December 2020

Climate Finance Markets and the Real Economy

Sizing the Global Need and Defining the Market Structure to Mobilize Capital

Extract containing Executive Summary & Call to Action. Please see link for full report.

BCG BOSTON CONSULTING GROUP

gfma GLOBAL FINANCIAL MARKETS ASSOCIATION

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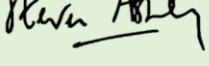
Foreword

Climate change poses economic and financial risks to the global economy. Efforts to mitigate against these risks and adapt to the changing climate will require a fundamental transformation of our global economy. The climate finance market structure must grow at an unprecedented scale, speed, and geographic scope, and this will require concerted and coordinated action by all stakeholders—the public sector, the real economy sectors, the financial sector, and the social sector. This report provides a roadmap (see section 5) for how to accelerate the evolution of climate finance and defines the roles capital market participants can play to facilitate this transition. Taken together, the recommendations enable the development of the climate finance market to grow to the $3–5 trillion+ of investment per year that this report estimates will be required to achieve the ambitions set out in the Paris Agreement.

This report was commissioned to Boston Consulting Group (BCG) by the Global Financial Markets Association (GFMA) with active contribution by GFMA member firms representing capital markets activities globally. Written jointly by GFMA and BCG and advised by contributing member firms (listed on the right), the report is based on interviews conducted with more than 100 market participants globally, during the third quarter of 2020.

GFMA represents the common interests of the world's leading financial and capital market participants to provide a collective voice on matters that support global capital markets. It also advocates on policies to address risks that have no borders, regional market developments that impact global capital markets, and policies that promote efficient cross-border capital flows to end users. GFMA efficiently connects savers and borrowers, thereby benefiting broader global economic growth. The Association for Financial Markets in Europe (AFME) located in London, Brussels, and Frankfurt; the Asia Securities Industry & Financial Markets Association (ASIFMA) in Hong Kong; and the Securities Industry and Financial Markets Association (SIFMA) in New York and Washington are, respectively, the European, Asian, and North American members of GFMA.

The cooperation of a representative global subset of our contributing member firms and individuals, as well as large corporates, asset managers, and climate think tanks that contributed their time toward the interviews and data gathering that form the basis of this report is greatly appreciated.



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Executive Summary

The Global Financial Markets Association (GFMA) and Boston Consulting Group's (BCG) report "Climate Finance Markets and the Real Economy" provides a roadmap for how to accelerate the evolution of climate finance, and defines the role capital market participants can play to facilitate the transition to a low-carbon economy in line with their responsibilities to serve clients, investors, and the societies in which they operate. Taken together, the recommendations included within this report enable the development of the climate finance market to grow to the $3–5 trillion+ of investment per year that this report estimates[1] will be required to achieve the ambitions set out in the Paris Agreement.

A $100–150T+ investment need

The Paris Agreement calls for measures that will limit the global temperature rise to below 2°C from pre-industrial levels, and to pursue efforts to limit it to 1.5°C.[2] Achieving this will require a fundamental transformation of our global economy.

The Banking and Capital Markets sector plays a critical role in this transformation as an intermediary between the supply and demand for capital—as a lender, arranger, and investor. Success in mobilizing both public and private capital by the Banking and Capital Markets sector to finance climate transition pathways will only be achieved by a holistic, complementary set of actions taken by the public sector, the social sector,[3] the real economy, and the broader financial sector at an accelerated pace and larger scale in the early part of this decade. According to the Intergovernmental Panel on Climate Change (IPCC), there is a finite budget remaining for additional emissions, ranging from 420 to 580 $GtCO_2$,[4] which—to stay within this budget—will require emissions to decline from the current 53 $GtCO_2e$ emissions[5] per year by more than 50 percent by 2030[6] and to net zero[7]

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[1] Additional external references on investment estimates: UNEP $1.5T; TCFD ~$1T; IRENA $3.8T; $1.6–3.8T as per IPCC for energy systems alone; OECD estimates $6.9T per year over next 15 years for <2°C for new infrastructure.

[2] In this report, a reference to "Paris-aligned" or "Paris ambition" or "Paris ambition-aligned" refers to an ambition of pursuing efforts to limit global temperature rise to 1.5°C.

[3] Public sector includes multilateral organizations, development finance institutions; Social sector includes philanthropic donors, civil society and other Non-Governmental Organizations (NGOs).

[4] Source: The Fifth Assessment Report of the United Nations Intergovernmental Panel on Climate Change.

[5] Carbon dioxide-equivalent emissions, a measure used to compare the emissions from various greenhouse gases based on their global warming potential.

[6] The Special Report on 1.5°C (SR15) released by the IPCC in 2018 confirmed that "In model pathways with no or limited overshoot of 1.5°C, global net anthropogenic CO_2 emissions decline by about 45% from 2010 levels by 2030 (40–60% interquartile range), reaching net zero around 2050 (2045–2055 interquartile range)."

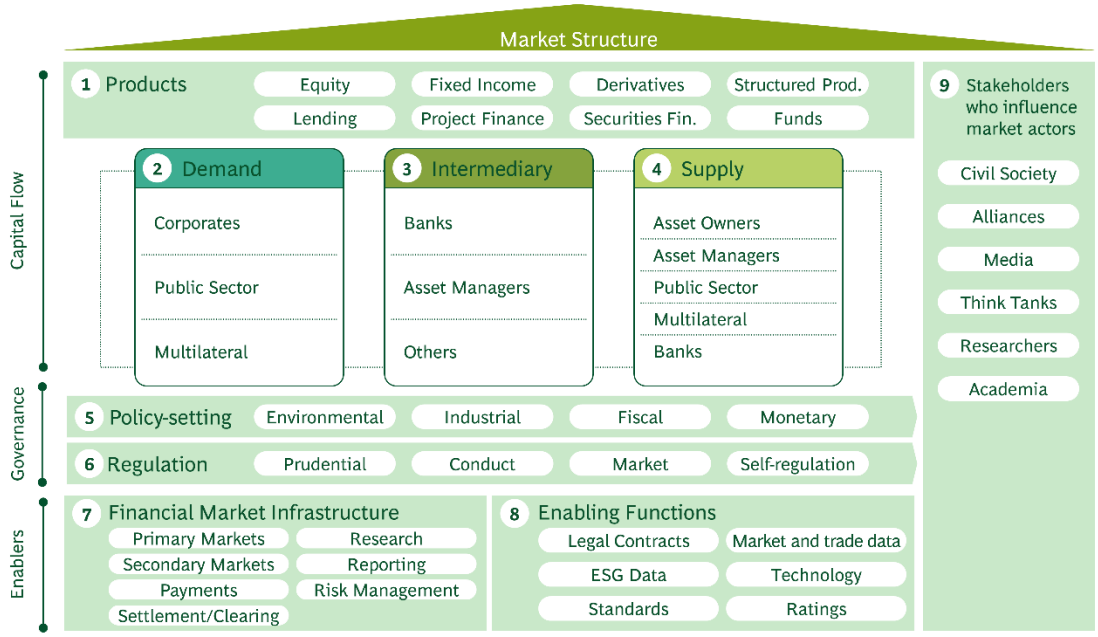
[7] IPCC definition of net zero: a global balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases.

emissions by 2050. To further emphasize the materiality to the real economy, more than 20 percent of global GDP could be at risk as a result of climate change-related impacts through physical changes in the environment by 2100.[8]

A key conclusion of this report is that the climate finance[9] market structure (CFMS) must grow at an unprecedented scale, speed, and geographic scope. The volume of Climate-Aligned Finance (i.e., the financing that focuses on enabling climate change mitigation) that will be necessary to achieve a scenario of limiting temperature rise to 1.5° Celsius will have to grow to over $100–150 trillion[10] cumulative in the next three decades, representing an average investment of $3–5 trillion+ per year globally for decarbonization of 10 sectors that represent 75 percent of global emissions.

Defining Climate Finance Market Structure (CFMS)

The term "Climate Finance Market Structure (CFMS)" is used to collectively define the range of financial market participants, products and financial instruments, policies and regulations, financial market infrastructure, and other enablers (e.g., legal contracts) that support capital markets activity for climate finance.

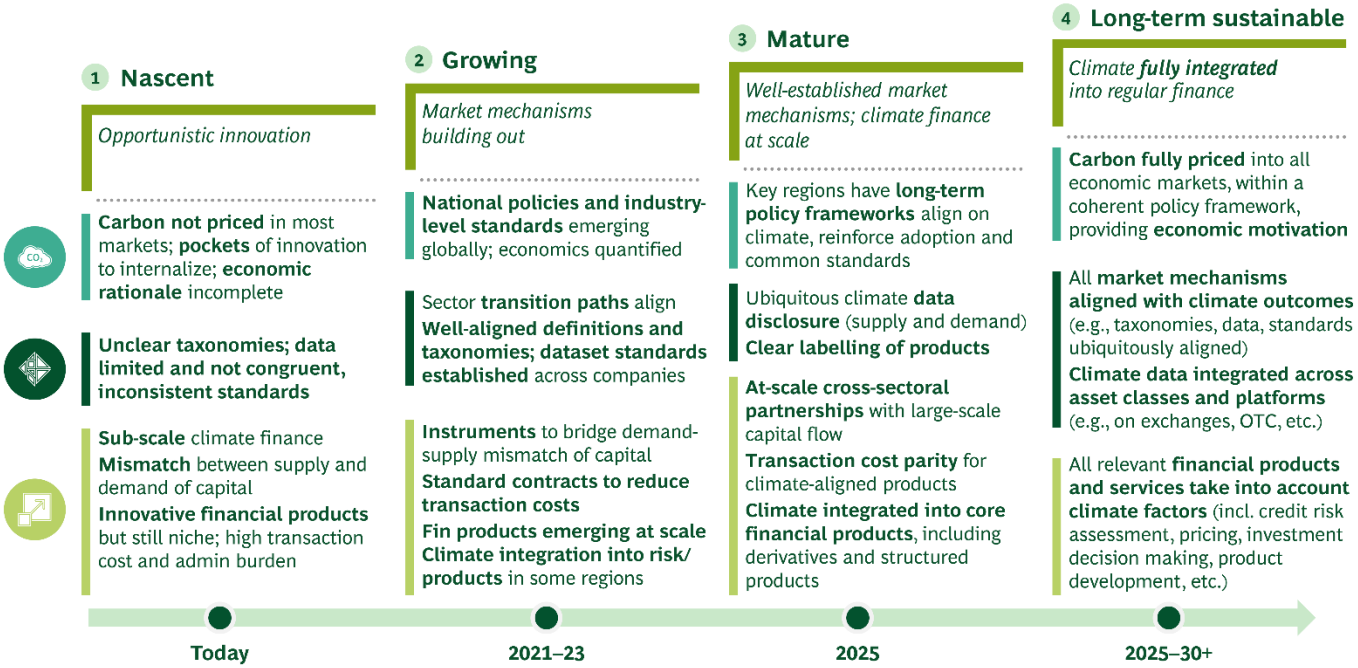


[8] As per a 2020 study by Oxford Economics.

[9] Climate Finance is defined as financing that supports the transition to a low-carbon and climate-resilient economy by enabling both climate change mitigation actions, especially the reduction of greenhouse gas emissions, and climate change adaptation actions promoting climate resilience of infrastructure and social and economic assets.

[10] The market sizing in this report is on financing needs associated with mitigation (climate-aligned finance), but the recommendations cover aspects related to both climate mitigation and adaptation. Market sizing covers 10 sectors that account for ~75% of global GHG emissions. The sections on sector insights and associated annexes provide details on data sources and assumptions that underpin the estimates.

Capital Markets Vision: Evolution of Climate Finance Market Structure (CFMS)



The current market for climate finance is estimated to be approximately $600 billion,[11] implying that an increase of more than five to eight times in the short term will be needed to support transition pathways to a low-carbon economy. The climate finance needs are also not linear over the next three decades—lack of urgent action today will result in significantly higher need for climate adaptation and mitigation investments in the future. The CFMS needs to evolve quickly, based on the recommendations within this report, to enable the significant climate finance need of $3–5 trillion+ per year (~25 percent of the estimated $15 trillion a year aggregate global financing pool) to be met.[12] This is achievable, but will require significant near-term action. It can be noted that the Banking and Capital Markets sector has made significant public commitments toward climate goals. This includes a range of commitments from banks to align portfolios with transition pathways to net zero by 2050, and/or financing targets linked to sector-specific sustainability considerations wherein banks have market expertise to help fast-track change. For example, an analysis of sustainable finance commitments made by banks globally shows at least $4 trillion worth of sustainable finance

[11] Market estimated, on average over a two-year period 2017/2018, at $579 billion, as per Climate Policy Initiative.

[12] Global financing pool is an estimate of aggregate debt, equity, and loans issued in a year (not outstanding).

commitments have been made for varying time frames (typically over the next 5–10 years), which translates to approximately $700 billion in terms of annual commitments toward sustainable finance.[13] The scale of financing needed urgently requires all actors to work together to aggressively unblock capital flows for climate finance needs.

A key risk to the scaling of the climate finance market is for policymakers and broader society to consider the role of financial market participants and the financial regulatory framework *independently* from the changes required in the broader economy and economic policy frameworks. Overreliance on financial regulation—rather than a holistic roadmap including economy-wide actions—to mobilize capital for climate finance and/or the use of financial regulation as a means of incentivizing change in the real economy could result in financial institutions being unable to support real-economy actors in the transition. Such risks include financing being directed at counterparties that are still economically uncompetitive due to an absence of carbon pricing and a lack of viable transition pathways for existing counterparties to begin their transitional activities. At worst, this could lead to substantial mis-pricing and financial stability risks, which would undermine the long-run ability of the financial system to direct finance to support region- and sector-specific transition pathways.

Five Imperatives for Serving Investment Needs of the Real Economy

(further details in section 3)

1. The Need for Climate Finance to Scale for ALL Asset Classes: Climate finance needs to be raised with a mix of instruments—an estimated 35 percent in equity, 44 percent in loans, and 21 percent in bonds.[14] While the markets for green bonds and loans, which rely on allocating capital based on designated "use of proceeds," has scaled significantly, this mix highlights the need to scale to other asset classes including equity, structured finance, and bank-intermediated lending while clearly connecting capital market activities, such as derivatives and securities lending, to climate-related metrics and outcomes. The inclusion of sustainability-linked instruments would also expand the potential financing options to align private finance with Paris-aligned temperature goals. But there is a growing recognition that the scale of financing will largely be sourced from vanilla equity and debt, rather than just "green label" instruments. Further, the development of financing structures to mobilize risk

[13] Includes public commitments made by Goldman Sachs, JPMorgan Chase, Morgan Stanley, Citi, Wells Fargo, Bank of America, RBC, BMO, BNP Paribas, NatWest, HSBC, Societe Generale, Nomura, Deutsche Bank, Barclays, and Standard Chartered—within the last two years.

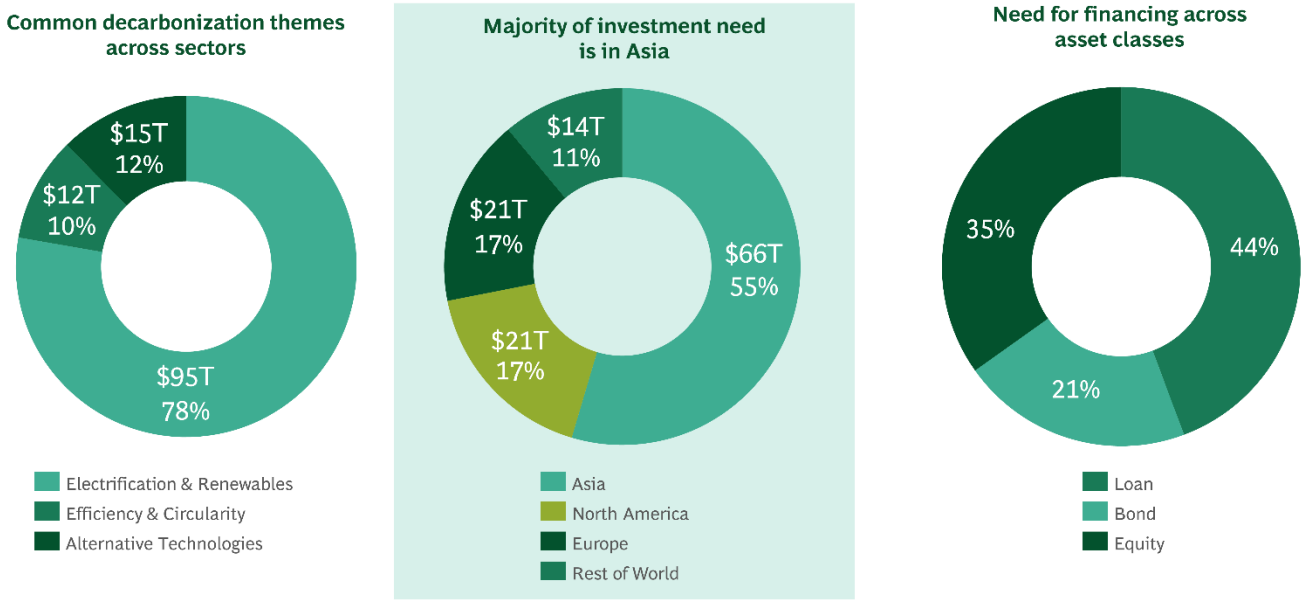
[14] This has been estimated based on the expected mix in North America, Europe, and Asia.

and equity capital for climate finance is necessary, requiring more risk-taking and patient capital to fund investments in early stage technologies and emerging markets.

2. The Imperative for Global Public Sector Leadership: Across several sectors, many decarbonization solutions are sub-scale and/or not cost competitive with conventional technologies absent a carbon price. Specifically, greenhouse gas (GHG) emissions are currently not sufficiently priced into markets, reducing the business case for investments that are required to accelerate the transition to a low-carbon economy. Low-carbon technologies are competing on an uneven playing field with legacy and frequently subsidized high-carbon activities. Policymakers will need to address this market failure by establishing sufficiently representative pricing, intentionally aligned carbon price levels, incentives supporting decarbonization, and environmental and industrial policies that align with reaching climate objectives. There is also a critical need for high-risk, patient capital for investments in sectors wherein decarbonization is dependent on technologies that are still in earlier stages of development, such as Iron & Steel, Heavy Road Transport, and Shipping. This will require the deployment of public capital in combination with private funding and innovative risk-sharing structures to support investment needs.

3. The Most Significant Regional Investment Demand, Estimated at $66 Trillion, Is in Asia: This is driven to a large extent by the scale and pace of growth of Asia's economies, growing population, increasing urbanization, and rapid industrialization. For example, in sectors such as Shipping, a large part of the merchant fleet is owned by Asian investors or entities, and sectors such as Iron & Steel have large and growing markets given large-scale infrastructure development. This demand will require the development of more efficient and at-scale capital markets that support global mobilization of climate-aligned capital. There is expected to be a significant dependency on bank-intermediated lending in these markets. Further, mobilizing capital at this scale in Asia is likely to be challenging given COVID-19-related economic strains and constraints on institutional investor risk appetite for exposure to some emerging markets. Financial innovation in Asia may facilitate global funding channels as Asian markets open to foreign investors.

Summary of Investment Need



Loans includes different types of loan financing structures such as bilateral lending, project finance, syndicated lending, etc.
Source: BCG Analysis

4. The Largest Sectoral Investment Need (~$95T) Is for Electrification of Technologies and Processes, and the Corresponding Switch from Fossil-Fuel-Based Power to Renewable Power: This need is present in, for example, the Light and Heavy Road Transport, Buildings, and Power sectors. This represents a shift in energy systems away from traditional energy sources such as fossil fuels toward renewable energy. End-use sectors (such as Iron & Steel, Chemicals, Light/Heavy Road Transport, Shipping, Aviation, and Buildings) have traditionally leaned on conventional fuel sources such as oil, gas, and coal. The decarbonization of these sectors involves large-scale electrification, coupled with a shift in the Power sector toward renewable energy, and associated strengthening in grid flexibility and reliability (e.g., with deployment of energy storage) in order to realize emissions reductions. This electrification could also test many of the planet's limitations in new ways—for example, space for new infrastructure, raw materials, and recycling of end-of-life project waste. There is also a significant role across sectors for alternative technologies such as clean hydrogen and carbon capture. Meeting the financial needs of these decarbonization levers will require not only a significant scaling of the climate finance market but also changes in financial solutions and partnership models and the growth of new industries. However, it should be noted that while we pursue the collective ambition of a decarbonized global economy, it will require significant

technological advances—and the hydrocarbon sector will continue to play a critical role during this transition process.

5. A Collaborative Multi-sector Effort to Address Transversal Risks and Opportunities: Ten sectors[15] account for approximately 75 percent of global GHG emissions. Decarbonization of these sectors will require development of new business models, investment, and collaboration across sectors. For example, the Energy sector is expected to play a critical role in the decarbonization of industry and transport through renewable electricity, alternative fuel production, and management of carbon capture utilization and storage (CCUS) sites. The development of an at-scale clean hydrogen industry will be essential to decarbonize sectors such as Iron & Steel, Heavy Road Transport, Aviation, and Shipping. Traditional industry sector boundaries will be stretched and leading firms will have to traverse across different sectors—for example, battery storage and mining. This will require large-scale cross-sectoral collaborations, mergers and acquisitions, and/or investments across all sectors over the period of transition.

Recommendations to Scale the Climate Finance Market Structure

Achieving the pace and scale of growth in climate finance will require fundamental changes to the current financial market structure to enable the needed efficiency, transparency, and scalability to address climate risks. This will require concerted and coordinated action by all stakeholders—the public sector, the real economy sectors, the Banking and Capital Markets sector, private and institutional investors and asset managers, and the social sector—to support the development of the CFMS.

The following capital markets participants' recommendations highlight an integral set of priority actions that, taken together, help facilitate the development and future of the CFMS. They were identified through interviews of 100+ capital markets leaders (comprising banks, investment banks, investors and asset managers, corporates, financial market infrastructures, innovators, standard-setting bodies, multilaterals, and regulators) during Q3 of 2020.

[15] Power, Iron & Steel, Chemicals, Cement, Aviation, Shipping, Light Road Transport, Heavy Road Transport, Aviation, Shipping, Agriculture, and Buildings—these sectors have been included in the analysis in this report.

#1 (detailed in section 4.1.1): We recommend that **governments establish legally enforceable, comprehensive, and sufficiently high levels of GHG-emissions pricing ("carbon pricing") mechanisms such as a GHG tax or trading schemes**, with explicit forward-looking direction on price levels, implemented in a way that respects a "just transition," minimizing social and economic costs for those least able to bear them.

- Currently, GHG emissions, the externality of carbon-fueled products and services, are not sufficiently priced into markets and the real economy, adversely impacting the business case for investments that are required to accelerate the transition to a low-carbon economy and creating a major market failure. Low-carbon alternatives are competing on an uneven playing field with legacy high-carbon activities that at times benefit from government subsidies.

- **Addressing this market failure requires both swift action to establish a sufficiently high and internationally aligned carbon price in the short term and increases in future carbon price levels to incentivize investment in low-carbon technologies today.** At the same time, this not a complete solution. For several hard-to-abate sectors, carbon pricing alone is insufficient, as the abatement costs, based on current technologies, exceed the typical levels that have been achieved by carbon pricing. The High-Level Commission on Carbon Prices suggested a carbon price in the range of $40–80/t in 2020 rising to $50–100/t by 2030 for a 2°C target. **Current carbon pricing schemes only cover ~22 percent of global GHG emissions,[16] with almost half of them priced at less than $10/t$CO_2$e.** Where needed, governments should evaluate the establishment of carbon border adjustment mechanisms to provide a level playing field for trade and to prevent carbon leakage, in close consultation with industry and in a manner that accounts for differences in transition pathways between countries.

- For most countries, the cost of inaction and the economic opportunities from climate action are likely to be significant. A country-level benefit of (often) 1+ percent of GDP[17] is estimated in addition to the collective, global business case of avoiding the 20+ percent GDP downside[18] triggered by global warming.

[16] World Bank State of Carbon Pricing 2020.

[17] BCG publications: "The Economic Case for Combating Climate Change," "Flipping the Script on Climate Action."

[18] As per a 2020 study by Oxford Economics in a scenario of global warming of 3°C by 2100.

#2 (detailed in section 4.1.2): We recommend that **governments commit to and implement effective and proportionate policies, fiscal programs, and legislative action** that will support achievement of the targets established in the Paris Agreement.

- **Stronger global goals on GHG emissions should be established**, together with appropriate corresponding transition pathways. Governments should commit to targets for their jurisdictions that align with Paris Agreement ambitions of limiting global warming this century to 1.5°C above pre-industrial levels, and translate these targets into national/regional environmental policies, industrial/sectoral policies, and fiscal and monetary programs. These policies, programs, and incentives should support and accelerate the development of low-carbon technologies needed to achieve Paris Agreement targets, several of which are not yet commercially viable. Further, governments should align their COVID-19 recovery funding and economic stimulus packages to pursue inclusive, sustainable, and green recovery—for example, given ongoing relief efforts from governments for the Aviation sector, they should consider including emissions targets and other covenants within COVID-19 relief packages in order to accelerate decarbonization.

#3 (detailed in section 4.1.3): We recommend that **governments and national/multilateral development banks motivate the mobilization of private sector capital through blended public/private finance solutions**.[19]

- There are three sources of risk that are disproportionately limiting the scale of the climate finance market. First, across several sectors, decarbonization solutions (e.g., production of low-carbon gases such as green hydrogen) are sub-scale and/or are not cost competitive with conventional technologies absent a carbon price. Second, several projects are not yet at scale and are small in number, leading to a lower overall volume of capital flow and need. This introduces barriers to attracting investors, particularly institutional investors that consider liquidity or minimum ticket sizes for rendering their investments economical. Third, financing of climate action in emerging markets is further constrained by sovereign, currency, and political risk factors.

- In order to de-risk capital outlay, concessionary capital (e.g., from public or private sources) must be deployed to mobilize additional capital for investment needs. **The public sector**

[19] Blended finance is defined as the use of catalytic capital from public sector or philanthropic sources to increase private sector investment in sustainable development. Source: Convergence Blended Finance.

should dramatically scale up the supply of catalytic capital[20] to mobilize private sector capital and enable long-dated higher-risk capital flow. Further, government sponsorship of research and development, in combination with private sector capital and expertise (venture capital and private equity), can accelerate the development and commercialization of innovative technologies for a low-carbon economy.

#4 (detailed in section 4.1.4): We recommend financial education and climate finance risk awareness building at an executive level to support corporates' ability to actively prioritize and accelerate their own preparations for a low-carbon future, embedding this as a strategic imperative for their boards and senior management.[21] The Banking and Capital Markets sector will be an important partner to corporates to both help navigate the risks and opportunities of climate change and mobilize appropriate financing solutions.

- Many industries and corporates are at different stages of understanding the implications of climate change on their business models and processes—both from a transition and physical risk perspective. Heightened expectations of institutional investors are driving the financial materiality of climate related risks and opportunities. Leading companies are taking measures such as building strong accountability through boards and senior executives, establishing internal carbon pricing, and investing in innovation. Growth in demand for financing of climate mitigation efforts by corporates, especially those with higher exposure to climate-related risks and opportunities, is an essential component for the development of more efficient and at-scale CFMS that supports global mobilization of climate-aligned capital.

#5 (detailed in section 4.1.5): We recommend that corporates and their industry associations coordinate and collaborate with the scientific community, standard-setting bodies, financial institutions, and governments to accelerate the development and alignment of sector- and region-specific transition pathways to achieve Paris Agreement climate goals, including viewpoints on where there is still evolution expected.

- The IPCC has determined global carbon budgets and pathways to achieving a 1.5°C target. The translation of this global budget into sector- and region-specific budgets and pathways is a crucial next step that is yet to be aligned. Alignment on these pathways will help deliver the clarity needed to drive climate action at scale from the real economy, and further enable

[20] Catalytic capital is defined by the MacArthur Foundation as “debt, equity, guarantees, and other investments that accept disproportionate risk and/or concessionary returns relative to a conventional investment in order to generate positive impact and enable third-party investment that otherwise would not be possible.”

[21] In this report the term "corporate" refers to non-financial companies.

the creation of taxonomies and benchmark standards for climate finance. Transition pathways should be based on inherent structural differences across different regions and factors such as geography, industrial mix, etc., and should be flexible to account for uncertainties of technological and scientific progress, and industry-specific solutions.

#6 (detailed in section 4.2.1): We recommend mandatory disclosure of corporate-specific, financially material, decision-relevant data relating to climate risks and opportunities. Consistent global disclosure frameworks, developed in consultation with industry participants and with adequate runway for implementation, should help strengthen the transparency and comparability of climate risk data.

- Market regulators, accounting standards boards, and exchanges, in consultation with corporates, Banking and Capital Markets firms, and investors, should continue to develop consistent climate-related disclosure frameworks for financial and non-financial corporates that are aligned with the Task Force on Climate-related Financial Disclosures (TCFD) recommendations and that provide a real benefit to providers and users of climate data. They should continue efforts to accelerate adoption of these disclosure frameworks.

- To date, voluntary disclosure regimes such as TCFD have proven to be helpful in guiding both voluntary and mandatory disclosures that allow corporates and investors to take into account materiality to the sector and proportionality. Climate disclosure regimes should balance the objectives of consistency and flexibility to reflect that materiality is corporate-specific and should reflect decision-relevant information for financing decisions. This recognizes that corporates in similar sectors can be exposed to different material risks and opportunities, reflecting differences in individual business models and operating environments.

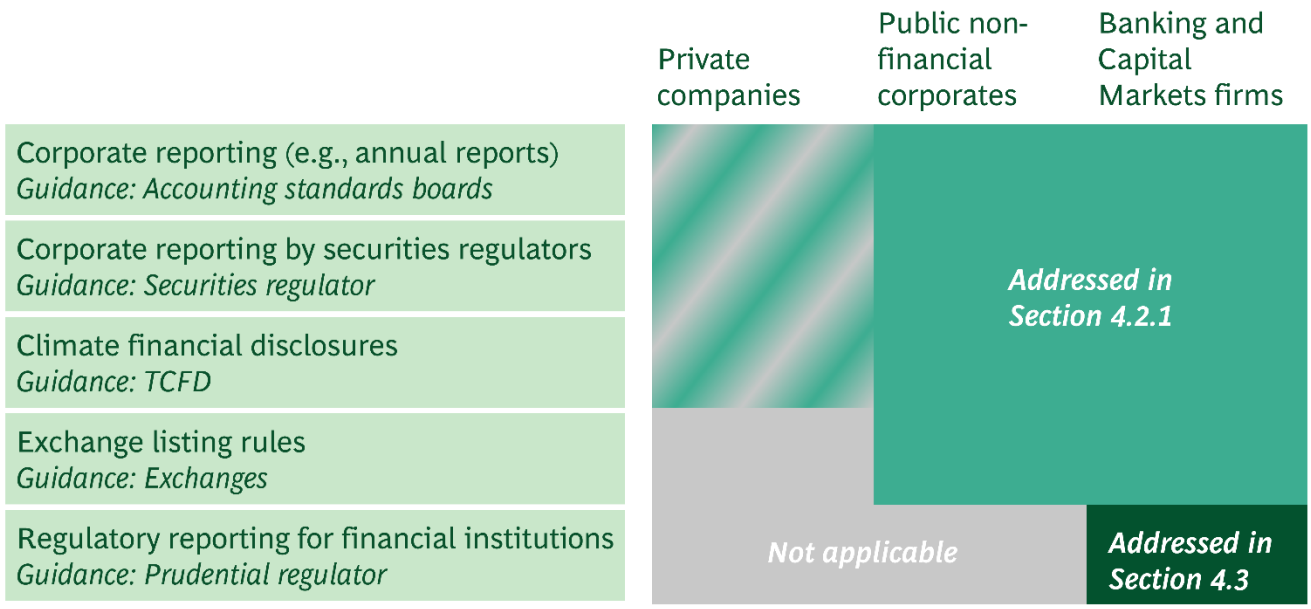
- Ultimately, internationally consistent material disclosures may be needed, taking into consideration best practices emerging from existing standards and global frameworks, to deliver comparable, comprehensive, decision-relevant climate data that is beneficial for the development of CFMS. Climate-related disclosures by banks have dependencies on non-financial corporate disclosures, and therefore, importantly, detailed banking disclosures and regulatory reporting requirements for capital market participants should not front-run the adoption and capacity of corporates to provide such financially material disclosures.

- Recognizing some jurisdictions are taking a more accelerated approach—and where appropriate, mandating financially material disclosures to facilitate transition of the real economy—policies should create appropriate incentives to encourage engagement with clients and investees on low-carbon pathways, and reflect that not all sectors are at the same stage of preparedness for transition. Regulated financial institutions have an important role

to play in partnering with clients on low-carbon solutions, particularly in sectors of the economy wherein **decision-relevant climate data may be less identifiable at this time.**

- We further believe that a **globally consistent approach to sustainability reporting is pivotal to prevent the proliferation of various emerging public and private reporting initiatives, which are often not aligned, make reporting costly and time-consuming for preparers, and are confusing and time-consuming to compare for users. Financial and non-financial firms operating cross-border, in particular, face additional costs, complexity, and reduced reliability of data due to lack of consistent frameworks.** Being aware that the administrative and economic costs of reporting would be significant (especially for micro-businesses), we believe that small and medium enterprises (SMEs) should be allowed to adopt a simplified standard, based on a very rigorous application of the materiality principle and corporate-specific exposure to risks that would reduce the number of metrics SMEs would report.

Scope of disclosures covered in the report



#7 (detailed in section 4.2.2): We recommend that the Banking and Capital Markets sector accelerate the development and scaling of a broad range of products and instruments in both public and private markets to meet the financing, investing, risk management, liquidity, and funding requirements of a range of market participants actively starting to transition. The range of products and instruments should include syndicated and bilateral loans, bonds, equity,[22] structured products, derivatives, project finance, and securities financing. In addition, we recommend that regulators holistically assess any current regulatory barriers that prevent this process, and encourage the development of these products and solutions.

- The climate finance market needs to scale across all asset classes—for instance, to bring more high-risk and patient capital (e.g., "green equity" that might represent equity capital from private and public sources that supports low-carbon technologies) to fund investments in early stage technologies, start-ups, and emerging market firms. Banks and capital markets firms should scale up the development of blended finance structures in collaboration with the public and social sectors to mobilize private sector capital toward riskier investments. Further, they should scale the development of the derivatives market for climate risk mitigation and better allocation of risk, as well as the use of pooling and securitization. In addition, the development of securities financing markets (with climate-aligned instruments as collateral) will enhance market liquidity and lower the cost of funding for climate finance.

- There is also a significant role for the Banking and Capital Markets sector to go beyond financial support, actively engaging with their clients through promoting cross-sectoral initiatives. This is particularly relevant in sectors that are highly dependent on other sectors for decarbonization—for example, the Iron & Steel sector that is likely to rely on clean hydrogen, or the Shipping sector that will rely on development of alternative fuels from sectors such as Chemicals and Energy.

- Many banks now have clear frameworks in place and have publicly disclosed commitments for significant balance sheet and financing capacity focused on assets that integrate Environmental, Social and Governance (ESG) factors. It is timely to rethink the approach and tools used to finance these commitments. Issuance across banks' entire liability structures (including non-equity capital) may be helpful in ensuring banks can continue to play their part in addressing environmental and social challenges. A globally consistent framework for banks to issue going and gone concern sustainable securities, including green capital instruments, is still lacking despite indications of strong investor appetite. An integral piece of the framework should be the inclusion of climate-aligned instruments to meet prudential

[22] Including equity-like instruments, such as convertible bonds and hybrid capital.

requirements on a like-for-like basis with existing equity and hybrid capital when considering regulatory ratios (capital, funding, and liquidity) accelerating realignment of bank balance sheet capacity with climate ambition.

#8 (detailed in section 4.2.3): We recommend that the Banking and Capital Markets sector, standard-setting bodies, industry, policymakers, and financial regulators collaborate to achieve consensus on a common global definition and set of principles concerning what constitutes climate finance. This should be translated into sector- and region-specific taxonomies that are comparable, flexible for evolution in response to technological and scientific developments, and include climate-related performance indicators and targets that correspond to Paris-aligned transition pathways.

- The shortcomings of foundational elements—which include the current lack of (a) common global definition of climate finance, (b) consistent principles for the development of taxonomies, and (c) well-defined sector- and region-specific taxonomies—result in higher transaction costs, the exclusion of several transition activities, and, more broadly, a sense of confusion in the CFMS. This report proposes a set of principles for the definition of taxonomies (see section 4.2.3).

- Importantly, taxonomies must lead to inclusion of a range of transition and enabling activities, and not focus purely on zero-carbon activities. Excluding specific activities or sectors will pose a big risk to the successful achievement of an orderly transition. They should also be based on common global principles, but be flexible in terms of regional and temporal variation.

- Further, financial instruments such as green bonds and green loans often rely on a "use of proceeds" model, which requires issuers to use funds raised for qualifying projects. Although this is an important first step, the issuance volume of green bonds to date is a small percentage (~2 percent) of global fixed income issuance.[23] Climate finance needs to scale beyond a "use of proceeds" approach to a broader taxonomy that is inclusive of all types of financial transactions—including equity, structured products, and derivatives, which are an important hedging tool for corporates—and include specific metrics and thresholds that enable achievement of climate goals. Scaling of instruments such as sustainability-linked bonds and loans would expand the financing options to align private finance with Paris Agreement goals. Further, there is growing recognition that climate finance must scale to

[23] Estimated percentage of total global bond issuance labelled green in 2019. Includes government bonds, corporates (financial and non-financial), securitized products, covered bonds, municipals; Source: AFME.

cover all equity and debt rather than pure "green" label instruments, while doing so in a way that retains alignment to scientifically determined climate-related indicators and targets.

#9 (detailed in section 4.2.4): We recommend that as data becomes more available, investors and asset managers continue to work toward accelerating integration of climate factors into their investment process, including integration of climate-related risk factors into risk and valuation models and frameworks. We also support investors and asset managers in their transition strategies for a Paris-aligned temperature scenario, and GHG reductions through engagement and stewardship with their portfolio companies.

- Asset managers and investors recognize climate-related risk factors in investment and capital allocation decisions. However, such analysis is significantly hampered by the level of disclosures and data availability. By deepening the integration of climate-related risks into investment decisions and investor stewardship priorities, investors—particularly asset owners—play a key role in influencing both the risk-adjusted costs of capital and availability of capital, especially for carbon-intensive sectors and assets.

#10 (detailed in section 4.2.5): We recommend that the Banking and Capital Markets sector and other market participants promote an innovation mindset in scaling climate finance. Innovation in financial markets—including financial product innovation; leveraging geospatial data for climate risk and asset performance assessment; Artificial Intelligence/Natural Language Processing (AI/NLP) to transform unstructured reporting and disclosures to structured and comparable decision-relevant data; standardization of legal contract language and industry data models; advancements in scenario analysis and risk modeling; and tools and platforms to promote climate finance awareness and literacy—will be critical to scaling climate finance.

- The transition to a low-carbon economy will require an exponential increase in climate-aligned investments. Financial product innovation will play a critical role in the mobilization of a broad pool of capital, including active participation by retail investors in funding climate finance. Mobilization of retail investor funding will require standardization of definitions, taxonomies, and labels that can communicate the risk-return characteristics and potential alignment with climate ambition in a simple manner. Fintech solutions could, for example, enable retail investors to have easy access to their investment portfolios by security, a measure of how these are performing financially, and how the associated companies contribute to delivering climate finance. Financial product innovation for retail products must remain consistent with legal and conduct requirements and balance reputational risks for the providers of products as it is extended to the non-institutional market segment. The

Banking and Capital Market sector and the Wealth and Asset Management sector can play a critical role in investor education and awareness.

#11 (detailed in section 4.3.1): We recommend that **supervisors, policymakers, and regulators seek to mitigate the risk of market fragmentation[24] through increased use of ex-ante, globally consistent regulation[25] and ex-post supervisory tools to support the development of consistent regulatory drivers, or intended barriers, aligned with the pace of climate finance market developments** and broader change in economic policy.

- Climate change is a risk for the financial sector and, if not managed, could be a source of risk to financial stability. Regulation has a role in managing the macro- and micro-prudential risk associated with climate change. However, regulation should not be a substitute for change in broader industrial, environmental, and economic policy. Regulation should be globally consistent and aligned with the pace of climate-finance market developments. Pre-emptive and punitive regulation could hamper the scaling of climate finance markets, result in disorderly market price movements for impacted sectors, and constrain the flow of capital required to transition hard-to-abate sectors and regions.

#12 (detailed in section 4.3.2): We recommend that **the Banking and Capital Markets sector share best practices of climate risk management capabilities, as well as increase transparency of the integration of climate risk** within firms' governance, strategy, planning, resource allocation, and risk-adjusted performance management framework.[26]

- Regulation is an important element in accelerating the evolution of the CFMS. It is important that regulation timelines consider the pace at which foundational capabilities required to fully comply, such as the provision of high-quality data, are also evolving.[27] Regulation should not drive toward simplistic "label-based" prudential surcharges or incentives (i.e., green is good, and brown is bad), but rather should be risk-based requirements reflective of the risk profile of the underlying exposure. And, finally, collaboration across the Banking and Capital Markets sector and regulators will be critical in order to support the development of leading practices in climate finance and risk management.

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[24] FSB Report on Market Fragmentation (June 2019); and IOSCO Good Practices on Processes for Deference (June 2020).

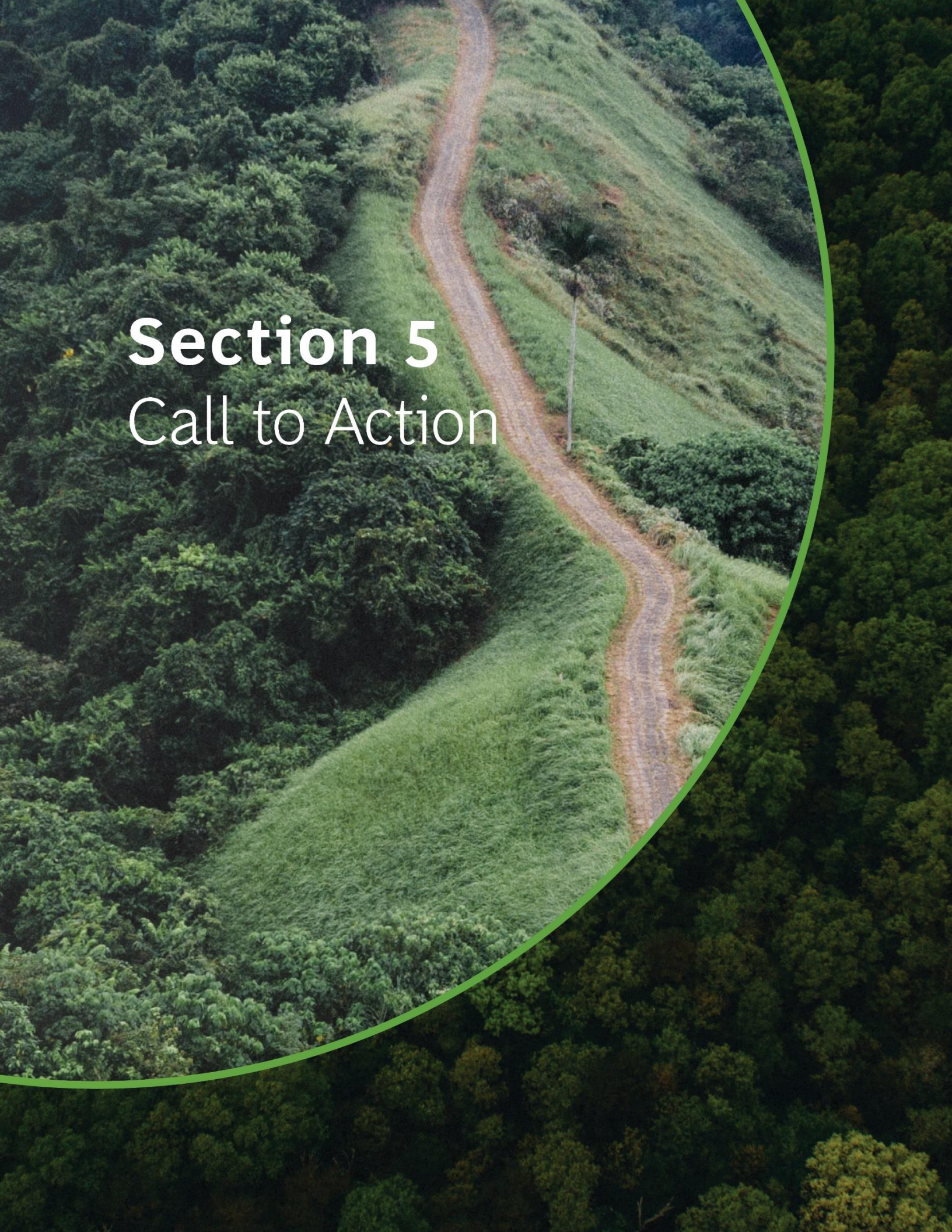
[25] Includes prudential, market, and conduct regulation.

[26] Subject to applicable international and national competition law regulation;
Risk-adjusted performance management framework is defined as the management accounting framework used for internal and external measurement of financial performance (e.g., RAROC).

[27] Foundational capabilities include taxonomies, accounting and disclosure standards, data management (definitions, collection, aggregation, and reporting), methodology, and technology tools.

For further details, please see the core sections of this "Climate Finance Markets and the Real Economy" report for an in-depth analysis of the following areas:

1. Context and Current State
2. Vision for At-Scale Climate Finance Market Structure: Key characteristics of an at-scale and efficient Climate Finance Market Structure
3. A $100–150 Trillion Investment Need—Sectoral and Regional Insights and Implications: Sector-specific insights and investment needs analysis including key decarbonization levers for sectors covering 75 percent of global GHG emissions, estimations of the capital requirements, and decomposition by region and instrument type. This report focuses on a subset of 10 sectors: Power, Iron & Steel, Cement, Chemicals, Light Road Transport, Heavy Road Transport, Aviation, Shipping, Agriculture, and Buildings
4. Recommendations for Scaling Climate Finance: Current state of development, key constraints that are limiting the growth of the climate finance market, and recommended priority actions to be taken by the different participants of the Climate Finance Market Structure
5. Call to Action: Summary of recommendations and sector insights, priority actions recommended for each stakeholder to achieve an at-scale and efficient Climate Finance Market Structure



Section 5
Call to Action

5 Section 5: Call to Action

This report has outlined a massive need to scale the climate finance market. **Each stakeholder has a key role to play in facilitating the growth of capital. The following is a summary of the recommendations, sector insights, and priority actions recommended for each stakeholder.** With coordinated action and ongoing collaboration among the multiple stakeholder groups highlighted in this report, the market for climate finance can thrive in the next decade.

"Climate Finance and the Real Economy": Recommendations to Scale the Climate Finance Market Structure

Motivating capital

1. We recommend that **governments establish legally enforceable, comprehensive, and sufficiently high levels of GHG-emissions pricing ("carbon pricing") mechanisms such as a GHG tax or trading schemes**, with explicit forward-looking direction on price levels, implemented in a way that respects a "just transition," minimizing social and economic costs for those least able to bear them.

   (detailed in section 4.1.1)

2. We recommend that **governments commit to and implement effective and proportionate policies, fiscal programs, and legislative action** that will support achievement of the targets established in the Paris Agreement.

   (detailed in section 4.1.2)

3. We recommend that **governments and national/multilateral development banks motivate the mobilization of private sector capital through blended public/private finance solutions**.

   (detailed in section 4.1.3)

4. We recommend **financial education and climate finance risk awareness building at an executive level to support corporates' ability to actively prioritize and accelerate their own preparations for a low-carbon future**, embedding this as a strategic imperative for their boards and senior management. The Banking and Capital Markets sector will be an important partner to corporates to both help navigate the risks and opportunities of climate change and mobilize appropriate financing solutions.

   (detailed in section 4.1.4)

5. We recommend that **corporates and their industry associations** coordinate and collaborate with the scientific community, standard-setting bodies, financial institutions, and governments to **accelerate the development and alignment of sector- and region-specific transition pathways** to achieve Paris Agreement climate goals, including viewpoints on where there is still evolution expected.

   (detailed in section 4.1.5)

Figure 18: Summary of recommendations (contd. on next page)

Financial Market Structure Changes

6 We recommend **mandatory disclosure of corporate-specific financially material, decision-relevant data relating to climate risks and opportunities.** Consistent global disclosure frameworks, developed in consultation with industry participants and with adequate runway for implementation, should help strengthen the transparency and comparability of climate risk data.

(detailed in section 4.2.1)

7 We recommend that **the Banking and Capital Markets sector accelerate the development and scaling of a broad range of products and instruments in both public and private markets to meet the financing, investing, hedging, market liquidity, and funding requirements of a range of market participants actively starting to transition**. The range of products and instruments should include syndicated and bilateral loans, bonds, equity, structured products, derivatives, and asset-level financing. In addition, we recommend that **regulators holistically assess any current regulatory barriers that prevent this process, and encourage the development** of these products and solutions.

(detailed in section 4.2.2)

8 We recommend that the Banking and Capital Markets sector, standard-setting bodies, industry, policymakers, and financial regulators **collaborate to achieve consensus on a common global definition and set of principles concerning what constitutes climate finance**. This should be translated into **sector- and region-specific taxonomies** that are comparable, flexible for evolution in response to technological and scientific developments, and include climate-related performance indicators and targets that correspond to Paris-aligned transition pathways.

(detailed in section 4.2.3)

9 We recommend that as data becomes more available, **investors and asset managers continue to work toward accelerating integration of climate factors into their investment process, including integration of climate-related risk factors into risk and valuation models and frameworks**. We also support investors and asset managers **in their transition strategies for a Paris-aligned temperature scenario**, and GHG reductions through **engagement and stewardship with their portfolio companies**.

(detailed in section 4.2.4)

10 We recommend that the Banking and Capital markets sector, and other market participations **promote an innovation mindset in scaling climate finance**. Innovation in financial markets, including financial product innovation, leveraging geospatial data for climate risk and asset performance assessment, AI/NLP to transform unstructured reporting and disclosures to structured and comparable decision relevant-data, standardization of legal contract language and industry data models, advancements in scenario analysis and risk modeling, and tools and platforms to promote climate finance awareness and literacy will be critical to scaling climate finance.

(detailed in section 4.2.5)

Climate Risk Management Framework

11 We recommend that **supervisors, policymakers, and regulators seek to mitigate the risk of market fragmentation through increased use of ex-ante, globally consistent regulation and ex-post supervisory tools to support the development of consistent regulatory drivers, or intended barriers, aligned with the pace of climate finance market developments** and broader change in economic policy.

(detailed in section 4.3.1)

12 We recommend that **the Banking and Capital Markets sector share best practices of climate risk management capabilities, as well as increase transparency of the integration of climate risk** within firms' governance, strategy planning, resource allocation, and risk adjusted performance management framework.

(detailed in section 4.3.2)

Coordinated action needed from all stakeholders (1/2)

Recommendations by market participant

Public Sector & Multi-laterals

- **Establish legally enforceable, comprehensive, and sufficiently high levels of GHG-emissions pricing ("carbon pricing")** mechanisms such as GHG tax or trading schemes, with explicit forward-looking direction on price levels, implemented in a way that respects a "just transition," minimizing social and economic costs for those least able to bear them.
- **Evaluate establishment of carbon border adjustment mechanisms to provide a level playing field for trade and to prevent carbon leakage**, in close collaboration and consultation with industry, in a manner that accounts for differences in transition pathways between countries.
- **Accelerate the development and alignment of sector- and region-specific transition pathways** to achieve Paris Agreement climate goals, in close collaboration with the scientific community, standard-setting bodies, financial institutions, corporates, and their industry associations.
- **Commit to and implement effective and proportionate policies, fiscal programs, and legislative action** that will support achievement of Paris Agreement targets; **align COVID-19 recovery funding and economic stimulus packages** to pursue inclusive forms of sustainable and green recovery.
- **Motivate the mobilization of private sector capital through blended public/private finance solutions.**
- **Dramatically scale up the supply of catalytic capital** that can help mobilize private sector capital and enable long-dated higher-risk capital flow.
- **Increase government sponsorship of research and development**, in combination with private sector capital and expertise (venture capital and private equity), to accelerate the development and commercialization of innovative technologies for a low-carbon economy.

Banking & Capital Markets firms

- **Partner with corporates to help navigate the risks and opportunities** of climate change, to mobilize appropriate financing solutions, and to promote cross-sectoral initiatives.
- **Accelerate the development and scaling of a broad range of products and instruments** in both public and private markets to meet the financing, investing, hedging, market liquidity, and funding requirements of a range of market participants actively starting to transition.
- **Support development of consistent climate-related disclosures aligned with TCFD recommendations;** continue efforts to accelerate adoption of these disclosures.
- **Promote an innovation mindset in scaling climate finance,** particularly in financial innovations including financial product innovation, standardization of legal contract language and industry data models, innovation in scenario analysis and risk modeling, and tools and platforms to promote climate finance awareness and literacy.
- **Share best practices on climate risk management capabilities; as well as increase transparency of the integration of climate risk** within firms' governance, strategy planning, resource allocation, and risk adjusted performance management framework.
- **Collaborate** with standard-setting bodies, industry, policymakers, and financial regulators to **achieve consensus on a common global definition and set of principles** concerning climate finance, and **translate these into sector- and region-specific taxonomies.**

Corporates

- **Actively prioritize and accelerate their preparations for a low-carbon future,** embedding this as a strategic imperative for their boards and senior management.
- **Explore proactive steps to further support their transition,** through internal carbon pricing mechanism where material, engagement with boards and shareholders to discuss and balance short-term return expectations vs. long-term business strategy, elevation of climate risk management in their organizations, and data practices in partnership with their financial services providers.
- **Accelerate the development and alignment of sector- and region-specific transition pathways** to achieve Paris Agreement climate goals, in close collaboration with their industry associations, the scientific community, standard-setting bodies, financial institutions, and governments.
- **Support development of consistent climate-related disclosures aligned with TCFD recommendations;** continue efforts to accelerate adoption of these disclosures.

Figure 19: Recommendations by market participant (contd. on next page)

Coordinated action needed from all stakeholders (2/2)

Recommendations by market participant

Regulators

- **Mandate disclosures for corporate-specific financially material, decision-relevant data** relating to climate-related risks and opportunities.
- **Encourage the development of new climate finance products and solutions** and holistically assess any current regulatory barriers that prevent this process.
- **Mitigate risk of market fragmentation** through increased use of ex-ante, globally consistent regulation and ex-post supervisory tools to support the development of consistent regulatory drivers, or intended barriers, aligned with the pace of climate-finance market developments, and broader change in economic policy.

Investors & Asset Managers

- Continue to work toward **accelerating integration of climate factors into their investment process, including integration of climate-related risk factors into risk models and frameworks.**
- Continue to work toward **transition strategies for a Paris-aligned temperature scenario**, and **GHG reductions through engagement and stewardship** with their portfolio companies.
- Continue efforts to **accelerate adoption of disclosure** frameworks.

Standard setting bodies and industry associations[1]

- **Facilitate multi-stakeholder efforts to accelerate the development and alignment of sector- and region-specific transition pathways** to achieve Paris Agreement climate goals.
- **Facilitate efforts to (1) achieve consensus on a common global definition and set of principles** concerning climate finance; and (2) **translate to sector- and region- specific taxonomies.**
- **Continue to develop consistent climate-related disclosures for financial and non-financial corporates** that are aligned with TCFD recommendations; and continue efforts to accelerate adoption of these disclosure frameworks.

Market infrastructure & enablers[2]

- Technology firms: **support digital innovations that will accelerate climate finance market development** such as geospatial data providers that enhance climate risk, or Natural Language Processing (NLP) products that transform unstructured reporting and disclosures to structured decision-relevant data.
- Stock exchanges: **play an important role in driving adoption of ESG disclosures by considering the materiality of climate-related governance, performance, and activities** as part of listing requirements where appropriate to the listed corporate.
- Credit ratings agencies: **continue efforts to align on more consistent ways to integrate climate related data** into credit ratings.

Social Sector, Research

- Social sector investors and funders: **scale up the supply of catalytic capital** that can help mobilize private sector capital and enable long-dated higher-risk capital flow; and **further the development of blended finance structures** in collaboration with the public sector to mobilize private sector capital toward riskier investments.
- Research organizations: **continue to play essential roles in accelerating the development and commercialization of innovative technologies** for a low-carbon economy.
- Environmental organizations: **continue to drive awareness of understanding the implications of climate change on business models and processes**—both from a transition and physical risk perspective.

1. Including accounting standard bodies, sustainability standard organizations, industry associations, climate science community; 2. Including technology firms, stock exchanges, credit rating agencies, and other market enablers

A $100–150+ Trillion Investment Need—Sectoral Insights and Implications (1/3)

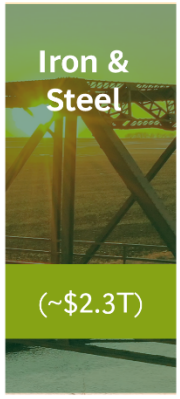
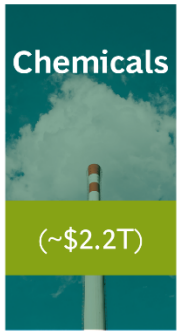
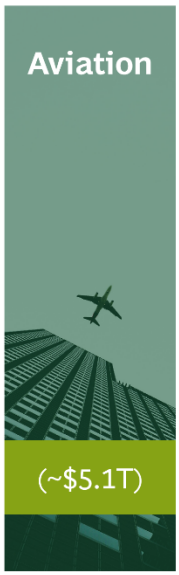
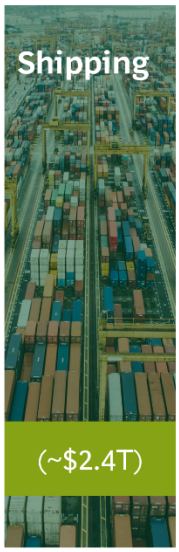
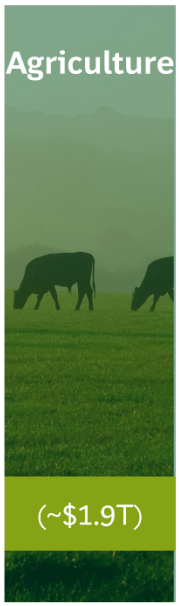
Sector	Key decarbonization levers	Key implications for climate finance
	• Increase reliance on renewables (~$39T): high upfront capex investments for renewable energy generation • Improve grid flexibility & reliability (~$17T): New network connections, energy storage • Invest in development of CCUS (~$3T): for coal power plants	• Significant investment across value chain from power generation to transmission and distribution • Renewable energy commercially viable in several regions today, but long-tenor, project finance structures needed to support high upfront capex needs • Need for high-risk/equity capital (e.g., in project equity or in storage solutions) • Role for the financial sector beyond capital: engaging corporates customers through Corporate Power Purchase Agreements, collaboration with the public sector for state-owned enterprises
	• Increase use of recycled scrap steel (~$0.7T): including buildout of EAF facilities • Use of natural gas as reducing agent (~$1.0T): installation of DRI-EAF facilities • Switch to H2-based reduction (~$0.1T): substitute fossil fuels • Retrofit plants with CCUS (~$0.5T): R&D and installation of CCUS	• Constraints in industry with limited cash flow to cover cost of capital • Financial sector support need with long-term finance structures and innovative funding options (e.g., funding initiatives with border taxes or ETS sales) • Need for substantial bridge funding to support transition while net zero emission solutions become commercially viable • Potential role for financial sector beyond capital by promoting cross-sectoral partnerships (e.g., for CCUS, H2 based reduction)
	• Invest in CCUS (~$1.1T): retrofits for existing cement plant equipment • Update plants with energy-efficient equipment (~$0.3T): including heat recovery • Increase use of alternate fuels & binders (~$0.1T): switch from coal as fuel, reduce clinker	• Near-term focus on developing commercial-scale pilots and demonstrating product readiness for CCUS; investment contingent upon achievement of commercial viability or provision of concessionary capital (e.g., public funding) where needed • Existing players expected to primarily access debt markets to fund expansion and equipment upgrades, given mature nature of industry
	• Improve process & energy efficiency (~$0.2T): heat recovery, industrial efficiency • Use alternative fuel and feedstocks (~$0.9T): electrification, green hydrogen & ammonia production • Deploy CCUS (~$1.1T): large need expected for production of blue hydrogen, and production in Asia	• Need for significant investment in early parts of chemicals value chain (~80% of emissions from extraction and refining of feedstock) • Opportunity to partner across industries such as Oil & Gas, Transport, Aviation, Steel/Iron & Shipping that are expected to be involved in clean feedstock or fuels (e.g., Green Hydrogen, Green Ammonia, etc.) • Need expected to ramp up on R&D investment for chemicals with less mature 'clean' solutions

Figure 20: Summary of sector insights (contd. on following pages)

A $100–150+ Trillion Investment Need—Sectoral Insights and Implications (2/3)

Sector	Key decarbonization levers	Key implications for climate finance
	• Develop electric vehicles (~$3.6T): R&D, conversion, construction of factories for vehicles and components • Develop electric 2/3 wheelers (~$0.2T): R&D, conversion, construction of factories for vehicles and components • Expand public charging infrastructure (~$1.2T): to support growth of EVs • Mode shift to mass transit (~$4.0T): buildout of public transportation infrastructure	• Strong dependency on public sector interventions to accelerate EV adoption - (e.g., taxes, fiscal incentives) • Opportunity to connect corporates across sectors for partnerships in charging infrastructure (e.g., Oil & Gas and vehicle manufacturers) • Strong corporate commitments for EV transition provide opportunity to drive EV adoption • Key to enable sustainable battery industry scale-up to support the EV transition: including policy frameworks to reduce investment risks, funding of sustainable battery manufacturing • PPPs expected to be key to catalyze private investment in public transport infrastructure
	• Develop & deploy battery electric commercial vehicles (~$17.5T): largely for lighter and shorter-distance applications • Develop & deploy hydrogen fuel-cell electric commercial vehicles (~$12.6T): R&D, conversion, construction of factories, purchase of vehicles • Produce hydrogen and build refueling infrastructure (~$1.8T): as fuel for hydrogen fuel-cell vehicles • Use of biofuels & synthetic fuels (~$0.2T): as substitutes for fossil fuels in ICE vehicles	• Strong need for public sector interventions & engagement to accelerate uptake of low-carbon powertrains and fuels (e.g., ban on ICE vehicles, subsidies, blended finance, fuel taxes etc.) • Opportunity to connect corporates across sectors for partnerships for investment in hydrogen refueling infrastructure (e.g., Oil & Gas and CV manufacturers) • Opportunity to finance expansion of corporate electric LCV fleets in the near future as logistical players (Amazon, DHL, FedEx, etc.) have made pledges • Opportunities to support buildout of green hydrogen sector as a cross-sectoral lever • Significant portion of trucking companies are private leading to challenges in emission disclosures and lowering the motivation to decarbonize
	• Improve fleet efficiency (~$0.2T): through retrofits • Use Sustainable Aviation Fuels (~$0.9T): to replace fossil fuel as low-carbon alternative • Deploy next-gen propulsion technologies (~$4.0T): including use of open-rotor, hybrid-electric, hydrogen, etc.	• Key to have measurable efficiency thresholds for fleet efficiency improvements for new aircraft and retrofits • Sustainable aviation fuels (SAF): opportunity for financial sector to leverage customer relationships across sectors to scale and de-risk capex investments (e.g., across fuel value chain including Agriculture, Chemicals, Power, and Oil & Gas sectors) • Offtake contracts between supplier of feedstock, SAF producers, and consumers important for scale • Important role for the public sector to ensure high safety standards around use of SAFs • Critical need for governments subsidies, carbon pricing, etc. to improve SAF economics • Accelerated decarbonization through incorporation of emissions criteria and targets by governments in COVID-19 relief packages for aviation sector

A $100–150+ Trillion Investment Need—Sectoral Insights and Implications (3/3)

Sector	Key decarbonization levers	Key implications for climate finance
	• Improve ship efficiency (~$0.6T): technologies related to drag reduction, exhaust treatment, etc. • Improve operational efficiency (~$0.1T): digital solutions to optimize route and speed, ship performance • Use of low-carbon fuel alternatives (~$1.7T): engines using clean fuel such as e-ammonia, and investment in land-based infrastructure for production and storage	• Operational and ship efficiency viable in short-term: finance enabled by measurable efficiency thresholds • Opportunities in optimizing chartering contracts between operator and owners through benefit sharing • Partnerships across the value chain important for alternative fuel development; opportunity for financial sector to leverage relationships across sectors • Critical role for governments in making e-fuels viable • Significant need for bilateral lending given private ownership with limited access to capital markets • Need to scale use of Poseidon Principles and integrate climate consideration into lending decision; critical since private ownership limits disclosure • PPPs and blended finance expected to be important and gaining traction
	• Shift diets towards plant-based and cultured meat (~$1.3T): will require driving change in consumer behavior • Improve manure management (~$0.5T): through infrastructure such as anaerobic digesters (AD) • Adopt regenerative farming practice (~$0.1T): for investment in no-till farming equipment	• Strong need for public sector capital and policy incentives to support farmers in transition • Potential role for financial institutions in supporting/financing through partnerships (e.g., with equipment suppliers, F&B companies, multilaterals, microfinance and mobile finance services, local intermediaries & governments) • Innovative structures such as cluster financing (e.g., for pooling of multiple AD deployments with lease/PPA)–cross-sectoral potential (e.g., with solar companies) • Engagement with both landowners and operators to drive regenerative practices, given split-incentives • Measurement of carbon challenging and likely to need technological innovation • Significant potential for capital markets activity in emerging alternative meat industry (e.g., through acquisitions, JVs, new entrants)
	• Increase efficiency of electric equipment (~$3.8T) • Reduce heating/cooling energy demand (~$1.5T): through building design & retrofits • Replace and electrify conventional heating (~$0.7T): with efficient and electric alternatives • Develop system-level district heating & cooling (~$0.1T) • Shift to efficient cooking technologies (<$0.1T)	• Finance for R&D for higher-performing, cost-effective heating technology (e.g., cold climate heat pumps) • Important for public sector to encourage accelerated adoption through programs/incentives • Need for engagement with private equity, pension funds, and REITs given high ownership levels • Collaboration between real estate community and policymakers on standards integrating emissions • Cross-sectoral efforts across industrial, power, and buildings for co-generation and waste heat utilization • Effort needed to drive technology adoption, e.g., through policies, product standards and labelling programs, education, etc.

Climate Finance Markets and the Real Economy

Sizing the Global Need and Defining the Market Structure to Mobilize Capital

BCG BOSTON CONSULTING GROUP

gfma GLOBAL FINANCIAL MARKETS ASSOCIATION

afme/ asifma sifma