

# Sovereign Bonds and Country Pathways

Towards greater integration of sovereign bonds  
into net zero investment strategies

April 2024



IIGCC

# Acknowledgements

The development of this Discussion Paper on Sovereign Bonds and Country Pathways has been led by Valentina Ramirez at IIGCC with contributions by Adrian Fenton and Mahesh Roy. We are grateful to all the members of IIGCC's Sovereign Bonds and Country Pathways working group, our co-leads David Flint, Aegon, Malika Takhtayeva, BNP Paribas; our subgroup co-leads Tongai Kunorubwe, T Rowe Price, Gaurav Trivedi, MSCI, Mahesh Jayakumar, MFS, Sean Shepley, Allianz GI, and Mayde Sykora, INVESCO, and active contributors including Scott Petrie, Baillie Gifford, Adriana Cola, AP2, and David McNeil, Insight Investment. We thank all the external parties for contributing with their thoughts and data (PCAF, ASCOR, Climate Action Tracker, Climate Change Performance Index, Bloomberg, BloombergNEF, PRI, Kepler Cheuvreux, BIS, OECD, S&P Global Ratings, EF data, Green Future Index). We would also like to thank members of all PALL Network Partners (AIGCC, IGCC, CERES) who provided valuable feedback.

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# Executive summary

- Sovereign bonds are a prominent asset class within institutional investors' portfolios with ICMA estimating that sovereign bonds made up 50% of the global outstanding bond market in 2020.<sup>1</sup> Integrating this asset class into net zero investment strategies is essential to fulfil individual commitments to net zero alignment.
- Despite their relevance, there is currently little evidence of adoption of this asset class within investors' net zero strategies. When it comes to sovereign bonds, investors see challenges in their ability to exercise asset selection to meet their individual net zero commitments, mainly due to:
  - i. Liability management restrictions under which a great portion of sovereign bond holdings operate,
  - ii. The limited number of prominent issuers and the concentrated nature of the market means that reducing or removing some sovereigns from the portfolio may force others to be overweighted thereby increasing material risks,<sup>2</sup>
  - iii. Persisting flaws in the global policy framework; currently, most NDCs suffer from ambition and/or implementation gaps within a non-binding framework, and
  - iv. A combination of concerns around engagement with sovereigns such as limited engagement opportunities, non-credible 'exit', intricate nature of sovereign entities, fairness considerations, lack of metrics to assess success, among others.
- As 'Universal Owners'<sup>3</sup>, holding diversified and long-term portfolios that are representative of global capital markets, institutional investors can play a proactive role in influencing a fair transition to a low-carbon economy thereby preserving long term value. As climate risks increase, they will increasingly affect the credit profiles of sovereign issuers;<sup>4</sup> in addition, neglecting the social elements of the low-carbon transition could hinder its progress, with potentially catastrophic consequences for investment portfolios worldwide.
- Institutional investors and sovereign entities can mutually benefit from their interactions around climate risks and opportunities. Investors can collaborate with sovereign entities to promote policies that address climate risks, and sovereigns can benefit from this interaction to improve their policy environments and foster private investment.
- To be able to fulfil their individual net zero commitments, institutional investors can contribute positively to overcoming some of the above-mentioned challenges through their sovereign bond holdings. To that end, this paper encourages investors to take some preliminary steps:
  - i. Track and measure financed emissions for sovereign bond holdings,
  - ii. Create or endorse methodologies to assess net zero alignment at country level,
  - iii. Set net zero alignment objectives and targets,
  - iv. Map engagement opportunities that enhance the use of their 'voice', and
  - v. When investment mandates allow, increase funds to climate solutions and transition finance, especially in Emerging Markets and Developing Economies (EMDEs).
- This discussion paper is the result of deliberations within IIGCC's Sovereign Bonds and Country Pathways working group. It provides the building blocks for an updated *sovereign bond's target setting and implementation guidance* complementing NZIF 2.0, by: i) mapping available data for assessing sovereign bonds' alignment with net zero goals; ii) analysing country decarbonisation pathways to inform sovereign net zero alignment; iii) discussing 'fair share' elements to incorporate common but differentiated responsibility and respective capability (CBDR+RC) principles embedded in the Paris Agreement, and iv) introducing preliminary ideas to define climate solutions for sovereigns.

- While it does not delve into sovereign engagement specifics, this paper, alongside supplementary guidance by IIGCC aims to foster communication between investors, sovereigns, and other stakeholders in the investment value chain.
- Ultimately, enhanced integration of sovereign bonds into net-zero investment strategies aims to empower investors to gradually influence real-economy emissions reductions globally. Crucially investors should avoid reaching portfolio decarbonisation by rebalancing capital away from emerging markets with high emissions profiles.<sup>5</sup> Private institutional capital is essential to closing the climate finance gap, recently estimated at \$2.4 trillion of annual climate-related investments needed in emerging markets and developing countries by 2030 to meet the Paris Agreement and related development goals.<sup>6</sup>

# Context

Since The Net Zero Investment Framework was launched in 2021, multiple tools and indicators have been made available which can be integrated to enhance the target setting guidance for sovereign bonds.

In 2023, IIGCC launched the Sovereign Bonds and Country Pathways working group to update target setting guidance for this asset class and increase its adoption into net zero investment strategies. The working group was set to:

1. Map and assess the open-source data that is available for investors to discern the degree to which a country is aligned with net zero.
2. Update target setting guidance for sovereign bonds, incorporating elements of ‘fair share’ that support a *just transition*.<sup>7</sup>
3. Enhance the engagement toolbox for sovereigns.

This paper addresses the first aim and provides background for the **target setting and implementation guidance for sovereign bonds** complementing NZIF 2.0 to be released in 2024.

- i. Section 1 introduces the **scope and objectives** of this discussion paper.
- ii. Section 2 discusses a **standard for apportioning sovereign bonds emissions**. In their second edition of the Financed Emissions Standard, the Partnership for Carbon Accounting Financials (PCAF) offered the first unified standard for sovereign emissions allocation and reporting for investment portfolios.
- iii. Section 3 discusses alternative **country and regional decarbonisation pathways** that can be used as benchmarks to assess net zero alignment at the country level. It further discusses the extent to which these pathways include elements of ‘fair share’ that accommodate for principles of ‘common but differentiated responsibility and respective capability’ (CBDR+RC) contained in the Paris Agreement.
- iv. Section 4 describes different open-source **tools for assessing countries’ net zero alignment** and efforts with a focus on decarbonisation.
- v. Section 5 introduces alternative approaches for evaluating **climate solutions for sovereigns** and discusses the limitations in applying the four-step approach used by IIGCC for evaluating climate solutions for corporate assets.<sup>8</sup>
- vi. Section 6 concludes and suggests **areas for further work**.

Sections 3, 4, and 5 of this paper will be further developed in future work by IIGCC. Sovereign engagement is not covered here but will be considered in future deliberations by IIGCC members and the investment community. We hope that this document, alongside forthcoming guidance on target setting and implementation, and climate solutions for this asset class, will encourage dialogue between investors and governments to drive emissions reductions in the real economy.

# 1 Introduction

## 1.1 Sovereign bonds: A major asset class with a highly influential counterparty

Sovereign bonds are a prominent asset class in investors' portfolios. The International Capital Markets Association (ICMA) estimated that sovereign bonds made up 50% (\$63.7 trillion) of the \$128.3 trillion global outstanding bond market in 2020.<sup>9</sup> Institutional investors have increasingly committed to net zero alignment, but fulfilling these commitments will not be possible without integrating sovereign bonds into net zero investment strategies.

The profile of sovereign bond portfolios is diverse across investors. While some are index-based strategies, a significant portion of sovereign bond portfolios follow liability management or liability driven strategies (i.e., ALM or LDI strategies<sup>10</sup>). This is particularly true for asset owners, such as pension funds and insurance companies, whose future payouts to beneficiaries need to be matched with a reliable income stream from the investment portfolio.

Moreover, most investment funds, irrespective of their strategy, manage their liquidity by holding a portion of the portfolio in liquid non-cash assets, such as money market funds (i.e., funds that invests in short-term, low-risk securities, such as government bonds, commercial paper, and certificates of deposit) or liquid, high-quality sovereign bonds. Therefore, most portfolios are likely to hold sovereign bonds even if through a small indirect proportion.

Besides their relevance within investment portfolios, sovereign bond holdings establish a crucial link between investors and policy makers. Policy decisions and administrative actions made by governments – at national, state, and municipal level – can greatly impact the real economy, influencing the cost of capital for different technologies and shaping the competitive landscape. These decisions play a pivotal role in either facilitating or delaying the ability of countries and companies to reach their net-zero emissions goals.

By promptly addressing climate risks, governments can improve the overall investment environment to attract more investment from external sources that support both businesses and public entities. In contrast, neglecting climate risks can create a negative feedback loop increasing credit risk and disincentivising investment flows. As climate risks escalate, climate factors are more likely to affect the credit profile of sovereign issuers,<sup>11</sup> raising borrowing costs for both sovereign and corporate entities. Countries with weaker credit profiles may struggle to manage climate risks effectively, worsening the credit risk for corporate issuers. This, in turn, limits institutional investors' ability to fund the countries and corporates most in need.

To understand how their assets are addressing climate transition risks institutional investors increasingly seek credible standardised documents. Beyond stating commitments in their National Determined Contributions (NDCs), all countries should aim to formulate and communicate a 'Low-Emissions Development Strategy' (LEDS). These are the long-term decarbonisation plans that governments submit under the UNFCCC and should include a prioritisation of mitigation sectors and measures, as well as quantified targets consistent with their NDCs.<sup>12</sup> As of October 2023, a total of 108 Parties to the Paris Agreement (84% of the world's GHG emissions) had updated and enhanced their NDCs, but the ambition of the commitments made is still insufficient to limit global temperature rise to 1.5°C.<sup>13</sup> Moreover, out of the 195 parties who had submitted an NDC, by September 2023 only 75 had produced Long Term-LEDS, of which 7% failed to include a quantifiable long-term goal.<sup>14</sup> As 'Universal Owners', holding diversified and long-term portfolios that are representative of global capital markets, institutional investors can strive for greater climate ambition globally.

## 1.2 Encouraging greater adoption of sovereign bonds in net zero investment strategies

Institutional investors can achieve positive climate impact and therefore positive economic outcomes, by influencing the behaviour of the agents that oversee the assets in which they invest (i.e., corporates and governmental entities seeking funding in the capital markets). To provide a set of principles and guidelines to help investors to achieve positive climate impact, IIGCC along with partners (AIGCC, IGCC and Ceres) launched the Net Zero Investment Framework (NZIF) in 2021.

The Net Zero Asset Managers (NZAM) and Paris Aligned Asset Owners (PAAO) initiatives bring together over 350 investors who have made an individual commitment to transition their investments to achieve net zero portfolio GHG emissions by 2050, or sooner. Both initiatives recognise and endorse NZIF as a transition plan guide, which contains target setting methodologies. As of January 2024, over 250 signatories have set their individual interim targets for 2030. Close to 200 investors have drawn on the NZIF to deliver these targets, establishing this framework as the preferred target setting approach for investors globally.

While NZIF adoption across asset classes (equity, corporate fixed income, real estate, infrastructure, and private equity) has been growing steadily, the inclusion of sovereign bond holdings has lagged considerably. Based on IIGCC analysis, of the 200 NZIF-based targets, roughly 9% include sovereign bonds in their scope; with over 100 investors excluding this asset class from the first iteration of their interim targets. By comparison, over 95% of targets include listed equities. This wide contrast reflects the specific challenges in integrating sovereign bonds into net zero investment strategies and highlights the need for an enhanced target setting methodology for this asset class.

Ultimately, incorporating sovereign bonds into net-zero investment strategies aims to empower investors to influence emissions reductions in the real economy. This entails avoiding 'paper decarbonisation', where apparent carbon reductions result mainly from portfolio allocation decisions rather than actual emissions reductions. It also means avoiding merely shifting investments away from emerging and developing markets with higher emissions profiles. Private institutional capital is vital to support the low-carbon transition and bridge the climate finance gap, particularly in EMDEs.

## 1.3 Challenges in integrating sovereign bond holdings into net zero investment strategies

Multiple barriers have complicated the integration of sovereign bonds into net zero investment strategies. Some of these may not be easily mitigated through enhanced investor commitments, such as:

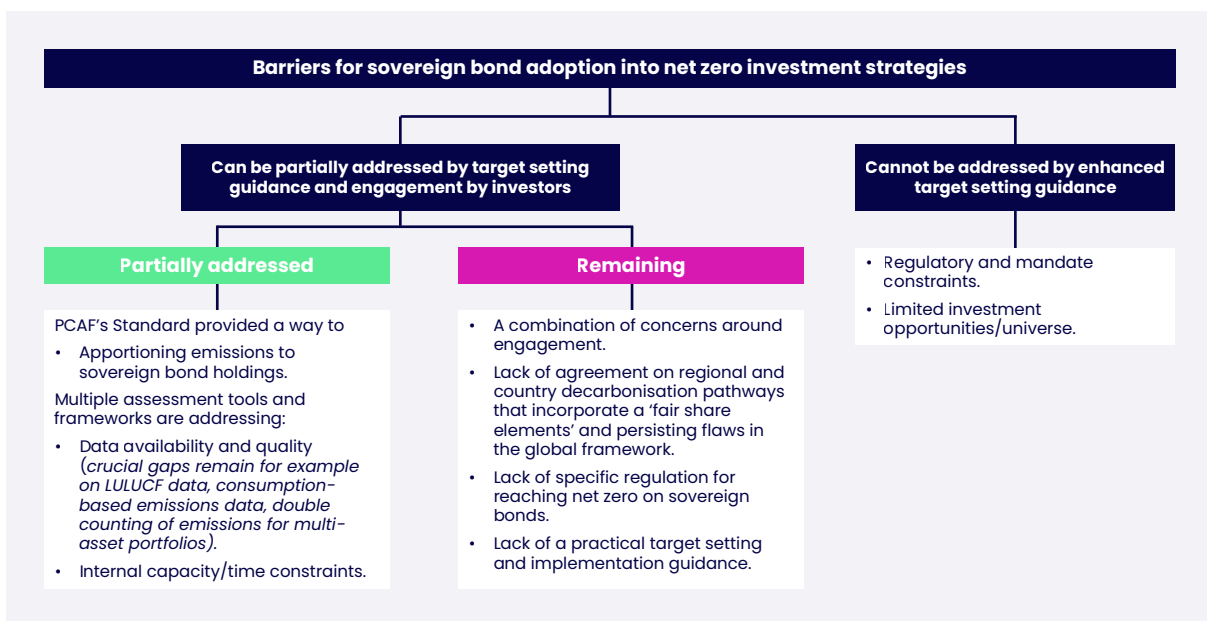
- **Regulatory and mandate constraints:** Institutional investors often allocate a substantial part of their funds to sovereign bonds based on regulatory requirements and specific mandates that limit cross-country investments. Pension funds and insurers, following liability driven strategies, prioritize low-risk, highly liquid investments, often in local sovereign issuances. By addressing climate systemic risks in the medium to long term, the pursuit of net zero objectives should not conflict with the broader goal of ensuring overall short- and medium-term financial stability. Hence, in situations where asset allocation decisions are constrained, the significance of investor engagement actions with sovereigns becomes particularly important in driving transformative change.



- Limited investment opportunities:** Unlike equities and corporate credit, there is very little turnover in the investable sovereign universe. There are [less than 150] sovereign bond issuers globally, compared to more than [70 thousand] corporate bond issuers. Furthermore, the prospect of new entrants may be low, as current sovereign debt levels and interest expense are the highest they have been in decades.<sup>15</sup> Amidst a limited and concentrated market, reducing exposure to some sovereigns on the portfolio may force others to be overweighted, which could lead to concentration risk.<sup>16</sup> In addition, some countries that are most in need of investment and are willing to pursue climate solutions are currently excluded from the investment universe due to lack of Eurobond<sup>17</sup> issuance, credit quality considerations (they either don't have a credit rating or are rated well below investment grade), and liquidity concerns tied to low issued volumes which leads to low participation in global investable indexes.

However, there are other limitations that can be gradually resolved through improved target setting and implementation guidance that leads to increased investor commitments and proactive engagement with sovereigns. Some of these limitations have been partially addressed, with varying degrees of success.

**Figure 1. Barriers for sovereign bond adoption into net zero investment strategies**



Source: IIGCC working group

The Partnership for Carbon Accounting Financials (PCAF) addressed the carbon accounting issue in their latest version of the Financed Emissions Standard.

- Apportioning emissions to sovereign bond holdings:** PCAF's Standard offers a way to assigning or allocating the responsibility of sovereign bond investments for the emissions of the corresponding countries. Some limitations remain as will be explored in Section 2.

Multiple assessment tools and frameworks, as well as emerging country decarbonisation pathways are addressing barriers related to:

- **Data availability and quality:** Data availability and quality of countries emissions and efforts to alignment varies greatly across countries. Countries that are parties to the United Nations Framework Convention on Climate Change (UNFCCC) regularly report their GHG emissions at territorial or production level to the UNFCCC secretariat and include emissions estimates in their Nationally Determined Contributions (NDC).<sup>18</sup> There are also several third-party data vendors that provide sovereign level emissions estimates. Crucial gaps remain in accounting and reporting for consumption-based emissions which incorporate emissions embedded in foreign trade, and Land Use, Land Use Change, and Forestry related (LULUCF) emissions.
- **Internal capacity constraints:** The ability of a country to gather and aggregate data, requires significant resources and coordination amongst relevant ministries. While these processes have improved, some countries may face more difficulty than others in fulfilling mounting climate-related disclosure requirements. Existing data gaps create challenges for index providers and investors who then need to fill data gaps that may expose them to greater tracking error and or potential reputational risk. Crucially, this is an area where continued investor engagement can be mutually beneficial for investors as well as sovereigns to convene and learn from each other's perspectives.

Additional barriers remain:

- **A combination of concerns around engagement:** These span limited opportunities for investor engagement<sup>19</sup> (particularly true for investors with lower AUM), the non-credible threat of 'exit' (particularly true for assets tied to ALM/LDI strategies), the complex and multifaceted nature of sovereign entities (including multiple forms of government and dynamic electoral cycles leading to potentially swinging commitments), lack of metrics to assess causation and ability to impact outcomes, among others. Investors' engagement with sovereigns is resource intensive, as it may involve repeated interactions with various entities within the target country. The complexity is further compounded by fairness concerns when engaging with countries with less historic responsibility in GHG emissions and/or lower capability to invest in the transition.
- **Persisting flaws in the global framework:** The current global framework exhibits persistent flaws, including the inconsistency in definitions among countries' NDCs, a lack of accountability for targets set, and discrepancies between commitments and the goals of the Paris Agreement. Most NDCs suffer from ambition and or implementation gaps: some have mediocre commitments, and the more ambitious are not complying with stated targets.<sup>20</sup> Furthermore, there is no consensus on the appropriate level of ambition for GHG reduction targets, particularly between developed and emerging markets. Ongoing debates centre on how these targets should equitably address concerns such as relative responsibility, the developmental needs of emerging markets, and the sovereign capability and costs associated with target implementation.
- **Lack of specific regulation for assessing and reporting on sustainability issues related to sovereign bonds:** While there is a proliferation of taxonomies to regulate ESG related finance mechanisms for investment in corporates, for the most part, these have remained silent on their treatment with respect to sovereigns. Moreover, reporting standard for public sector entities are also lacking although some bodies, such as the International Public Sector Accounting Standards Board (IPSASB), have announced the development of international sustainability reporting standards tailored to the public sector's unique needs.<sup>21</sup>

- **Lack of a specific robust target-setting methodology for sovereign bonds:** Since NZIF was first launched, multiple tools and indicators have emerged which can be integrated to enhance the target-setting guidance for sovereign bonds. By incorporating the latest insights from the industry, this paper lays the groundwork for improved target setting guidance for this asset class.

Given this non-exhaustive list of barriers, there may be scepticism about the practicality of establishing precise targets for sovereign assets. However, members of the IIGCC working group are confident that while achieving ambitious targets may not be immediately feasible, the ongoing effort can eventually influence the narrative, advance the climate agenda, and gradually overcome some of the constraints.

## 1.4 Limitations of this paper

This document provides a basis for supplementary guidance and implementation support to NZIF, hence it has a specific focus on mitigation (net zero alignment) and transition risks. Adaptation and resilience are not discussed in this document as we aim to develop a specific and detailed Climate Resilience Investment Framework, covering core asset classes and building on the work already undertaken. Investors should endeavour to draw on this framework to ensure the transition to net zero is also a resilient one. Physical impacts of climate change can present material risks to investment portfolios. IIGCC believes that management of physical climate risks is a core component of responsible investment, and therefore, an investor's transition plan. Taking action to address these risks, whilst seeking investment opportunities in adaptation solutions, is needed to build the financial resilience of individual assets and portfolios more broadly.

This paper does not address assessment of net zero alignment of State-Owned Enterprises (SOEs), some of which have different degrees of government involvement. While NZIF has not yet published a specific guidance for SOEs, these may in general be assessed under the corporate equity and corporate fixed income methodology. However, future tools that may be provided to enhance engagement with SOEs, will combine elements of both, sovereign and corporate engagement.

Sub-sovereigns are considered in scope in the climate solutions section but are not analysed at length from the net zero alignment perspective, due to lack of open-source data availability. Current methodologies primarily focus on assessing countries at the national level, and the PCAF accounting standard is yet to be extended at state and or municipal level. However, some data providers, such as CDP have been collecting sub-sovereign data from states and municipalities; CDP has obtained disclosure from more than 1,200 sub sovereign entities across almost 100 countries globally.<sup>22</sup> Nevertheless, many concepts applicable at the sovereign level can be extended to analyse policies and progress at the sub-national level.

Similarly, supra-nationals are excluded from the current analysis. According to PCA, not all supranationals are to be treated equal. Some refer to political unions (e.g., EU), while some might be multilateral banks collecting contributions from multiple country members (e.g., World Bank). While some concepts of this work could be applied to political or economic partnerships, this is not the case for the latter.

## 2 Apportioning emissions to sovereign bond holdings

### 2.1 PCAF's financed emissions for sovereign debt

The Partnership for Carbon Accounting Financials (PCAF) provides a standardized methodology for financial institutions to assess and disclose GHG emissions associated with financial activities. In the second edition of the Financed Emissions Standard published in 2022, PCAF provided a way to attribute emissions to sovereign debt.

Regarding emissions coverage, PCAF suggests applying the equivalent of Scope 1 to 3 definitions to sovereigns, aligning with how the Greenhouse Gas Protocol applies to cities, as illustrated in the table below.

**Figure 2. PCAF Standard for Sovereign Bonds – Emissions Covered**

Scope 1	Scope 2	Scope 3
<p><b>Production emissions including exports</b></p> <p>Domestic GHG emissions from sources located within the country's territory. This aligns with the UNFCCC definition of domestic territorial emissions, including emissions from exported goods &amp; services.</p>	<p><b>Emissions from imported electricity, heat, steam, and cooling (energy sector)</b></p> <p>GHG emissions occurring as a consequence of the domestic use of grid-supplied electricity, heat, steam and/or cooling, which is imported from another territory.</p>	<p><b>Emissions from non-energy imports (non-energy sectors)</b></p> <p>Emissions attributable to non-energy imports as a result of activities taking place within the country's territory.</p>

Source: [PCAF](#), Global GHG Accounting and Reporting Standard. Financed Emissions 2nd Edition, 2022.

This approach allows for different views of a sovereign's emissions activity:

- **Production emissions including exports (Scope 1)**. This view follows the territorial emissions approach adopted by UNFCCC for annual national inventories and is the one often referenced in NDCs. Note that these include emissions from exported goods & services.
- **Holistic view (Scope 1 + Scope 2 + Scope 3)**. Requested by EU Sustainable Finance Disclosure Regulation (SFDR).
- **Consumption emissions (Scope 1 – Exported Emissions + Scope 2 + Scope 3)**. This excludes emissions from exported goods and services from the holistic view.

These calculations should cover GHG emissions from key sectors and categories such as energy, industrial processes and product use, agriculture, forestry, other land use, and waste.<sup>23</sup> One of the principles of PCAF for reporting on financed emissions from sovereign debt is the reporting including and excluding LULUCF.

When it comes to the attribution of sovereign bond emissions, absolute country emissions must be normalised to allow for comparison. The Standard uses GDP adjusted for Purchase Power Parity (PPP) in international USD as a normalisation factor; this is to ensure a fairer comparison considering the size of the economies and the exchange rate effect.



Figure 3. PCAF Standard for Sovereign Bonds

<b>Attributed Emissions – general formula</b>	
<i>Attributed Emissions</i> =	$\frac{[\text{Exposure to Sovereign Bond (USD)}]}{\text{PPP-adjusted GDP (international USD)}} \times \text{Sovereign Emissions (tCO}_2\text{e)}$
<b>Financed Emissions</b>	
<b>Production view</b>	
<i>Financed Emissions production view</i> =	$\frac{[\text{Exposure to Sovereign Bond (USD)}]}{\text{PPP-adjusted GDP (international USD)}} \times \text{Sovereign Scope 1 Emissions (tCO}_2\text{e)}$
<i>Intensity Emissions, production view</i> =	$\frac{\text{Financed Emissions (Production view)}}{\text{PPP-adjusted GDP (international USD)}}$
<b>Consumption view</b>	
<i>Financed Emissions consumption view</i> =	$\frac{[\text{Exposure to Sovereign Bond (USD)}]}{\text{PPP-adjusted GDP (international USD)}} \times \text{Sovereign Consumption Emissions (tCO}_2\text{e)}$
<i>Intensity Emissions, consumption view</i> =	$\frac{\text{Financed Emissions (Consumption view)}}{\text{Population}}$

Source: [PCAF](#), Global GHG Accounting and Reporting Standard. Financed Emissions 2nd Edition, 2022.

The normalisation factor for assessing carbon intensity of a sovereign has been a source of debate, as distinct alternatives can lead to large differences for some countries. The Standard details some alternatives and their main drawback.

- **Public debt:** If outstanding debt was used as the attribution factor, attributed emissions would be dependent on the level of a government's debt, which can generate unwanted incentives in portfolio steering, and this fails to consider that sovereigns mainly finance themselves through tax revenue.
- **GDP:** Emissions per GDP is closer to the corporate approach of emissions per unit of revenue. As per most calculation methods, GDP is imperfect as a denominator in the attribution factor: it is a *flow* metric, and the relationship between investments and GDP are not 1:1. Additionally, if left unadjusted for purchasing power parity (PPP), the results tend to benefit larger developed markets over smaller emerging markets.
- **Total capital stock (IMF):** As a measure of total value of gross fixed capital formation in the economy that theoretically resembles total capital and EVIC for corporates. Lack of data availability is cited as a reason why it was not considered.
- **Population:** For consumption emissions, PCAF recommends using normalisation per capita. Assessing emissions from the consumption point of view in relation to the population leads to a more equitable approach to assess emissions impact, as will be developed later in this paper.

## 2.2 Limitations of the standard

In general, the limitations of the standard largely reflect the lack of data availability.

**Production vs consumption emissions:** It is widely accepted that consumption-based emissions more accurately reflect sovereign responsibility for GHG emissions by incorporating the effects of foreign trade. However, their use and potential to be required by the Standard is hampered by the lack of data availability and the increased complexity involved in their calculation. Currently, countries report to the UNFCCC and set NDC targets based on production emissions. Further engagement with actors in the ecosystem could lead to consumption-based emissions being transparently published and used for decision-making.

For data availability reasons, reporting emissions from the consumption perspective is recommended but not expected under the PCAF Standard. The Standard recommends considering both production and consumption emissions when analysing, comparing, and engaging with sovereigns to ensure a more holistic assessment of a sovereign's GHG emissions. Financial institutions are also invited to review at least 5 years of historical data for a better understanding of sovereigns' overall emissions trends and underlying patterns. However, it is important to note that whilst being recommended, consumption-based emissions data are currently not fully implementable for the entire sovereign debt universe.

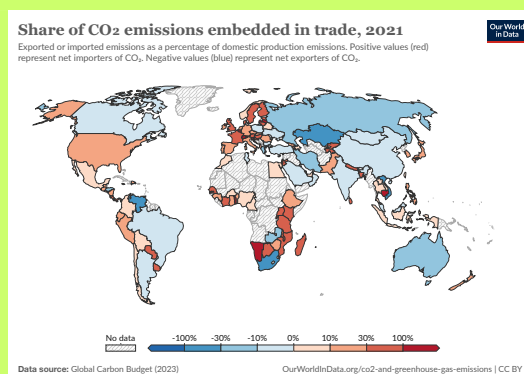
### Box 1. Carbon emissions embedded in trade: Consumption vs. production view

A statistical analysis developed by Kepler Cheuvreux, finds that developed economies often have less carbon-intensive production processes compared to EMDEs, but their consumption patterns are, on average, more carbon intensive.<sup>24</sup> Hence, from the emissions point of view, production-based data tends to penalise some EMDEs, given that a portion of their emissions are due to the production of goods to meet demand elsewhere.

While the consumption-based emissions view is more equitable, data is limited, not fully consistent across countries, and is subject to a series of assumptions embedded in their calculation. The OECD provides datasets and methodologies designed to estimate the demand-based carbon dioxide emissions.<sup>25</sup> Private vendors can also offer this data on a commercial basis.

Based on data from Global Carbon Budget, countries shown in red import more CO<sub>2</sub> embedded in goods than they export. For example, in the case of the United States, emissions calculated on a consumption basis are ~11% higher than production-based emissions.

Conversely, countries shown in blue, export more carbon embedded in goods than they import. For example, India's consumption-based emissions are 8.5% lower than its production-based emissions, meaning that this share of its emissions are being produced to satisfy the demand of countries somewhere else.



Source: Our World in Data. Retrieved February 2024. Visit the source for full disclosure of the methodology and data used.

**Emissions from Land Use, Land Use Change and Forestry (LULUCF):** These can be both a major source and sink of carbon emissions; however, there is significant data uncertainty in their estimation, and this data is often highly volatile making it difficult to consider for decision making. Inclusion of LULUCF emissions can also potentially mask increasing emissions in other sectors (e.g., energy, industrial processes). Countries and third-party data providers vary in the exclusion of LULUCF emissions from overall emissions calculations based on these limitations. One open-source data available is produced by FAOSTAT, albeit with a lag.<sup>26</sup> Aware of these challenges, PCAF expects financial institutions to report Scope 1 emissions including and excluding LULUCF.

**Double counting:** For multi asset mandates, for example a global aggregate fixed income mandate that is potentially comprised of sovereign, corporate, municipal, and securitised fixed income assets, there are concerns that attributing emissions to sovereign territories may result in double counting, for example by attributing emissions at the Swiss sovereign level as well as attributing emissions to a Swiss company at the corporate level. PCAF recommends reporting emissions separately by asset class, without aggregating them to avoid double counting.

**Sub-sovereign and municipal counterparties** are excluded from PCAF's standard due to limited data availability and because these counterparties are not directly subject to international GHG emissions inventory standards e.g., by the UNFCCC.<sup>27</sup>

**On supranationals,** PCAF does not have a formal recommendation but advises against assigning emissions on supranationals such as multilateral development banks (MDBs) based on the commitments made by member countries. Supranationals that refer to political unions or economic partnerships are different as their balance sheets represent the aggregated balance sheets of their members. For the latter, it is technically possible to aggregate the GHG emissions of the supranationals by adding up the emissions of its members. This aggregated view may be useful for engagement with respective bodies.<sup>28</sup>

## 2.3 Suitability of PCAF Standard for emissions attribution of sovereign bond holdings

In their second edition of the Financed Emissions Standard, PCAF offered the first unified standard for sovereign emissions allocation and reporting for investment portfolios. The working group reached a unanimous decision for NZIF to formally endorse PCAF as a suitable standard for attributing ‘financed emissions’ to this asset class.

### Reasons cited to support endorsement

- ✓ Industry-led effort
- ✓ The Financed Emissions Standard is a globally accepted standard with significant adoption by all types of financial institutions
- ✓ Collaborative approach
- ✓ Continuously improving

PCAF Standard offers a useful list of required data and potential sources (See Table 5-25 of the Standard).

PCAF also developed a data quality scoring framework to give an indication of the accuracy of carbon footprint calculations. Emissions data from UNFCCC national inventories are considered verified and should be assigned the highest quality score of 1. Data estimated using proxies (population, GDP, regional aggregations) should be assigned the lowest quality score of 5.

By endorsing PCAF, investors are armed with a definition of ‘financed emissions’ for its sovereign bond holdings. In the next two sections this paper explores the available tools and methodologies that support investors in evaluating the extent to which a country is aligned with net zero in accordance with the goals of the Paris Agreement.



# 3 Regional and country pathways to assess country net zero alignment

Investors can use regional and country decarbonisation pathways<sup>29</sup> as benchmarks for assessing the quality of a country's mitigation targets and its past performance. This can be done in a similar way as sectoral decarbonisation pathways – such as those published by the Transition Pathway Initiative (TPI) and the Science Based Targets Initiative (SBTi) – act as benchmarks against which investors can evaluate the past mitigation efforts and future targets of corporate in high impact sectors.

However, when assessing a country's net zero alignment and choosing the pathways that will operate as benchmarks, investors should consider the equity elements underpinning the distinction between developed and developing economies; this is to avoid implementing strategies that lead to systematically rebalancing away from emissions-intensive emerging markets assets.<sup>30</sup> According to recent estimates \$2.4 trillion of annual climate-related investments are needed in EMDEs (excluding China) by 2030 to meet the Paris Agreement and related development goals.<sup>31</sup>

This section introduces ways to incorporate elements of equity into regional and country decarbonisation pathways. It also briefly describes the types of pathways available, lists some of them, and points to their distinct attributes. It then highlights areas for improvement, which justify the need for comprehensive assessments that will be discussed in Section 4. A byproduct of this analysis may be to give investors greater nuance in assessing corporate assets against these pathways, and or combining regional with sectoral decarbonisation pathways, which will be the subject of upcoming work for IIGCC.

## 3.1 Incorporating fairness into country net zero expectations and pledges

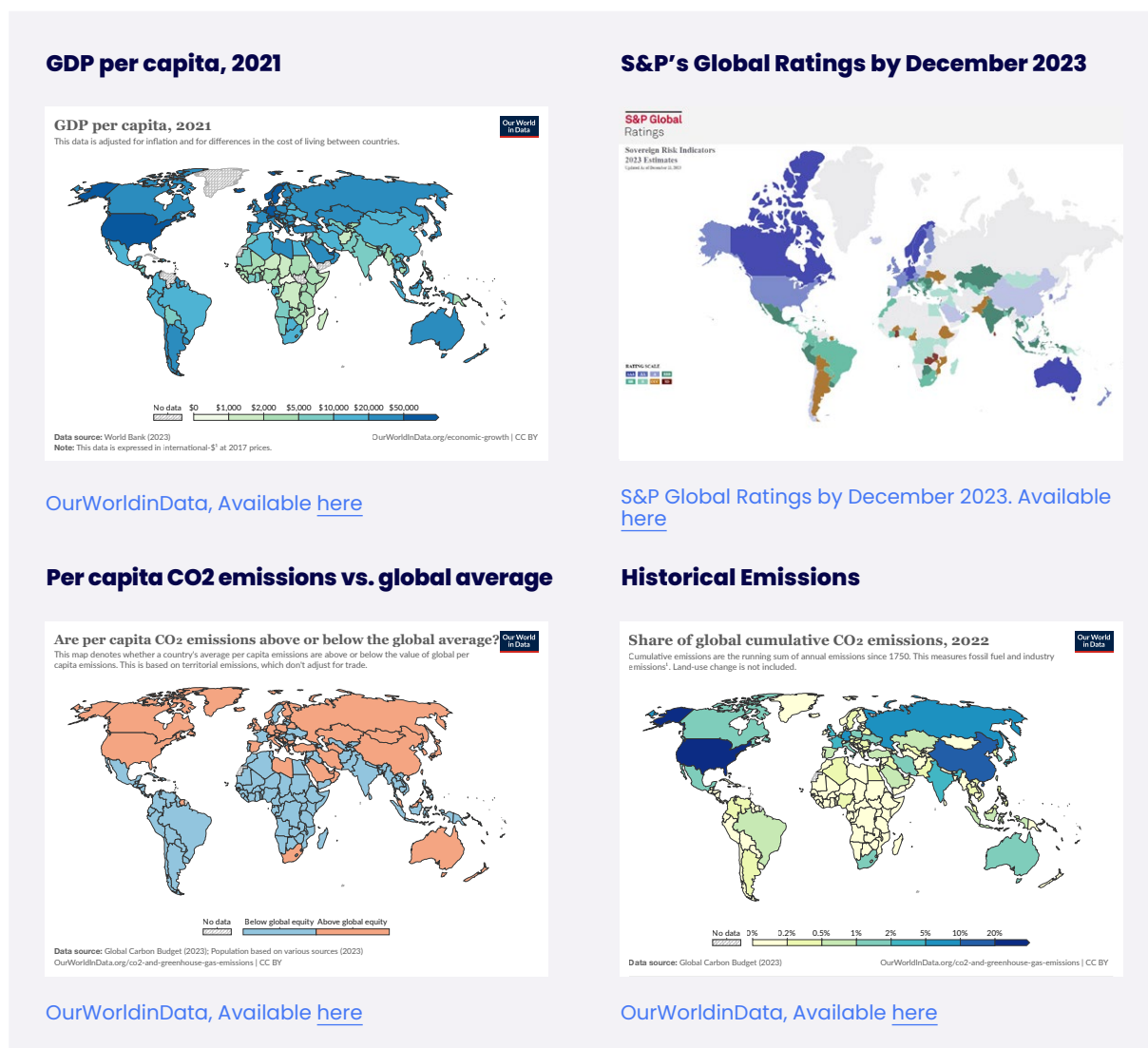
Net zero alignment at the national level will progressively influence credit ratings –of sovereigns as well as corporate bonds– via transition risk exposure.<sup>32, 33</sup> In general, countries with credible net zero pathways that successfully reduce GHG emissions, reduce fossil fuel rents, and or increase renewable energy consumption (thereby reducing transition risk), may reduce their sovereign risk and borrowing costs.<sup>34</sup> This may, in turn, have a positive impact on their overall economic performance.

Underlying these transmission mechanisms there is an imperative to connect the environmental and social realms via actions that facilitate a Just Transition.<sup>35</sup> Ignoring the fairness and equity elements of the transition may guarantee a disorderly transition or perhaps prevent it from happening altogether. At the micro-level, as carbon-intensive sectors experience the shift towards a low-carbon economy, workers and communities linked to those sectors will benefit from additional government and international support. Without such support, citizens may strongly reject climate-friendly policies and vote against climate aware politicians. At the macro-level, fiscal constraints and social unrest may further affect the investment environment and may exacerbate geopolitical tensions.

Although, in general, their historic emissions liability is larger,<sup>36, 37</sup> developed economies are currently better equipped to deal with the transition. They have access to a greater pool of financial resources to invest in green technologies, they tend to have cleaner production means, and better credit ratings leading to lower borrowing costs.

On the other hand, the economies of several emerging and low-income countries rely heavily on carbon intensive sectors; their public companies create jobs for many people and exports from high-emission industries provide a source of foreign currency and fiscal revenue, so they will need differentiated green policies to enable the transition.<sup>38</sup> The low carbon transition in emerging and developing economies requires a significant amount of investment capital. Much of that capital will come from the public sector which can in turn be partially funded by international institutional investors, for example via sovereign bonds, instruments combining blended finance, securitised assets and or private equity and credit.

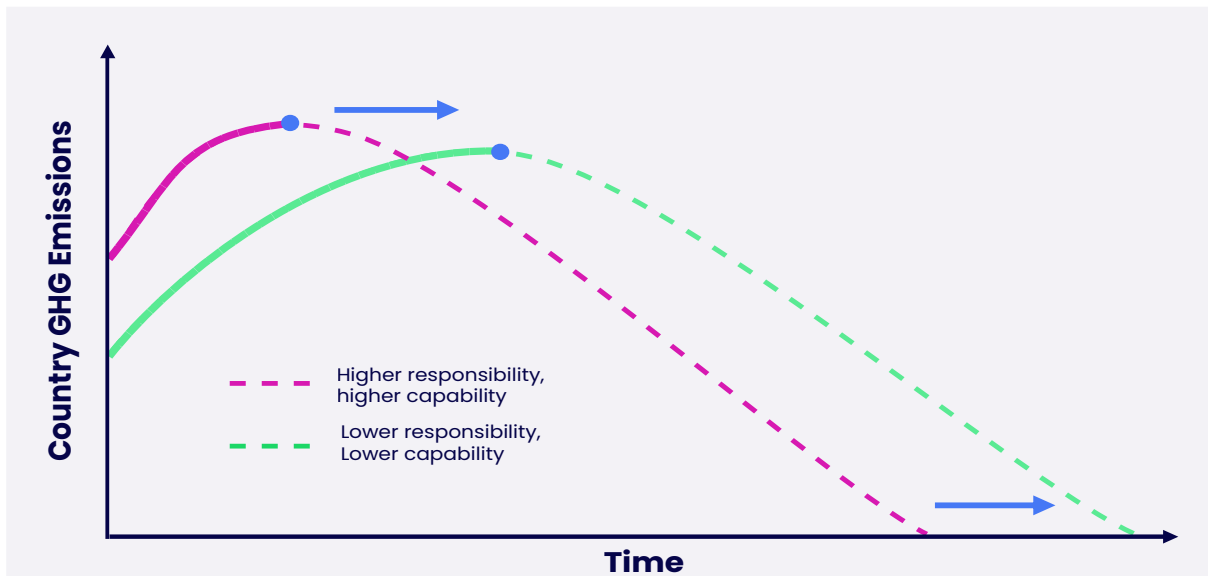
**Figure 4. Maps illustrating the distinction between developed markets and EMDEs in their differentiated financial capabilities and their responsibility for historical GHG emissions**



Recognising the distinction described above, the Paris Agreement upholds that actions taken for its implementation should “reflect equity and the principle of common but differentiated responsibilities and respective capabilities (CBDR+RC) in the light of different national circumstances”.<sup>39</sup> Equity and fairness elements of the PA are also embedded in Article 4.1., which states that the modality of getting to net zero needs to be done on the “basis of equity, and in the context of sustainable development and efforts to eradicate poverty.”<sup>40</sup>

Despite ‘equity’ and ‘fairness’ being normative concepts that may mean different things to different people, there is relative agreement on two important implications of the CBDR+RC instruction: i) developing countries will take longer to reach peak emissions, and ii) developed economies are expected to provide resources for developing economies to meet their climate targets. How much longer, and how many resources, will remain a matter of continuing negotiations defining the ‘fair share’ of effort to be borne by each country.

**Figure 5. Common but Differentiated Responsibility and Respective Capabilities (CBDR+RC)**



Source: IIGCC.

Developing countries will take longer to reach peak emissions.

Some countries should reach net zero before 2050, while some may be allowed to take longer. Currently about a dozen countries have net zero dates exceeding 2050, but the majority are aiming for 2050 or before.

Developed economies are expected to provide resources for developing economies to meet their climate targets.

In establishing the distinction between developed economies with higher historic emissions liability, and EMDEs that require external support to meet their mitigation goals, one common frame of reference is provided by the classification of parties within the United Nations Framework Convention on Climate Change (UNFCCC) signed in 1992. As of end of 2023, UNFCCC had 198 Parties divided in three groups depending on their expected climate commitments:<sup>41</sup>

- **Annex I Parties** are industrialised economies that were OECD members in 1992 plus countries with economies in transition (the EIT Parties), including the Russian Federation, the Baltic States, and several Central and Eastern European States.
- **Annex II Parties** are the OECD members of Annex I, but not the EIT Parties. These are required to provide financial resources to enable developing countries to undertake emissions reduction activities and to help them adapt to adverse effects of climate change.
- **Non-Annex I Parties** are mostly developing countries. Certain groups of developing countries are recognized by the Convention as being especially vulnerable to the adverse impacts of climate change, including countries with low-lying coastal areas and those prone to desertification and drought.

While the classification was initially intended to facilitate differentiated responsibilities and respective capabilities in addressing climate change, it has faced criticism for being outdated, inequitable, and ineffective in promoting global climate action. Some critics argue the current classification fails to account for significant changes in economic development and emissions profiles that have occurred throughout the last three decades, for example in the case of China.<sup>42</sup> Current OECD membership, or World Bank income group classification, as well as private vendors market classifications may provide some alternatives for establishing this distinction, all with their own limitations.



## Box 2. Principles of fair share and indicators to operationalise them

Rajamani et al studied 168 Nationally Determined Contributions (NDCs) to the 2015 Paris Agreement to test the fairness justifications offered to back national commitments.<sup>43</sup> The authors illustrate how various ‘fair share’ principles (left) can be operationalised using multiple indicators (right).

The paper defines “fair share” principles as those that are supported by principles of international law (e.g., sustainable development, special circumstances, common but differentiated responsibilities and equity), and distinguishes them from those that are not supported by such principles (e.g., least [material] cost and grandfathering). The authors suggest that the rationale behind states’ commitments to reach the Paris Agreement should be reviewed for consistency with established ‘fair share’ principles and the normative underpinnings of the climate change regime.

Principles	Indicators
<p><b>Backed by principles of international law:</b></p> <ul style="list-style-type: none"> <li>✓ CBDR &amp; RC</li> <li>✓ Sustainable development</li> <li>✓ Special circumstances</li> <li>✓ Equity</li> </ul> <p><b>Not backed by principles of international law:</b></p> <ul style="list-style-type: none"> <li>✗ Least [material] cost</li> <li>✗ Grandfathering</li> </ul>	<p><b>Backed by principles of international law:</b></p> <ul style="list-style-type: none"> <li>• Responsibility</li> <li>• Share of cumulative GHG emissions</li> <li>• Emissions per capita</li> <li>• GDP per capita</li> <li>• LDCs/SIDS classification</li> </ul> <p><b>Not backed by principles of international law:</b></p> <ul style="list-style-type: none"> <li>• Share of global emissions</li> <li>• Target in line with global least cost pathway</li> <li>• Emissions/GDP</li> <li>• Progression of own efforts</li> <li>• In line with own targets</li> <li>• Current emissions levels</li> </ul>

Indicators on the dashed square on the right, can be used to operationalise ‘fair share’ principles on the dashed square on the left.

CBDR & RC: Common but Differentiated Responsibility and Respective Capability. Grandfathering: prior emissions increase future emission entitlements. LDCs: Least Developed Countries. SIDS: Small Islands Developing States.

Source: Adapted from Lavanya Rajamani, et al, 2021, National ‘fair shares’ in reducing greenhouse gas emissions within the principled framework of international environmental law, *Climate Policy*, 21:8, 983–1004. Available [here](#).

When setting targets or assessing sovereign alignment, investors are encouraged to incorporate the equity principles embedded in the Paris Agreement. The principles they prioritise and the indicators they use to operationalise them are to be endorsed or developed according to their and their clients’ preference.

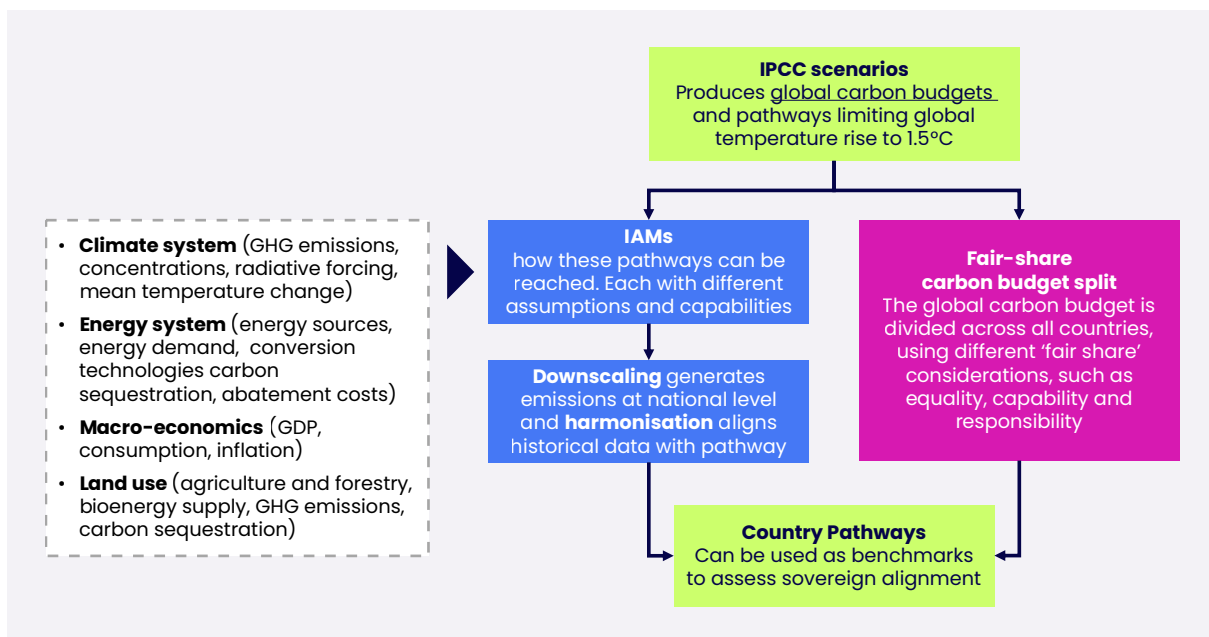
## 3.2 Existing country and regional decarbonisation pathways and areas for improvement

Country decarbonisation pathways vary substantially in the extent and pace of emissions reduction required for each country to achieve net zero alignment. Hence, when evaluating alternative pathways, it's crucial to understand their underlying methodology and key assumptions. There are two main approaches to generate country decarbonisation pathways, but to align with established climate science, both should consider the global carbon budgets provided by the Intergovernmental Panel on Climate Change (IPCC), which essentially quantifies the emissions that can still be released to limit global warming in accordance with the Paris Agreement goals. The main difference between these approaches lies on *how* the global carbon budget is allocated among regions and countries.

One approach involves the use of Integrated Assessment Models (IAMs). IAMs are simplified representations of intricate physical and social systems. They consider multiple sectors and include multiple feedback loops between climate, energy, macro-economic and land use models, incorporating a series of assumptions and capabilities. These intricate models are typically done at regional level and are then *downscaled* to the country level with different levels of granularity, and subsequently *harmonised* to align future trends with historical data. IAMs are often *least cost* models which means they focus on the most cost-effective ways to keep emissions within the carbon budget. As a result, they often overlook historic emissions and elements of equity or 'fair share' introduced above.

The alternative approach involves distributing the global carbon budget among all countries. While the IAMs are more intricate and can offer greater detail at the sector level, this method provides flexibility in the parameters used, particularly by allowing for the consideration of important 'fair share' factors when allocating the carbon budget.

**Figure 6. Alternative methods for producing country decarbonisation pathways**



Source: IIGCC. IAMs: Integrated Assessment Models. IPCC: Intergovernmental Panel on Climate Change.

The table below provides a non-exhaustive list and short description of some of the net zero regional or country decarbonisation pathways available to date. It is important to note that there is no such thing as a ‘perfect’ or ‘universally valid’ pathway; these are all constructed scenarios to inform possible internally consistent futures. Depending on their methods and assumptions, they can serve different purposes.

**Methods and ‘fair share’ considerations:** As explained above, these can be split into two main categories. IAMs that are built on intricate least-cost modelling and respond to feasibility concerns. Carbon budget splits make it easier to incorporate different fair-share elements.

- **IAMs:** Pathways from Climate Action Tracker (CAT), Climate Analytics’ 1.5 national pathways explorer, IEA, and NGFS net zero scenarios. CAT models do incorporate fairness elements by constructing a ‘fair share’ range for each country from the range of fairness estimates from the literature. Under IEA NZE scenarios advanced economies take the lead and reach net zero emissions by 2045 in aggregate. Their latest published scenarios translate in 11.6% year-on-year emissions reductions between 2022 and 2035 for advanced economies, and 6.8% for EMDEs.<sup>44</sup> Climate Analytics’ 1.5 national pathways explorer and NGFS do not explicitly consider equity or ‘fair share’ elements in their models.
- **Carbon budget split:** ASCOR fair share pathways and Equity Reference Calculator. ASCOR fair share allocation is calculated based on responsibility (historical emissions per capita over years 1990–2021), capability (GDP per capita), and equity (population). The lower the first two, and the higher the third, the more carbon budget is allocated. The CCPI uses the common but differentiated contraction and convergence approach to allocate the fair share. Equity Reference Calculator’s methodology for carbon budget allocation is not clear on the parameters used.

### Granularity and coverage

- **Regional:** Most IAMs operate at regional aggregates called macro-regions. While some have granular pathways *downscaling* these regions to the country level for several countries, others –e.g., IEA NZE scenario– only provide a split between developed markets and EMDEs as detailed above.
- **Country level:** Fair-share carbon budget split pathways have a universal coverage, given that, by definition, they divide the global carbon budget across all countries. Some IAM pathways – e.g., NGFS, Climate Analytics’ 1.5 national pathways explorer, CAT – offer good downscaling from macro-regions to the country level, but the country coverage varies significantly between them. Sven Teske’s pathway based on UNFCCC’s ‘Global Stocktake’ has sectoral pathways for all G20 countries. The CCPI has pathways for 63 countries plus the EU. ASCOR is currently limited to 25 pilot countries, but it will be expanding to 70+ countries in the coming years.<sup>45</sup>

### Motivation

Depending on the organisation that produces the pathways there are differences in the motivations and underlying assumptions used to create them. For example, some pathways such as the NGFS net zero scenarios are more policy-driven and rely more heavily on policy intervention such as carbon taxes, or market dynamics such as the scaling of carbon removal technologies, to reach a net-zero future. On the other hand, some pathways such as the IEA NZE scenarios are more energy production and consumption driven. CAT and Climate Analytics least-cost scenarios focus on maximising robustness from the established climate science perspective. Lastly, some pathways that are equity driven such as the Equity Reference Calculator or ASCOR fair share pathways, don’t look at the sectors and their required energy transformation, and instead focus on ensuring each country decarbonises according to its required ‘fair share’.

Figure 7. Mapping some country and regional decarbonisation net zero pathways

Provider	Coverage	Key takeaway
 Fair share pathways	Initially 25 pilot countries (will expand to 70 in 2024)	Carbon budget split – Based on fair share considerations (capability, responsibility, and equity)
	40 countries, including EU	IAMs & carbon budget split – Evaluates government targets and actions against IPCC pathways and against a “fair share range” of emissions allowances based on available literature. The IAM-derived pathways feed into 1.5 National Pathway Explorer.
1.5°C national pathway explorer	64 countries	IAMs – Least cost modelling; good coverage and can be viewed as the gold standard due to their scientific robustness and country-specific focus
	63 countries, plus the EU	Carbon budget split – Based on common but differentiated contraction and convergence approach
	Universal coverage	Carbon budget split – Calculator that allows the user to input their ‘fair share’ preferences. Combines estimates of emissions intensity reduction with estimates of GDP growth
	Global, split by developed and developing countries	IAMs – Bottom-up energy modelling but limited at downscaling and non-energy emissions. Emissions reduction rate only at advanced and emerging countries grouping
	IAM dependent, downscaling to ~100 countries	IAMs – Wide variety of scenarios and IAMs generated from a policy perspective. Detailed explanation of downscaling, yet technological assumptions may not be as robust
	G20 countries	IAMs – High technical resolution bottom-up pathways. Carbon budget for 2050 is calculated for each country. Information on sectors not available per country in paper
	EU27 countries	Legislation – Basic pathway based on a 55% reduction of GHG in the EU by 2030. Can be used as a benchmark by investors for EU sovereign debt

Sectoral pathways by TPI and SBTI broadly derive from IEA’s general model.

Source: IIGCC.

Lastly, beyond IAMs and carbon-split ‘fair share’ pathways, some legislations may provide mandatory targets that essentially be used as benchmarks in the same way as pathways. For example, the EU Green Deal’s current target to cut emissions by at least 55% by 2030 from a 1990 baseline.<sup>46</sup>

Continued use of these pathways by investors, and intentional efforts to better understand them, can inform ways to improve them. In a recent study by the OECD examining climate change mitigation scenarios used in the financial sector for establishing climate-related targets and evaluating alignment with the Paris Agreement, the authors found that: i) very few scenarios meet all criteria of the Paris-consistency framework; ii) the existing limited geographical and sectoral granularity requires investors to make additional assumptions to fill gaps; and (iii) users often lack adequate information on uncertainties related to scenario assumptions and feasibility.<sup>47</sup> The following are some of the additional challenges that remain and prevent the exclusive use of these pathways as the basis to evaluate net zero alignment at the sovereign level.

- **Data availability and quality** – All of the net-zero pathways available open source reflect production emissions data, thereby incorporating a disadvantage to countries that are net-carbon exporters. (See Box 1) They also often exclude LULUCF emissions, which can be critical for certain countries such as Brazil, Indonesia, and Iceland.
- **Equity considerations when dealing with countries with less historic responsibility in GHG emissions** – Many scenarios can lead to achieving the Paris-goal on paper, but not all of them can be deemed equitable or desirable from the ‘fair share’ perspective. On this specific issue, as in others, there is often information that is lost between climate modellers and model users. For example, most model users ignore if Negishi weighting is an embedded assumption in some models; this is relevant information from the equity perspective. as this approach essentially freezes the current distribution of income between world regions (i.e., rich regions stay rich, poor stay poor).<sup>48</sup>
- **Granularity and sectoral and regional integration** – Some pathway users struggle with understanding or defining each country’s highest possible ambition. More integration at granular geographical and sectoral level and covering all sources of GHG is needed to improve net zero scenario models.
- **Time track** – Some pathways focus on reaching net zero emissions by 2050 (IEA NZE scenarios, Climate Analytics national pathways explorer). Some keep track of targets and allocation only up to 2030 (ASCOR fair share pathways, CCPI, Equity Reference Calculator, CAT adds 2035 for its current policy scenario with 2024’s country updates).

As a complimentary approach to assess portfolio alignment for corporates, IIGCC proposed the Cumulative Benchmark Divergence metric (CBD) along with implementation guidance.<sup>49</sup> It uses carbon performance data from TPI to assess the alignment of companies in emissions intensive sectors by comparing their emissions reduction performance and their forward-looking targets to 2050 with the relevant sectoral benchmark arriving at a single relative alignment score. These alignment scores can be aggregated (weighting by emissions footprint and asset value) to create an alignment figure for covered assets. This approach could be extended to sovereign bonds. However, its widespread use would require scientifically robust decarbonisation pathways that are aligned with the Paris Agreement goals, provide data at least up to 2050 or more, and incorporate equity elements that can serve as ‘fair share’ benchmarks. Ideally the assessed country will be able to provide a credible target pathway up to 2050.

Even as these models and scenarios continue to evolve from the climate science perspective and through the integration of equity elements, a remaining challenge will continue to be that of distinguishing between the technological challenges, and political implementation barriers.

In view of such limitations, when assessing net zero alignment at a country level the performance against a given pathway may be complemented with more comprehensive tools or methodologies, such as those introduced in the following section.

## 4 Sovereign net zero assessments

Multiple organizations and initiatives focus on assessing the alignment of sovereigns with net-zero goals and stated climate targets. These assessments typically involve evaluating a country's mitigation commitments and actions (see Section 3), its policies, and the actions taken to decarbonise the energy mix.

Previous NZIF target-setting guidance for sovereign bond referenced the Climate Change Performance Index (CCPI) criteria to score the relative net zero alignment of sovereign assets. Since then, a variety of entities have come up with additional tools and indicators serving a similar purpose. The working group engaged with several of them based on their potential relevance, the breadth, and the transparency/replicability of their assessments. The following tools offer –all or most of– their assessment outcomes for free to users in the investment community. A full detail of their methodology is available on their website.

### **Assessing Sovereign Climate-related Opportunities and Risk – [ASCOR](#)**

ASCOR is an investor-led project that developed an open-source, publicly available, independent tool to assess the progress made by countries in managing the low-carbon transition and the impacts of climate change. It was launched in 2023 with 25 pilot countries with plans to increase coverage to 70 countries by 2024 and to 100+ countries over the coming years. The assessment is undertaken at the national level, focusing on multiple indicators across 3 pillars: Emissions Pathways, Climate Policies, and Climate Finance. The project was created to facilitate engagement and dialogue between issuers and investors and drive financing for climate change mitigation and adaptation. Its Assessment outcomes for qualitative indicators are binary variables: Yes or No. Its assessment outcomes for quantitative metrics are numerical (usually normalised). Its Assessment outcomes for thematic areas are ordinal variables based on the results of the qualitative indicators within that area: Yes, Partial, or No.

As part of the indicators supporting the assessment of the 'Emissions Pathways' pillar, ASCOR evaluates if the linear extrapolation of the country's most recent 5-year decarbonisation trend, in absolute production-based emissions, is sufficient to meet: i) the country-specific 1.5°C benchmark in 2030 (using Climate Analytics' 1.5 national pathway explorer as the benchmark), and ii) the country-specific fair share allocation in 2030 (i.e., ASCOR's carbon-budget split allocation that explicitly considers elements capability, responsibility, and equity, as introduced in section 3). Find ASCOR's detailed methodology [here](#).<sup>50</sup>

### **Climate Action Tracker – [CAT](#)**

The Climate Action Tracker (CAT) is a science-based assessment that tracks government climate action and measures it against the globally agreed Paris Agreement. The project is a result of a collaboration of two organisations, Climate Analytics and NewClimate Institute. It considers 3 elements: Policies and action, Emissions reduction targets, Climate finance. Its assessment outcome comes in the form of 5 rating categories for its overall rating as well as its elements: *Critically Insufficient*, *Highly Insufficient*, *Insufficient*, *Almost Sufficient*, *1.5C Paris Agreement Compatible*. Most of the information regarding the CAT methodology and data is publicly available, although its commercial use by investors requires a data licensing agreement.



The CAT computes country emission pathways compatible with the Paris Agreement (PA) in two ways: from a feasibility perspective and from a fairness perspective. The feasibility perspective shows Paris compatible pathways from global least-cost integrated assessment models (IAMs) scaled to the country level. The CAT also provides a fair share emission level for each country to complement the IAMs approach. This stems from fairness estimates from the most recent literature, including over 40 studies used in the 5th Assessment Report of the IPCC. From these estimates, the level corresponding to the PA agreement target is estimated using the climate model MAGICC. For some developed countries, the PA compatible fair share level might not be feasible with domestic reductions alone, but has to be reached by providing support for emission reductions overseas. The CAT also provides feasible and fair levels corresponding to higher temperature targets, they are used for rating a country's NDC. Find their detailed methodology [here](#).<sup>51</sup>

### Climate Change Performance Index - [CCPI](#)

The Climate Change Performance Index (CCPI), published annually since 2005, is an independent monitoring tool for tracking countries' climate performance. It was designed to enable transparency in national and international climate politics. Its assessment outcome comes in the form of a score, ranking and rating that measures a country's climate profile incorporating 14 indicators across 4 categories: Current emissions, Energy usage, Renewable energy, and Climate policy progress. The climate policy is assessed annually through a comprehensive questionnaire completed by up to 450 national climate experts, supporting the independence and robustness of data collection and validation. This assessment uses a standardized framework to compare the climate performance of 63 countries and the EU, which together are responsible for 90% of global GHG emissions. There are plans to expand the list of countries covered. The tool is managed by Germanwatch and the NewClimate Institute, and both the data and its methodology are freely available to the public. However, commercial use requires permission or a license.

CCPI uses a 'common but differentiated contraction and convergence' approach to calculate the Paris-compatible decarbonisation pathways. Under this approach, all countries are collectively responsible for reducing their per capita emissions, forming a common thread. However, the differentiation comes when determining the starting points for these emissions' reduction pathways. For all Annex 1 countries, the responsibility for decarbonisation begins in 1990. For all other countries from the moment, they exceed the global average per capita emissions level, with 2015 (year of the Paris agreement) being the latest acceptable starting point. This differentiation ensures that historical emissions disparities and different capabilities are addressed while fostering a sense of shared responsibility. Find their detailed methodology [here](#).<sup>52</sup>

Figure 8. Mapping publicly available country environmental assessment tools

Tool	In a nutshell
	<ul style="list-style-type: none"> <li>■ <b>Assessment tool</b> specifically created by investors to support sovereign engagement and investment decision-making</li> <li>■ <b>Coverage:</b> 25 countries initially (to be expanded to 70 in 2024)</li> <li>■ <b>3 pillars:</b> Emissions pathways, Climate policies, Climate finance</li> <li>■ Investor-driven, all from public sources, fully transparent and replicable methodology</li> </ul>
	<ul style="list-style-type: none"> <li>■ <b>Rates</b> countries' climate commitments and their effects on global warming in 5 categories.</li> <li>■ <b>Coverage:</b> 40 countries including the EU</li> <li>■ <b>3 pillars:</b> Policies and action, Emissions reduction targets, Climate finance</li> <li>■ Solid scientific base. Commercial use possible with a licence</li> </ul>
	<ul style="list-style-type: none"> <li>■ <b>Ranks, rates and scores countries'</b> climate policies and climate performance</li> <li>■ <b>Coverage:</b> 63 issuers + EU</li> <li>■ <b>4 pillars:</b> Current emissions, Energy usage, Renewable energy, and Climate policy progress</li> <li>■ Scores available since 2005, easy to understand. Commercial use possible with a licence</li> </ul>

Source: IIGCC.

All these tools place a focus on transparency, and they cover a significant portion of GHG emissions and sovereign issuers. However, some gaps can remain. Climate policies are continuously updated worldwide; this means that keeping the scores and tools up to date can be resource intensive. Some tools update their outcomes *ad-hoc*, quarterly or yearly. No such open-source tools have been published at the state or municipal level, which in the future could prove useful, specifically to assess municipalities and states that are bond issuers. Additionally, the degree to which these tools provide detail on a country's approach to nature and biodiversity protection policies can be expanded in the future.

Crucially, continued investor engagement could lead to the development of tools that have proven useful in the corporate realm and could be adapted to the sovereign sphere, such as a 'TCFD for sovereigns'<sup>53</sup>, or eventually a TNFD for sovereigns. This, beyond the disclosure regime under which countries already operate for reported both emissions and targets (NDCs) coordinated by the UNFCCC. Moreover, investor engagement could incentivise policymakers to enhance the precision of global decarbonisation pathways by creating sector-specific scenarios at the national level,<sup>54</sup> which will be greatly beneficial for example to be used as reference for climate aware benchmarks.

Beyond these tools, there are other data sources that are commercially available. For example, Bloomberg's Government Climate Scores (GOVS) measures 140 governments' decarbonisation transition efforts across +100 metrics, including forward looking data, for investors to analyse each country's progress and preparedness in meeting the global PA goals, relative to their peers. The three equally weighted score pillars include: Carbon transition, Power sector, Climate policies.<sup>55</sup> The assessment on policies is informed by its partner entity BloombergNEF which publishes a yearly Climate Policy Factbook that evaluates the G-20 members' progress in three concrete policy areas: i) phasing out support for fossil fuels, ii) putting a price on emissions, and iii) implementing climate risk policy.<sup>56</sup>

Lastly, there are other tools offering complementary data such as: The [Net Zero tracker](#), which focuses on emissions accounting and reporting, and includes data for several cities and states. The [Green Future Index](#), which offers a comparative yearly ranking of 76 nations and territories on their progress and commitment toward building a low-carbon future. The [ND-GAIN Index](#), provides information to assess a country's vulnerability and investment readiness which can help investors assess the needs and opportunities for improving resilience to climate change.

IIGCC's private vendors catalogue<sup>57</sup> includes a compilation of commercial providers offering Implied Temperature Rise measures (ITRs) for sovereigns. These are forward-looking metrics often expressed in degrees Celsius, designed to indicate the temperature alignment of specific assets with global temperature goals. Despite their appeal, two key challenges prevent their widespread use for evaluating a country's net zero alignment. Providers draw conclusions based on proprietary models leading to less transparency and scrutiny. Moreover, there is a variation in timeframes and underlying assumptions (e.g., some offer ITRs up to 2030, 2050, 2100), complicating their comparability at face value.

Investors have the capacity to wield a constructive influence not only through engagement actions that influence decarbonisation at the asset level, but also by amplifying financial support for governments and public entities to enact climate solutions.

# 5 Climate solutions for Sovereigns

This section shares introductory perspectives when applying the concept of climate solutions to sovereign bond holdings. The questions and perspectives introduced here will be expanded by upcoming supplementary guidance on Climate Solutions for Sovereign Bonds.

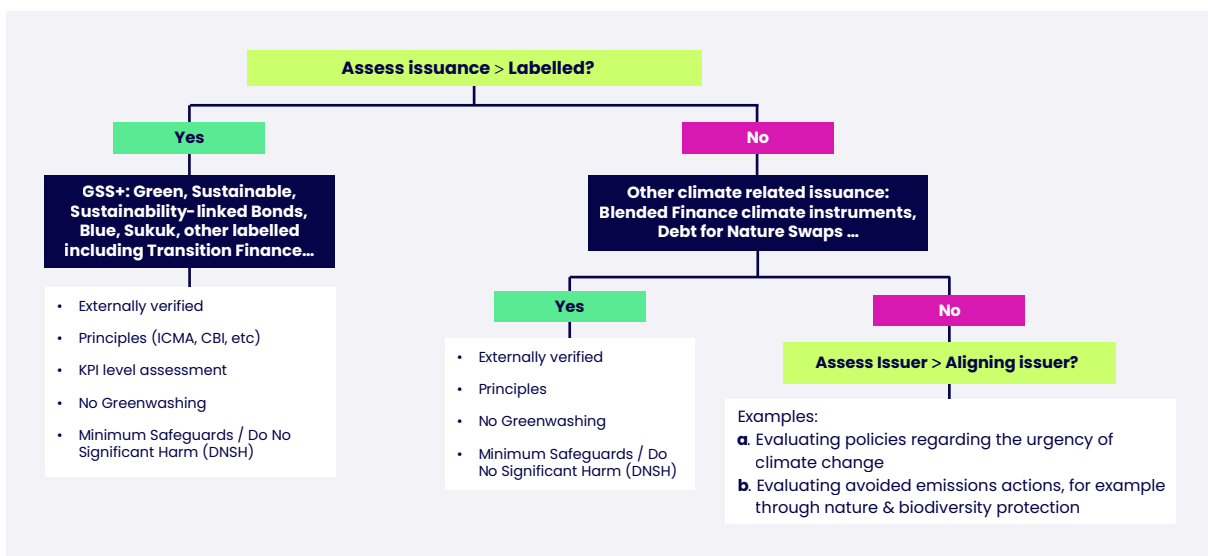
In 2023, IIGCC released guidance on climate solutions, focusing on their application to listed equity and corporate fixed income.<sup>58</sup> Climate solutions in the context of listed equities and fixed income were defined as “activities, goods or services that contribute substantially to, and/ or enable emissions reductions to support decarbonisation in line with credible 1.5°C pathways towards net zero, or that contribute substantially to climate adaptation”. The guidance proposed a four-step approach for corporates to classify and calculate climate solution metrics. However, applying this approach to sovereign entities poses challenges due to their distinct nature, governance, and financial structure. Unlike corporates, sovereigns do not produce goods or services that fit existing taxonomies, and their funding mechanisms differ significantly, making climate solutions for sovereigns difficult to assess under specific metrics such as green revenue or green capex.

While labelled bonds (also referred to as GSS+ issuance, encompassing Green, Sustainable, Sustainability-linked, and other labelled bonds) provide an easily accessible avenue for sovereign bond investors to encourage or enable increased capital deployment into climate solutions by sovereigns and public authorities, their coverage in emerging markets is still limited. The group explored ways in which the assessment of climate solutions for sovereigns could be complemented, for example, by including approaches to assess climate solutions at the issuer level in particular for EMDEs. However, challenges remain in assessing the impact and attribution of alternative approaches, and further analysis is needed.

## Deliberations around the correct identification approach

The working group studied the issuance only, as well as the issuance and issuer perspective.

**Figure 9. Potential approaches to define climate solutions for sovereigns – Issuance and issuer perspectives**



Source: IIGCC.

# 1 Issuance only perspective

## Labelled bonds (GSS+ issuance, including Transition Finance)

Labelled bonds either allocate funds to climate-related projects (through use of proceeds instruments), or explicitly commit to achieving a quantifiable result through climate-related KPIs (through sustainability-linked instruments). When issued by a national government or state or municipal public entity, this provides an easily accessible way to link investors' funding with outcomes that can be defined as climate solutions.

Notably, beyond the link and potential tag to climate solutions, there are additional intangible benefits for sovereigns when issuing labelled instruments. Some sovereign issuers regard this as a positive experience which has benefitted their countries beyond offering (in some cases cheaper) funding, for example by improving structures for additional disclosure, bolstering accountability, and fostering stronger engagement with investors on the targets and strategy.

However, in the sovereign space, labelled bonds still account for a small fraction of sovereign bond issuance, and they have limited coverage in EMDEs. Despite substantial growth in recent years, the total value of labelled (GSS+) bonds outstanding globally currently stands at \$4 trillion, of which \$511.3 billion are labelled sovereign bonds.<sup>59</sup> This represents roughly 5% of the sovereign bond market, according to some estimates.<sup>60</sup> Out of over 195 countries worldwide, 59 sovereigns –less than one-third–, have issued labelled bonds to date.<sup>61</sup> Notably, the majority sovereign bond issuance and labelled sovereign bond issuance comes from issuers in developed markets. From 2019 to 2022, the proportion of EMDEs' issuance within the overall labelled issuance fluctuated between 8% and 13%.<sup>62</sup>

Chile and Uruguay pioneered sovereign issuance of Sustainability-Linked Bonds (SLBs) in 2022<sup>63</sup>, and they remain the only ones to have done so thus far. Going forward, the [Sustainability-linked Sovereign Debt Hub](#) suggests multiple ways to scale sovereign SLB issuance including credit enhancement, catalytic financing, standardisation, capacity building, regulation, fiscal frameworks, and nature market linkages.<sup>64</sup> Yet, concerns about equity may arise with SLBs structured with a coupon step-up, as failure to meet targets could burden taxpayers to benefit private investors. Furthermore, in the broader context of sovereign labelled bond issuance, some civil society organizations worry about exacerbating debt vulnerabilities in EMDEs, and the fact that labelled issuance could divert attention from urgently needed policies to address 'fair share' considerations between Developed Markets and EMDEs.<sup>65</sup>

Some regulators and market participants have introduced *Transition Finance* as a label that seeks to encourage investors to provide the funds that corporates need to implement their net zero transition. Pioneered by Japan, the use of the label is yet to be fully adopted and scaled in the sovereign debt context. Japanese issuers issued \$5.04 billion worth of transition bonds from 2021 until the end of 2023. In 2024, there were two new issuances from the Government of Japan (the first sovereign to issue under the Transition label) totalling approximately \$10.6 billion.<sup>66</sup>

However, the 'Transition' label is not exempt from controversy, due to risks stemming from: i) ambiguity in the definition, as transition activities are usually high emitting, it is hard to draw the line of what is acceptable in terms of time/tenure and region considering CBRD+RC principles, ii) heightened risks of greenwashing linked to the above, and iii) ethical considerations around activities that may perpetuate environmental harm while balancing the social and economic impacts underpinning *Just Transition* principles. This highlights the need for clear definitions, robust oversight mechanisms, and careful consideration of the social, economic, and environmental implications of financing activities aimed at transitioning to a low-carbon economy.

In 2023, ICMA updated its Climate Transition Finance Handbook, which applies to corporates as well as sovereign issuers. This document provides common expectations on the practices, actions, and disclosures that should be made available when raising funds in debt markets for climate transition-related purposes.<sup>67</sup> The Climate Bonds Initiative (CBI) equally provides transition frameworks that apply to sovereign debt.<sup>68</sup>

Labelled bonds offer investors an increasingly accessible means to finance climate solutions for sovereigns and bond issuer states and municipalities. However, limiting the definition of climate solutions to these may overlook funding opportunities in EMDEs, and may fail to capture the spectrum of options for investors to facilitate climate financing. The working group examined alternative instruments that could promote increased capital deployment into climate solutions by sovereigns, some of which integrate aspects of labelled instruments.

## Other climate related issuance

### Blended finance<sup>69</sup> and other climate funding initiatives

As this paper emphasises above, for global decarbonisation to occur in the timeframes needed to avoid the worst effects of climate change, mobilising private capital into EMDEs is crucial. Climate and transition funding initiatives like the Just Energy Transition Partnership (JETPs) that directly address country risk and aim to contribute to a just and orderly low-carbon transition, are an important step as governments NGOs/philanthropies and private investors look to accelerate this process.

It is worth noting that much of the focus of funding initiatives like the JETPs and the broader reforms in DFIs and MDBs is on primary finance – somewhat necessarily. For many investors, particularly asset owners like pension funds, the ability to address individual country risk and focus on specific projects across multiple countries and regions is beyond current resourcing and capability. Institutional investors would benefit from active secondary markets and the aggregation of projects and finance into products that are familiar to them (labelled bonds, securitised assets, debt funds etc.) which can be facilitated by MDB reform and moving from an ‘originate and hold’ model, to an ‘originate and distribute’ one. This is where the large financial resources of institutional investors in the capital markets can help replenish balance sheets and support capital structures through de-risked investment vehicles that meet their fiduciary duty to provide risk adjusted returns to their beneficiaries.

Examples of issuances using the blended finance structuring approach, are recent nature focused transactions such as the Seychelles Blue Bond in 2018<sup>70</sup>, or Debt for Nature Swap issued by Ecuador in 2023.<sup>71</sup> As is often the case, the credibility of these structures should not be taken as face value, as there are examples of best as well as bad practices.<sup>72</sup>



### **Debt for Nature Swaps (DNS), or Debt for Climate Swaps (DCS)**

DNS and DCS consist of buying back existing debt, reducing overall principal or cash flows to provide greater fiscal space, in exchange for sovereign commitments on conservation and/or mitigation or adaptation efforts. Debt relief can be offered directly by an official creditor (in a “basic” or “bilateral” debt swap) or financed by an NGO or new lender who buys back privately held debt (in a “tripartite” debt swap). Some DNS have involved a combination of public and private support, including a financial guarantee or political risk insurance from a development bank. These Instruments might be best suited for small countries that are most exposed to climate risks. In some cases, climate-conditional grants or broad debt restructuring remain the more efficient forms of support.<sup>73</sup>

### **Insurance linked securities (ILS) such as catastrophe bonds**

Essentially, ILS are financial instruments that transfer insurance risks from insurers to capital market investors. An ILS investor will receive interest payments, paid out of the insurance risk premium plus a money market return from a collateral raised through invested funds equating the insured amount. If the insured event (e.g., fire, or flooding, in a specified location) does occur within the timeframe of the bonds (usually up to 3 years), the risk of capital loss to the investor is limited to the invested amount. The return of these instruments is mainly determined by the insurance risk assumed. The best-known ILS instruments are the catastrophe bonds or “cat” bonds, which are also the tradeable portion of the ILS market. With \$45 billion<sup>74</sup> outstanding, this is already a well-established market, and it is expected to grow in importance over the years.

It could be argued that these instruments contribute to climate resilience by enhancing disaster risk preparedness, especially when the beneficiaries are sovereigns or public entities. As extreme events become more frequent due to global warming, ILS and cat-bonds are expected to become more relevant. In such cases it could make sense to include them in the definition of climate solutions for sovereigns. A potential hurdle is the difficulty in establishing a direct causal link between climate and the insured event. Moreover, given their distinct risk profile, these instruments constitute a different asset class, with risk/return characteristics that do not resemble sovereign bonds. Some sovereigns also hold their own reinsurance contracts or have conditions on coupon change if an event occurs through disaster clauses.<sup>75</sup>

### **Other green securitised assets**

Securitisation is the process in which income generating assets are pooled and ring-fenced via Special Purpose Vehicles (SPVs) so that they can be repackaged into capital market securities. When the underlying assets credibly contribute to the environment or society in demonstrable ways, e.g. green loans, leases for solar and wind assets, green transport tickets, they can be certified and labelled as Green, Sustainable or ESG securitised assets. These instruments offer an opportunity for institutional investors to contribute to closing the low-carbon financing gap by allowing smaller scale assets to be aggregated to access the capital markets.

Some limitations preventing the scaling of this market have had to do with limited standardisation of contracts for relevant low carbon asset types, lack of sufficient volume of underlying assets to repackage, and low credit ratings for green Asset Backed Securities (ABS). Beyond helping to provide the right policy environment to tackle these challenges, sovereign entities could also tap into the opportunity by issuing these instruments with their revenue generating assets to attract greater private funding.

### Box 3. Taking steps to minimise greenwashing concerns

To minimise *greenwashing* concerns, investors can take additional steps to validate the principles and attributes of the labelled bond or climate related issuance.

This may involve further scrutiny into the bonds' credibility, integrity, and ambition. Credibility assesses the environmental benefits generated by the bond's use of proceeds or KPIs. Integrity focuses on processes and management systems governing the proceeds, mitigating risks, and reporting on thematic bond programs. Ambition evaluates the transformative power of the stated objective and action, and the issuers' contribution to that transformation. Combined, these are necessary conditions to avoiding *greenwashing*. As an example, a green bond from country X financing utility-scale solar PV could be externally verified as green, but if the reporting on the allocation of funds and sufficient tracking of proceeds is lacking, its integrity is weakened. Additionally, without clear renewable power targets from the issuer, the bond's ambition is compromised.

When it comes to sustainability-linked sovereign debt (SLBs), an institutional investor can also seek to shape the bond characteristics, pushing for nuanced yet ambitious KPIs and fair pay-off characteristics. To give more structure to the target setting exercise the World Bank, developed the Feasibility-Ambitiousness (FAB) Matrix which gauges targets along feasibility and ambitiousness dimensions. This helps issuers map out possible blind spots and avoid targets that are vulnerable to greenwashing accusations: i.e. highly ambitious targets may not be feasible (long shots), or highly feasible targets may not be ambitious (low-hanging fruits).<sup>76</sup>

## 2 Considering an Issuer perspective

As investors seek to mitigate physical and transition risks, and as the toolkit for sovereign engagement expands, there is potential to link funding of specific sovereign issuers to investors' allocation towards incentivising climate solutions, particularly with the view of expanding the coverage to some issuer countries especially when the funding is supporting EMDEs that may lack established green or sustainable bond frameworks for labelled (GSS+) issuance. The working group explored potential alternatives in which investors may establish a link for funding climate solutions, based on sovereign issuer characteristics. For example:

### i) Evaluating policies regarding the urgency of climate change

Policymakers and elected authorities can either impede or facilitate an orderly and just transition, by shaping the rules that guide and govern companies' behaviour. By setting national or sub-national net-zero ambitions and plans, they wield significant influence over the real economy. Therefore, evaluating the incentives (carrot) and penalties (stick) that public issuers perform to promote desired climate actions within their specific contexts, may be considered as an indirect avenue for investors to fund climate solutions. In doing so, Institutional Investors can encourage governments to transparently communicate their low-carbon transition plans and alignment with climate goals.

While such sustainability reporting standards for the public sector are launched and implemented, there is a pool of data available for evaluating a country's policy urgency on climate change. ASCOR, Climate Action Tracker, CCPI all assess climate policies at the national level within their assessment methodologies, albeit with different degrees of granularity. For example, under its 'climate policies' pillar, ASCOR evaluates indicators spanning climate legislation, carbon pricing, fossil fuel subsidies, sectoral transition policies, adaptation policies and *Just Transition*.<sup>77</sup>

Additional tools are provided by the IEA through its [Government Energy Spending Tracker](#), which measures clean energy investment support and consumer energy affordability measures at the national level. [BloombergNEF's Policy Scoreboard](#) assesses country's policy mix for decarbonisation across 7 sectors (power, low-carbon fuels and CCUS, road transport, buildings, industry, circular economy, agriculture), using more than 120 metrics to evaluate policies' presence (policies in place), robustness (subjective assessment of policy success, and effectiveness (quantitative metrics to measures policy success). The [Stockholm Environment Institute](#) (SEI) has announced it is working on a database on government climate policies. Lastly, PRI recently developed a global, policy-based forecast of forceful policy responses to climate change and implications for energy, agriculture and land use, the [Inevitable Policy Response](#) (IPR) forecast.

## ii) Evaluating avoided emissions actions e.g., through nature & biodiversity protection

Acknowledging nature and biodiversity's critical role in achieving global mitigation and adaptation goals, a case could be made to count as a climate solution the investments that prioritises issuers actively engaged in emissions avoidance, notably through nature conservation efforts. Deforestation and nature degradation are increasingly recognised as significant market failures. To make nature conservation financially viable, countries may need to consider implementing non-market mechanisms such as robust carbon and pollution taxes, governmental incentives for environmental services, and a re-evaluation of existing subsidies that incentivise damaging land-use change.

International negotiations, particularly surrounding Article 6 of the Paris Agreement, highlight various collaboration approaches within global carbon markets. Article 6.8 emphasizes the establishment of programs focusing on 'non-market approaches' to fulfil Nationally Determined Contributions (NDCs). A potential framework for framing climate solutions from the issuer's perspective involves assessing the issuer's implementation of Article 6.8 measures, such as establishing National Protected Areas (NPAs) alongside enforcement actions. Another example could involve evaluating the issuer's progress towards the 30×30 agenda outlined at the 2020 Biodiversity COP in Montreal, where many countries committed to protecting 30% of land by 2030.

### Challenges with the issuer and issuance approach

In exploring the issuer-level approach, overlaps with the country alignment assessment become apparent. There is also the fact that different policies might be relevant for different countries and no one-size-fits all assessment should be made. Additional complications arise as to how to deal with situations where climate-friendly policies at the issuer level are reversed post-funding, as removing a climate solution' tag linked to the issuer might be perceived as *'stone throwing'*.

More generally, key questions remain, such as whether investors can genuinely claim to have contributed to a climate solution that wouldn't have occurred otherwise (i.e., additionality concerns). Also, a significant challenge lies in addressing impact and attribution across issuer-and issuance level alternatives, as not all capital raised through sovereign debt issuance may be directed towards climate solutions, potentially overstating their impact; this is complicated by the fact that money is fungible and public budget do get frequently re-allocated. Additionally, it's crucial to evaluate issuers' credibility in successfully implementing the environmental commitments they make. Both the sovereign bonds and climate solutions working groups aim to advance this thinking going forward.

## 6 Conclusion of the working group and next steps

This paper discussed the challenges that sovereign investors face when aiming to exercise asset selection to incorporate net zero alignment considerations. Regulatory restrictions, limitations in the investable universe, flaws in the global climate governance framework, as well as complexities around investor engagement with sovereigns, explain why there is little evidence of adoption of this asset class in net zero investment strategies.

Given the relevance and scale of sovereign bond holdings, fulfilling the investors' individual commitment to reach net zero will be impossible without integrating sovereign bonds into net zero investment strategies. Despite the barriers complicating this adoption, there are also sources of recent progress that enable greater investor action: i) renewed investor interest and willingness, ii) new assessment tools and constantly improving data sources and techniques, iii) evolving sectoral and regional decarbonisation pathways, iv) enhanced target setting and implementation guidance, v) emerging opportunities to engage collectively<sup>78</sup>, and more to come.

Increased credit risk through both physical and transition lenses demands a more proactive role from investors. As 'Universal Owners' with diversified and long-term portfolios reflecting global capital markets, institutional investors have the chance to assume a proactive stance in steering a just transition to a low-carbon economy. Sovereign bond holdings offer a stage for achieving mutual benefits in enriching the engagement between investors and sovereign entities to tackle systemic climate risks and expand the funding opportunities. Institutional investors have an opportunity to help re-shape the perception of this relationship from 'order takers' to 'key partners and collaborators' in the global transition.

While regulations continue to evolve, and the enabling factors continue to improve, investors committed to reaching net zero by 2050 are encouraged to take initial measures to align their sovereign bond holdings and contribute to shape market practice:

- i.** Track and measure financed emissions for sovereign bond holdings,
- ii.** Create or endorse methodologies to assess net zero alignment at country level,
- iii.** Set net zero alignment objectives and targets,
- iv.** Map engagement opportunities that enhance the use of their 'voice', and
- v.** When investment mandates allow, increase funds to climate solutions and transition finance, especially in Emerging Markets and Developing Economies (EMDEs).

To establish goals and effectively interact with sovereign issuers, it is crucial to comprehend the specific decarbonisation pathways of regions and individual countries within global climate scenarios such as those provided by IEA, NGFS, and others that may emerge. A byproduct of this analysis may be to give investors greater nuance in assessing non sovereign assets against these pathways; however, this is not addressed in full in this paper and will be the subject of upcoming work for IIGCC.

Investors have a multiplicity of tools from which to draw on for designing or endorsing their own net zero alignment methodologies at sovereign level. The specific tool or approach taken will highly depend on their own objectives and preferences. Incorporating equity and 'fair share' elements within the assessment will remain crucial to avoid creating incentives to rebalance away from countries most in need of capital to finance the transition.

Substantial differences between corporate and sovereign call for distinct methods to identify and measure climate solutions for sovereigns. Limiting the definition to labelled bonds alone might disregard for alternative ways in which investors can encourage increased capital deployment into climate solutions by sovereigns and public authorities. The paper introduced alternative approaches for evaluating climate solutions for sovereigns, considering both the issuance and issuer perspectives.

**This paper provided the foundation for further IIGCC work in the space:**

- NZIF 2.0: High level guidance across asset classes.
- Target setting and implementation guidance: detailed guidance and support in target setting for the adoption of sovereign bonds into net zero investment strategies.
- Sovereign engagement deliberations: deliverables to be defined.
- Climate solutions for sovereigns guidance: Recommendations to measure and assess climate solutions for sovereigns.
- Emerging Markets and Just Transition workstreams: workplan under design, incorporating elements of country pathways.

# Annex

## Resources – Entities, Initiatives, databases

The following is a non-exhaustive list of resources available that can be useful for investors who are interested in assessing net zero alignment at country level. Most are open sources; but some are commercial sources. Refer to IIGCC’s Data Vendors’ catalogue for a detailed assessment of other commercial vendors.

<p><b>Net zero assessment tools at country level</b></p>	<ul style="list-style-type: none"> <li>■ ASCOR – Assessing Sovereign Climate Opportunities and Risks</li> <li>■ CAT – Climate Action Tracker</li> <li>■ CCPI – Climate Change Performance Index</li> <li>■ Bloomberg GOVS – Bloomberg Government Environmental Score</li> <li>■ Net Zero Tracker</li> <li>■ GFI – Green Future Index</li> <li>■ S&amp;P – Trucost Sovereign Carbon Exposure</li> </ul>
<p><b>Regional and country decarbonisation pathways</b></p>	<p><b>Integrated Assessment Models (IAMs)</b></p> <ul style="list-style-type: none"> <li>■ NGFS Net zero scenario</li> <li>■ 1.5 National pathway explorer by Climate Analytics</li> <li>■ IEA Net Zero Scenario</li> <li>■ Climate Action Tracker</li> </ul> <p><b>Carbon-budget split</b></p> <ul style="list-style-type: none"> <li>■ ASCOR’s carbon-split fair share pathways</li> <li>■ Climate Change Performance Index</li> <li>■ Equity Reference Project Calculator</li> </ul>
<p><b>Useful sources for sovereign climate solutions – Issuance perspective</b></p>	<ul style="list-style-type: none"> <li>■ ICMA – International Capital Markets Association</li> <li>■ CBI – Climate Bonds Initiative</li> <li>■ AFII- Anthropocene Fixed Income Institute</li> <li>■ EF Data – Comprehensive database on labelled issuance</li> <li>■ Sustainability-linked Sovereign Debt Hub</li> </ul>
<p><b>Useful sources for sovereign climate solutions – Issuer perspective</b></p>	<ul style="list-style-type: none"> <li>■ ASCOR – Assessing Sovereign Climate Opportunities and Risks</li> <li>■ CAT – Climate Action Tracker</li> <li>■ CCPI – Climate Change Performance Index</li> <li>■ IEA Government green spending data</li> <li>■ IMF Climate Change Dashboard</li> <li>■ World Bank ESG Data Portal</li> <li>■ BloombergNEF</li> <li>■ PRI – Inevitable Policy Response (IPR) forecast</li> <li>■ Stockholm Environment Institute (SEI) – upcoming database</li> <li>■ ND GAIN – Vulnerability and readiness assessment</li> </ul>



# Endnotes

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- 15 S&P Global, 2024. Sovereign Debt 2024: Borrowing Will Hit New Post-Pandemic Highs. Available [here](#).
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- 23 IPCC Guidelines for National Greenhouse Gas Inventories, 2006. Quality assurance/Quality control and verification. Available [here](#).
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- 25 For greater detail, visit OECD - Carbon dioxide emissions embodied in international trade. Available [here](#).
- 26 Visit FAOSTAT data portal [here](#) and recent methodology updates [here](#).

- 27 [PCAF](#), Global GHG Accounting and Reporting Standard. Financed Emissions 2nd Edition, 2022.
- 28 [PCAF](#), Global GHG Accounting and Reporting Standard. Financed Emissions 2nd Edition, 2022.
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- 49 IIGCC, CBD metric. Discussion paper available [here](#), and implementation guidance [here](#).
- 50 Please reach out to [Gri.Ascor@lse.ac.uk](mailto:Gri.Ascor@lse.ac.uk) for enquiries.
- 51 Please reach out to [info@climateactiontracker.org](mailto:info@climateactiontracker.org) for enquiries.
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