An Economic Remodel: The Genesis of Modern Corporate Sustainability

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An Economic Remodel: The Genesis of Modern Corporate Sustainability

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Senior Honors Thesis

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Introduction

My thesis aims to understand and analyze what is catalyzing the advancement of sustainability in corporate agendas. After my internship at Deloitte and four years of UCLA and Dartmouth undergrad, I recognized some important themes emerging in the sustainability landscape. Sustainability is at the forefront of policy and stakeholder engagement right now. Shareholders, consumers, regulators, policy makers, are all putting pressure on CSuite executives to redefine materiality and increase transparency in order to properly understand sustainability-related risks and opportunities within companies. Climate and nature-related disclosures are becoming just as important as financial disclosures because companies are being evaluated holistically, and a company’s response to sustainability can affect their bottom line. Lastly, consumers are enabled to choose from products and services that best align with individual sets of values.

With these insights, I base most of my thesis research in 2023-2024 white paper journalism on what major investment companies and consulting firms are publishing with respect to the evolving regulatory landscape and investor expectations. From what I have garnered, corporate sustainability is logarithmically growing, and this is the dawn of actionable responses to environmental strain. Although it is out of necessity, as we are surpassing critical inflection points of warming, people are understanding that environmental issues will impact the viability of company operations and corporate bottom lines in some way or another. Environmental stressors will touch every single person and company in some way. While it may be a range of deleterious consequences on a per capita basis, it will only become more extreme the less we do anything about it.
With that, I believe the current trajectory of investor attitudes and disclosure frameworks enhancing corporate transparency surrounding sustainability are moving towards a promising future where capitalism and posterity can coexist. When facing any financial crisis, we try to correct market inefficiencies and close loopholes. While climate change is exposing the most severe externalities embedded in our economic system, now onward marks our economic remodel toward “welfare economics.” The next few decades will be telling, and the corporate sphere is undergoing a proverbial trial by fire, but I believe in human’s resilience and adaptation even if it was human-caused in the first place.
Efficiency and Optimality

There are two themes that drive the economy we know today: efficiency and optimality. We see these factors playing out in normative economic analyses, influencing how resources are allocated and welfare is maximized. They are interrelated in nature, but distinct, from each other (Perman et al. 2013). These will be the two themes that underlie what I focus on in this thesis: how the political economy influences the acceleration of corporate sustainability agendas. Although markets will never be one-hundred percent efficient and optimal, environmental degradation is posing serious threats now and to the future of well-functioning markets. Environmental strain on companies’ bottom line is becoming more and more apparent, leading to stakeholders, shareholders, and business entities themselves incurring major risk for future success and continuation. Ceres interviewed 20 plus investors, quoting one in a recent article articulating that they feel like they have to “make a bet without knowing anything” (Anonymous Investor in Ross 2024). With that, I will be focusing on how shareholders are putting downward pressure on companies to disclose and advance their sustainability efforts while the global regulatory landscape is trying to match or, in some cases, advance this pace. Once companies face this pressure to calculate, disclose, and report their material sustainability-related risks and opportunities, they are funneled toward a number of climate mitigation, reduction or offsetting strategies to attain net-zero emissions.

Increasing environmental efficiency is a conduit to a more sustainable economy constrained by planetary boundaries. Efficiency can be thought of in terms of missed opportunities (Perman et al. 2013), and is important to recognize in the corporate context when analyzing investment opportunities and risks. For instance, if a company selling carbon offsets fails to consider albedo when selecting a forested area for preservation, the intended impact of
the offset investment may be undermined. Research indicates that albedo plays a significant role in carbon sequestration efforts (Rautiainen et al. 2018). In regions of high altitude or elevation, like boreal forests, the clearcutting of these regions are replaced by snow and ice, which has a high reflectivity rate of solar radiation. So, the increased albedo of the exposed surface partially counteracts the released carbon by the felled trees. Conversely, in lower elevation areas with dark soil, the warming effects of clearcutting are intensified beyond the CO2 emissions from trees due to the ground absorbing more CO2 than before (Rautiainen et al. 2018). This is related to inefficient carbon offsets because if some factors get overlooked within the forest system, it potentially leads to missed opportunities to conserve areas with the highest carbon sequestration potential. This type of holistic approach extends itself to promoting the highest amount of efficiency in a given system, which is important in corporate decision making.

The second theme, optimality, shares a connection with efficiency but stands as a distinct concept on its own. While efficiency is a prerequisite for optimality, the latter extends beyond mere efficiency. To determine what is optimal, we need to look at a group of people within a society, and grasp how that society defines an overall objective on how to maximize resource-use to understand optimality (Perman et al. 2013). In our present economic system, prioritizing resource allocation solely for maximizing profit may not always align with social optimality. This is where environmental economics comes into play; it tends to slip through econometric models and lies in market inefficiencies we grapple with to this day.

In this thesis, I am going to provide an overview of how economic theory has evolved from Adam Smith to present day welfare economics, outline market inefficiencies that expose material climate risks and opportunities, highlight shareholders’ perspective on corporate sustainability agendas, analyze the ESG regulatory environment, highlight corporate emission
mitigation and reduction strategies, take a deep dive into the carbon market and nature-related co-benefits, and conclude by interpolating how these factors have and will continue to accelerate corporate sustainability progress.

From Adam Smith to the Present Day

Natural resources and environmental issues have, in some capacity, always been taken into account even though ecological economics is distinctly recognized as a sub-discipline of economics today. Starting in the 18th and 19th century, it is apparent that resource-use was top of mind for classical economists, especially as population was growing, agricultural production was increasing, and the Industrial Revolution was exploding. Adam Smith’s infamous ‘Invisible Hand’ theory was a widespread idea that took hold of economics as we know it today. Smith explained that every individual acts in their own best interest, and in doing so, creates the most value individually, which inherently creates a society that is also producing the most amount of value possible. This is the market mechanism that guides maximizing public interest and societal well-being by people acting in terms of maximizing their own self interest. Economists and philosophers, like Smith, were concerned with how resources were being used, because in their eyes, resources (primarily land) were wealth indicators. Since resources were limited and the population was growing, this gave rise to the concept of diminishing returns. Questions were floating around on how economic growth can be sustained in the future. Malthus in his Essay on Principle of Population theorized that long-run economic growth was constrained by limited resources and rapid population growth. To theorists, economic-growth was understood to be transient, and would only last until society hit the maximum carrying capacity and would stay at this stationary state thereafter. Ricardo and Mill developed these ideologies and extended them to
take into account quality of land, renting and managing land in parcels, technological advancements, pushing frontiers, and even valuing amenities provided by natural resources (i.e. natural beauty of a countryside) (Perman et al. 2013). Classical economists were concerned with how resource management and use would impact economic growth and societal well-being in the short-term and long-term.

The 1870’s then gave rise to neoclassical economics, redefining value to be considered in terms of exchange, inherently reflecting preference and cost of production in the transaction. People, like Marx, Menger, Walras, Keynes, were influential figures during this period creating models that are prevalent today; new theories of marginal analysis gave diminishing returns a formal model, utility and demand theories were constructed, emphasis was being placed on allocative efficiency rather than aggregate economic activity, remedies to unemployment and recessions were being constructed, and General Equilibrium Theory was developed, providing a foundation for efficiency and optimality to be employed. However, concern for natural resources was not underscored in neoclassical economic models (Perman et al. 2013). This shift paved the way for what we know today, welfare economics.

Welfare economics takes these models and puts them under environmental and social constraints. It works to determine what is most efficient and optimal in exploiting natural resources. This is the final development in mainstream economics that provides a framework for making judgements based on how to allocate resources in different alternative configurations of economic activity. Pareto optimality, ethical structure, utilitarianism created by theorists like Mill and Pareto are all ideas that are still evolving today (Perman et al. 2013).

The development of economic theory is important to take into consideration as we grapple with deleterious environmental consequences of inefficient resource use. It sets the stage
for where we find ourselves today, as we call on policy and regulation to correct market shortcomings. These inefficiencies embedded in economic models have persistent externalities that have the potential to lead us to more frequent and severe market failures if climate does not get internalized, which I will go into more in the next section. This imposes varying climate-related financial risks and opportunities to entities, stakeholders, and shareholders.

**Market Inefficiency**

These material climate risks are co-existent within macroeconomic trends. After every financial crisis, we ask ourselves, “how can we prevent this from happening in the future?”. Many times, reform is the answer. After the Wall Street Crash of 1929, rigorous mandatory audits, disclosure requirements, and a securities regulator was enacted by Congress to restore confidence in the U.S. market. In the early 2000s when Enron, Worldcom, and various other companies collapsed, audit, accounting, and governance practices were reformed once again geared towards making corporate disclosure reliable. In short, the Wall Street collapse of assets led to stringent regulatory creation. The 2002 crisis underscored the need for reliable data and resulted in assurance reforms to build back trust. Now, climate change is, again, reshaping the standards that we accept today (Ross 2024). Since environmental impacts are not yet fully factored into economic models, policy and regulations are attempting to make up for this shortcoming. Many believe the first steps towards this policy and regulatory correction is mandating corporate climate disclosures (Fink 2021). However, these disclosures are not yet fully audited, assured, or universally standardized. Consequently, this information gap can snowball into market failure. It is said that to have economic efficiency, a set of perfect, institutional circumstances are required. They are:
1. Markets exist for all goods and services produced and consumed.
2. All markets are perfectly competitive.
3. All transactors have perfect information.
4. Private property rights are fully assigned in all resources and commodities.
5. No externalities exist.
6. All goods and services are private goods. That is, there are no public goods.
7. All utility and production functions are ‘well behaved’.

(Perman et al. 2013)

It is extremely rare that any of these circumstances are perfectly attained, especially on the sustainability front. Markets do not exist for all goods and services, they are not all perfectly competitive, transactors do not have perfect information, property rights are not well-defined, externalities persist, goods can be public, club, or common goods, and utility and production functions are variable. For the purpose of this thesis, I focus most on how political economic models are working to bridge information gaps so that climate data is available and assured for shareholders and stakeholders.

My aim is to transition from the broader theoretical concepts of economic efficiency concerning resource allocation and optimal market conditions. Instead, I will delve into how advancing sustainability agendas can reveal profound opportunity, and the specific mechanisms through which sustainability disclosures serve as measures in managing material climate risk.

**Climate Risks and Opportunities: Investor Attitudes**

Burgeoning climate risks and the energy transition are prompting the necessity of corporate sustainability related information to be disclosed for shareholders and stakeholders. In
the face of climate disruption and opportunity, a company’s bottom line may fluctuate on the basis of how the C-Suite executives are reallocating capital in response to environmental pressures. According to McKinsey & Company, more than 90% of the companies interviewed could point to a specific “trigger” that induced their sustainability action and agenda. A lot of the time, they faced pressure from consumers or jumps in commodity prices. More than half cited long-term risks to their business: 26 percent mentioned mitigating reputational risk, and 15 percent each said avoiding regulatory problems and eliminating operational risks (Bonini and Swartz 2014). It seems as though the stick to get firms engaged in sustainability are financial risks to their bottom line, and the carrot is financial opportunities pursuing sustainability brings once aware of climate risks. The value at stake from sustainability issues can be as high as 25 to 70 percent of earnings before interest, taxes, depreciation, and amortization (Bonini and Swartz 2014). Business models can and do change on the basis of how their company is being impacted from climate strains. For example, Lockheed Martin wanted to reduce wood waste from packing crates. As it started on this “one modest initiative”, it found other efficiency improvements that reduced overhead and resulted in more than $7.5 million in savings from a $240,000 investment. Dupont, a diversified science company, is another case that capitalized off of sustainability action. The company invested $879 million in R&D for products with quantifiable environmental benefits. In just three years, DuPont has recorded $2 billion in annual revenue from products that reduce GHG emissions and an additional $11.8 billion in revenues from non-depletable resources (Bonini and Swartz 2014). Cases like these demonstrate how climate action or inaction can drastically affect a company’s financial well-being.

With that, investors want to understand companies’ short-, medium- and long- term sustainability plans as climate action proves to impact overall business strategy and financial
performance. To bridge this information gap, investment and asset wealth management firms are putting downward pressure on investee companies to report reliable climate data.

One way for investors to communicate the need for climate related data is through direct engagement. Climate 100+ is the world’s largest investor-led initiative that engages corporate emitters through direct communication with an investee company’s board and executive leadership. This is done in two phases, the first being the initial engagement. Shareholders voice their concerns about ESG with those who can address them. Normally, this is conducted through proxy voting which facilitates conversation and influences the company’s management decisions. Phase two takes this climate awareness a step forward by asking companies to take action on their commitments to reduce greenhouse gas emissions across the value chain and implement plans to deliver on robust targets (Harrison February 2024). While the first phase is widely accepted, the second phase has proved controversial.

Investment and asset management firms are walking a fine line of outward ESG support due to political backlash from major clients. The second phase of Climate 100+ “appears to be what recently compelled State Street, JPMorgan, BlackRock and PIMCO to leave the initiative” (Harrison February 2024). The departure of these and several other high-profile firms represent a total of $14 trillion in assets. This skittish behavior is suspected to have come from the “Republican-led anti-ESG onslaught that swelled in 2023, including antitrust tantrums targeted at nonprofits championing sustainable investment across the financial industry” (Harrison February 2024). These antitrust tantrums GreenBiz references come from Republican attacks accusing the movement toward sustainability investment as an illegal conspiracy to advance left-wing political agendas. Rep. Jim Jordan (R-Ohio), the head of the GOP-controlled House Judiciary Committee, viciously claimed “Corporations are collectively adopting and imposing left-wing
environmental, social, and governance [ESG]-related goals” (Elbein 2023). Though, in an antitrust law, collusion happens when market competitors agree to fix prices by secretly and illegally working together to divide the markets or restrict supply. Later, The Hill found that this campaign against ESG investment was likely funded by the fossil fuel industry (Elbein 2023). The United States is experiencing some, for lack of a better term, growing pains surrounding the approach behind sustainability.

It seems that U.S. asset management firms are more comfortable with demanding climate disclosures from companies than demanding specific climate action (Harrison February 2024). Larry Fink in his 2021 Annual Letter to CEOs wrote, “We [BlackRock] strongly support moving to a single global standard, which will enable investors to make more informed decisions about how to achieve durable long-term returns” (Fink 2021). While support for disclosure regulations and ESG remains, Fink’s outward push for ESG action has tapered off from 2020 onwards as Republican leaders threaten to pull money out of BlackRock’s management. Florida Chief Financial Officer Jimmy Patronis, a main opponent to ESG investment, threatened to pull $2 billion worth of assets from BlackRock in 2022. Similarly, Louisiana followed suit and threatened $794 million for the same reason (Au-Yeung 2022). Though, hope remains as asset managers still proclaim (less controversially) that “Capitalism has the power to shape society and act as a powerful catalyst for change” (Fink 2022). This change Fink is talking about is in the global context of achieving net zero, but steps towards capitalistic net zero pathways seem to start with companies disclosing material sustainability information.
Disclosures Enhance Corporate Transparency

Disclosures, historically, have been used to establish trust in the market by increasing corporate transparency. Government agencies create regulatory commissions that mandate disclosures from firms by creating universal frameworks of basic financial reporting in efforts to prevent financial crises, reduce uncertainty in the market, and create a common baseline of firm-specific information that is available (“Disclosure,” n.d.). As climate risks and new environmental standards are increasingly straining more corporate functions like supply chains and downstream activities, regulators and industry standard setters are rapidly working to uphold the trust in the market that it has worked hard to build (Ross 2024). This regulatory response is laying the groundwork for the emerging sustainability disclosures we are seeing today.

What is deemed material for companies to report is expanding beyond pure financial information. Investors need to understand material climate information from corporate disclosures to make informed decisions on how to allocate capital. Externalities imposed by environmental factors are having increasingly more severe effects on a company’s financial performance, though the cost is not directly internalized by the transaction itself. Additionally, corporate responsibility is an attribute that stakeholders are demanding to see in the companies they buy or invest in. In a recent Ceres study, “the message from the more than 20 investors we spoke with was unanimous: the current state of climate-related information is insufficient. Investment decisions often rely on data that is based on inconsistent methodologies and that lacks a systematic check on management biases” (Ross 2024). Macroeconomic trends are pushing towards internalizing these externalities, calling on policy and regulation to make up for market failures (Harrison January 2024). In just the few months of writing this thesis, the SEC announced the long-awaited climate-related disclosure rule that was officially finalized a few
days ago (Ceres 2024). Though it was months after the EU ruling and is less strict than the European standards, reform is under our noses, especially as globalization continues to reshape the interconnected landscape of markets and regulations.

The “Big Three” ESG Disclosure Standards

*United States and the SEC*

The regulatory agency that enforces disclosure requirements in the United States is the Securities and Exchange Commissions (SEC). According to the SEC’s website, it has a “three part mission—maintain market integrity, facilitate capital formation and protect investors—[which] takes on particular importance in times of economic uncertainty. Disclosure—providing the public with the information necessary to make informed investment decisions—is fundamental to furthering each aspect of our mission.” Up to now in the year 2024, the mission outlined above is under a strictly financial umbrella. As climate effects expose deep flaws embedded in the structure of our economy, the SEC is moving toward the incorporation of sustainability related information to make a company’s risks, positions, and strategies available to stakeholders. The SEC’s rule that was just finalized called *The Enhancement and Standardization of Climate-Related Disclosures for Investors* mandates companies to:

- Report Scope 1 and 2 GHG emissions, subject to assurance requirements being phased-in.
- Governance and oversight of material climate-related risks.
- The material climate risks impact the company’s business model, strategy, and outlook.
- The risk management processes for material climate related risks.
- Material climate targets and goals. (Deloitte 2024)
This regulatory mechanism is working to correct the information gap between investors and investee companies on material climate risks and opportunities so that investment decisions can be accurately assessed. While this is a “landmark” disclosure rule for the U.S. (Deloitte 2024), European standards were passed months ahead and are much more stringent.

The European Union and Broader International Standards

The other two standards that have significantly transformed ESG disclosures were passed by the European Union (EU) as part of the Corporate Sustainability Reporting Directive (CSRD) and internationally by the International Sustainability Standards Board (ISSB). Between the SEC, European Financial Reporting Advisory Group (EFRAG), and ISSB, companies will most likely find themselves having to comply with one or more of these disclosure regimes. This global network of reporting requirements increases transparency on ESG matters that investors and stakeholders have been advocating for (Ohl, Horn, and Wieman 2022). While they are separate disclosure frameworks, they all promote corporate sustainability transparency and have extensive overlap.

The EU regulations make climate disclosures mandatory under the CSRD and affect both European and non-European entities. Large EU companies, as well as listed Small to Medium Enterprises (SMEs), and some non-EU companies generating over EUR 150 mil on the EU market will have to comply with these standards. These entities will have to apply these new rules for the first time in the 2024 financial year, for reports to be published in 2025 (European Commission 2024). The CSRD itself is considered to be “a more comprehensive ESG disclosure regime as compared to that of the SEC and the ISSB” (Ohl, Horn, and Wieman 2022), and the scope of the sustainability information required to to be reported by the CSRD are as follows:
- Report Scope 1, 2, and 3 GHG emissions and reduction strategy and targets.
- General information related to business strategy and resilience of the business model and strategy related to sustainability matters.
- Sector-specific information related to the scale of the risks and effects related to sustainability matters of the relevant sector.
- Targets and transition plans, including alignment with the Paris Climate agreement and achieving climate neutrality by 2050 in line with the EU’s goals in the European Climate Law.
- Actual and potential adverse environmental impacts due to operations and value chain.

(Chin et al. 2022)

That being said, SMEs will be subject to a more limited set of reporting requirements, but will still have to thoroughly report their material ESG matters. Additionally, non-EU entities that are subject to CSRD from 2028 on will have to publish material ESG information in accordance to the disclosure standards, and have to report non-EU undertakings to ensure a level playing field for companies operating in the EU market (Chin et al. 2022). Out of all three ESG disclosures, the EU is taking the most aggressive approach toward mandating complete and accurate material climate data.

As for the ISSB, this is an all-encompassing approach to promote and standardize material ESG information. The ISSB was formed in 2021 at COP26 because the United Nations saw the need to address climate change through a formal climate disclosure standard. The objective was to deliver a global baseline to satisfy capital market needs. Since the ISSB is more investor-focused, the commission collaborates with the Global Reporting Initiative (GRI) which is focused on broader stakeholders to create a two-pillar system in the pursuit of a global baseline
for corporate reporting (Ohl, Horn, and Wieman 2022). Any organization or company, private or public, of any size and anywhere can participate in ISSB/GRI standards. It has three reporting standards- Universal, Sector, and Topic Standards- and all companies who voluntarily decide to report with regard to GRI standards report Universal Standards (which include sustainability considerations surrounding the company’s economic, societal, and environmental impact) with Topic and Sector standards as additional, voluntary reporting criteria (Molfetas 2023). The ISSB and GRI are global efforts to create concise, baseline standards that make it easy for a company to report and readable to shareholders.

A noteworthy mention is that the inclusion of nature-related disclosures is rapidly permeating these frameworks as well, going beyond material climate-related financial disclosures. The TNFD, Taskforce on Nature-related Financial Disclosures, is leading this charge and has developed a set of disclosure recommendations and guidance that encourage and enable business and finance to assess, report and act on their nature-related dependencies, impacts, risks and opportunities. Their aim is for global financial flows to start shifting from nature-negative outcomes towards nature-positive ones. The ISSB just announced its commencement to integrate TNFD recommendations into its framework and will continue their partnership in the future, researching and developing its standard setting work. Additionally, the ESRS (advisory board under EFRAG responsible for the CSRD) and GRI also incorporate recommendations made by the TNFD, as the TNFD has designed their nature-related frameworks to provide a high level of consistency in approach, structure, and language complementary to existing climate standards (TNFD 2024). Nature is emerging and gets labeled what climate was a decade ago.

Climate and nature is top of mind for standard setters. The “big three” advisory boards all share the consensus that improving sustainability disclosures ensures the stability and credibility
of capital markets. The accountability and transparency entities are now having to take responsibility for what could be a catalyst for influencing behavior and shifting towards more sustainable practices (Ohl, Horn, and Wieman 2022). The EFRAG, ISSB, and SEC are working to create and standardize climate disclosures so that material ESG information is available to stakeholders and shareholders. In turn, this drives value and creates competitive advantages for those who advance their corporate sustainability agendas. Mandatory corporate compliance with regulatory agencies is accelerating sustainability agendas.

**Sustainability Pressure from Investors, Emerging Reporting Frameworks, What Next?**

Now that global climate- and nature- related regulatory standards are shifting from being voluntary measures to mandatory initiatives and offering competitive advantages, the transparency this requires is sparking action in corporations to meet their sustainability targets. However, the disarray of robust corporate climate and nature-related data combined with malfeasance of carbon markets and barriers to immediate, widespread execution of sustainability solutions marks a critical inflection point for a sustainable economy.

To do a better job of explaining this, I am going to use a track metaphor. The set of sustainability standards that passed is like a renowned, Olympic track facility that has just opened. The foundation is laid, the rubber mix (hopefully originated from recycled fibers) has just been painted, the AC is full blast, it is ready to hold one of the largest games ever witnessed. People flock from all around the world to watch what’s going to happen. The spectators (investors), file into the stands. They are made up of people who have participated in past games, are dedicated fans, or are intense sports betterers. As they look at the new track, the spectators' expressions are a combination of confusion, anxiety, but also enamoration, because this track is
unlike any other facility they have ever seen. Some have been wanting this track to be built for a long time now, others have been reluctant because they idolize the way past Olympic games were run. Regardless, everyone is settling into their seats to watch. So far, where we find ourselves in this metaphor is also where we find ourselves in this research topic. The stage has been set. We have an understanding of investor attitudes and sustainability reporting frameworks.

Now, it’s time for the athletes to start warming up and putting on their gear. They have three options. They can:

1. Bring their own set of gear.

   By bringing their own set of gear, they know what they are getting. Their “spikes” (as my track friend informed me, not “cleats”) are already broken in, they know how to apply the KT tape, etc. The downside is that it is solely their responsibility to remember the gear, and the burden falls on them if they don’t bring enough tape or forget their spikes.

2. Buy an entirely new set of gear from sponsors.

   If they choose option 2, they can show up to the Games, ready to go. Their travel process was seamless, there was no stress getting to the track, and they could just pick up new gear as soon as they got to the facility. However, the only thing is that they don’t know how the spikes or KT tape will fit and how that will impact their performance in the future.

3. Bring their own cleats and buy KT tape from sponsors.

   Choosing option 3, you know exactly how your spikes are going to fit, and the burden of traveling with *everything* is lifted. You still don’t know how the KT tape will fit, but the stakes are lower because it is arguably a less performance-impacting component.

   These options are options that companies have to grapple with when decarbonizing and becoming nature-positive entities. They could either:
1. Achieve net-zero by decarbonizing their entire Scope 1, 2, and 3 emissions. They are familiar with their value chain, resources, and capital, and front their time and investment in reducing their own emissions, so they show up to the market having achieved net-zero by themselves. However, they have the sole responsibility to decarbonize, which is highly unlikely to be feasible, especially for large companies with global operations.

2. Invest solely in carbon offsets. They are not changing any aspects of their value chain management, resources, and capital allocation, and instead rely on credits and offset projects in the market to achieve net zero. These companies are typically the laggards of environmental initiatives in the corporate sphere, but generate enough revenue to allocate the capital necessary to invest entirely in offsets.

3. Decarbonize their Scope 1 emissions, reduce energy-usage and buy RECS for Scope 2 emissions, and offset their Scope 3 emissions through carbon credits. This is a mix of restructuring and directly reducing their emissions, and investing in offsetting their hard-to-abate operations in the meantime to achieve net-zero.

** I am focusing on climate primarily, as nature-positive agendas are relatively nascent.

Most companies right now are finding themselves choosing option 3. They know how the spikes fit, and they can just grab the rest of what they need when they get there. This is a great solution, in theory, because you can reduce emissions where it’s easy and then purchase credits to offset the rest. However, there are some major growing pains associated with this concept. I’ll first define and highlight the feasibility of and some challenges in mitigating Scope 1, 2, and 3 emissions in order to give some background as to why companies are investing in carbon credits and offsets, what the carbon market looks like now, and what the market might look like in the future.
Scope 1 and Scope 2 Emission Reduction Strategies

In this section, I will define Scope 1 and 2 emissions and provide strategies on how companies work to reduce these GHG emissions. According to the EPA, Scope 1 emissions are “direct GHG emissions that occur from sources that are controlled or owned by an organization (e.g., emissions associated with fuel combustion in boilers, furnaces, vehicles). Meanwhile, Scope 2 emissions are “indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling”. They are calculated in an organization’s GHG inventory because even though they physically occur offsite at a power generation facility, it is still part of the organization’s energy use (US EPA 2020). Scope 1 and 2 are the most straightforward emissions to reduce and mitigate, in most cases, by companies.

Scope 1 emissions are seemingly the most straightforward since they cover the direct emissions from industry and transportation that the company owns and operates itself. It includes the emissions of stationary combustion from organization-owned facilities and mobile combustion from transportation vehicles that the organization operates and controls. Meanwhile, Scope 2 emissions are indirect and normally come from purchased energy. Energy generation represents nearly 40% of global GHG emissions, and industry is responsible for about half of those emissions according to the World Resource Institute. There are two standards to report Scope 2 emissions: a location-based method and a market-based method. Location-based Scope 2 reporting is the average emission intensity of the grid specific to where the consumption takes place. Market-based methods derive emission factors from contracts of the sale or purchase of energy. It is specific to supplier rates, direct contracts, and renewable energy credits (P.J. Farrenkopf, n.d.). In a nutshell, scope 1 and 2 are the direct emissions from company operations and the energy it uses to do so.
Through emission reduction techniques, improved energy efficiency, and investment in renewable energy, Scope 1 and 2 emissions can be effectively mitigated. The most common, low-hanging fruit is to reduce energy consumption and conserve energy onsite and in an organization’s fleet. Energy efficiency and transportation optimization are also fairly easy strategies to implement through supply chain network optimization technology and specialized management systems. Additionally, power purchase agreements (PPAs) are becoming more pervasive as companies look to produce renewable energy. They are contractual agreements allowing third-party developers to install and operate an energy system on an organization’s property. The organization can then buy the low-cost renewable energy while benefiting from tax credits and the income from the sale of energy. Lastly, companies can procure clean energy through Direct PPAs, a renewable source delivers the renewable energy to the site, and Renewable Energy Credits (RECs) which involves little more than a company signing a check and being able to reduce emissions the company is reporting. Given these common and fairly straightforward emission reduction and management techniques, companies still find themselves needing to offset their remaining emissions as they transition towards net-zero.

Similar to the process of investing in RECs, companies purchase carbon credits and offsets to be able to claim net-zero while decarbonizing. Carbon credits and offsets, theoretically, create a net climate benefit by funding carbon projects that sequester one tonne of CO2 for every ton a company produces (P.J. Farrenkopf, n.d.). However, we find that offsetting emissions is still a nascent market that I will go into more depth in the next section. The overall sentiment behind Scope 1 and Scope 2 emissions is that with accurate data and capital to deploy reduction techniques, they are the essential, but also low-hanging fruit emission mitigation measures. That
said, Scope 3 activities contribute the majority of corporate GHG emissions but also have the most complicated and unclear pathway of decarbonization.

**Scope 3: Indirect Emissions through the Value Chain**

I will now define Scope 3 emissions, highlight the difficulty of tracking and obtaining accurate Scope 3 data, and then delve into why it’s valuable to bolster supply chain management and work to mitigate Scope 3 emissions. According to the EPA, Scope 3 GHG emissions are “the result of activities from assets not owned or controlled by the reporting organization, but that the organization indirectly affects in its value chain”. The value chain consists of upstream and downstream activities of a company’s operations. Scope 3 emissions are the catch-all for emissions not accounted for in Scope 1 and 2 emissions and are also the Scope 1 and 2 emissions of another organization. Under GHG Protocol standards, Scope 3 emissions must be reported to all relevant scope 3 categories (US EPA 2016). Additionally, since scope 3 represents a majority of the organization’s emissions (making up 65-95% of most companies’ carbon impact) (PricewaterhouseCoopers, n.d.), they offer significant emission reduction opportunities. Companies who fall on the greater Scope 3 side tend to be heavily dependent on carbon-intensive inputs. Their own emissions might seem low, but that is because they outsourced from other firms along their value chain. Scope 3 is tricky as it involves numerous actors that make up the entire Scope 3 emission quantification.

Though the organization does not directly control Scope 3 emissions, they have the ability to influence the activities that produce these emissions by influencing their suppliers to or choosing vendors based on their practices. The EPA identified an “advanced” corporate Scope 3 engagement as one that calculates and publicly discloses relevant categories of scope 3
emissions, assesses the climate impacts (both actual and potential impact) of their suppliers, engages them to report and reduce their GHG emissions, and considers supplier GHG management in business decisions. Additionally, to be advanced the organization must receive third-party verification for all its scope 3 emissions to at least a level of limited assurance and publicly discloses the results (US EPA 2016). Scope 3 is the most complicated, hard-to-abate emissions that pose significant climate impact and set the stage to define who are the corporate leaders in the environmental space.

Indirect CO2e abatement strategies and the “advanced” Scope 3 engagement label is much easier said than done. Supply chain managers face a daunting task because of how significant scope 3 emissions count for of total emissions produced and the non-direct control they have over the value chain. These two factors can make estimating and tracking scope 3 emissions “devilishly complicated” (PricewaterhouseCoopers, n.d.). For example, a financial institution PricewaterhouseCoopers (PWC) consulted for had multiple loans to various operations and activities of the same oil and gas companies up and down the value chain, in different parts of the world (PricewaterhouseCoopers, n.d.). This can make data collection difficult as the emission sources are so vast and diversified. However, PWC encourages an “incremental approach” to ease the burden of sifting through so much data. Furthermore, in many cases, PWC also found that as much as 80% of an organization’s supply chain emissions come from one-fifth or less of its purchases. Six of the most common scope 3 challenges PWC has helped organizations address are:

1. Collecting and reporting data.
   a. It can be time-consuming and resource intensive.
2. Organizations that are reliant on third-party sources for Scope 3 emission calculations.
   a. Since they are not involved, they struggle to understand their own footprint data.

3. Scope 3 modeling provided by suppliers may not be detailed.
   a. This leads to the inability to support better management decisions or identify distinct opportunities for emission reduction.

4. There can be an overreliance on modeling (e.g., spend based modeling, like relying on industry-average emissions footprint of a given company).
   a. Executive rewards are tied to the model’s output.
   b. Managers are tempted to focus on correcting the model and identifying its assumptions rather than improving Scope 3 emissions.

5. A company lacks statistical expertise.
   a. A small sample of supplier data can be used to estimate scope 3 emissions, but without the statistical expertise, the result is unreliable data.

6. A company lacks the governance and organizational structure to oversee Scope 3 data in multiple parts of the business.
   a. Even if a company has the right expertise, they often lack processes to oversee estimations, quantification and extrapolation of Scope 3 data.
   b. Since the activities involve subjective choices and judgments in a widely unregulated process, the most easily measurable data gets reported rather than the “big ticket items” that are the most material.

(PricewaterhouseCoopers, n.d.)
While these are very real challenges companies face, the solutions do not have to be tackled simultaneously. The key is to measure and track business processes to establish baseline emissions, focus efforts towards the greatest impacts, and prioritize supplier expectations and create supplier performance incentives. Active communication up and down the value chain can foster relationships with suppliers and improve collaboration, which in turn can offer new revenue-generating opportunities, lead to cost savings, or both. Not only does this positively affect a company’s bottom line, but it also is meeting investor priorities. A survey of 325 investors representing $14 trillion in assets under management found that more than one-third of them found Scope 3 emission reduction a priority (PricewaterhouseCoopers, n.d.). While Scope 3 emissions are more difficult to abate than Scope 1 and 2, there is apparent value in making targets and tracking progress towards net zero, inclusive of Scope 3.

In the meantime, companies are starting to turn toward carbon credits and the carbon markets to offset or buy allowances for any remaining Scope 1, 2, or 3 emissions that were unable to be mitigated. In the next section, I will take a deeper look into carbon markets, analyze why companies participate in these markets and invest in offsets, where the carbon credit system falls short, and what the future of carbon markets will look like.

**Carbon Markets**

Carbon markets are notoriously unreliable and unpredictable, but if managed and regulated properly, could be the short-term net-zero bridge companies are looking for during their decarbonization transition. There are two main carbon marketplaces that impact how companies interact with their GHG emissions: compliance markets and voluntary markets.
Compliance markets are marketplaces where companies are given a certain number of carbon credits per year and are mandatory for companies to comply with. In the case of cap-and-trade, otherwise known as Emissions Trading Systems (ETS), regulators set a limit on the amount of carbon emissions a company can produce (the “cap”), and then participants can “trade” their emissions depending on how much they pollute that year. If the company falls under the “cap”, they could sell their allowances to those who were over the cap limit and needed to buy more allowances to pollute (Mora Fernández Jurado 2020). Eventually, the goal with this trading scheme is to lower the emissions caps annually while simultaneously increasing the price of carbon allowances to make it more expensive to pollute every year (Financial Times 2023). These compliance schemes are regulated by a legislative body and normally target entities across the electricity generation, large industrial, and fuel supply industries. For example, California’s cap-and-trade system is designed for entities that emit 25,000 or more metric tons of CO2e per year which, collectively, are responsible for ~85% of the state’s emissions. Each year, the cap subsequently declines 3% through 2020 and 5% per year through 2030, and these entities have an option to use allowances and offsets as compliance instruments. An allowance is a tradable credit to emit up to one MT CO2e. An offset is a tradable compliance instrument representing GHG reduction of GHG removal enhancement of one MT CO2e. However, an interesting conditional within California’s carbon market is that only 8% of an entity’s compliance obligation can use offset credits, and must decline over time (Berkeley Law 2019). Other compliance examples beyond California’s cap-and-trade would be carbon schemes like UK ETS, New Zealand ETS, Australia ACCUs. When you take the compliance market as a whole, the magnitude of capital is profound; the compliance market is valued at $850 billion, and this number has only increased since 2021 (Elias Ayrey 2023). Compliance markets are similar to
each other around the world, but especially distinct from voluntary marketplaces that non-industrial and -electricity generating companies tend to participate in.

Voluntary markets are rapidly growing as entities and individuals look to reduce their carbon footprint and achieve their climate goals. These types of markets are independent of compliance markets, and the credits traded cannot be used to meet legal and regulatory obligations placed by compliance markets (Crowe 2023). This marketplace is valued at just $2 billion in 2021 and consists of companies looking to offset their hard-to-abate emissions or individuals who are wanting to offset their personal carbon footprint (Elias Ayrey 2023). In most cases, companies utilize the voluntary carbon marketplace to offset their Scope 3 emissions since it is largely contingent on other stakeholders spanning the value chain but is often most material for a company. Participation in voluntary marketplaces is increasing, nonetheless, as corporate sustainability disclosures become widespread and companies need to demonstrate progress toward net zero commitments while upholding the quality of data reported.

An interesting caveat I find is that regardless of the type of market, voluntary or compliance, they are both primarily made up of the same types of carbon projects. Both the voluntary and compliance markets pull from the same carbon projects, like direct air capture, but they sell much higher in compliance markets than voluntary (Elias Ayrey 2023). The most extreme marginal pricing, as seen in Figure 1, is between a Nature Based Offset at $1 in the voluntary market, and the EU’s valuation being at almost $80 USD in the compliance market. For a full set of live carbon prices in the compliance and voluntary markets see Figure 1 (CarbonCredits.Com 2024).
Figure 1. Live carbon prices in the voluntary and compliance markets. Carbon prices are measured in one tonne of CO2.

Given this information, I believe that the price differences between the two markets are due to the voluntary market lacking regulation, oversight, and competition. They do not provide a space where credits can be traded like commodities. Companies only participate to invest in offsets and work towards the corporate net-zero label. On the other hand, markets like the EU ETS in the compliance markets buy, sell, and trade credits like commodities, allowing the market to set the price given the willingness-to-pay of a company to pollute one tonne of CO2. The lack of competition is just one of many market failures we see in the voluntary market, even though the types of carbon projects are virtually the same.

Carbon projects are ultimately what companies invest in when they buy a carbon credit to offset their emissions. They can range anywhere from avoided deforestation, afforestation, renewable energy implementation, water filtration, to energy efficiency. That said, most credits are sourced from trees and one-fourth are sourced from replacing fossil fuels with renewable
energy. Trees are the most common type of carbon project because they are accessible, the growth of forests absorbs 30% of human induced CO2 emissions every year, and deforestation represents 11% of anthropogenic carbon (Elias Ayrey 2023). Additionally, it can provide about one-third of carbon mitigation required to keep warming below 1.5 degrees Celsius (IPCC Sixth Assessment Report 2022). Forests are effectively cheap, deployable at scale, and provide co-benefits outside of just fixing carbon. They can improve water quality, provide habitat biodiversity and ecosystem services, promote climate resilience, and protect climate control for livestock and people (Ahmed 2024). There are three types of forest projects. A company can obtain credits for reforestation which are purely removal credits, avoid emissions by protecting trees that would have otherwise been deforested, or improve forest management which both removes and avoids emissions (Elias Ayrey 2023). Reforestation, avoidance of deforestation, and improved management are the three leading projects due to their scalability, sequestration potential, and low-cost. Below’s graphic details other examples of carbon projects.

Figure 2: Carbon credit projects that reduce emissions or remove carbon dioxide from the atmosphere.
In order to be an effective carbon credit, there are five fundamental components of carbon projects. Otherwise, the investment is not actually offsetting corporate emissions. The components of a carbon project are:

1. Additional- ensuring the project actually removes carbon.
   a. Were these trees actually at risk?
   b. Would these trees have been planted anyway?

2. Baseline- understanding what BAU would look like if the project was not undertaken.
   a. What would have happened if the project didn’t exist?
   b. How many trees would have been cut down?

3. Verification- having complete and accurate data on how much carbon the project avoids or mitigates.
   a. How much carbon are the trees storing?
   b. How is the project being monitored?
   c. How is the project performed?

4. Leakage- evaluating if the project encourages more carbon being emitted elsewhere.
   a. Forest example- will it lead to the same amount of timber harvesting being conducted elsewhere?
   b. REC example- RECs can add more energy to the grid, bringing the cost of energy down, allowing consumers to increase their energy consumption at the same price, and ultimately lead to the same amount of fossil fuels being burned in addition to the extra renewable energy.

5. Permanence- contracting the appropriate project lifetime so that the above measures do not go to waste.
a. How long does the project protect the tree?

(Elias Ayrey 2023)

These five components are the foundation to understanding if a company is investing in the highest quality carbon offsets. However, the market is still largely unregulated and is widely unreliable as to how much carbon current projects actually store.

Within the past few years, the voluntary carbon market has been derided for past scandals and lack of regulation and standards. An infamous article published by The Guardian in 2023 claimed more than 90% of rainforest carbon credits by the largest certifier, Verra, are considered to be worthless (Greenfield 2023). This means that for large companies like Gucci, Delta, Shell, and Disney claiming to be net-zero because they offset their emissions, their investments do not represent genuine carbon abatement and are deemed ‘phantom credits’. In another news article, financial risk investors incur when buying carbon offsets are starting to ramp up (Bloomberg.Com 2023). Zimbabwe, the 12th largest creator of offsets, announced it will take half of all revenues generated from offset projects developed on its territory. The African nation has 4.2 million credits from 30 registered projects last year according to BloombergNEF. This move negates all past agreements with international organizations and means that more revenue generated from credits will go towards national coffers rather than project developers. Many project developers feel “blindsided”, as the move was swift, with no warning, and takes away from the revenue pool meant for projects like reforestation. Additionally, corporate buyers that offset their emissions through carbon credits are exposed to high risk with the volatility of the market. However, the problem is not that Zimbabwe shouldn’t get paid for carbon projects developed in their territory, it’s that Zimbabwean government leaders “acted rapidly without
prior notice” (Bloomberg.Com 2023). There is a global volatile structure between traders, governments, and companies that create extreme risk in offset investments.

While the carbon market is highly unregulated between actors, Zimbabwe’s decision does raise some important equitability caveats that do need to be addressed. Carbon credits are being treated like sovereign assets just like any other commodity. This creates an inequitable result stemming from a system that has been ridiculed for decades, as developed nations take and trade resources from emerging economies, stripping developing countries of an increasingly valuable resource. This setup is gaining traction to be labeled as a new form of colonialism: carbon colonialism. Rich Gilmore, chief executive officer at investment manager Carbon Growth Partners in Melbourne, told Bloomberg, “We need to acknowledge that the past 200 years of resource extraction have miserably failed people and the planet. And if we want the carbon market to scale, we need to respect the right of the nations of the south to determine their own rules” (Bloomberg.Com 2023). A balance needs to be struck between having enough revenue to uphold the integrity of carbon projects while paying individual people or entire nations justly for the resources used. That way, the market can build trust, see investment growth through calculated risks and opportunities, and accurately pay those involved with the transaction.

While there are inherent risks and growing pains associated with the relatively nascent market, it is projected to grow exponentially in the coming years. The Science Based Targets will allow companies to use “environmental attribute certificates” to abate certain scope three emissions (GreenBiz 2024). These certificates, which cover both RECs and carbon offsets, will drive investment as companies seek to achieve the net-zero label while incrementally working towards decarbonization. Partly, this is why we are seeing high utilization of offsets in this intermediary time between meeting sustainability targets, compliance with disclosure
requirements, and the immediate infeasibility of meeting net-zero through operational emission reduction. The carbon market is worth about $2 billion today and projected to grow to as much as $1 trillion in the next 15 years, even as it faces questions surrounding the fundamental credibility and effectiveness (Bloomberg.Com 2023). Carbon markets are only going to become more and more prevalent as sustainability agendas are getting pushed by stakeholders and government regulations.

Not only are carbon markets useful for offsetting Scope 3 emissions, they are also sparking corporate investments in nature-based solutions. Nature now is what ‘climate’ was a decade ago (Morgan Stanley 2023). It is relatively new corporate verbiage that is being defined, as a company’s bottom line may be affected by increasing environmental stressors. For example, if a large beverage company’s revenue is contingent on water, but its water supply is drying up, then that is a systems-based, ecological collapse that needs to be addressed in economic modeling. According to the Nature Conservancy, nature-based solutions can provide up to 37% of the emissions reductions needed by 2030 (Julia Strong 2024). However, there is a $400 billion investment gap in nature, as there is only $200 billion in funding right now of the $600 billion that is needed by 2030. It mostly is sourced from governments with some private investment, but offsets are providing a market that could encourage more private investment from corporations (Julia Strong 2024). By allowing the use of carbon credits for Scope 3 emissions, appropriate financing and timely corporate climate action can be facilitated, ensuring that companies are able to accurately assess and invest in their corporate environmental impact.

The case for quantifying nature-related risks and opportunities is robust, as companies are highly dependent on functioning ecological systems. Nature and its contributions to the wellbeing of humans and quality of life generate over $44 trillion in economic value—half of the
world’s GDP. Yet, environmental degradation can lead to a $2.7 trillion decline in global GDP annually if we continue down the path we are currently. Entire ecosystems and critical resources are at risk of collapsing (Morgan Stanley 2023). Investment in nature is a critical component in protecting people and businesses from incurring detrimental losses in the near future. According to a roundtable discussion with World Wildlife Foundation (WWF) and Morgan Stanley’s Global Sustainability Office, four ways to ramp up nature investing are to:

1. Incorporate nature-related risks into investing strategies. Accounting for how biodiversity- and nature- related risks across value chains, operations and investments can help investors better understand their exposure to companies that are highly dependent on nature as their business model (for example, a clothing store sourcing fibers and other raw materials for production)

2. Identify nature benefits from carbon offsets and credits. Co-benefits of carbon credits are important to quantify so it can attract existing pools of climate-oriented investment capital to nature-based solutions. This trend towards identifying nature-related benefits from carbon projects like RECs, reforestation, or carbon sequestration can help to put a monetary value on the benefits associated with protecting nature.

3. Reduce risk in nature investments with flexible capital. Development institutions, philanthropic organizations and government agencies are more likely to deploy capital that is flexible, patient, and higher-risk as they balance investment goals with ESG considerations. Capital from these sources may help to lower investment barriers for private investors because it could help bridge the risk-return profile of nature-based projects to match the expectations of market-rate investors.
4. Create regulations and incentives. Governments may put regulations, incentives, and market structures in place to encourage private sector investment in nature. Standardization promotes transparency to better understand risk- adjusted returns, giving investors more confidence in the market. Regulation could also reduce or eliminate incentives that may be harmful to nature.

(Morgan Stanley 2023)

We are hurtling toward a future that is looking to correct market inefficiencies and internalize environmental externalities to ensure our posterity. Carbon markets can be a foundational

Conclusion

The ways in which we interact with the environment and use resources has been top of mind since the dawn of classical economics. Adam Smith, one of the most influential economists in the 18th and 19th century and to this day, equated wealth with land. Economists and philosophers like Ricardo, Mill, and Malthus were concerned with how quality of land would impact the economy. They knew that the rate of land extraction could not go on forever, and that returns would diminish over time. Though pushing frontiers and technological improvements were deemed worthy outlets to avoid an environmental degradation crisis, resource depletion was still a constraint to economic activity. As preference and cost started to be represented by transactions, neoclassical economists like Keynes and Manger moved away from looking at aggregate economic activity towards allocation efficiency and marginal analysis. Inherently, this shifted emphasis towards maximum production per unit rather than looking at total benefit. This leaves room for environmental externalities and tends to not be socially optimal. Now, we are at the age of welfare economics where these two ideologies are being meshed and transformed so
that, ideally, a change that benefits one without harming any other. This has more of a socially-responsible take on individual benefit and is establishing an economic system that promotes circular environmental practices so we are operating as a closed loop.

Climate risk threatens economic welfare, and the effect is predominantly seen in corporate value chains. As severe climate patterns like floods, droughts, fires, hurricanes, and tornados are threatening the viability of supply chains, entities are scrambling to improve resilience and adaptation to a warming climate. In addition to environmental strains on corporate bottom lines, most stakeholders expect ESG related targets and action from companies they buy from or invest in. As Fink said, “over time, companies and countries that do not respond to stakeholders and address sustainability risks will encounter growing skepticism from the markets, and in turn, a higher cost of capital” (Fink 2020). Additionally, shareholders want to understand investee companies’ suppliers, producers, distributors, and other entities involved in each step of the value chain, as well as the resources, materials, and inputs used at each stage, as economic inefficiencies run rampant. Material climate information is imperative to making risk-adjusted investment decisions, but it is just now becoming regulated by disclosure regimes. This policy mechanism is band-aiding market failures by trying to bridge the stakeholder-company information gap. While disclosures are a good first step towards advancing sustainability agendas, action post-climate pledge is lagging. This second phase is seeing some growing pains, especially in the United States, as Republican political agendas are polarized from ESG matters. However, the fact of the matter is that the world is moving towards a value driven economy, with sustainability at the forefront; “the more your company can show its purpose in delivering value to its customers, its employees, and its communities, the better able you will be to compete and deliver long-term, durable profits for shareholders” Fink (2021).
Though the sustainability movement is inevitable, the push and pull from policy, the economy, shareholders, and stakeholders will define the rate at which corporate sustainability agendas are accelerated.
Aakash Ahmed and Julia Strong. 2024. The Nature-Based Climate Solutions Industry-Capital, Tech Start-Ups, and NGOs. Dartmouth College ENVS 80.18.


https://corporatefinanceinstitute.com/resources/accounting/disclosure/.


https://www.youtube.com/watch?v=FF2_AZ3fZyU.


https://www.youtube.com/watch?v=6cxalUYGU8g.


https://info.greenbiz.com/index.php/email/emailWebview?md_id=35743&email=MjExLU5KWS0xNjUAAAGRIHrQuF2HbtwOl0YQoArBBgXnogbFe8VVdeiCqaVBscuuwET1RFCb421gLBzif_0NZAcZIQo0UAy3nTqeP7A6Qjo5M0GsUXiXQ.

https://info.greenbiz.com/index.php/email/emailWebview?md_id=35743&email=MjExLU5KWS0xNjUAAAGRIHrQuF2HbtwOl0YQoArBBgXnogbFe8VVdeiCqaVBscuuwET1RFCb421gLBzif_0NZAcZIQo0UAy3nTqeP7A6Qjo5M0GsUXiXQ.

https://corpgov.law.harvard.edu/2022/10/10/navigating-the-esg-landscape-comparison-of-the-big-three-disclosure-proposals/.  
Perman, Roger, Michael Common, Yue Ma, James Mcgilvray, and David Maddison. 2013.  
“TNFD Welcomes the ISSB’s Decision to Commence Work on Nature-Related Issues.” 2024. April 24, 2024.  