From: Truman Semans
Sent: Wednesday, June 16, 2021
To: rule-comments@sec.gov
Subject: OS-Climate response to SEC for Public Input on Climate Change Disclosures

Dear Securities and Exchange Commission:

OS-Climate (Open Source Climate, or "OS-C") appreciates the opportunity to respond to the request by the Securities and Exchange Commission (SEC) for Public Input on Climate Change Disclosures.

Umbrella Project of The Linux Foundation (LF), 501(c)(6) non-profit. OS-C is funded by annual membership fees and philanthropic contributions, and the OS-Climate Platform is a free public good. Further information on the Community-Based Open Source approach is provided at https://www.linuxfoundation.org/ .

OS-Climate is a technical organization, not a policy advocacy organization. Without exception, the comments submitted by OS-Climate are superseded by any and all comments submitted directly to the SEC by an OS-Climate Member.

The initial Founding Members of OS-Climate are Allianz, Amazon, Microsoft, and S&P Global. The lead members are BNP Paribas, Goldman Sachs, and KPMG. Other initial Founding Members include Federated Hermes, London Stock Exchange Group, the Net Zero Asset Owner Alliance, and Ortec Finance, and S&P Global. The OS-Climate Planning Team partners include WWF, Ceres, and SASB. This submission represents the views of OS-Climate and not necessarily of all of its Members.

Please see attached a document inserting, as responses to the SEC questions, excerpts from the Commodity Futures Trading Commission report, "Managing Climate Risk in the U.S. Financial System," in which OS-Climate participated as a Climate Subcommittee member and Chapter co-leader, and which OS-Climate approved as part of the consensus of the Climate Subcommittee.

The OS-Climate Members support the mission of rapidly scaling finance and investment to meet Paris Accord goals, and development of data, modeling, and analytics products and investment products for climate-smart portfolio construction, asset allocation, risk assessment, other investment decisions, lending, planning, and policymaking.

The OS-C Platform is being developed by teams composed of more than 40 modeling and data experts from across the OS-C Members, with input from more than 110 other Member subject matter experts (SMEs) and other staff.

The OS-C Platform that the Members are building combines:

- Data Commons – a federated "library of libraries" of public and proprietary climate & ESG data. This will help enable convergence of standards while in the meantime building an open database that is a "universal translator" so that all reporting entities can input to a common database, and all users extracting data based on a specific standard can do so.

    - The Commons will serve like a "public utility" supporting a wide range of government, research, academic, and non-profit data providers by better connecting them to both open source and proprietary decision tools, and in many cases providing long-term data storage. The Data Commons will have fully transparent data governance.
    - Curated library of public and private sources, for both transition and physical risk/ opportunity.
    - Coverage includes corporate, economic, sector, policy, technology, linkage, and asset-level data.
    - More accurate corporate historical and forward-looking climate & ESG metrics as a public good.
    - Another deliverable on the roadmap is a technical facility where corporations can disclose in one place, with an efficient process, all of the voluntary and mandatory data disclosures they wish to make or are required to provide.

- Analytic tools in two primary areas:
    - Scenario Analysis, including an open source Physical Risk Scenario Analysis Tool.
    - Alignment, focusing initially on an open source Implied Temperature Rise Tool.
    - Further information on these tools that OS-Climate will present during COP26 will be shared on the OS-C website.

The Linux Foundation (LF) has developed community-based governance, collaboration rules, licensing, perfected over the last 20 years through more than 300 global projects involving more than 2,000 member companies and 243,000 individual contributors.

- LF projects serve as a "Switzerland" where competitors can work together on the "pre-competitive" layer of technology and standards they all need. This prevents "wheel re-invention" and frees up resources to accelerate innovation.
- The LF method is specifically suited to situations for markets early in their development, when some patterns of competition can impede market progress by sowing confusion and slowing crucial standards development – exactly the current situation with climate-aligned finance, investing, and business.
- LF Open Data initiatives address areas in which convergence on data standards is needed to accelerate innovation. See https://www.jointdevelopment.org/.

Further information about OS-Climate can be found at https://www.os-climate.org/home/.

While the attached responses convey no new information to the SEC, we hope that this response selecting relevant guidance from the CFTC report will be helpful to the Commission.

Respectfully submitted,

Truman Semans

Truman Semans
CEO, Linux Foundation OS-Climate

OS-Climate (Open Source Climate, or "OS-C") appreciates the opportunity to respond to the request by the Securities and Exchange Commission (SEC) for Public Input on Climate Change Disclosures.

Submitted June 15, 2021

This document provides, as responses to some of the SEC questions, only certain excerpts from the Commodity Futures Trading Commission report, "Managing Climate Risk in the U.S. Financial System," in which OS-Climate participated and which OS-Climate approved as part of the consensus of the Climate Subcommittee. Excerpts are cited as recommendations of the report (e.g., (R.5.1, p.127)) and in some cases, explanatory text from Chapters (e.g., (Ch.4, p.42)).

1. **Definition of the role of the SEC in regulating climate-related disclosure**
    a. **How can the Commission best regulate, monitor, review, and guide climate change disclosures in order to provide more consistent, comparable, and reliable information for investors while also providing greater clarity to registrants as to what is expected of them?**

"Financial regulators, in coordination with the private sector, should support the availability of consistent, comparable, and reliable climate risk data and analysis to advance the effective measurement and management of climate risk." (R.5.1, p.127)

"[Financial regulators should] ensure that investors, customers, and counterparties have adequate information to understand material climate risk. Publicly traded companies, entities registered with the CFTC and other regulators, and financial institutions should disclose information about material climate-related risks in an adequate and timely manner." (Ch.4, p.42)

"All relevant federal financial regulatory agencies should incorporate climate-related risks into their mandates and develop a strategy for integrating these risks in their work, including into their existing monitoring and oversight functions. Regulators should further develop internal capacity on climate-related risk measurement and management, including through their strategic planning, organizational structure, and additional resourcing." (R.4.1, p.124)

"Regulators, in consultation with industry participants, external experts, and other stakeholders, should develop and prescribe a consistent set of broadly applicable scenarios, guidelines, and assumptions and require institutions to assess their exposure to those scenarios. Climate scenarios should be both plausible and relevant, all the while informed by climate science. Regulators should require a range of climate scenarios, including scenarios covering severe but plausible outcomes. Key assumptions (including policy pathways) and limitations should be transparent. Scenarios, assumptions, and guidelines should be updated as relevant factors are

better understood and as policy and technology evolve. There should be a recognition that climate risk will manifest differently across various parts of the financial system." (R.6.6, p.129)

"Use [scenario analysis] results to upgrade risk management capabilities. Regulators and risk managers can use insights coming from scenario analyses to strengthen and augment existing institutional risk management. Each institution should determine how to do so within its own framework but could include climate-related limits, adjustment to underwriting processes, client engagement, and climate risk appetite." (R.6.12, p.130)

"Research arms of federal financial regulators should undertake research on the financial implications of climate-related risks. This research program should cover the potential for and implications of climate-related "sub-systemic" shocks to financial markets and institutions in particular sectors and regions of the United States, including, for example, agricultural and community banks and financial institutions serving low-to-moderate income or marginalized communities. Research should also include the impact of climate risk on financial system assets and liabilities, including by sensitivity of specific sectors to climate change, geographic location, and tenor. In doing so, regulators should identify data gaps and approaches to address these shortcomings. Regulators should develop assessments of the magnitude of the impact of climate on these assets and liabilities, for example through scenario analysis." (R.4.3, p.124)

"Financial regulators should proactively encourage capacity building for climate risk management. This should be consistent with the education and training practices supported by agencies in implementing the Sarbanes-Oxley Act of 2002. It should align with and aid in meeting regulator expectations around embedding climate risk in governance frameworks." (R.5.3, p.128)

"Clarifying the Definition of Materiality: Disclosure of material climate risk is essential, but the existing disclosure regime cannot fill the reporting gaps discussed in [the CFTFC Climate Report]. The primary barrier is the significant ambiguity about when climate change rises to the threshold of materiality, particularly for medium- and long-term risks. Without further clarity on what is material and therefore on what must be disclosed, companies concerned about being disadvantaged by moving sooner than their competitors are unlikely to proactively expand their disclosure. Comparable disclosure cannot develop without clear rules about what metrics companies should consider." (Ch.7, p.98)

"Material climate risks must be disclosed under existing law, and climate risk disclosure should cover material risks for various time horizons. To address investor concerns around ambiguity on when climate change rises to the threshold of materiality, financial regulators should clarify the definition of materiality for disclosing medium- and long-term climate risks, including through quantitative and qualitative factors, as appropriate. Financial filings should include disclosure of any material financial risks from climate change in a consistent but non-boilerplate manner, as well as a qualitative description of how firms assess and monitor for potential changes in climate risks that may become material." (R.7.2, p.132)

"Disclosure in SEC filings has been inadequate, in part, because materiality under U.S. law is often interpreted as limiting required disclosure to short- and medium-term risks, and firms may have assumed that climate risks are relevant only over longer time horizons. However, different

firms and industries may have different time horizons over which climate risks are deemed material, taking into account factors like the economic life of assets, the percentage of valuation that can be attributed to future growth, the nature of climate-related risk exposure, and corporate strategy. Physical risk exposure of a company or industry may fall somewhere between near-term acute shocks and long-term chronic stresses. These factors should be evaluated when determining which climate risks—including medium—to long-term transition risks—are material and should be included in SEC filings. Moreover, even in the case of long-term physical and transition risks, investors have asked the SEC to consider the perspective of shareholders investing for the long-term benefit of their beneficiaries. For example, the California Public Employees' Retirement System (CalPERS), the second largest pension fund in the United States, "urge[d] the SEC" to consider improvements to its disclosure regime, including "clarifying the definition of materiality to reflect long-term investor needs" (Hoffer, 2016). Guidance published by BlackRock (the largest asset management firm in the United States) and CalPERS for engaging the companies they own make clear their emphasis on long-term value creation and their need for climate risk disclosures to ensure that value is sustained (CalPERS, 2019; Fink, 2020)." (Ch.7, p.94)

b. Where and how should such disclosures be provided? Should any such disclosures be included in annual reports, other periodic filings, or otherwise be furnished?

"A report by the GAO found that "[c]limbate-related disclosures vary in format because companies may report similar climate-related disclosures in different sections of the annual filings," which may result in "SEC reviewers and investors [finding] it difficult to navigate through the filings to identify, compare, and analyze climate-related disclosures across filings..." (GAO, 2018, p. 19). The report also found that "climate-related disclosures in some companies' filings use boilerplate language, which is not specific to the company, and information is unquantified," thereby limiting the utility of the information to investors (GAO, 2018)." (Ch.7, p.94)

"Financial filings should include disclosure of any material financial risks from climate change in a consistent but non-boilerplate manner, as well as a qualitative description of how firms assess and monitor for potential changes in climate risks that may become material." (R.7.2, p.132)

2. Assessment of current climate risk information and analysis methods

a. What information related to climate risks can be quantified and measured?

"Physical Risk:

"The measurement and understanding of physical risk vary considerably from sector to sector and remains, overall, in an early stage of development. The impacts of physical risks may also vary significantly within a sector depending on the risk and firms' climate management practices and capacities. In general, physical risks may be either acute or chronic. Their severity depends on the physical exposure of assets, infrastructure, and populations. Advances in attribution

science that help distinguish climate trends from natural variability (NASEM, 2016), together with advances in measurement technology, are improving the understanding of physical climate risk (Keenan, 2019). With further advances in technology and standardized disclosure practices, additional physical risks may be discovered, and existing risks will be measured and reported with increasing precision and sophistication. Through stress testing, scenario planning and other analytical measures, sectors and firms may be better prepared to mitigate and adapt to climate change. (Ch.2, p.12)

“Estimates of physical risks are based on a variety of assumptions, scenarios, and Representative Concentration Pathways (RCPs). RCPs are widely used, consensus-based models that estimate how climate systems may respond to specific concentrations of greenhouse gas in the atmosphere. Currently, no standardization exists within or across sectors on which parameters to use for evaluating physical risk, and so these estimates remain first-order approximations. For instance, there is an ongoing debate concerning the assumptions in RCP 8.5 (the most severe of the RCPs) and whether it underestimates business as usual (Christensen, Gillingham, and Nordhaus, 2018) or overestimates physical and economic impacts by disregarding gradual shifts in the global energy economy (Ritchie and Dowlatabadi, 2017). However, these pathways and associated estimates nevertheless importantly help shape awareness among policymakers and the private sector on the magnitude and nature of the risk. (Ch.2, p.12)

“Agriculture: While the magnitudes of the estimates and the extent to which adaptation may mitigate future losses vary (Burke and Emerick, 2016), there is general agreement that climate change will reduce average yields and total production for most crops in most regions. (Porter et al., 2014). [...] Other risks include degradation in water and soil quality (Gowda, et al., 2018), quantity (Dai and Zhao, 2017), and increased uncertainty and variability in crop and fisheries yields (Walthall, et al., 2012), increased range and virulence of pests (Taylor, et al., 2018), and more frequent disruptions of distribution and processing from extreme weather [...] More broadly, climate change is impacting, and is projected to impact, not only commercial agriculture in the United States, but also the ecological systems and biodiversity that agricultural systems rely on for everything from the provision of clean water to healthy forests (Lipton, et al., 2018). Logistical constraints that prevent or delay the shipment of crops, seeds and material, such as when the Mississippi River has too little or too much water to safely support barge traffic, also impact the agricultural economy (Attavanich, et al., 2013). (Ch.2, p.12-13)

“Infrastructure: Awareness is growing across infrastructure sectors, including energy, water, transportation, and communications, that physical risks do not just impact particular sites and locations (Bertolotti, et al., 2019), but also shorten the lifecycle of infrastructure and degrade its operational reliability (Maxwell, et al., 2018). Even slight degradations in lifecycle performance can compromise the long-term yields and creditworthiness of revenue-producing assets in both the public and private sectors. In addition, there is growing appreciation that disruptions in energy, transportation, and communications infrastructure can impose economic losses on communities, adding to the losses from damage to the infrastructure itself. Even in low-to-middle income countries with significantly less infrastructure than the United States, infrastructure disruptions already impose between $391 billion and $647 billion in annual costs to firms and households

(Hallegatte, et al., 2019). It is reasonable to assume that under a business-as-usual scenario annual losses in the United States could far exceed these estimates. (Ch.2, p.14)

“Utilities: In the context of longstanding deferred maintenance challenges, the U.S. power infrastructure faces significant vulnerabilities from more frequent extreme weather attributed to climate change (ASCE, 2017). [...] In addition, the adaptation measures themselves—such as periodically cutting-off power in high-risk fire zones in California—may impose collateral economic costs (Ovaere, et al., 2019). Early-stage research suggests electrical transmission and distribution infrastructure costs from climate change could increase 25 percent by 2090 (Fant, et al., 2020). Similar costs associated with climate adaptation and direct losses likely will strain existing utility credit quality and bonding capacity, as well as increase customer costs—potentially limiting broader economic activity. (Ch.2, p.15)

“Transport and Water: The same can be said of infrastructure supporting the treatment, distribution and supply of water (Maxwell, et al., 2018). Even without climate change, significant resources will be required to safeguard water infrastructure. A survey of local governments by the U.S. Environmental Protection Agency estimated that state and local investments of $472 billion (2018) will be required over the next two decades just to maintain drinking water infrastructure (EPA, 2018). One estimate puts future investments to maintain all domestic water infrastructure at $123 billion per year (Ajami, et al., 2018). Climate change impacts likely will add to ongoing capital investment deficits in water infrastructure. Failure to adequately invest in water infrastructure could result in the loss by 2040 of nearly a million jobs that directly depend on water (EPA, 2018). (Ch.2, p.15)

“Economic Impact of disasters: As represented in Figure 2.2, the economic costs of disasters to the public and private sectors have been rising, as represented by the rising incidence of billion-dollar disasters. This is a function of greater exposure of cities, populations and assets, and the greater intensity and frequency of a variety of extreme weather events. Many of these extreme events are already attributable in varying degrees to climate change. For local governments, losses from such extreme events can have fiscal ramifications for many years. Even without climate change, the United States needs to make significant investments in building new infrastructure and maintaining existing infrastructure. Climate change and extreme weather events add additional barriers of cost, time, uncertainty, and risk to these investments. (Ch.2, p.16)

“Real Estate: Since the value of real estate is closely linked to the value of the land it is built on, physical risks, such as wildfires and rising sea levels, can directly affect real estate prices. Indeed, emerging research shows that exposure to climate-related risks already affects real estate values. For example, research has shown that increased perceptions of physical risk in a local housing market depress the prices of homes exposed to sea level rise (Giglio, et al., 2015a; Giglio, et al., 2015b). (Ch.2, p.17)

“Mortgages: Since most residential real estate in the United States is purchased with a mortgage, physical risk could also affect the underlying mortgages. Early-stage research suggests that wildfires and flooding cause increased residential mortgage default rates (Issler,

et al., 2020). As Chapter 3 will discuss, declines in mortgage values could affect financial market participants, including banks that hold these mortgages on their balance sheets, investors in mortgage-backed securities, and government-sponsored enterprises (GSEs), primarily Fannie Mae and Freddie Mac, which guarantee the default risk of the mortgages they securitize (Ouazad and Kahn, 2019). Emerging evidence suggests that lenders are passing along riskier mortgages (Ouazad and Kahn) to the GSEs, in part, to remove risk from their own books (Keenan and Bradt, 2020). The federal guarantee of the GSEs suggests that U.S. taxpayers may ultimately be on the hook for prepayment and default risks associated with the impacts of physical risks on collateral values (Ouazad and Kahn, 2019; Keenan and Bradt, 2020). (Ch.2, p.17)

“Human health: Health impacts from climate change include extreme heat exposure; degraded air quality; infectious, water- and vector-borne diseases; food contamination and declining access to nutritious foods; chronic physical and mental stress; and, physical injuries and mental distress from extreme events (Ebi, et al., 2018) [...] These impacts could also reduce labor capacity and productivity, which in turn could reduce the capacity of workers and employers to pay for healthcare services. Most critically, extreme heat is anticipated to greatly impact human health and lead to greater rates of premature mortality. From extreme heat alone, annual damages from premature death in 2090 were projected to be between $60 billion (2015) and $140 billion (EPA, 2017). States in the Southeast and Great Plains could see declines in labor capacity approaching 3 percent (Dunne, et al., 2013; Houser, et al., 2015); some locations in Florida and Texas could see a total loss in annual labor hours of 6 percent or more (Gordon, 2014; EPA, 2017). (Ch.2, p.18)

“Healthcare System: Finally, as the COVID-19 pandemic has made clear, healthcare and public health systems in the United States have limited excess capacity to treat patients during extreme events (Bein, et al., 2019). Such events could include, for example, events stemming from infectious diseases and tropical cyclones attributable, in part, to climate change (Wu, et al., 2016). Public health infrastructure in the United States and around the world has been affected by significant reductions of public investment in recent decades (Masters, et al., 2017). Unless this trend is reversed, the U.S. healthcare system may not be able to cope with the burdens from climate-related physical risk. For instance, healthcare facilities, networks and enterprises could face financial challenges associated with the exposure of highly vulnerable and aging populations subject to increasing climate-attributed stresses, such as extreme heat and infectious disease, and shocks, such as stronger hurricanes and wildfires (Desai, et al., 2019). (Ch.2, p.18)

“Transition Risks:

“Transition risks arise from both uncertainties and substantive changes. They include market, credit, policy, legal, technological, and reputational risks. These transition risks range from the introduction of an explicit or implicit price on carbon to the economic obsolescence of entire asset classes because of changing consumer preferences. Transition risks may lead to economic losses for some, while at the same time yielding benefits for others. Transition risks may lead to

both stranded capital, where asset-level capital is at-risk from devaluation, or stranded value, where the market-value of a project or firm is at-risk from devaluation or otherwise negatively discounted (NGFS, 2019a). In essence, transition risks arise when firms fail to prepare for or recognize broader market transitions. (Ch.2 p.19)

“Stranded Assets: In a speedy transition to a net-zero economy, fossil fuel industry assets might become stranded (Harvey, et al., 2018). To provide some context, 75 percent of total U.S. energy is derived from fossil fuels (EIA, 2020). In 2019, fossil fuels provided the energy for 62 percent of electricity generation and 95 percent of transportation (EIA). One estimate for stranded capital from fossil fuel assets suggests a potential global loss of wealth between $1 trillion and $4 trillion (Mercure, et al., 2018). In an alternative estimate, current stranded assets within fossil fuel companies range between $250 billion and $1.2 trillion—depending on how fossil fuel firms respond to global emissions reductions (IEA, 2020). (Ch.2, p.19)

“Stranded Value: In terms of stranded value, emerging evidence suggests that, in some cases, markets may already be pricing in transition risk. For example, a recent study suggests that uncertainty associated with policy risk is already penalizing oil companies that are investing in undeveloped fossil fuel reserves (Atanasova and Schwartz, 2019). (Ch.2 p.20)

“Understanding the vulnerability of exposed assets and counterparties to climate risk requires a wide variety of qualitative and quantitative metrics, and detailed data is largely unavailable across most use cases. (Ch.5, p.58)

b. How are markets currently using quantified information?

“Scenario analysis:

“Climate scenarios, as advocated by the Task Force on Climate-related Financial Disclosures (TCFD) and others, are used by researchers, policymakers, and, increasingly, corporations to analyze potential climate-related futures, including the economic, social, and environmental implications of achieving different temperature and emissions goals. (Ch.6, p.73)

“[P]ractitioners can analyze scenarios that differ in their global trajectories of greenhouse gas emissions and atmospheric concentrations and thus pose different physical risks and damages from climatic disruption and ocean acidification. These scenarios can express the range of effects that different levels of radiative forcing would have on extreme weather events, sea level rise, agricultural productivity, public health, and other environmental and economic outcomes. Similarly, practitioners can analyze a low-carbon transition scenario in which the United States adopts an ambitious climate policy and compare it to a scenario—called a baseline, business-as-usual, or reference scenario—in which no new policies are adopted. In so doing, analysts gain insights into the potential outcomes (positive and negative) for individual assets, entities, or industries, as well as to the overall macroeconomy. Climate-related scenario analysis is gaining traction in several contexts, both domestically and internationally. Climate scenarios are being used within companies for internal decision-making; in analyses for disclosure of climate-related

risks to investors and regulators; by banks and other financial institutions to assess individual investments and overall portfolios; and by financial regulators. (Ch.5, p.74)

“Current initiatives, such as the Inevitable Policy Response promulgated by the United Nations’ Principles for Responsible Investment (PRI), have begun to provide a resource for financial markets to forecast short- to mid-term climate policies (PRI, 2019). Key policy domains include coal phase-outs; bans on internal combustion engine vehicles; carbon pricing; carbon capture and storage; net-zero power; energy efficiency; land use-based carbon management; and agricultural technologies and infrastructure policies. Each of these policies is evaluated based on institutional, political, and technological readiness, as well as metrics associated with social momentum and social equity (PRI). (Ch.2, p.21)

c. Are there specific metrics on which all registrants should report (such as, for example, scopes 1, 2, and 3 greenhouse gas emissions, and greenhouse gas reduction goals)? What quantified and measured information or metrics should be disclosed because it may be material to an investment or voting decision?

“Regulators should require listed companies to disclose Scope 1 and 2 emissions. As reliable transition risk metrics and consistent methodologies for Scope 3 emissions are developed, financial regulators should require their disclosure, to the extent they are material. (R.7.6, p.133)

“Scope 3 emissions are a proxy for and an important input to transition risk, particularly for bottom-up company-specific analysis, as they reflect transition exposure. For automakers, Scope 1 and 2 emissions include vehicle manufacturing, while Scope 3 emissions include the upstream supply chain as well as the downstream gasoline, diesel, or electricity that customers use to operate vehicles. The Scope 1 and 2 emissions from operating a building are dwarfed by the Scope 3 emissions from steel, cement, and other materials used during construction. However, Scope 3 emissions represent only a portion of transition risk, and complementary data is required to make Scope 3 emissions fully decision useful. Among other factors, emissions intensity, demand and supply elasticity, and the associated pass-through of production prices to consumers impact vulnerability in the short-term, while transition plans, evolving consumer preferences and technology innovation impact vulnerability in the longer-term. Effective risk management requires focus on the full spectrum of transition risk. For example, to assess oil and gas company transition risk from carbon pricing, key inputs include capital structure, marginal cost of production, emissions intensity of products, and duration of reserves. (Ch.5, p.62)

“Financed emissions: Financed emissions are a special category of Scope 3 emissions, reflecting the indirect emissions underlying financial portfolios, products and services. Financed emissions can help highlight the point-in-time carbon exposure of a financial institution, portfolio or product, but need to be complemented with a range of other data (for example, use of proceeds from a financing and companies’ emissions trajectories and financial capabilities) and specifics of the underlying portfolio or financial product (such as asset class, duration, diversification, geographic exposure, hedging, and risk mitigation) to be decision useful for transition risk management. Businesses are increasingly committing to net-zero emissions, and increased sustainable investments by an institution could cause its financed emissions to decline. In addition, design

issues specific to financed emissions raise challenges, particularly around allocating emissions to the wide range of financial activities. Financed emissions from owning 1 percent of a company might include 1 percent of that company's emissions; a portfolio can rapidly double count if aggregate financed emissions include each underlying company's own Scope 3 upstream and downstream emissions. The calculation becomes significantly more complex with other activities, such as when a financial institution serves as a counterparty or is one of multiple underwriters of a financing. There is no agreed standard for financed emissions and little consistency or comparability to date, but a wide range of methodologies are being developed. Existing estimation methods present significant challenges and regulators should encourage the market to develop a more consistent way of measuring and reporting Scope 3 emissions across sectors where they are material and relevant. (Ch.5, p.62)

d. Should disclosures be tiered or scaled based on the size and/or type of registrant)? If so, how?

e. Should disclosures be phased in over time? If so, how?

f. How are markets evaluating and pricing externalities of contributions to climate change?

"Climate risk is in part a manifestation of the failure of the current economic system to price externalities and capture them in current accounting, performance measurement, and incentive systems. Scenarios help elucidate the nature of the externalities and translate climate risk into financial risk. Climate risk derives in part from a lack of policies, like a price on carbon, that would internalize the external costs of damaging emissions, but it also comes from traditional accounting practices that ignore these externalities and the prospect of their regulation. This mispricing naturally leads to the misallocation of capital, including the continuing distortions in energy systems that promote climate change. Financial regulators around the world are aware of this misallocation and mispricing and some are adopting policies to address it. They do not have the authority to directly regulate emissions, but they can, through their financial stability objectives, promote climate risk management—which in turn can facilitate the orderly transition to a net-zero economy. Scenario analysis is an important tool that regulators can use to encourage climate risk management: Have you thought about these risks? Have you discussed them with your clients? What are you doing about it? (Ch. 6, p.79)

g. Do climate change related impacts affect the cost of capital, and if so, how and in what ways?

"Growing demand for investments to protect infrastructure from climate-related physical risk are likely to increase fiscal pressure on state and local governments. Many of them are already straining under the weight of unfunded pension obligations and rising healthcare costs (Gilmore and St. Clair, 2018). The COVID-19 pandemic will add to pre-existing fiscal burdens. Some financial markets are beginning to price in the expected fiscal burdens of coping with physical

risk. For example, municipal bond markets may already be pricing in exposure to sea level rise in some coastal jurisdictions (Goldsmith-Pinkham, et al., 2019). With greater discovery and reporting of physical risk, many public borrowers may face higher capital costs to compensate investors for higher perceived default risk. That, in turn, will increasingly limit governments' capacity to invest in critical infrastructure and in infrastructure that supports and protects their tax base. It may also result in higher local property and sales taxes. (Ch.2,. p.15)

"[T]he benefits of comprehensive climate disclosure are several. Investors can better assess a more refined measure of the long-term cost of capital, as well as risks to firms, margins, cash flow and valuations. In addition, investors and society can gain greater assurance that issuers take these risks seriously. In the absence of robust disclosure, market participants may presume that a company is unprepared for climate-related risks, especially at a time of heightened volatility, such as during an extreme climate-attributed event. Ultimately, a lack of disclosure could also affect market confidence in management, valuation multiples and the cost of capital. (Ch.7, p.87)

h. How have registrants or investors analyzed risks and costs associated with climate change?

"While there is no one-size-fits-all methodology, tool, or scenario, many approaches may be appropriate for different cases. Integrated environmental and economic datasets and methods are relatively new and evolving so any climate risk management approach should be flexible and allow for ongoing learning and the incorporation of best available science and technology. (Ch.5, p.55)

"Ideal use case for climate data: Data should allow for both bottom-up and top-down analysis at the appropriate level of detail for the use case (the specific situation in which a product or service will be used). Ideally, available data would support a wide variety of estimates and projections, covering appropriate time horizons with levels of detail, geographical coverage, and confidence relevant to the particular use case. In this ideal situation, these models would produce decision-useful data that are comprehensive, consistent, and comparable and that would inform assessments of the underlying risk, uncertainty, and vulnerability of firms, counterparties, assets, and markets. (Ch.5, p.58)

"Climate Risk Analysis:

"Risk Identification: The first step in identifying potential vulnerabilities to different types of climate risks is a qualitative or quantitative exercise that categorizes climate risks and then applies the categories to the relevant asset classes, sectors, and geographies. This can be done, for example, through a heat-mapping exercise. For transition risk, the identification exercise may use exposure and vulnerability data on the carbon intensities of different sectors and assumptions about a firm's elasticity and ability to pass-through costs. For physical risk, the exercise may use forward-looking climate data to discern the exposure and vulnerabilities of different sectors to specific climate impacts based on their geographic location, as well as their ability to improve resilience with hardening measures. Mapping out risks should include the transmission

mechanisms of climate risk into financial products and services. For example, banks that have more concentrated long-dated loans are likely to face greater credit risk exposure through their lending than asset managers, which have greater market risk exposure. (Ch.5, p.63)

“Risk Assessment and Measurement: Financial institutions may use various approaches, including top-down or bottom-up, based on the type of risk, the structure of their business, and the balance between the efficiency of the analysis and its effectiveness in informing risk management decisions. For example, to assess its liquidity position, a bank may consider a top-down climate stress test, applying a set of asset-based shocks to its tradable assets. Such a top-down approach may be relevant for a bank that has a diverse global portfolio of credit counterparties and a loan book that is more short-term and marked-to-market. Bottom-up approaches often require asset-level data, which is often limited. A range of analytical methods may be necessary to manage credit risks and distinguish relative vulnerabilities within a portfolio. Examples could include portfolio review by sector or specific analysis of more material exposures, such as bottom-up analysis at the company-level. This may require enhanced due diligence of companies to gather the relevant climate risk data such as Scope 1, 2 and 3 emissions exposure, elasticity studies to understand vulnerability to price adjustments, and organizational resilience efforts, including insurance and business model transition plans. Physical risk assessment for material exposures in particular requires asset-level analysis since it is location specific. However, some transition risk assessments may also require geographic data (for example, for a power company, the electricity generation mix of coal, gas, renewables, and nuclear and whether it operates in jurisdictions with current or future carbon regulations). Resilience and the application of risk mitigation measures are critically important and may be evaluated by a firm’s (i) utilization of risk transfer mechanisms; (ii) ability to pass through costs; and, (iii) financial wherewithal to manage risk, among other structural mitigants. While financial institutions may have different levels of capacity today, all should work to enhance their assessment protocols and frameworks. (Ch.5, p.63-64)

“Risk Monitoring and Management: [As] financial institutions conduct analyses to quantify climate risks and understand risk concentrations and material exposures, they should consider how to effectively size their risk appetite and monitor and manage their climate risk to stay within their risk appetite. For example, metrics such as climate-related value at risk or exposure to high carbon intensity sectors could be monitored and managed against established industry limits defined by risk appetite. Monitoring would not only enable institutions to assess changes to climate risk exposure and sensitivity over time, but also to identify appropriate adjustments to mitigate the risk. Depending on the nature of their business, financial institutions could shift the allocation of capital in their portfolio from higher climate risk companies to lower climate risk companies, adjust their underwriting and investing exposures to different sectors or geographies, adjust the tenor or other structural aspects of their loans, or reduce insurance underwriting exposure to higher climate risk companies. Financial institutions also could manage climate risk by increasing their sustainable investments (as described in Chapter 8) and by encouraging companies to improve resilience through climate mitigation and adaptation activities. (Ch.5, p.64-65)

“Challenges to Assessing Climate Risks

“State of assessment capabilities: While an ecosystem of climate data is emerging, much of the advances in measuring and evaluating asset exposure have not been accompanied by corresponding advances in evaluating the sensitivity of exposed assets or the adaptive capacity of firms to manage sensitivity and exposure. Physical risk data and projections need to be overlaid with exposure data at the asset level. Some financial institutions may have asset-level data to overlay with physical risk data, for example, a bank providing project finance loans. However, most finance use cases will not have direct access to asset-level data for counterparty analysis, let alone analysis of multiple counterparties in a portfolio (such as a listed equities portfolio). Understanding the vulnerability of exposed assets and counterparties to climate risk requires a wide variety of qualitative and quantitative metrics, and detailed data is largely unavailable across most use cases. (Ch.5, p.58)

“Expanding climate risk data: The increasing adoption of climate risk management practices should incentivize the development of more robust climate risk data. However, while physical risk data is more widely available than transition risk data, both are generally insufficient, and several barriers impede the development of robust decision-useful data. Effective risk management in general, including scenario analysis as described in [the CFTC Report], relies on the analysis of physical and transition risk data. (Ch.5, p.58)

i. What are registrants doing internally to evaluate or project climate scenarios, and what information from or about such internal evaluations should be disclosed to investors to inform investment and voting decisions?

“Internal Use of Scenario Analysis:

“Climate scenarios are being used within companies for internal decision-making; in analyses for disclosure of climate-related risks to investors and regulators; by banks and other financial institutions to assess individual investments and overall portfolios; and by financial regulators [...]. Each of these applications may require different scenarios that capture different risks. They may involve different modeling tools, underlying data, assumptions, and time scales. While useful, climate scenarios have limitations. The optimal design of climate scenarios will depend on the goals and methods of analysis. A wide variety of scenarios and of models to analyze the scenarios can be useful depending on the application. (Ch.6, p.64)

“Temperature Scenarios: One common scenario design posits a future in which atmospheric concentrations of greenhouse gases are stabilized at a level at which global mean temperatures do not rise by more than a certain amount, such as 2 degrees Celsius above pre-industrial levels. Lower temperature targets require that greenhouse gas concentrations stabilize at lower levels, meaning that fewer net emissions can be emitted globally. Achieving a lower temperature target reduces the physical impacts of climate change but requires more aggressive and disruptive policies to achieve the necessary transition. [...] a temperature scenario analysis can emphasize the physical climate outcomes, the policy outcomes, or both. Because temperature scenarios play out over at least several decades, they tend to involve longer-term projections of both physical

and transition risks. meaning that fewer net emissions can be emitted globally. Achieving a lower temperature target reduces the physical impacts of climate change but requires more aggressive and disruptive policies to achieve the necessary transition [...], a temperature scenario analysis can emphasize the physical climate outcomes, the policy outcomes, or both. Because temperature scenarios play out over at least several decades, they tend to involve longer-term projections of both physical and transition risks. (Ch.6, p.75)

“Event-Based Analysis: Event-based scenarios focus on the potential short-term impact of one triggering event, such as the sudden implementation of a major emissions regulation, a technological breakthrough, or an extreme weather event. Triggers can also include sharp changes in preferences, such as increased consumer demand for carbon-neutral products or the refusal of market actors to insure coal mines. Event-based scenarios could be particularly useful for stress testing by firms and regulators because abrupt or disorderly outcomes may pose special risks for companies and the financial sector because the risks may not be priced into asset values. Modeling shorter-term, disorderly scenarios can also highlight the importance of near-term decisions in managing risks. Event-based scenarios are particularly appropriate for financial institutions. For example, an event scenario that specifies sea-level rise 30 years from now is not necessarily relevant to a trading company whose average risk duration is one year, but it is relevant to a potential mortgage investor. [...] Another important component of event scenario design is the potential for multiple simultaneous (and potentially uncorrelated) events—such as this year’s sudden precipitous drop in oil prices as the COVID-19 growth shock was taking hold. Future examples could include a harvest shock in a breadbasket region of the world, which in turn could cause a spike in international food prices and trigger instability in food importing countries. In the face of multiple events, financial risks previously regarded as non-material could suddenly become material. (Ch 6. p.77)

“Policy Pathways: To analyze the implications of achieving a given emission or concentration target, modelers run “solve-to-match” scenarios in which they estimate the carbon prices or other policy features that would be consistent with achieving a goal. For example, modelers may estimate the greenhouse gas (GHG) price trajectory that, when applied globally, stabilizes atmospheric concentrations of GHGs at a particular level. Alternatively, a climate policy scenario may reflect the actual policies countries are implementing or plausibly could implement. In that case, modelers would simulate different policies in different countries. For any given country, these scenarios may be much less stringent than those that achieve a temperature target of 2 degrees Celsius or less. (Ch.6, p.77)

“Limitations:

“While useful, climate scenarios and the models that analyze them have limitations: they are sensitive to key assumptions, most have been developed for purposes other than financial risk analysis, and they cannot fully capture all of the potential effects of climate- and policy-driven outcomes. Like many modeling exercises, climate scenario outcomes are sensitive to key assumptions and parameters, such as the rate of technical change. (Ch.6, p.78)

“Recommendations for Scenario Analysis:

“Analyze more than one warming path. Various long-term paths for climate change exist and can be used for scenario analysis. Three common scenarios are (i) Paris-aligned (for example, consistent with limiting temperatures well below 2 degrees Celsius above pre-industrial levels), (ii) current trajectory and (iii) in-between (for example, late policy adoption with a more abrupt and disruptive response). Each will produce different impacts on institutional portfolios and provide insights that will help to more effectively manage risk, particularly bookends of best- and worst-case scenarios. Scenarios should include both shorter- and longer-horizon paths as appropriate. (R.6.1, p.128)

“Analyze disruptive policy. It is particularly important to analyze a scenario involving a major policy disruption. Transition scenarios have wide implications across the economy, industries, and markets. Unanticipated policies can abruptly strand long-lived capital assets or induce rapid reallocation of capital across sectors and industries. Increasing physical impacts may increase the risks of a disorderly transition as fires, floods, and hurricanes, and the attendant shifts in public sentiment, force governments into unanticipated policy responses. Scenarios are therefore especially relevant for risk management. (R.6.2, p.128)

“Analyze both broad and specific impacts. Scenarios should capture the breadth of impacts but with a focus on materiality, covering a global perspective but enabling regional, country, and sectoral analysis appropriate to the firm’s business. (R.6.3, p.129)

“Map macroeconomic and financial impacts. Scenarios should take into account macroeconomic and financial outcomes since these are likely to be most material to financial institutions. Coming up with additional temperature scenarios, for example, is less important than providing some common guidance on potential transmission mechanisms and implications for macroeconomic and financial factors. (R.6.4, p.129)

“Account for adaptation actions to the extent feasible. Tackling climate change necessarily involves myriad adjustments by a range of actors. Modeling the effects of such adaptation actions on portfolios is complex but may become more feasible with future technology and scenario modeling development. (R.6.5, p.129)

“Tailor analysis to specific exposures. How an institution analyzes scenarios should be determined based on the unique nature of its portfolio. Not every scenario will be material to an institution’s portfolio, depending on its largest asset concentrations, longest-dated assets, and highest potential sensitivities. (R.6.11, p.130)

“Use results to upgrade risk management capabilities. Regulators and risk managers can use insights coming from scenario analyses to strengthen and augment existing institutional risk management. Each institution should determine how to do so within its own framework but could include climate-related limits, adjustment to underwriting processes, client engagement, and climate risk appetite. (R.6.12, p.130)

j. How does the absence or presence of robust carbon markets impact firms' analysis of the risks and costs associated with climate change?

"Without an effective price on carbon, financial markets lack the most efficient incentive mechanism to price climate risks. Therefore, all manner of financial instruments—stocks, bonds, futures, bank loans—do not incorporate those risks in their price. Risk that is not quantified is difficult to manage effectively. Instead, it can build up and eventually cause a disorderly adjustment of prices. (Ch.1, p.4)

"Today, various carbon pricing policies operate in 78 countries, states, provinces, and cities. Together, these initiatives cover about 22 percent of global GHG emissions. However, prices in many jurisdictions remain low, with half of the emissions covered by carbon pricing initiatives priced at $10 per metric ton or less (World Bank, 2020). In 2017, the High-Level Commission on Carbon Prices concluded that a carbon price in 2020 in the range of $40 to $80/tCO2 and rising to $50 to $100/tCO2 by 2030 would be consistent with meeting the temperature target in the Paris Agreement (High-Level Commission on Carbon Prices, 2017). In the absence of effective, broadly applied carbon pricing, financial markets will continue to struggle to motivate economic agents to act in ways compatible with long-term temperature targets. (Ch1, p.5)

"The global damage from an additional metric ton of CO2 is uncertain but is captured in the concept of the "social cost of carbon" (SCC). The U.S. government's central estimate for the 2020 SCC, calculated in 2016, amounts to $52 per metric ton of CO2 in current dollars (IWG, 2016). However, some scholars have argued that a more comprehensive consideration of damages or risk aversion would likely lead to a significantly higher SCC (Revesz et al., 2014; Daniel et al., 2019). Recent empirical evidence also finds that some measures of climate damages are much higher than previously understood (Hsiang et al., 2017). (Ch.1, p.4)

"The United States should establish a price on carbon. It must be fair, economy-wide, and effective in reducing emissions consistent with the Paris Agreement. This is the single most important step to manage climate risk and drive the appropriate allocation of capital. (R.Ch.1, p.123)

3. Role of industry leaders in developing disclosure standards

a. What are the advantages and disadvantages of permitting investors, registrants, and other industry participants to develop disclosure standards mutually agreed by them?

"In developing and implementing the recommendations below, financial regulators and the entities they oversee should consult with stakeholders, including investors, businesses, global peers, and other market intermediaries to create a U.S. climate disclosure regime [...] Because the understanding of climate risk remains at an early stage, any regulatory approach to climate-related disclosure should evolve in line with emerging best practices. Regulators should continually monitor the state of corporate climate disclosures, evolving clarity on the financial

impacts of climate change and emerging best practices. This will allow regulators to continually monitor the quality of the information disclosed in a sophisticated manner, and issue supplemental guidance or begin rulemaking where needed to reflect emerging best practice and market needs. (R.Ch.7, p.131)

b. Should those standards satisfy minimum disclosure requirements established by the Commission? How should such a system work? What minimum disclosure requirements should the Commission establish if it were to allow industry-led disclosure standards? What level of granularity should be used to define industries (e.g., two-digit SIC, four-digit SIC, etc.)?

"In light of global advancements in the past 10 years in understanding and disclosing climate risks, regulators should review and update the SEC's 2010 Guidance on climate risk disclosure to achieve greater consistency in disclosure to help inform the market. Regulators should also consider rulemaking, where relevant, and ensure implementation of the Guidance. Such an update could incorporate advice on:

- Information that is needed from all companies in order to enable financial regulators to assess the systemic risks posed by climate change. Federal financial market regulators should work closely with prudential regulators to develop these rules.
- Industry-specific climate risk information. Rules should build from existing standards that provide industry-specific climate disclosure recommendations, for example, those developed by the TCFD, SASB, CDSB, the Physical Risks of Climate Change (P-ROCC) framework, and the Global Real Estate Sustainability Benchmark (GRESB) standards for real estate and infrastructure. Because these standards are already sophisticated, regulators do not need to create their own standards or metrics from scratch. Regulators should encourage stakeholders to partner with these standard-setting bodies to further develop, standardize, implement, and validate these metrics over time. Regulators should also acknowledge, in any rulemaking, that climate disclosure standards continue to evolve, and it could provide issuers flexibility, where appropriate, to adopt these evolving standards.
- Governance, risk management and scenario planning information that demonstrates how well companies are situated for a clean energy transition. Federal financial market regulators should work closely with prudential regulators to develop these rules. Scenario planning disclosure is discussed in Chapter 6. Regarding governance and risk management disclosure, regulators should consider the TCFD's recommendations and the Committee of Sponsoring Organizations of the Treadway Commission/World Business Council for Sustainable Development (COSO/WBCSD) guidance, applying enterprise risk management to environmental, social and governance-related risks. (R.7.5, p.100)

4. **Creation of sector-specific standards**
    a. **What are the advantages and disadvantages of establishing different climate change reporting standards for different industries, such as the financial sector, oil and gas, transportation, etc.?**

    b. **How should any such industry-focused standards be developed and implemented?**

See response above to 3(b).

5. **Use of existing frameworks**
    a. **What are the advantages and disadvantages of rules that incorporate or draw on existing frameworks, such as, for example, those developed by the Task Force on Climate-Related Financial Disclosures (TCFD), the Sustainability Accounting Standards Board (SASB), and the Climate Disclosure Standards Board (CDSB)?**

See response above to 3(b).

"Regulators should encourage stakeholders to partner with these standard-setting bodies to further develop, standardize, implement, and validate these metrics over time. Regulators should also acknowledge, in any rulemaking, that climate disclosure standards continue to evolve, and it could provide issuers flexibility, where appropriate, to adopt these evolving standards. (R.7.5, p.132)

"Financial regulators, in coordination with the private sector, should support the availability of consistent, comparable, and reliable climate risk data and analysis to advance the effective measurement and management of climate risk." (R.5.1, p.127)

    b. **Are there any specific frameworks that the Commission should consider? If so, which frameworks and why?**

See response above to 3(b).

6. **Evolution and future governance of standards**
    a. **How should any disclosure requirements be updated, improved, augmented, or otherwise changed over time?**

"Account for adaptation actions to the extent feasible. Tackling climate change necessarily involves myriad adjustments by a range of actors. Modeling the effects of such adaptation actions

on portfolios is complex but may become more feasible with future technology and scenario modeling development. (R.6.5, p.129)

“Ensure a mechanism for ongoing refinement and improvement. As science, data, tools, conditions, and policy change, it is important for regulatory guidelines to evolve as well. Data in particular is evolving rapidly. Creating a mechanism for regular updating, rather than relying on ad hoc adjustments, would be beneficial to ensure effective and pragmatic oversight. As regulators better understand the material risks in the system and their spillover effects across industries and markets, a mechanism for ongoing learning and timely refinement from these lessons learned will ensure they are most effectively managing risk across the system. (R.6.10, p.130)

“Because the understanding of climate risk remains at an early stage, any regulatory approach to climate-related disclosure should evolve in line with emerging best practices. Regulators should continually monitor the state of corporate climate disclosures, evolving clarity on the financial impacts of climate change and emerging best practices. This will allow regulators to continually monitor the quality of the information disclosed in a sophisticated manner, and issue supplemental guidance or begin rulemaking where needed to reflect emerging best practice and market needs. (R.Ch.7, p.131)

b. Should the Commission itself carry out these tasks, or should it adopt or identify criteria for identifying other organization(s) to do so? If the latter, what organization(s) should be responsible for doing so, and what role should the Commission play in governance or funding?

Once climate risk disclosure standards are well advanced, accounting standards regulators should undertake a mapping exercise of the applicability of accounting standards to climate-related disclosure and subsequently issue guidance on disclosure, as appropriate. This would provide U.S. companies greater clarity about how climate risks may be integrated into financial statements. (R.7.8, p.133)

The United States should direct the Federal Accounting Standards Advisory Board (FASAB) to study and pilot the development of climate-related federal accounting standards, disclosure procedures and practices for U.S. government departments, agencies and administrative units. (R.7.9, p.133)

c. Should the Commission designate a climate or ESG disclosure standard setter? If so, what should the characteristics of such a standard setter be? Is there an existing climate disclosure standard setter that the Commission should consider?

7. Incorporation of standards into existing SEC disclosure requirements

a. What is the best approach for requiring climate-related disclosures? For example, should any such disclosures be incorporated into existing rules such as Regulation S-K or Regulation S-X, or should a new regulation devoted entirely to climate risks, opportunities, and impacts be promulgated?

See response to question 1"

"In the United States, the SEC's Regulation S-K provides disclosure requirements for publicly traded firms. They are required to disclose, through annual or other public filings, known trends, events, or uncertainties that are "reasonably likely to have a material effect" on the firm's financial condition or operating performance. Information is material if there is a substantial likelihood that a reasonable investor would consider it important in making an investment decision.

"In response to a petition from 22 institutional investors and other organizations managing more than $1.5 trillion in assets, the SEC in January 2010 published, Commission Guidance Regarding Disclosure Related to Climate Change (the SEC Guidance or Guidance). It interprets SEC disclosure requirements, as they apply to business or legal developments relating to climate change (SEC, 2010). In addition to the review of the applicability of requirements under Regulation S-K to climate risks, the Guidance also discussed several topics that represent "some of the ways climate change may trigger disclosure required by these rules and regulations" and which "a registrant may need to consider" (SEC, 2010, p. 22). These include the impacts of legislation and regulation, international accords, indirect consequences of regulation or business trends, and the physical risk of climate change.

"The SEC Guidance discussed disclosure requirements applicable to material climate risks: Description of Business, Legal Proceedings, Risk Factors, Management's Discussion and Analysis, and Foreign Private Issuers. The Guidance also addressed disclosure in financial statements, where the SEC noted that "[i]n addition to the Regulation S–K items discussed in this section, registrants must also consider any financial statement implications of climate change issues in accordance with applicable accounting standards, including Financial Accounting Standards Board [(FASB)] Accounting Standards Codification Topic 450, Contingencies, and FASB Accounting Standards Codification Topic 275, Risks and Uncertainties" (SEC, 2010, p. 22).

"The Sarbanes-Oxley Act of 2002 also set out requirements related to corporate disclosure that have resulted in rulemaking by the SEC. Section 302 of the law discusses disclosure controls, including the requirement to establish, maintain, and regularly evaluate the effectiveness of the issuer's disclosure controls and to have corporate officers certify that such controls are in place (SEC, 2002). Building on this, Exchange Act Rules 13a-14 and 15d-14 require that the issuer's principal executive officer and principal financial officer certify that the financial statements and other financial information included in the report do not omit a material fact. The purpose of the

rules is to avoid misleading quarterly and annual reports and ensure the fair presentation in all material respects of the financial condition, results of operations and cash flows of the issuers.

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“To the extent climate risk is material to an issuer, Section 302 of Sarbanes-Oxley applies. The SEC’s 2010 climate disclosure guidance points this out and discusses management’s obligation, when determining materiality, to “consider all relevant information even if that information is not required to be disclosed” and “consider whether they have sufficient disclosure controls and procedures to process this information” (SEC, 2010, p. 19).

“The impact of the 2010 Guidance has been limited. A report by the GAO found that ‘[c]limate-related disclosures vary in format because companies may report similar climate-related disclosures in different sections of the annual filings,” which may result in “SEC reviewers and investors [finding] it difficult to navigate through the filings to identify, compare, and analyze climate-related disclosures across filings…’ (GAO, 2018, p. 19).” The report also found that “climate-related disclosures in some companies’ filings use boilerplate language, which is not specific to the company, and information is unquantified,” thereby limiting the utility of the information to investors (GAO, 2018). While the SEC has not updated the guidance since it was issued in 2010, global expectations for increasingly sophisticated and robust climate risk disclosure in financial filings have grown.

“The quality of climate disclosure in the United States by issuers largely remains inadequate for the needs of investors (Mahoney and Gargiulo, 2019). Disclosure in SEC filings has been inadequate, in part, because materiality under U.S. law is often interpreted as limiting required disclosure to short- and medium-term risks, and firms may have assumed that climate risks are relevant only over longer time horizons. However, different firms and industries may have different time horizons over which climate risks are deemed material, taking into account factors like the economic life of assets, the percentage of valuation that can be attributed to future growth, the nature of climate-related risk exposure, and corporate strategy. Physical risk exposure of a company or industry may fall somewhere between near-term acute shocks and long-term chronic stresses. These factors should be evaluated when determining which climate risks—including medium- to long-term transition risks—are material and should be included in SEC filings.

“Moreover, even in the case of long-term physical and transition risks, investors have asked the SEC to consider the perspective of shareholders investing for the long-term benefit of their beneficiaries. For example, the California Public Employees' Retirement System (CalPERS), the

second largest pension fund in the United States, “urge[d] the SEC” to consider improvements to its disclosure regime, including “clarifying the definition of materiality to reflect long-term investor needs” (Hoffner, 2016). Guidance published by BlackRock (the largest asset management firm in the United States) and CalPERS for engaging the companies they own make clear their emphasis on long-term value creation and their need for climate risk disclosures to ensure that value is sustained (CalPERS, 2019; Fink, 2020).” (pp.92-94)

“Financial filings should include disclosure of any material financial risks from climate change in a consistent but non-boilerplate manner, as well as a qualitative description of how firms assess and monitor for potential changes in climate risks that may become material. (R.7.2, p.132)”

b. Should any such disclosures be filed with or furnished to the Commission?

8. Inclusion of governance and oversight information for climate-related issues

a. How, if at all, should registrants disclose their internal governance and oversight of climate-related issues? For example, what are the advantages and disadvantages of requiring disclosure concerning the connection between executive or employee compensation and climate change risks and impacts?

“Financial supervisors should require bank and nonbank financial firms to address climate-related financial risks through their existing risk management frameworks in a way that is appropriately governed by corporate management. That includes embedding climate risk monitoring and management into the firms’ governance frameworks, including by means of clearly defined oversight responsibilities in the board of directors. (R.4.7, p.125)

“Recommendation 5.3: Financial regulators should proactively encourage capacity building for climate risk management. This should be consistent with the education and training practices supported by agencies in implementing the Sarbanes-Oxley Act of 2002. It should align with and aid in meeting regulator expectations around embedding climate risk in governance frameworks. (R.5.3, p.70)

9. Adoption of a global set of standards

a. What are the advantages and disadvantages of developing a single set of global standards applicable to companies around the world, including registrants under the Commission’s rules, versus multiple standard setters and standards?

“[M]anaging climate-related financial risks requires close attention to the unique circumstances of the United States. They include the idiosyncrasies of our complex system of financial regulation,

as well as existing and proposed legislation. It also must take into account the central role that the private sector plays in our financial system, and the importance of consultation and collaboration between the private and public sectors in the design of new policies. (Ch1, p.2)

“Given the inadequacy of the current climate risk disclosures, U.S. regulators should build on their global counterparts’ models and issue rules for climate risk disclosures. They should monitor the rules for effectiveness. Such action by regulators would be directly responsive to market demand for enhanced climate disclosure (Ch.7, p.97)

“In developing and implementing the recommendations below, financial regulators and the entities they oversee should consult with stakeholders, including investors, businesses, global peers, and other market intermediaries to create a U.S. climate disclosure regime. They also should closely coordinate with international bodies and foreign regulators to ensure the U.S. regime is aligned internationally. Because the understanding of climate risk remains at an early stage, any regulatory approach to climate-related disclosure should evolve in line with emerging best practices. (Ch.7, p.98)

“Encourage domestic and global coordination across regulators to provide a coherent approach. This is an overarching theme of this report and especially applicable to the use of scenarios for risk management. Requiring entirely different stress scenario exercises from institutions operating under different jurisdictions would be costly while generating uncertain value. Harmonizing requirements and prioritizing practical, actionable exercises where feasible would be useful. The high costs associated with multiple regulatory regimes is a lesson of post-financial crisis regulation that can be applied now to climate risk. (R.6.8, p.130)

b. If there were to be a single standard setter and set of standards, which one should it be?

c. What are the advantages and disadvantages of establishing a minimum global set of standards as a baseline that individual jurisdictions could build on versus a comprehensive set of standards?

“Provide analytical discretion, to the extent practicable, as long as regulatory needs for consistency and comparability are met. Given the many unknowns and complexities inherent in modeling the economy, climate change science, and policy, regulated entities will need some discretion in how they perform their analysis based on the prescribed scenario. On the other hand, regulators need consistent approaches across firms so they can ensure risks are responsibly analyzed and reported. Investors would benefit from better comparability across scenario-related disclosures. To achieve a balance across these needs, regulators, in consultation with the firms they regulate, should specify key assumptions, scope, and the outputs they expect. As long as regulators’ prescribed expectations are satisfied, regulators should allow financial institutions to provide additional context and analysis informed by the nature and complexity of their business. (R.6.7, p.129)

d. If there are multiple standard setters, how can standards be aligned to enhance comparability and reliability?

"Recommendation 5.1: Financial regulators, in coordination with the private sector, should support the availability of consistent, comparable, and reliable climate risk data and analysis to advance the effective measurement and management of climate risk.

- Regulators and financial institutions should support the range of platforms for climate data and analysis, including improving public access to governmental data and expertise that can enable climate risk management. They should also support new and existing open source platforms, as well as proprietary efforts to develop new climate risk datasets and tools that leverage innovative technologies. (R.5.1, p.70)

"Regulators should closely monitor international experience with climate risk stress testing of banks and insurers and apply relevant lessons to the U.S. context. U.S. regulators should engage in international forums, such as the NGFS, to ensure that climate risk stress testing conducted in the United States is comparable to similar exercises in other jurisdictions and avoid duplicative exercises for institutions with a multi-jurisdictional footprint. (R.4.9, p.125)

"Standardized Definitions: A common set of definitions for climate risk data—including modeling and calculation methodologies—is important for developing consistent, comparable, and reliable data. For data to be decision useful, it is necessary to know which climate-related variables materially impact the performance of markets, countries, sectors, asset classes, companies, projects, and securities, and how these variables interact. While these interactions often defy analysis, the ambition to better understand them remains. These fundamental research questions inform what data should be disclosed, including unit of measurement, frequency, and format. Common definitions for climate risk data include reporting formats and calculation methodologies that can help mitigate limitations. However, lack of standards, and differences among standards, can create barriers to climate risk management. Voluntary disclosure frameworks, as described in Table 7.1, have helped significantly, but in the aggregate these frameworks identify more than 165 potentially "material" metrics, an overwhelmingly large number for many financial institutions. In some cases, different units of measure are stipulated for similar metrics across frameworks. Organizations are actively working to address some of these standards issues, but further work is needed. (Ch.5. p.60)

e. What should be the interaction between any global standard and Commission requirements?

f. If the Commission were to endorse or incorporate a global standard, what are the advantages and disadvantages of having mandatory compliance?

"The TCFD's most recent status report included a review of reporting by more than 1,100 companies from 2016 to 2018, and found that, while disclosure rates were increasing, surveyed companies only made, on average, 3.6 of the 11 total TCFD recommended disclosures (TCFD,

2019b). An analysis of Russell 3000 companies found that 30 percent discussed climate change as a risk in their 10-K filings, but only 3 percent of companies discussed climate risks in the MD&A section of those filings (Rozin, 2019). [...] For all industries in which climate risk is material, the lack of comprehensive and comparable disclosure not only poses a challenge to investors seeking to assess, manage, and mitigate climate risk, but it also impedes the ability of disclosing organizations to inform their strategic responses to climate risk by benchmarking their performance against peer organizations. [...] Given the disparity in the quality and extent of disclosures under the existing regime, clearer and more consistent guidance as well as mandatory disclosure requirements may be needed for climate risk disclosure that covers materiality assessments. (Ch.7. p.91-92)

“A mandatory, standardized disclosure framework for material climate risks, including guidance about what should be disclosed that is closely aligned with developing international consensus, would improve the utility and cost-effectiveness of disclosures. (Ch.7, p.131)

10. Audit and assurance of disclosures

- **a. How should disclosures under any such standards be enforced or assessed? For example, what are the advantages and disadvantages of making disclosures subject to audit or another form of assurance?**
- **b. If there is an audit or assurance process or requirement, what organization(s) should perform such tasks?**
- **c. What relationship should the Commission or other existing bodies have to such tasks?**
- **d. What assurance framework should the Commission consider requiring or permitting?**

11. Additional reliability measures

- **a. Should the Commission consider other measures to ensure the reliability of climate-related disclosures? Should the Commission, for example, consider whether management’s annual report on internal control over financial reporting and related requirements should be updated to ensure sufficient analysis of controls around climate reporting?**
- **b. Should the Commission consider requiring a certification by the CEO, CFO, or other corporate officer relating to climate disclosures?**

12. Adoption of "comply or explain" framework

a. What are the advantages and disadvantages of a "comply or explain" framework for climate change that would permit registrants to either comply with, or if they do not comply, explain why they have not complied with the disclosure rules?

"As described in response to question 3, as long as regulators' prescribed expectations are satisfied, regulators should allow financial institutions to provide additional context and analysis informed by the nature and complexity of their business. (R.6.7, p.129)

"Article 173 of France's Energy Transition Law lays out climate disclosure requirements for both listed companies and investors. The regulation uses a "comply or explain" approach that provides flexibility for how firms disclose their risks. Additionally, Article 173 calls for an assessment of reporting progress made during its first two years. This review may lead to more explicit guidance on reporting methodologies. Similar models are being explored by Spain and Sweden, among others. (Ch.7, p.96)

b. How should this work? Should "comply or explain" apply to all climate change disclosures or just select ones, and why?

13. Inclusion of a discussion section

a. How should the Commission craft rules that elicit meaningful discussion of the registrant's views on its climate-related risks and opportunities?

"As earlier chapters of this report have shown, the physical and transition risks of climate change are increasingly material to firms, investors, and the U.S. economy. When climate-related issues materially impact a firm's underlying operations and capital investments, the firm's financial statements should address them. When these issues pose material risks to firms, other sections of financial filings, such as Management's Discussion and Analysis, Risk Factors, and Description of Business (collectively, MD&A), should address them. (Ch.7, p.87)

"Regulators should consider additional, appropriate avenues for firms to disclose other substantive climate risks that do not pass the materiality threshold over various time horizons outside of their filings. Regulators should consider that a growing number of companies are creating greenhouse gas reduction targets and strategies out to the year 2035 or 2050, and targeted disclosure related to these items may be appropriate to facilitate robust efforts toward this positive trend. (R.7.3, p.132)

b. What are the advantages and disadvantages of requiring disclosed metrics to be accompanied with a sustainability disclosure and analysis section similar to the current Management's Discussion and Analysis of Financial Condition and Results of Operations?

"Provide analytical discretion, to the extent practicable, as long as regulatory needs for consistency and comparability are met. Given the many unknowns and complexities inherent in modeling the economy, climate change science, and policy, regulated entities will need some discretion in how they perform their analysis based on the prescribed scenario. On the other hand, regulators need consistent approaches across firms so they can ensure risks are responsibly analyzed and reported. Investors would benefit from better comparability across scenario-related disclosures. To achieve a balance across these needs, regulators, in consultation with the firms they regulate, should specify key assumptions, scope, and the outputs they expect. As long as regulators' prescribed expectations are satisfied, regulators should allow financial institutions to provide additional context and analysis informed by the nature and complexity of their business. (R.6.7, p.129)

14. Relationship to the private sector

a. What climate-related information is available with respect to private companies, and how should the Commission's rules address private companies' climate disclosures, such as through exempt offerings, or its oversight of certain investment advisers and funds?

15. Incorporation of climate-related standards into a broader ESG framework

a. In addition to climate-related disclosure, the staff is evaluating a range of disclosure issues under the heading of environmental, social, and governance, or ESG, matters. Should climate-related requirements be one component of a broader ESG disclosure framework?

b. How should the Commission craft climate-related disclosure requirements that would complement a broader ESG disclosure standard?

c. How do climate-related disclosure issues relate to the broader spectrum of ESG disclosure issues?

As stated in publicly available materials, OS-Climate's near term focus is on climate-related data, however the longer term roadmap extends to water, biodiversity, social justice, and other ESG factors.