# Striking the Right Chord: Insights for Taxonomy Harmonization from a Comparative Analysis of Six Sustainable Finance Taxonomies

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## Abstract

Achieving the objectives of the Sustainable Development Goals and the Paris Agreement requires unprecedented levels of investment. However, mobilizing sufficient public and private sector capital faces persistent barriers, including the lack of shared definitions for what constitutes a 'sustainable' investment. Sustainable finance taxonomies – classification systems that identify and define activities or assets considered sustainable for investment purposes – have emerged as critical tools for establishing detailed sustainability definitions, with a growing number of national and regional governments developing them to support their sustainable finance markets. However, limited coordination in taxonomy development has raised concerns about market fragmentation due to inconsistent approaches. While this has prompted calls for taxonomy harmonization to promote consistent sustainability definitions globally, the literature also recognizes a need to ensure taxonomies reflect local context and priorities. This introduces complexity for harmonization efforts, which must balance achieving globally consistent definitions while accommodating appropriate local differences.

In this context, this thesis utilizes a comparative case study approach to examine six sustainable finance taxonomies developed by Bangladesh, China, the Climate Bonds Initiative, the European Union, and Mongolia. Through systematic analysis guided by a structured case framework developed for this research, the study builds understanding of existing approaches to taxonomy design and considers the implications of these findings in relation to reconciling the harmonization imperative of ensuring globally consistent sustainability definitions with the realities of how the taxonomy landscape is evolving across developed and developing economies. The analysis reveals that while these taxonomies share many overarching features of design, there are notable variations in their approaches. This includes different classification structures that diminish comparability without serving a clear purpose, inconsistent operationalization of shared underlying concepts, and sustainability definitions that vary considerably due, in large part, to local considerations.

Based on these findings, the thesis proposes three harmonization-focused action areas. First, developing a global structural framework could establish a common foundation for organizing and presenting sustainability definitions within taxonomies. Second, strengthening alignment of key underlying concepts could improve definitional consistency across taxonomies. However, the analysis underscores that harmonization should go beyond eliminating differences to accommodate appropriate local variation. Therefore, a third action area via international cooperation is proposed: mutual recognition of taxonomies' sustainability definitions. This balanced approach aims to improve overall comparability of taxonomies' definitions while ensuring that appropriate differences reflecting local context do not unnecessarily hinder cross-border flows of sustainability-aligned investment.

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## List of Abbreviations

| Abbreviation | Meaning |
|---|---|
| **ASEAN** | Association of Southeast Asian Nations |
| **BDT** | Bangladeshi taka |
| **BGD** | Bangladesh |
| **BREEAM** | Building Research Establishment Environmental Assessment Methodology |
| **CASBEE** | Comprehensive Assessment System for Built Environment Efficiency |
| **CBI** | Climate Bonds Initiative |
| **CCA** | Climate change adaptation |
| **CCM** | Climate change mitigation |
| **CDA** | Climate Delegated Act |
| **CGT** | Common Ground Taxonomy |
| **CHN** | China |
| **CITES** | Convention on International Trade in Endangered Species of Wild Fauna and Flora |
| **CMSME** | Cottage, Micro, Small, and Medium Enterprises |
| **CSP** | Concentrated solar power |
| **CSRD** | Corporate Sustainability Reporting Directive |
| **DNSH** | Do No Significant Harm |
| **EMDE** | Emerging market and developing economies |
| **ESDD** | Environmental and social due diligence |
| **ESIA** | Environmental and social impact assessment |
| **ESRM** | Environmental and social risk management |
| **EU** | European Union |
| **EUROSTAT** | European Statistical Office |
| **FI** | Financial institution |
| **GBP** | Green Bond Principles |
| **GBS** | European Green Bond Standard |
| **GHG** | Greenhouse gas emissions |
| **ICMA** | International Capital Market Association |
| **ICNEA** | Industrial Classification of National Economic Activities (China) |
| **IFC** | International Finance Corporation |
| **INDC** | Intended Nationally Determined Contribution |
| **IOSCO** | International Organization of Securities Commissions |

| Abbreviation | Meaning |
|---|---|
| **IPCC** | Intergovernmental Panel on Climate Change |
| **IPSF** | International Platform on Sustainable Finance |
| **ISIC** | International Standard Industrial Classification |
| **ISO** | International Organization for Standardization |
| **LEED** | Leadership in Energy and Environmental Design |
| **MDG** | Millennium Development Goals |
| **MNG** | Mongolia |
| **MSS** | Minimum Social Safeguards |
| **NACE** | Statistical Classification of Economic Activities in the European Community |
| **NDC** | Nationally Determined Contribution |
| **NFRD** | Non-Financial Reporting Directive |
| **NGO** | Non-governmental organization |
| **NZEB** | Nearly-zero energy building |
| **OECD** | Organisation for Economic Co-operation and Development |
| **PBC** | People's Bank of China |
| **SBFN** | The Sustainable Finance and Banking Network |
| **SC** | Substantial Contribution |
| **SDG** | Sustainable Development Goals |
| **SFP** | Sustainable Finance Policy (Bangladesh) |
| **SFWG** | G20 Sustainable Finance Working Group |
| **SME** | Small and medium-sized enterprises |
| **SREDA** | Bangladesh Sustainable and Renewable Energy Development Authority |
| **SRF** | Socially Responsible Finance |
| **TC** | Technical Criteria |
| **TEG** | European Union Technical Expert Group on Sustainable Finance |
| **TR** | European Union Taxonomy Regulation |
| **TSC** | Technical Screening Criteria |
| **UN** | United Nations |
| **UNEP** | United Nations Environment Programme |
| **USD** | United States dollar |
| **USGBC** | U.S. Green Building Council |

# Chapter 1: Introduction

The global agenda for sustainable development and climate action, outlined by the Sustainable Development Goals (SDGs) and the Paris Agreement, faces a critical financing challenge. For instance, in developing countries alone, recent estimates place the gap between actual and required financing for the SDGs at USD 3.9 trillion per year (OECD, 2022). While large, this gap represents ~1% of the total global financial assets of financial entities, which reached USD 379 trillion in 2018 (Financial Stability Board, 2020). This suggests that the private sector can play a major role in bridging the financing gap by shifting existing capital into sustainability-aligned investments (OECD, 2022; UNEP, 2018). However, mobilizing sustainability-aligned investment at scale requires enabling actions to address existing barriers that hinder the sustainable finance market.

A significant barrier to scaling up private financing is the lack of shared, detailed definitions of sustainable economic activities and assets. As Berrou et al. (2019) explain, detailed definitions play an essential market-enabling role in sustainable finance. First, directing finance towards sustainability-aligned investments requires making determinations about which activities are 'sustainable.' Second, detailed definitions provide policymakers with a basis for implementing measures that encourage sustainable finance market growth. Finally, and perhaps most critically, uncertainty in the absence of detailed definitions threatens market credibility, as it may lead to instances where sustainable finance is directed to projects without clear environmental or social benefits. As a result, the continued absence of detailed sustainability definitions creates uncertainty that discourages actors from entering the sustainable finance market (Berrou, Ciampoli, et al., 2019; G20 Green Finance Study Group, 2016).

To address this informational barrier and support sustainable finance market growth, an increasing number of governments are establishing detailed sustainability definitions at a national or regional level in the form of sustainable finance taxonomies. These taxonomies, which are classification systems that identify and define activities or assets considered sustainable for investment purposes, have emerged as "the essential operational standards in the sustainable finance market" (Migliorelli, 2021, p. 8). However, the emerging global taxonomy landscape has been characterized as scattered (Portilla et al., 2020) and siloed (G20 Sustainable Finance Working Group, 2021) due to the limited coordination among governments on taxonomy development. This lack of coordination, coupled with the rapidly rising number of taxonomies globally, has driven concerns that inconsistent approaches could lead to market fragmentation by advancing definitions that differ in their interpretations of sustainability. Such fragmentation could ultimately

undermine taxonomies' intended purpose by further confusing market participants and exacerbating greenwashing risk (G20 Sustainable Finance Working Group, 2021).

These concerns have prompted growing calls for taxonomy harmonization – a process to make "the regulatory requirements or governmental policies of different jurisdictions identical, or at least more similar" (Leebron, 1996, p. 66) – to promote globally consistent sustainability definitions (Amundi & International Finance Corporation, 2020; Deschryver & de Mariz, 2020; Hussain et al., 2020; International Network of Financial Centres for Sustainability, 2018; OECD, 2017; Portilla et al., 2020; SBN Green Bond Working Group, 2018). Yet, also suggested within the literature is a need to 'localize' taxonomies to some degree to appropriately reflect national context and priorities (Hussain et al., 2020; Portilla et al., 2020; SBN Green Bond Working Group, 2018). This reveals a central tension between global consistency and local relevance that introduces complexity for prospective harmonization efforts, as it suggests a need for a nuanced approach that balances the need to eliminate differences that promote consistency while potentially accommodating certain locally contextualized differences in taxonomy design. Interestingly, this tension mirrors debates within the broader development literature, particularly surrounding implementation of the SDGs, where competing imperatives of global consistency and local relevance are considered (Fukuda-Parr, 2022; Kanbur et al., 2018; Sachs et al., 2019). Drawing insights from this literature can help inform approaches to taxonomy harmonization.

Despite this challenge for taxonomy development, there is limited academic research examining taxonomy design that would build understanding of existing approaches and inform harmonization of the global landscape. To address this knowledge gap, this thesis utilizes a qualitative case study approach to investigate the designs of six sustainable finance taxonomies developed by the Climate Bonds Initiative, Bangladesh, China, the European Union, and Mongolia. The research is guided by the following central question:

1. What lessons can be drawn to reconcile calls for harmonization with how we see sustainable finance taxonomies evolving in both developed and developing economies?

To explore this question, two supporting sub-questions are posed:

2. What are the key design characteristics of sustainable finance taxonomies?
3. With respect to these characteristics, what similarities and differences exist across sustainable finance taxonomies?

Through examining these questions, this research contributes to our understanding of the emerging global taxonomy landscape and offers practical insights to inform future harmonization

efforts. The analysis reveals that while these six taxonomies share many overarching features of design, there is notable variation in approaches taken to incorporate and operationalize these features. This includes different classification structures, inconsistent approaches to operationalize key underlying concepts, and differences between taxonomies' sustainability definitions due to localization.

Based on these findings, and informed by lessons from SDG implementation about balancing global frameworks with local implementation needs, several harmonization-focused action areas are proposed. First, the development of a global framework to establish a shared classificatory structure among taxonomies could improve the overall comparability of their sustainability definitions. Second, strengthening the alignment of shared underlying concepts that inform approaches to defining sustainability could improve definitional consistency. Finally, to accommodate local differences observed in this analysis, harmonization should go beyond efforts to eliminate differences that improve overall comparability and consistency. Therefore, a third action area via international cooperation is proposed: mutual recognition of taxonomies' sustainability definitions, with the objective of ensuring that appropriate definitional differences to account for local context do not unnecessarily hinder cross-border flows of capital directed towards sustainability-aligned investments.

This thesis proceeds as follows: Chapter 2 reviews relevant literature on sustainable finance taxonomies and broader debates around harmonization and localization in sustainable development. Chapter 3 outlines the comparative case study methodology. Chapters 4 and 5 present the results of the within-case and cross-case analyses. Chapter 6 discusses key findings and implications for harmonization efforts. Finally, Chapter 7 concludes with a summary of contributions and suggestions for future research.

## Chapter 2: Literature Review

This literature review begins by situating sustainable finance in relation to its associated, narrower concepts. Following this, I examine the need for detailed sustainability definitions to address ambiguity within the market and note the emergence of sustainable finance taxonomies as an essential tool for this purpose. Next, I trace the progression of the taxonomy landscape from market-based to government-led approaches and identify a growing concern for market fragmentation arising from the increasing number of national and regional taxonomies, combined with an observed lack of coordination between governments on taxonomy development.

Finally, I consider the calls within the literature for taxonomy harmonization and identify a central tension for taxonomy development: the competing imperatives of global harmonization and local relevance. This is further considered by drawing parallels to debates within the broader development literature, particularly surrounding the SDGs, which sheds light on several considerations that help to inform the research approach, including the implementation and technical operationalization of globally shared concepts, and the potential role of power dynamics in influencing a harmonization process.

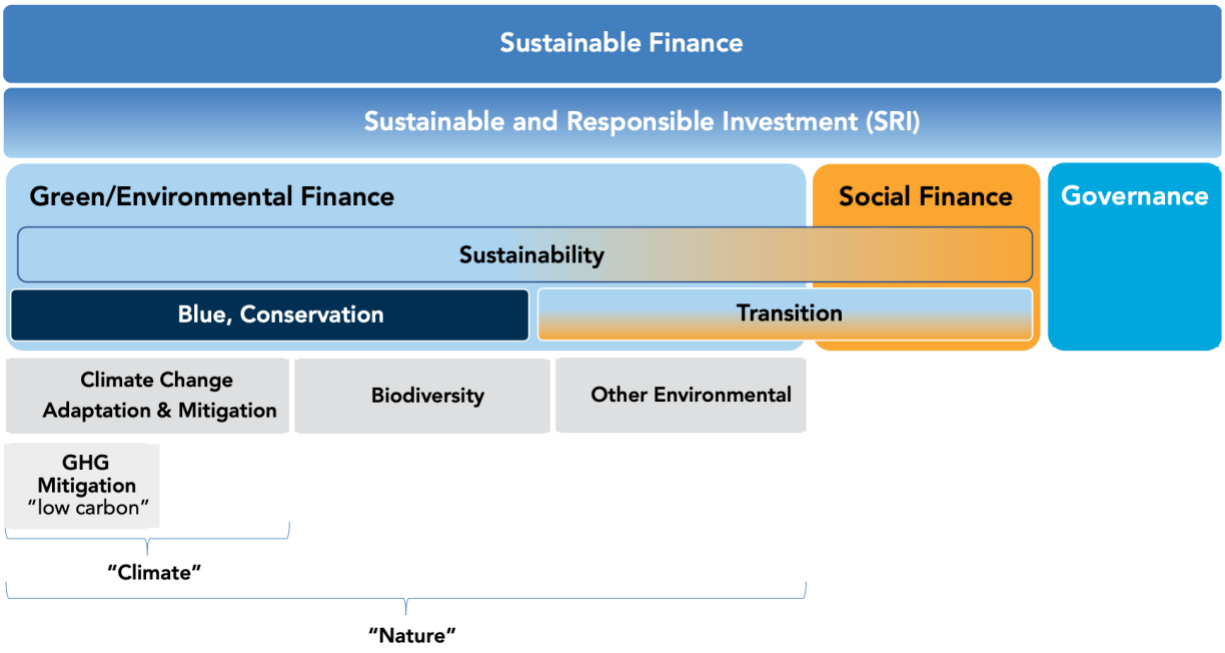
### The Need for Detailed Definitions to Support the Sustainable Finance Market

Many definitions of *sustainable finance* exist, as there is no consensus on defining the term; however, a systematic review of the literature by Cunha et al. (2021) reveals agreement that sustainable financing and investment activities are distinguishable from traditional financing through the incorporation of environmental and/or social considerations into financial decision-making. Notably, the incorporation of environmental and/or social issues is additional to typical financial considerations that inform traditional financing decisions. For the sake of defining the term, Berrou et al. (2019) offer a sufficiently broad definition, stating that sustainable finance can generally be understood as "the stocks and flows of financial resources and assets (across banking, investment and insurance industries) which is aligned with a range of environmental, social and economic objectives…" (p. 5).

Sustainable finance is generally considered an umbrella term that encompasses a multitude of narrower concepts that denote financing that differs in its environmental or social focus (Cunha et al., 2021; Forstater & Zhang, 2016). This is illustrated in Figure 1. It should be noted that while the points discussed in this review hold relevance for sustainable finance more generally, many discussions in the literature focus on the narrower green or climate finance categories. As such, the literature reviewed here often reflects this narrower focus. *Green (or*

*environmental) finance* is broadly distinguishable from other sustainable financing categories through its focus on environmental objectives (Forstater & Zhang, 2016). Meanwhile, *climate finance* is essentially a sub-set of green finance that is specifically focused on climate change mitigation and climate change adaptation (Forstater & Zhang, 2016). Generally, sustainable finance and its narrower financing categories are underdefined – i.e., they are defined at a high level without specificity, which is fittingly reflected in Forstater and Zhang's (2016) own description of green finance to differentiate it from climate finance: "something broader than climate finance, in that it addresses other environmental objectives and risks." (p. 10).

**Figure 1**
*Nested Concepts Within Sustainable Finance*

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High-level definitions convey a general understanding of sustainable finance and its associated concepts; however, they do not provide more specific detail regarding 'what' is sustainable for the purposes of investment. This lack of detailed definitions of sustainability has been identified as a significant barrier for specific financing instruments, namely green and other sustainability-labelled bonds (Deschryver & de Mariz, 2020), as well as for the sustainable finance market more generally (Berrou, Ciampoli, et al., 2019; G20 Green Finance Study Group, 2016). Discussing green finance specifically, Berrou at el. (2019) argue that the development of a detailed definition of 'green' is "central to the debate surrounding the future of the [green] market" (p. 32). First, that identifying green investments implies making determinations as to which activities are

'green' so that green finance is directed towards environmentally beneficial investments (Berrou, Ciampoli, et al., 2019). Second, that detailed definitions will provide a basis for policymakers to implement measures that encourage the market's growth; and, finally, that uncertainty in the absence of detailed definitions could harm the market's credibility, as it may lead to instances where green finance is directed to projects without environmental benefits (Berrou, Ciampoli, et al., 2019).

Suggested here is that detailed definitions play an important market enabling role. Their continued absence results in uncertainty that can discourage actors from entering the sustainable finance market (Berrou, Ciampoli, et al., 2019; G20 Green Finance Study Group, 2016). For instance, a UBS Group survey of 5,300 investors found that 72% of investors believed sustainable investing language to be confusing (UBS, 2018). For policymakers, a 2018 review of practices in EMDEs identified the lack of frameworks and guidance, including the development of detailed definitions to assess 'greenness', as the most urgent issue to address in countries with no green bond issuance (SBN Green Bond Working Group, 2018).

Overall, the issues highlighted in the literature point to a shared concern for greenwashing. Over the last few decades, greenwashing has become a prolific corporate communication practice that undermines consumer confidence in products carrying green labeling and investor confidence in environmentally conscious corporations (Delmas & Burbano, 2011). While there is no consensus on defining greenwashing, Delmas and Burbano (2011) define the practice as "the intersection of two firm behaviors: poor environmental performance and positive communication about environmental performance" (p. 65). In finance, greenwashing would generally mean that proceeds raised under the guise of financing activities or projects that contribute to an environmental objective could, in actuality, be financing projects with no clear environmental benefits. Without clear definitions and standards, there may be cases in which investors find it hard to determine the legitimacy of a potential investment. Thus, greenwashing presents as a persistent threat to the credibility of the green finance market, as it is possible for issuers to engage in unintentional misuse, or even bad faith usage, of the green label.

While Berrou at al. (2019) highlighted that greenwashing risk can discourage investors from entering the market, it can also discourage prospective bond issuers. In the green bond market, even the perceived risk of greenwashing can lead board-level executives to reject the possibility of an issuance (Deschryver & de Mariz, 2020). This is because the lack of definitional clarity can expose prospective green bond issuers to reputational risk if they are accused of greenwashing in relation to the projects financed through the bond's proceeds (KPMG, 2015). In the case of bond

issuers, detailed definitions can assist with dispelling potential greenwashing concerns by assisting issuers in demonstrating the environmental additionality of the projects financed by the bonds' proceeds. Clear definitions may be particularly important to address greenwashing risks in markets where bond issuers may not enjoy the general perception by investors that green bonds carry environmental benefits, which may place a greater burden upon issuers to prove the additionality of their green projects. This is highlighted in a recent study which surveyed stakeholders in the Canadian green bond market, which found that Canadian green bonds are "more likely to be perceived critically regarding the impact evaluation of their use-of-proceeds compared to their global counterparts" (Saravade, 2024, p. 64).

### The Use of Taxonomies to Define Sustainability

Greenwashing risks arising from uncertainty have prompted efforts to improve market clarity by developing detailed sustainability definitions. As noted by Berrou et al. (2019), sustainable or green finance implies making determinations about which sectors or activities are 'sustainable.' This determination has been the primary focus of definitional development, which therefore positions recent definitions to be most supportive of use of proceeds finance, where capital is raised for the purposes of financing specific projects or activities (Kahlenborn et al., 2017). In this context, an analysis of current practice by Kahlenborn et al. (2017) identifies several definitional approaches: sustainability objectives, taxonomies, exclusion criteria, indicators, and 'greenness' ratings.

Of the above definitional approaches, sustainable finance taxonomies are the focus of this research. In recent years, taxonomies have emerged as "the essential operational standards in the sustainable finance market" (Migliorelli, 2021, p. 8). They are noted not only for offering an approach to developing highly detailed definitions, but also their ability to incorporate other approaches identified above as part of the sustainability definitions they put forward (Kahlenborn et al., 2017). In the remainder of this sub-section, I introduce the concept of a taxonomy, how it relates to classification more generally, and provide an overview of their development within sustainable finance.

*Taxonomy*, the literal meaning of which is arrangement (*taxis*) method (*nomia*) (Harper, n.d.), is a specific *classification* approach, where a hierarchical (multi-level) classification structure is commonly considered a distinguishing feature (Fernandez & Eastman, 1990). *Classification* refers to both a process and a resulting outcome. As a process, classification encompasses the identification and arrangement of 'things' in an organized, structured fashion

(Bliss, 1929, p. 143). A classification, or *classification system*, also denotes the resulting outcome of the process (Bliss, 1929). As alluded to in Bliss's definition of the classification process, the arrangement of *things* can take many forms, resulting in classification systems that follow very different structures.

Like other classification systems, taxonomies act as representations of knowledge within a domain (Kwasnik, 1999). They enable rich description, help to simplify complex realities, and facilitate identification of similarities and differences between classified items (Bailey, 1994). Some of the earliest uses of taxonomies (in practice, but not in name) are the arrangement and description of medicinal plants by both the ancient Chinese and Egyptians (Cain, 2020). In the modern day, a taxonomic system familiar to many is the classification of biological organisms pioneered by Carolus Linnaeus through his Linnaean system (Cain, 2020, see "The Linnaean System") and the binomial nomenclature for the naming of species (Cain, 2020, see "Nomenclature").

### From Market-Based to Government-Led Taxonomy Development

Within sustainable finance, taxonomies are emerging as a key approach to developing detailed sustainability definitions. Specifically, sustainable finance taxonomies are classification systems that identify and define items considered 'sustainable.' These 'items can include economic activities, projects, or technologies, to name a few (Kahlenborn et al., 2017). As is the case with taxonomies more generally, sustainable finance taxonomies are seen as useful knowledge representations that "systematize knowledge on what should be considered eligible for 'sustainable' financing" (Migliorelli, 2021, p. 10).

Early on, efforts to establish definitions were largely market-based, and aimed to support the growth of the green bond market. In 2008, the World Bank issued the first labelled green bond (World Bank Group, 2015). In the following years, and as the green bond market gained traction, debates arose over whether steps should be taken to support continued, credible market growth. On the one hand, many market participants expressed concern that the absence of shared principles or standards would give rise to greenwashing risks and ultimately harm market credibility (Tripathy et al., 2020). However, others worried that introducing stringent standards on definitions and reporting for green bonds would themselves inhibit the market's growth (OECD, 2017).

In 2014, the Green Bond Principles (GBPs) were introduced by the International Capital Markets Association (ICMA) (Climate Bonds Initiative, n.d.). The GBPs provide a voluntary

framework for green bond issuance that helped boost confidence in the green bond market by offering a standardized approach on issuance and reporting practices (International Capital Markets Association, 2021). However, while the GBPs include a list of broad green project categories (e.g., clean transportation), they do not define eligible green projects within these categories. Around this same time, others, namely the Climate Bonds Initiative (CBI), believed that the market needed detailed definitions to guide eligibility determinations for use of proceeds financing, and subsequently published the first iteration of the CBI Taxonomy (Tripathy et al., 2020). The CBI Taxonomy is intended to inform bond issuers' selection of projects eligible to be financed under CBI's certification scheme for climate-labelled bonds, a bond standard similar to the GBPs but that, due to the introduction of the Taxonomy, is underpinned by more detailed project definitions (Tripathy et al., 2020).

It should be noted that, in addition to broader market-based definitional efforts to support the growth of the sustainable finance market, there were similar efforts underway within development finance. In 2011, development banks began cooperating to establish methods for tracking and reporting their climate-related financing (African Development Bank et al., 2016). This cooperation was furthered in 2015 when a group of major multilateral development banks and the International Development Finance Club mutually agreed on common principles to track and report on both climate mitigation and adaptation financing (African Development Bank et al., 2016). Like the GBPs, these agreed principles similarly identify high-level project categories; however, they provide further detail with the identification of more specific sub-categories that are each accompanied by examples of eligible projects (African Development Bank et al., 2016).

More recently, governments are increasingly involved in efforts to establish detailed definitions. And it is at this point that detailed definitions began to more frequently take the form of actual taxonomies. The shift from market-based to government-led efforts began in 2015 with the publication of the *Green Bond Endorsed Project Catalogue* by China (People's Bank of China, 2015a). China's Catalogue was followed by three more early taxonomy entrants: Bangladesh, Mongolia, and the European Union. The introduction of taxonomies in these countries, particularly in China and the European Union, has set off a flurry of development efforts globally, with new taxonomies in development or published by the United Kingdom, Russia, Malaysia, Singapore, and South Africa (FoSDA, 2021). The rising number of taxonomies has coincided with accelerated development of green finance standards more broadly following the 2015 Paris Agreement, which explicitly highlighted finance's central role to support climate goals (Nedopil et al., 2021).

## Market Fragmentation

The shift towards official sector taxonomies suggests an increasing awareness around the need to improve definitional clarity within sustainable finance. However, taxonomy development at the national and regional levels lacks coordination and is often characterized as scattered (Portilla et al., 2020) and siloed (G20 Sustainable Finance Working Group, 2021). Their rising number, coupled with an observed lack of coordination on their development, may lead to inconsistent approaches to defining sustainability within taxonomies, and therefore foster differing interpretations of what is sustainable for investment purposes across jurisdictions. Consequently, a commonly cited concern in relation to taxonomy development is market fragmentation.

In financial markets, market fragmentation generally refers to fragmentation "either geographically or by type of product or participant" (Financial Stability Board, 2019, p. 4). The globalized nature of the financial system leaves it vulnerable to market fragmentation resulting from, among other reasons, regulatory fragmentation – i.e., divergences across domestic or regional rules and regulations (Financial Stability Board, 2019). In some cases, market fragmentation may be desirable; however, it can also lead to increased cross-border investment costs and an overall reduction in the efficiency of global financial markets (Financial Stability Board, 2019).

These concerns may be well-founded, as fragmentation across the financial market has occurred in recent years. For example, serious weaknesses in the over the counter (OTC) derivatives market were made apparent by the 2008 financial crisis, and the Group of 20 (G20) initiated reforms to address these weaknesses by improving transparency and safety (International Swaps and Derivatives Association, 2021). While these reforms have been beneficial, the International Organization of Securities Commissions (IOSCO) (2019) noted that since 2015, regulators have reported fragmentation "often along jurisdictional lines" to be a possible "unintended result of the implementation of the post-crisis regulatory reforms and their national implementation" (p.4). In this case, fragmentation is primarily attributed to two things: (a) inconsistencies in national implementation of reforms concerning substance and timing and (b) the extraterritorial effects of some national policies (Financial Stability Board, 2019).

Market fragmentation concerning the sustainable finance landscape is somewhat different. In the case of post-2008 regulatory actions, geographical fragmentation has resulted from implementation differences for reforms designed to conform with existing international standards. An additional challenge for sustainable finance is the lack of a global policy framework to inform and drive the development of internationally consistent sustainable finance taxonomies

(Portilla et al., 2020). Ironically, if taxonomies were to drive fragmentation by advancing inconsistent sustainability definitions, this could add to confusion and exacerbate greenwashing risk (G20 Sustainable Finance Working Group, 2021).

Both private and public institutions have voiced concerns about sustainable finance market fragmentation. Of the 70 financial institutions surveyed in the Global Climate Finance Survey conducted by the Institute of International Finance and the European Banking Federation, 65% felt that "'Green' regulatory fragmentation is a big source of concern" and "that current regulatory initiatives will have a material impact on the market environment for sustainable finance" (Gibbs et al., 2020, p. 5). Regarding the public sector, a 2019 survey on market fragmentation was issued to IOSCO's board members and observers in which several respondents identified the lack of international sustainable finance standards as a potential driver of market fragmentation (The Board of the International Organization of Securities Commissions, 2019). Respondents also noted sustainable finance's status as an emerging sector, alongside other rapidly evolving areas of financial innovation such as crypto and cyber resilience, where the rules and regulations across jurisdictions are often in different stages of development and may not be uniform in their approach (The Board of the International Organization of Securities Commissions, 2019).

### Taxonomy Harmonization to Address Market Fragmentation Risk

The risk of market fragmentation and its negative implications for the sustainable finance market suggest attention is needed towards the consistency of sustainability definitions and, by extension, the taxonomies emerging over time that establish them. On this point, the available literature holds a similar position on the need for common definitions to support the sustainable finance market. In a report on the evolution of the green bond market, the OECD notes the rising number of definitions and advocates for "convergence towards commonly accepted definitions… to maximise the effectiveness, efficiency and integrity of the market" (OECD, 2017, p. 13). Similarly, the Sustainable Banking and Finance Network (SBFN) identifies the harmonization of definitions as an objective for green bond markets, stating that the "use of global definitions and common categories, as well as reference to global standards for what qualifies as green projects and sectors, will build the credibility of bonds among international investors." (SBN Green Bond Working Group, 2018, p. 42). Deschryver and Mariz (2020) also cite the need for common global definitions to support the standardization of the green bond market.

As recognition for the role of taxonomies as a definitional tool has grown, calls for shared – or harmonized – definitions have evolved into calls to harmonize taxonomies, as this is viewed as a

means for promoting shared definitions globally. Amundi and the International Finance Corporation (2020) note that clearer, more widely used green definitions are emerging as taxonomy development continues, but stress that the harmonization of taxonomies will be important going forward to ensure the confidence of investors. A World Bank guide similarly emphasizes taxonomy harmonization to promote consistent definitions, stating that "a taxonomy harmonized with others in major capital markets will support inter-market capital flows – a critical factor for countries seeking access to the growing international pool of green capital" (Hussain et al., 2020, p. 51).

Other reports also acknowledge that harmonization of individual taxonomies would be beneficial; however, they go a step further by suggesting convergence towards a single, global taxonomy. For instance, The International Network of Financial Centres for Sustainability (FC4S) notes its own concerns for fragmentation owing to the proliferation of taxonomies intended to define sustainability, and states that the development of an international taxonomy, or at least convergence of taxonomies towards a high level of comparability, is "in the core interest of the world's financial centres" (2018, p. 3). Portilla et al. (2020) voice similar concerns and advocate for driving "as far as possible towards an aligned and internationally consistent taxonomy" (2020, p. 13).

The literature here employs varying terminology, e.g., harmonization, uniformity, and convergence. Going forward, the term harmonization is used in this thesis, and can be defined as a process that, in a legal or regulatory sense, entails "making the regulatory requirements or governmental policies of different jurisdictions identical, or at least more similar" (Leebron, 1996, p. 66). As defined, the term harmonization is appropriate here, as it aligns with the calls in the above literature to ensure taxonomies become substantially more similar or even uniform.

While the literature places a clear emphasis on taxonomy harmonization, the notion of 'localized' taxonomy design is also raised. In other words, it is suggested that individual taxonomies should reflect the local context and priorities of the jurisdictions where they will be implemented. In fact, much of the same literature emphasizing harmonization acknowledges a need for a degree of localization. For instance, the SBFN report recommending the harmonization of definitions also underscores the importance of respecting the varying characteristics of local markets (SBN Green Bond Working Group, 2018). Similarly, the World Bank's guide emphasizing harmonization of taxonomy approaches includes an accompanying acknowledgement for local context, cautions against simply emulating taxonomies elsewhere, and advises justifying a taxonomy "on the basis of national realities and sustainable development priorities" (Hussain et

al., 2020, p. 53). Even where localization is not necessarily encouraged, it is acknowledged as a possible reality to contend with (Portilla et al., 2020).

### *Balancing Global Harmonization with Local Relevance*

Fundamentally, these calls for localization relate to a need to ensure the local relevance of the sustainability definitions advanced by taxonomies and seem to suggest that some differences between taxonomies may be necessary. But if localization is important, what are the implications for taxonomy harmonization? The literature on harmonization more generally suggests that the existence of difference doesn't necessarily undermine the prospects of harmonization, as uniformity – the elimination of all differences) is not the sole possible outcome of the process (Andreadakis, 2012). This is implied in Leebron's (1996) definition cited above, which identifies improving the similarity of two or more policies, rules, regulations, etc. as the clear directional objective of harmonization, while identifying uniformity as one possible outcome.

That said, while some degree of localization does not render harmonization impossible, it does introduce complexity to the process. This is not necessarily surprising. Fox (1991) explains that, in practice, heterogeneity across countries can introduce complexity to harmonization efforts. Costs that arise from differences can lead us to wish for the adoption of the best – or ideal – standard; however, "when one takes a longer view of what is 'best' and respects cultural and contextual differences among nations… the problem of 'ideal' law becomes more elusive and the problem of harmonization becomes more complex" (Fox, 1991, p. 593).

Returning to the taxonomy-related literature reveals limited insight on navigating the complexities of the harmonization process that localization may be introducing. While calls for harmonization, in some cases, go as far as suggesting convergence towards a global taxonomy, the emphasis on localization indicates that such an outcome (uniformity) is unlikely, and perhaps even undesirable. Beyond this, the issue of harmonization is not explored in detail. Consideration for localization – particularly on how and to what extent taxonomies should be localized, is similarly limited. The World Bank's guidance does suggest that local considerations could inform the selection of sustainability objectives to incorporate into a taxonomy, the selection of sectors and economic activities to prioritize for inclusion during development, as well as the use of national policy targets to guide eligibility determinations (Hussain et al., 2020). However, how to accommodate localized features of design while pursuing global harmonization is not explored. The lack of attention towards this issue is notable, as localization likely already is driving some of the differences emerging across taxonomies. This is noted by the International Platform on

Sustainable Finance (IPSF), which suggests that authorities "understandably [reflect] their local needs, their environmental priorities and stages of market development" while also cautioning that this may be contributing to fragmentation risk (2020, p. 8).

Overall, this literature reveals a tension within taxonomy development between global and local considerations. To promote globally consistent sustainability definitions, clear emphasis is placed on harmonizing the multitude of taxonomies. At the same time, the literature acknowledges that a degree of 'localization' to ensure local relevance is important. This suggests that localization is one driver of, and potential rationale for certain differences between taxonomies. This introduces complexity to harmonization considerations as it indicates that a taxonomy harmonization process must navigate the challenge of striking a balance between eliminating differences that improve similarity, while preserving others to maintain local relevance. However, the taxonomy-related literature to date has not comparatively examined existing taxonomy approaches with harmonization in mind. Consequently, it offers limited insight to inform harmonization challenges. This thesis aims to address this gap through consideration of the questions previously outlined in the introduction.

## Defining and Measuring the Sustainable Development Goals

To further inform the research approach, this section looks to the broader development literature on the Sustainable Development Goals (SDGs). While the appropriateness of the SDGs as an agenda for development is strongly contested, this issue is not examined here, as the SDGs role as a development agenda has effectively been institutionalized through formal adoption at the United Nations (UN) (Fukuda-Parr, 2022). Rather, the relevance of the SDGs to this research lies within debates that explore their role as a global framework, perspectives on their local implementation, and their technical operationalization through target setting and indicator selection. These debates highlight similar challenges of balancing global and local perspectives and ultimately shed light on considerations potentially relevant to challenges of taxonomy harmonization.

### *The SDGs as a Global Development Framework*

The SDG Agenda is the product of a goal-setting exercise, in which its 17 goals act as a vehicle to convey global norms (Fukuda-Parr & McNeill, 2019) by framing the policy space in accordance with the priorities articulated through them (Bøås & McNeill, 2003). The SDG Agenda priorities gain legitimacy through international agreement, which in turn galvanizes support, facilitates efforts to quantify resource needs, and sets the stage for evaluating performance in

achieving the goals (Bourguignon et al., 2010; Fukuda-Parr & McNeill, 2019; Kanbur et al., 2018). As such, Kanbur et al. (2018) suggest that the SDGs are perhaps best viewed as global framework that provides a basis for action.

While the SDG Agenda's 17 goals provide a basis, they are qualitative statements of policy priorities (Fukuda-Parr & McNeill, 2019). Supporting their achievement in practice requires considering how to technically operationalize the goals and strategies for their implementation. On these points, there are debates which hold relevance for this research. The first relates to implementation, where opposing viewpoints exist on how to implement the SDGs domestically. This debate sheds light on how local considerations can potentially shape the implementation of a global agenda. A second area of debate focuses on technical operationalization, where discussions point to how targets and indicators are ultimately what determine the meaning of – or define – the concept of development in the context of the SDG Agenda, and the role that power dynamics can play in this seemingly technical process.

**Implementation.** There are differing views as to how global goals like the SDGs should be implemented in practice. Overall, the literature broadly acknowledges that heterogeneity across countries may necessitate contextualizing global goals for domestic implementation. However, differing perspectives on implementation shed light on (a) how a shared concept or agenda globally can take on different meanings as it is further shaped during national implementation, and (b) that even with overlap (e.g., through shared priorities) differences across countries may still arise through altered ambition.

First, there are differing perspectives on whether the SDGs should be implemented locally in their entirety or in a narrowed down, prioritized fashion. Proponents of implementing the SDGs entirely acknowledge the need to adapt the SDGs to local context but argue overall that the transformative change envisioned by the SDGs will be difficult or impossible to achieve if countries instead pick certain goals to implement over others (Sachs et al., 2019). Similarly, while exploring potential implementation issues, Fukuda-Parr (2022) identifies national adaptation and selectivity as avenues that may compromise the transformative potential of the SDGs, as governments may cherry pick goals to pursue, while avoiding the goals that are politically problematic or the most challenging to achieve. In contrast, Kanbur et al. (2018) notes that, as a global goal-setting exercise that must balance a multitude of perspective to reach agreement, the SDG Agenda has a large number of goals and targets that, for practical reasons, will need to be narrowed down by individual countries. They argue that, while the SDGs are a useful frame of reference, their implementation must be guided by national context (Kanbur et al., 2018). This echoes an earlier,

similar assessment of the Millennium Development Goals (MDGs), where the authors argue that goal implementation must account for an individual country's context, and that limited resources will likely mean that some goals are pursued at the expense of others (Bourguignon et al., 2010). While it is important to consider appropriate strategies for implementation, a key takeaway from the above is that if local context *does* in part shape national implementation of the SDGs, then individual countries would be likely to pursue a differing mix of goals.

A second implementation consideration relates back to the notion that goal setting acts as a vehicle to convey norms. If the SDGs establish global development norms, and outline targets that establish performance expected to be achieved for each goal, to what extent should individual countries adhere to these performance expectations? Bourguignon et al. (2010) consider this within their assessment of the MDGs, where they argue that a possible role for global goals (e.g., MDGs, SDGs) is to set an international standard. Setting the global goal and target establishes an expectation of performance that can be adopted by individual countries. However, Bourguignon et al. (2010) argue that domestic debate should take priority, and therefore domestic decisions about the level of ambition to be pursued must be accepted. This is in contrast to Fukuda-Parr's (2022) concern that national adaptation of the SDGs may risk the transformative potential of the goals if governments are subjected to, and acquiesce to pressure to water down ambition, which suggests a view that ambition levels set globally shouldn't be adjusted. While Kanbur et al. (2018) argue for narrowing down the SDG goals and targets at the national level, they do not appear to take a position on whether performance targets should be adjusted. However, the authors do argue for determining indicators at the national level to measure goals and targets in a way that supports national dialogue and communication on progress, and that is sensitive to a country's statistical capacity (Kanbur et al., 2018).

The first point on implementation considered above highlights that the shared global agenda established by the SDGs may ultimately take on different meaning as it is shaped by national implementation strategies. On the second point discussed here, there are different perspectives on whether countries should adhere to expectations outlined globally or to adjust in accordance with domestic needs and priorities. While this debate again points to disagreement on an appropriate implementation strategy overall, a key takeaway is that even where countries may overlap on the development priorities they pursue when implementing the SDGs, differences may arise due to altered expectations of performance or because of measurement differences.

**Operationalization.** To reiterate, the process of target and indicator selection is necessary to operationalize the priorities – or norms – of development initially conveyed by the SDG Agenda's

global goals. Therefore, the structure of the SDG Framework consists primarily of three key elements: goals, targets, and indicators (Fukuda-Parr & McNeill, 2019). Establishing these elements required lengthy negotiations involving a large number of states and other stakeholders. Generally, the negotiation process to establish the *goals* is viewed as more inclusive and transparent than those of previous agendas, which is attributed in particular to greater inclusion of Global South and non-state actors (Fukuda-Parr, 2022; Horner & Hulme, 2019). However, the literature is more critical of the process to select targets and indicators. Overall, examining this literature sheds light on how operationalization influences meaning, and differing approaches to operationalization can lead to different interpretations of a shared concept. This points to a need to identify and comparatively examine the specific elements within taxonomies that constitute their respective approaches to operationalizing (i.e., defining) the sustainability concept, as this may be a key source of difference. Moreover, this literature raises additional considerations on power dynamics. The choice of targets and indicators and the implications this has on the overall meaning of the SDG goals demonstrates how tools of measurement are powerful and purposive (Kelley & Simmons, 2015). Given calls for taxonomy harmonization, this suggests that it is important to not only consider differences and how to eliminate them, but also which approaches taxonomies may converge towards through the elimination of difference and who is positioned to influence expectations on taxonomy approaches.

Generally, the SDGs targets and indicators are contested in the literature as a result of their role in establishing meaning for each goal. In multiple articles, Fukuda-Parr welcomes what is, in her view, a normative shift in development brought about by the SDGs (Fukuda-Parr, 2016, 2022; Fukuda-Parr & McNeill, 2019). However, she is quite critical of chosen targets and indicators. In an article examining the transformative potential of the SDGs, Fukuda-Parr (2022) notes that the SDGs continue to be contested not on the basis of their text – which has been formally adopted – but on the basis of how this text is interpreted (e.g., targets and indicators).

Fukuda-Parr and McNeill (2019) lament a slippage of ambition resulting from targets and indicators that have altered intended meaning. For instance, the goal of SDG 10 is to "reduce the inequality within and among countries" (UN General Assembly, 2015, p. 14). Target 10.1 continues to frame income inequality as an issue primarily addressed through poverty eradication, rather than tackling unequal wealth / income distribution (Fukuda-Parr & McNeill, 2019). This framing reflects the view of some parties that were opposed to treating inequality and poverty as standalone goals (Fukuda-Parr & McNeill, 2019). In this case, target 10.1 defines SDG 10 in a way that is tailored to the indicator – the World Bank's shared prosperity measure – that was selected

later (Fukuda-Parr & McNeill, 2019). Specifically, target 10.1 stipulates that "by 2030, progressively achieve and sustain income growth of the bottom 40 percent of the population at a rate higher than the national average" (UN General Assembly, 2015, p. 21). Despite certain stakeholders advocating for the use of the Gini coefficient, its use was precluded by how target 10.1 was defined, as it typically measures income distribution of an entire population (Fukuda-Parr & McNeill, 2019). Target 10.1 illustrates how the choices made to operationalize the goals dictate their meaning. In this case, the target and indicator alter how inequality is perceived and how it is addressed. For other goals, targets were well-received, but the indicators are not sufficient. This is the case for SDG 4 on education, where target 4.1 stipulates free and compulsory education by 2030 for all children, yet the notion of *free* education is entirely lost in the choice of indicators, as none are included that would enable measurement of this aspect (Unterhalter, 2019).

**Power dynamics.** The above raises additional considerations on power dynamics. The literature discusses how power dynamics influence seemingly objective, technical processes, which can further one perspective at the expense of others. This issue is not exclusive to the formulation of the SDGs. There is increasingly widespread use of the measurement and dissemination of information using indicators (Kelley & Simmons, 2015). Their formulation is typically portrayed as an objective, often scientific process carried out by technical experts rather than policymakers; yet indicators are actually underpinned by specific theories and values (Merry, 2011). The information that is then conveyed is not necessarily neutral, but powerful and purposive, and can be gathered and deployed as a form of soft power (Kelley & Simmons, 2015). Further, as Keohane and Nye (1998) point out, information gathering is costly, which affords advantages to states with the resources and capacity to establish institutions that build knowledge and positions them to set agendas that shape preferences more broadly.

Power dynamics, particularly in relation to harmonization, are not raised in the taxonomy-related literature. However, the use of reference taxonomies is a practice worth exploring in this context. This increasingly common practice refers to the use of existing taxonomies – particularly those of the European Union and China – by taxonomy developers as guidance during their own development process (G20 Sustainable Finance Working Group, 2021). Raising the need to address market fragmentation risk, the G20 Sustainable Finance Working Group (SFWG) not only recommended the use of reference taxonomies but also stated that countries with limited capacity could consider adopting a reference taxonomy for use in their own markets (G20 SFWG, 2021). The inclusion of this practice within the G20 SFWG's recommendations for improving global alignment suggests that it is viewed as a harmonization strategy.

The G20 SFWG does not identify a specific taxonomy for use as a reference; however, frequent use of the EU and Chinese taxonomies as reference raises questions of whether the practice positions countries to influence taxonomy development and, ultimately, how sustainability is defined in other jurisdictions. In fact, harmonization processes are vulnerable to power imbalances, as some countries – "guidance-givers" – are capable of exerting influence to encourage harmonization towards their own approaches, regardless of whether the approach is truly a 'right answer' (Fox, 1991, p. 595). The EU in particular has expressed a desire to influence sustainable finance approaches globally. For instance, a cited benefit during considerations of whether to develop the EU Taxonomy was that doing so would give "more weight to the EU at a global level, both politically and economically" (European Commission, 2018, p. 78). Both the EU Taxonomy and the European Green Bond Standard have been characterized by European policymakers and the European Commission's sustainable finance advisory body as global gold standards (McGuinness, 2023; Platform on Sustainable Finance, 2022b). Further, the European Commission led the launch of the International Platform on Sustainable Finance (IPSF), a forum for countries to exchange information and promote best practice in sustainable finance (European Commission, n.d.).

The EU's global regulatory influence is well-known. In 2012, Anu Bradford (2012) coined the term 'Brussels effect' – both de facto and de jure – to describe Europe's unique "unilateral power to regulate global markets" (p. 3). Within the literature, some have a positive view of this influence. Schütze et al. (2020) characterize the EU Taxonomy as "a blueprint for a global standard defining sustainable economic activities" (p. 492). In later writing, Anu Bradford argues that the Brussels effect may bring about the positioning of the EU Taxonomy as a global sustainable finance standard, and states that the EU's approach "should lead to new and upgraded projects and activities in line with the taxonomy criteria as well as a redirection of capital flows and investments into such activities" (Bradford, 2021, n.p.).

Bradford's observation that the EU Taxonomy is likely to redirect investment into activities it defines as sustainable is notable, as this is the very reason that has led others to raise concerns. For instance, Lehmann and Plant (2020) note that the implications the EU's sustainable finance regulatory approach could have on international investment are being overlooked despite the dependence, in part, that emerging and developing economies have on cross-border climate finance. Specifically, they note the importance of ensuring that the EU's efforts to pursue high

standards does not render projects ineligible for financing that are otherwise defined as sustainable within the taxonomies of other countries (Lehmann & Plant, 2020).

## Summary

Taxonomies have emerged as a key tool for defining sustainability in the context of sustainable finance. However, there are design and implementation challenges, including a central tension between the need for global taxonomy harmonization to promote consistent sustainability definitions and avoid market fragmentation on the one hand, and the need for taxonomies to be tailored to some degree to local contexts on the other. However, there is a lack of inquiry within the literature into taxonomy design that would build understanding and generate insights for effectively navigating the complexities of harmonization. This study aims to address this research gap by examining taxonomy design, identifying similarities and differences in design across individual taxonomies, and considering the related implications for harmonization.

Broader debates within the development literature surrounding the SDGs help to further inform the research approach. The SDG Agenda acts as a global framework that establishes a basis for implementing national development agendas. While the literature disagrees on implementation strategies, the debate highlights the potential for shared concepts to take on different meaning through local implementation, where development priorities articulated by the SDGs may be narrowed down or redefined at the national level. While taxonomies lack an organizing framework on a global level, their development is driven by the need to operationalize a shared 'sustainability' concept. Moreover, the way in which targets and indicators shape interpretation of the SDGs indicates the significance that approaches taken to operationalize concepts have on overall meaning. This suggests a need to examine the specific elements of design that constitute taxonomies' sustainability definitions, as these elements could be a key source of difference.

Finally, the SDG literature points to a need to consider the possible role of power dynamics in shaping global expectations around taxonomy approaches, and the implications of this for taxonomy harmonization. This is particularly important considering the increasingly common use of reference taxonomies to guide the development process, which may position countries to exert disproportionate influence on global taxonomy development in the absence of research to inform a more formal and balanced harmonization process. This situation echoes broader patterns in global governance where certain actors are better positioned to shape international norms and practices.

# Chapter 3: Methodology

The literature suggests a need for taxonomy harmonization to promote the use of globally consistent sustainability definitions. However, the harmonization process requires navigating complexities of taxonomy design, particularly the need for some degree of localization. This issue was at the core of this study, which was guided by a central research question:

1. What lessons can be drawn to reconcile calls for harmonization with how we see sustainable finance taxonomies evolving in both developed and developing economies?

To explore this question, this study employed a qualitative, comparative case study approach to investigate the design characteristics of sustainable finance taxonomies and identify similarities and differences across their respective approaches. This is reflected in the following sub-questions, which were intended to guide the case study approach:

2. What are the key design characteristics of sustainable finance taxonomies?
3. With respect to these characteristics, what similarities and differences exist across sustainable finance taxonomies?

## Case Study Approach

Simply described, case study research is "research that provides a detailed account and analysis of one or more cases" (Clandinin & Johnson, 2014, p. 560). As a research method, qualitative case study is flexible (Merriam & Tisdell, 2016; Simons, 2009; Stake, 1995) and enables a highly descriptive research product (Merriam & Tisdell, 2016). It is best suited to 'how,' and 'why' questions, as well as 'what' questions that are exploratory in nature (Yin, 2018). Various types of case study exist; however, a comparative approach – otherwise described as a collective (Stake, 1995), or multiple case (Yin, 2018) approach – is appropriate for the research aims of this thesis.

This research was oriented towards instrumental case study, where the purpose is to understand cases in order to generate insights about a broader issue of interest (taxonomy harmonization), rather than to reach conclusions about individual cases (Stake, 1995). In this context, a comparative strategy was followed that involved performing within-case and cross-case analysis. The approach was further informed by a series of semi-structured interviews with six individuals of various backgrounds, but that possessed knowledge of sustainable finance. The remainder of this chapter outlines the approach in more detail, beginning with the case study selection and procedure, followed by information regarding the interview process.

### *Case Definition and Selection*

A case is a "bounded system" (Clandinin & Johnson, 2014, p. 435). Here, each case is an individual sustainable finance taxonomy. To guide case selection, a sustainable finance taxonomy has been broadly defined as a classification system that identifies items considered 'sustainable' in the context of sustainable finance. Taxonomy development within sustainable finance is in a nascent stage. While several private entities may have developed taxonomies of their own, the primary focus of this research is on taxonomies created by or for governments at a national or regional level. The OECD (2020) has referred to these taxonomies as legislative or official taxonomies.

Case selection was undertaken in April 2021. At this time, few official or legislative taxonomies were developed to a degree that would facilitate meaningful analysis. Given this, the fairly broad definition of taxonomies to guide case selection is justified, as it is sensitive to the current reality. An over-specification of what a taxonomy must consist of could have had unintended consequences by prematurely excluding specific approaches.

The taxonomies selected for study include five official sector taxonomies from four jurisdictions and one market-based taxonomy. They include China's 2015 Green Bond Endorsed Project Catalogue (People's Bank of China, 2015a), China's 2021 Green Bond Endorsed Project Catalogue (People's Bank of China et al., 2021b), the Climate Bonds Taxonomy (Climate Bonds Initiative, 2021c) the Mongolian Green Taxonomy (Mongolian Sustainable Finance Association et al., 2019), Bangladesh's Sustainable Finance Policy (2020), and the European Union (EU) Taxonomy for sustainable activities (Regulation (EU) 2020/852, 2020). While the Climate Bonds Taxonomy was not developed by a government and is therefore not an official national or regional taxonomy, its role in pioneering a taxonomy-based approach to establishing detailed definitions in the sustainable finance market, as highlighted in the literature review, justify its inclusion in this research.

Case selection was not guided by a specific sampling method. The five official sector taxonomies selected for study were the only official sector taxonomies in existence at the time, with the exception of Malaysia's Climate Change and Principle-Based Taxonomy (Bank Negara Malaysia, 2021). The Malaysian Taxonomy was excluded from the study because its principles-based approach does not identify and classify items as 'sustainable' and therefore does not constitute a taxonomy as defined.

## Data Collection and Analysis

The comparative strategy began by conducting a within-case analysis, which involves studying each case individually (Clandinin & Johnson, 2014). Following this, the information generated through individual case description during within-case analysis was used to perform a comparative, cross-case analysis to identify similarities and differences within shared design characteristics across the selected cases. The combined use of within-case and cross-case analysis is advantageous because it elevates the research beyond a descriptive exercise (Paterson, 2010). Finally, the results of the within-case and cross-case analysis were considered in relation to taxonomy harmonization, the broader issue of interest in this thesis.

For each case study, documents were the primary data source. For each case, this consisted of either a single document or series of documents that constituted the published taxonomy. Taxonomy documents were obtained from the websites of the developing government agencies or organizations. Data collection primarily occurred during within-case analysis, where taxonomy documents were analyzed in order to generate a detailed description of each case. While the intention is to build an in-depth understanding of each case, cross-case analysis is dependent upon the information generated through within-case analysis; therefore, it was necessary to ensure that document analysis during individual case study yielded comparable information (Clandinin & Johnson, 2014). For this reason, a Case Framework was developed to establish a standard approach for data collection and case description. During document analysis, text was color coded to the corresponding cross-cutting dimension, and a notation was added to thematically organize the data to the relevant category in the Case Framework.

### *Case Framework*

The Framework sets out three cross-cutting dimensions for comparison: Purpose & Application, Classification Structure, and Defining Sustainability. Within these dimensions, broad categories are identified to facilitate qualitative data collection during the within-case analysis on the background, purpose, and design characteristics of each taxonomy. As intended, my understanding of each case, and the design characteristics across cases, improved as the within-case analysis progressed. As a result, the initial Framework was refined several times to incorporate additional categories and adjust existing ones. The resulting final Framework is included in the Appendix, with a description of the cross-cutting dimensions and categories in Table 47 and accompanying questions that supported the analysis in Table 48.

Given the concerns raised in the literature, and related calls for taxonomy harmonization, variation in approaches taken across taxonomies was expected. Therefore, it was crucial to ensure that the categories within the Framework were broadly applicable across cases to reveal varying approaches among shared characteristics of design. The degree to which the taxonomy-related literature informed the categories of the Framework was limited due to the lack of prior research into the design of sustainable finance taxonomies. For this reason, the literature on classification systems more broadly and the debates within the development literature pertaining to the SDGs proved useful to inform the approach and the identification of the Framework's categories identified within the 'Classification Structure' and 'Defining Sustainability' dimensions.

**Classification Structure.** The literature on classification systems informed the inclusion of this dimension and related design characteristics in the Framework. Within the sustainable finance literature, taxonomies are recognized as important tools to establish detailed sustainability definitions. However, why taxonomies are so useful for this purpose is not discussed in detail. Migliorelli (2021) comes the closest to elaborating on this when describing taxonomies as the sustainable finance market's essential operational standard, as they "systematize knowledge on what should be considered eligible for 'sustainable' financing" (p. 10). This alludes to the utility of taxonomies more generally, as explained in the classification systems' literature.

Kwasnik (1999) explains that classification systems are knowledge representations. The usefulness of classification systems for representing what is known within a domain is due to their structural characteristics (Kwasnik, 1999). A classification makes it possible to bring together large amounts of disparate information and organize it within a structured system that reflects information in a meaningful and useful way (Bailey, 1994; Kwasnik, 1992). Like other classification systems, a sustainable finance taxonomy can be understood as a structured system to arrange information, which, as described by Migliorelli (2021), acts as a tool to systematize knowledge within sustainable finance.

There are various ways to structure classification systems, and therefore their structural properties are not uniform (Kwasnik, 1999). Fernandez and Eastman (1990) identify hierarchical structure as the feature that distinguishes taxonomies from other classification systems; however, following a hierarchical structure does not mean that taxonomies within the same knowledge domain will arrange and present information in a uniform way. For instance, hierarchical structures incorporate more than one level of classification (Kwasnik, 1999), but there is no limit to the number of levels that can be incorporated into the structure. Similarly, a hierarchical structure is expected to feature a comprehensive set of categories at its broadest (or highest) level (Kwasnik,

1999), but these categories are determined by the developer of a classification and would not be uniform across different classifications simply because they are within a shared domain. Based on this, it was expected that the selected cases would, as taxonomies with hierarchical structure, share certain structural characteristics. However, varying design choices to implement these shared structural characteristics would be expected to drive differences in how information is arranged and presented. To examine this, structural characteristics are elaborated in the Framework.

**Defining Sustainability.** The sustainable finance literature raises concerns that sustainability definitions may differ across countries as a result of different approaches to taxonomy design. Given the knowledge gap that this research has aimed to address, the existing taxonomy-related literature offered limited insight to inform expected design characteristics that relate to, and may drive differences in, taxonomies' sustainability definitions. That said, the themes revealed in the literature review related to the SDG Agenda proved useful to inform the approach taken in the Framework for examining taxonomies' sustainability definitions. Namely, this included considerations relating to the role of the SDGs as a global framework that articulates the sustainable development concept, the implementation of the SDGs at the national and sub-national level, and the technical operationalization of the Goals through target-setting and indicator selection.

Much like the SDG Agenda's role in operationalizing the sustainable development concept, a taxonomy seeks to define sustainability in a way that operationalizes the concept at a level that is useful for investment purposes. Notably, given that five of the six taxonomies selected are regional or national taxonomies, the considerations raised regarding national and sub-national implementation of the SDG Agenda suggested that localization may in fact be an important driver of difference among the design characteristics that constitute taxonomies' sustainability definitions. For this reason, it was important to incorporate the design characteristics of taxonomies' sustainability definitions within the framework to examine how the sustainability concept is operationalized in each.

### *Interviews*

Semi-structured interviews were conducted with six individuals that possess knowledge of sustainable finance. The interviewees included three individuals from academia, two individuals from research centers, and a senior executive from a Canadian financial institution. Findings from the interviews are not directly quoted in the analysis to follow, as this was not a study of expert opinion. Rather, the purpose of these interviews was to inform further refinements of the Case

Framework discussed above, as well as key points of discussion surrounding the findings following the case study results. To identify potential interviewees, I developed inclusion criteria relating to acceptable types of organizations from which participants could be sourced and the areas of expertise participants should ideally possess. In consultation with my thesis supervisor and a member of the thesis committee, potential participants were identified, contacted via email, and provided with a briefing note describing the research and the purpose of the interview. While I did not receive a response from all the individuals contacted, the response rate was high, so participant recruitment was largely successful. This recruitment material has been included in the Appendix below.

Prior to contacting potential participants, I obtained ethics approval from the University of Ottawa's Social Sciences and Humanities Research Ethics Board. Interviewees were asked to participate in an approximately 60-minute virtual interview using Zoom videoconferencing software. As a result of the COVID-19 pandemic, a virtual interview format was deemed appropriate. Recent research on the use of Zoom for collecting qualitative interview data found that study participants have an overall positive view of the software for this purpose because of its relative ease of use and security options, among other reasons (Archibald et al., 2019). The use of Zoom was beneficial, as it enabled interviewing participants located anywhere in the world. In accordance with the commitments made in my research ethics proposal, documented consent from each participant was obtained in advance of each interview. An interview protocol was developed to guide the interviews and was intentionally open-ended and flexible.

# Chapter 4: Within-Case Analyses

This chapter presents the detailed results of the individual within-case analyses of the taxonomies developed by the European Union, the Climate Bonds Initiative, China, Mongolia, and Bangladesh. As explained in the previous chapter, this analysis aims to build an in-depth understanding of each taxonomy's design characteristics, according to the Case Framework's cross-cutting dimensions and the design characteristics associated with each: (a) purpose & application, (b) classification structure, and (c) defining sustainability. In doing so, this analysis has generated case descriptions that enable the comparative assessment, the results of which are presented in Chapter 5.

## The European Union Taxonomy for Sustainable Activities

This section provides an overview of the European Union Taxonomy for Sustainable Activities (the 'Taxonomy'). Unless otherwise cited, this section is informed by *Regulation 2020/852* to establish a framework for facilitating sustainable investment (Regulation (EU) 2020/852, 2020), commonly known as the 'Taxonomy Regulation' (TR), and *Commission Delegated Regulation 2021/2139* for establishing the technical standards for economic activities that may substantially contribute to climate change mitigation and climate change adaptation (Delegated Regulation (EU) 2021/2139, 2021), known as the 'Climate Delegated Act' (CDA).

### *Purpose and Application*

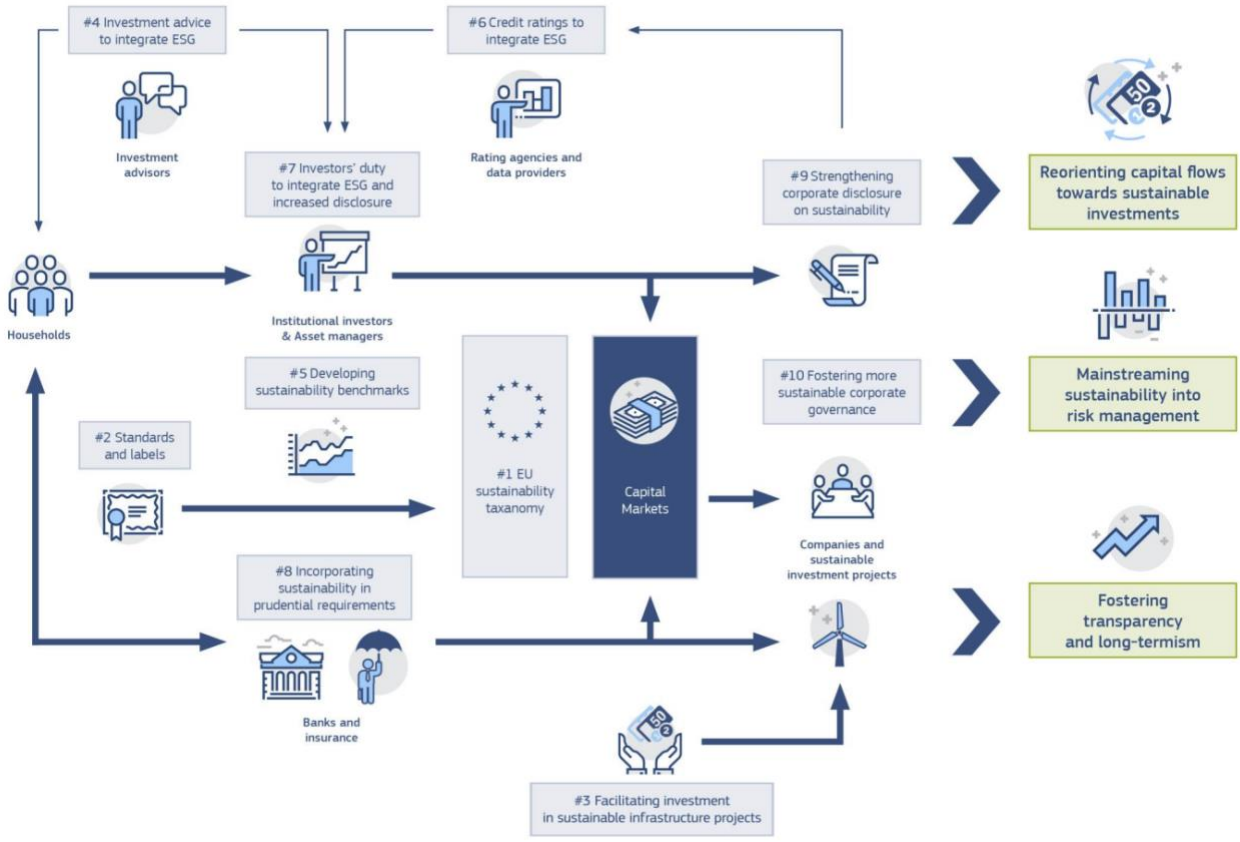
The EU Taxonomy is being developed with the intention of fostering a uniform understanding of sustainability for the purposes of investment at EU level by introducing harmonized definitions of economic activities that can be considered environmentally sustainable. In the Taxonomy Regulation, the Commission has reasoned that EU Member States would increasingly seek to introduce classification systems and labelling schemes for sustainable finance within their respective jurisdictions given the general understanding that these tools can reduce greenwashing concerns in the sustainable finance market. However, a market environment in which multiple classification systems for sustainable finance exist in Europe would "increase costs and significantly disincentivize economic operators from accessing cross-border capital markets for the purposes of sustainable investment" (Regulation (EU) 2020/852, 2020, p. 15).

The EU Taxonomy is identified as "the most important and urgent action" (European Commission, 2018, p.4) of a broader sustainable finance policy framework that is intended to support a reorientation of capital flows towards sustainable investment (European Commission, Directorate-General for Financial Stability, Financial Services and Capital Markets Union, 2018).

The Taxonomy's definitions, harmonized across Member States, will provide a foundational basis for additional tools, including "standards, labels, green-supporting factor for prudential requirements, [and] sustainability benchmarks" (European Commission, 2018, p.4).

**Figure 2**

*Action Items of the EU Action Plan on Financing Sustainable Growth*




From *Action Plan: Financing Sustainable Growth* (p. 19) by European Commission, Directorate-General for Financial Stability, Financial Services and Capital Markets Union, 2018 (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52018DC0097). CC BY 4.0.

The Taxonomy mandatorily applies to the EU and Member States, and both financial and non-financial companies. First, the EU and Member States must apply the Taxonomy when determining which economic activities qualify as sustainable under any introduced standards and requirements for sustainability labelled financial products. A notable example now includes the EU's voluntary European Green Bond Standard (GBS). Bond issuers wishing to issue bonds against the GBS are required to allocate the proceeds to projects that align with their criteria in the Taxonomy, or to finance a time-bound investment plan that will bring a project in line with its Taxonomy criteria (Regulation (EU) 2023/2631, 2023).

Second, financial and non-financial companies have taxonomy-related disclosure obligations under the Corporate Sustainability Reporting Directive (CSRD). Originally, these obligations applied to companies subject to the Non-Financial Reporting Directive (NFRD); however, the NFRD has been replaced by the CSRD. The CSRD expanded the number of companies subject to taxonomy-related disclosure obligations to approximately 50,000, up from a previous 12,000 (European Parliament, 2022). At product level, companies offering financial products in the EU must disclose information relating to (a) the environmental objectives the investments contribute towards, and (b) the percentage of underlying investments that are environmentally sustainable (i.e., Taxonomy aligned). For products that do not claim to pursue environmental sustainability, Taxonomy disclosures can either be completed or include a disclaimer stating that the Taxonomy criteria for environmental sustainability were not accounted for. At entity level, non-financial companies subject to the CSRD are required to report annually on the proportion of their revenue, and capital and operating expenditures that are aligned with the Taxonomy (Delegated Regulation (EU) 2021/2178, 2021). Reporting metrics differ for financial companies, which are required to report annually on the proportion of their taxonomy-aligned investments (Delegated Regulation (EU) 2021/2178, 2021).

### *Classification Structure*

The Taxonomy includes the CDA and, more recently, the Environmental Delegated Act. The CDA's activity listings and criteria are divided into two annexes, one for each of the climate-related objectives. The Taxonomy assumes a hierarchical structure with two levels of classification. The headline categories (at the highest, least detailed level) are essentially economic sectors, while the classification unit (items at the lowest, most granular level) are economic activities. At its most granular, the Taxonomy identifies 88 economic activities in the annex covering climate change mitigation and 94 economic activities in the annex covering climate change adaptation. An overview of the classificatory structure is shown in Table 1.

**Table 1**
*Classificatory Structure of the EU Taxonomy*

| Feature | Mitigation Annex | Adaptation Annex |
|---|---|---|
| **Classification Unit** | Activities | |
| **Level 1** | 9 | 13 |
| **Level 2** | 88 | 95 |

| | |
|---|---|
| **Headline Categories** | Forestry |
| | Environmental Protection and Restoration Activities |
| | Manufacturing |
| | Energy |
| | Water Supply, Sewerage, Waste Management and Remediation |
| | Transport |
| | Construction and Real Estate Activities |
| | Information and Communication |
| | Professional, Scientific and Technical Activities |
| | Financial and Insurance Activities* |
| | Education* |
| | Human Health and Social Work Activities* |
| | Arts, Entertainment and Recreation* |

*Note.* * = Headline categories appearing in the Adaptation Annex only.

The basis of the Taxonomy's structure is the Statistical Classification of Economic Activities in the European Community or 'NACE' (EUROSTAT, 2008). NACE is the EU's comprehensive economic activity classification the ensures the comparability of statistical information across all EU Member States (EUROSTAT, 2008). NACE is derived from the United Nations' International Standard Industrial Classification of All Economic Activities (ISIC) (EUROSTAT, 2008), and is divided into four classification levels – sections, divisions, groups, and classes (EUROSTAT, 2008). Apart from 'Environmental Protection and Restoration Activities', the Taxonomy's headline categories are categories of NACE, from either the section (e.g., manufacturing) or division (e.g., forestry) levels.

The EU Technical Expert Group on Sustainable Finance's (TEG) limited time to develop recommendations, as well as the technical complexity of the Taxonomy, necessitated the prioritization of sectors and economic activities to limit the initial scope of the Taxonomy to a realistic level (EU Technical Expert Group on Sustainable Finance, 2019). NACE served as a framework for identifying priority economic activities for inclusion, and the naming of included activities is either the same as, or adapted from, NACE groups and classes. The Taxonomy has its own numeric coding system and assigns a code to each category and activity. Additionally, NACE codes are referenced in the descriptions of Taxonomy activities. Some taxonomy activities may only have a relationship to one NACE group or class, while other activities map to several NACE

groups or classes; therefore, more than one NACE code may be referenced in an activity description.

### *Defining Sustainability*

**Coverage, Objectives, and Key References.** Broadly, the scope of the Taxonomy's sustainability coverage is environmental. The TR identifies six environmental objectives, which were identified based on their alignment with the EU's public policy goals (European Commission, 2018):

- "Climate change mitigation
- Climate change adaptation
- The sustainable use and protection of water and marine resources
- The transition to a circular economy
- Pollution prevention and control
- The protection and restoration of biodiversity and ecosystems" (Regulation (EU) 2020/852, 2020, p. 17).

Activities included in the Taxonomy are mapped directly to an included sustainability objective, which establishes activities' expected contributions to sustainability.

For each sustainability objective, the TR identifies international agreements, Commission strategies and communications, and/or EU laws that should be used to interpret their meanings. These references mainly serve to inform the work of the bodies established by the Commission to develop the Taxonomy's criteria, which is discussed more below. Table 2 includes a summary of the types of key references cited for each objective.

**Table 2**
*Summary of Key References Linked to EU Taxonomy Sustainability Objectives*

| Objective | Key References |
|---|---|
| **Climate change mitigation** | - Paris Agreement temperature goals.<br>- Various EU legislation. |
| **Climate change adaptation** | - Sendai Framework for Disaster Risk Reduction.<br>- Relevant EU legislation (none specifically mentioned) |
| **Water resources**[1] | - Commission communications addressing: water scarcity and drought, safeguarding water resources in Europe, and pharmaceuticals in the environment.<br>- Various EU legislation. |

| | |
|---|---|
| **Pollution prevention**[2] | - Various EU legislation. |
| **Circular economy**[3] | - Commission communications on creating an EU circular economy action plan, and a European plastics strategy.<br>- Various EU legislation. |
| **Ecosystem protection**[4] | - Commission communications on biodiversity, enhancing natural capital, preventing wildlife trafficking, and forest protection / restoration.<br>- Various EU legislation. |

*Note.* 1 = sustainable use and protection of water and marine resources. 2 = transition to a circular economy. 3 = Pollution prevention and control. 4 = protection and restoration of biodiversity and ecosystems.

**Approach to Eligibility.** The Taxonomy intends to identify environmentally sustainable economic activities. According to the TR, an environmentally sustainable economic activity:

- Substantially contributes to at least one of the Taxonomy's objectives.
- Does no significant harm to the remaining objectives.
- Complies with minimum social safeguards.

By definition, any economic activity that does not comply with all three of these overarching conditions cannot be considered environmentally sustainable. Importantly, the inclusion of an activity in the Taxonomy does not imply that all real-world instances of that activity automatically comply with these three conditions. Rather, activities in the Taxonomy are accompanied by technical screening criteria (TSC) that define an environmentally sustainable version of the activity. Real-world instances of included activities must demonstrate compliance with TSC to themselves be considered sustainable (i.e., aligned). The remainder of this section explains the Taxonomy's technical criteria-based approach in more detail, outlining how the three overarching conditions are operationalized.

**Substantial Contribution.** The TR broadly defines substantial contribution (SC) for each objective. However, to operationalize the concept, the EU TEG further elaborated upon the TR's definitions to support the identification of economic activities and to define technical screening criteria (TSC) that reflect activity environmental performance of a level that constitutes substantial contribution. First, building upon the TR definitions, the EU TEG identified key references relevant to the EU and that defined end-state targets for an objective (Platform on Sustainable Finance, 2022a). This enabled the TEG to set an appropriate and uniform ambition level of expected environmental performance when defining activity-level TSC for the SC concept (Platform on Sustainable Finance, 2022a). After establishing this, different contribution types for objectives

were outlined to support identification of activities for inclusion (Platform on Sustainable Finance, 2022a).

The ambition level informed by key references and linked to each objective is termed the "headline ambition level" (Platform on Sustainable Finance, 2022a, p. 23) and policy targets were selected as key references if they were "science-based, based on international agreements that [the] EU supports, [and] reflect [the] EU's response to international agreements or [the] EU's leadership on an objective" (Platform on Sustainable Finance, 2022a, p. 26). The elaboration of more specific key references and the identification of different contribution types to support activity selection is illustrated in Table 3, in the context of the Taxonomy's climate change mitigation objective, where the ambition level for contribution is aligned with EU-specific climate commitments.

**Table 3**
*Operationalizing Substantial Contribution to Climate Change Mitigation*

| **SC Component** | |
|---|---|
| **TR Definition** | "…contribute substantially to the stabilisation of greenhouse gas emissions by avoiding or reducing them or by enhancing greenhouse gas removals"[1] |
| **Key References** | **TR:** Paris Agreement temperature goals & various EU legislation.<br>**TEG elaboration:** EU targets of 55% GHG emissions reduction compared to 1990 by 2030; net-zero GHG emissions by 2050.[2] |
| **Contribution Types (**An activity contributes to mitigation by…) | **Reducing** GHG emissions, either as:<br>- A high impact (GHG emissions) activity that greatly reduces its own emissions.[3]<br>- A low impact (GHG emissions) activity that replaces a high impact activity.[3] |
| | **Removing** GHGs (net-negative emissions, i.e., net-positive impact).[3] |
| | Directly **enabling** the above activity types.[3] |

*Note.* [1]European Parliament and Council of the European Union (Regulation (EU) 2020/852, 2020, p. 17). [2]Platform on Sustainable Finance (2022a, pp. 25–26). [3]Platform on Sustainable Finance (2022a, pp. 122–123).

**Do No Significant Harm.** The principle of Do No Significant Harm (DNSH) is the approach incorporated by the Taxonomy for environmental risk management. DNSH is intended to ensure that an activity's substantial contribution to one objective is not outweighed by negative impacts to the other five environmental objectives. For each objective, the TR broadly defines what constitutes significant harm. The TR definitions are summarized in Table 4. DNSH criteria are defined objective-by-objective, meaning that to demonstrate its sustainability, an activity may

potentially need to comply with one set of SC criteria and up to five sets of DNSH criteria. If an activity poses no risk of harm to an objective, DNSH criteria are not defined for that objective (EU Technical Expert Group on Sustainable Finance, 2020). EU environmental legislation was treated as the baseline for DNSH. Therefore, if EU legislation was considered appropriate to prevent significant harm, DNSH criteria will generally not reflect requirements additional to this legislation (EU Technical Expert Group on Sustainable Finance, 2020).

**Table 4**
*Significant Harm to Environmental Objectives as Defined in the EU Taxonomy Regulation*

| Objective | Significant Harm |
|---|---|
| **Climate Change Mitigation** | The activity leads to significant greenhouse gas emissions. |
| **Climate Change Adaptation** | The activity leads to an increased adverse impact of the current climate and the expected future climate, on the activity itself or on people, nature or assets. |
| **Sustainable Use of Water and Marine Resources** | The activity is detrimental to (1) the good status or the good ecological potential of bodies of water, including surface water and groundwater; or (2) the good environmental status of marine waters. |
| **Transition to a Circular Economy** | The activity: (1) leads to significant inefficiencies in the use of materials or in the direct or indirect use of natural resources such as non-renewable energy sources, raw materials, water and land at one or more stages of the life cycle of products, including in terms of durability, reparability, upgradability, reusability or recyclability of products. (2) Leads to a significant increase in the generation, incineration or disposal of waste, with the exception of the incineration of non-recyclable hazardous waste; or (3) the long-term disposal of waste may cause significant and long-term harm to the environment. |
| **Pollution Prevention and Control** | The activity leads to a significant increase in the emissions of pollutants into air, water or land, as compared with the situation before the activity started. |
| **The Protection and Restoration of Biodiversity and Ecosystems** | The activity is: (1) significantly detrimental to the good condition and resilience of ecosystems; or (2) detrimental to the conservation status of habitats and species, including those of Union interest. |

**Minimum Social Safeguards.** The minimum social safeguards (MSS) requirement is the Taxonomy's approach to social risk management and is the counterpart to DNSH requirements. Unlike the SC and DNSH concepts, technical screening criteria are not defined at the activity level to demonstrate compliance with MSS. Rather, an activity complies with MSS if the responsible entity demonstrates that it has implemented the procedures set by the OECD *Guidelines for*

*Multinational Enterprises* (2011) and the United Nations' *Guiding Principles on Business and Human Rights* (2011). In particular, adherence to the UN Guiding Principles includes the International Labour Organisation's *Declaration on Fundamental Principles and Rights at Work* and the United Nations High Commissioner for Human Rights' *International Bill of Human Rights*.

**SC and DNSH Technical Screening Criteria.** Most activities are not automatically considered sustainable (taxonomy aligned) and have TSC they must comply with. The TR sets general requirements for the development of SC and DNSH criteria, including that they:

- Be quantitative and thresholds-based when possible, and otherwise qualitative.
- Account for EU legislation, and build upon EU labels, certification schemes, relevant methodologies, and statistical classifications.
- Be science-based.
- Account for the full life cycle of activities.
- Account for activities' nature and scale.
- Avoid distorting market competition by covering all relevant activities within a sector and giving equal treatment to activities with equal contributions.
- Be usable and set in a way that facilitates verification.

Geothermal power generation illustrates the Taxonomy's eligibility approach as it relates to the operationalization of the SC and DNSH concepts. Specifically, geothermal power generation in the Taxonomy refers to the "construction or operation of electricity generation facilities that produce electricity from geothermal energy" (Delegated Regulation (EU) 2021/2139, 2021, p. 68). To constitute a substantial contribution to climate change mitigation, the SC criteria – depicted in Figure 3 – stipulate that geothermal facilities must have life cycle GHG emissions lower than 100g$CO_2$e/kWh. In line with the TR's requirements to ensure equal treatment of activities within sectors, this threshold is applicable to all power and heating / cooling generation activities in the Taxonomy that contribute to climate change mitigation. This threshold was set in accordance with an ambition level that aligns with the EU's net-zero emissions by 2050 target (EU Technical Expert Group on Sustainable Finance, 2020).

**Figure 3**
*Substantial Contribution to Mitigation Criteria for Geothermal Power Generation*

*Technical screening criteria*

| Substantial contribution to climate change mitigation |
| --- |
| Life-cycle GHG emissions from the generation of electricity from geothermal energy are lower than 100 g $CO_2$e/kWh. Life-cycle GHG emission savings are calculated using Commission Recommendation 2013/179/EU or, alternatively, using ISO 14067:2018 or ISO 14064-1:2018. Quantified life-cycle GHG emissions are verified by an independent third party. |

From *Delegated Regulation (EU) 2021/2139* (p. 80) by European Commission, Directorate-General of Financial Stability, Financial Services and Capital Markets Union, 2021 (http://data.europa.eu/eli/reg_del/2021/2139/oj). CC BY 4.0.

In addition, geothermal power generation must comply with DNSH criteria for all other objectives except the transition to a circular economy. As Figure 4 illustrates, DNSH criteria can be generic or activity specific. In the case of climate change adaptation, DNSH criteria are the same for all activities. The specific DNSH requirements for pollution prevention and control require geothermal facilities to comply with air quality limits set by EU legislation.

**Figure 4**
*DNSH Criteria for Geothermal Power Generation*

| Do no significant harm ('DNSH') | |
| --- | --- |
| (2) Climate change adaptation | The activity complies with the criteria set out in Appendix A to this Annex. |
| (3) Sustainable use and protection of water and marine resources | The activity complies with the criteria set out in Appendix B to this Annex. |
| (4) Transition to a circular economy | N/A |
| (5) Pollution prevention and control | For the operation of high-enthalpy geothermal energy systems, adequate abatement systems are in place to reduce emission levels in order not to hamper the achievement of air quality limit values set out in Directive 2004/107/EC of the European Parliament and of the Council ([166]) and Directive 2008/50/EC of the European Parliament and of the Council ([167]). |
| (6) Protection and restoration of biodiversity and ecosystems | The activity complies with the criteria set out in Appendix D to this Annex. |

From *Delegated Regulation (EU) 2021/2139* (p. 80) by European Commission, Directorate-General of Financial Stability, Financial Services and Capital Markets Union, 2021 (http://data.europa.eu/eli/reg_del/2021/2139/oj). CC BY 4.0.

SC and DNSH criteria can vary in their complexity for activities within the same sector. For instance, power generation activities involving solar, wind, and ocean energy technologies have no SC criteria, despite being in the same sector as geothermal power generation. This does not give the appearance of equal treatment within sectors; however, solar, wind, and ocean energy technologies are exempt from life cycle emissions assessments on the basis that current scientific literature suggests that virtually all power and heat / cool generation activities involving these technologies will have life cycle emissions below the Taxonomy's 100g$CO_2$e/kWh threshold (EU Technical Expert Group on Sustainable Finance, 2020).

On the other hand, hydropower generation sits at the other end of the complexity spectrum. While hydropower is similarly subject to the 100g$CO_2$e/kWh threshold, the SC criteria also specify a minimum power density requirement of 5W/$m^2$ and limits eligibility to run-of-river plants only. Hydropower's potentially significant environmental impacts are also reflected in the complexity of its accompanying DNSH criteria, which are three pages in length for the 'sustainable use and protection of water and marine resources' objective. The DNSH criteria refer to compliance with specific EU legislation and involve taking steps to mitigate impacts on fish migrations and sediment flows, protecting or enhancing habitats, and assessing all possible impacts on habitats and species, among other requirements (see: 'Electricity generation from hydropower' in: Delegated Regulation (EU) 2021/2139, 2021, p. 65-68).

## The Climate Bonds Taxonomy

This section provides an overview of the Climate Bonds Taxonomy (the 'Taxonomy'). Unless otherwise cited, information in this chapter is directly sourced from the January 2021 version (Climate Bonds Initiative, 2021c).

### *Purpose and Application*

The overarching objective of CBI's Standard and Certification Scheme is to:

> Provide the green bond market with the trust and assurance that it needs to achieve scale. Activating the mainstream debt capital markets to finance and refinance climate-aligned projects and assets is critical to achieving international climate goals and robust labelling of green bonds and green loans is a key requirement for that mainstream participation (Climate Bonds Initiative, 2019b, p. 3).

The Taxonomy contributes to this objective by providing issuers with a classification of assets eligible to be financed by the proceeds raised from the issuance of a certified climate bond or loan. Therefore, the Taxonomy underpins the process for establishing project eligibility and facilitates the Standards' required reporting and assurance processes.

The Taxonomy, and the Standard more generally, are internationally oriented (Climate Bonds Initiative, 2019b). As such, the Taxonomy has not been developed with any single jurisdiction in mind. As a key component of the Standard, the Taxonomy's primary users are entities that seek to obtain CBI's certification for intended bond or loan issuances. To obtain the Climate Bonds Certification Mark under the Standard, there are several mandatory requirements to fulfill during both the pre- and post-issuance phases.

In the pre-issuance phase, issuers are required to provide a list of nominated projects and assets (Climate Bonds Initiative, 2019b). The Taxonomy functions as an initial screening tool for this process, as nominated projects and assets are required to fall within a listed sector (Climate Bonds Initiative, 2019b). Once a list has been established, CBI's sector-specific criteria – which are subsets of the Taxonomy – facilitate the verification process for the individual projects and assets, which must be undertaken by a CBI-approved verifier (Climate Bonds Initiative, 2019b). The verification report must include, among other things, the verifier's findings regarding the bond or loan's conformance to the relevant sector criteria (Climate Bonds Initiative, 2019b). Once a debt instrument has been awarded Pre-Issuance Certification, the issuer has 24 months to obtain Post-Issuance Certification (Climate Bonds Initiative, 2019b). To do this, an issuer must demonstrate the bond or loan's ongoing compliance with the requirements of the Standard, including

adherence to the sector criteria (Climate Bonds Initiative, 2019b). Similar to the pre-issuance phase, this requires engagement with an approved verifier to provide an assurance report (Climate Bonds Initiative, 2019b).

### *Classification Structure*

The Taxonomy assumes a hierarchical structure consisting of five classification levels. The headline categories are a mix of broad sectors and environmentally themed asset categories. The classification unit is assets, with 188 assets organized under eight headline categories. The classificatory structure is further summarized in Table 5 and Table 6. No coding system is used to assign codes to categories and assets, and the Taxonomy does not reference, or incorporate any features of, existing statistical classifications.

**Table 5**
*Classificatory Structure of the Climate Bonds Taxonomy*

| Classification Unit | Assets |
|---|---|
| **Level 1** | 8 |
| **Level 2** | 10 |
| **Level 3** | 46 |
| **Level 4** | 104 |
| **Level 5** | 188 |
| **Headline Categories** | Energy |
| | Transport |
| | Water |
| | Buildings |
| | Land Use & Marine Resources |
| | Industry |
| | Waste & Pollution Control |

**Table 6**
*Illustrative Example of the CBI Taxonomy's Classificatory Structure*

| | | |
|---|---|---|
| **Energy** | | |
| **Electricity & Heat Production** | | |
| **Solar** | **Generation facilities (power and heat)** | PV generation facilities (onshore) |
| | | Concentrated solar power facilities (onshore) |
| | **Supply chain facilities** | Manufacturing facilities wholly dedicated to onshore solar energy development such as PV cells & components, CSP dishes, troughs & components etc. |
| | | Dedicated storage, distribution, installation, wholesale and retail |

### *Defining Sustainability*

**Coverage, Objectives, and Key References.** The Taxonomy's scope is environmental; however, it is more narrowly limited to climate-related considerations, as the covered sustainability objectives include climate change mitigation and adaptation. In recent years, CBI has gradually incorporated greater consideration for climate adaptation and resilience, marked by the development of their Climate Resilience Principles (Climate Bonds Initiative, 2019a), but consideration for the adaptation objective is limited and climate change mitigation remains as the primary focus. The Paris Agreement temperature goal of limiting global warming to less than 2°C, and ideally 1.5°C, serves as an international key reference and is linked to the mitigation objective.

**Approach to Eligibility.** An asset's eligibility relies on its potential to support a low-carbon economy. Alignment is demonstrated through compatibility with a GHG emissions trajectory in line with the 2°C Paris Agreement goal. The Taxonomy itself provides an initial indication of asset eligibility using a traffic light concept:

- Green signals that an asset is automatically compatible with a 2°C trajectory.
- Orange signals an asset's potential compatibility with a 2°C trajectory. In this case, whether an asset is aligned, and therefore capable of being financed under CBI's Standard, is contingent upon compliance with technical criteria.

- Red signals an asset's incompatibility with a 2°C trajectory. These assets are not eligible for financing under the Standard. Essentially, the red signal screens out assets that are not capable of achieving a performance level in line with a 2°C temperature goal.

The Taxonomy is accompanied by sector-specific documents that include full criteria for eligible assets. Technical Working Groups (TWGs) are responsible for drafting sector-specific eligibility criteria and making a final recommendation to the Board (Climate Bonds Initiative, 2015b). TWGs are comprised of a broad range of experts from NGOs, think tanks, academia, and elsewhere (Climate Bonds Initiative, 2015b). Each sector also has an Industry Working Group (IWG) with members from industry associations and individual companies that provide the TWG with input on the practicality and usability of the proposed criteria (Climate Bonds Initiative, 2015a); however, IWGs do not have any decision-making authority (Climate Bonds Initiative, 2015a).

The development of sector criteria is guided by general principles. Additional sector-specific principles are specified in certain cases. The general principles include:

- Ensure criteria are aligned with a level of ambition corresponding to the Paris Agreement goal to limit warming to 2°C or less.
- Be science-based.
- Use quantitative targets or thresholds wherever possible, and ensure they reflect the uncertainty of estimates.
- Align with existing standards to promote efficiency of verification. Specifically, the estimation of GHG emissions should follow IPCC guidance and methods.
- Support an evaluation leading to a decision of eligible or not eligible.
- Ensure a level playing field in terms of geography and technology.
- Are supported by key stakeholders in industry, finance, and broader civil society (Climate Bonds Initiative, 2021a).

As previously mentioned, the Taxonomy is not specific to any jurisdiction, and the sector criteria reflect this. For example, criterion three in the sector-specific documents for the agricultural sector require an asset's alignment with a 2°C performance pathway, and this can be demonstrated in one of two ways. The first is to provide the expected emissions reduction trajectory of the activity all the way out to 2050. For example, if the baseline year for the project is 2020, then the project must achieve 47% mitigation by 2050, with other targets in 2030 and 2040. The second option is to provide evidence that the project follows (or will follow) low-emission crop

production best practices, such as having a nutrient management plan in place for the use of fertilizer. Interestingly, there are exemptions to complying with criterion three that possibly reflect an acknowledgement of location-specific limitations that could make compliance with technical criteria challenging. An exemption is provided for projects that are (a) located in low-income countries (as defined by the World Bank), (b) associated with agricultural products that are for domestic consumption only, and (c) an appropriate justification is provided for why it would not be possible to demonstrate compliance (due to various challenges). This exemption is provided on the basis that these projects have "low responsibility for mitigation and high vulnerability to climate change" (Climate Bonds Initiative, 2021b, p. 26).

## China's 2015 Green Bond Endorsed Project Catalogue

This section provides an overview of China's 2015 Green Bond Endorsed Project Catalogue. Unless otherwise cited, the information in this chapter has been sourced directly from the *Preparation Instruction on Green Bond Endorsed Project Catalogue (2015 Edition)* (People's Bank of China, 2015a).

### *Purpose and Application*

Broadly, the 2015 Catalogue contributes to the Chinese government's overall vision of implementing a top-down governance framework for establishing a green financial system. The need for sufficient financing is acknowledged, as this financing is understood to be essential for facilitating China's "industrial restructuring" and "transition to a green economy" (p. 1). Specifically, the 2015 Catalogue was intended to support overall aims by providing China's market with clear definitions for green projects, thereby encouraging both domestic and international investors to engage in green investment.

The 2015 Catalogue was released as an annex to Announcement No. 39, a regulatory document issued by the PBC in relation to the issuance of green bonds in China's inter-bank market (People's Bank of China, 2015b). All bond issuance in China is subject to regulatory approval (Asian Development Bank, 2018), and Announcement No. 39 stipulates a series of specific requirements for green bond issuers. In addition to other notable requirements, including quarterly and annual use-of-proceeds disclosure, and instructions on the management of proceeds (Zhang, 2020), Announcement No. 39 states that the green financial bond prospectus "shall include project categories, project selection criteria, decision making procedures, environmental benefits, use and management of green financial proceeds, and etc...." (People's Bank of China, 2015b, p. 2). Preceding this, the document states that "the definition of green projects shall refer to the *Green Bond Endorsed Project Catalogue*" (People's Bank of China, 2015b, p. 1). Therefore, the 2015 Catalogue is mandatory for the purposes of green bond issuance falling under the oversight of the PBC. The mandatory use of the 2015 Catalogue for this purpose is further supported by China's 2018 progress report published by the Sustainable Banking and Finance Network (2018), which states plainly that "in 2015, the PBC required bond issuers to refer to the China Green Bond Endorsed Project Catalogue" (p. 9). The primary users are banks and other financial institutions. Announcement No. 39 states that "financial institutions as mentioned in this Announcement includes development banks, policy banks, commercial banks, finance company of enterprise group, and other financial institutions established in accordance with the law" (People's Bank of China, 2015b, p. 1).

### *Classification Structure*

The 2015 Catalogue follows a hierarchical structure with three levels of classification. The classification unit is assets. The Catalogue's 38 identified assets are organized under six environmentally themed headline categories. The classificatory structure is further summarized in Table 7.

**Table 7**
*Classificatory Structure of the China 2015 Green Bond Catalogue*

| Classification Unit | Assets / Projects |
|---|---|
| **Level 1** | 6 |
| **Level 2** | 31 |
| **Level 3** | 38 |
| **Headline Categories** | Energy Saving |
| | Pollution Prevention and Control |
| | Resource Conservation and Recycling |
| | Clean Transportation |
| | Clean Energy |
| | Ecological Protection and Climate Change |

The Catalogue has a simple coding system that assigns a numeric code to each category across all three classification levels. In addition to a description for each asset, relevant codes are identified from China's Industrial Classification of National Economic Activities (ICNEA). As illustrated in Table 8, the third classification level itself does not necessarily provide granular information about eligible assets. Rather, this detail is provided in the accompanying description in the specification column and can include multiple assets or projects.

**Table 8**
*Illustrative Example of the 2015 Catalogue's Structure*

| Level I | Level II | Level III | Specification | ICNEA Code |
|---|---|---|---|---|
| **Pollution Prevention & Control** | Environmental Restoration Project | Project Implementation | Includes, but not limited to: integrated improvement of the urban polluted water, mine land reclamation and ecological | N77 |

| | |
|---|---|
| | restoration, remediation of soil pollution, etc. |

### *Defining Sustainability*

**Coverage, Objectives, and Key References.** The 2015 Catalogue is environmental in scope. Sustainability objectives included within the Catalogue's scope are not explicitly identified; however, it is stated that identified assets are associated with China's most pressing environmental issues. These include (a) climate change, (b) degradation of the environment, (c) pollution, and (d) resources constraints. There are no key references identified with linkages to the environmental issues.

**Approach to Eligibility.** A set of general design principles guided the identification of assets for inclusion in the Catalogue:

- Consideration of national context, namely the current stage of China's industrial policy. The focus is to be on environmental improvement and reducing resource pressures.
- Included assets/projects exhibit clear environmental benefits.
- Given that capital market participants are not environmental professionals, methods for defining and classifying should be clear and easy to understand and operationalize.
- Leverage existing international standards in the document's design, where appropriate, to promote international comparability and alignment.

The Catalogue does not employ widespread use of technical screening criteria to define asset alignment with sustainability. Generally, an asset's inclusion is an indication of alignment. This approach is reflected in the fact that the Catalogue is not technology neutral and applies for the majority of included assets and projects. In these cases, the specification column typically references specific technologies or processes that set boundaries on eligibility. Table 8 above illustrates this. The specification and defining criteria for environmental restoration projects: project implementation includes specific types of projects that are eligible for financing. However, the list of eligible projects is intentionally open ended with the addition of "includes but not limited to" (People's Bank of China, 2015a, p. 12-13). This is also demonstrated in "1.2.2 Energy Saving Technology Improvement on Existing Buildings" (People's Bank of China, 2015a, p. 10), summarized in Table 9. The specification column includes renovations projects pertaining to specific features of an existing building, rather than defining an outcome, such as a relative energy performance improvement rate, to be achieved through the renovation project.

**Table 9**
*Green Building Requirements in the 2015 Catalogue*

| Level III Asset / Project | Specification |
|---|---|
| **Energy Saving Technology Improvement on Existing Building** | Renovation project could include, but is not limited to, performing energy saving renovations on the building envelope, heat supply systems, heating / cooling system, lighting, and hot water facilities.[1] |

1: People's Bank of China, 2015a, p. 10

For some assets / projects, requirements are specified. This includes complying with existing standards. This includes green building construction projects, which are aligned with the Catalogue if the green building will achieve a rating of two stars or more when assessed against China's green building standards for either industrial buildings or residential and public buildings.

## China's 2021 Green Bond Endorsed Project Catalogue

This section provides an overview of China's 2021 Green Bond Endorsed Project Catalogue (the '2021 Catalogue'). The information in this chapter has been sourced directly from an official English translation of the *Green Bond Endorsed Project Catalogue (2021 Edition)* (People's Bank of China et al., 2021b) unless otherwise cited. While the 2015 Catalogue is reviewed in the previous sub-section, the intention of additionally examining the updated 2021 Catalogue was to enable potential consideration of the ways in which the design characteristics of China's Catalogue evolved between the original and subsequent iterations.

### *Purpose and Application*

The 2021 Catalogue has been developed to define projects that are acceptable to finance with green bond proceeds, with authorities aiming to promote market acceptance of China's domestic green bonds by ensuring that green bonds finance projects with environmental benefits (People's Bank of China, 2021). As the successor to the 2015 Catalogue, it is similarly linked to the same broader policy aims of establishing China's green financial system to facilitate the role of green finance in facilitating sustainable development (People's Bank of China, 2021), which supports the achievement of China's *Integrated Reform Plan for Promoting Ecological Progress*.

The use of the 2021 Catalogue is mandatory for green bond issuers for green project identification purposes. While the 2015 Catalogue was mandatory for green bonds issued in China's interbank bond market, the 2021 Catalogue's application is broader and applies to all domestic green bonds (Climate Bonds Initiative & CIB Research, 2022). An accompanying notice additionally directs "relevant agencies" (People's Bank of China et al., 2021a, p. 2) to use the 2021 Catalogue as a basis when developing support green finance policies and guidance.

### *Classification Structure*

The 2021 Catalogue is hierarchically structured, spanning four classification levels. The general structure, summarized in Table 10, represents a significant expansion to the less granular 2015 Catalogue. The six headline categories are green industry groupings first identified in the *Green Industry Guidance Catalogue (2019 Edition)*. The classification unit is economic activities (e.g., transport of hazardous waste) and is uniform throughout.

**Table 10**
*Classificatory Structure of the 2021 Green Bond Endorsed Project Catalogue*

| | |
|---|---|
| **Classification Unit** | Asset / Projects |

| | |
|---|---|
| **Level 1** | 6 |
| **Level 2** | 25 |
| **Level 3** | 47 |
| **Level 4** | 203 |
| **Headline Categories** | Energy Saving and Environmental Protection Industry |
| | Clean Production Industry |
| | Clean Energy Industry |
| | Ecology and Environment-Related Sector |
| | Sustainable Upgrade of Infrastructure |
| | Green Services |

The Catalogue applies a numeric coding system across all four classification levels (e.g., 1 → 1.1 → 1.1.1 → 1.1.1.9). Notably, the 2015 Catalogue's referencing of codes from China's economic activity classification has not been carried over to the 2021 Catalogue. Table 11 depicts an example of the structure and coding system.

**Table 11**
*Illustrative example of the 2021 Catalogue's Classificatory Structure and Codes*

| Level I | Level II | Level III | Level IV |
|---|---|---|---|
| **(4) Ecology and Environment-Related Sector** | (4.1) Ecological Agriculture | (4.1.3) Supply of Green Agricultural Products | (4.1.3.1) Green Organic Agriculture |
| | | | (4.1.3.2) Green Animal Husbandry |

### *Defining Sustainability*

**Coverage, Objectives, and Key References.** The 2021 Catalogue is environmental in scope and includes three sustainability objectives: (a) environmental improvement, (b) climate change response, and (c) efficient resource use (People's Bank of China et al., 2021a). Activities in the Catalogue are not mapped to the objectives they contribute to. There are no key references identified with direct linkages to the sustainability objectives.

**Defining Sustainability: Approach to Eligibility.** Activities in the 2021 Catalogue are eligible, but not automatically green (aligned). Primarily, the Catalogue defines activity alignment using detailed descriptions. This means that an entity determines the alignment of its activities

with the Catalogue by assessing whether they meet their corresponding descriptions. An example of this approach is shown in Table 12.

**Table 12**
*General Example of the 2021 Catalogue's Eligibility Approach*

| Activity | Description |
|---|---|
| **Drought and Flood Management for Water-Related Ecosystem (4.2.1.11)** | Restoring connectivity of natural water systems; wetland restoration; construction / operation of:<br>- Facilities for water conservation<br>- Information platforms for disaster warnings<br>- Other facilities for disaster prevention and response[1] |

1: (People's Bank of China et al., 2021b, p. 45).

Some activities in the Catalogue are subject to requirements beyond descriptions of their specific characteristics. First, technical criteria are identified directly within activity descriptions for only two activities: solar power generation and energy efficiency equipment. More commonly, descriptions will include references to domestic standards and regulations, but the purpose for referencing domestic standards varies, as illustrated in Table 13.

**Table 13**
*The Referencing of Domestic Standards in the 2021 Catalogue*.

| Activity | Description | Purpose of Reference to Standard |
|---|---|---|
| **Transport of Hazardous Waste** | Applicable to the transport of waste identified in the *National List of Hazardous Wastes*. | The referenced standard includes an eligibility list. In this case, specifying which forms of waste are within the scope of the Catalogue activity. |
| **Green Buildings** | Industrial green buildings are designed / constructed in accordance with the *Green Industrial Building Evaluation Standard*. | The referenced standard defines existing requirements for green building construction. Catalogue requirements are not additional to existing expectations. |
| **Manufacturing of Energy-saving Motors** | The equipment must meet or exceed level one of the relevant national energy efficiency standards. | The referenced standards define existing requirements. A specific performance rating assessed against the standards must be achieved |

| | |
|---|---|
| | to be aligned for the purposes of the Catalogue. |

**Risk Management.** In a press release announcing the 2021 Catalogue's publication, it is stated that the principle of Do No Significant Harm has been adopted (People's Bank of China, 2021). Yet almost all activities in the Catalogue are not subject to environmental and social risk requirements beyond the existing regulations that all activities (green or non-green) must meet. A blanket statement to this effect is included in the Catalogue, stating that activities are to comply "with relevant safety, environmental protection and quality regulations and policies" (p. 64).

However, a limited consideration of the DNSH principle appears in the descriptions of a few activities, which are summarized in Table 14. References to DNSH are not accompanied by criteria; therefore, what exactly would constitute 'significant harm' is unclear. There is no direct relationship between DNSH and the Catalogue's sustainability objectives. For instance, the reference to DNSH for marine energy requires that marine energy facilities not cause damage to marine ecology or biodiversity, which are not specific objectives identified within the Catalogue.

**Table 14**
*References to the DNSH Principle in the 2021 Catalogue*

| Activity | Description – DNSH Reference |
|---|---|
| **Construction / Operation of Large-Scale Hydropower Facilities** | "… without exerting serious impact on the eco-environment" (p. 32). |
| **Construction / Operation of Marine Energy Utilization Facilities** | "… on the premise of not causing serious damage to marine ecology and biodiversity" (p. 32). |
| **Protection of Natural Forest Resources** | Projects on state-owned forest areas (e.g., eco-tourism) "do no harm to surface vegetation and biodiversity protection" (p. 41). |

*Note.* Author's construction, sourced from: People's Bank of China, National Development and Reform Commission, & China Securities Regulatory Commission. (2021, April 21). *Green Bond Endorsed Projects Catalogue (2021 Edition)*. http://www.pbc.gov.cn/goutongjiaoliu/113456/113469/4342400/2021091617180089879.pdf

## The Mongolian Green Taxonomy

This chapter provides an overview of Mongolia's Green Taxonomy. Unless otherwise cited, this chapter is informed by the *Mongolian Green Taxonomy* (Mongolian Sustainable Finance Association et al., 2019) document.

### *Purpose and Application*

The National Sustainable Finance Roadmap released in 2018 communicates Mongolia's ambitions to transform its financial system by embedding sustainability considerations into decision making. Several actions to help achieve this policy goal are identified in the roadmap, but hindering this overarching effort is a lack of a common understanding surrounding green and sustainable finance and the projects and activities that may be considered environmentally sustainable. In the absence of a common definition, several issues are identified:

- The challenges of identifying green or sustainable opportunities increases the costs of project assessment and monitoring, which discourages financial institutions from shifting capital into sustainable projects and activities.
- A lack of clarity for market participants leading to heightened concerns for greenwashing and perceptions of low market integrity.
- The absence of common definitions makes it more difficult for the government to track Mongolia's overall progress in delivering on the country's targets for climate finance.

Given this, the objective of the Taxonomy is "to develop a nationally agreed classification framework of activities that contribute to climate change mitigation, adaptation, pollution prevention, resource conservation, and livelihood improvement in the context of green finance" (Mongolian Sustainable Finance Association et al., 2019, p. 6). With more specific aims to:

- Provide financial market participants and policy makers with a common understanding and approach for green project identification.
- Enhance market integrity by reducing greenwashing concerns.
- Attract greater investment into green projects by foreign investors, the private sector, and international financial institutions.
- Enhance the government's ability to track private investment in green projects, and the ability to measure the impact these investments have on Mongolia's development and climate change targets.
- Inform future national green finance policies and regulations for boosting green market opportunities.

The Taxonomy has not been developed with a primary user group or use case in mind. Rather, it is intended to support a variety of users (e.g., financial and non-financial companies, debt issuers, policymakers) and use cases. After publication, the Taxonomy became mandatory for reporting purposes in October 2019, when the Central Bank of Mongolia issued a directive for banks to report quarterly green loan statistics against the Taxonomy, with reporting beginning in Q1 2020 (Enkhtur & Munkhbat, 2020).

### *Classification Structure*

The Taxonomy is hierarchically structured with three classification levels identifying eight categories, 28 sub-sectors, and 58 'technologies.' These technologies are assumed to be non-exhaustive, as a presentation delivered on the Taxonomy states that they serve as examples to demonstrate what is eligible under each sub-sector (Enkhtur & Munkhbat, 2020). In actuality, the 'technologies' classification level does not have a uniform classification unit and identifies a mix of assets (e.g. composting facilities), products (e.g., energy efficient products), and activities (e.g., manufacturing of green building materials). A simple numeric coding system (e.g., 1 → 1.1 → 1.1.1) is used to assign codes at each classification level. Feature of classificatory structure are summarized in Table 15 and Table 16.

**Table 15**
*Structure of the Mongolian Green Taxonomy*

| **Classification Unit** | Assets / Products & Activities |
|---|---|
| **Level 1** | 8 |
| **Level 2** | 28 |
| **Level 3** | 58 |
| **Headline Categories** | 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 and Ecotourism |
| | Clean Transport |

**Table 16**
*Illustrative Example of the Mongolian Taxonomy's Classificatory Structure and Codes*

| Category | Sub-Sector | Technologies |
|---|---|---|
| (7) Sustainable agriculture, land use, forestry, biodiversity conservation & eco-tourism | (7.1) Sustainable agriculture | (7.1.1) Organic agriculture and animal husbandry products |
| | | (7.1.2) Sustainable textile processing and producing |
| | | (7.1.3) Climate smart agriculture |

### *Defining Sustainability*

**Coverage, Objectives, and Key References.** There are six general design principles. Three provide direction for the Taxonomy's sustainability coverage:

- Contribute to Mongolia's key targets for green development and climate change.
- Address Mongolia's environmental challenges.
- To support a sustainable transition, cover high-emitting and economically significant sectors.

In an initial proposal document, Mongolia's key environmental challenges were identified as (a) air pollution, (b) climate change, and (c) water vulnerability (Mongolian Sustainable Finance Association et al., n.d.). These appear to have later been refined into the sustainability objectives identified for consideration in the Taxonomy:

- climate change mitigation,
- climate change adaptation,
- pollution prevention,
- resource conservation,
- livelihood improvement.

While livelihood improvement may be considered a social objective, its consideration within the Taxonomy is stated to be within the context of green finance. Therefore, the Taxonomy is still environmental in scope; however, the inclusion of a livelihood objective highlights Mongolia's consideration for the interconnected nature of environmental and social sustainability.

Many key references are identified; however, they are mapped to the Taxonomy's headline categories summarized in Table 15, rather than the sustainability objectives. In line with design principle 1 (contribute to national policy targets), the identified key references are targets

set by Mongolia relating to reductions in GHG emissions, pollution, and waste; safeguarding water resources and improving the population's access to safe drinking water; increasing sustainable agricultural and pasture management practices, and others. A full listing of key references is included on pages 9-10 of the Taxonomy (Mongolian Sustainable Finance Association et al., 2019).

**Approach to Eligibility.** An additional two broad design principles relate to the Taxonomy's eligibility approach, including:

- Principle 4: Alignment with international best practices and standards.
- Principle 5: Compliance with environmental, social and governance regulations and standards.

The expectation that included activities and assets contribute to sustainability is clearly identified; however, the contribution of individual items is not further contextualized as items are not mapped to the Taxonomy's sustainability objectives. In the absence of more detailed criteria, the Taxonomy primarily relies on descriptions in an 'examples' column to provide additional detail about listed items or include listings of eligible technologies. However, requirements are identified in some instances. Most commonly, local or international standards are specified. Less commonly, a broad performance criterion is specified and applicable to several items under a category.

First, no performance criteria or standards are specified for items classified under the renewable energy category. Listed 'technologies' (activities / assets) are accompanied by descriptions that include more detail about the item, or specific technologies or characteristics that are considered eligible. Examples are provided in Table 17.

**Table 17**
*Eligibility Approach: Examples from Mongolia's Renewable Energy Category*

| Sub-Category | Technologies (Assets) | Example(s) |
|---|---|---|
| Solar | Power generation facilities | Onshore centralized and distributed solar power (CSP & PV) facilities; distributed solar power stations. |
| | Small-scale distributed solar systems | Small, portable solar home systems; standalone systems powering small communities (e.g., mini grids). |
| Supply Chain | Manufacturing of renewable energy equipment | Products, components, equipment, and machinery for: geothermal, hydro, solar CSP & PV, and wind energy. |

Note. Author's construction, adapted from: Mongolian Sustainable Finance Association, Tsinghua University's Center for Finance and Development, & International Finance Corporation. (2019, p. 11). *Mongolian Green Taxonomy*. https://www.greenfinanceplatform.org/policies-and-regulations/mongolia-green-taxonomy

However, the absence of any requirements at all is the exception, rather than the rule. Items classified under both the low pollution energy and energy efficiency categories have performance criteria. The low pollution energy category has a performance criterion that requires items in the category to demonstrate an 80% or more reduction in fine particulate pollution (PM2.5) compared to an unspecified coal baseline. While items in the energy efficiency category must lead to reduction in GHG emissions of 20% or more.

Commercial, industrial, public, and residential green buildings are not subject to performance criteria. Rather, they must demonstrate compliance with either the Mongolian Energy Passport and relevant local building norms, or with an internationally recognized green building certification, e.g., LEED, EDGE, BREEAM, US Energy Star, or an EU Energy Performance Certificate. However, the approach to green infrastructure, illustrated in Table 18, is similar to that of the renewable energy category, with the addition of a specification of baseline compliance with Mongolia's local building norms.

**Table 18**
*Eligibility Approach: Green Infrastructure in the Mongolian Taxonomy*

| Sub-Category | Technologies (Assets) | Example(s) | Threshold |
|---|---|---|---|
| **Green Infrastructure** | Green infrastructure | Multi-purpose green areas (e.g., water retention, bicycle paths); flood protection (e.g., surge barriers, levees). | Complies with local building norms |
| | Ger area[1] improvements | Khashaa improvements: retrofitting homes, improved sanitation facilities, electricity & heating connections, rainwater harvesting. | Complies with local building norms |

Note. Author's construction, adapted from: Mongolian Sustainable Finance Association, Tsinghua University's Center for Finance and Development, & International Finance Corporation. (2019, p. 17). *Mongolian Green Taxonomy*. https://www.greenfinanceplatform.org/policies-and-regulations/mongolia-green-taxonomy

**Risk Management.** Asset-level criteria to avoid environmental and social harm are not specified; however, existing environmental and social risk management standards must be applied to all items in the Taxonomy – specifically, the *Mongolian Sustainable Finance Principle Guidelines* (the 'Principles') (Mongolian Bankers Association, 2014). The Principles were developed by the Mongolian Bankers Association to provide banks with guidance to implement sustainable finance

related policies, processes, and decision-making procedures (Mongolian Bankers Association, 2014). The Principles cover:

- The natural environment,
- People and communities,
- Cultural heritage,
- Green economy growth,
- Financial inclusion,
- Ethical finance & corporate governance,
- Transparency & accountability,
- 'Practice what we preach' (Mongolian Bankers Association, 2014, p. 3).

For each principle, there is information on what the principle means, relevant international standards, implementation guidance, best practice examples, and how to demonstrate progress towards implementation (Mongolian Bankers Association, 2014). The Principles were developed to support both domestic and international application. The guidance provided is summarized in Table 19.

**Table 19**
*Summary of Guidance in the Mongolian Sustainable Finance Principle Guidelines*.

| Element of Guidance | Summary Observations |
|---|---|
| **Exclusion List** | Prohibited to finance activities from this list, which is similar to the IFC Exclusion List (International Finance Corporation, 2007). In addition to any activities that violate national or international law, includes activities impacting a range of E&S considerations across labor, biodiversity conservation and forestry practices, weapons / harmful substances, etc. |
| **Additional Due Diligence** | Listed activities require additional due diligence, e.g., resettlement of citizens; involves land important to local livelihoods, is close to protected areas, or is otherwise ecologically or economically significant; nuclear energy, hydropower projects, other large projects, etc. |
| **Relevant International Standards** | International standards are identified for each principle. IFC Performance Standards and Equator Principles are identified where applicable, international conventions & agreements (CITES), standards set by the International Organization for Standardization (ISO), etc. |

| | |
|---|---|
| **Implementation** | Identifies specific considerations to account for within sustainable finance policies and procedures to ensure the principle is adequately addressed. |
| **Good Practices** | Identifies existing policies implemented by institutions as points of reference, and relevant guides/handbooks mostly from international organizations (e.g., IFC, World Bank, UNEP-FI). |
| **Demonstrating Progress** | Outlines specific actions for institutions to take that represent progress towards full implementation of the Principles. |

*Note.* Author's construction, sourced from: Mongolian Bankers Association. (2014). Mongolian Sustainable Finance Principles Guidelines. https://data.sbfnetwork.org/sites/default/files/1330_Mongolia_Sustainable_Finance_Principle_Guidelines_2014_MBA.pdf

## Bangladesh's Sustainable Finance Policy for Banks and Financial Institutions

This section presents an overview of Bangladesh Bank's green finance taxonomy. Unless otherwise cited, the information in this chapter has been sourced directly from the *Sustainable Finance Policy for Banks and Financial Institutions* (Sustainable Finance Department, 2020).

### *Purpose and Application*

Broadly, the SFP is a policy tool within the Country's broader sustainable finance framework that aims to mobilize investment towards climate objectives and sustainable development initiatives more generally. Specifically, the rationale for the SFP's implementation is to strengthen the participation, and increase the contribution of, the financial sector, namely – Bangladeshi banks and other financial institutions to the Country's climate and broader sustainable development goals.

The Taxonomy can be understood to be the specific instrument for achieving the stated aims of the SFP. The Sustainable Finance Taxonomy, of which the Green Taxonomy is a sub-set, is identified as a classification tool serving as "a structured mechanism for identifying and recognizing [that] a product/project/initiative belongs to green and other products of agriculture, CMSME, or socially responsible financing linked to sustainability" (p. 5). Additionally, while not explicitly stated, the Taxonomy will provide a foundational reference for further policy development, as Bangladesh Bank states its intention to, as a next step, lead an inter-agency effort to develop national standards and guidelines for green bonds.

The SFP applies to Bangladeshi banks and other financial institutions. The SFP is mandatory for reporting purposes, as banks and other financial institutions are required to report quarterly lending figures for green- and sustainability-aligned financing. It is stated within the guidance that "necessary actions will be taken against banks/FIs for any non-compliance of the said guidelines/credit norms/instructions" (Sustainable Finance Department, 2020, p. 30). Notably, Bangladesh Bank is working to actively incentivize sustainable lending through the implementation of a sustainability rating system. The rating system is intended to provide national recognition for the top performing institutions accounting for four major areas: "(i) sustainable finance, (ii) corporate social responsibility, (iii) green finance, and (iv) core banking sustainability" (Sustainable Finance Department, 2020, p. 30).

### *Classification Structure*

The SFP contains two separate taxonomies. The green finance taxonomy is within the sustainable finance taxonomy and has two levels of classification. There are 11 environmentally

themed headline categories. The classification unit is not uniform. Instead, a mix of assets (e.g., paper recycling plant), products (e.g., solar home system), and activities (e.g., fish cultivation in cages) are identified. The general structure is summarized in Table 20. The Taxonomy uses a simple alphanumeric coding system, illustrated in Table 21, with headline categories assigned a letter, and level two items assigned a number (e.g., H → 51, 52, 53).

**Table 20**
*Classificatory Structure of Bangladesh's Green Taxonomy*

| **Classification Unit** | **Assets / Projects / Products** |
|---|---|
| **Level 1** | 11 |
| **Level 2** | 68 |
| **Headline Categories** | Renewable Energy |
| | Energy and Resource Efficiency |
| | Alternative Energy |
| | Liquid Waste Management |
| | Solid Waste Management |
| | Recycling and Manufacturing Recyclable Goods |
| | Environment Friendly Brick Production |
| | Environment Friendly Establishments |
| | Green Agriculture |
| | Green CMSME |
| | Green Socially Responsible Finance |

**Table 21**
*Illustrative Example of the Bangladesh Green Taxonomy's Classificatory Structure and Codes*

| **Headline Category** | **Asset / Projects / Product** |
|---|---|
| **A. Renewable Energy** | 1. Solar Home System |
| | 2. Solar Pico Grid |
| | 3. Solar Micro Grid |
| | 4. Solar Park |
| | 5. Solar Irrigation Pumping System |

### *Defining Sustainability*

**Coverage, Objectives, and Key References.** The Taxonomy is environmental in scope and has six stated sustainability objectives. The objectives are identical to those covered in the European Union's Taxonomy. Aside from climate change mitigation and adaptation, the objectives are not explicitly linked to key references or otherwise defined.

- Climate change mitigation: the activities and projects in the taxonomy are viewed as items that contribute to Bangladesh's intended nationally determined contribution (INDC) for mitigation. The INDC is an unconditional / conditional target of a 5% / 15% reduction in GHG emissions throughout the power, transport, and industry sectors by 2030.
- Climate change adaptation: the activities and projects in the taxonomy are also viewed to be items which should contribute to Bangladesh's INDC for adaptation, which is, "to protect the population, enhance their adaptive capacity and livelihood options, and to protect the overall development of Bangladesh in its stride for economic progress and wellbeing of the people" (pg. 3).
- Sustainable protection of water and marine resources,
- Transition to a circular economy, waste prevention and recycling,
- Pollution prevention and control,
- Protection and restoration of biodiversity and healthy ecosystems.

**Approach to Eligibility.** The Taxonomy identifies three general "performance thresholds" (p. 11) that are identical to the EU Taxonomy's overarching eligibility concepts:

- Substantial contribution to at least one objective.
- Do no significant harm to the remaining objectives.
- Meet minimum social and governance safeguards.

While the performance thresholds mirror the EU Taxonomy's eligibility concepts, they are operationalized differently here as Bangladesh's Taxonomy lacks technical screening criteria.

***Substantial Contribution.*** Primarily, the Taxonomy's inclusion of an asset / activity signals its contribution to sustainability. This is not further defined with technical screening criteria or contextualized by mapping assets / activities to the covered sustainability objectives. Additionally, most classified items are not accompanied by further descriptions.

In terms of requirements, green buildings and buildings with green characteristics are exceptions. Green buildings in Bangladesh must be certified as such by Bangladesh's Sustainable

and Renewable Energy Development Authority (SREDA). For green buildings outside of Bangladesh, certification can be obtained through several standards: LEED, BREEAM, CASBEE, EDGE, or GRIHA. For buildings with green characteristics, an annex sets out a list of 'green' equipment (e.g., lighting, insulation, water systems) and accompanying performance specifications for each.

***Risk Management.*** Together, the Do No Significant Harm and Minimum Safeguards requirements form Taxonomy's approach to environmental and social risk management. These concepts are operationalized through a negative screening process using two activity exclusion lists, followed by an environmental and social due diligence (ESDD) process unless otherwise exempted.

All potential loans must be screened by banks and financial institutions against two exclusion lists. The first list identifies activities that render projects ineligible for finance more generally and is taken directly from Bangladesh Bank's *Guidelines on Environmental & Social Risk Management (ESRM) for Banks and Financial Institutions in Bangladesh* (Sustainable Finance Department, 2022). The activities on this first list are generally illegal or otherwise unacceptable, such as illegal logging, activities that involve forced labor, or that operate on Indigenous-owned land without prior consent. The second list includes activities that are not necessarily ineligible to be financed more generally but are ineligible for financing categorized as sustainable. This second list includes exclusions on both environmental and social grounds. is a list of activities that are ineligible for finance categorized as sustainable and includes exclusions on both environmental and social grounds. An essentially blanket statement covering the Do No Significant Harm concept is included (Bangladesh Bank, 2020):

> [The activity] does significant harm to natural reserves, scenic spots, drinking water source reserves, basic farmland reserves, forest parks, geo parks, important wetlands, natural forests, important habitats for wildlife, key protected places for growth and reproduction of wild plants, natural spawning grounds, feeding grounds, wintering ground sand migration channels for important aquatic organisms, natural fishing grounds, water and soil (p. 32).

The sustainable finance exclusion list also explicitly excludes certain activities, including any involving the use of thermal coal, the extraction and production of fossil fuels, new fossil fuel electricity production, nuclear power generation, and road construction, maintenance or expansion. Social considerations that render projects ineligible for sustainable financing include not maintaining occupational health & safety requirements; endangering local livelihoods or

decreasing indigenous peoples' quality of life; and not incorporating gender equality, freedom of association, or worker bargaining rights.

The DNSH concept is not directly linked with the Taxonomy's six sustainability objectives. Rather, DNSH and MSS are addressed through existing environmental and social risk management processes that are not specific to sustainability-aligned finance. These processes are outlined in Bangladesh's ESRM for Banks and Financial Institutions, and must be applied to all loan proposals pertaining to:

> agriculture finance; cottage, micro, small, and medium enterprises (CMSME) finance; financing in retail and trading enterprises; consumer financing; financing in all large manufacturing and service enterprises (other than CMSME, retail and trading enterprises) and infrastructure finance (Sustainable Finance Department, 2022).

The current and previous iteration of the ESRM were developed with technical support from the IFC (Sustainable Finance Department, 2022). The ESRM takes compliance with applicable national legislation as its baseline, and additionally consists of three components to assess environmental and social risks: an exclusion list (the first (general) list for negative screening in the Taxonomy), an environmental and social due diligence (ESDD) generic checklist and ten sector-specific checklists, and an environmental and social impact assessment performed by a third party (Sustainable Finance Department, 2022). The applicability of the three components varies based on loan type, loan size, and / or sector. Table 22 provides examples of this, and assumes that all loans being assessed will be categorized as sustainable finance, which require the additional step of screening against the Taxonomy's exclusion list specific to sustainable finance (Sustainable Finance Department, 2022).

**Table 22**
*Examples of Applicable ESRM Processes if Loan is Categorized as Sustainable*

| Loan Type | Exclusion List (Generic) | Taxonomy Exclusion List (Sustainable) | ESDD[1] Checklist | ESIA[2] |
|---|---|---|---|---|
| **Cottage, micro, consumer finance; retail and trade enterprises** | X | X | | |

| | | | | |
|---|---|---|---|---|
| **Small enterprise, loan < 3 million BDT** | X | X | | |
| **Small/Medium enterprise, loan > 3 million BDT** | X | X | X | |
| **Small/Medium enterprise, any loan amount if for brick kilns** | X | X | X | |
| **Infrastructure Projects** | X | X | X | X |

*Note*. Author's construction, sourced from: Sustainable Finance Department. (2022, p. 9-10). *Guidelines on Environmental & Social Risk Management (ESRM) for Banks and Financial Institutions in Bangladesh* (Version 2022). https://www.bb.org.bd/mediaroom/circulars/gbcrd/jun262022sfd03e.pdf

1: Environmental & Social Due Diligence. 2: Environmental & Social Impact Assessment.

The ESDD checklist involves a review of a project's compliance with relevant national laws, the project entity's environmental and social track record, and the project's compliance with identified environmental and social risks against international standards and best practice (Sustainable Finance Department, 2022). A low-medium-high risk rating is generated from this assessment, with medium and high-risk projects requiring "a time bound action plan and relevant covenants… included in the investment documentation" (Sustainable Finance Department, 2022, p. 17) and ongoing monitoring of actions taken to mitigate environmental and social risks throughout project development (Sustainable Finance Department, 2022).

# Chapter 5: Cross-Case Analysis

Leveraging the data collected to generate individual case descriptions in the prior chapter, this chapter outlines the findings of the cross-case analysis. The chapter is structured in line with the Case Framework, and considers: purpose and application, elements of structure, and elements for – and approach to – defining sustainability.

## Purpose and Application

As expected, the purpose of establishing a taxonomy was, across all cases, to provide shared, detailed definitions of sustainability by identifying activities or assets that are considered sustainable for investment purposes. This is driven by a broader objective to align financial systems with sustainability, which itself is considered a necessary step on a path towards achieving sustainable development. This is shown in Table 23.

While united in purpose, the primary application, summarized in Table 24, differs across cases. This Speaks to the variety of use cases for taxonomies' sustainability definitions, including thematic bond issuance, climate finance tracking, sustainable finance lending by financial institutions, and disclosure and reporting requirements. That said, differences in primary applications do appear to have some influence on certain design choices, which is noted where relevant in the subsequent sub-sections of this chapter.

**Table 23**
*Comparative Overview of the Purpose of the Taxonomies and Related Policy Aims*

| | Policy Aims with Linkage to Taxonomy | | Taxonomy Purpose |
|---|---|---|---|
| | **Sustainable Development** | **Financial System** | |
| **EU** | **International**:<br>Agenda 2030 (SDGs)<br>Paris Agreement<br>**Union:**<br>European Green Deal | Reorient the flow of capital towards sustainability-aligned investment, as part of a "comprehensive shift in the financial system" to achieve sustainable and inclusive growth. | Establish a common classification system for sustainable economic activities. |
| **CBI** | **International**:<br>Paris Agreement | Develop the green / climate bond market to mobilize large scale, climate-aligned investments. | Establish a credible bond labelling scheme, including a taxonomy to identify green assets and projects. |

| | | | |
|---|---|---|---|
| **CHN '15 & '21** | **National**:<br>Integrated Reform Plan for Promoting Ecological Progress | Promote the development of the green bond market, as part of the establishment of a green financial system. | Establish a catalogue of projects for green investment |
| **MNG** | **International**:<br>Agenda 2030 (SDGs)<br>Paris Agreement (INDCs)<br>**National**:<br>National Green Development Policy (2014)<br>Sustainable Development Vision 2030 (2016) | Reform the financial system to embed sustainability / Create an operational sustainable finance system. | Establish a national classification identifying green economic activities. |
| **BGD** | **International**:<br>Agenda 2030 (SDGs)<br>Paris Agreement (INDCs)<br>**National**:<br>Perspective Plans (2010 – 2021)<br>8th Five Year Plan<br>Vision 2041<br>Delta Plan 2100 | Mainstreaming sustainability in the financial sector / Facilitate the financial sector's role in achieving sustainable development. | Establish a mechanism for identifying sustainability-aligned initiatives for sustainable finance. |

**Table 24**
*Comparative Overview of Primary Use Cases*

| | **Primary Application(s)** |
|---|---|
| **EU** | **Policy / Regulatory Action:** Taxonomy to be used as basis for future financial product standards and labelling requirements.<br>**Disclosure**: Non-financial and financial companies to disclose their taxonomy alignment using various indicators depending on type of institution (e.g., non-financial and financial corporates). |
| **CBI** | **Bond Issuance:** bonds issued under the Climate Bond Standard must finance projects that comply with the CBI Taxonomy and sector criteria.<br>**Finance Tracking:** CBI uses the Taxonomy to perform an initial screening of bonds for inclusion / exclusion in their bond database. |
| **CHN '15** | **Bond Issuance:** Catalogue identifies eligible projects for financing by green bonds issued in China's interbank bond market (Climate Bonds Initiative & China Central Depository and Clearing Company, 2017). |
| **CHN '21** | **Bond Issuance:** Catalogue identifies eligible projects for financing by all types of Chinese domestic green bonds (Climate Bonds Initiative & CIB Research, 2022). |

| | |
|---|---|
| **MNG** | **No specific primary application**. Taxonomy is a tool for a range of applications applicable to many users (e.g., financial institutions, bond issuers, industry, verification and standard-setting companies, and policymakers). |
| **BGD** | **Sustainable / Green Lending:** banks and financial institutions to use the Taxonomy for identifying eligible sustainable and green projects / products when providing loans.<br>**Reporting:** banks and financial institutions report quarterly green finance figures to Bangladesh Bank (central bank) according to Taxonomy categories. |

### Taxonomy Structure

As expected, the structural characteristics across cases are broadly shared. However, there are substantial differences among the specific approaches to these characteristics. A summary of comparative observations is provided in Table 25.

**Table 25**
*Summary of Comparative Observations Relating to Taxonomy Structure*

| Element | Observations |
|---|---|
| Broad Structure | All six taxonomies are hierarchical (multi-leveled) classifications. The number of levels varies from a minimum of 2 to as many as 5. |
| Headline Categories | Headline categories differ across cases. Mainly either thematic sustainable / green project categories or economic activity / asset groupings. In some cases, categories are inconsistent, with some being thematic and others reflecting an asset-based grouping. |
| Classification Unit | Classification unit differs across cases. Can be activities, assets, or products / technologies. In some cases, there is no adherence to a single, uniform unit. |
| Coding System | Coding systems of varying robustness are used in five cases. Codes are assigned at each classification level. The EU Taxonomy and China's 2015 Catalogue additionally reference activity codes from existing statistical classifications. |
| Use of Existing Classifications | Two (EU, CHN '15) cases reference existing statistical classifications. Both reference activity codes. The EU Taxonomy additionally uses an existing classification as the basis of its structure by adopting / adapting terminology for the headline categories and classification unit. |

All six taxonomies organize information using multiple levels of classification, which is an inherent characteristic of hierarchical classification structure (Kwasnik, 1999). The number of levels varies from two in the EU and Bangladesh to five in the CBI taxonomy. The classification unit described, or defined, varies. The EU Taxonomy utilizes economic activities, CBI uses assets, and

the remaining four have units of analysis that are less uniform that can include assets, projects, and products / technologies. These features are summarized in Table 26.

**Table 26**
*Comparative Overview of Structural Design Characteristics*

| | EU | | CBI | CHN '15 | CHN '21 | MNG | BGD |
|---|---|---|---|---|---|---|---|
| **Unit** | Activities | | Assets | Assets / Projects | Activities | Assets / Projects / Products | Assets / Projects / Products |
| **Level** | M | A | | | | | |
| **1** | 9 | 13 | 8 | 6 | 6 | 8 | 11 |
| **2** | 88 | 94 | 10 | 31 | 25 | 28 | 68 |
| **3** | | | 46 | 38 | 47 | 58 | |
| **4** | | | 104 | | 203 | | |
| **5** | | | 188 | | | | |

*Note*. M = mitigation; A = adaptation

Since the headline categories influence the organization of all lower levels, the differences across cases pose comparability challenges. The types of categories used appear to be at least somewhat influenced by either the primary application or the chosen classification unit. For instance, China's 2015 and 2021 catalogues are primarily intended to support green bond issuance and, as illustrated in Table 27, have environmentally themed categories somewhat resembling the project categories of the International Capital Market Association's Green Bond Principles. This is also the case for the categories in the Mongolian Taxonomy, which does not have bond issuance as its primary application but shares characteristics of China's catalogues due to Mongolia's consideration of China's experiences developing the 2015 Catalogue (Mongolian Sustainable Finance Association et al., 2019).

**Table 27**
*Mapping of Headline Categories to ICMA's Green Project Categories*

| ICMA[1] | CHN '15 | CHN '21 | MNG |
|---|---|---|---|
| Energy Efficiency<br>Green Buildings | Energy Saving | | Energy Efficiency<br>Green Buildings |

| | | | |
|---|---|---|---|
| Pollution Prevention & Control | Pollution Prevention & Control | Energy Saving & Environmental Protection Industry | Pollution Prevention & Control<br>Sustainable Water & Waste Use |
| Circular Economy | Resource Conservation & Recycling | Clean Production Industry | |
| Renewable Energy | Clean Energy | Clean Energy Industry | Renewable Energy<br>Low Pollution Energy |
| Environmentally Sustainable Management of Living Natural Resources and Land Use<br>Terrestrial & Aquatic Biodiversity<br>Climate Change Adaptation | Ecological Protection & Climate Change Adaptation | Ecology and Environment-Related Sector | Sustainable Agriculture, Land Use, Forestry, Biodiversity Conservation and Ecotourism |
| Clean Transportation | Clean Transportation | Sustainable Upgrade of Infrastructure | Clean Transport |
| | | Green Services | |

1: (International Capital Markets Association, 2021).

In contrast, the EU Taxonomy features substantially different headline categories that relate to the choice of classification unit – economic activities. The EU Taxonomy's headline categories represent activity groupings that are primarily adapted from the *Statistical Classification of Economic Activities in the European Community* (NACE), as shown in Table 28.

**Table 28**
*Mapping of EU Taxonomy Headline Categories to NACE Sections*

| **NACE (Revision 2)** [1] | **EU Taxonomy** |
|---|---|
| Agriculture, forestry and fishing | Forestry |
| Not covered in NACE | Environmental Protection and Restoration Activities |
| Manufacturing | Manufacturing |
| Electricity, gas, steam and air conditioning supply | Energy |
| Water supply, sewerage, waste management and remediation | Water supply, sewerage, waste management and remediation |
| Transportation and storage | Transport |

| | |
|---|---|
| Construction | Construction and real estate activities |
| Real estate activities | |
| Information and communication | Information and Communication |
| Professional, scientific and technical activities | Professional, scientific and technical activities |
| Financial and insurance activities | Financial and insurance activities |
| Education | Education |
| Human health and social work activities | Human health and social work activities |
| Arts, entertainment and recreation | Arts, entertainment and recreation |

*Note.* 1: European Commission, & Eurostat. (2008). NACE rev. 2 (English edition). Office for Official Publications of the European Communities. https://op.europa.eu/s/zE0U.

China's 2015 Catalogue and the EU Taxonomy both reference existing classification systems within their structures, but to different degrees. In China's 2015 Catalogue, one or more activity codes from the Industrial Classification of National Economic Activities (ICNEA) are provided as part of each project description. Similarly, the EU Taxonomy includes one or more activity codes from NACE in most activity descriptions, and – as illustrated in Table 29 – also adopts NACE categories for use in the Taxonomy. In addition to referencing codes from ICNEA and NACE to indicate the relationship between the activities of these classifications and the items listed in the taxonomies, both the 2015 Catalogue and the EU Taxonomy also assign a code to each item from a coding system unique to the taxonomy itself. The four remaining taxonomies are not informed by an existing classification system.

**Table 29**
*Classification Units of Selected Cases; Solar Energy Example*

| **EU (Activities)** | **CBI (Assets)** | **BGD (Products / Tech.)** |
|---|---|---|
| Electricity generation using solar PV | PV generation facilities (power & heat) | Solar Home System |
| Electricity generation using CSP | CSP generation facilities (power & heat) | Solar Pico Grid |
| Cogeneration of heat/cool & power from solar energy | | Solar Micro Grid |
| Production of heat/cool from solar thermal heating | | Solar Park |
| | | Solar Irrigation Pumping System |
| | | Solar Nano Grid |

| | |
|---|---|
| | Solar Mini Grid |
| | Net Metering Rooftop Solar System |

As summarized in Table 30, five of the six taxonomies have a system for assigning codes to each listed item, and the EU and Mongolian Taxonomies appear to be the most logical in their construction. The codes are numerical, and the coding patterns leave space for adding more activities in the future without necessitating code changes for the existing activities. For example, the EU Taxonomy's 17 manufacturing activities are coded as 3.1, 3.2, 3.3 and so on. Activities under the next headline category – Energy – are assigned codes beginning with 4. This leaves enough room for 82 additional manufacturing activities without having to alter existing codes to accommodate for their inclusion. China's 2015 Catalogue has a similar coding pattern, expanded to reflect three classification levels as opposed to the two classification levels of the EU Taxonomy (e.g., 3.1.1, 3.1.2). However, any consideration that may have been given to this coding structure is undermined by the updated 2021 Catalogue, which uses the same coding system but has assigned the same numerical codes to different activities. For example, code 1.3.1 in the 2015 Catalogue is assigned to the "construction and operation of energy management centers" (People's Bank of China, 2015a, p. 10), while code 1.3.1 in the 2021 Catalogue is assigned to the "manufacturing of advanced environmental protection equipment" (People's Bank of China et al., 2021b, p. 9). The coding system for listings in Bangladesh's Sustainable Finance Policy are alphanumerical and do not leave room for future additions without alterations to existing codes. For instance, the 20 items in the Renewable Energy category are coded A1 – A20, while the code for the first item under the next headline category is B21, meaning any additions to the Renewable Energy category would require code changes of every item that is listed after a new addition (Bangladesh Bank, 2020).

**Table 30**
*Presence of Nomenclatures and Codes*

| | EU | CBI | CHN '15 | CHN '21 | MNG | BGD |
|---|---|---|---|---|---|---|
| **Nomenclature** | NACE | None | ICNEA | None | None | None |
| **Codes?** | Yes | No | Yes | Yes | Yes | Yes |

## Defining Sustainability

As demonstrated earlier in this chapter, the shared purpose of taxonomy development across cases is to establish sustainability definitions. Through these definitions, the taxonomies

examined here operationalize the sustainability concept at a level that is useful for sustainable finance market participants. To comparatively analyze the sustainability definitions across cases, this sub-section considers the similarities and differences among the design characteristics within the Case Framework's 'Defining Sustainability' dimension that represent the constituent components of taxonomies' sustainability definitions. Ultimately, this comparison identifies guiding concepts shared across cases that form the basis of the approaches across cases for operationalizing the sustainability concept. As will be discussed here, variation in approaches across shared characteristics of design contributes to differences arising between taxonomies' sustainability definitions.

### *Guiding Concepts*

The underlying concepts that inform the approach to defining sustainability across cases are largely shared. These concepts include the expectation of a (positive) contribution to sustainability and the management or avoidance of environmental and social harms. Together, these concepts form the basis of determining whether an activity or asset is sustainable.

The contribution concept is readily identifiable – in all six cases, the inclusion of the activities or assets listed in the taxonomy are supported by the rationale that they contribute to one or more of the identified sustainability objectives. The evidence of this is shown in Table 31. Five taxonomies identify the avoidance of environmental harms, while the taxonomies of Bangladesh, the EU, and Mongolia additionally identify the avoidance of social harms. Information on this concept is shown in Table 32.

**Table 31**
*Comparative Overview of the Contribution to Sustainability Concept Across Cases*

| | Contribution Concept |
|---|---|
| **BGD** | The Sustainable Finance Policy identifies "substantial contribution" (p. 11) as one of three overarching eligibility expectations. The Policy further states that the Green Taxonomy identifies "activities that contribute substantially to environmental objectives" (p. 16). |
| **CBI** | According to the Climate Bonds Standard (V3.0), eligible projects & assets (as determined by inclusion in the Taxonomy & compliance w/ Sector Criteria) "can be regarded as contributing to the rapid transition to a low carbon and climate resilient economy in line with the goals of the Paris Agreement" (p. 22). |
| **CHN '15 & '21** | The 2015 Catalogue prioritizes "projects with direct and marked environmental benefits, and those [that] accord with national industrial policy" and notes “special consideration of environmental benefits in GHG emission reduction, pollution reduction, resource conservation, ecological protection, and etc.” (p. 2). |
| **EU** | The Taxonomy Regulation states that, to be eligible, an economic activity must contribute "substantially to one or more of the environmental objectives" (p. L 198/27). |
| **MNG** | The Green Taxonomy is intended to "help re-orient capital to sectors and projects that substantially contribute to environmental sustainability and emission reduction" (p. 6). Further, the Green Taxonomy's overall objective is to classify "activities that contribute to climate change mitigation, adaptation, pollution prevention, resource conservation, and livelihood improvement in the context of green finance" (p. 6). |

**Table 32**
*Comparative Overview of Environmental and Social Harm Concepts Across Cases*

| | Environmental and Social Harm Concepts |
|---|---|
| **BGD** | In addition to a substantial contribution to one objective, the Sustainable Finance Policy that activities "do no significant harm (DNSH) to the other five [objectives]" and "meet minimum social and governance safeguards" (p. 11). |
| **CBI** | Limited evidence for avoiding environmental harm, specifically in terms of adaptation. Criteria in some sectors incorporate requirements relating to climate adaptation and resilience.<br>No evidence of requirements relating to social harms. |
| **CHN '15** | No evidence of requirements relating to social harms. |
| **CHN '21** | In announcing the 2021 Catalogue, the People's Bank of China identified three important developments that includes respecting "the universally adopted principle of 'Do No Significant Harm (DNSH)'" (p. 2).<br>No evidence of requirements relating to social harms. |

| | |
|---|---|
| **EU** | In addition to substantial contribution, the Taxonomy Regulation states that activities must "not significantly harm any of the environmental objectives set out [in this regulation]" and "is carried out in compliance with minimum [social] safeguards" (p. L 198/27). |
| **MNG** | Mongolia's Green Taxonomy stipulates that "minimum environmental and social risk management regulations and standards should be applied to all types of activities included in the taxonomy" (p. 8). |

But while these concepts are present across cases, there are clear differences in the approaches taken for establishing (a) what constitutes a contribution to sustainability, and (b) what constitutes an unacceptable level of environmental or social harm (outweighing any positive contribution)? The remainder of this section examines the relevant design characteristics and considers them in relation to the operationalization of these concepts.

### *Sustainability Objectives and Key References*

All six taxonomies identify specific sustainability objectives. A comparative mapping of objectives, shown in Table 33 proved challenging to produce accurately due to a lack of uniformity in the terminology employed when referring to specific objectives, a lack of definitions for each objective in most of the assessed cases, and no mapping of the relationship between activities and objectives in most cases. Therefore, Table 33 should be interpreted as a determination of approximate areas of overlap between the objectives across cases.

Across cases, the included objectives are overwhelmingly environmental in nature. Climate change mitigation is the only objective present in all six, while climate change adaptation is present in five cases. Other frequently identified objectives relate to the themes of preventing or controlling pollution, biodiversity and ecosystem conservation, and efficient resource use. Both Mongolia and Bangladesh tend to demonstrate a more multi-dimensional view of sustainability compared to the EU, CBI, and Chinese taxonomies. For instance, Mongolia's 'livelihood improvement' is the only clearly identified social objective across all six cases. Meanwhile, Bangladesh's Taxonomy does not include social objectives in its identification of sustainability objectives, but it is the only taxonomy to map its objectives and categories to the Sustainable Development Goals. Bangladesh also places an emphasis on 'cottage, micro, small and medium enterprises' (CMSME) financing; and green 'socially responsible finance' (SRF) within its green taxonomy.

Despite sustainability objectives being identified in all cases, the taxonomies developed by Bangladesh, China, and Mongolia do not map activities or assets to the sustainability objectives they contribute to. In many instances, the description of the item implies a contribution to multiple

objectives. For example, China's 2015 Catalogue explains that projects in the 'Energy Saving' category may contribute to more efficient resource utilization, reduced GHG emissions, and pollution reduction (People's Bank of China, 2015a). In contrast, a clear linkage is made between activities / assets and the objective they contribute to in the EU and CBI taxonomies. Among cases, the EU Taxonomy has the most direct and clear integration of objectives, with a separate listing of activities included for each objective (Delegated Regulation (EU) 2021/2178, 2021).

**Table 33**
*Comparative Mapping of Sustainability Objectives Across Cases*

| EU | CBI | CHN '15 | CHN '21 | MNG | BGD |
|---|---|---|---|---|---|
| CCM | CCM | GHG Reduction | Climate change response | CCM | CCM |
| CCA | | Ecological Protection | | CCA | CCA |
| Sustainable use and protection of water and marine resources | | | Environmental Improvement | Resource conservation | Sustainable protection of water and marine resources |
| The protection and restoration of biodiversity and ecosystems | | | | | Protection and restoration of biodiversity and healthy ecosystems |
| The transition to a circular economy | | Resource conservation | Efficient use of resources | | Transition to a circular economy, waste prevention and recycling |
| Pollution prevention and control | | Pollution reduction | Efficient use of resources | Pollution prevention | Pollution prevention and control |
| | | | | Livelihood improvement | |

CCM = climate change mitigation; CCA = climate change adaptation.

In most cases, sustainability objectives are linked to key references. For comparative purposes, key references are discussed here in the context of climate change mitigation, as this

objective is included in all six taxonomies. In all four cases that include key references, the Paris Agreement serves as an initial reference point for climate change mitigation. With the exception of the CBI Taxonomy, which has not been developed to apply to a specific jurisdiction, the Paris Agreement is further interpreted through national and regional climate change commitments. This is illustrated in Table 34.

**Table 34**
*Key Policy References for the Climate Change Mitigation Objective Across Cases*

| | |
|---|---|
| **EU** | 1.5°C Paris Agreement goal, interpreted at the EU level as a 55% reduction in GHGs by 2030 compared to 1990 & net-zero emissions by 2050. |
| **CBI** | 1.5°C Paris Agreement goal, interpreted as compatibility with a net-zero by 2050 trajectory. |
| **CHN ’15 & ‘21** | None |
| **MNG** | Paris Agreement goals, interpreted at country level as Mongolia's NDC of 22.7% GHG reduction by 2030 compared to a business-as-usual scenario for 2010. |
| **BGD** | Paris Agreement goals, interpreted at country level as Bangladesh's (I)NDC of a 5% unconditional / 15% conditional GHG reduction by 2030 in the power, transport, and industry sectors.<br>Sustainable Development Goals 7 (7.2, 7.3, 7.a), 8.4, 9.4, 13 (13.2, 13.a). |

Notably, the selection of sustainability objectives and key references is, in most cases, informed by national or regional considerations. In the cases of the EU, China, and Mongolia, it is stated the objectives reflect public policy goals (EU) or the key environmental challenges facing the country (China, Mongolia). As mentioned above, these objectives are then linked in certain cases to key references that represent national or regional policy targets. This is notable due to the important role of the objectives and key references in operationalizing the guiding concepts, particularly the contribution concept.

As was illustrated in Table 31, the inclusion of an activity or asset, in all cases, is conditioned upon whether it contributes to sustainability. The expectation of a contribution to sustainability is contextualized through the identification of sustainability objectives, i.e., an activity or asset could be included within these taxonomies if it contributes to one or more of the identified objectives. For this reason, the sustainability objectives (a) define the contribution concept at a high level within the taxonomy, and (b) ultimately determine the bounds of the scope of activities or assets to be included.

Further to the above, the key references further define the expectations for what constitutes a contribution by an activity or asset. This is most evident in the EU and CBI Taxonomies, where criteria are defined to differentiate when activities in the real economy that correspond to a taxonomy activity can be considered to be contributing to sustainability. In these cases, the choice of key reference directly influences the ambition, or stringency, of the criteria that define what constitutes a contribution. Depending on the specific eligibility approach, which is discussed below, the objectives and key references can play a similar role in operationalizing the harm avoidance concept. As demonstrated in the within-case analysis, this is the case for the EU, which requires activities to comply with additional criteria to demonstrate that no significant harm occurs to the other five environmental objectives included in the EU Taxonomy.

### *Specific Approaches to Eligibility*

The sustainability objectives and key references help to assign a broad meaning to the guiding concepts that facilitates determinations on the inclusion of activities or assets. Following this, any additional steps taken to define the activities and assets are part of the overall approach to eligibility. Here, a general distinction can first be drawn between the six cases in terms of the broad approach to eligibility. Namely, the cases can be distinguished according to two main approaches: (1) a thresholds-based approach that utilizes quantitative and qualitative criteria to define activity eligibility, and (2) a catalogue approach where inclusion of an activity or asset typically implies automatic eligibility without assessment against criteria. The general approach for each case is identified in Table 35.

**Table 35**
*The Primary Eligibility Approach of Each Taxonomy*

| | BGD | CBI | CHN '15 | CHN '21 | EU | MNG |
|---|---|---|---|---|---|---|
| **Approach** | Catalogue | Thresholds | Catalogue | Catalogue | Thresholds | Catalogue |

These overarching approaches are useful to some extent when drawing general distinctions; however, the within-case analysis demonstrates that the approach to eligibility in an individual taxonomy is often quite nuanced and can vary depending on the activity or asset in question. Given this, this sub-section highlights sector-specific comparative observations to demonstrate the differences in approaches across cases. As a first step in drawing more specific distinctions, Table 36 relates each taxonomy's approach back to the guiding concepts of contribution and harm avoidance.

**Table 36**
*Summary of Taxonomy Contribution and Harm Avoidance Requirements*

| | Acknowledged Concepts | Cont. Criteria | Env. Harm Criteria | Soc. Harm Criteria |
|---|---|---|---|---|
| **BGD** | Contribution Harm (E&S) | Minimal | Sustainable finance exclusion list | Sustainable finance exclusion list |
| **CBI** | Contribution Harm (E) | Yes | Adaptation principles (some sectors) | None |
| **CHN '15** | Contribution | Minimal | None | None |
| **CHN '21** | Contribution Harm (E) | Minimal | Minimal (~6 activities): mentioned but not defined. | None |
| **EU** | Contribution Harm (E&S) | Yes | Generic and activity-level requirements for all six objectives | Compliance w/ international standards |
| **MNG** | Contribution Harm (E&S) | Minimal | Sustainable Finance Principles | Sustainable Finance Principles |

Given that included sustainability objectives vary across cases, there is not a perfect overlap of included activities and assets. This is a difference worth highlighting. Differences in activities coverage are, at least in part, driven by the inclusion of different objectives in taxonomies. The implication of these coverage differences is that activities recognized as sustainable in one country may not be recognized as sustainable in another. This is due to the binary nature of taxonomies, where an activity is considered sustainable if it is included and meets any requirements. An activity that is not included at all is not necessarily unsustainable, but its lack of inclusion means it cannot be recognized as sustainable for investment purposes by those referencing a taxonomy that excludes it.

That said, there are many instances of overlapping activity and asset coverage across cases. While the comparative observations made here will focus more on differences, there are instances of overlapping coverage where approaches to eligibility are similar. Where similarities exist, it is typically because the activity is sustainable ‘by nature’, i.e., virtually all real-world instances of the activity would be contributing to sustainability. Similarity in approaches across cases is illustrated in Table 37, using wind power generation as an example.

**Table 37**
*Criteria for Wind Energy Across Cases*

| Taxonomy | Activity Description | Criteria |
|---|---|---|
| **BGD** | Wind power plant | **Contribution:** None.<br>**Env/Soc Harm:** Exclusion list (applicable to all finance categorized as sustainable or green) |
| **CBI** | Onshore wind farms | **Contribution:** No more than 15% of electricity generated from non-renewable sources.<br>**Env/Soc Harm:** None |
| **CHN '15** | Wind power generation | **Contribution:** specific to construction and operation of wind farm.<br>**Env/Soc Harm:** None |
| **CHN '21** | Construction and operation of wind power facilities | **Contribution:** Construction and operation of facilities that utilize wind energy to generate electricity.<br>**Env/Soc Harm:** None |
| **EU** | Electricity generation from wind power | **Contribution:** Construction or operation of electricity generation facilities that produce electricity from wind power.<br>**Env. Harm:** Generic DNSH requirements for adaptation and protection & restoration of biodiversity and ecosystems; activity specific DNSH requirements for sustainable use and protection of water and marine resources (offshore only); circular economy; protection and restoration of biodiversity and ecosystems (offshore only).<br>**Social Harm:** compliance with (1) OECD Guidelines for Multinational Enterprises and (2) UN Guiding Principles on Business and Human Rights. |
| **MNG** | Wind energy generation facilities | **Contribution:** Onshore wind electricity generation facilities, distributed wind electricity generation facilities, wind pumps, wind turbines.<br>**Env/Soc Harm:** None |

However, there are also differences between cases when defining the same activity. This is evident in the buildings sector, shown in Table 38. Unlike wind power generation, buildings may or may not be 'green' depending on several factors related to performance. The need to distinguish between regular buildings and green buildings is reflected in each taxonomy, but in different ways. Bangladesh and Mongolia both cite multiple building certifications – national and international – that a building could adhere to to qualify as 'green.' China's catalogues are similar but rely solely on national building standards. The taxonomies that are primarily thresholds-based approaches – CBI and the EU – both include quantitative performance thresholds. The CBI Taxonomy features emissions intensity criteria that is specific to the city where the building project is located, which

reflects the global nature of the Climate Bonds Standard. The EU Taxonomy's threshold is specific to requirements set within EU legislation, specific to the European context and requires obtaining a certificate common within Europe. The EU Taxonomy stipulates additional criteria to avoid harming the remaining five environmental objectives, and entity-level compliance with social principles.

**Table 38**
*Criteria for Green Buildings Across Cases*

| | Activity / Asset | Criteria |
|---|---|---|
| **BGD** | Green Buildings | **Contribution:** Obtains appropriate certification: SREDA (Bangladesh); USGBC - LEED, BREEAM, CASBEE, EDGE, GRIHA (International).<br>**Env/Soc Harm:** Generic exclusion list. |
| **CBI** | Residential & Commercial Buildings | **Contribution:** Emissions intensity in top 15% of buildings in project city **OR** meets a CBI-approved emissions intensity proxy for localities where data is unavailable. **Alternatively**, buildings not yet in top 15% can finance improvements over time that will bring building emissions intensity in line with threshold.<br>**Env/Soc Harm:** None |
| **CHN '15** | Green Buildings | **Contribution:** At least two-star rating according to: Green Industrial Building Evaluation Standard (industrial) or Green Building Evaluation Standard (others).<br>**Env/Soc Harm:** None |
| **CHN '21** | Green Buildings | **Contribution:** Adheres to national codes and standards for obtaining a national green building evaluation label. For example: Green Industrial Building Evaluation Standard or the Green Building Standard.<br>**Env/Soc Harm:** None |

| | | |
|---|---|---|
| **EU** | Construction of New Buildings | **Contribution:** Primary energy demand is at least 10% lower than threshold set for EU nearly-zero energy building requirements. Performance certified through an Energy Performance Certificate. Buildings larger than 5000 $M^2$ must undergo air tightness and thermal integrity testing upon completion, and calculation of life-cycle global warming potential at each stage of construction. Results disclosed to investors / clients.<br>**Env. Harm:** Generic 'do no significant harm' (DNSH) requirements for adaptation; activity specific DNSH requirements for (a) sustainable use and protection of water and marine resources; (b) circular economy; (c) pollution prevention and control; (d) protection and restoration of biodiversity and ecosystems.<br>**Social Harm:** compliance with (1) OECD Guidelines for Multinational Enterprises and (2) UN Guiding Principles on Business and Human Rights. |
| **MNG** | Construction of New Green Buildings (Commercial, Public, Industrial, Residential) | **Contribution:** Compliance to local building norms & the Mongolian Energy Passport; OR internationally and nationally recognized green building certification such as LEED, EDGE, BREEAM; Energy certifications such as US Energy Star and energy labelling schemes such as Energy Performance Certifications in the EU.<br>**Env/Soc Harm:** None |

There are several differences highlighted by the buildings sector. First, and more generally, individual taxonomies are relying on either (a) building performance thresholds or (b) established standards for green buildings. Where green building standards are used, China has referenced national standards, while Mongolia and Bangladesh have referenced national and international standards. Where performance thresholds are used, the differences between the approaches taken by CBI and the EU demonstrate how approaches can reflect the context of a taxonomy's specific jurisdiction, or a more global view.

# Chapter 6: Discussion

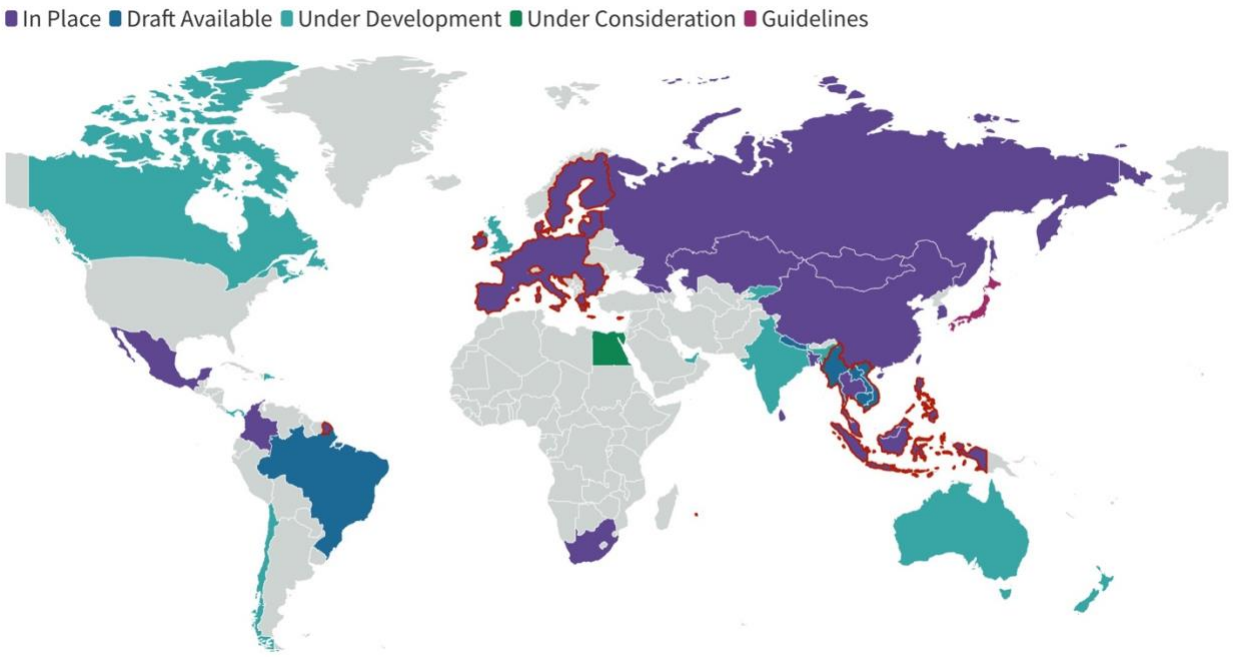
This analysis of sustainable finance taxonomies aimed to build understanding of their design, and identify similarities and differences across cases, to consider the lessons that can be drawn from these insights to reconcile calls for harmonization with how we see taxonomies evolving across both developed and developing countries. Through in-depth analysis of each case, the within-case analysis aimed to unpack each taxonomy's key features of design. Following this, the comparative analysis mapped the varying approaches to operationalizing the design characteristics within the Case Framework's cross-cutting dimensions of comparison. Revealed by this analysis is a complex landscape of design approaches, where the identified differences reinforce the need to consider pathways forward for harmonization that may help to resolve inconsistencies arising among taxonomies globally, while remaining nuanced in its approach to addressing existing differences.

## What is the 'Ideal' Harmonization Outcome for Sustainable Finance Taxonomies?

As Fox (1991) explains, the heterogeneity of countries makes harmonization a complex exercise. The costs of differences lead us to wish for the adoption of an ideal standard; however, "when one takes a longer view of what is 'best' and respects cultural and contextual differences among nations… the problem of 'ideal' law becomes more elusive and the problem of harmonization becomes more complex" (Fox, 1991, p. 593). This research has not sought to identify an ideal outcome for taxonomy harmonization. Nevertheless, before delving deeper into this discussion, it is important to consider how the global taxonomy landscape continues to evolve, and the likely implications of its evolution on harmonization and its realistic outcomes.

When beginning this research, the reviewed cases – apart from the Climate Bonds Taxonomy – represented the taxonomies that had been developed by national or regional governments. However, as shown in Figure 5, the global landscape has evolved quickly, and over 40 national and regional taxonomies are in varying stages of development. So, while the notion of a global taxonomy emerging in the future cannot be ruled out, the rapid increase in the number of taxonomies at the national and regional level suggests that such an outcome is an unlikely one for harmonization. This is underscored by the results of cross-case analysis, which reveals how local considerations do in fact appear to drive differences among certain design elements, particularly those that are components of taxonomies' sustainability definitions. Balancing this reality within a single global taxonomy would be exceedingly challenging – perhaps even impossible - to achieve in practice.

**Figure 5**
*The Global Taxonomy Landscape as of 2024*




Source: author's construction. Note: red boundary lines indicate regional taxonomy efforts in the European Union and Association of Southeast Asian Nations.

This thesis aimed to address the gaps within the literature around understanding taxonomy approaches with a view towards generating practical insights that may inform potential harmonization efforts going forward. Therefore, rather than contemplate 'ideal' outcomes, the harmonization-focused action areas proposed in this chapter are intended to be pragmatic and grounded in the realities presented by the clear trend towards national and regional taxonomy development. They are harmonization actions that, based on the results of the analysis, could offer a potential pathway for improving the similarity of national and regional taxonomies worldwide. Specifically, three harmonization-focused areas are discussed here: (a) establishing mechanisms through international cooperation to facilitate mutual recognition of taxonomies' sustainability definitions between countries; (b) developing a global structural framework as a uniform basis to build taxonomies upon; and (c) strengthening the alignment of key concepts and methods.

## Balancing Localization and Harmonization Imperatives when Defining Sustainability

The key output of taxonomies are sustainability definitions, and the number of design decisions involved creates potential for divergences that arguably pose the greatest challenge for

future harmonization efforts. Table 39 re-states key comparative observations relating to the design characteristics that form taxonomies' sustainability definitions.

**Table 39**
*Summary of Comparative Observations Relating to Sustainability Definitions*

| Concepts / Elements | Observations |
|---|---|
| Contribution | Contribution (all cases) and harm avoidance (all, except CHN '15) are guiding concepts for defining sustainability within taxonomies and are operationalized by the design elements in this table. |
| Harm Avoidance | |
| Dimensions | All six cases cover the environmental dimension of sustainability. |
| Objectives | All six taxonomies identify objectives. The objectives are thematically similar. Climate change mitigation is the only objective covered in all cases. Others include adaptation, pollution prevention, resource conservation / circular economy, and biodiversity & conservation.<br>The objectives give meaning to contribution (all) and harm avoidance (BGD, EU). |
| Key References | Key references are international, regional, or national targets to be achieved in relation to an objective. The role of key references varies.<br>• None (CHN).<br>• Mentioned in relation to objectives (BGD, MNG).<br>• Inform ambition level of criteria that operationalize the contribution concept (CBI, EU) and/or the harm avoidance concept (EU). |
| Inclusion | The inclusion, or identification, of activities and/or assets is a key aspect of design in all cases and differentiates taxonomies from less granular guidance and definitions. Activity / asset inclusion primarily indicates:<br>• Eligibility (CBI, EU)<br>• Alignment (BGD, CHN, MNG) |
| Description | Some (EU, CHN, MNG) include descriptive statements explaining the boundaries of listed activities / assets. In taxonomies that primarily do not specify requirements, descriptive statements have a role in eligibility determinations as they may identify specific activity / asset characteristics (e.g., technologies, processes). |
| Requirements | Requirements include qualitative & quantitative technical criteria, references to existing standards, and exclusion lists. Requirements are present to some extent in all six cases, but only two (CBI, EU) specify requirements for most activities / assets. Requirements of taxonomies can differ (for the same activity) in many ways:<br>• Technical criteria: (a) no criteria vs. criteria, (b) different metrics, (c) same metric, different threshold.<br>• Referencing existing standards: (a) national, (b) international, (c) both. |

| | |
|---|---|
| | • Use of general exclusion lists to screen out ineligible investments (BGD, MNG).<br>• Harm avoidance: (a) comply with existing environmental & social risk management regulations / guidelines; (b) comply with requirements additional to existing regulations / guidelines. |

Importantly, the decisions that lead to differences in the ways taxonomies approach sustainability definitions are not necessarily arbitrary ones. The limited taxonomy literature available prior to this case study suggested that while harmonization is important for taxonomy design, so too is the consideration of local context. This reflects a tension seen in other domains of sustainable development policy - particularly in debates about implementing the SDG Agenda.

The SDG experience offers valuable insights for taxonomy development, particularly regarding how local context shapes the implementation of global agendas. For instance, setting aside the appropriateness of certain strategies, the literature points to the prioritization of different goals or adjustments to target ambition levels based on national circumstances and capabilities. The comparative findings from this analysis reveal similar patterns emerging in national and regional taxonomy development – from the selection of sustainability objectives that reflect national priorities, to the use of key references like national climate targets to calibrate technical criteria. However, while the SDG Agenda provides an organizing framework that helps balance local implementation needs with global coherence, taxonomy development lacks any such framework. As a result, taxonomies' varying approaches to incorporating local context is contributing to the overall fragmented nature of the emerging taxonomy landscape, presenting a fundamental challenge for harmonization efforts that must balance the need for greater consistency with legitimate differences driven by localization.

### *Divergences Relating to Localized Taxonomy Design*

Importantly, a taxonomy's definition of sustainability is, in actuality, comprised of dozens or even hundreds of activity- or asset-level definitions, and there is not a one-size-fits-all approach to addressing the differences that exist between them. Given this, striking an appropriate balance between harmonization imperatives and the localization of taxonomy definitions is likely to be challenging. The comparative analysis reveals three key areas where local context plays a role in shaping taxonomy design: sustainability objectives, key references, and approaches to eligibility. Here, I discuss comparative observations related to these areas and raise considerations for future harmonization efforts that I believe could support aims to strike an appropriate balance between global consistency and local relevance.

**Sustainability Objectives.** The use of sustainability objectives to interpret what constitutes a contribution to sustainability means that the objectives ultimately shape a taxonomy's scope of coverage, as activities or assets are included if they contribute to a selected objective. As a result, taxonomies that prioritize different sustainability objectives are likely to have non-overlapping coverage. Coverage differences arising from a locally informed selection process for sustainability objectives is likely appropriate; however, it is important to consider the potential implications for cross-border investment. The reviewed taxonomies are binary in nature – i.e., included activities are potentially or automatically considered sustainable, while unlisted activities are not. However, unlisted activities are not necessarily unsustainable, as they may simply contribute to objectives that are outside a taxonomy's scope of coverage. For this reason, entities seeking to finance activities classified as sustainable in one taxonomy may have difficulties attracting sustainability-aligned investment from foreign investors referencing a different taxonomy that does not include the same activity in its listing.

This is not to say that non-overlapping coverage is a "bad" difference. However, none of the taxonomies reviewed here are exhaustive classifications of sustainable activities, and as long as that continues to be the case, actions could be taken to ensure that cross-border investments for activities that are appropriately identified as sustainable in one taxonomy, but outside the scope of another, are not hindered. One such option could be for countries to cooperatively identify a list of activities that are crucial for advancing sustainable development priorities globally, with particular attention to activities that advance objectives in developing countries. While there is already an intent to expand many existing taxonomies over time that will eventually lead to more comprehensive coverage, an agreed of list of critical activities could be used by countries to conduct immediate extensions of their taxonomies to incorporate activities from the list that are not yet covered.

**Eligibility Divergences.** Likely the most significant challenge for harmonization efforts will be addressing divergences between taxonomies' eligibility approaches for determining what is sustainable. These eligibility divergences emerge in two main ways: through the use of entirely different approaches, and through variations within the same approach. The reviewed taxonomies have been categorized into two groups: a thresholds-based approach employed by the EU and CBI, and a catalogue-based approach taken by Bangladesh, China, and Mongolia. The defining difference between the two approaches is whether technical criteria are specified for most listed activities.

Geothermal power generation, the criteria for which were summarized in Table 40, provides a useful example to illustrate differences both within the same approach and between different approaches.

**Table 40**
*Criteria for Geothermal Power and Heat Generation Across Cases*

| | Activity Description | Criteria |
|---|---|---|
| **BGD** | N/A | N/A |
| **CBI** | Geothermal generation facilities (power & heat) | **Contribution: Option 1:** direct CO2 emissions < nationally specific threshold OR < 100 gCO2/kWh, whichever is higher. **Option 2**: when not meeting option 1, facility is eligible if mitigation technologies are deployed so that the release of non-condensable gases (resulting in direct CO2 emissions) are rendered negligible. **Option 3:** For non-annex 1 countries only, projects accredited by the Clean Development Mechanism are eligible without demonstrating compliance with Options 1 or 2.<br>**Env/Soc Harm:** Complies with international best practice on environment, health, and safety for geothermal power generation (e.g., IFC / World Bank). Enhanced geothermal systems must comply with US Department of Energy's *Protocol for Addressing Induced Seismicity Associated with Enhanced Geothermal Systems* (Geothermal Technical Working Group, 2016). |
| **CHN '15** | Other' energy facility construction & operation | **Contribution:** Engineering, construction, and operation of renewable energy generation like geothermal power and marine power.<br>**Env/Soc Harm:** None |
| **CHN '21** | Construction & operation of geothermal energy utilization facilities | **Contribution:** (1) Indoor heating and cooling facilities using heat pumping and other technologies to extract shallow geothermal energy. (2) Construction / operation of power facilities that generate electricity from geothermal resources.<br>**Env/Soc Harm:** None |
| **EU** | Electricity generation from geothermal | **Contribution:** Lifecycle GHG emissions < 100gCO2e/kWh, verified by an independent third-party.<br>**Env. Harm:** Generic DNSH criteria: climate change adaptation; sustainable use and protection of water and marine resources; protection and restoration of biodiversity and ecosystems. Specific DNSH criteria: pollution prevention and control.<br>**Social Harm:** compliance with (1) OECD Guidelines for Multinational Enterprises and (2) UN Guiding Principles on Business and Human Rights. |

| | | |
|---|---|---|
| **MNG** | Geothermal power and heat generation facilities | **Contribution:** Facilities for electricity generation and thermal applications of geothermal power in all sectors, geothermal heat pumps for space and district heating.<br>**Env/Soc Harm:** None |

First, the catalogue-based taxonomies that include geothermal power (China, Mongolia) specify no criteria, implying that all geothermal power generation projects are aligned with sustainability. However, geothermal power is subject to GHG emission thresholds in the threshold-based taxonomies (CBI, EU), meaning that geothermal projects with emissions exceeding the threshold are not considered sustainable for the purposes of sustainable finance. Further still are the differences within the thresholds-based approaches of the CBI and EU taxonomies when defining 'sustainable' geothermal power generation. First, the EU Taxonomy considers any geothermal power facility, irrespective of location, to not be 'green' if the facility's life cycle emissions exceed 100gCo2e/kWh (Regulation (EU) 2020/852, 2020). This is the threshold for all power and heat/cool generation activities in the EU Taxonomy and the ambition of this threshold is set according to the EU's net-zero emissions by 2050 goal, which is the key reference linked to the climate change mitigation objective (Regulation (EU) 2020/852, 2020). Therefore, the ambition of the EU Taxonomy's power generation threshold is calibrated to align with a locally informed ambition level.

In contrast, the market-based Climate Bonds Taxonomy defines three compliance pathways for geothermal power. Most significantly is the calculation of an emissions threshold for geothermal that is based on national-level characteristics, such as the overall energy mix, based on where the geothermal project is located. With this approach, countries with an energy mix dominated by fossil fuel-based power generation will have higher a higher GHG emission threshold for geothermal power. Additionally, in the non-annex 1 countries identified by the Kyoto Protocol, the CBI Taxonomy considers geothermal power projects automatically aligned if the project is accredited by the Clean Development Mechanism (Geothermal Technical Working Group, 2016).

A comparison of the requirements for green buildings, summarized in Table 38, illustrate further differences. Starting with a general observation, green buildings are subject to requirements in all reviewed cases, but the nature of these requirements varies. The taxonomies of Bangladesh and Mongolia reflect a focus on international applicability by referencing both local and international green building standards. In contrast, China's 2015 and 2021 Catalogues rely solely on national green building standards, which promotes local relevance but likely limits the relevance and comparability of the Catalogues internationally.

The taxonomies taking a threshold-based approach also differ in their approach to technical criteria. The Climate Bonds Taxonomy does not rely on existing green building standards but reflects an internationally applicable approach that requires buildings to have an emissions intensity within the top 15% of buildings in the project city (Climate Bonds Initiative, 2020). This requirement also acknowledges potential data constraints by allowing buildings to qualify using an emissions intensity proxy for locations where necessary data is unavailable. Meanwhile, the EU Taxonomy uses a different metric, requiring buildings to demonstrate a primary energy demand that is 10% lower than the European Union's "nearly-zero energy building" (NZEB) requirements, and to certify this performance with an Energy Performance Certificate (Regulation (EU) 2020/852, 2020). This use of EU-specific references, while perhaps appropriate to promote usability in the European Context, likely limits its international applicability in a way that is similar to China's reliance on national building standards.

These findings demonstrate the ways that local context influences aspects of taxonomy design. The selection of sustainability objectives reflects national priorities but can lead to varying coverage across taxonomies. Additionally, decisions made to define eligibility, including calibrating criteria according to national or regional key references and utilizing domestic standards, can drive differences across eligibility approaches.

### *Balancing Localization and Harmonization*

Based on insights from the comparative analysis, and assuming that certain differences drive in part by localization persist, there is a likely need for harmonization mechanisms to preserve appropriate localized differences while minimizing market fragmentation risks noted in the literature review. Therefore, rather than focusing this discussion solely on eliminating differences, this first proposed action area concentrates on ways to accommodate difference while promoting cross-border compatibility of definitions through mutual recognition, supplementing locally applicable eligibility criteria with internationally applicable criteria, and proportionality of eligibility requirements.

First, if locally informed definitions are to persist without hindering cross-border sustainable investments, there is a need for cooperation between countries to facilitate mutual recognition despite definitional differences. This is particularly important if taxonomies increasingly pursue thresholds-based approaches where the ambition of criteria is set in accordance with national or regional key references. Whether calibrating thresholds in this way is appropriate or not, the EU Taxonomy's use of this method sets a precedent for other taxonomies to follow suit. However, different targets or varying timelines to achieve targets, will lead to

definitional differences. For instance, the use of regional emissions targets or Nationally Determined Contributions as key references for a climate change mitigation objective to inform activity-level emissions thresholds. Acknowledging this as an appropriate locally driven aspect of taxonomy design and formally recognizing equivalence between activity definitions despite potential differences in ambition, would help avoid the potential of definitional differences discouraging investors from steering sustainability-aligned investments towards projects internationally that may not align with the ambition level reflected in the taxonomy defined for the investor's jurisdiction.

Second, the local applicability of taxonomies does not need to come at the expense of international applicability. Specifying compliance with local standards is understandable, as these standards are likely familiar to a taxonomy's target users; however, if equivalent standards exist at an international level, there is no reason not to include a reference to these international standards alongside local ones. A sole reliance on local standards for certain activities, such as green building construction, diminishes the international applicability of a taxonomy. Integrating an international perspective should be a design consideration throughout the taxonomy development process. For existing taxonomies, countries could cooperate through comparative exercises to identify equivalence between respective national standards and international standards and modify definitions where necessary to acknowledge this.

Finally, countries developing taxonomies with detailed and complex eligibility approaches should take proportionality under consideration when doing so. While capacity constraints are not cited in the documentation of any of the taxonomies reviewed here, it seems likely that decisions relating to eligibility approaches are at least in part driven by several capacity-related constraints. For instance, compliance with thresholds-based approaches relies on the availability of relevant data. Additionally, a thresholds-based approach may be preferred to address greenwashing; however, countries differ in their capacity to act against false taxonomy-related compliance claims. The complexities of a thresholds-based approach that does not integrate proportionality considerations is also likely to prove challenging to meet by individuals or small and medium enterprises that seek to obtain finance. A taxonomy that does not account for these limitations will see its international applicability further diminished, as certain user groups will likely find it impossible to demonstrate the compliance of their activities.

These issues are most clearly demonstrated by the EU Taxonomy's Do No Significant Harm Principle (DNSH). DNSH adds significant complexity to an already complex eligibility approach, and DNSH requirements for ensuring that activities are not causing unacceptable harm to other

environmental objectives are based primarily on EU environmental legislation. In contrast, for example, the Bangladesh Taxonomy requires assessments against existing environmental risk management processes that seek to align with IFC Performance Standards. The IFC Standards apply a proportionality lens to account for SMEs, and the rigor of the environmental risk assessment required by Bangladesh is dependent on company size. The presence of the harm avoidance concept in five of six reviewed taxonomies underscores the importance of ensuring that 'sustainable' activities identify and manage their environmental and social risks; however, in the absence of proportional thinking, and without taking steps like those discussed above on mapping equivalence and mutual recognition, harm avoidance adds an additional layer of complexity that may have unintended consequences. Generally, to incorporate proportionality and promote the broader usability of taxonomies, countries could consider (a) multiple compliance pathways where necessary, and (b) exempting user groups such as SMEs from compliance with certain requirement where appropriate to do so.

These considerations for accommodating local variation in taxonomy design offer a first step toward harmonization; however, their effectiveness would be enhanced by complementary actions to improve the overall comparability of taxonomies. The remainder of this chapter focused on two action areas in particular. First, structural differences across cases serve no clear purpose and unnecessarily complicate comparison. Establishing a global structural framework would eliminate arbitrary differences by providing a consistent way to organize and present sustainability definitions within taxonomies. Second, even with a global structural framework in place, comparability and consistent could be further improved by strengthening the alignment of the key concepts and methods that underlie the operational approach to defining sustainability, potentially making it easier to recognize, through mutual recognition, legitimate differences driven by local context (e.g., criteria ambition levels) while ensuring the external validity of eligibility approaches.

## A Global Structural Framework for Taxonomy Development

Overall, the structural inconsistencies between taxonomies identified in the cross-case analysis diminish the comparability of their sustainability information. These inconsistencies include broader differences in organization such as the use of varying classification levels, differing classification units and headline categories, the use of different statistical classifications as reference (or none at all), and poorly designed coding systems that either (a) identify several codes per item (EU), (b) are inconsistent across earlier and later versions (China), or (c) do not leave room for additional items in subsequent versions.

As Kwasnik (1999) explains, a classification is a form of knowledge representation. This is enabled by their structural properties, which allow us to embed significant amounts of information in a way that imposes order on – and meaningfully reflects – our knowledge within a domain (Kwasnik, 1992). As such, the structural element of taxonomies primarily function as a container. They do not themselves define sustainability, rather, they provide a structured framework to embed and organize sustainability definitions.

For considering differences identified between structural elements, as opposed to those between sustainability definitions, the above distinction is important. As discussed, it may be appropriate for taxonomies' sustainability definitions to reflect local context to some degree, which may justify some differences. In contrast, the primarily organizational purpose of the structural elements makes existing differences harder to justify. This is particularly the case given that future harmonization efforts rely on identifying and understanding, through comparison, the similarities and differences between taxonomies.

For instance, consider findings from the cross-case analysis related to classification units. In the comparative review, I highlight the shared purpose of the reviewed taxonomies, which is to identify what is sustainable. On the surface, the 'what' that each taxonomy identifies appears to vary due to differences in the classification unit. However, whether a taxonomy's units are activities, assets, products, etc., the 'what' being identified is the underlying finance, irrespective of the specific unit used. This suggests that the analytical objective is the same – to identify underlying investments and expenditures aligned with sustainability. For instance, consider the comparison of the EU and CBI taxonomies in Table 41.

**Table 41**
*Different Classification Units Despite Similar Analytical Objective*

| | EU | CBI |
|---|---|---|
| **Unit** | Electricity generation from geothermal energy | Geothermal electricity generation facilities |
| **Criteria** | "Lifecycle GHG emissions from the generation of electricity from geothermal energy are lower than 100gCO2e/kWh" (Delegated Regulation (EU) 2021/2139, 2021, p. 80). | Facilities' "direct emissions [are] less than 100gCO2/kWh" (Geothermal Technical Working Group, 2016, p. 2). |
| **Underlying Finance** | Turnover (revenue) and capital & operating expenditures related to the construction and operation of the | Related / supporting expenditures of a project or physical asset (geothermal facility) are aligned if asset criteria are met. |

| | |
|---|---|
| | geothermal facility are aligned if activity criteria are met. |

Here, the EU Taxonomy's unit is economic activities while CBI uses physical assets. Despite the use of different units, the criteria of both taxonomies pertain to the generation facility itself. Further, satisfying the criteria indicates alignment of the activity / asset's supporting expenditures – in this case, for the construction and operation of geothermal facilities. While the EU and CBI taxonomies differ slightly in terms of the underlying finance considered to be aligned, this is due to different uses cases, not necessarily a limitation on the use of assets as opposed to activities. The CBI Taxonomy primarily supports debt issuance and is therefore focused on expenditures. Meanwhile the EU Taxonomy additionally supports disclosures where an entity must report taxonomy alignment in terms of both revenue and expenditures.

While the relationship between the EU's geothermal activity and CBI's geothermal asset is straightforward, this is not always the case. The use of different classification units leads to organizational differences throughout every classification level, which diminishes comparability. Using the geothermal example, the EU and CBI taxonomies overlap in their coverage of geothermal power generation and the manufacturing of geothermal equipment that enables geothermal power. However, as shown in Table 42, the EU Taxonomy's use of activities leads to geothermal activities being organized under multiple headline categories, where electricity generation is under energy and the manufacture of geothermal equipment falls under manufacturing. Meanwhile, as shown in Table 43 the CBI Taxonomy groups all geothermal-related assets under the energy category. Additionally, there are different levels of granularity employed here, with the EU activity applying not just to geothermal, but to the manufacture of all renewable energy technologies. When examining two or more taxonomies comparatively, it is possible in most cases to determine linkages between activities, assets, and / or products, even if organized differently; however, the efficiency of comparison is clearly reduced.

**Table 42**
*Structural Organization of the EU Taxonomy*

| Headline Category | Activity |
|---|---|
| Energy | Electricity generation from geothermal energy |
| Manufacturing | Manufacture of renewable energy technologies |

**Table 43**
*Structural Organization of the CBI Taxonomy*

| Asset Categories | | | | Asset |
|---|---|---|---|---|
| **Energy** | Electricity & Heat Production | Geothermal | Generation facilities (power & heat) | Electricity generation facilities |
| | | | Supply chain facilities | Manufacturing facilities for geothermal energy developments, such as turbines. |

The use of different classification units for the same analytical objective – identifying underlying finance aligned with sustainability – is a good example of an element of taxonomy design where agreeance on a uniform approach could be beneficial and appropriate. An agreed classification unit would not only improve comparability at the lowest classification level, but through all preceding levels as well. In turn, this would improve the structural consistency of taxonomies overall, boost comparative efficiency, and ultimately catalyze further harmonization if desired.

### *Establishing a Framework to Reconcile Inconsistent Structural Approaches*

Given the above, the first action area proposed here is the creation a globally agreed framework, functioning as a shared structural basis when developing national and regional taxonomies. Such a framework could promote the comparability of sustainability definitions across taxonomies by (a) encouraging taxonomy development on the basis of a uniform structural 'container,' and (b) by providing an international point of comparison to establish relationships between taxonomies.

**An International Point of Comparison.** A benefit of this approach is that, even in cases where structural divergences may persist, the global framework could function as a single point of comparison to establish relationships – or correspondence – between the contents of taxonomies. This is because any individual taxonomy that establishes and publishes its correspondence to the Framework would indirectly establish correspondence with the taxonomies of other countries that do the same. Given the increasing number of taxonomies, this offers a method of comparison that would be more efficient than one-to-one comparisons between individual taxonomies.

The limited comparisons of taxonomies to date have been one-to-one comparisons. The most notable example is the EU ← → China comparison conducted by the International Platform

on Sustainable Finance. The result – known as the Common Ground Taxonomy (CGT) – demonstrates the inefficient, time-intensive nature of one-to-one comparisons. For instance, the comparative work to complete the CGT took over a year, despite limiting the comparison to the activities related to just a single objective: climate change mitigation (IPSF Taxonomy Working Group, 2022). Additionally, while the CGT proposes its own set of 'common' activities, the primary focus of the comparison was to determine, for each common activity, which taxonomy defines a stricter eligibility approach (IPSF Taxonomy Working Group, 2022). The utility of the CGT would be greater if the focus had first been on reconciling the very different structures of the EU and Chinese taxonomies. While the current CGT comparison enables other countries to compare their own taxonomies to the CGT and publish the results, there are several limitations. Namely, the CGT only enables comparison of activities that (a) are associated with the climate change mitigation objective, and (b) are covered by both the EU and China. Activities in other taxonomies that fall outside of this scope cannot be compared unless a country extends the CGT's structure itself.

**Uniform Structural Basis.** The framework I raise for consideration here should be established at an international level and feature comprehensive coverage to accommodate the varying sectoral and activity / asset coverage of individual taxonomies. The framework would act as a uniform container for organizing and presenting sustainability definitions within taxonomies. This could encompass the development of a basic, but comprehensive classification structure with accompanying methods to adapt the structure where necessary within individual taxonomies. Ideally, a basic structure would standardize approaches for structural elements observed in this thesis, including headline categories & classification units, coding systems, and the extent to which the features of existing classifications could be utilized. Table 44 summarizes the potential structural harmonization actions envisioned.

**Table 44**
*Harmonization Actions Relating to Taxonomy Structures*

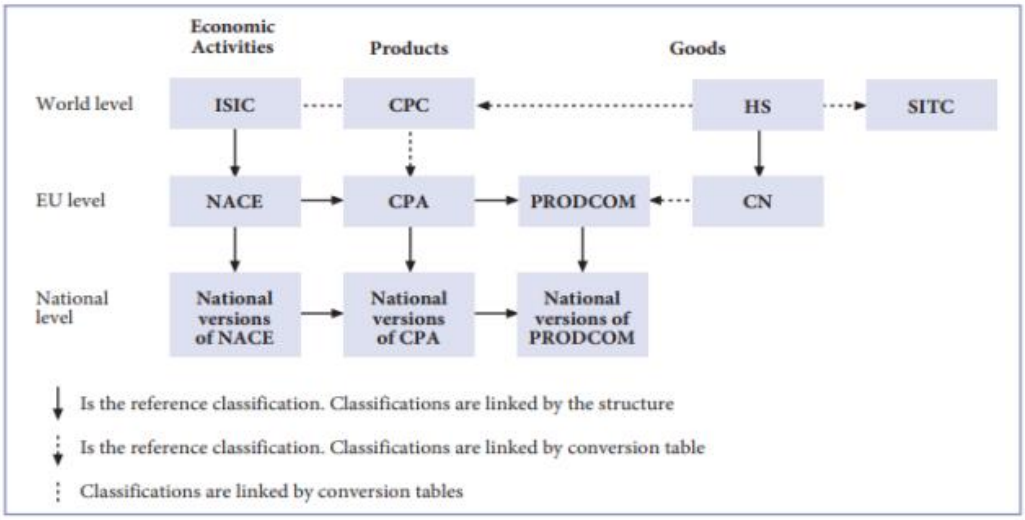
| Element | Harmonization Goal | Notes |
|---|---|---|
| **Broad classification structure** | Uniform | All levels, including the classification unit and headline categories. |
| **Coding system** | Uniform | Ideally, a single coding system could be developed, as well as a standard method to adapt / extend the system when necessary. |
| **Presentation format** | Uniform | Set presentation standards for information in taxonomies. Specify minimum information a taxonomy should include (a) about the taxonomy |

| | |
|---|---|
| | more generally (e.g., approach, methods), and (b) for all individual units (e.g., unit code, description, explanatory notes). |
| **Harmonization action:** International coordination to develop a framework that serves as a uniform structural basis for individual taxonomies. | |

**A Framework Informed by International Statistical Classifications?** Developing a Framework from scratch could be a time- and resource-intensive undertaking. It would necessarily involve (a) devising and clearly explaining its methodological basis, (b) establishing a clearly defined classification unit, (c) formulating an exhaustive and consistent set of categories at each classification level, (d) developing a robust coding system capable of accommodating additions resulting from future revisions, (e) and describing detailed methods for implementation, adaptation, and/or extension of the Framework structure within individual taxonomies. While it would be necessary for the Framework to incorporate these features, it may be possible to simplify the effort using an existing statistical classification to inform much of the Framework's overall structure, concepts, and methods.

The global statistical ecosystem, which is illustrated in Figure 6, is comprised of a complex patchwork of international, regional, and national classification systems that collectively work to promote consistent compilation and dissemination of statistical information. In many domains, an established international classification functions as a reference classification for national and regional classifications covering the same variable. A notable example is the International Standard Industrial Classification of All Economic Activities (ISIC), which is the international classification of reference for economic activities. Most countries have established activity classifications using ISIC as a basis.

**Figure 6**
*The International Family of Statistical Classifications with EU Examples*




From *NACE background*, by Eurostat, 2021, Statistics Explained (https://ec.europa.eu/eurostat/statistics-explained/index.php?title=NACE_background). CC BY 4.0.

In fact, some taxonomies already incorporate elements of existing classifications into their structures, including two reviewed here (the EU Taxonomy and China's 2015 Catalogue). As discussed previously, the NACE classification referenced in the EU Taxonomy is derived from ISIC, meaning it takes ISIC as its basis but adapts some of ISIC's features for suitability within the European Union. As a result, NACE and ISIC are highly comparable. More recently, other taxonomies have begun to incorporate ISIC directly. For instance, Table 45 illustrates the Association of Southeast Asian Nations (ASEAN) Taxonomy's unique approach to incorporating ISIC in order to ensure appropriateness for use. The ASEAN Taxonomy references second and third level (group) ISIC activities and their three-digit codes. But in cases where the granularity of ISIC is insufficient for use in the Taxonomy, the ISIC activity is further disaggregated, and its code is extended.

**Table 45**
*ASEAN Taxonomy's Extension of ISIC Activities and Codes*

| Level[1] | Code | Activity / Activity Grouping |
|---|---|---|
| Level 1 (ISIC) | D | Electricity, gas, steam, and air conditioning supply |
| Level 2 (ISIC) | 35 | Electricity, gas, steam, and air conditioning supply |
| Level 3 (ISIC) | 351 | Electric power generation, transmission and distribution |
| Level 4 (ASEAN extension of ISIC) | 351[01] | Solar power generation |

| | | |
|---|---|---|
| Level 4 (ASEAN extension of ISIC) | 351[02] | Wind power generation |
| Level 4 (ASEAN extension of ISIC) | 352[03] | Hydro power generation |

[1] Information from: ASEAN Taxonomy Board. (2021, p. 73). *ASEAN Taxonomy for Sustainable Finance: Version 1*. ASEAN Taxonomy Board. https://asean.org/book/asean-taxonomy-for-sustainable-finance/.

This example demonstrates the possibilities of adapting ISIC or another similar classification to inform taxonomy structure, along with a sensible method to extend activity codes. However, other taxonomies that have referenced ISIC have not done so in a similar way. This includes the EU Taxonomy, which similarly disaggregated NACE activities to achieve appropriate granularity, but does not feature codes extended from the NACE activities that the Taxonomy's activities are derived from. Incorporating an existing classification into the common Framework would reduce the risks of additional structural differences from arising by promoting a consistent method of incorporation.

There are many potential benefits to be realized by using an existing classification as the Framework's starting point. Internationally agreed concepts, standards and methods govern the design of statistical classifications in order to promote consistency and comparability of statistical information. For example, these classifications must comprehensively cover all instances of a variable, be mutually exclusive in their classification of variables, define a clear unit of classification, feature a robust coding system, and sufficiently describe the boundaries of their categories (Hancock, 2013).

### Strengthening Conceptual Alignment

While a common structural framework could provide the foundation for organizing and presenting sustainability definitions in a comparable manner across taxonomies, further harmonization progress would require addressing a deeper challenge: aligning key concepts and methods that underlie the approach to defining sustainability. The comparative analysis identifies guiding concepts that are largely shared across cases, including the contribution (to sustainability) concept and avoiding environmental and/or social harms; however, there are substantial differences in the approaches taken to operationalize these concepts.

The differences identified in the analysis echo considerations raised in the literature on the SDGs. Just as the selection of targets and indicators to accompany the SDGs ultimately shapes the meaning of the goals, taxonomies' varying approaches to operationalizing key underlying concepts can lead to differing interpretations of sustainability. For instance, while the comparative

analysis identified the presence of the contribution concept across all cases, the concept is operationalized differently through varying combinations of sustainability objectives, key references, and eligibility approaches. Even when taxonomies overlap in their choice of sustainability objectives and include the same activities or assets, their determinations of what constitutes a sufficient contribution varies due to the use of national or regional key references that localize interpretations of the ambition level expressed in technical criteria.

Strengthening conceptual alignment therefore requires a coordinated and systematic approach focusing on several key areas. First, the guiding concepts that underlie approaches should be explicitly recognized and defined in taxonomy documentation. Second, while respecting that different approaches exist for defining eligibility (e.g., thresholds vs catalogue), these approaches could be standardized to improve alignment in how key concepts are operationalized across taxonomies. Finally, where alignment is not feasible or desirable, taxonomy documentation should provide a clear explanation and justification.

Table 46 identifies potential actions that could be considered to strengthen conceptual alignment. Notably, these actions would require international cooperation. On this point, the SDG literature again offers valuable insights. Specifically, the literature discusses how technical processes are not necessarily objective exercises, but ones that can be shaped by power dynamics (Kelley & Simmons, 2015; Merry, 2011). As noted in the literature review, increasing use of references taxonomies to support national and regional taxonomy development raises questions about whose interpretations of sustainability, through taxonomies' definitions, may become dominant. More formalized international cooperation on actions to strengthen conceptual alignment and to standardize approaches, as suggested here, must therefore carefully consider, and be inclusive of, the varying perspectives of countries seeking to develop taxonomies.

**Table 46**
*Comparative Observations Pertaining to Key Concepts and Related Characteristics*

| | **Observations** |
|---|---|
| **Terminology** | A variety of categories (including classification units) are used in taxonomies. The nature of categories is often not clearly identified or defined and differ across taxonomies.<br>Ideally, countries could agree on uniform categories and a single classification unit when developing a common structural framework. Alternatively, or additionally, a typology of categories could be established, defining each and identifying the relationships between them. |

| | |
|---|---|
| **Objectives** | While sustainability objectives are used to operationalize the contribution concept and, in some cases, the harm avoidance concept, the objectives are not always clearly defined in taxonomy documentation.<br>A comprehensive list of sustainability (environmental and social) objectives, with a definition of each, could be agreed to ensure consistent meaning across taxonomies. Ideally, relevant international key references for each objective could be identified as well. |
| **Key References** | The level at which key references are implemented varies between taxonomies.<br>In cases where key references will operationalize contribution and/or harm avoidance requirements, standard methods should be developed for this purpose to promote the external validity of approaches taken by individual taxonomies. |
| **Contribution** | Taxonomies differ in their approaches to these concepts (e.g., criteria vs. no criteria), and with how they implement the same approaches (e.g., differing ambitions of technical criteria, or the use of different metrics) |
| **Harm Avoidance** | A single eligibility approach to operationalize these concepts should not be prescribed, but the methods of individual approaches should be standardized. |

# Chapter 7: Conclusion

This comparative study yields important insights into sustainable finance taxonomy design approaches and offers potential directions for future harmonization efforts. Through within- and cross-case analysis of six taxonomies, this thesis has identified key variations in taxonomy design approaches and considered their implications for balancing calls for harmonization with the observed evolution of taxonomies across both developed and developing economies.

The findings reveal several important considerations for taxonomy harmonization. First, the structure of taxonomies varies significantly across cases in ways that diminish comparability without serving a clear purpose. This suggests that a common structural framework at an international level could promote greater comparability and boost the efficiency of comparative efforts. Second, while taxonomies share certain guiding concepts for defining sustainability, there are substantial differences in how these concepts are operationalized. This indicates that comparability could be improved further by strengthening alignment of key underlying concepts and methods across taxonomies.

Perhaps most significantly, this research highlights the need to strike an appropriate balance between harmonization and localization imperatives across elements for defining sustainability within taxonomies. The influence of localization on taxonomy design is particularly pronounced in the selection of sustainability objectives that reflect national priorities, the use of national and regional key references to calibrate technical criteria, and varying approaches to eligibility that may reflect different capacity levels across jurisdictions. Given this, cooperative efforts to identify equivalence and agree to mutual recognition of taxonomies across countries represent potentially important steps towards achieving an appropriate balance between global consistency and local relevance.

Through these findings and suggested harmonization actions, this research has contributed to the emerging literature on sustainable finance taxonomies in several ways. First, it provides a systematic comparative analysis of taxonomy design approaches at a time when the number of taxonomies globally continues to grow rapidly. To guide this analysis, a structured Case Framework was developed to individually and comparatively examine taxonomy design characteristics according to cross-cutting dimensions – a methodological tool that could support future comparative research as the taxonomy landscape continues to evolve. Second, the proposed harmonization-focused action areas can not only provide a basis for future harmonization efforts but also serve as potential focal points for future research aiming to explore taxonomy harmonization in more detail. Finally, it demonstrates how insights from the broader

development literature could inform approaches to taxonomy harmonization, particularly in relation to navigating the tension between global consistency and local relevance.

Since the completion of the primary research for this thesis, the global sustainable finance taxonomy landscape has continued to evolve, with numerous additional jurisdictions launching or developing their own frameworks (Figure 5). The state of the landscape appears to underscore the continued, and perhaps heightened, relevance of the central challenges explored herein. The need remains for the tension between achieving globally consistent sustainability definitions to mitigate market fragmentation and the tailoring of taxonomies to reflect diverse national contexts and priorities to be a focal point of international efforts. Ongoing initiatives aimed at enhancing comparability, such as the International Platform on Sustainable Finance's Common Ground Taxonomy, reinforces this thesis's emphasis on the need for harmonization, while the persistent diversity in approaches regarding scope (e.g., inclusion of transition or social elements), eligibility criteria, and structure mirrors the variations identified in the comparative analysis of the six foundational taxonomies examined.

While the specific taxonomies analyzed represent an earlier stage of this evolving landscape, the core findings regarding the sources of divergence – differing structural designs, inconsistent operationalization of concepts like 'substantial contribution' and 'do no significant harm', and eligibility criteria shaped by local policy references – may offer an enduring lens through which to understand the complexities facing taxonomy developers today. Consequently, the harmonization-focused action areas proposed in this work – advocating for a global structural framework, strengthened conceptual alignment, and crucially, pathways for mutual recognition – could provide a relevant and pragmatic approach for consideration in navigating the current landscape. This thesis aimed to contribute by not only exploring the challenges arising from uncoordinated taxonomy development but also by proposing a balanced strategy that moves beyond calls for simple uniformity and offering potential mechanisms to foster harmonization and interoperability while respecting the legitimacy of localized approaches.

That said, important areas for future research remain. The rapid evolution of the taxonomy landscape following case selection underscores an ongoing need to examine how approaches to taxonomy design are continuing to develop, and the associated implications of these developments, to ensure that future harmonization outcomes are effective and appropriate. For instance, while the results of this analysis do not establish whether differing approaches to eligibility when defining sustainability are due to capacity limitations (e.g., whether technical criteria are defined), future research could seek to understand what drives the decisions of

taxonomy developers when determining which approaches are appropriate, and whether this holds implications for specific harmonization strategies to improve the alignment of concepts and methods to operationalize these concepts. Additionally, the use of reference taxonomies like the EU Taxonomy to guide development, as noted in the literature review, raises questions about whose interpretations of sustainability may become dominant through harmonization. If, as suggested within the proposed action areas, international cooperation on harmonization ensues, it will be essential to account for the limitations and priorities of developing countries to ensure that taxonomy harmonization outcomes do not hinder sustainable finance from flowing where it is most needed.

In conclusion, this research underscores that while harmonization of sustainable finance taxonomies is needed to address existing design variation, the approach taken matters significantly. Rather than pursuing uniformity, harmonization efforts should aim to improve comparability while preserving appropriate differences that reflect local context and priorities. Through careful attention to balancing these imperatives, taxonomies can better serve their ultimate purpose of enabling the mobilization of private capital towards sustainability-aligned investments globally.

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# Appendix

## Case Framework

**Table 47**
*Case Framework: Design Characteristics, Defined*

| | |
|---|---|
| **Purpose and Application** | |
| **Taxonomy Objective(s)** | Stated goals that the development of a taxonomy is specifically intended to support. |
| **Policy Aims** | Broader policy goals linked to the objectives the taxonomy is intended to support. |
| **Application** | Mandatory or voluntary use cases of the taxonomy identified by the custodian. |
| **Users** | Identified user groups of the taxonomy, in relation to the identified use cases. |
| **Classification Structure** | |
| **Classification Levels** | A classification level is a distinct aggregation level to which categories, or the classification unit, belong. A flat classification has a single level, while a hierarchy has a minimum of two levels (United Nations Statistics Division, 2000). |
| **Classification Unit** | Items classified at the taxonomy's lowest (most detailed) classification level are known as concepts (Technical Committee ISO/TC 46, 2013). The classification unit refers to the nature of these concepts (i.e., economic activities, products, assets). The classification unit within each taxonomy may or may not be uniform. |
| **Headline Categories** | Categories represent a grouping of lower-level categories or concepts. Headline categories refer to categories at the top level of the taxonomy. |
| **Coding System** | The systematic numbering and/or lettering of all categories and concepts in a classification (United Nations Statistics Division, 2000). |
| **Defining Sustainability** | |
| **Principles** | Principles that inform a taxonomy's scope of coverage (sustainability dimension & objectives) or the approach to eligibility. |
| **Scope of Coverage** | The broader dimensions of sustainability covered by the taxonomy (environmental, social, governance). |
| **Sustainability Objectives** | A specific aspect within the broader notion of sustainability (e.g., climate change mitigation, biodiversity conservation, universal energy access). |
| **Key References** | Specific goals to be achieved in relation to a sustainability objective (e.g., 2°C Paris Agreement goal relating to climate change mitigation). These may be goals set within a national, regional, or international context. |

| | |
|---|---|
| **Eligibility Approach** | The eligibility approach encompasses a taxonomy's methods for defining the sustainability of classified items. These methods can relate to both:<br>• How an item contributes to sustainability.<br>• Identifying and managing potential risks posed by a classified item (see risk management).<br>Taxonomies are normative documents, that may or may not specify requirements. In this thesis, items included in a taxonomy are taxonomy-eligible, while real-world instances of items that comply with their requirements are taxonomy-aligned.<br>Requirements can be 'taxonomy requirements' that are unique and directly specified within a taxonomy or 'referenced requirements' by including references to other regulations or standards that themselves contain requirements. Generally, requirements may pertain to an item's:<br>• Measurable performance (quantitative or qualitative)<br>• Characteristics (processes / procedures, specific inputs or outputs, or simply the nature of the item itself)<br>A taxonomy does not necessarily use a uniform approach to define requirements for each item, but an overall approach can be described based on the predominant approach used – e.g., technical screening criteria approach; catalogue-based approach. |
| **Risk Management Approach** | Refers to a taxonomy's approach to setting requirements related to identifying and managing environmental and social risks. If a risk management approach is incorporated, related considerations may or may not be determinants of eligibility. |

**Table 48**
*Case Framework: Questions, Within-Case Analysis*

| | |
|---|---|
| **Purpose and Application** | |
| **Taxonomy Objective(s)** | Why is the taxonomy being developed? |
| **Policy Aims** | What policy aims is the taxonomy intended to support? |
| **Application** | Is there a primary use case? Additional use cases? |
| **Users** | Is there a primary user group? Additional user groups? |
| **Classification Structure** | |
| **Classification Levels** | How many levels of classification are there? |

| | |
|---|---|
| **Classification Unit** | What is the nature of the classification unit? I.e., the unit defined within the most (lowest) detailed classification level. |
| **Headline Categories** | What is the nature of categories at the least detailed (highest) level of classification? How many categories are there? |
| **Coding System** | Is there a system to assign unique codes to classified items? |
| | **Defining Sustainability** |
| **Principles** | Are there principles informing the scope of coverage and overall eligibility approach? |
| **Scope of Coverage** | What broader dimensions of sustainability are covered (environmental, social)? |
| **Sustainability Objectives** | Are specific sustainability (environmental or social) objectives identified? |
| **Key References** | Are specific policy objectives/targets made in the context of sustainability objectives identified? |
| **Eligibility Approach** | What is the predominant approach to eligibility?<br>What does the inclusion of an item within the taxonomy indicate?<br>Does the taxonomy specify requirements? If yes, are they general requirements, item specific, or both? |
| **Risk Management** | Are there requirements to avoid/manage environmental or social risks? Is this a determinant of eligibility? I.e., does the existence of negative environmental or social impacts = non-compliance under the taxonomy? |

**Interview Recruitment Email Script**

RE: Invitation to Participate in Study on Evaluating Green Taxonomies

Dear Recipient,

My name is Caelan Welch, and I am a MA student in the School of International Development and Global Studies at the University of Ottawa. My research supervisor is Professor Geoff McCarney, the Director of Research for the Institute of the Environment and Smart Prosperity Institute at the University of Ottawa, and a professor in the International Development and Global Studies department at the University of Ottawa.

I am conducting a research study on green taxonomies, and their use as a classification tool for defining 'green' projects and activities. The purpose of the study is to evaluate green taxonomies through a comparative review of existing taxonomies developed mostly by governments. In identifying the commonalities and areas of departure between taxonomies developed by governments at the national and regional level, the objective is to provide an insightful look at existing taxonomies, helping to inform inclusive approaches to standardization/harmonization. I am particularly interested in understanding approaches to harmonization as they relate to emerging markets and developing economies (EMDEs).

You have been identified as someone with expertise in sustainable finance, and knowledge of green taxonomies, who may be able to help inform my study. Should you be interested in doing so, participation will consist of a single one-on-one semi-structured interview conducted virtually, that will take approximately 60 minutes of your time. During the interview you will be asked to answer questions related to the key findings of the study's comparative analysis of several existing green taxonomies.

If you are interested in learning more, or in participating in this study, please contact me directly.

Sincerely,

Caelan Welch