify production. 100,000 native trees were planted in and around the vanilla plots, which provide shade and enable the farmers to diversify their income. A third example is Nespresso, a coffee unit of Nestle, a Swiss food and drink company. It is investing \$600 million over the course of five years to plant 10 million trees in Mexico, Nicaragua, Ethiopia, Columbia, and Guatemala from where it obtains coffee beans ("Carbon inserting explained", 2020).

However, carbon inserts are not available to retailers selling other brand's products or service-based businesses that do not source raw, natural materials. Even a product-based business cannot become carbon neutral or a zero net emitter only by using carbon inserts for its scope 3 emissions. It still must directly reduce its own scope 1 and 2 emissions. Carbon inserting is best viewed as a piece of the sustainability challenge and may be used in tandem with carbon offsets and other zero net emissions strategies.

7. CARBON OFFSETS

Since there is no national or global oversight of how the term, zero net or net zero, is used, loopholes may exist. One of the biggest loopholes in zero net pledges is using carbon offsets as a replacement for cutting emissions. The most common examples are planting trees or protecting forests, rather than reducing reliance on oil, coal, and methane (Mackenzie, 2021). Since many companies are setting zero net emissions goals, they are looking for ways to use carbon removal to help meet these targets. The most popular carbon removal method is planting trees which captures carbon dioxide and stores it in tree trunks and tree roots. Trees can also generate benefits of improving soil quality, retaining water, and increasing both plant and animal biodiversity. However, if companies and countries rely on trees for their main carbon removal solution, an unrealistic amount of land will be needed. One estimate suggested an area the size of China. Companies that buy forest-linked carbon offsets get credit for climate action without lowering their own emissions unless part of their value chain as scope 3 emissions. Many companies choose to do so because

it is cheaper than cutting their own scope 1 or 2 emissions. Companies should always prioritize cutting their own emissions first and only use such carbon offsets for activities that cannot be decarbonized through technology (Rathi, 2021a).

Additional carbon removal options are more expensive than tree planting programs. One is using crushed minerals that accelerate a natural process. Another is burning biomass in power plants, then burying the produced carbon dioxide. There are also giant air filters that trap carbon dioxide, just like trees do, and then the carbon is injected deep underground. While countries and companies are developing and using carbon dioxide removal techniques, they must first prioritize cutting their own carbon emissions (Rathi, 2021b).

Another example is the promising technology of carbon capture and storage or sequestration which is the only scalable technology that removes carbon from the atmosphere and buries it deep underground. United Airlines has committed to a multimillion-dollar investment in a startup company that captures carbon using direct air capture (DAC) technology. This investment will help fund the first of several DAC plants that are expected to capture and store one million metric tons of CO₂ per year which is equivalent to planting 40 million trees. Carbon sequestration is a real and permanent solution (Kirby, 2020).

Of the ten largest U.S. companies by market value, only four, all technology companies, have announced plans to reduce their emissions to zero net by 2050: Apple, Microsoft, Amazon, and Facebook. A fifth one, another technology company, Alphabet's Google, has a goal to become carbon-free by 2030. The other five largest market value companies, JPMorgan Chase, Johnson & Johnson, Walmart, Mastercard, and Bank of America, all have pledged to fully offset their scope 1 and 2 emissions but not their scope 3 emissions. Promising to achieve zero net emissions is one thing; actually, doing it is quite another. The way many companies seek to achieve zero net emissions by purchasing carbon offsets is increasingly being seen as another form of greenwashing (Quinson, 2021a).

Another industry sector, oil and gas producers, faces the most daunting task to hit their zero net goals, especially the ones that include scope 3 emissions in their goals. Such companies include the major European oil companies, Royal Dutch Shell, Repsol, Total, Eni, and Equinor, but the only major U.S. oil company is Occidental Petroleum (Quinson, 2021a). For example, the Spanish firm Repsol is devoting 40% of its capital expenditures to low carbon projects and France's Total stated is planning to increase its renewable energy capacity five-fold over the next four years. Italy's Eni is buying into the U.K. offshore wind projects, developed by Norway's Equinor, which also has U.S. offshore wind projects. In the first quarter of 2020, Equinor had more earnings from renewables than from its oil and gas exploration and production. Such renewables earnings came from asset rotation or "farm downs", i.e., the selling of renewable assets at various stages of development to new owners, such as Eni and BP. Thus, Eni and BP are paying Equinor for taking on the earlier stages of developing offshore wind projects, like the well-established strategy of major oil companies

buying oil fields, initially discovered, and developed by small oil companies (Bullard, 2021b).

Major oil companies are implementing CCS projects, aided by government subsidies. In early 2021, the Netherlands government told a consortium of four companies, Royal Dutch Shell, ExxonMobil, Air Liquide, and Air Products Chemicals, that it will spend as much as \$2.6 billion in the coming years to put some of their carbon emissions underground. The Port of Rotterdam project could sequester 2.5 million metric tons of carbon dioxide annually by storing it in depleted gas fields in the seabed. This project will trap pollution from the four companies' oil refineries and hydrogen production plants in a shared network, called the hub approach. The gases will then be compressed and transported by pipes off the coast and pumped into a sandstone reservoir three kilometers below the seabed that once held natural gas. The Netherlands subsidy is designed to prevent the four companies from incurring losses for building the hub (Mathis & Rathi, 2021).

In late 2020, the U.K. government announced a similar plan to invest \$1.4 billion to build four CCS hub projects to remove 10 million tons of CO₂ by the end of 2030. In the U.S., Valero Energy and BlackRock plan to develop an industrial-scale carbon-capture pipeline system and a storage chamber with an initial capacity of 5 million tons of CO₂ per year. The Korea National Oil Corp's gas field off the coast of South Korea is running dry. When it closes in 2022, its pipeline to the port of Ulsan will go into reverse, creating South Korea's first major carbon-capture reservoir by injecting CO₂ into the rock below the seabed. This CCS project will store 400,000 tons of carbon dioxide emissions annually for 30 years, starting in 2025. It helps restore geotechnical stability because pumping CO₂ back into the subterranean rock strata would balance the loss of the extracted gas. The technique was previously used in reverse to force crude oil or gas from reservoirs by pumping in CO₂ (Lee, 2021).

Carbon offsets have some tricky issues, such as permanence (will the trees planted be left there or cut down as soon as they hit maturity?) and leakage (did that carbon offset for forest preservation just cause trees to be cut down somewhere else?). Critics have called carbon offsets "a license to pollute," saying that purchasing offsets basically gives companies a way to pay to help publicize achieving zero net emissions without lowering their own carbon footprint. A London-based startup company, Sylvera, uses machine learning and satellite images to assess whether projects are delivering the climate impact they promise, especially since the carbon offset market is unregulated. The company has analyzed 35 projects and found that nearly half of them do not deliver what they claim, i.e., greenwashing. For example, one project failed to prevent deforestation in a certain area as there was significant deforestation in nearby areas, meaning the specific site's contribution was negligible. A nonprofit organization, Carbon Plan, found that California's offset projects were overclaiming 30% of their carbon savings which meant that \$400 million was paid for 30 million metric tons of emissions reduction that did not actually occur (Mathis & Levinston, 2021).

Many of the world's largest companies have

made zero net emission commitments using a significant amount of carbon offsets. Per company sustainability reports, Delta purchased almost 8 million metric tons of equivalent carbon dioxide in the 2017-2019 period and has vowed to allocate \$1 billion to buy carbon offsets over the next decade. Alphabet and Disney both purchased almost 3 million metric tons in the 2017-2019 period. Royal Dutch Shell plans to spend \$300 million over the next three years. Microsoft and Facebook zero net emission goals will require them to buy millions of carbon offsets. However, some companies, including Capital One Financial and Lyft, announced that they will steer away from using carbon offsets to hit their sustainability targets. Barbara Haya, a University of California researcher, has studied these types of carbon projects for almost two decades and said: "We just do not have time for false offsets that take credit for reductions that were already happening anyway" (Elgin, 2020).

Elaborating this potential problem of greenwashing with carbon offsets is the current negative publicity surrounding a nonprofit organization, Nature Conservancy, which is the largest U.S. seller of carbon offsets. It is now conducting an internal review of its portfolio following concerns that it is facilitating the sale of meaningless carbon credits to corporate clients. These credits were created in forestry areas for trees that were in no danger of destruction since the mission of Nature Conservancy is to conserve nature. It owns or has helped develop more than 20 such projects on forested lands mainly in the U.S., which have generated millions of dollars of credits sold to such major companies as JPMorgan Chase, BlackRock, and Disney who use them to claim large reductions in their own publicly reported emissions. Selling such carbon credits for well-protected trees potentially undermines the sustainability efforts of some of the world's largest companies. Legitimate carbon offset projects include protecting mangrove forests and destroying heat-trapping gasses from landfills and coal mines. However, carbon offset payments for already safe ecosystems do not fundamentally change the amount of carbon dioxide in the atmosphere (Elgin, 2021).

Carbon offsets have become an increasingly common way for businesses to claim reductions in their emissions and help reach net zero emission goals. In 2020, companies purchased more than 93 million carbon offset credits, an increase of 33% over 2019. This market is predicted to grow sharply to \$100 billion in the decade ahead as large emitters, such as Royal Dutch Shell, Delta Airlines, and JetBlue Airways, have vowed to negate pollution by acquiring more carbon offsets. Although this money sometimes flows to organizations that implement good works, like the Nature Conservancy which has protected more than 125 million acres since its founding 70 years ago, experts say that carbon projects that take credit for the activity that was already occurring are meaningless and undermine the credibility of the entire carbon offset market (Elgin, 2021).

Another nonprofit organization, the National Audubon Society, is being scrutinized for the same issues. In 2013, it began selling carbon credits from a natural sanctuary in the swampy tidal region of South Carolina, which it has been preserving

since 1970. By selling nearly 900,000 carbon credits there, Audubon netted more than \$3 million. Norman Brunswig, the former manager of this sanctuary said: "We never intended to cut that forest" (Elgin, 2021). Ted Turner, the second largest private landowner in the U.S. after John Malone, another U.S. billionaire, has created Ted Turner Reserves to sell carbon offset credits. Charles Canham, a forest scientist and Nature Conservancy chapter board member, summarized carbon offset sales: "These deals bring an awful lot of money to the table, but it comes at a cost of pretending that they have a meaningful climate-mitigation effect" (Elgin, 2021).

The most common type of carbon offset available on the voluntary markets today is avoided deforestation. It works on the principle that, in a bid to meet climate goals, the world will have to avoid cutting down forests. Unlike accounting for the burning of fossil fuels, emissions from forests and agriculture are hard to measure, and often these measurements rely on methods that grant emissions reduction based on avoiding a hypothetical polluting activity. At the COP 26 UN Glasgow meeting in November, countries will have to find a way to agree on rules for Article 6 of the Paris Agreement to create a new carbon market that helps private and public entities trade carbon offsets. The goal of this market is to reduce emissions but without clear accounting and strict regulations, there is a big risk of greenwashing (Rathi, 2021a).

Summarizing the problems with carbon offsets, United Airlines CEO Scott Kirby said: "Traditional carbon offsets do almost nothing to tackle emissions from flying and more importantly, they simply do not meet the scale of this global challenge. They have three major problems:

- They are non-transparent and are just a way for CEOs to write a check and then claim zero net emissions.
- They are not real and not going to reduce carbon.
- They are not a feasible way to solve the problem.

Companies must move past carbon offsets and focus on real solutions, like our sustainable jet fuel and carbon sequestration projects" (Kirby, 2021).

8. CARBON CREDITS IN AGRICULTURE

Carbon credits in agriculture are produced when farmers adopt practices that reduce emissions. They can be either carbon inserts if agriculture is part of a company's supply chain or carbon offsets if agriculture is not part of a company's supply chain. For example, Cargill, a global food corporation, is now only using carbon programs to offset its own emissions. However, Land O'Lakes, a butter maker, and Indigo Ag and Nori, agriculture-tech firms, are planning to sell their carbon credits as carbon offsets in a national carbon market to be launched by 2022, supported by General Mills, McDonald's, and other U.S. companies. However, if these other companies also count such credits as part of their own carbon inserts in their supply chains, that could lead to double counting, especially by the purchasing companies using these carbon credits as carbon offsets. Non-agriculture carbon offset buyers include Microsoft and North Face (Dorning, Nicholson, & Almeida, 2021).

With cows belching methane, pigs pooping, fertilizers emitting nitrous oxide, and tractors burning diesel, the agriculture sector now accounts for 15% of global GHG emissions. Methane is a GHG 21 times more powerful than carbon dioxide and nitrous oxide is 300 times more potent than carbon dioxide. However, the world's soil may be able to sequester as much carbon as the fossil fuel emissions from the global transport sector or almost as much as the carbon dioxide released by the global electricity sector. Cover crops, pasture grasses, and trees take in carbon from the atmosphere and deposit it in roots and soil (Dorning et al., 2021).

Special feeds, like a feed mixture using garlic-and-citrus developed by Mootral, a Swiss startup company, can cut methane emissions from livestock by 30%. Under Mootral's carbon offset program, called Cow Credits, a certified farmer that has produced milk using Mootral's supplement can sell its equal to one ton of carbon dioxide to customers who want to offset their pollution. Over 300 Cow Credits have already been sold to U.S. coffee chains and a dietary supplement producer. Also, methane from manure can be turned into biofuel and nitrous oxide can be reduced by "no till" and reduced-till field plowing. Cover crops planted between growing seasons draw more carbon from the air into the soil and over time reduce the need for fertilizer (de Sousa, 2021b).

Nestle, a Swiss multinational food and drink company, and Barry Callebaut, a Swiss cocoa processor and chocolate manufacturer, have partnered with U.S. dairy farmers to use a feed additive that cuts methane emissions from cattle. Fonterra Co-operative Group of New Zealand farmers, one of the largest dairy producers in the world, has partnered with Royal DSM, a Dutch global health, nutrition, and materials company, to accelerate the deployment of a cow feed additive in New Zealand. Several Burger King restaurants have started selling Whopper burgers sourced from cows belching less methane from a lemongrass feed (de Sousa, 2021b).

Another new cow methane reduction technique, which can be used in combination with these new cow feeding solutions, is cow masks. Zelp, a U.K. startup company, has developed cow masks and claims that they can reduce methane emissions by more than half. It may charge an annual subscription fee of \$80 a cow. The cow mask is placed above the cow's mouth and acts like a catalytic converter on a car. A set of fans powered by solar-charged batteries sucks up the burps and traps them in a chamber with a methane-absorbing filter. Once the filter is saturated, a chemical reaction turns the methane into CO₂ which is then released. Agricultural giant Cargill will start selling these methane-absorbing wearable devices for cows, putting its support behind this experimental technology that could help the industry cut GHG emissions. Cargill expects to start offering the devices to European dairy farmers in 2022. Cargill aims to cut emissions from its global supply chains by 30% by 2030 and this carbon insert will help it cut such scope 3 emissions. Farmers could also potentially recoup their cow mask costs by selling carbon offsets to other companies (de Sousa, 2021a).

Human activity accounts for about 60% of global methane emissions annually, with about 35%

of that attributable to the fossil fuel industry. Methane is the primary component of natural gas and, thus, the burden for reducing it would largely fall on the oil industry. In an oilfield, methane leaks out of processing equipment and is sometimes vented directly from wells with natural gas flaring. Landfills and coal mines are another major source of methane. Derek Walker, vice president for climate at the Environmental Defense Fund, summarized: "It will take a while to slow down the concentration of carbon in the atmosphere, but methane turns the dial down a lot faster and a lot sooner" (Dlouhy, 2021). Various scientists view reducing methane emissions from the fossil fuel industry as the cheapest and easiest way to hold down global temperatures in the near term. That could blunt the worst of climate change while buying time for reducing carbon emissions (Clark, Malik, & Rathi, 2021).

9. CLIMATE DISCLOSURE METRICS

Since there are no global or national oversight requirements for reporting climate disclosure metrics, numerous alternatives abound in practice. The Greenhouse Gas Protocol was launched by the World Resources Institute and the World Business Council for Sustainable Development in 1997. CDP was founded in 2002 as a non-for-profit international organization, based in the U.K. It supports companies and cities in disclosing their environmental impacts and aims to make environmental reporting and risk management a business norm. CDP started its annual Global Climate Change reports in 2016. The SASB was founded in 2011 and started its annual Technical Climate Bulletin analyzing industries for climate risk in 2018. The Taskforce on Climate-Related Financial Disclosures was created in 2015 by the Financial Stability Board, based in Basel, Switzerland. The Technical Expert Group (TEG) on sustainable finance was established by the European Commission (EC) in 2018. The EC adopted the TEG's final report which had new rules setting out minimum technical requirements for the methodology of EU Paris-aligned climate benchmarks and ESG climate disclosure requirements in 2020. A framework for zero net investing was announced by the Institutional Investors Group on Climate Change in 2021 (Mackenzie, 2021).

All these projects have the same problem, except the EU rules. They just advocate for voluntary climate disclosure metrics, leaving the possibility for greenwashing. Thus, boards of directors need to become more knowledgeable about climate disclosure metrics. They might refer to powerful senior executives, like Larry Fink, CEO of BlackRock, Mike Younis, Vice President of State Street, and Jim Fitterling, CEO of Dow. Such executives have recommended the use of the SASB climate disclosure metrics which aim to establish industry-specific disclosure standards across environmental, social, and governance topics (Bloomberg, 2021).

Acknowledging the general principle of Peter Drucker, the well-respected management guru: "what gets measured gets managed", the SASB goal is to facilitate communication between companies and investors about financially material, decision-useful information, Boards could follow the lead of

hundreds of companies across 72 industry sectors which are reporting with SASB standards. Over one-third are based outside the United States ("Sustainability Accounting Standards Board", n.d.). Many of these companies are very well-known, including BlackRock, Bloomberg, Clorox, Delta, Dow, Estee Lauder, General Mills, GM, Goldman Sachs, Ford, Hewlett Packard, Intel, Intuit, Kellogg's, Lowe's, Macy's, Marriott, Medtronic, Merck, Moody's, Morgan Stanley, Motorola, Netflix, Philip Morris, Target, Thomson Reuters, Visa, and Wells Fargo (SASB, 2021).

The SASB's 2021 Technical Climate Bulletin analyzed 72 industries for climate and systematic risk. For example, there are eleven required SASB disclosure topics with corresponding accounting metrics for the Extractives and Minerals Processing industry sector, briefly as follows (SASB, 2021):

1. Greenhouse gas emissions: In metric tons, gross global scope 1 emissions, percentage methane, hydrocarbons, other combustion, and other emissions.

2. Air quality: In metric tons, air emissions for the following pollutants: nitrogen oxide (NOx), sulfur dioxide (SOx), volatile organic compounds (VOCs), and particulate matter.

3. Water management: In thousand cubic meters: total fresh water withdrawn; total fresh water consumed; percentage of each in regions with high or extremely high baseline water stress.

4. Biodiversity impacts: Description of environmental management policies and practices for active sites; number and aggregate volume of hydrocarbon spills.

5. Security, human rights, and rights of indigenous peoples: Percentage of proved and probable reserves in or near areas of conflict and in or near indigenous land.

6. Community relations: Discussion of process to manage risks and opportunities associated with community rights and interests; number of days and duration of delays.

7. Workforce health & safety: Total recordable incident rate (hours); fatality rate, near miss frequency rate; average hours of health, safety, and emergency response training for full-time, contract, and short-service employees.

8. Business ethics & transparency: Percentage of proved and probable reserves in countries that have the 20 lowest rankings in Transparency International's Corruption Perception Index.

9. Reserves valuation & capital expenditures: Sensitivity of hydrocarbon reserve levels to future price projection scenarios that account for a carbon emissions tax in million barrels; estimated carbon dioxide emissions embedded in proved hydrocarbon reserves in metric tons; amount invested in renewable energy.

10. Management of the legal & regulatory environment: Discussion of corporate positions related to government regulation and/or policy proposals that address environmental and social factors affecting the industry.

11. Critical incident risk management: Process safety event rates for loss of primary containment of greater consequence (Tier 1); description of management systems used to identify and mitigate catastrophic and tail-end risks.

Only 25 fossil fuel companies (all non-majors) participated in the SASB industry sector report.

The lack of participation by major energy companies was foreseeable, due to the complexity and details required for the eleven industry disclosure topics and corresponding accounting metrics. There would have been less opportunity for greenwashing. Big oil companies have typically spent more on advertising climate goals than on emission reductions and continue to support industry organizations that support fossil fuel (Bloomberg, 2021).

In the CDP Global Climate Change report, there are 14 categories, and the first two categories have major subcategories: 1) governance with subcategories of board oversight, management responsibility, and employee incentives and 2) risk and opportunities with subcategories of time horizons, management processes, risk disclosures, opportunity disclosures, business impact assessment, and financial plan assessment. In the 2018 CDP report, 6,937 companies participated and were identified by region and industry, including 118 fossil fuel companies. In this CDP report, only half of the fossil fuel companies provided any financial figures for the second category of risk and opportunities, but these companies did report a positive, aggregate benefit/cost outcome of \$116 billion (CDP, 2019).

There are many different climate disclosure frameworks around the world. For climate risk analysis, a consensus and a required framework are needed for consistency and comparability. Steve Waygood, Chief Responsible Investment Officer at Aviva Investors, commented: "Voluntary compliance is insufficient. Regulations and requirements are needed for companies to comply or explain why not. TCFD established good voluntary climate disclosures and now regulators can take the next step and mandate both short-term and long-term, science-based targets and disclosures for net zero to avoid green wishing" (Waygood, 2021). The International Organization of Securities Commissions Organization (IOSCO) includes 90% of the public market security regulators in the world, including the U.S. SEC. It has a working group to further refine a prototype climate-related disclosure standard and the SEC has also established a working group for the same purpose. Standard metrics are needed as benchmarks for investors, companies, boards, and other stakeholders to assess climate and financial risk, climate performance, sustainability for current and future business operations, and possible related legal liabilities (Ramani, 2021).

By mid-year 2021, multi-billion-dollar investments in both climate funds and in climate tech companies had set records for such annual investments. The challenge is how to create value for both companies and investors (Bullard, 2021a). It will be interesting to see if either the IOSCO and/or the SEC include the social cost of carbon (SCC) in such disclosure standards. As one analyst said: "This SCC number is the most important number you've never heard of" (Wagner, 2021). The SCC is the sum of all climate damages caused by an additional ton of CO₂ emitted right now in today's dollars. The dollar value for every ton of CO₂ avoided is the SCC (Wagner, 2021). It would be a relevant metric to include in required climate-related disclosures, especially to help stakeholders assess the public value arising from firms' performances in reducing greenhouse gases versus the cost of such operations by the firms.

10. GLOBAL BANK GREENWASHING

Boards of directors have responsibilities for monitoring their companies' commitments to zero net missions versus greenwashing. Typical audit and investigative techniques are to follow the money, as opposed to company websites or tweets with climate pledges and images. For example, major global banks have established climate finance goals, such as:

- JPMorgan Chase's goal to finance \$2.5 trillion in climate change and sustainable investment activity by 2030.

- Citigroup committing \$1 trillion to the same goal.

- Wells Fargo's goal to lend or invest \$200 billion in environmentally sustainable businesses and projects by 2030.

- Bank of America's plan to zero out GHG emissions from its financing activities, operations, and supply chain by 2050.

- HSBC's plan to do the same (Bullard, 2021c).

However, major global banks are still financing fossil fuel companies per the 2021 Fossil Fuel Finance Report, now in its 12th year and published by Rainforest Action Network, the Sierra Club and four other nonprofit organizations. The world's 60 largest banks have provided \$3.8 trillion in financing to fossil fuel companies over the last five years since the Paris Climate Agreement was signed in 2016. Banks provided more financing to oil, gas, and coal companies in 2020 than they did in 2016. Even with the pandemic, the first half of 2020 saw the highest level of fossil fuel financing in any half-year since the Paris Agreement. Ben Cushing, financial advocacy campaign manager at the Sierra Club, commented: "Major banks around the world, led by U.S. banks, in particular, are fueling climate chaos by dumping trillions of dollars into the fossil fuels that are causing the crisis" (Paddison, 2021).

Banks have interpreted zero net emissions in several ways. At one extreme, they could continue to finance carbon-intensive fossil fuel activities while finding ways to absorb carbon dioxide elsewhere, like with carbon offsets, and using creative accounting to balance their emissions scores. At the other extreme, they could actively engage with companies to ensure they have credible climate plans, using divestment or the withdrawal of credit and services as a threat to make sure these companies improve. Alternatives in between are vast, especially with no global oversight (Mackenzie, 2021).

For example, JPMorgan Chase provided \$51 billion of fossil fuel financing in 2020, 20% less than 2019, but enough to keep its position as the world's biggest fossil fuel financier. Jamie Dimon, JPMorgan Chase CEO, observed: "We are dedicated to addressing climate and sustainability around the world, but the issue is complex. We need to acknowledge that the solution is not as simple as walking away from fossil fuels. We will need resources, such as oil and natural gas until commercial, affordable, and low-carbon alternatives can be developed to meet all of our global energy needs. This is where business and government leaders need to focus their time and attention" (Quinson, 2021b).

A dramatic example of greenwashing by these global banks matches their climate finance goals with their total fossil fuel company financing over the 2016-2020 period. The previous list of the five

banks' climate finance goals reflects in order the top four fossil fuel financing banks in the world, all U.S. banks, plus HSBC, a British bank, which was thirteenth in the report, as follows (Paddison, 2021):

- JPMorgan Chase: \$316.7 billion;
- Citigroup: \$237.5 billion;
- Wells Fargo: \$233.3 billion;
- Bank of America: \$198.5 billion;
- HSBC: \$110.8 billion.

Just these five greenwashing banks poured \$1.1 trillion into fossil fuel financing over the last five years which was 32% of the total \$3.8 trillion financing by the 60 largest global banks. European banks also contributed to such financing and greenwashing. The French bank, BNP Paribas, which has pledged to be a leader in climate strategy, provided \$40.8 billion in fossil fuel financing in 2020, an increase of 41% from the previous year. Since 2016, the bank's fossil fuel financing has risen 142% and totaled \$120.8 billion for the 2016–2020 period, putting it in tenth place in the report. Credit Suisse was 19th at \$82.2 billion and Deutsche Bank was 20th at \$74.6 billion. Also, there were other international banks in the top twenty list of the Fossil Fuel Finance report. There were three Canadian banks, three Japanese banks, and two Chinese banks. Also, completing the top twenty list were Barclays (7th place at \$114.9 billion) and Morgan Stanley (12th place at \$110.8 billion) (Paddison, 2021).

11. CONCLUSION

This research paper identified boards of directors' challenges and responsibilities to track and assess their companies' commitments to zero net emissions goals and performances. This literature-search research broadened previous research on companies' commitments to renewable energy (Grove & Clouse, 2021), to zero net emissions goal commitments, and related boards' monitoring responsibilities, especially to avoid greenwashing. Also, this research extended previous research on climate change risks and opportunities (Grove et al., 2021) to establish board challenges for zero net emissions goals and performances by their companies. Such challenges were elaborated in the following research sections: overview of climate risk, current climate lawsuits and board risks, EU climate deal, carbon inserts, carbon offsets, carbon credits for agriculture, climate disclosure metrics, global bank greenwashing, and conclusions.

This research paper found that a major challenge for boards was to determine whether their companies were really trying to reach zero net emissions or just doing greenwashing. If the IOSCO could establish climate disclosure metrics for public companies, an investigation by boards for this greenwashing challenge would be facilitated. Climate disclosure metrics are relevant and needed to help stakeholders, including boards, assess company climate performances, opportunities, and risks. Limitations of this research paper are the emerging and evolving nature of climate change goals and

assessments. Future research could help address such limitations with case studies or empirical studies, especially to check for greenwashing.

Concerning climate challenges for boards of directors, they could take urgency and guidance from these climate experts' comments at the Bloomberg Green Summit April 26–27, 2021, in assessing their companies' zero net goals, targets, and performance. Al Gore summarized the importance of a 2050 global zero net emission goal: "Air pollution kills 9 million people each year. The amount of carbon inserted into the atmosphere each day is equivalent to 600 Hiroshima bombs. Stop using the sky as an open sewer! Time is the most precious commodity as we have solutions right now" (Bloomberg, 2021). Jenna Jambeck, a National Geographic Explorer, said: "The equivalent of one dump truck of refuse enters our oceans every minute!" (Bloomberg, 2021). Many experts agreed that short-term, medium-term, and long-term goals with standard metric targets are needed to avoid just greenwashing 2050 zero net goals by companies and countries and just "kicking the can down the road to 2050". Anthony Malkin, CEO, Empire State Realty Trust, commented on reducing emissions: "There is no silver bullet, just silver buck shots" (Bloomberg, 2021).

Amanda Ripley, a journalist, published a new book, *High Conflict*, in April 2021. It identified three things about climate change that make it a very different kind of conflict than partisan strife, gang violence, or guerrilla warfare: 1) the scale is global, 2) it is entrenched in the enabling infrastructure of modernity, and 3) the clock is ticking. Ripley points to evidence that there may be ways out of such self-propagating destructiveness, and it starts simply as follows. Breathe, long and slow, the way trained soldiers do in combat. Recognize enablers of conflict. Shut them down. And get to work (Ripley, 2021). A rapid transition to clean energy can stabilize the climate, improve our health, provide good-paying jobs, grow the economy, and ensure our children's future (Mann & Hassol, 2021).

Larry Fink warned: "Sustainability as a risk factor is becoming very relevant and long-term planning is needed. Stop the climate disease curve with carbon reduction. There is great potential with technology" (Bloomberg, 2021). The most promising green technologies are electric vehicles, battery energy storage, building retrofitting, carbon capture and storage, biofuels, agriculture decarbonization, and water conservation technologies. Mark Carney, Vice Chair of Brookfield Asset Management and former Governor of the Bank of England, commented: "Companies should not buy carbon offsets until they are already reducing their own carbon emissions. Are companies decarbonizing or just greenwashing?" (Bloomberg, 2021). An example might be Tesla selling its electric vehicle regulatory emission credits to GM, Ford, and Fiat Chrysler, automobile companies that have only recently started developing their own electric cars (Bloomberg, 2021).

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