Developing an Operational Transition Finance Definition for Project-Level Financing

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CLIMATE POLICY INITIATIVE

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ABOUT CLIMATE POLICY INITIATIVE

CPI is an analysis and advisory organization with deep expertise in finance and policy. Our mission is to help governments, businesses, and financial institutions drive economic growth while addressing climate change. CPI has seven offices worldwide, in Brazil, India, Indonesia, South Africa, the United Kingdom, and the United States.

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RELATED CPI WORKS

Net Zero Finance Tracker

Net Zero Finance Tracker Methodology (2025)

A Roadmap for Green and Transition Finance in India (2024)

Unlocking transition finance for achieving net-zero emissions in Indonesia (2025)

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GLOSSARY

Term	Definition
Technical screening criteria (TSC)	Technical screening criteria are used within taxonomies to determine whether an economic activity contributes to defined environmental objectives, such as climate change mitigation or adaptation.
Technological neutrality	The principle of technological neutrality ensures that any technology that meets the required technical screening criteria and other assessment criteria can qualify as aligned under a given taxonomy classification system.
Quantitative taxonomy thresholds	Quantitative taxonomy thresholds are used to determine whether an economic activity meets given assessment for a taxonomy classification system. These thresholds can be used to distinguish between different classifications for activities.
Whitelist-based taxonomy	A whitelist-based taxonomy seeks to identify sectors and activities that are eligible under a taxonomy classification system, such as activities that are considered 'green' or 'sustainable'. The inclusion of different sectors and activities is often based on expert judgement or consensus, rather than detailed assessment criteria.

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1. INTRODUCTION

Transition finance is needed to support the shift from today's high-carbon economy to a net-zero future. While green or climate investment plays a significant role in scaling climate-aligned sectors and activities, it does not encompass all activities that are key to the global transition. In carbon-intensive sectors, transition finance can support a shift to low-carbon pathways and contribute to the phase-out of high-emission activities. This is especially important for the power sector, where the provision of fossil fuel subsidies continues to create barriers for investment in low-carbon energy (Rahko et al. 2025). Without a financing mechanism that supports such shifts, the transition of key sectors may be slowed down or disrupted. Understanding existing transition finance flows is therefore key; yet, despite a growing body of transition finance frameworks, there is currently no universally agreed framework, nor is there a definition that applies to flows at the activity/project level.

This report demonstrates how organizations can begin tracking transition finance flows at the activity level, distinguishing between activities that align with net-zero pathways and those that currently do not.

- **Section 2** examines existing frameworks, taxonomies, and guidance to highlight examples of both transition finance definitions and operational approaches to classify transition activities. Commonalities and divergences in approaches are explored to distill key components that can inform the development of credible, context-sensitive transition finance frameworks.
- **Section 3** applies the proposed framework at the activity/project-level for the power sector and details operational definitions for fossil fuel/high-emissions, transition, and clean energy finance. The section also highlights the development of scenario-aligned global investment benchmarks for this year's iteration of Climate Policy Initiative's (CPI) Net Zero Finance Tracker.
- **Section 4** discusses the limitations of transition finance frameworks and potential future developments.

This report has been produced with the aim of encouraging stronger reporting practices among financial institutions, in addition to highlighting metrics that can help them to achieve meaningful impact in the real economy. It builds upon CPI's expertise in tracking primary project/activity-level investment flows and other transition metrics developed as part of CPI's NZFT workstream.

The developed operational approach informs this year's iteration of the NZFT to provide a more precise view of financial alignment with net-zero goals. This approach will, over time, be scaled across other sectors, supporting CPI's broader mission to develop robust, evidence-based approaches for tracking and accelerating the transition to a low-carbon economy.

While complementary, the proposed approach differs from other works in this area, which offer more systemic interpretations of transition finance, such as those that view it through the lens of financing for corporates with transition plans.

2. THE LANDSCAPE OF TRANSITION FINANCE

This section provides a structured, comparative analysis of existing frameworks, guidance, and taxonomies to clarify how transition finance is defined, used, and applied across jurisdictions and institutions. This section presents such analysis and identifies potential key components that can inform the development of credible, context-sensitive transition finance frameworks.

2.1 UNDERSTANDING THE BOUNDARIES OF TRANSITION FINANCE

Existing taxonomies and frameworks use various terms interchangeably, including *sustainable finance*, *green finance*, *climate finance*, *taxonomy-aligned finance*, and *transition finance*. This has led to conceptual overlaps, inconsistent application, and challenges to policy coherence, as these concepts continue to evolve over time. *Transition finance* exemplifies this challenge, with the OECD noting that there is no consensus on the definition, technical criteria, or qualifying sectors relating to the term (OECD 2022). This ambiguity remains, with implications for policy design and implementation, underscoring the importance of establishing coherent and transparent frameworks that can guide financial actors and support the effective alignment of capital with climate goals.

Transition finance has moved to the forefront of both policy and market agendas, with growing emphasis on how capital markets—particularly sustainable bonds—are financing the transition. The ICMA notes that at least three overlapping definitions of transition finance are in use, reflecting an evolving and sometimes fragmented understanding of the concept (ICMA 2024):

- **Economy-wide transition** involves a comprehensive transformation across all sectors, aiming not only to meet Paris Agreement targets but also to advance broader sustainability goals—such as biodiversity conservation and circular economy principles—which are often aligned with green taxonomies or the UN Sustainable Development Goals.
- **Climate transition** focuses on aligning with Paris goals and reaching net-zero emissions. This approach generally targets specific sectors, particularly those with high emissions, such as energy and heavy industry.
- **Hard-to-abate transition** addresses the unique decarbonization challenges of sectors that are heavily reliant on fossil fuels or are inherently emissions-intensive. It also includes efforts to scale up more sustainable alternatives to the outputs of these sectors.

CPI has contributed to advancing this agenda through country-specific work on transition finance. In India, CPI's publication *A Roadmap for Green and Transition Finance in India* (CPI and Observer Research Foundation 2024) explored both the supply and demand of finance across key energy-intensive sectors and developed a roadmap for financing the transition of hard-to-abate industries and enabling technologies. Its proposed definition of transition finance emphasizes financing for hard-to-abate sectors and enabling technologies that are not yet fully

aligned with the Paris Agreement but are essential for emissions reduction in the absence of feasible "green" alternatives.

Similarly, in *Unlocking Transition Finance for Achieving Net-Zero Emissions in Indonesia* (CPI 2025a), CPI assessed investment gaps, financing barriers, and enabling policies to align Indonesia's financial system with its climate goals. This work highlighted the significant role of transition finance in addressing mismatches between investment needs and the financial sector's capacity and proposed policy measures to mobilize new pools of capital for decarbonization.

Together, these country-level perspectives underscore the importance of grounding transition finance in local contexts, reflecting national policy priorities, sectoral challenges, and financial market structures. They also illustrate a broader perspective: while the overarching goal of transition finance is universal—mobilizing capital to enable the net-zero transition—the pathways to achieve it must be tailored, inclusive, and credible.

2.1.1 OVERVIEW OF TRANSITION FINANCE DEFINITIONS

Many definitions of transition finance exist, with significant overlaps and divergences across different institutions (see Table 1). Despite numerous efforts to provide guiding frameworks for transition finance—both within capital markets and more broadly—this variation in definitions underscores the need for a concise, practical definition that financial institutions can use.

Table 1: Non-exhaustive list of transition finance definitions from various institutions

Institution	Definition
CBI, EBRD, Green Climate Fund	"Climate transition finance refers to finance earmarked to fund this dynamic process of decarbonizing [a corporate] entity. [It] can be seen as a sub-set of green finance because it contributes to a better environmental outcome." (CBI et al. 2023)
European Commission	"...the financing of climate- and environmental performance improvements to transition towards a sustainable economy, at a pace that is compatible with the climate and environmental objectives of the EU. ... Transition finance means financing investments compatible with and contributing to the transition, which avoids lock-ins, including: A. investments in portfolios tracking EU climate transition benchmarks and EU Paris-aligned benchmarks; B. investments in Taxonomy-aligned economic activities, including: i. transitional economic activities as defined by Article 10(2) of Regulation (EU) 2020/852 for the climate mitigation objective, ii. Taxonomy-eligible economic activities becoming Taxonomy-aligned in accordance with Article 1(2) of Commission Delegated Regulation (EU) 2021/2178 over a period of maximum 5 (exceptionally 10) years; C. investments in undertakings or economic activities with a credible transition plan at the level of the undertaking or at activity level; D. investments in undertakings or economic activities with credible science-based targets, where proportionate, that are supported by information ensuring integrity, transparency and accountability." (European Commission 2023b)

Institution	Definition
GFANZ	"...investment, financing, insurance, and related products and services that are necessary to support an orderly real-economy transition to net zero. GFANZ has also identified four key transition financing strategies that finance or enable the following: 1. Climate Solutions – Entities and activities that develop and scale climate solutions 2. Aligned – Entities that are already aligned to a 1.5°C pathway 3. Aligning – Entities committed to transitioning in line with 1.5°C-aligned pathways 4. Managed Phaseout – The accelerated managed phaseout of high emitting physical assets." (GFANZ 2023)
G20	"...financial services supporting the whole-of-economy transition, in the context of the Sustainable Development Goals (SDGs), towards lower and net-zero emissions and climate resilience, in a way aligned with the goals of the Paris Agreement." (G20 Sustainable Finance Working Group 2022; 2023)
OECD	"...finance deployed or raised by corporates to implement their net-zero transition, in line with the temperature goal of the Paris Agreement and based on credible corporate climate transition plans." (OECD 2022)
Japan's Financial Services Agency et al.	"...a financing means to promote long-term, strategic GHG emissions reduction initiatives that are taken by a company considering to tackle climate change for the achievement of a decarbonized society. In particular, Japan, with the aim to achieve 2050 carbon neutral, defines transition finance as a finance for supporting the fundraiser who have set their target consistent with the Paris Agreement and satisfied the elements set forth in these Guidelines." (FSA et al. 2021)

2.1.2 IDENTIFYING SPECIFIC TRANSITION FINANCE ACTIVITIES

By zooming in on more granular operational approaches that capture specific transition activities, we observe that various methods have been adopted to evaluate priority sectors and their alignment with country-specific or global climate goals. Table 2 provides an indicative sample of these approaches; more details are provided in Annex Table A.1.

Table 2: Indicative sample of operational approaches to transition activities

Approach	Assessment Criteria	Transition Sectors in scope	Alignment
1. Regional Jurisdictions			
ASEAN Taxonomy	Adopts a system to evaluate economic activities through technical screening criteria (TSC) consisting of a multi-tiered approach and two main elements: (i) a principles-based Foundation Framework with a qualitative assessment of activities based on a sector-agnostic decision tree and (ii) a Plus Standard with detailed technical criteria, metrics, and thresholds. (ATB 2024)	▪ Agriculture, forestry & fishing ▪ Carbon capture, utilization, and storage (CCUS) ▪ Construction and real estate ▪ Electricity, gas, steam and air conditioning supply ▪ Information & communication ▪ Manufacturing, transportation & storage ▪ Professional, scientific & technical ▪ Water supply, sewage, waste management	Aligned with Paris goals

Approach	Assessment Criteria	Transition Sectors in scope	Alignment
EU Taxonomy	Identifies and labels (through TSC) transitional activities and other green activities compatible with a pathway to limit the temperature increase to 1.5 °C above pre-industrial levels. Many transition activities' TSC are defined based on the intended environmental or emissions outcomes. These performance thresholds and conditions are to be updated every three years to reflect technological progress and climate ambition. Eligibility methods and metrics differ depending on the type of activity and may include absolute performance thresholds, demonstrated improvements relative to a baseline, and, in some cases, criteria linked to transition pathways and time-limited eligibility (sunset clauses) to prevent the long-term use of high-emissions solutions. (European Commission 2023c)	▪ Construction and real estate activities ▪ Energy ▪ Information and communication ▪ Manufacturing ▪ Transport	Aligned with Paris goals
2. National Jurisdictions			
Bangladesh Taxonomy	Adopts a classification system to define which economic activities are considered eligible for green finance. The taxonomy is predominantly whitelist-based, but at a high level, it incorporates some performance thresholds across six environmental objectives: 1. Climate change mitigation 2. Climate change adaptation 3. Sustainable protection of water and marine resources 4. Transition to a circular economy, waste prevention, and recycling 5. Pollution prevention and control 6. Protection and restoration of biodiversity and healthy ecosystems (Bangladesh Bank 2020)	▪ Renewable energy ▪ Energy & resource efficiency ▪ Alternative energy ▪ Liquid waste management ▪ Solid waste management ▪ Recycling and manufacturing recyclable goods ▪ [Environmentally] friendly brick production ▪ Green agriculture ▪ Green cottage, micro, small and medium enterprise ▪ Green socially responsible finance	Aligned with Paris goals through Bangladesh's emissions reduction NDC target.
Indonesian Taxonomy for Sustainable Finance	Adopts a system to evaluate economic activities by determining if an activity makes a substantial contribution to at least one Environmental objective, avoids significant harm to others, addresses any potential harm (where applicable), and complies with established social safeguards. TKBI employs two primary assessment pathways: the TSC approach for non-MSMEs and a Sector-Agnostic Decision Tree for MSMEs. (OJK 2025)	▪ AFOLU ▪ Energy ▪ Industrial processes and products use (IPPU) ▪ Transportation and storage	Aligned with Paris goals, with respect to Indonesia's NZE 2060 goal.
Japan Basic Guidelines on Climate Transition Finance	Sectoral decarbonization roadmaps, at their core, outline the anticipated actions companies should take—alongside possible technological solutions—to achieve carbon neutrality by 2050. Developed by METI, the roadmaps also offer sector-specific context and analysis, including current industry trends, common practices, production methods, and the reasoning behind each roadmap. They are grounded in scientific evidence and aligned with the objectives of the Paris Agreement. (FSA et al. 2021)	▪ Cement ▪ Chemicals ▪ Electricity ▪ Gas ▪ Paper and pulp ▪ Petroleum ▪ Steel and Iron	Aligned with Paris goals, with respect to Japan's carbon neutrality by 2050 goal.

Approach	Assessment Criteria	Transition Sectors in scope	Alignment
Korean Taxonomy	Identifies and labels (through TSC) transitional activities alongside other green activities. The Korean Green Taxonomy, closely aligned with the EU Taxonomy, borrows its core principles while tailoring them to the Korean context and regulatory landscape. (South Korea Ministry of Environment 2022)	▪ Energy ▪ Industry ▪ Transport	Designed to support South Korea's national goal of achieving carbon neutrality by 2050 but does not explicitly require that all activities be aligned with a 1.5°C scenario.
Mongolian Green Taxonomy	Adopts a whitelist-based framework to identify sectors and activities that adhere to the following six principles: 1. Contribute to national policies and targets 2. Address environmental challenges 3. Cover high-emitting, key economic sectors 4. Align with international standards and good practices 5. Comply with ESG standards 6. Continues review and development For each sector, a list of key reference policy targets is provided. These targets influence the inclusion of activities under the taxonomy. (Mongolian Sustainable Finance Association 2023)	▪ Renewable energy ▪ Low pollution energy ▪ Energy efficiency ▪ Green buildings ▪ Pollution prevention and control ▪ Sustainable water and waste use ▪ Sustainable agriculture, land use, forestry, biodiversity conservation & eco-tourism ▪ Clean transport	Aligned with Paris goals through Mongolia's emissions reduction NDC target.
Singapore-Asia Taxonomy for Sustainable Finance	Adopts a classification system with "green" anchored in science-based pathways and drawing on the EU Taxonomy's TSC, while also integrating regional considerations where appropriate. The taxonomy reflects key elements of transition finance found in the ASEAN Taxonomy. It recognizes activities that are not yet aligned with a 1.5 °C trajectory but are either advancing toward low-carbon operations or contributing to near-term emissions reductions. These "amber" activities are subject to time limits, typically phased out by 2030 or 2035. The taxonomy includes a measures-based approach for specific sectors such as cement, hydrogen, and basic chemicals, offering a more practical path for hard-to-abate industries. However, this added flexibility must be grounded in transition plans aligned with a 1.5 °C goal. (MAS 2023)	▪ Agriculture ▪ CCUS ▪ Energy ▪ Forestry ▪ ICT ▪ Real estate/ construction ▪ Transport ▪ Waste ▪ Water	Aligned with Paris goals

Approach	Assessment Criteria	Transition Sectors in scope	Alignment
3. Private Institutions			
BNEF Energy Finance Ratios	Categorizing energy supply activities into two buckets: (1) low-carbon; (2) fossil fuels. Transition-specific activities are then not explicitly identified, but BNEF identifies looks at transition holistically as the shift from fossil-fuel-based energy supply to low-carbon energy supply, measured using investment or financing low-carbon to fossil fuel investment ratios that align with energy investment projections for the net-zero transition at a global level. (BNEF 2022)	• BNEF's Low-carbon energy supply activities cover two sectors for a range of renewable technologies: (1) production and supply; (2) manufacturing. The electricity grid is also covered under this category.	Aligned with Paris goals due to the use of net zero scenario data from IEA, IPCC, and NGFS.
Climate Bonds Initiative (CBI) Taxonomy	Adopts a classification system to evaluate economic activities through TSC. The Taxonomy serves as the foundational tool used by the Climate Bonds Initiative (CBI) to assess whether the assets or projects backing a bond meet the requirements for green or climate-aligned finance. When a sector has undergone comprehensive analysis and has established specific eligibility criteria, bonds within that sector can be formally certified under the Climate Bonds Standard. For sectors where criteria are still being developed, certification is not yet available for bonds in those areas. (CBI 2021)	• Buildings • Energy • ICT • Land use & marine resources • Transport • Industry • Waste & pollution control • Water	Aligned with Paris goals
Climate Bonds Initiative (CBI) White Paper	The CBI whitepaper introduces the concept of a 'transition label' and highlights important considerations for transition-related financial instruments. It suggests categorizing entities, activities, and related measures into five groups — Near Zero, Pathway to Zero, Interim, No Pathway to Zero, and Stranded—using a decision tree to guide classification. At the heart of the framework are five core transition principles that define what constitutes credible transition pathways. These principles stress that genuinely transitioning entities and activities are those already following—and committed to continuing on—such pathways. (CBI 2020)	*Does not provide a comprehensive list of activities.*	Aligned with Paris goals through halving emissions by 2030 and achieving net zero by 2050.

The above approaches vary significantly in their design and ambition. Some rely on detailed criteria and quantitative thresholds to assess the relative contributions of activities to climate objectives (e.g., the EU Taxonomy and the Singapore-Asia Taxonomy), while others adopt more flexible, principle-based guidance. The ambition of the different approaches also differs: while some accept alignment with Nationally Determined Contributions (NDCs) as sufficient, others recognize the potential limitations of NDCs in meeting the Paris goals (Tandon 2021). Eligible investments are similarly context-dependent, reflecting differences between each jurisdiction's emissions profile and economic priorities—two characteristics that also help to shape the sectoral scope of a jurisdiction's transition sectors.

2.2 DISTILLING KEY COMPONENTS OF A TRANSITION FINANCE FRAMEWORK

The key components of transition finance definitions (Section 2.1.1) and specific approaches to transition activities (Section 2.1.2) are distilled in Table 3, expanding on previous analysis by the ICMA (2024).

CPI organizes these components into two broad groups. The first concerns environmental impact, emphasizing the importance of investing in climate solutions and preventing carbon lock-in. The second encompasses socioeconomic components, including institutional-level governance and the broader economic impact of transition finance.

Table 3: Key components identified in existing transition finance frameworks

	Commonality	Description	Described in Definition/Approach
Environmental impact	**(a) Paris alignment at the global or country level**		
	Supporting decarbonization pathways that target global alignment with the Paris Agreement	Finance must support a decarbonization pathway consistent with the Paris Agreement, typically targeting net-zero by 2050. Activities should align with recognized global or national decarbonization pathways (e.g., IEA NZE, IPCC).	▪ Bangladesh (2020) ▪ BNEF (2022) ▪ GFANZ (2023) ▪ G20 (2023; 2022) ▪ Japan's FSA et. al. (2021) ▪ Mongolian Green Taxonomy (2023) ▪ OECD (2022)
	Supporting decarbonization pathways that target regional alignment with the Paris Agreement		▪ ASEAN Taxonomy (2024) ▪ EU Commission (2023) ▪ EU Taxonomy (2020)
	(b) Emissions mitigation and avoidance of carbon lock-in		
	Focus on high-emitting/hard-to-abate sectors	Transition finance is specifically aimed at sectors that are currently emissions-intensive but are essential to the economy.	▪ CBI/EBRD/GCF (2023) ▪ G20 (2022; 2023) ▪ Japan's FSA et. al. (2021) ▪ Korean Taxonomy (2021) ▪ Mongolian Green Taxonomy (2023) ▪ OECD (2022) ▪ Singapore-Asia (2023)
	Evidence of GHG emissions reductions	Finance should lead to a reduction in emissions over a defined period.	▪ EU Taxonomy (2020) ▪ Japan's FSA et. al. (2021) ▪ Singapore-Asia (2023)
	Avoidance of carbon lock-in	Finance should not support activities or infrastructure that delay or prevent long-term decarbonization.	▪ EU Taxonomy (2020) ▪ Japan's FSA et. al. (2021) ▪ OECD (2022) ▪ Singapore-Asia (2023)

	Commonality	Description	Described in Definition/Approach
Socioeconomic	**(c) Broader governance and holistic outcomes**		
	Transparency, integrity, and accountability	Emphasis on clear disclosure, monitoring, and governance mechanisms to prevent greenwashing.	▪ CBI/EBRD/GCF (2023) ▪ EU Commission (2023) ▪ GFANZ (2023) ▪ OECD (2022)
	Whole economy/just transition approach	Transition finance should support economy-wide decarbonization efforts, including fair outcomes across regions and populations.	▪ GFANZ (2023) ▪ G20 (2022; 2023) ▪ OECD (2022)

2.2.1 PARIS ALIGNMENT AT THE GLOBAL OR COUNTRY LEVEL

A core element of the definitions and approaches analyzed is their alignment with the goals of the Paris Agreement and net-zero scenarios. Net-zero scenarios, such as those developed by the IEA, IPCC, and NGFS, inform the development of decarbonization pathways and are increasingly used by financial institutions to benchmark their progress toward net zero. Section 3 discusses how data extracted from these scenarios could be used for a country-specific application of a transition finance framework.

Country-agnostic alignment approaches, such as the CBI Taxonomy (CBI 2021) and BNEF's Energy Supply Investment Ratios (BNEF 2022), have been developed by evaluating technological sectors holistically. They aim to identify which sectors and technologies are climate-aligned, specifically those consistent with the goals of the Paris Agreement. While their harmonized, simplified set of criteria can be beneficial in certain contexts—particularly for actors with cross-jurisdictional investments and in green bond issuance—they often fail to account for localized nuances in technological developments. Regional approaches such as the EU Taxonomy and the ASEAN Taxonomy can offer greater flexibility here, as regional/bloc-level alignment can be tailored to the socioeconomic context of individual member states.

The context for transition finance varies across geographies. It is shaped by differences in industrial profiles, resource endowments, development stages, and policy environments. In contrast to country-agnostic alignment approaches, country-specific alignment approaches account for a given country's economic, geographical, and social characteristics, enabling adaptation to different stages of technological development and sector-specific pathways.

Table 4 summarizes the advantages and limitations of these two alignment approaches, drawing on examples analyzed in previous sections.

Table 4: Comparison of country-agnostic and country-specific alignment approaches

Alignment approach	Advantages	Limitations	Examples
Country Agnostic	▪ Facilitates cross-border investments and country-country comparability ▪ Promotes global alignment and enhances reporting consistency ▪ Reduces fragmentation in financial markets ▪ More easily adopted by cross-jurisdictional investors	▪ May not reflect local environmental, social, or economic realities in certain geographies ▪ Risks marginalizing sectors that are of economic importance to developing economies ▪ Implementation may be difficult due to differing regulatory requirements between countries and a lack of activity-level data, particularly in developing markets	▪ BNEF (2022) ▪ CBI Taxonomy (2021)
Country specific	▪ Aligns with national development goals and climate targets ▪ Reflects local economic, environmental, and social characteristics ▪ Enables the factoring in of nationally important but globally overlooked economic priorities ▪ Greater coherence with the domestic regulatory landscape	▪ May cause increased market fragmentation and result in cross-border reporting inconsistency ▪ Deviance from regional taxonomies may limit access to international capital ▪ Can be resource-intensive to develop and maintain ▪ Misalignment with international standards may limit credibility ▪ Must be complemented by credible country-level climate scenarios	▪ Bangladesh Taxonomy (2020) ▪ Indonesia Taxonomy (2025) ▪ Korean Taxonomy (2022) ▪ Mongolian Green Taxonomy (2023) ▪ Singapore-Asia Taxonomy (2023)

2.2.2 EMISSIONS MITIGATION AND AVOIDANCE OF CARBON LOCK-IN

Several approaches rely on a tiered classification system, complemented by technical screening criteria (TSC) to evaluate economic activities. Such systems help to illustrate an activity's degree of alignment with climate goals and demonstrate that not all economic activities are immediately 'green'. They allow for 'transitional' or 'amber' stage activities that are not yet fully aligned with the Paris goals but are expected to align within a defined timeframe or to contribute significantly to near-term emissions reductions. Activities can also be defined with clear performance milestones and sunset dates to ensure that they do not remain transitional, as exemplified in the EU Taxonomy.

Other approaches explicitly separate green and transition activities, often developing standalone criteria for what qualifies as a 'transition' activity. Such criteria can include country-specific considerations, sector decarbonization roadmaps, and the availability of low-carbon alternatives. Distinguishing between green and transition activities is particularly useful for carbon-intensive sectors, where immediate alignment with Paris goals may not be feasible. For such sectors, activities can be identified that contribute to emissions mitigation efforts and the avoidance of long-term carbon lock-in.

2.2.3 BROADER GOVERNANCE AND HOLISTIC OUTCOMES

Many taxonomies, frameworks, and operational approaches encourage transparent and accountable reporting. This ensures credibility and promotes trust in the quality of climate-related investments reported under these frameworks. Clearly defining which economic activities align with the Paris goals, using robust technical criteria, can mitigate the risk of greenwashing. Integrity is reinforced through independent verification and alignment with international standards, while accountability mechanisms—such as mandatory reporting, third-party assurance, and penalties for misrepresentation—ensure actors are held accountable for their environmental claims and progress.

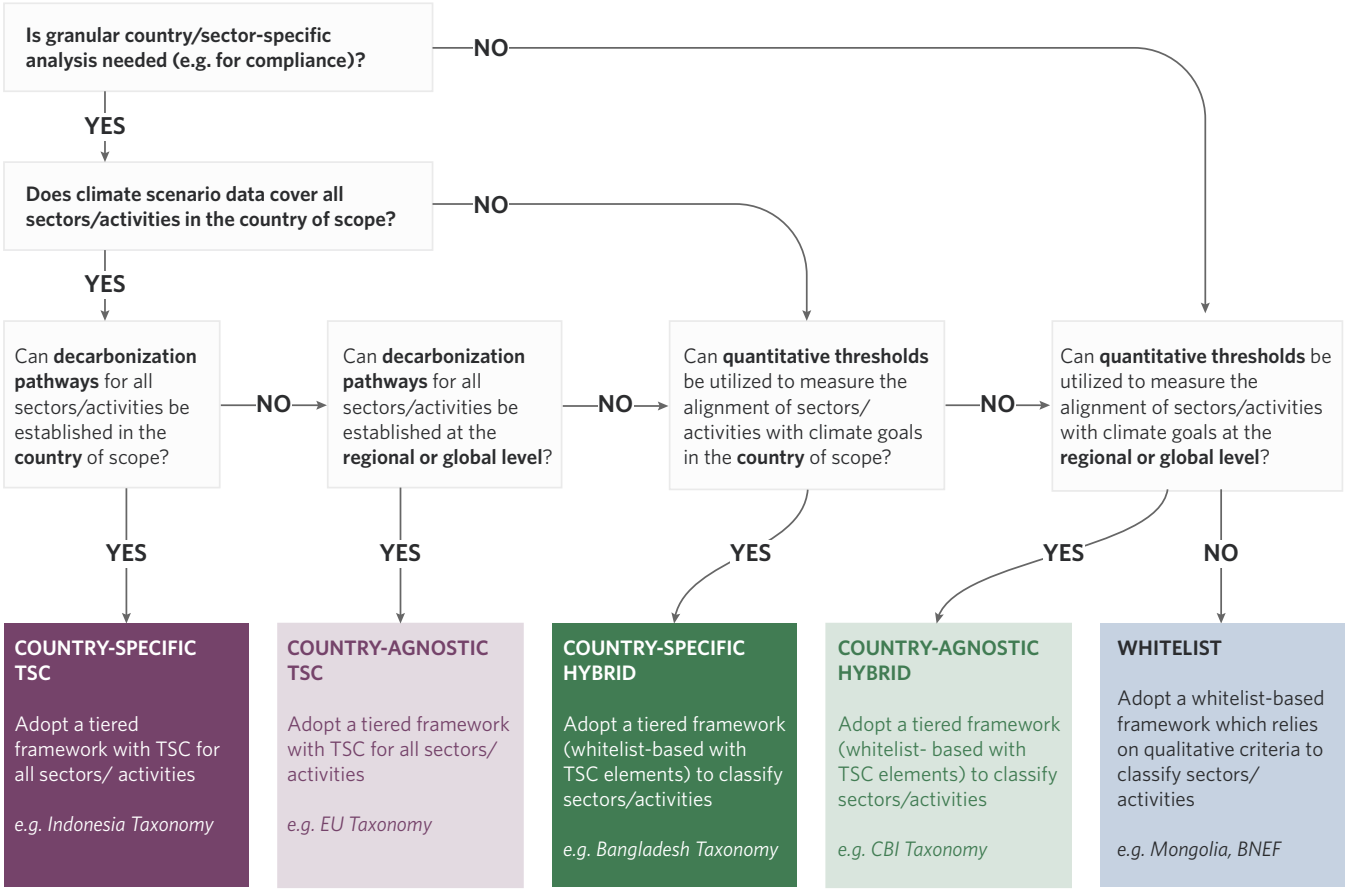
Frameworks and taxonomies are increasingly incorporating whole-economy or just transition principles. Rather than focusing solely on 'green' sectors, transition finance supports high-emitting or hard-to-abate industries in shifting to decarbonization pathways, encouraging wider systemic change. Additionally, transition principles are being embedded through requirements for social safeguards, stakeholder engagement (particularly with workers and affected communities), and the consideration of how finance affects the job market. By integrating broader socioeconomic objectives, these frameworks and taxonomies aim to drive an inclusive transformation that prioritizes both people and the environment.

2.3 NAVIGATING TOWARD THE RIGHT TRANSITION FINANCE FRAMEWORK

Figure 1 depicts a range of framework approaches that could be adopted if certain conditions are met. It offers a simplified view of the approaches that were analyzed in Table 2, utilizing decision nodes to guide the selection of an appropriate framework approach.

The selection of a framework approach should be influenced by the scope and availability of data. Establishing an operational definition of transition finance at the activity level highlights the difficulties with this, as decarbonization pathways and technical screening criteria are available only for a limited number of countries and sectors. As data availability improves, there is an expectation that any implemented framework should align more closely with a country-specific TSC framework. This is because these frameworks can fully account for the socioeconomic context of the countries in which they are implemented, thereby enhancing the precision of the resulting definition of transition finance.

Figure 1: Decision tree demonstrating a range of framework approaches[1]



1 For definitions of key terminology used in this figure, please refer to the Glossary

3. APPLYING A TRANSITION FINANCE FRAMEWORK TO THE POWER SECTOR

This section begins by introducing a primarily **country-agnostic approach** to define financial activities (Section 3.1), before explaining how this can be complemented with a benchmarking approach to assess whether current flows/investment trends are compatible with the transition (Section 3.2).

We demonstrate an NZFT-specific transition finance framework that can help to assess the financing of new projects in the power sector, drawing on previous work on taxonomies for low-carbon, climate-resilient investment, in particular, for the Global Landscape of Climate Finance, as well as previous work on fossil fuel financing (CPI 2020).

The focus on the power sector derives from its significant contribution to global emissions. For example, in 2022, heat and power generation accounted for approximately 44% of global energy-related CO_2 emissions, with coal plants emitting around 73% of these emissions (IEA 2024c).

The power sector is also inherently connected to other economic sectors that require rapid decarbonization, making it a catalyst for systemic change. Decarbonizing electricity generation is not only essential for achieving direct emissions reductions but also for enabling broader decarbonization of end-use sectors, such as transport, buildings, and industry (IPCC 2022).

Compared with other sectors, the power sector demonstrates significant data availability at both the asset and transaction levels. Asset-level data enables enhanced tracking of emissions and investment flows, which is essential for aligning portfolios with climate goals (IIGCC n.d.). Similarly, the availability of transaction-level data for these assets improves the traceability of financial flows (CPI 2024).

The framework implemented in Section 3.1 reflects a country-agnostic, hybrid approach that incorporates both whitelist and TSC components. Following a review of relevant activity-level data, it was determined that a country-specific framework could not be implemented. This is primarily due to a lack of environmental performance data at the asset level (e.g., lifecycle emissions of a power plant), which prevents us from determining more precise classifications based on detailed TSC.

3.1 OPERATIONAL DEFINITIONS FOR FOSSIL FUEL/HIGH-EMISSIONS, TRANSITION, AND CLEAN ENERGY FINANCE

Defining transition finance for the power sector is important, but it is also necessary to complement this with definitions for fossil fuel/high-emissions and clean energy finance. This highlights the importance of distinguishing between finance for activities that align with net-zero pathways and those for which a transition pathway has not yet been established. Furthermore, the use of these definitions demonstrates, from an investment perspective, that equal prioritization should be given to finance for activities classified as either clean or transitional, given their centrality to achieving long-term decarbonization goals.

3.1.1 IDENTIFYING CRITERIA FOR TAXONOMY CLASSIFICATIONS

The output of this exercise is the development of taxonomy classifications for the power sector (Section 3.1.2), in which CPI classifies finance for technologies that are fossil fuel/high-emissions, transition, or clean energy. **These classifications have been developed by implementing a conservative, country-agnostic framework, reflecting the lack of environmental performance data available at the asset and transaction levels**. Demonstrating the implementation of this framework, the key operational definitions CPI has adopted for its taxonomy classifications are listed in Table 5 below.

Table 5: Operational definitions for taxonomy classifications

Type of Finance	Definition	Lifecycle Emissions Threshold
Fossil Fuel/High-Emissions finance – 'carbon intensive'	This refers to financing for activities that are typically carbon-intensive and do not currently demonstrate alignment with a net-zero pathway. While many of these activities dominate the emissions profiles of both developed and developing economies, they are not considered aligned by the majority of the approaches assessed in Section 2.	For this classification, CPI has adopted a threshold of 425gCO_2e/kWh in lifecycle emissions. Any activities found to exceed this threshold are considered fossil fuel/high-emissions. This value is based on the Amber Tier 3 TSC of the ASEAN Taxonomy (ATB 2024) and is slightly lower than the UK's Emissions Performance Standard (EPS) of 450gCO_2e/kWh for a plant running at baseload (UK GOV 2014). Other taxonomies apply more stringent benchmarks. For example, the EU extended environmental taxonomy sets a threshold of 270gCO_2e/kWh of direct GHG emissions for electricity-generation projects under the "Do No Significant Harm" (DNSH) criteria for climate change mitigation (EU Platform on Sustainable Finance 2022). Similarly, Singapore's taxonomy sets a short-term threshold of 220gCO_2e/kWh (2023–30) (MAS 2023). These examples illustrate that thresholds in taxonomies are often tailored to national or regional priorities. Given the global scope of this analysis, a threshold of 425gCO_2e/kWh has been adopted. Several taxonomies and frameworks classify activities above this limit as 'red', 'misaligned', or 'ineligible'.
Transition finance – 'on a credible transition pathway'	This represents finance for activities that cannot yet be classed as low carbon but can demonstrate alignment with a net-zero pathway. Credible net-zero scenarios, such as those of the IEA (2024e) and the NGFS (2025), should be used to assess whether these activities can meet defined, time-bound emissions reductions by a prescribed sunset date. Adherence to this condition shields against long-term carbon lock-in and mitigates the risk of power sector assets becoming stranded.	For this classification, the lower limit is set at 100gCO_2e/kWh in lifecycle emissions, reflecting the upper boundary for clean energy finance and aligning with TSC for 'green' or 'aligned' activities in several taxonomies and frameworks (ATB 2024; EU Platform on Sustainable Finance 2022; MAS 2023). The upper limit is set at 425gCO_2e/kWh, beyond which an activity is considered 'high emission'. This threshold aligns with TSC for 'transitional' or 'amber' activities in several taxonomies and frameworks.
Clean energy finance – 'aligned with a net-zero pathway'	Clean energy finance is defined as finance for activities that result in zero or near-zero emissions and are aligned with a net-zero pathway. Such activities qualify for green finance under the taxonomies of the EU, CBI, and Singapore.	For this classification, the upper limit is set at 100gCO_2e/kWh in lifecycle emissions, which aligns with the TSC for 'green', 'aligned' or 'eligible' activities in several taxonomies and frameworks (ATB 2024; EU Platform on Sustainable Finance 2022; MAS 2023).

3.1.2 DEVELOPING THE TAXONOMY CLASSIFICATIONS

This section demonstrates how the operational definitions for fossil fuel/high-emissions, transition, and clean energy finance have been applied to develop NZFT-specific taxonomy classifications for the power sector. Table 6 summarizes the primary subsectors and solutions that were examined, along with their respective classifications. Further details regarding the application of this classification framework to specific subsectors can be found in Annex Table A.2.

To classify subsectors and solutions, CPI has adopted a systematic approach:

1. Literature and data sources are collected to generate a range of estimates for the lifecycle emissions of each solution.
2. If a range falls within the threshold for a given classification, the solution is assigned that classification.
3. If no range of estimates can be generated, or if the range spans two classification thresholds, TSC from existing taxonomies and frameworks is used to evaluate the solution.
4. If TSC cannot be verified through an examination of asset-level data, the solution is assigned the higher (more conservative) classification.

Table 6: Summary of CPI's power sector taxonomy classifications[2]

Subsector	Solutions Examined	Classification	Framework approach	Justification
Bioenergy	Biodiesel	Transition	Country-agnostic	Due to the collection of a wide range of lifecycle emissions estimates, these bioenergy solutions have been evaluated against the TSC of existing taxonomies. This TSC cannot be verified using activity level data, so CPI adopts the more conservative classifications for these solutions.
	Bioethanol	Transition	Country-agnostic	
	Biogas (Biomethane)	Transition	Country-agnostic	
	Charcoal	Fossil Fuel/ High-Emissions	Country-agnostic	Solution found to exceed the emissions threshold for 'Fossil Fuel/High-Emissions'.
	Fuelwood/ Wood Pellets	Transition	Country-agnostic	CPI were unable to collect a credible set of lifecycle emissions estimates for this solution. This bioenergy solution has therefore been evaluated against the TSC of existing taxonomies. This TSC cannot be verified using activity level data, so CPI adopts a conservative classification for this solution, which matches that of other Bioenergy solutions which have been evaluated.

2 ***Definitions:***
- ***Subsector*** *– Key components of the energy sector, summarizing groups of different technologies.*
- ***Solutions*** *– Types of technologies that are typically deployed at the asset level.*
- ***Classification*** *– Represents the tag applied to each solution, following the application of the framework.*

Subsector	Solutions Examined	Classification	Framework approach	Justification
Carbon Capture	CC(U)S in Coal-Fired Plants	Fossil Fuel/ High-Emissions	Country-agnostic	CPI were unable to collect a credible set of lifecycle emissions estimates for these solutions. These CC(U)S solutions have therefore been evaluated against the TSC of existing taxonomies. This TSC cannot be verified using activity level data, so CPI adopts conservative classifications for these solutions, based on the fuel of the plant in which CC(U)S solutions are deployed.
	CC(U)S in Gas-Fired Plants	Fossil Fuel/ High-Emissions	Country-agnostic	
	CC(U)S in Oil-Fired Plants	Fossil Fuel/ High-Emissions	Country-agnostic	
Energy Storage	Electrochemical Storage	Clean Energy	Country-agnostic	CPI were unable to collect a credible set of lifecycle emissions estimates for these solutions. These energy storage solutions have therefore been evaluated against the TSC of existing taxonomies. CPI finds that existing taxonomies automatically include energy storage under their 'green' or 'aligned' classifications and so CPI adopts a similar approach.
	Mechanical Storage	Clean Energy	Country-agnostic	
	Thermal Storage	Clean Energy	Country-agnostic	
Hydrogen (Production)	Blue Hydrogen	Fossil Fuel/ High-Emissions	Country-agnostic	Due to the collection of a wide range of lifecycle emissions estimates for this solution, blue hydrogen has been evaluated against the TSC of existing taxonomies. This TSC cannot be verified using activity level data, so CPI adopts a conservative approach for this solution.
	Green Hydrogen	Clean Energy	Country-agnostic	Solution found to not exceed the emissions threshold for 'Clean Energy'.
	Grey Hydrogen	Fossil Fuel/ High-Emissions	Country-agnostic	Solution found to exceed the emissions threshold for 'Fossil Fuel/High-Emissions'.
Nuclear	Fission	Transition	Country-agnostic	Due to the collection of a wide range of lifecycle emissions estimates for this solution, nuclear has been evaluated against the TSC of existing taxonomies. This TSC cannot be verified using activity level data, so CPI adopts a conservative approach for this solution.
Power Grids	Digitalisation	Clean Energy	Country-agnostic	Classified as 'Clean Energy' as these solutions do not directly produce any emissions.
	Mini-Grids	Clean Energy	Country-agnostic	
	System Reinforcement and Asset Replacement	*(See Section 3.1.3)*	Country-specific	*(See Section 3.1.3)*
	New Connections		Country-specific	

Subsector	Solutions Examined	Classification	Framework approach	Justification
Renewable Energy	Geothermal	Clean Energy	Country-agnostic	Solutions found to not exceed the emissions threshold for 'Clean Energy'.
	Hydropower	Clean Energy	Country-agnostic	
	Marine	Clean Energy	Country-agnostic	
	Solar	Clean Energy	Country-agnostic	
	Wind	Clean Energy	Country-agnostic	
Waste-to-Energy	Incineration (MSW)	Fossil Fuel/ High-Emissions	Country-agnostic	Solution exceeds the emissions threshold for 'Fossil Fuel/High-Emissions'.

Based on this classification system, CPI does not currently classify any fossil fuel solutions as transition finance. This aligns with a key finding from the IEA, which contends that if renewable energy technologies can be deployed at pace then 'no new long-lead time upstream oil and gas projects are needed in the NZE Scenario, neither are new coal mines, mine extensions or new unabated coal plants'(IEA 2024). However, once country-specific approaches and socioeconomic conditions are factored in, some fossil fuel solutions could be considered to be aligned with net zero under certain conditions. For example, Mongolia includes heat and electricity generation from natural gas in its Green Taxonomy, but only if an 80% reduction in pollution (PM2.5) can be achieved compared to a coal baseline (Mongolian Sustainable Finance Association 2023). Similarly, Indonesia includes natural gas extraction under the 'green' classification of its Sustainable Finance Taxonomy (OJK 2025), provided that carbon capture and storage (CCS) infrastructure is attached to this activity.

CPI's country-agnostic approach relies on the application of consistent environmental criteria to establish classifications for different solutions. In addition, it is important to note that CPI classifies investments in solutions once they have reached financial close. **This has resulted in no fossil fuel investment being classified as transition finance for this year's iteration of the NZFT**, with CPI taking a conservative approach in the absence of higher-resolution environmental performance (asset-level) data that might otherwise enable more precise classifications or the reassessment of a particular asset over time.

Separately to the above approach, CPI has sought to demonstrate that a country-specific approach can be adopted to classify power grid solutions and to develop energy supply finance benchmarks. This has been possible primarily due to the availability of standardized country-level datasets. The following section (3.1.3) describes the methodology that has been developed to classify solutions for: 1) *System Reinforcement and Asset Replacement,* and *2) New* Connections.

3.1.3 A COUNTRY-SPECIFIC FRAMEWORK FOR POWER GRIDS

Transmission and distribution (T&D) systems are essential to the energy transition but may not align with climate goals. T&D networks are energy-source agnostic, transporting both renewable and fossil-based electricity. As such, T&D investments cannot be automatically considered climate-aligned unless the nature of the connected energy source is known, posing a challenge for classification within climate finance tracking frameworks. Moreover, part of the T&D infrastructure is often embedded within renewable project financing and not separately itemized, making it difficult to quantify the proportion of finance going towards grids.

Project-level financing is uncommon for T&D infrastructure, which is typically funded through public or balance-sheet financing rather than standalone project finance. Unlike generation assets, T&D investments are often large, return-regulated, and embedded within national planning frameworks, making them more suited to financing via sovereign budgets, utility balance sheets, or concessional loans (US DOC 2021). As a result, only a small portion of global grid-related investment is financed through identifiable project-level transactions, with capital largely being mobilized by national utilities or multilateral finance institutions. CPI's project-level dataset on T&D infrastructure, primarily sourced from IJGlobal, captures only a portion of this market—approximately USD 150 billion—compared to the global benchmark estimate of over USD 300 billion (IEA 2024a; IRENA 2024; BNEF 2024). This dataset is skewed toward project-financed assets and underrepresents countries such as China, where grid investment is state-led. Therefore, project data cannot reliably estimate total T&D investment or indicate whether connected energy sources are renewable, fossil-based, or a mix.

A new country-level approach is needed to assess the alignment of T&D investments with climate goals. To address this, CPI has developed a methodology that utilizes data for national electricity mixes as a proxy for the climate alignment of T&D assets. This is presented in the Annex of the most recent Global Landscape of Climate Finance (CPI 2025b), along with the associated methodology (CPI 2025c). The approach draws on BNEF's New Energy Outlook Grid Data Viewer (requires login), which provides annual estimates of investment in new grid connections, system reinforcement, and transmission and distribution asset replacement. However, as this data is not energy-source tagged, additional indicators are needed to assess whether investments are enabling clean energy. CPI uses renewable energy statistics—specifically, installed capacity and electricity generation data over a five-year rolling period—to estimate the share of total electricity derived from clean sources in each country, based on IRENA's Renewable Energy Statistics. The five-year window helps smooth short-term fluctuations and reflect both historical and recent growth trends, allowing CPI to attribute a portion of aggregate T&D investment to clean energy in line with each country's progress. The processing methodology is further detailed in the Annex to this paper.

Mini-grids and distributed systems remain outside the scope of tracking due to data limitations. While T&D investments are dominated by national grid infrastructure, mini-grids and distributed energy systems, which are often directly connected to local solar or wind installations, are important in remote and off-grid areas. These systems typically supply power to nearby communities or industrial plants via local substations. However, due to the lack of disaggregated, standardized data, these systems are not yet covered in CPI's methodology. Future work could integrate this segment, particularly in the context of energy access and decentralized energy transitions.

3.1.4 LIMITATIONS OF CLASSIFICATION APPROACHES FOR TRANSITION FINANCE

Developing technology-focused frameworks that solely emphasize emissions impact can neglect social safeguards and biodiversity considerations. For instance, CPI's implemented approach relies on lifecycle emissions metrics to classify technologies for the power sector, which can obscure critical social considerations such as equity, access, and local stakeholder impact. While some taxonomies integrate social considerations, our operational framework does not explicitly assess how transition technologies affect communities, workers, or vulnerable groups. As a result, the taxonomy classifications may overlook whether a transition is fair or just. In addition, this assessment of a solution's environmental impact does not currently consider biodiversity considerations. This contrasts with frameworks such as the EU Taxonomy, which classifies activities that support the protection and restoration of ecosystems.

Technological maturity varies across countries, affecting the relative strength of transition classifications. For example, a recent report from India's Ministry of Coal highlights that blue hydrogen coupled with CCUS should be considered transitional (India MOC 2023), with academic studies from China (Lu et al., 2025) supporting this view. Additionally, since 2018, India has implemented a program to recover energy in the form of biogas and power: Energy from Urban, Industrial, Agricultural Wastes/Residues and Municipal Solid Waste. As of 2023, the share of Waste-to-Energy (WtE) in the renewable energy mix was around 0.5% and the country is planning to increase this share through such programs (International Trade Administration 2024).

At the same time, India is increasing its generation of energy from natural gas, in line with the government's target to increase the share of natural gas in the national energy mix to 15% by 2030, up from 6.4% in 2022 (IEA 2025a). In contrast, in the UK, where mature renewable alternatives like offshore wind are available, a significant scale-up of gas infrastructure may no longer be considered a transitional measure. Taxonomies and other classification approaches should therefore aim to account for contextual variations in technological readiness as much as possible.

Frameworks must capture geopolitical and supply chain dependencies. Technological feasibility often hinges on external factors such as fuel imports or international partnerships. In Singapore, for instance, a new 600MW hydrogen-ready Combined Cycle Gas Turbine is planned to enable the transition from natural gas to lower-carbon fuels over time (Reuters 2025). Yet, this transition depends on the country's ability to secure hydrogen imports through geopolitical agreements (EMA Singapore 2024). Such geopolitical dynamics cannot easily be reflected in the logic of classification frameworks.

Corporate-level contexts may influence which technologies are viable transition options. An entity's existing assets, revenue model, or infrastructure may shape its definition of transition. For example, a gas transmission company may pursue hydrogen blending within existing pipelines as a practical transition strategy, even if alternative solutions, such as the complete electrification of end uses or dedicated hydrogen infrastructure, are technically superior. A relevant case is Enagás, Spain's national gas transmission system operator, which has plans to repurpose sections of its existing gas network to transport low-carbon hydrogen as part of the EU's Hydrogen Backbone Initiative. Whitelist-based taxonomies—which classify technologies at the sectoral level—may fail to incorporate such firm-specific considerations which are key drivers of corporate transition planning.

Frameworks built on the principle of technological neutrality provide a limited view without more granular environmental performance data. The EU Taxonomy (European Commission 2023c) supports technological neutrality, meaning that any solution that achieves environmental objectives should be eligible, with emissions thresholds adopted to define climate-aligned activities. However, emissions performance is often contingent on operational inputs such as the type of biomass or waste feedstock, making consistent classification difficult. Moreover, emissions data is rarely available at a granular level, particularly for project-specific or aggregated investment tracking, which limits the ability to operationalize such an approach across diverse technologies.

3.2 USING BENCHMARKS TO MEASURE TRANSITION ALIGNMENT

Achieving the Paris goals is contingent upon mobilizing capital for energy supply investments.

Clean energy benchmarks provide a lens for evaluating the alignment of financial flows with transition pathways outlined in available climate scenarios. The use of such a metric is benefiting from increased recognition from regulators (ILB 2025), as these benchmarks can provide a structured approach to quantifying the financial intensity of energy supply investments across various sectors and technologies, revealing evolving dynamics between different types of energy investment.

A key component of clean energy benchmarks is the use of climate scenarios. Climate scenario providers, such as the IEA, NFGS, and IPCC, call for increased climate-aligned investment across the energy supply sector, with some predicting that investments must rise to USD 5 trillion by 2030 (IEA 2021), compared to USD 3.3 trillion today (IEA 2025b).

CPI proposes using global benchmarks to measure progress in capital deployment in the energy sector (as discussed in Section 3.1), expressed as a percentage of clean and transition energy investment. Two scenario providers have been prioritized for the power sector: the IEA and the NGFS. These providers were chosen based on a review of relevant literature and due to the granularity of investment projection data, which is made available by both. Data for energy supply investment projections from the IEA has been extracted for its Net Zero by 2050 Scenario (IEA 2024e). For NGFS, data was extracted for its Net Zero 2050 Scenario (NGFS 2025) across three different climate models: GCAM, MESSAGEix-GLOBIOM and REMIND-MAgPIE. Importantly, both scenarios were independently evaluated by the OECD (2024) as being consistent with the most stringent application of two key criterions of the Paris goals: 1.5°C in 2100 and limited overshoot of 1.5°C.

The benchmarks have been adapted to align with two types of indicators: new project finance and credit finance to corporates, both of which are used in the NZFT. This adaptation is important, since these two indicators track different forms of investment: the project finance indicator primarily tracks investment flows to new energy projects, while the credit finance indicator tracks banks' lending, and bond and equity underwriting for energy projects, primarily for corporate finance. To reflect the different scopes of these indicators, the benchmarks have been adapted in the following ways:

1. **IEA net-zero benchmark for project finance**: The project finance indicator primarily tracks investment flows to new projects and expansion of existing projects. However, the IEA's capex approach includes not only capex for new projects and project expansions, but also capex for other purposes (e.g., large maintenance interventions or extending the lifetimes of existing facilities). At the same time, the IEA finds 'no new long-lead time upstream oil and gas projects are needed in the NZE Scenario, neither are new coal mines, mine extensions or new unabated coal plants' if rapid clean energy deployment can be achieved (IEA 2024f). As a result, for its application to CPI's project-level finance indicator, we calculate a benchmark with no fossil fuel investment needed for the IEA's net-zero aligned scenario.
2. **NGFS benchmarks for project finance**: In contrast to the above adaptation for the IEA net-zero scenario, the NGFS project finance benchmarks do allow for a small proportion of investment in fossil fuels. The investment projections for all three models (GCAM, MESSAGEix-GLOBIOM and REMIND-MAgPIE) correspond to direct investment required to deploy new technologies in the energy system, rather than investments in existing technologies. This characteristic, along with the fact that these projections do not include operation and maintenance costs, ensures that the NGFS benchmarks are applicable to our project finance indicator. In addition, the lifetime of each newly deployed technology is capped, suggesting that technologies can be retired early but not prolonged.
3. **IEA net-zero benchmark for credit finance**: The credit finance indicator tracks banks' lending, bonds and equity underwriting for corporates in fossil fuels and clean energy supply chains. Such financing includes, in part, financing for maintaining the operation of existing assets, rather than only capex. However, as most lending activity is usually tied to new investment, we use the IEA's benchmark as a proxy for this indicator.[3]

While this report focuses on global alignment benchmarks, both the IEA and NGFS provide regional and country-level data that could be used to develop country-specific benchmarks. For example, NGFS provides downscaled country-level investment projection data across its three climate models for several countries, including Brazil, Canada, India, and the USA. Utilizing such data would improve our ability to assess financial institutions' transition alignment by developing benchmarks for specific countries where they are making investments in energy sector projects. Table 7 depicts the range of benchmarks that have been calculated by CPI for this year's iteration of the NZFT.

Table 7: Summary of CPI's calculated benchmarks

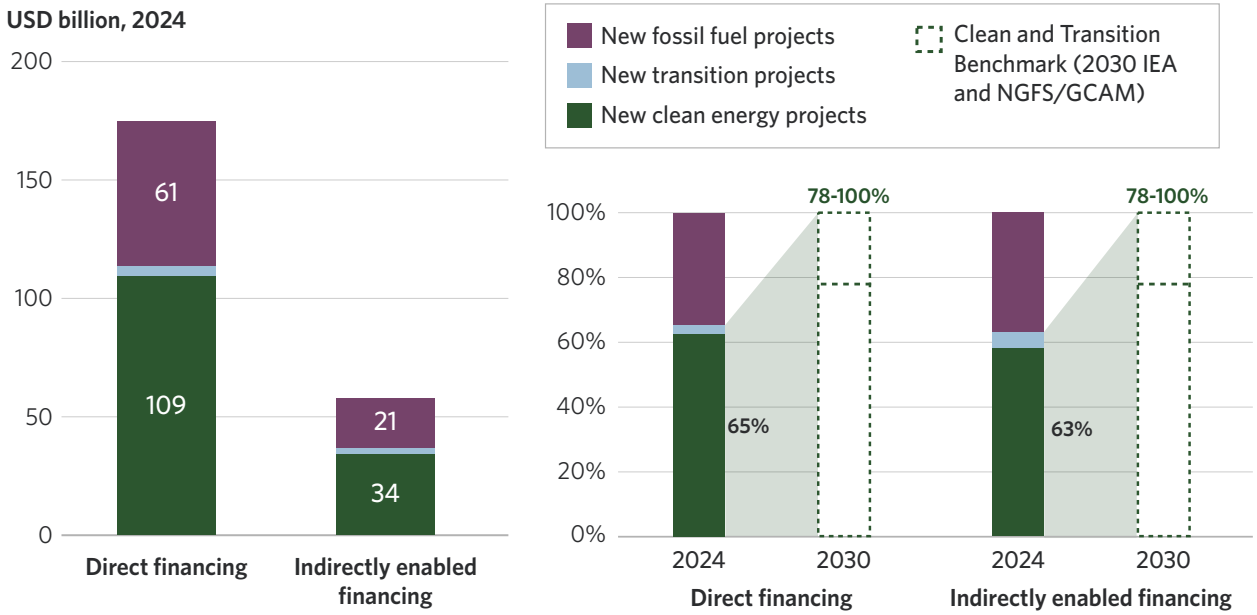
NZFT Indicator	Scenario Provider	Scenario	Model	Benchmark Calculation	2024	2025	2030	2050
Project-level Finance	IEA	Net Zero by 2050 (1.5°C-aligned)	Global Energy and Climate Model	(Clean Energy) / (Total Finance)	96%	95%	93%	93%
Project-level Finance	IEA	Net Zero by 2050 (1.5°C-aligned)	Global Energy and Climate Model	(Clean Energy + Transition) / (Total Finance)	100%	100%	100%	100%

3 The only alteration—specific to CPI's NZFT use case and due to the availability of data for our credit finance indicator—involves changing the scope of the benchmark to not track investment in bioenergy or nuclear solutions (which fall under CPI's transition finance classification). As a result, the investment projections for such solutions are removed from the calculation of this benchmark.

NZFT Indicator	Scenario Provider	Scenario	Model	Benchmark Calculation	2024	2025	2030	2050
Project-level Finance	NGFS	Net Zero 2050 (1.5°C-aligned)	GCAM	(Clean Energy) / (Total Finance)	65%	68%	74%	88%
Project-level Finance	NGFS	Net Zero 2050 (1.5°C-aligned)	GCAM	(Clean Energy + Transition) / (Total Finance)	67%	70%	78%	95%
Project-level Finance	NGFS	Net Zero 2050 (1.5°C-aligned)	MESSAGEix-GLOBIOM	(Clean Energy) / (Total Finance)	58%	63%	73%	85%
Project-level Finance	NGFS	Net Zero 2050 (1.5°C-aligned)	MESSAGEix-GLOBIOM	(Clean Energy + Transition) / (Total Finance)	65%	70%	80%	92%
Project-level Finance	NGFS	Net Zero 2050 (1.5°C-aligned)	REMIND-MAgPIE	(Clean Energy) / (Total Finance)	78%	81%	87%	81%
Project-level Finance	NGFS	Net Zero 2050 (1.5°C-aligned)	REMIND-MAgPIE	(Clean Energy + Transition) / (Total Finance)	91%	93%	97%	97%
Credit Finance	IEA	Net Zero by 2050 (1.5°C-aligned)	Global Energy and Climate Model	(Clean Energy) / (Total Finance)	64%	67%	73%	68%

Figure 2 illustrates how the benchmarks are operationalized in practice for the NZFT. Aggregated volumes of investment are recorded for the different taxonomy classifications which were established in Section 3.1.2. A 'clean energy' or 'clean energy and transition' investment share is then calculated for each year of assessment, reflecting the proportion of NZFT-tracked finance directed toward either clean energy, or clean energy and transition finance solutions (depending on the indicator). The resulting figures can then be compared against calculated benchmarks for the current year (2024), as well as those for 2030 and 2050.

Figure 2: Illustrative graph demonstrating the use of benchmarks for the NZFT



Source: CPI analysis based on BNEF, GEM, IJ Global, PPI and Bloomberg.

Note: The NZFT project finance indicator tracks financing for clean energy, transition, and FF projects. This covers both direct project financing (primary investment) and financing indirectly enabled by FIs as shareholders (where FIs support the primary investors). Direct project finance refers to funding dedicated to a specific asset or infrastructure, e.g., a gas pipeline or solar installation. It includes both balance sheet finance to projects and project-finance contractually tied to the project and ring-fenced from other company activities (e.g. SPVs). This approach excludes refinancing for existing projects, capturing only new project flows. Alignment of investment flows is measured against clean energy and transition finance benchmark ratios using IEA's Net Zero by 2050 scenario—recalculated to reflect rates for new capacity developed—and NGFS/GCAM's scenario (CPI, 2025c). See page 36 for details on the technology classification adopted.

3.2.1 LIMITATIONS IN SCENARIO USAGE

1. **The extracted investment projection data from both the IEA's and NGFS's net zero scenarios only reflect estimates for capex investments in different sectors and technologies.** Clean energy and transition finance investment shares calculated from these scenarios can serve as valuable metrics for measuring the alignment of investment flows (capex) in new energy projects over a given period. However, indicators measuring flows to real-economy corporates in the clean energy or fossil fuel supply chain capture a broader range of financial flows to companies, which generally encompass both capex and opex. As a result, comparing clean energy and transition finance investment shares derived from such flows with the IEA and NGFS benchmarks may either underestimate or overestimate transition alignment. Over time, scenario providers should strengthen their projected flows to account for the nuances in financial institutions' investment flow metrics.

2. **Data coverage differs between the scenario providers and models.** The investment projection data offered by both scenario providers covers different technology sectors and solutions and demonstrates contrasting levels of granularity. For example, NGFS's REMIND-MAgPIE model does not offer investment projections for the extraction of fossil fuels, whereas its GCAM and MESSAGEix-GLOBIOM do. This creates difficulties in comparing findings across benchmarks, as these scenarios and models are fundamentally constructed with differing macroeconomic assumptions.

4. FUTURE DIRECTION

For future iterations of the NZFT, CPI aims to potentially further develop its operational transition finance framework in three ways:

1. **Integrating social/just transition considerations.** This could be achieved by determining eligibility criteria at the technology/solution level for social equity, ensuring that any practical applications of the framework, such as CPI's taxonomy classifications, reflect a shift toward an inclusive, socially responsible low-carbon economy.
2. **Updating the classifications in the power sector taxonomy as the availability of environmental performance and impact data improves.** In the absence of more granular environmental performance data at the asset level (lifecycle emissions, source of feedstock), CPI has collected data from literature sources to determine the classifications for different subsectors/solutions for the power sector (see Annex Table A.2). Should the granularity of data improve, CPI hopes to be able to offer a more precise classification of technologies for different countries. In addition, CPI will explore the possibility of integrating biodiversity considerations into its environmental impact assessment of tracked solutions.
3. **Building upon the work to develop country-specific benchmarks that link to national decarbonization pathways.** The availability of downscaled scenario data at the country level for power-sector investments, particularly from NGFS, supports the development of country-specific finance benchmarks. Given the constraints of climate scenarios and their specific models, developing country-specific finance benchmarks would ensure that investment volumes can be accurately benchmarked for a given country, taking into account its technological and transitional context.

5. ANNEX

This table provides a more detailed view of the approaches assessed in Section 2.1.2. These approaches rely on TSC to evaluate economic activities, unless otherwise stated.

Table A.1: Detailed view of operational approaches to transition activities

Approach (Countries Covered)	Assessment Criteria	Transition Definition/Conditions	Alignment	Sectors Covered	Additional Notes
ASEAN Taxonomy (ASEAN member states)	Activities are defined based on the ISIC classification system. This classification system evaluates economic activities through TSC, consisting of a multi-tiered approach and two main elements: (i) a principles-based Foundation Framework with a qualitative assessment of activities based on a sector agnostic decision tree, and (ii) a Plus Standard with detailed technical criteria, metrics, and thresholds.	The 'green' tier represents activities that are already aligned with 1.5°C pathways or are very close. 'Amber' denotes 'transitional' activities, representing a progressive movement on the path to a more sustainable ASEAN with due consideration to the practicalities of implementing sustainable activities. Activities classified as "amber" are those that: ▪ Do not yet achieve zero or near-zero emissions but are on a decarbonisation trajectory consistent with the goals of the Paris Agreement. ▪ Are achieving short-term emissions reductions, though low-emission alternatives are not yet economically or technologically feasible. ▪ Produce fewer emissions compared to existing alternatives and are necessary for a limited period while low-carbon technologies continue to develop into viable and scalable solutions.	Activities are aligned to the decarbonization trajectories that aim to meet the 1.5 °C target under the Paris Agreement. Activities are assessed in alignment with ASEAN Member States' specific decarbonization pathways.	▪ Agriculture, forestry & fishing ▪ CCUS ▪ Construction and real estate ▪ Electricity, gas, steam and air conditioning supply ▪ Information & communication ▪ Manufacturing, transportation & storage ▪ Professional, scientific & technical ▪ Water supply, sewage, waste management	Does not have a separate list of solely eligible transition activities. ASEAN breaks down each ISIC economic activity into tiers based on how closely aligned the activity is to the Paris agreement targets, defined time frame and the level of significant harm done to other Environmental Objectives.

Approach (Countries Covered)	Assessment Criteria	Transition Definition/Conditions	Alignment	Sectors Covered	Additional Notes
Bangladesh Sustainable Finance Taxonomy (Bangladesh)	Adopts a classification system to define which economic activities are considered eligible for green finance. The taxonomy is predominantly whitelist-based, but at a high level it incorporates some performance thresholds across six environmental objectives: 1. Climate change mitigation 2. Climate change adaptation 3. Sustainable protection of water and marine resources 4. Transition to a circular economy, waste prevention and recycling 5. Pollution prevention and control 6. Protection and restoration of biodiversity and healthy ecosystems	Included activities substantially contribute to climate change mitigation without doing any significant harm to the other environmental objectives.	Aligned with Paris goals through Bangladesh's emissions reduction NDC target.	▪ Renewable energy ▪ Energy & resource efficiency ▪ Alternative energy ▪ Liquid waste management ▪ Solid waste management ▪ Recycling and manufacturing recyclable goods ▪ [Environmentally] friendly brick production ▪ Green agriculture ▪ Green cottage, micro, small and medium enterprise ▪ Green socially responsible finance	N/A

Approach (Countries Covered)	Assessment Criteria	Transition Definition/Conditions	Alignment	Sectors Covered	Additional Notes
EU Taxonomy (Country agnostic, focused on economic activities deemed critical to the EU economy)	Activities are defined based on the NACE classification system. Identifies and labels (through TSC) transitional activities alongside other green activities which are compatible with a pathway to limit the temperature increase to 1.5 °C above pre-industrial levels. For many transitional activities, the TSC are defined based on the intended environmental or emissions outcomes—in other words, they assess whether the activity achieves a certain level of environmental or GHG performance. These performance thresholds and conditions are designed to evolve every three years, ensuring they reflect the latest technological progress and growing climate ambition. The specific eligibility methods and metrics differ depending on the type of activity and may include absolute performance thresholds, demonstrated improvements relative to a baseline, and, in some cases, criteria linked to transition pathways and time-limited eligibility (sunset clauses) to prevent the long-term use of high-emissions solutions.	Transition activities make a substantial contribution to climate change mitigation where no technologically and economically feasible low carbon alternative exists. They are compatible with a pathway to limit the temperature increase to 1.5 °C above pre-industrial levels. They reflect best-in-class performance. And do not hamper the development and deployment of low-carbon alternatives and do not lead to lock-in of carbon-intensive assets.	The EU Taxonomy aims to classify economic activities as environmentally sustainable, with a focus on aligning with the Paris Agreement's goal of limiting global warming to 1.5°C and requires activities to make a substantial contribution to at least one out of six environmental objectives while causing no significant harm to others. It also should comply with minimum safeguards and TSC.	▪ Construction and real estate activities ▪ Energy ▪ Information and communication ▪ Manufacturing ▪ Transport	N/A

Approach (Countries Covered)	Assessment Criteria	Transition Definition/Conditions	Alignment	Sectors Covered	Additional Notes
Indonesian Taxonomy for Sustainable Finance (Indonesia)	The taxonomy's system categorizes: Green activities: aligned with a 1.5°C outcome. Amber: Transition activities that do not currently meet green thresholds but are on a pathway to net-zero or contribute to net-zero outcomes. It employs an evaluation framework based on Environmental Objectives (EOs) and Essential Criteria (ECs) to assess whether an activity contributes meaningfully to sustainability goals. The framework determines if an activity makes a substantial contribution to at least one EO, avoids significant harm to other EOs, addresses any potential harm (where applicable), and complies with established social safeguards. It incorporates two main assessment pathways: 1. The TSC approach uses predefined thresholds and metrics to evaluate whether an activity contributes significantly to a specific EO. This method is typically applied to activities aligned with one of the five priority sectors outlined in the Nationally Determined Contributions (NDC), particularly at the corporate or non-MSME level and other activities explicitly defined within the TKBI framework. TSCs may include qualitative and/or quantitative benchmarks, or rely on the intrinsic nature of the activity to demonstrate alignment with an EO.	Activities that are not currently in line with commitments to keep global temperature rise in check are not yet on the NZE pathway, however: Are moving toward a "Green" classification within a specified timeframe. Facilitate significant emissions reductions in the short or medium term by a specific deadline; or Encourage other activities to be sustainable and fulfilling social aspects.	In line with the commitment to keep global temperature rise below 1.5°C in line with the Paris Agreement including considering Indonesia's NZE in 2060 (or earlier) and fulfilling social aspects.	▪ AFOLU ▪ Energy ▪ Industrial processes and products use (IPPU) ▪ Transportation and storage	Activities that meet the "Transition" criteria in one of the EOs and partially fulfill the ECs, namely: 1) Still causing damage/loss (DNSH) to the other EO despite remediation/repair (RMT); 2) Has a future improvement plan; 3) Complies with all social aspects.

Approach (Countries Covered)	Assessment Criteria	Transition Definition/Conditions	Alignment	Sectors Covered	Additional Notes
	2. The Sector-agnostic Decision Tree (SDT) Approach offers a principle-based, sector-neutral method for assessing activities through a decision tree tailored to each EO. This tree guides users through a series of binary ("Yes" or "No") questions, each representing a specific criterion relevant to the EO in question. Users must provide responses based on available information to determine the activity's alignment with taxonomy standards.				
Japan Basic Guidelines on Climate Transition Finance (Japan)	This framework is both asset and entity-focused. Sectoral decarbonization roadmaps have been developed with a special focus on hard-to-abate sectors. At their core, these roadmaps outline the anticipated actions companies should take—alongside possible technological solutions—on the path toward achieving carbon neutrality by 2050. Developed by METI, the roadmaps also offer sector-specific context and analysis, including current industry trends, common practices, production methods, and the reasoning behind each roadmap. They are grounded in scientific evidence and aligned with the objectives of the Paris Agreement.	In line with ICMA transition handbook, following the four key elements to enhance credibility of the issuance of bonds to finance climate transition. 'Transition finance is finance for supporting the fundraisers who have set their target consistent with the Paris Agreement and satisfied the elements set forth in these Guidelines.'	Yes – Paris Agreement, IEA's scenarios, SBTi, NDCs and industry sector roadmaps.	Sector-specific roadmaps are available for 7 key sectors: ▪ Cement ▪ Chemicals ▪ Electricity ▪ Gas ▪ Paper and pulp ▪ Petroleum ▪ Steel and Iron	N/A

Approach (Countries Covered)	Assessment Criteria	Transition Definition/Conditions	Alignment	Sectors Covered	Additional Notes
Korean Taxonomy (Korea)	Identifies and labels (through TSC) transitional activities alongside other green activities. The Korean Green Taxonomy, closely aligned with the EU Taxonomy, borrows its core principles while tailoring them to the Korean context and regulatory landscape. Activities classified as: Green: activities contributing to carbon neutrality and environmental improvements Transitional: consists of economic activities necessary during the transition period as intermediate processes to shift toward carbon neutrality.	The 'transitional' categorization consists of economic activities necessary during the transition period as intermediate processes to shift toward carbon neutrality.	The Korean Green Taxonomy (K-Taxonomy) aims to support South Korea's national goal of achieving carbon neutrality by 2050, but it does not explicitly require that all activities be aligned with a 1.5°C scenario.	Activities are covered for the following sectors: ▪ Energy ▪ Industry ▪ Transport	6 Environmental Objectives (EOs) DNSH for other EOs Activities must comply with minimum social safeguards
Mongolian Green Taxonomy (Mongolia)	Adopts a whitelist-based framework to identify sectors and activities that adhere to the following 6 principles: 1. Contribute to national policies and targets 2. Address environmental challenges 3. Cover high-emitting, key economic sectors 4. Align with international standards and good practices 5. Comply with ESG standards 6. Continues review and development For each sector, a number of key reference policy targets are listed. These targets influence the inclusion of activities under the taxonomy.	The taxonomy covers activities in the highest emitting sectors of the economy and those that contribute to the sustainable transition of other key economic sectors.	Aligned with Paris goals through Mongolia's emissions reduction NDC target.	▪ Renewable energy ▪ Low pollution energy ▪ Energy efficiency ▪ Green buildings ▪ Pollution prevention and control ▪ Sustainable water and waste use ▪ Sustainable agriculture, land use, forestry, biodiversity conservation & eco-tourism ▪ Clean transport	N/A

Approach (Countries Covered)	Assessment Criteria	Transition Definition/Conditions	Alignment	Sectors Covered	Additional Notes
Singapore-Asia Taxonomy for Sustainable Finance (Singapore, but intended to be interoperable with other ASEAN member states)	The Singapore-Asia Taxonomy adopts a classification system with the "green" category anchored in science-based pathways and drawing from the EU Taxonomy's TSC, while also integrating regional considerations where appropriate. The taxonomy reflects key elements of transition finance found in the ASEAN Taxonomy. It recognizes activities that are not yet aligned with a 1.5 °C trajectory but are either advancing toward low-carbon operations or contributing to near-term emissions reductions. These "amber" activities are subject to time limits, typically phased out by 2030 or 2035. The taxonomy includes a measures-based approach for specific sectors such as cement, hydrogen, and basic chemicals, offering a more practical path for hard-to-abate industries. However, this added flexibility must be grounded in transition plans aligned with a 1.5 °C goal. Follows a classification system to evaluate ISIC economic activities. Green: activities that contribute substantially to climate change mitigation by operating at near-zero emissions or are on 1.5°C-aligned pathway. Amber: activities that are not presently on the 1.5°C pathway but are either moving toward a green transition pathway within a defined timeframe. OR Facilitate significant emissions reductions in the short term with a prescribed sunset date. Red: do not comply with green or amber criteria OR directly unsustainable activities.	Activities labelled 'amber' are not presently on a 1.5°C pathway but are either: Moving toward a Green transition pathway within a defined timeframe. Facilitating significant emissions reductions in the short term with a prescribed sunset date.	Aligned with the goals of the Paris Agreement.	▪ Agriculture ▪ CCUS ▪ Energy ▪ Forestry ▪ ICT ▪ Real estate/ construction ▪ Transport ▪ Waste ▪ Water	Does not have a separate list of solely eligible transition activities. Breaks down each ISIC economic activity into tiers. The transition label (amber) does not apply to new projects since building new activities with long lifespans beyond the sunset dates, would lock in assets longer into the future, resulting in stranded assets. Current version focuses on climate mitigation activities only.

Approach (Countries Covered)	Assessment Criteria	Transition Definition/Conditions	Alignment	Sectors Covered	Additional Notes
BNEF Energy Supply Finance Ratios (Country agnostic)	Develops energy supply investment ratios across a range of different climate scenarios by categorizing energy supply activities into two buckets: (1) low-carbon; (2) fossil fuels. These ratios offer financial institutions insight into how their financing activity aligns with energy investment projections for the net-zero transition at a global level.	*(Does not explicitly define transition finance, or transition activities in its approach).*	Aligned with Paris goals due to the use of net zero scenario data from IEA, IPCC, and NGFS.	BNEF's Low-carbon energy supply activities cover two sectors for a range of renewable technologies: (1) production and supply; (2) manufacturing. The electricity grid is also covered under this category.	N/A
CBI (Climate Bonds Initiative) Taxonomy (Country agnostic)	Classification system indicates whether identified assets and projects are considered to be automatically compatible with a 1.5°C decarbonization pathway. The Taxonomy serves as the foundational tool used by the Climate Bonds Initiative (CBI) to assess whether the assets or projects backing a bond meet the requirements for green or climate-aligned finance. When a sector has undergone comprehensive analysis and has established specific eligibility criteria, bonds within that sector can be formally certified under the Climate Bonds Standard. For sectors where criteria are still being developed, certification is not yet available for bonds in those areas.	'Orange' activities are defined as those that are potentially compatible, depending on whether specific criteria are met.	Consistent with Paris Agreement goals and aligns with IPCC and IEA research.	Thresholds are developed for "orange" activities for all sectors: ▪ Buildings ▪ Energy ▪ ICT ▪ Land use & marine resources ▪ Transport ▪ Industry ▪ Waste & pollution control ▪ Water	Targeted specifically to the bond market. Does not contain a DNSH principle/ criteria. This taxonomy has a broader aim of evaluating progress toward a low carbon economy.

Approach (Countries Covered)	Assessment Criteria	Transition Definition/Conditions	Alignment	Sectors Covered	Additional Notes
CBI (Climate Bonds Initiative) White Paper (Country agnostic)	Covers both entities and activities. Introduces the concept of a 'transition label' and highlights important considerations for transition-related financial instruments. It suggests categorizing entities, activities, and related measures into five groups: Near Zero, Pathway to Zero, Interim, No Pathway to Zero, and Stranded, using a decision tree methodology to guide classification. At the heart of the framework are five core transition principles that define what constitutes credible transition pathways. These principles stress that genuinely transitioning entities and activities are those already following—and committed to continuing on—such pathways. It is important to note that this framework is still a proposal and has not yet been established as an official taxonomy. Includes category on "enabling activities" which enable transition in other economic activities or sectors.	5 Principles: 1. Credible transition goals and pathways align with 1.5°C global warming limits 2. Credible transition goals and pathways are established by the climate science community and are not entity-specific 3. Credible transition goals and pathways don't count offsets, but should count upstream scope 3 emissions 4. Credible transition goals and pathways take into account technological viability, but not economic competitiveness 5. Credible transition means actually following the transition pathway - pledges, policies and strategies alone are not sufficient	Aligned with the goals of the Paris Agreement through halving emissions by 2030 and achieving net zero by 2050.	*(Does not provide a comprehensive list of sectors/activities).*	The transition label can be used for eligible investments that: (1) Are making a substantial contribution to halving global emissions levels by 2030 and reaching net zero by 2050 but will not have a long-term role to play; OR (2) Will have a long-term role to play, but at present the long-term alignment to net zero goals is not certain.

Table A.2: Schematic view of the approach to classifying subsectors and solutions in CPI's Power Sector Taxonomy

<table>
<tr><td rowspan="4">Bioenergy</td><td colspan="2">DEFINITION
▪ Bioenergy refers to energy that is derived from organic material, which is often referred to as biomass. Feedstocks for this energy source may take the form of wood, waste matter from crops, animal matter, or crops specifically grown for the purpose of producing fuels.
▪ With applications that span electricity generation, industrial/residential heating and transport fuels, bioenergy has grown to become the largest source of renewable energy globally, accounting for 55% of the total share (IEA n.d.-e).
▪ Despite its prominent use as a renewable energy source, producing bioenergy resources creates competition for land and water with crops grown for food production, and can result in the displacement of communities with major land use changes (Miyake et al. 2012).</td></tr>
<tr><td colspan="2">EXAMPLE TAXONOMY CLASSIFICATION APPROACHES
CBI Taxonomy:
▪ Biomass, Biofuels and Biogas feedstocks must be produced with an 80% reduction in emissions compared to a fossil fuel baseline.
EU Taxonomy – Substantial Contribution Criteria:
▪ Food and feed crops are not used for the manufacture of biofuels for use in transport or for the manufacture of bioliquids.
▪ The greenhouse gas emission savings from the manufacture of biofuels and biogas for use in transport and from the manufacture of bioliquids are at least 65 % in relation to the GHG saving methodology and the relative fossil fuel comparator.</td></tr>
<tr><td colspan="2">CPI TAXONOMY CLASSIFICATION APPROACH
▪ In the absence of more granular data at the activity level, the classifications for biodiesel, bioethanol and biogas reflect a conservative approach.
○ Existing TSC from taxonomies have been examined for 'green', 'aligned' or 'credible' activities. These criteria require biomass feedstocks to be sourced sustainably (e.g. FSC certified), for food and feed crops not to be used in the manufacture of fuels, and for any greenhouse gas savings to achieve a significant (80%) decrease from a fossil fuel baseline.
○ After reviewing the available activity level data, CPI finds no evidence which would enable a verification of these requirements, and so a conservative classification is instead applied: biodiesel, bioethanol and biogas are classified as Transition.
▪ Charcoal, however, has significant impacts, with the literature demonstrating that it meets the emissions threshold for Fossil Fuel/High-Emissions.</td></tr>
<tr><td>LIFECYCLE EMISSION INTENSITIES[4]
▪ Biodiesel ~8-68 gCO_2e/MJ = ~29-245 gCO_2e/kWh (IEA 2024b)
▪ Bioethanol ~1-103 gCO_2e/MJ = ~4-371 gCO_2e/kWH (IEA 2024b)
▪ Biogas (Biomethane) ~5-56 gCO_2e/MJ = ~18-202 gCO_2e/kWh (IEA 2024b)
▪ Charcoal ~300-1400 gCO_2e/MJ = ~1080-5040 gCO_2e/kWh (UNCCLEARN n.d.)
▪ Fuelwood/Wood Pellets – N/A</td><td>SOLUTION CLASSIFICATIONS
▪ Biodiesel – Transition
▪ Bioethanol – Transition
▪ Biogas (Biomethane) – Transition
▪ Charcoal – Fossil Fuel/High-Emissions
▪ Fuelwood/Wood Pellets – Transition</td></tr>
</table>

4 Where possible, lifecycle emissions intensity data has been collected for each technology/solution. The figures provided reflect an average figure taken from multiple sources from literature.

Carbon Capture

DEFINITION

- Carbon capture refers to technologies that capture emissions from industrial processes before either storing them permanently (CCS) or for re-use as part of the industrial process (CCUS). Two of its most common forms involve capturing gases, either pre- or post-combustion.
- Additionally, novel technologies such as Direct Air Capture (DAC) continue to receive significant financial support, despite demonstrating a lack of commercial viability at this stage (UNFCC n.d.).
- While not a generation technology, carbon capture has the potential to significantly reduce the emissions of the fossil fuel industry. Despite this, the energy intensive nature of the process, along with its impact on water usage and potential leakage risks, should not be ignored. The sector continues to attract scrutiny as these technologies can be seen to extend or even increase the efficiency of fossil fuel plants. (Earth Justice 2023; IEEFA 2022)

EXAMPLE TAXONOMY CLASSIFICATION APPROACHES

CBI Taxonomy:

- *Coal- and Oil-fired Plants – Can only be considered compatible if 100% of the emissions are captured*
- *Gas-fired Plants – Further work is required to determine the compatibility of this technology*

Singapore Taxonomy:

- *Lifecycle GHG emissions from the generation of electricity must be <100gCO_2ekWH*
- *CCUS for production of products that release the CO_2 immediately when these are used (such as fuels), or for enhanced oil recovery, and the production of other forms of fossil energy sources are considered ineligible*

CPI TAXONOMY CLASSIFICATION APPROACH

- The nascent adoption of CC(U)S leads CPI to exercise caution in classifying this technology in its taxonomy. CC(U)S deployment is behind expectations and remains well below that which is required in the IEA's Net Zero Scenario (IEA n.d.-d), meaning that its viability as an effective emissions reduction solution cannot yet be fully understood.
- Carbon capture technology has also been deployed at plants for the purposes of Enhanced Oil Recovery (EOR) (NETL n.d.). This can increase the production efficiency of said plants and extend the life of fossil fuel electricity generation facilities that might otherwise have been decommissioned.
- In the absence of robust lifecycle emissions intensity data for different types of CC(U)S, CPI has evaluated carbon capture technologies using TSC from existing taxonomies.
  - With the CBI Taxonomy requiring 100% of emissions to be captured in order for CC(U)S technologies to be considered 'eligible' and Singapore stating that fossil fuel-based carbon capture is not eligible, CPI has adopted a conservative approach and classified CC(U)S activities at fossil fuel plants as Fossil Fuel/High-Emissions. Without more granular environmental performance data at the asset level, CPI cannot verify these technologies against the TSC of existing taxonomies.

LIFECYCLE EMISSION INTENSITIES

- N/A

SOLUTION CLASSIFICATIONS

- Coal-Fired Plants – Fossil Fuel/High-Emissions
- Gas-Fired Plants – Fossil Fuel/High-Emissions
- Oil-Fired Plants – Fossil Fuel/High-Emissions

Energy Storage

DEFINITION

- Energy storage refers to technologies that capture electricity and store it for use at a later date. In the context of electricity systems, grid-scale storage plays a critical role in balancing the supply and demand for electricity, particularly because variable energy sources now make up a significant share of the global energy mix.
- Technologies such as lithium-ion batteries, pumped hydro storage, compressed air energy storage, and emerging options like flow batteries and green hydrogen allow excess electricity to be stored during periods of surplus and released during peak demand or outages. Deployment of these technologies enhances grid stability and supports decarbonization by reducing the reliance on fossil fuel-based peaking plants. In the context of the transition, energy storage is a cornerstone of a resilient, low-carbon energy sector (IEA n.d.-c).

EXAMPLE CLASSIFICATION APPROACHES

EU Taxonomy – Substantial Contribution Criteria:

- *Considered 'transition enabling' and includes pumped hydropower storage*

Singapore Taxonomy – 'Green' Classification:

- *Mechanical, thermal, pumped hydropower and electrochemical storage systems are considered 'green' under the Singapore-Asia Taxonomy. Where the activity includes chemical energy storage, the medium of storage complies with the criteria for manufacturing of the corresponding product.*

CPI TAXONOMY CLASSIFICATION APPROACH

- In the absence of robust lifecycle emissions intensity data for different types of energy storage, CPI has evaluated carbon capture technologies using TSC from existing taxonomies.
  - The EU Taxonomy considers energy storage 'transition enabling' and Singapore only includes 'green' criteria for mechanical, thermal, pumped hydropower and electrochemical storage systems. In alignment with these taxonomies, CPI classifies energy storage as Clean Energy in its taxonomy.
- While some energy storage systems are in the early stages of development (e.g., mechanical, thermal), a combination of grid-scale energy storage solutions will be required in order to balance supply and demand for electricity in a net-zero economy (Upadhyay et al. 2025).

LIFECYCLE EMISSION INTENSITIES

- N/A

SOLUTION CLASSIFICATIONS

- Electrochemical Storage – Clean Energy
- Mechanical Storage – Clean Energy
- Thermal Storage – Clean Energy

Hydrogen (Production)

DEFINITION

- Hydrogen has many applications, but it is typically used in the refining and chemical sectors, primarily to produce ammonia. While it is typically produced using coal and natural gas, there is growing investment in producing low emissions 'green' hydrogen using renewables (through electrolysis) or by utilizing carbon capture technologies, i.e. for 'blue' hydrogen (National Grid n.d.).
- Hydrogen as a fuel is viewed as essential for the decarbonization of key hard-to-abate sectors such as sea transport and chemicals production, but there is uncertainty surrounding the speed at which production can be scaled up to meet global needs (IEA n.d.-a; House of Commons Science and Technology Committee 2022).

EXAMPLE CLASSIFICATION APPROACHES

EU Taxonomy – Substantial Contribution Criteria:

- *The activity complies with the lifecycle GHG emissions savings requirement of 73.4% for hydrogen [resulting in lifecycle GHG emissions lower than 3tCO_2e/tH_2] and 70% for hydrogen-based synthetic fuels relative to a fossil fuel comparator of 94g CO_2e/MJ.*

Singapore Taxonomy – 'Green' Classification:

- *Hydrogen must meet specific carbon intensity thresholds.*
- *The feedstock is not coal or coal derivatives.*
- *Biomass from primary sources is not eligible as a feedstock.*

CPI TAXONOMY CLASSIFICATION APPROACH

- With its relatively high emissions intensity per kilogram of hydrogen produced, CPI classifies grey hydrogen production as Fossil Fuel/High-Emissions in its taxonomy.
- Given its reliance on CCS technology and use of natural gas, production of blue hydrogen is also classified as Fossil Fuel/High-Emissions. This aligns with the classification approach that has been adopted for CC(U)S technologies.
- Provided that it is being produced with renewable energy, CPI classifies green hydrogen production as Clean Energy in its Taxonomy. The low emissions intensity of the overall production process is detailed in numerous studies, including from the IEA, but fundamentally, producing electrolytic hydrogen is emissions free at the point of production (IEA 2024d).

LIFECYCLE EMISSION INTENSITIES

- Blue Hydrogen (Steam reforming) ~ 6.1-11.4 kgCO_2/kgH2 = 183-342 gCO_2/kWh (IEA 2023a)
- Green Hydrogen (Electrolysis with renewables) ~ 1-2kgCO_2/kgH2 = 30-60 gCO_2/kWh (IEA 2023a)
- Grey Hydrogen (Coal gasification) ~ 22.7 kgCO_2/kgH2 = 681 gCO_2e (IEA 2023a)

SOLUTION CLASSIFICATIONS

- Blue Hydrogen (Steam Reforming) – Fossil Fuel/High-Emissions
- Green Hydrogen (Electrolysis with Renewables) – Clean Energy
- Grey Hydrogen (Coal gasification) – Fossil Fuel/High-Emissions

Nuclear

DEFINITION

- Energy produced in this sector is derived from nuclear fission, a process that splits atoms to produce heat and generate electricity. With its significant share, approximately 9% (World Nuclear Association 2025b), of global energy generation, it is widely adopted as a key baseload power source that produces very few emissions during the electricity production process.
- However, along with finite uranium reserves and the significant cost/risk associated with the disposal of radioactive waste (Lappi and Lintunen 2021), deploying nuclear technology is subject to long lead times and requires massive volumes of investment (World Nuclear Association 2025a). Ultimately, this raises doubts over the importance of deploying new nuclear facilities for the energy transition, with further question marks surrounding the future of new-generation technologies, such as modular reactors and nuclear fusion.

EXAMPLE CLASSIFICATION APPROACHES

CBI Taxonomy:

- *Fission – Considered 2 degrees compliant, but uranium mining requires further investigation*

EU Taxonomy – Substantial Contribution Criteria:

- *The activity generates electricity using nuclear energy. Lifecycle greenhouse gas (GHG) emissions from the generation of electricity from nuclear energy are below the threshold of 100 g CO_2e/kWh.*

CPI TAXONOMY CLASSIFICATION APPROACH

- After reviewing relevant data sources from the literature, CPI finds that there exists a huge range of estimates for the lifecycle emissions of electricity generation from nuclear fission. While this range of estimates can be attributed to methodological differences and the evolving nature of lifecycle analysis studies, it suggests that CPI should adopt a conservative approach to classifying nuclear in its taxonomy.
  - Without more granular environmental performance data at the asset level, CPI cannot verify nuclear solutions against an example TSC of existing taxonomies, such as that of the EU Taxonomy. As a result, CPI classifies nuclear as Transition in its taxonomy.
- With other low-cost renewable technologies available that can be installed to the grid at a faster rate (Forbes 2025), CPI cautions against placing equal importance upon expanding the capacity of both the renewable and nuclear sectors.

LIFECYCLE EMISSION INTENSITIES

- Fission:
  - 2 - 130 gCO_2e/kWh; mean = 29gCO_2e/kWh (World Nuclear Association 2011)
  - (near 0) - 200+ gCO_2e/kWh (NREL 2021)

SOLUTION CLASSIFICATIONS

- Fission – Transition

Power Grids

DEFINITION

- Power grids refer to infrastructure that supports the transportation of electricity from generation facilities to end users. With the majority of this infrastructure scaled to control the delivery of electricity at national and regional levels, they act as a mechanism to balance both the supply and demand of electricity in real-time.
- Developments in the energy sector over the past decade have placed increased pressure on grids, which have previously been fossil-backed (IEA 2023c). In particular, the integration of renewable assets, electric vehicles, and heat pumps requires greater generation flexibility (European Commission 2023a), as demand is expected to be more intermittent.
- Given the significant investment required to modernize our grid systems for the transition, innovations in the form of mini grids and digitalization offer hope that effective infrastructure can be deployed to match the pace of economic growth (ETC n.d.).

EXAMPLE CLASSIFICATION APPROACHES

EU Taxonomy, under 'Transmission and distribution of electricity' – Substantial Contribution Criteria:

- *Considered 'transition enabling'*
- *More than 67% of newly enabled generation capacity in the system is below the generation threshold value of 100 gCO_2e/kWh measured on a life cycle basis in accordance with electricity generation criteria, over a rolling five-year period*
- *The average system grid emissions factor, calculated as the total annual emissions from power generation connected to the system, divided by the total annual net electricity production in that system, is below the threshold value of 100 gCO_2e/kWh measured on a life cycle basis in accordance with electricity generation criteria, over a rolling five-year period*

Singapore Taxonomy:

- *The 'Green' classification requires transmission and distribution infrastructure to have a dedicated direct connection or an expansion of connection between power plants with energy intensities less than 100gCO_2e/kWh (lifecycle emissions)*
- *Transmission and distribution infrastructure dedicated to connecting fossil fuel plants to the grid is classified as 'Ineligible'*

CPI TAXONOMY CLASSIFICATION APPROACH

- Due to the availability of regional and country-level data, CPI has developed a country-specific methodology that has been used to classify some of the activities of this sector. The adoption of this methodological change for power grids highlights the advantages of utilizing harmonized datasets from reputable sources, such as IRENA, to enable more precise classifications of activities in this taxonomy.
- For a more detailed breakdown of CPI's country-specific methodology for power grids, refer to **Section 3.1.3**.

LIFECYCLE EMISSION INTENSITIES

- N/A

SOLUTION CLASSIFICATIONS

- Digitalisation – Clean Energy
- Mini-Grids – Clean Energy
- System Reinforcement and Asset Replacement – See **Section 3.1.3**
- New Connections – See **Section 3.1.3**

Renewable Energy

DEFINITION

- Renewable energy refers to energy derived from sources that are replenished over time. Key renewable technologies include solar photovoltaics (PV), wind turbines, geothermal and ocean (marine) energy.
- Analysis from the IEA demonstrates that renewable energy is the fastest-growing source of electricity globally and is expected to account for over 90% of global electricity expansion through 2030 (IEA n.d.-b). Due to their centrality to the decarbonization of the power sector, this rapid scale-up in the deployment of renewables is key to achieving global climate goals (IEA 2023b).
- In addition to cutting emissions, deploying renewable energy assets enhances energy security by reducing the dependency on fossil fuel imports (EEA 2016). Declining capital costs and modular construction components also make them particularly important for enhancing energy access in developing regions, reinforcing the contribution of renewable energy to a just and sustainable energy transition.

EXAMPLE CLASSIFICATION APPROACHES

CBI Taxonomy:

- *Geothermal – Considered 2-degrees compliant if direct emissions are less than 100 gCO_2e/kWh*
- *Hydropower – Proposed: power density greater than 5W/m2; or emissions of electricity generated less than 100gCO_2e/kWh*
- *Marine – Considered 2-degrees compliant*

Singapore-Asia Taxonomy:

- *Solar PV and CSP – All generation activities are considered eligible*
- *Wind – All generation activities are considered eligible*

CPI TAXONOMY CLASSIFICATION APPROACH

- Following a review of literature, CPI finds that each of the assessed renewable technologies meets the lifecycle emissions intensity criteria set for Clean Energy.
- The required shift away from fossil fuel electricity production is contingent on the deployment of new renewable energy assets, particularly in developing economies (IEA 2024g). Their importance to the energy transition as proven low-emissions technologies cannot be understated, with their impact extending well beyond environmental considerations.

LIFECYCLE EMISSION INTENSITIES[5]

- Solar PV ~8-83 gCO_2e/kWh (UNECE 2021)
- Solar CSP ~14-122 gCO_2e/kWh (UNECE 2021)
- Wind (offshore) ~12-23 gCO_2e/kWh (UNECE 2021)
- Wind (onshore) ~8-16 gCO_2e/kWh (UNECE 2021)
- Geothermal ~11-47 gCO_2e/kWh (median values) (NREL 2017)
- Marine (Ocean) ~9-126 gCO_2e/kWh (Paredes et al. 2019)
- Hydropower (Large) ~2-33 gCO_2e/kWh (Wang et al. 2024)
- Hydropower (Small) ~1-55 gCO_2e/kWh (Wang et al. 2024)

SOLUTION CLASSIFICATIONS

- Solar PV – Clean Energy
- Solar CSP – Clean Energy
- Wind – Clean Energy
- Geothermal – Clean Energy
- Marine (Ocean) – Clean Energy
- Hydropower (Large) – Clean Energy
- Hydropower (Small) – Clean Energy

5 Despite many renewable sources of energy producing no emissions at the point of generation, technologies/solutions are assessed based on lifecycle emissions intensity data, which evaluate the environmental impact of a product or system throughout its entire lifecycle.

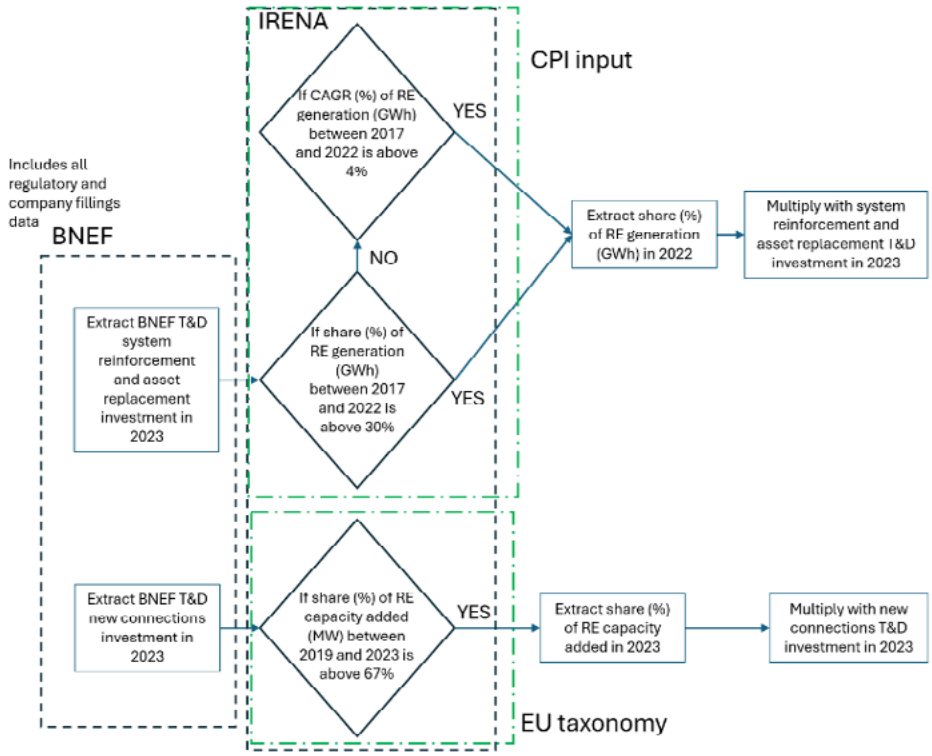
<table>
<tr><td rowspan="4">Waste-to-Energy</td><td colspan="2">DEFINITION
The most common type of WtE plants adopt a process in which household and other industrial waste is incinerated to generate electricity and heat. Other common forms of WtE technologies include gasification (to produce syngas) and anaerobic digestion, which harnesses the gases released by organic matter during its decomposition in an anoxic environment.
Despite showing potential as an effective waste management solution, WtE by incineration can discourage recycling practices (Zero Waste Europe 2017) and should only be considered a solution if it enables a reduction in landfill methane emissions. The release of air pollutants and toxic ash byproducts further complicates the picture, particularly for many developing countries that continue to deploy such technologies (GCHA 2023).</td></tr>
<tr><td colspan="2">EXAMPLE CLASSIFICATION APPROACHES
CBI Taxonomy:
Only facilities outside the EU are potentially eligible. Plant efficiency must be greater than or equal to 25%; bottom ash recovery is required; recovery of metal must be greater than or equal to 90%; the average carbon intensity of electricity and/ or heat over the life of the plant must be less than or equal to the waste management allowance.
Singapore-Asia Taxonomy:
Waste directly used in waste-to-energy facilities without any pre-sorting, or metal recovery in bottom ash is less than 50%, or plant efficiency is less than 10% would render incineration ineligible.</td></tr>
<tr><td colspan="2">CPI TAXONOMY CLASSIFICATION APPROACH
Following a review of literature, CPI finds that WtE by incineration meets the lifecycle emissions intensity criteria set for Fossil Fuel/High-Emissions.
With a lifecycle emissions intensity that greatly exceeds this threshold, CPI believes this demonstrates that a conservative approach to this form of electricity generation has been taken for the development of its taxonomy.</td></tr>
<tr><td>LIFECYCLE EMISSION INTENSITIES
WtE Incineration (municipal solid waste [MSW]) ~580 gCO_2e/kWh (Europe) (Zero Waste Europe 2019)</td><td>SOLUTION CLASSIFICATIONS
WtE Incineration (MSW) – Fossil Fuel/High-Emissions</td></tr>
</table>

5.1 TRANSMISSION AND DISTRIBUTION PROCESSING METHODOLOGY

New grid connections are classified using a 67% renewable capacity addition threshold based on EU Taxonomy guidance. These projects support the expansion of and access to the electricity supply of a grid system. CPI evaluates grid connection investment based on the share of renewable capacity added over the past five years. If this exceeds 67%, then the respective share of investment is counted as clean energy finance, reflecting the EU Taxonomy's criteria for grid alignment (<100 gCO_2e/kWh lifecycle emissions). Asset replacement and system reinforcement require more flexible thresholds, as they support mixed energy flows. CPI applies a 30% renewable generation threshold based on the 2023 global average (Ember 2023). If a country exceeds this over five years, that share of investment is classified as clean energy finance.

Forward-looking criteria capture the growth trajectory of clean energy deployment in emerging markets below a 30% threshold. If a country has not reached 30% but has achieved ≥4% compound annual growth rate (CAGR) in renewable generation over five years, CPI counts a share of investment toward climate-aligned upgrades. This draws on the Green Grids Initiative "Which Grids are Green" framework (GGI 2024) and captures progress in Southeast Asia, sub-Saharan Africa, and Latin America. The methodology reflects diverse energy trajectories and avoids blanket assumptions. Since energy mixes vary, uniform criteria risk misclassification. CPI combines backward-looking performance with forward-looking growth to include countries actively transitioning. Figure A.1 below shows the filtering process.

Figure A.1: Filtering approach adopted for this country-specific methodology for power grids



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