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Transition Finance to Drive an Economy-Wide Transition for a Net Zero Future

Introduction

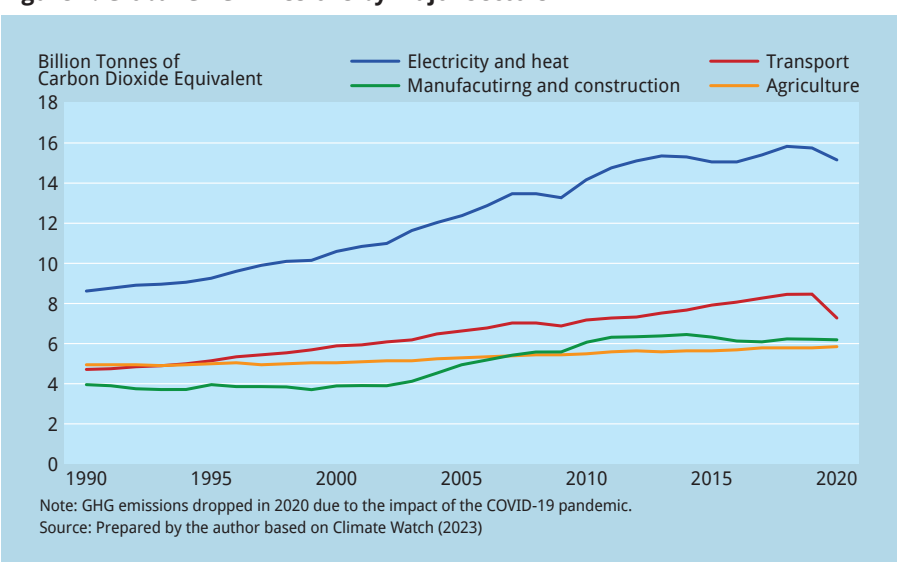
Transition finance aims to promote not only green or near-green activities but also emissions-intensive sectors, including hard-to-abate sectors, that make efforts to substantially reduce greenhouse gas (GHG) emissions. Currently, the market for transition finance particularly supporting emissions-intensive sectors lags the relative popularity of green, sustainability, and sustainability-linked bonds globally. This reflects the fact that some investors associate transition finance with greenwashing, while others are cautious about financing emissions-intensive companies due to the lack of common definitions and criteria applied to their targets and decarbonization pathways.

Main sources of GHG emissions

In financing the process of promoting the whole-of-economy transition to net zero, it is important to know where GHG emissions concentrate across sectors and what emissions reduction challenges these sectors face. According to Climate Watch (2023), electricity and heat, transport, manufacturing, and construction account for about 70% of GHG emissions globally (Figure 1). Among them, electricity and heat account for more than 30% of total global emissions, followed by transport (15%), manufacturing and construction (13%), and agriculture (12%). Other emission sources include aviation, shipping and bunker fuels, buildings, changes in land use, and waste management.

While many entities (or companies) in these sectors are currently emissions-intensive, their GHG emissions can be reduced by using existing technologies. Emissions can be reduced by improving energy efficiency; increasing renewable energy and electric vehicles (EVs); and promoting the electrification of industrial and energy use in buildings. To promote widespread adoption, however, further advancement of these technologies, improvement in their affordability, and a rapid increase in their supply base are essential. Accelerating these green activities should also involve expanding enabling activities and their associated technologies—such as energy storage and batteries, power grids, heat pumps, recycling and reutilization,

Figure 1: Global GHG Emissions by Major Sectors



Note: GHG emissions dropped in 2020 due to the impact of the COVID-19 pandemic.
Source: Prepared by the author based on Climate Watch (2023)

and low-carbon alternatives. The mining and processing of rare and precious metals are also associated with the production and widespread adoption of renewable energy and EVs. Entities are expected to reduce GHG emissions further from these mining and refining activities and address other environmental impacts, as well as social issues such as human rights and workers' rights.

Reducing emissions in agriculture, forestry, and other land uses could be implemented, for example, by restoring soil, peatlands, and woodlands; promoting carbon and regenerative farming; and developing blue carbon ecosystems. Producing protein alternatives or plant-based dairy products is also an important innovation to reduce emissions from beef production.

It will be desirable for a wide range of the aforementioned activities and technological advancements to be undertaken at a faster-than-current pace in the future. Even if that were achieved, however, it would be difficult to reduce global GHG emissions completely to net zero due to the presence of hard-to-abate sectors. About 20-30% of global GHG emissions come from these sectors. These sectors substantially emit GHG by utilizing fossil fuel-based energy and high-temperature processes, but a substantial emissions reduction is considered difficult at the current stage due to the challenges related to electrifying all their production and operational processes, the limited availability of low-carbon alternatives, and the long lifespan of their assets. Hard-to-abate sectors generally include aluminum, cement, glass, iron and steel, basic chemicals, paper and pulp, petrochemicals, fertilizer, heavy-duty trucking, marine transport and shipping, aviation, construction materials (e.g., concrete), and waste management. Additionally, some countries consider fossil fuel-based electricity as part of the hard-to-abate sectors. All these sectors require new types of technologies and substantial investment. If the status quo is maintained, emissions from these sectors are likely to rise significantly in emerging and developing economies with growing, young labor forces, high economic growth, and a rising role as global supply chain hubs.

The information and communication technology (ICT) sector, particularly with the use of big data, artificial intelligence (AI), and blockchain technology, is expected to play a crucial role in supporting emissions reductions or the removal of carbon dioxide (CO2) from the atmosphere in the aforementioned greener and emissions-intensive sectors. Promoting energy savings, reducing demand-supply mismatches of renewable energy through better demand-supply forecasting, monitoring forest conditions more effectively, tracking sustainable materials, and estimating the carbon footprints of customers' purchases are increasingly becoming feasible with the promotion of digitalization. While the ICT sector could be viewed as one of the enabling sectors, it requires substantial energy for operating data centers, manufacturing ICT equipment, and using blockchain-based tracking systems. Thus, reducing emissions from ICT and related activities must be implemented together.

Emissions may remain large for some sectors even after efforts to utilize and develop the aforementioned measures and technologies. In this case, using carbon capture and storage (CCS) and carbon capture, utilization and storage (CCUS) technologies could be considered as possible options, provided CO2 can be stored permanently. The regional availability of geological storage, technology advancement, and better cost performance, meanwhile, are important challenges to exploit these technologies. CCS and CCUS technologies are likely to be used more intensively in hard-to-abate sectors. Other measures to reduce GHG emissions from the atmosphere and store them permanently, known as carbon dioxide removal (CDR) measures, should be explored. CDR measures are comprised of nature-based and technology-based solutions. Nature-based solutions include afforestation, reforestation, and the restoration of wetlands and peatlands, some of which are already mentioned above. Technology-based solutions generally comprise direct air capture (DAC) and bioenergy with CCS (BECCS), which capture CO2 from biomass.

Divergent approaches to transition finance

To financially support those investments and innovative activities in emissions-intensive sectors, including hard-to-abate sectors and associated enabling sectors, scaling up transition finance must be promoted and undertaken promptly. Expanding the investor base must be done by mitigating greenwashing concerns. The Organisation for Economic Co-operation and Development (OECD) Industry Survey on Transition Finance revealed that more than 60% of investors were hesitant to provide transition finance due to inadequate clarity on how to assess credible corporate alignment with a pathway that is consistent with the Paris Agreement's goals (OECD 2022).

There are some initiatives related to transition finance (see Shirai [2023] for details). While all these approaches share the common goal of advancing transition finance, there are notable disparities in their methodologies. These discrepancies encompass data prerequisites (including Scope 3 emissions data and targets), alignment with the net zero or 1.5°C pathway, the presence of time-bound criteria or thresholds, as well as the utilization of science-based (or evidence-based) criteria and employing carbon budgets. This paper aims to provide some insights on the whole-of-economy transition toward net zero, aiming to enhance the credibility and transparency of corporate disclosures. Section 2 will focus on the issues of classifying the whole-of-economy transition into entities and activities. Section 3 focuses on existing approaches related to entities, and Section 4 offers conclusions.

Assessing the Whole-of-Economy Transition Process

In promoting transition finance, it is useful to look at the pathway of transitioning the whole economy toward net zero by treating entity- (or corporate-) level and activity-level separately. This is because large companies often engage in several activities across multiple sectors or within the same sector. In this case, decarbonization efforts need to be examined per activity in each sector while also ensuring that the aggregation of those emissions reduction efforts is consistent with the decarbonization pathways toward net zero at an entity-level across the value chain. In general, emissions-intensive companies pursue emissions reductions using existing technologies but also engage in various other activities and technological options in a flexible manner during the process of making emissions-cutting efforts at an entity-level. Investors could finance several diverse activities and innovations that could actually or potentially reduce emissions, anticipating that such finance could eventually lead to a steady reduction at the entity-level and across the entire value chain. Activities could be differentiated by sector as well as by technological features and feasibility.

Identifying entities contributing to the whole-of-economy transition

In principle, nearly all entities in the world need to make efforts to reduce GHG emissions to achieve net zero (Figure 2). Entities need to align with the 1.5°C targets and pathways regarding Scope 1 and Scope 2 emissions, and, if material, Scope 3 emissions. According to the GHG Protocol, Scope 1 and Scope 2 refer to direct emissions and emissions from purchased electricity, respectively, while Scope 3 emissions are from suppliers and users and comprise 15 categories. Globally, very few entities are currently aligned with the 1.5°C targets and associated pathways. These entities, together with entities with nearly zero emissions, could be called "Aligned Entities." Some entities are already making efforts to align with the 1.5°C targets and pathways or at least with the well-below-2°C targets and pathways. These entities are not yet aligned with the 1.5°C targets and pathways, but they could be candidates for "Aligning Entities" under certain conditions (such as timelines of alignment and credible transition plans). So far, many other entities have not yet launched emissions reduction initiatives, and these entities are neither Aligned nor Aligning Entities. As pointed out above, hard-to-abate sectors may require special attention and disclosure requirements to be eligible for "Aligning Entities," given the greater technological and cost challenges.

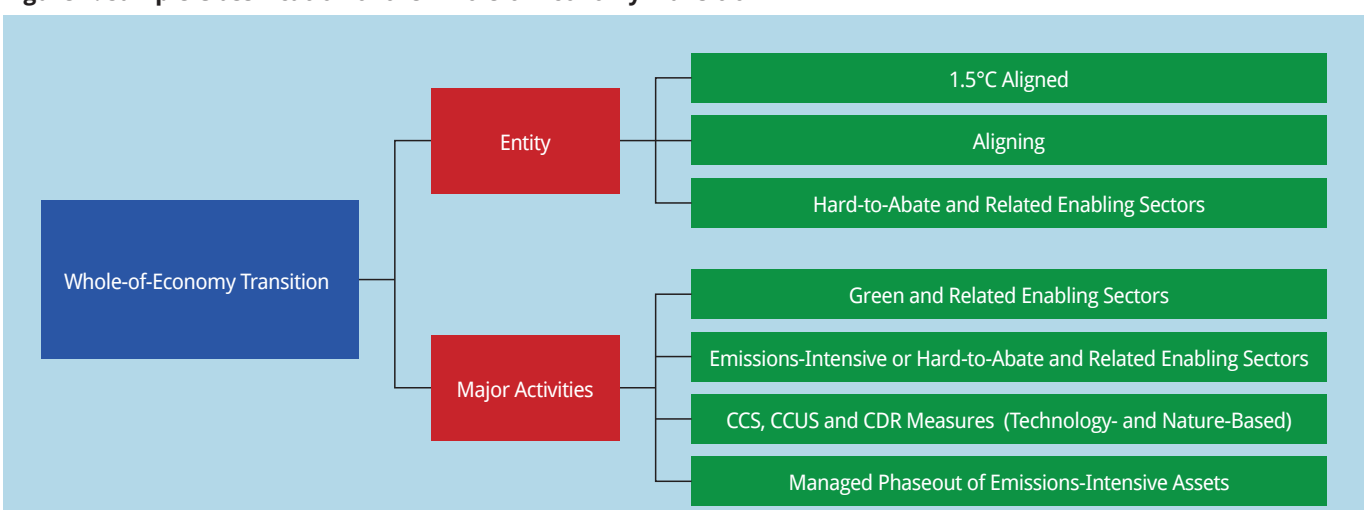
A growing number of large entities globally have begun to reduce GHG emissions in some activities, although their emissions remain substantial overall. In electricity generation, for example, it is desirable for power companies to increase renewable or other low-carbon energy sources soon. However, power companies in some countries may find it difficult to do so on a significant scale in the immediate future due to heavy dependence on fossil fuels, limited availability of renewable energy, or other country-specific reasons. In such cases, power companies may try to increase renewable energy generation over time while continuing to operate fossil fuel-fired power plants, primarily relying on increasingly efficient plants. At the same time, companies may conduct experiments on co-firing with hydrogen at fossil fuel power plants and invest in CCS or CCUS facilities.

In this case, investors may wish to know whether the power companies' overall emissions reduction pathways are consistent with the 1.5°C pathways, as well as the technological and cost performance potential of utilizing new technologies (hydrogen or CCS and CCUS). Such companies need to present their overall decarbonization strategies in their transition plans, which should include several activity- or technology-based options and progress concerning the commercial feasibility of new technologies. Actions related to power companies could comprise green activities (e.g., power generation using renewable energy), closing inefficient fossil fuel power plants, installation of CCS and CCUS facilities, and experimentation with co-firing hydrogen. Hydrogen can be emissions-intensive if production uses fossil fuels, or green if renewable energy is used. Over time, companies' emissions might be reduced as technological advancements enable a higher mixing ratio of hydrogen and more green hydrogen or abated hydrogen become available.

Another example is the case of car and truck manufacturers that are attempting to reduce GHG emissions throughout the entire value chain. They may plan to do so by producing more hybrid vehicles and further shifting to EVs and fuel cell vehicles (FCVs). Meanwhile, developing biofuels and e-fuels using hydrogen can be promoted. In this case, the companies implement diverse actions comprising green activities (such as producing EVs and FCVs), less emissions-intensive activities (e.g., producing hybrid cars), increasing use of more sustainable materials and inputs, and developing biofuels and e-fuels using hydrogen. As the availability of renewable energy improves, the use of green hydrogen could be expanded, or emissions-intensive hydrogen can be abated with CCS and CCUS.

To prepare a credible transition plan, entities in carbon-emissions sectors are expected to set net zero targets by 2050 at the latest, along with associated short- and medium-term targets. These targets are expected to be science-based and in line with the Paris Agreement goals. It is also desirable to set sector-based decarbonization pathways based on carbon budget concepts. Large entities engaged in multiple sectors may cover several sectoral-based pathways. Emissions-intensive entities also need to look at the pathways of enabling activities as part of the value chain and due to the need to disclose all scopes of emissions (Scopes 1, 2, and 3). Using sectoral

Figure 2: Sample Classification of the Whole-of-Economy Transition



Source: Prepared by the author

technical screening criteria that include quantitative thresholds and timelines reflecting the latest information and adjusting for country-specific conditions could be useful to increase investors' trust.

It is ideal for entities to reduce GHG emissions linearly toward net zero by around 2050. In practice, actual decarbonization pathways vary significantly by sector, available technologies or advancements in new technologies, cost performance, installation of CCS and CCUS facilities, utilization of CDR measures, and country-specific circumstances. Country-specific circumstances could include the availability of affordable low-carbon energy, green hydrogen, various emissions-cutting technologies, as well as the size of fiscal support obtained domestically or from other countries, companies, or investors. For hard-to-abate sectors, it may be useful for entities to disclose progress related to new technologies leading to substantial emissions reduction in terms of technological and cost performance (Figure 3).

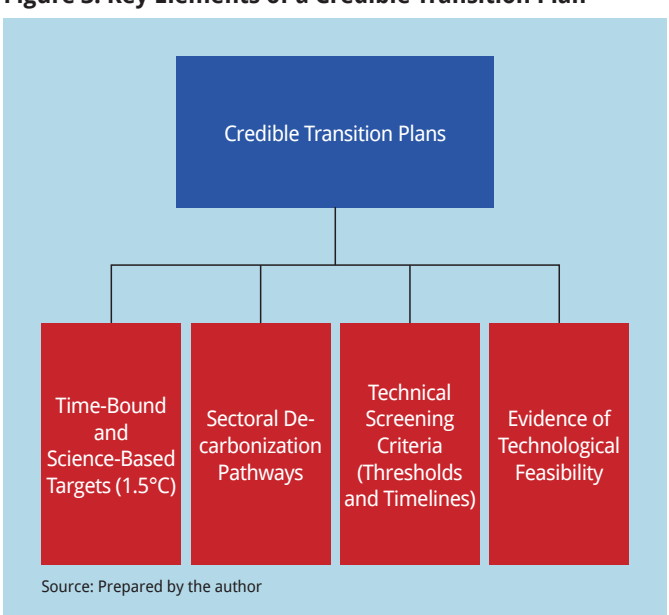
Classifying the whole-of-economy transition into activities

To promote the whole-of-economy transition to a net zero or 1.5°C pathway, a wide range of activities should be pursued by entities, as already pointed out. Following the aforementioned discussion, these activities could be decomposed into (1) green or near-green activities, as well as related enabling activities; (2) emissions-intensive and/or hard-to-abate sectoral activities that are making efforts or planning to reduce emissions and associated enabling activities; (3) CCS and CCUS; (4) CDR measures; and (5) managed phase-out of emissions-intensive assets (Figure 2). Both activities (1) and (2) should take into account the life cycle emissions and Scope 3 emissions. Their enabling activities refer to those that have the potential to enable substantial GHG emissions reductions in other sectors and should take life cycle considerations into account as well. ICT-related activities could make significant contributions to emissions reductions in activities (1) and (2). CCS and CCUS could be included as enabling activities of (1) and (2), but they are treated separately due to the unique nature of technologies to capture and store emissions, which could potentially be essential in certain sectors.

For example, (1) green activities may refer to generating renewable energy and producing EVs, while their related enabling activities could include the production of related equipment, batteries and storage, grids, precious metals, heat pumps, hydrogen, as well as the utilization of ICT and transportation. Meanwhile, (2) emission reduction efforts in hard-to-abate sectors include activities closely associated with hydrogen reduction steel, chemical, and aluminum production; using electric arc furnaces, using electrolysis to produce chemicals, and using electric heating equipment to produce aluminum; and developing aviation powered by hydrogen fuels or batteries, etc. Enabling activities that support these efforts could be the production of hydrogen, batteries, and renewable energy.

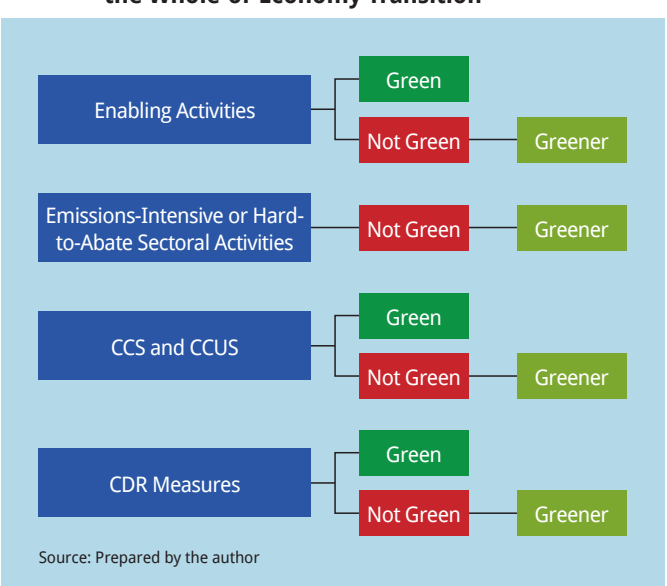
Economic activities could consider information from sectoral criteria developed by the Climate Bonds Initiative (CBI), based on the 1.5°C alignment, as a reference. These criteria are consistent with the 1.5°C alignment, and thus limited focus is provided on the transitioning process, known as "transitional activities." Meanwhile, taxonomies developed by the Association of Southeast Asian Nations (ASEAN) and some ASEAN member countries, such as Singapore, Indonesia, and Thailand, designate green and transitional activities under the traffic light classification system (e.g., green; amber or transitional; or red or ineligible). The treatment of these transitional activities varies, for example, depending on how differently sourced hydrogen is treated and how CCS or CCUS facilities are taken into account. There is no clear consensus yet as to whether black or brown hydrogen (hydrogen made from black or brown coal) and/or grey hydrogen (hydrogen made from natural gas) should be completely excluded from activities contributing to transitioning some sectors to low-carbon targets worldwide. Green hydrogen and blue hydrogen (black, brown, and grey hydrogen with CCS or CCUS technologies) are preferred over black, brown, and grey hydrogen. Figure 4 illustrates various activities that could actually or potentially contribute to emissions reduction. Over time, many of these activities are expected to reduce emissions based on lifetime considerations.

Figure 3: Key Elements of a Credible Transition Plan



Source: Prepared by the author

Figure 4: Illustrative Example of Activities Contributing to the Whole-of-Economy Transition



Source: Prepared by the author

Overview of Three Existing Approaches to Identifying Entities

This section sheds light on three existing approaches developed with the aim of enhancing the credibility of entities' commitment to decarbonization efforts. The first approach is developed by the Science-Based Targets initiative (SBTi) to certify targets aligned with a 1.5°C trajectory. Entities with certified targets could be regarded as Aligned Entities based on detailed decarbonization pathways developed for certain emissions-intensive sectors. The second approach is a certification and labeling scheme developed by CBI to certify Aligned Entities and Transition Entities from the perspective of the 1.5°C alignment. The third approach, developed by the Glasgow Financial Alliance for Net Zero (GFANZ), also labels Aligned Entities and Aligning Entities, aiming to encourage transition finance among investors.

Setting science-based targets to enhance credibility of entities

To enhance the credibility of entities' decarbonization efforts, investors increasingly prioritize science-based targets and associated sector-specific pathways. The most well-known science-based targets are those certified by the SBTi. The focus is on offering the Net Zero Standard Criteria aimed at encouraging companies to adopt 1.5°C-aligned SBTs (SBTi 2023). The time frame for these targets is divided into near-term (5–10 years) and long-term SBTs (net zero by 2050 or earlier). The targets encompass Scope 1 and Scope 2 emissions, with at least 95% coverage of all such emissions. Scope 3 emissions are to be included if they account for 40% or more of total Scope 1, 2, and 3 emissions. Entities must establish 1.5°C-aligned Scope 1 and Scope 2 targets to be accomplished within 5–10 years. Achieving these near-term targets necessitates the implementation of actions that significantly reduce emissions by around 2030.

In establishing the targets, the SBTi offers two approaches: the cross-sector Absolute Contraction Approach and, for certain sectors, the Sectoral Decarbonization Approach. The former applies a consistent absolute emissions reduction rate across all sectors, aligning with global decarbonization trajectories. All applicable companies are required to reduce emissions at a minimum fixed annual rate of 4.2%. The Sectoral Decarbonization Approach is prepared for establishing emissions targets for emissions-intensive sectors, including hard-to-abate sectors. Based on the carbon budget approach, the SBTi developed a sector-specific emissions corridor. The SBTi's near-term targets for entities are established along their convergence trajectory. The SBTi offers specific requirements and guidance aligned with the 1.5°C pathway for emissions-intensive sectors—including aluminum, apparel and footwear, aviation, buildings, chemicals, cement, financial institutions, ICT, maritime, oil and gas, power, steel, and transport.

CBI's approach to aligned and transition entities

CBI, which has been providing the criteria for labeling green and other labeled bonds, has introduced a labeling scheme for non-financial entities (CBI 2024). Based on the Climate Bonds Standard and the Sector Criteria, entities are certified as Aligned or Transition in terms of alignment with the 1.5°C pathway. An entity needs to identify activities included within the 90% certification threshold and those outside of the boundaries, along with explanations. The certification is valid for five years from the date of certification. The two levels of certification depend on when the Climate Mitigation Performance Targets align with the Sector Criteria: Level 1 (Aligned) and Level 2 (Transition).

1. **Level 1 (1.5°C Aligned):** The Climate Mitigation Performance Targets align with the Sector Criteria at the time of certification and thereafter until the date the Climate Mitigation Performance Targets represent net zero emissions or 2050, whichever comes sooner.

2. **Level 2 (Transition):** The Climate Mitigation Performance Targets do not align with the Sector Criteria at the time of certification but align by the end of December 2030, and thereafter until the date the Climate Mitigation Performance Targets represent net zero emissions or 2050, whichever comes sooner.

An entity needs to have a transition plan that incorporates strategies, including visions about future activities, assets, and business models, to achieve the emissions reduction targets. The targets must include interim targets on a three-yearly basis for the nine years after the certification date and on a five-yearly basis thereafter over the full-time horizon. The interim targets should also align with CBI's Climate Bonds Standard Sector Criteria and be aligned with those Criteria by the end of 2030 at the latest. The targets encompass Scope 1 and Scope 2 emissions for all companies, and Scope 3 emissions if the relevant Climate Bonds Standard Sector Criteria address those three emissions. The Sector Criteria are comprehensive, incorporating green and enabling activities, as well as emissions-intensive and hard-to-abate sectors and their enabling activities.

GFANZ's transition finance approaches to entities

In view of promoting investors to finance the whole-of-economy climate transition toward net zero, The GFANZ Secretariat identified four strategies: (1) climate solutions, (2) aligned, (3) aligning, and (4) managed phaseout, all of which are collectively called transition finance (GFANZ 2023). Among them, two strategies related to entities are highlighted as entry-level classification.

Aligned Entities: The Aligned strategies aim at financing entities that are already aligned to a 1.5°C pathway. Thus, the strategies apply to consecutive stages in an entity's transition toward net zero, delineating the entity's level of commitment and progress toward operations consistent with a net zero pathway.

Five Attributes for Aligned Entities:

- A commitment or stated ambition to reach net zero with pathways or benchmarks specified.
- Establishment of net zero targets covering interim targets and emissions-based key performance indicators (KPIs) covering Scopes 1, 2, and 3 (if material).
- Net zero transition plan should be established and implemented.
- Additional KPIs (where applicable) may be considered in the identification of Aligned Entities (e.g., low-carbon revenues or low-carbon capex).
- Entities are expected to show alignment to pathways and actual performance against their targets for two continuous years.

Aligning Entities: The Aligning strategies aim at financing entities that are committed to transitioning in line with 1.5°C-aligned pathways. Thus, the strategies apply to consecutive stages in an entity's transition toward net zero, delineating the entity's level of commitment, and progress toward operations consistent with a net zero pathway.

Five Attributes for Aligning Entities:

- A commitment or stated ambition to reach net zero with pathways or benchmarks specified.
- Established net zero targets (set to pathway): Establishment of net zero targets including interim targets and emissions-based KPIs covering Scopes 1, 2, and 3 (if material).
- Net zero transition plan should be under development.
- Additional KPIs may be considered in the identification of Aligning Entities (e.g., low-carbon revenues or low-carbon capex).
- Aligning Entities are converging toward pathways and expected to meet interim targets.

GFANZ's approach to Aligned Entities appears to be roughly consistent with the SBTi and CBI approaches due to its emphasis on net zero targets and Scope 1, 2, 3 emissions data. While both CBI and GFANZ emphasize transition plans, GFANZ's approach is somewhat ambiguous regarding sectoral decarbonization approaches and hard-to-abate sectors. Additionally, GFANZ's attributes related to Aligning Entities appear less ambitious than CBI's classification of Transition Entities due to the lack of timeline and details in the transition plan.

Conclusions

This paper focused on the whole-of-economy transition toward net zero and offered additional insights to clarify the transition finance frameworks by distinguishing entities and activities separately. To assess the alignment of entities, this paper focused on the three approaches adopted by SBTi, CBI, and GFANZ, all of which pay attention to alignment with net zero targets and 1.5°C pathways. Further discussions are necessary to define Aligning or Transition Entities since there appears to be a large divergence between these criteria. Another issue is that setting targets and pathways following the SBTi and CBI approaches may not be sufficient in hard-to-abate sectors due to a high degree of technological and cost performance uncertainties. Some evidence from various experiments related to new emissions-reducing technology may be additionally needed. This paper could be a useful starting point to develop more credible transition finance approaches taking into account country- and region-specific conditions.

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