SUSTAINABLE DEBT
GLOBAL STATE OF THE MARKET
2022

Climate Bonds INITIATIVE

citi

GB-TAP Green Bond Technical Assistance Program
IFC International Finance Corporation WORLD BANK GROUP
Creating Markets, Creating Opportunities
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J.P.Morgan

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1. Introduction

Contents

List of Acronyms

A&R: Adaptation and resilience
ABS: Asset-backed securities
AFFLU: Agriculture, forestry, food, and land use
BILs: Bipartisan Infrastructure Laws
CBS: Climate Bonds Standard
CBS v4: Climate Bonds Standard V4
DM: Developed market
DRE: Distributed renewable energy
EM: Emerging market
ESG: Environmental, social, and governance
EU: European Union
FCA: Financial Conduct Authority
GBDB: Green Bond Database
GBF: Global Biodiversity Framework
GBP: ICMA's Green Bond Principles
GHG: Greenhouse gas
GSS: Green, social and sustainability
GSS+: GSS, SLB, and transition bonds
IIJA: Infrastructure and Investment Jobs Act
IPR: Inevitable Policy Response
IRA: Inflation Reduction Act
KPI: Key performance indicator
LAC: Latin America and Caribbean
METI: Japan's Ministry of Economy, Trade, and Industry
MDB: Multilateral development bank
S&S: Social and sustainability
SME: Small and medium-sized enterprise
SSBDB: Social and Sustainability Bond Database
SBT: Science-based targets
SBTi: Science Based Targets initiative
SBP: ICMA's Social Bond Principles
SDG: Sustainable development goal
SLB: Sustainability-linked bond
SLL: Sustainability-linked loan
SNAT: Supranational
SPT: Sustainability performance target
TNFD: Taskforce on Nature-related Financial Disclosures
TPT: Transition Plan Taskforce
UoP: Use of proceeds
YOY: Year-on-year

About this report

This is the 12th iteration of Climate Bonds Initiative's (Climate Bonds) Global State of the Market Report. The scope of this report includes analysis of the green, social and sustainability (GSS) markets, plus sustainability-linked bonds (SLBs), and transition bonds. This report describes the shape and size of the GSS, SLB, and transition (collectively GSS+) debt market as of 31 December 2022.

About the Climate Bonds Initiative

Climate Bonds is an international organisation working to mobilise global capital for climate action. It promotes investment in projects and assets needed for a rapid transition to a low-carbon, climate-resilient, and fair economy. The mission focus is to help drive down the cost of capital for large-scale climate and infrastructure projects and to support governments seeking increased capital markets investment to meet climate and greenhouse gas (GHG) emission reduction goals. Climate Bonds conducts market analysis and policy research; undertakes market development activities; advises governments and regulators; and administers a global green bond Standard and Certification scheme. Climate Bonds screens green finance instruments against its global Taxonomy to determine alignment, and shares information about the composition of this market with partners. The Climate Bonds team has also expanded its analysis to other thematic areas, such as social and sustainability bonds via the development of screening methodologies for investments that give rise to positive social impacts and added resilience. Certification against the Climate Bonds Standard (CBS) represents about 20% of global green bond market volumes. This scheme is underpinned by rigorous scientific Criteria to ensure that Certified bonds and issuers are consistent with the well-below 2˚C target of the Paris Agreement. Obtaining and maintaining Certification requires initial and ongoing third-party verification to ensure the assets meet the metrics of sector Criteria.

Climate Bonds expands its Certification scheme to include corporate entities and SLBs

Certification under the Climate Bonds Standard v4 (CBS v4) is expanding beyond Use-of-Proceeds (UoP) instruments to include non-financial corporate entities and their SLBs. Launched in April 2023, the CBS v4 is a major new development for Climate Bonds, which has driven credible climate financing for over a decade. Drawing from its experience in developing detailed sector Criteria for assets, activities and investments, Climate Bonds will provide transparent science-based Criteria for non-financial corporate entities, credible SLBs and similar instruments, and assurance for investors that sustainability requirements have been met in respect of any Certified issuance.

This work goes beyond sectoral transition pathways and includes key governance elements that indicate a company's preparedness to transition to net zero. Certification will be available for corporates with emissions already near zero as well as those with activities in high-emitting sectors, providing the corporate has suitably ambitious performance targets and credible transition plans. CBS v4 enables corporates aligned with 1.5-degree pathways, or those that will be aligned by 2030, to obtain Certification. SLBs issued by and in respect of the activities of qualifying non-financial corporates can also be Certified under the CBS v4.

GSS+ scorecard

	Green	Social	Sustainability*	Transition	SLB
Total size of market (cumulative)	USD2.2tn	USD653.6bn	USD682.0bn	USD12.5bn	USD204.2bn
Number of issuers	2,457	772	507	39	336
Number of countries	85	49	57	12	50
Number of currencies	49	42	41	7	21

*To avoid double counting, deals with multiple labels were classified as sustainability bonds.

2. Methodology

Scope of analysis

This report includes five sustainable debt themes based on the projects, activities, and expenditures financed: green, social, sustainability, SLB, and transition.

The GSS+ themes can be described as follows:

Green: dedicated environmental benefits (captured since 2012).

Social: dedicated social benefits (captured since 2020).

Sustainability: green and social benefits combined into one instrument (captured since 2020).

SLBs: changes in coupon (almost always step-ups) linked to performance against entity-level sustainability performance targets (SPTs) (captured since 2021).

Transition: UoP supporting transition at activity or entity level (captured since 2021).

Methodology overview

This report draws on three Climate Bonds databases:

1. Green Bond Database (GBDB)

2. Social and Sustainability Bond Database (SSBDB)

3. SLB and Transition Bond Database

To qualify for inclusion, debt instruments must have a label. Green, social, sustainability, and transition bonds must finance sustainable projects, activities, or expenditures. SLBs must annunciate credible and ambitious transition SPTs. Debt labels describe the types of projects, activities, or expenditures financed, and/or their benefits. Green, social, sustainability, and transition are the most common labels, but a broad range of labels is used (see Appendix 1).

Green

All deals in the green theme have been screened to verify the integrity of their green credentials. Screening is based on a set of process rules stipulated in the Climate Bonds GBDB Methodology, including carrying a label and all net proceeds verifiably (through public disclosure) meeting Climate Bonds' green definitions derived from the Climate Bonds Taxonomy.[1]

Social and sustainability

Social and sustainability (S&S) deals are classified based on the UoP (which is typically related to the deal's label), as follows:

Sustainability: UoP includes a combination of green and social projects, activities, or expenditures, e.g., renewable energy, low-carbon transport, employment generation and gender equality.

Social: UoP is exclusively related to social projects, e.g., health, employment, gender equality, affordable housing, etc.

Any instrument financing only green projects is included in the GBDB should it meet eligibility requirements, irrespective of its label (e.g., an SDG bond that only finances solar energy). A sustainability-labelled bond that only finances social projects will fall under the social theme, whereas one that finances a combination of green and social would be considered to fall under the sustainability theme.

Sustainability-linked bonds

SLBs raise general purpose finance and involve coupon step-ups or, occasionally, step-downs linked to the achievement of pre-defined, time-bound SPTs. Climate Bonds has developed a screening methodology for SLBs as transition instruments. This methodology, as well as the SLB database, are expected to launch in Q2 2023.

Transition bonds

Climate Bonds records but does not screen transition bonds. A transition bond has UoP earmarked for activities that are not low- or zero-emission (i.e., not green), but have a short- or long-term role to play in decarbonising an activity or supporting an issuer in its transition to Paris Agreement alignment. The transition label enables inclusion of a more diverse set of sectors and activities and includes labels such as blue transition and green transition. At present, transition bonds predominantly originate from highly polluting and hard-to-abate industries such as extractives like mining, materials such as steel and cement, and industrials including aviation and shipping.

As Criteria are developed, Climate Bonds will update its GBDB methodology and then begin screening bonds from issuers in those sectors for inclusion, whether labelled as transition or as green. The Climate Bonds Taxonomy defines the assets and activities that are aligned with a 1.5-degree pathway, accepting financing with either label. In 2022, Climate Bonds launched Criteria for Basic Chemicals, Cement, Hydrogen Production, and Steel. Entities operating in those sectors can now refer to the Criteria to determine the appropriate assets, projects and expenditures for inclusion in a green or transition bond.

New Climate Bonds sector Criteria for UoP bonds

	Steel	Cement	Basic Chemicals	Hydrogen
Mitigation criteria	✓	✓	✓	✓
Adaptation & resilience	✓	✓	✓	✓
Use-of proceeds instruments				
Coverage	Excludes mining, stainless & high alloy steels	Excludes concrete mixing & standalone limestone quarrying	Only basic chemicals	Hydrogen production
New assets	✓	✓	✓	✓
Mitigation measures/ retrofits	✓	✓	✓	✓
Pathway thresholds	Technology -specific	3-year pathway check OR meet average pathway value for bond tenor at time of Certification	EU Taxonomy	Estimations and assumptions based on EU Taxonomy

3. Report highlights

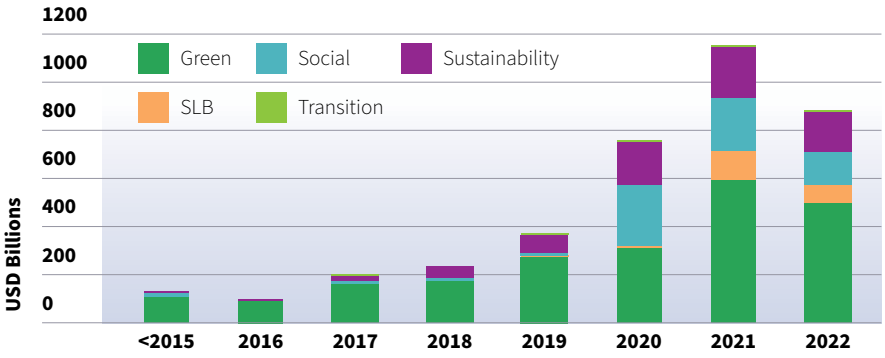
By 31 December 2022, Climate Bonds had recorded GSS+ debt instruments with a cumulative volume of USD3.7tn. In 2022, Climate Bonds captured USD858.5bn of new GSS+ volumes, 24% below the USD1.1tn recorded in 2021. Green remained the dominant theme, taking 58% of the total with volumes of USD487.1bn.

Market analysis

The sustainable debt market in 2022

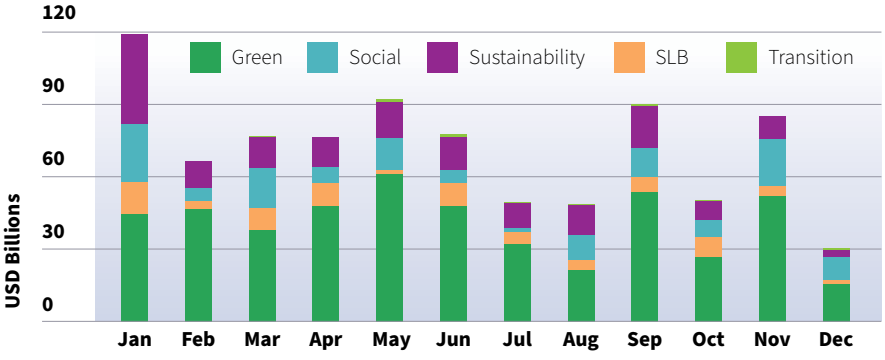
- Climate Bonds captured GSS+ debt amounting to USD858.5bn in 2022.
- January was exceptionally strong with GSS+ issuance reaching almost USD119bn, 88% more than the USD62bn priced in January 2021. Issuers began to grow nervous in February with the threatened Russian invasion of Ukraine happening towards the end of that month.
- The invasion caused energy price spikes, driving high inflation. The expectations and consequences of rising interest rates rapidly hit the debt market, and issuance in all categories of bonds declined in 2022 – this extended to bonds bearing thematic labels (-24% YOY). GSS+ deals contributed 5% to total debt market volumes, the same as in 2021.[2]
- The social theme experienced the biggest drop of 41% YOY. Issuers are no longer tapping the debt market to fund the COVID-19 recovery, favouring instead the combination of social and environmental UoP under the sustainability label.
- Transition was the only theme to demonstrate growth, expanding 5% YOY albeit from a small base. The number of transition bond issuers almost tripled. This reflects the strong policy support the label has received in China and Japan.
- Supranationals dominated the top ten sources of thematic debt in 2022, with USD115.9bn in volumes across all three GSS categories. The USA was the largest country source and priced the highest share of sustainability deals (USD21.5bn). China produced the largest volume of green bonds (USD85.4bn), France owned social bonds (USD54.5bn), Italy was top in SLBs (USD14.7bn), while USD1.9bn of transition debt originated from Japan.
- GSS+ deals were priced in 40 currencies. The top three currencies were together responsible for 81% of the volumes, including 42% priced in EUR. Investors in the region have the immediate advantage of a broader investible opportunity set.

GSS+ volumes reached USD858.5bn in 2022



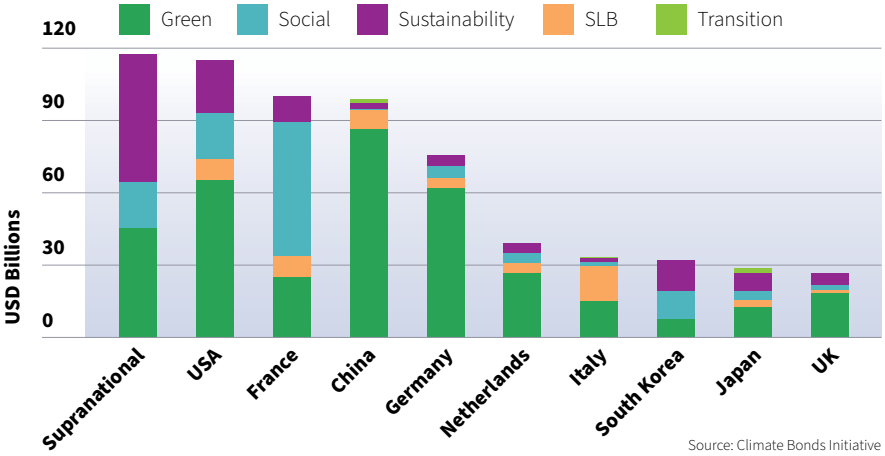
Source: Climate Bonds Initiative

January was the strongest month in 2022



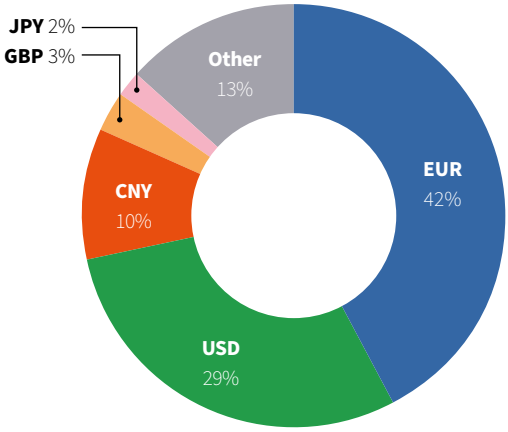
Source: Climate Bonds Initiative

The USA was the largest country source of GSS+ debt in 2022



Source: Climate Bonds Initiative

42% of the volumes were priced in EUR



Green bond market scorecard

	2022	2021	Change YOY
Size of market	USD487.1bn	USD582.4bn	-16%
Number of issuers	741	976	-24%
Average size of instrument	USD140m	USD124.6m	12%
Number of countries	51	62	-18%
Number of currencies	33	35	-6%

Social bond market scorecard

	2022	2021	Change YOY
Size of market	USD130.3bn	USD219.5bn	-41%
Number of issuers	153	183	-16%
Average size of instrument	USD55.2m	USD90.5m	-39%
Number of countries	27	30	-10%
Number of currencies	24	27	-11%

Sustainability bond market scorecard

	2022	2021	Change YOY
Size of market	USD161.3bn	USD204.1bn	-21%
Number of issuers	206	262	-21%
Average size of instrument	USD131.9m	USD176.1m	-25%
Number of countries	36	47	-23%
Number of currencies	28	31	-10%

Sustainability-linked bond market scorecard

	2022	2021	Change YOY
Size of market	USD76.4bn	USD112.1bn	-32%
Number of issuers	142	190	-25%
Average size of instrument	USD372.6m	USD437.9m	-15%
Number of countries	35	36	-3%
Number of currencies	16	18	-11%

Transition bond scorecard

	2022	2021	Change YOY
Size of market	USD3.5bn	USD3.3bn	5%
Number of issuers	25	9	178%
Average size of instrument	USD100.4m	USD278.5m	-64%
Number of countries	3	7	-57%
Number of currencies	3	6	-50%

Spotlight sections

This paper includes spotlight analyses of two topics which are expected to impact the GSS+ market in the coming year.

The Sovereign GSS+ Bond Club

Sovereign issuers wield the ultimate power in the GSS+ market due to their size and influence. This issuer category has massive potential to push the climate, social, and biodiversity agendas forwards and can help to galvanise action from the private sector. This section highlights key market developments in 2022.

Adaptation and Resilience (A&R)

The GSS+ debt market has emerged as a prominent vehicle for channelling demand from investors towards climate action. While resilience is already being financed in the GSS+ debt market, financial instruments clearly designed and labelled to support resilient investments remain scarce. Through its Global Climate Resilience Programme, Climate Bonds aims to provide the market with clearer definitions and rulesets to enable sovereign, sub-national, and corporate debt issuers to finance projects that increase physical, social, economic and ecosystem dimensions of resilience.

Size matters: Green bond issuance rankings in 2022

Largest Green Bond

European Union

Amount: USD6.5bn

UoP: (1) Research and innovation activities supporting the green transition, (2) Digital technologies supporting the green transition, (3) Energy efficiency, (4) Clean energy and network, (5) Climate change adaptation, (6) Water & waste management, (7) Clean transport & infrastructure, (8) Nature protection, rehabilitation and biodiversity, (9) Other enabling activities

Largest Sovereign Green Bond

Republic of Italy / Federal Republic of Germany

Amount: USD6.1bn (reopening) / USD4.9bn (new bond)

UoP: Renewable energy, transport, building, water, waste, and land use / Transport, international cooperation, R&D, energy and agriculture

Largest Certified Climate Bond

Dutch State Treasury Agency / China Development Bank

Amount: USD5.2bn (reopening) / USD2.3bn (new bond)

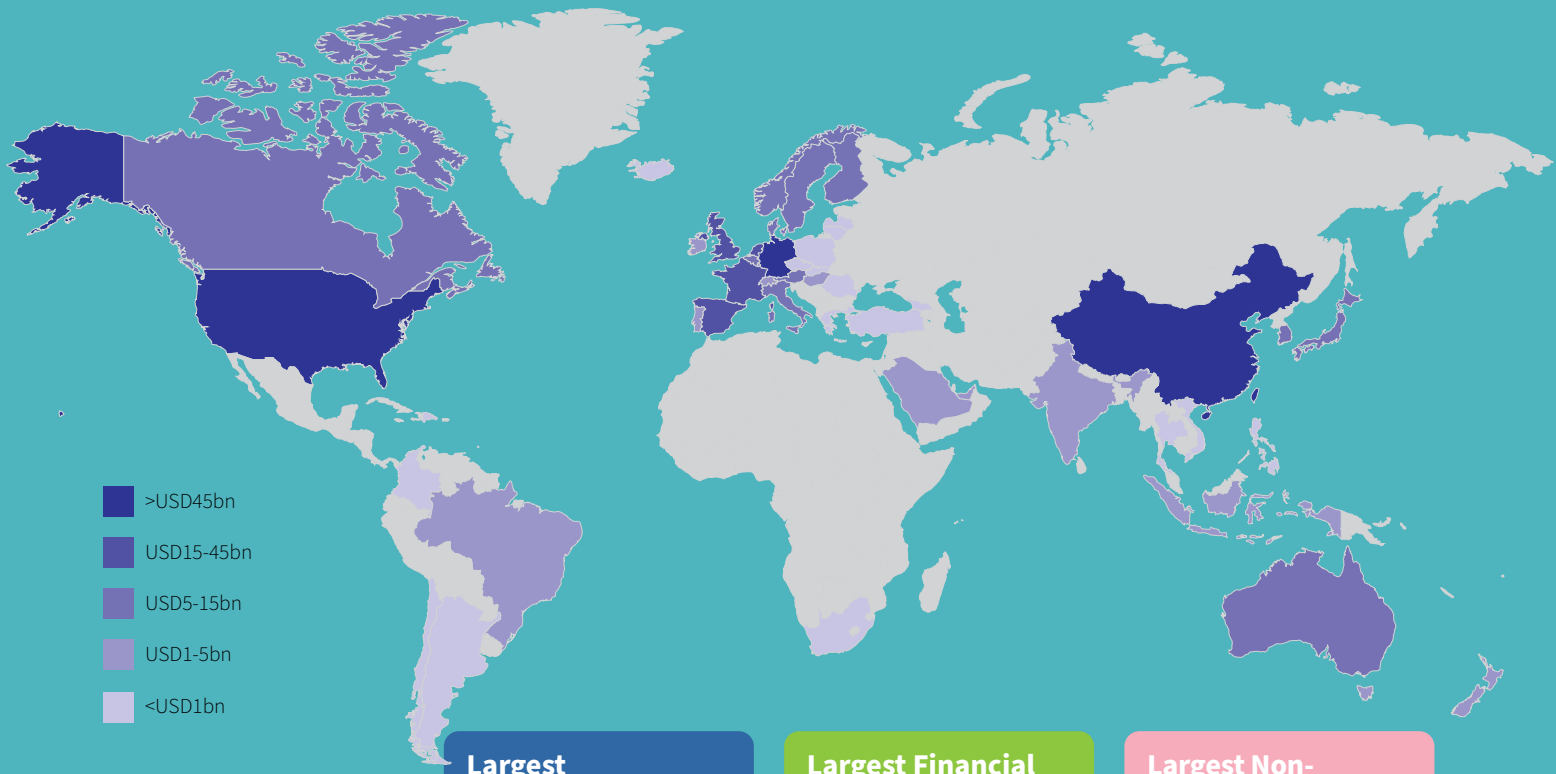
UoP: Delta Plan, i.e., the world's most advanced and sophisticated floodplain management system / Low-carbon transport

Largest Green Sukuk

Republic of Indonesia

Amount: USD1.5bn

UoP: Renewable energy, transport, building, waste, land use, and climate change adaptation



Largest Development Bank Green Bond

European Investment Bank (EIB)

Amount: USD4.3bn

UoP: Low-carbon transport, energy efficiency and renewable energy projects

Largest Financial Corporate Green Bond

Bank of China

Amount: USD4.7bn

UoP: Renewable energy, low-carbon transport, waste recycling, water

Largest Non-Financial Green Bond

Société du Grand Paris*

Amount: USD1.9bn

UoP: Low-carbon transport, i.e., Paris metro project

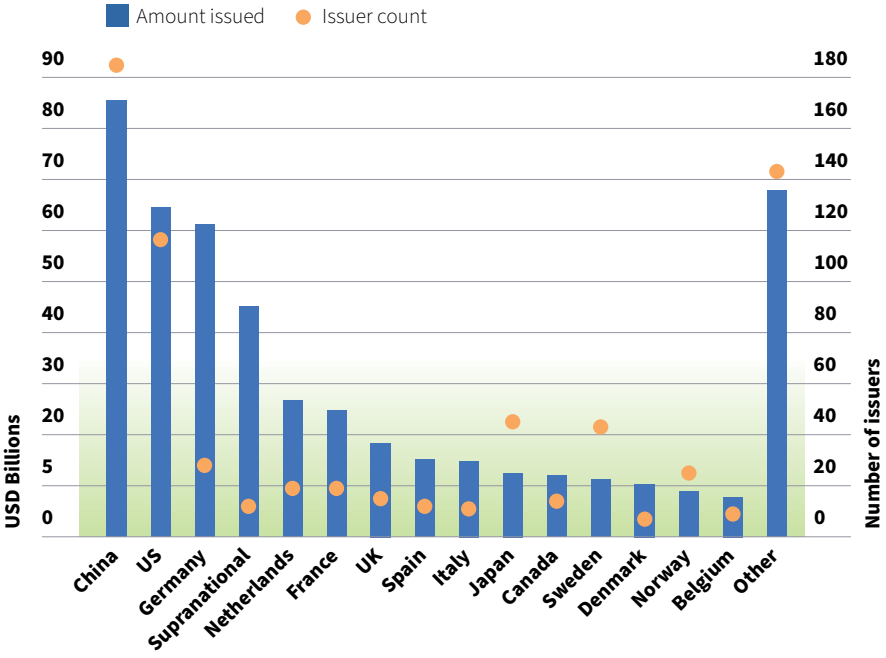
*GBE

4. Green

Introduction

- In 2022, green bond issuance experienced its first YOY drop for a decade, reaching USD487.1bn (16% lower than 2021 volumes).
- Prevailing market conditions fuelled a decline in debt issuance volumes across all categories of bonds. Green bonds maintained 3% of overall issuance volumes.[3]
- The green label continues to dominate global thematic debt issuance, ending the year with 56% of GSS+ volumes and lifting the cumulative total of the segment to USD2.2tn.
- To date, green bond demand has far exceeded supply. This continued in 2022 and issuers of green bonds remarked that investors describing themselves as green or socially responsible helped to get deals over the line.[4]
- Many countries committed some portion of their fiscal spending to accelerate the transition to a low-carbon economy. Several European Union (EU) member states continued to issue green bonds, France being the most consistent country in its sixth consecutive year of issuance. Newcomers to the Sovereign Green Bond Club were Austria, Canada, Denmark, New Zealand, Singapore, and Switzerland.
- The global energy crisis has fuelled clean-energy policy in the world's largest economies.[5] As governments worldwide keep expanding their climate ambitions, more capital is being earmarked to increase renewable energy capacity and nascent technologies, such as green hydrogen.

China surpassed the USA as the main source of green debt in 2022



Top 3 green bond market trends in 2022

1. The green bond market was somewhat affected by the global market turmoil throughout 2022, such that issuance was lower compared to the prior year. However, it did hold its own, maintaining c. 3% of the total issuance volume.

2. With respect to disclosure, achieving an adequate level of rigour in a rapidly evolving market remained a key challenge in 2022. As more rules are developed, and processes and metrics for measuring the impact of investments evolve, it can be challenging for issuers to keep pace. Issuers need to keep informed and evolve with the market, but overall will need to strengthen their entity level-reporting capabilities.

3. Most of GSS+ bonds with A&R-related UoP issued in 2022 were labelled as green (53%) (see spotlight section on Resilience on page 26).

The 2022 green bond market in numbers

TOP 3 COUNTRIES

1. China USD85.4bn (18%)
2. USA USD64.4bn (13%)
3. Germany USD61.2bn (13%)

TOP 3 ISSUERS

1. European Union, Supranational (SNAT) (USD26bn)
2. European Investment Bank (EIB), SNAT (USD14.5bn)
3. Federal Republic of Germany, Germany (USD14.3bn)

TOP 3 MOST FREQUENT ISSUERS

1. Ginnie Mae (431 deals)
2. Fannie Mae (263 deals)
3. Deutsche Bank (71 deals)

Green loans

Green loans are a form of financing that enables borrowers to raise capital for projects that have a positive environmental impact. Like green bonds, they are dependent on environmental or climate criteria for the planned UoP.

However, these loans differ from green bonds because they are typically smaller in size and done via a private operation. Another important difference, particularly in the sustainable finance market, is that loans generally have more opaque disclosure given they tend to be privately (often bilaterally) arranged. This means it is often hard to (i) discover relevant deals, and (ii) find essential information about the deals, including details such as loan amount and term, as well as UoP.

Climate Bonds tracks green loans within the Climate Bonds GBDB, but with the caveat that this data is collected on a best-efforts basis (unlike green bonds, where the confidence level is much higher) and deals may take longer to be added to the database. Green loan figures included in this report are therefore indicative and should be treated as such.

As of 20 January 2023, Climate Bonds captured USD10.4bn of green loans priced in 2022. The addition of 49 loan instruments contributed 19% to the cumulative total of 263. Green loans constituted 2% of the market in 2022, and 70% of the volume originated from Asia-Pacific and Europe combined (35% each).

At present, Climate Bonds does not track S&S loans in the SSDB, nor sustainability-linked loans (SLLs) among general purpose instruments (only SLBs).

One new market, 382 new issuers

The Dominican Republic was the only country to join the green bond market in 2022, as the country's major public-private power generation company **Empresa Generadora de Electricidad Haina (EGE Haina)** made its debut with a USD20m bond. The proceeds were earmarked for the expansion of the installed capacity of its wind farm from the current 176 MW to 296 MW.

The 382 debut green bond issuers accounted for USD142bn of green volumes, or 29% of the 2022 total. Non-financial corporates were responsible for 37% of debut issuer volume. With USD9.6bn and 431 deals, **Ginnie Mae** was the top debut issuer. The **Republic of Austria** made the second-largest contribution to debut volumes, printing two deals with a total of USD5.3bn. The **Government of Canada** placed third, with a sovereign green bond worth USD4bn.

Geographical contribution

Two-thirds (67%) of 2022 green bond volume originated from developed markets (DM), 23% from emerging markets (EM) and 9% from SNAT issuers. Volumes shrank in all regions YOY, except SNAT which stood at USD45.1bn, a 43% increase from the prior year.

The bulk of SNAT growth was driven by the **EU**'s extensive green bond programme, which since its debut in October 2021 has issued a cumulative total of USD39.9bn over four deals. This is part of the European Commission's efforts to fund up to 30% of its NextGenerationEU recovery plan by issuing dedicated green bonds, aimed at generating multiple benefits for the EU, capital markets, and sustainable finance. Stated objectives include (i) bringing a new highly rated and liquid green asset to the market, giving access to green investments for a wide range of investors; (ii) helping the European Commission access a wider range of investors; (iii) allowing investors to diversify their portfolio of green investments with a highly rated liquid asset, thereby potentially accelerating a virtuous circle of sustainable investments; (iv) further boosting the green bond market and serving as an inspiration to other issuers; (v) strengthening the role of the EU and the Euro in the sustainable finance markets.[6]

Pending green bonds

As of 20 January 2023, USD20bn of green bonds priced in 2022 remained under assessment (pending) for inclusion in the Climate Bonds GBDB. While the size of the green bond market has broadly experienced an exponential upward trajectory in the past decade, there is lack of standardised information and common definitions across global markets, which would boost the growth of a cohesive market.

The buildings industry and property sector represent a particular challenge. A wide range of building certification schemes and energy efficiency ratings are used across the market as evidence of green impact. Issuers' public disclosure on the carbon mitigation aspect of the assets funded via green bonds is often inadequate. Climate Bonds seeks high levels of ambition from green bond issuers, supporting deals that deliver decarbonisation sooner and that help keep global warming to 1.5 degrees. Only highly rated, well-established international and local certification schemes and energy performance rating schemes are eligible for inclusion in the GBDB.

Another key challenge relates to the lack of CO_2 emissions levels for low-carbon transport vehicles. This asset category is often presented with no eligibility threshold by issuers. As the market develops, new low-carbon technologies make alternatives mainstream. Low-carbon vehicles should adhere to a maximum of 50gCO_2/p-km to the end of 2025 and zero thereafter.

Assets that are not supportive of rapid decarbonisation are not eligible for inclusion in the GBDB.

Cumulative regional green bond issuance since 2006

Region	Green bond markets	Issuers	Amount issued (USDbn)	Change 2021-2022
Africa	9	24	4.7	↓
Asia-Pacific	23	973	512.7	↓
Europe	34	647	1,001.9	↓
Supranationals	-	17	168.5	↑
Latin America	16	130	37.5	↓
North America	2	669	434.2	↓

The growth in Asia-Pacific, the second largest region, can be attributed to the increasing weight of financial corporate issuers in the market, which contributed USD51.8bn or 39% of its issuance in 2022 (2021: USD39.7bn or 28%). The top three most prolific Asia-Pacific countries were China (USD85.4bn and 332 deals), Japan (USD12.6bn and 69 deals) and South Korea (USD7.9bn and 30 deals). China's strong performance (up 22% from 2021) was driven by the top three regional issuers: **Bank of China** (USD12.8bn and ten deals), **China Development Bank** (USD7.8bn and six deals) and **China Three Gorges Corporation** (USD5.1bn and 14 deals).

The 2022 green bond market in numbers

DEAL SIZE

- **14%** of deals were benchmark-sized (USD500m+)
- Average deal size **USD140m** (2021: USD125m)

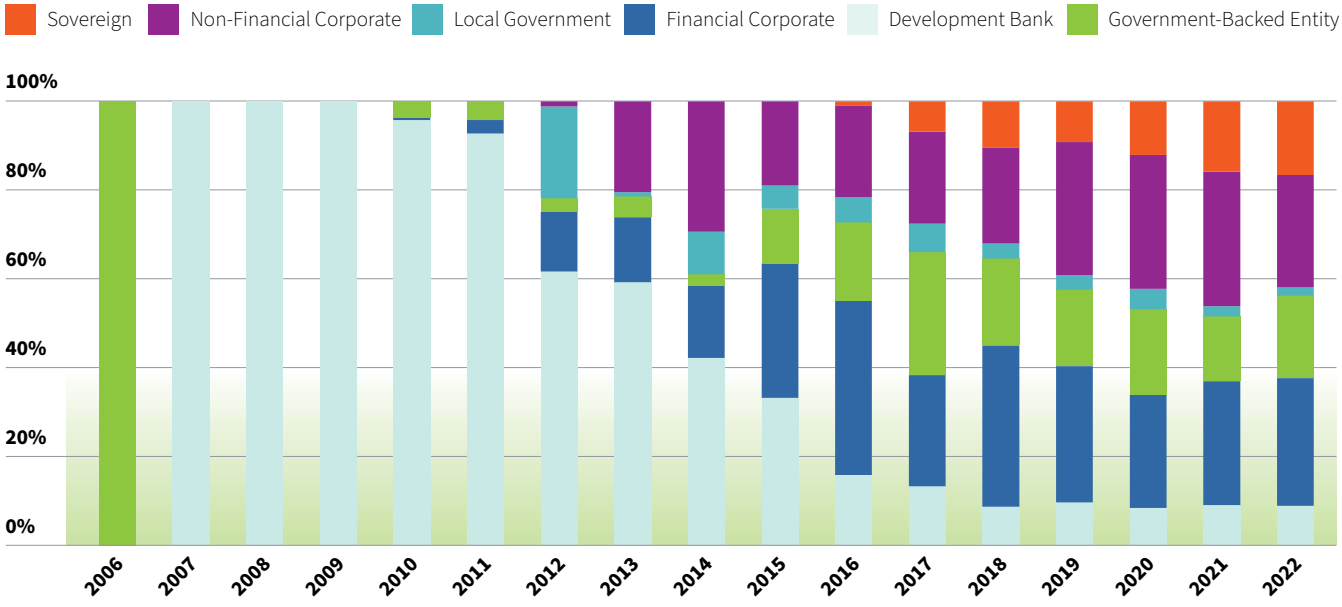
DEAL CURRENCY

- **79%** of issuance in hard currency (2021: 81%)
- Deals issued in **33 currencies** (2021: 35)
- Top 3 currencies: **EUR**, **USD**, **CNY**

EXTERNAL REVIEWS

- **16%** of deals received an external review (2021: 10%)

Corporates contributed 54% of green volumes



The private sector fuelled 2022 market growth

Private sector issuers were responsible for most of the green volumes in 2022, with a slight drop to 54% from 58% the prior year. Financial corporates made the largest contribution with 29% of volumes, while 25% originated from non-financial corporates. European corporates were responsible for just under half of private sector green bond issuance, the two most prolific issuers being German commercial bank Helaba (USD5.2bn and 45 deals) and Danish multinational power company Orsted (USD4bn and six deals).

Just under a fifth (19%) of 2022 green bond issuance originated from government-backed entities, which was the only issuer type to record an increase versus 2021 (up 6%). Growth in this segment was driven by the **EU**, addressed above, which reopened its 2037 deal three times for a total of EUR6.5bn (USD6.9bn) to fund a broad range of UoP categories leading to GHG emission reductions and adaptation measures. By volume, **Fannie Mae** took the second spot with USD10.2bn, and was also second by number of deals (263), after **Ginnie Mae** (USD9.6bn, 431 deals).

Top green non-financial corporate issuers, 2022

	2022		Cumulative totals	
Issuer name	**USDbn**	**Number of deals**	**USDbn**	**Number of deals**
China Three Gorges Corporation	5.1	14	13.7	34
Orsted	4	6	9.4	15
Iberdrola	3.1	4	8.7	12
Honda Motor Company	2.8	3	2.8	3
Volkswagen	2.6	3	2.6	3
E.ON	2.6	3	7.6	8
EDP	2.4	3	2.4	3
General Motors	2.3	2	2.3	2
RWE	2.1	1	4.3	4
Huaneng Lancang River Hydropower	2	16	2.5	22

Largest deal in each issuer type, 2022*

Issuer type	Issuer	USDbn
Development bank	EIB	4.3
Financial corporate	Bank of China	4.7
Government-backed entity	EU	6.9
Local government	Province of Ontario	2.1
Non-financial corporate	RWE	2.1
Sovereign	Republic of Italy	8.2

*Includes reopenings/taps

Green bonds: an opportunity for biodiversity

Biodiversity is a vital aspect of bio-economy protection, and species variation provides the foundation for food systems, ecosystems, and terrestrial and aquatic life. The increased profile driven by COP15, the Global Biodiversity Framework (GBF) and the work of the Taskforce on Nature-related Financial Disclosures (TNFD) have catalysed an expansion in issuance with UoP targeting biodiversity protection and restoration compared to 2021 levels.

In 2022, 60 bonds were issued with UoP for biodiversity protection projects. Europe was the source of 46 deals, and UoP included financing in line with national biodiversity strategies, conservation of flora and fauna, forest protection and protection of Natura2000 sites (a coordinated network of protected sites for the breeding and resting of threated species). Some bonds specifically listed protection of endangered species to encourage recovery of wild species numbers.

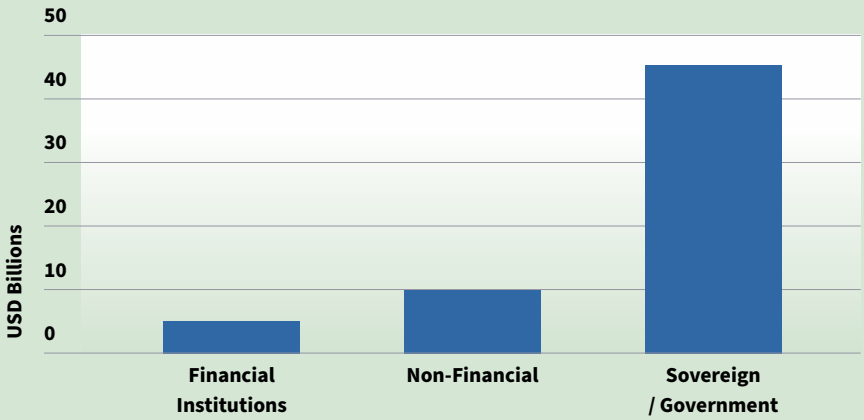
Bond issuance from agriculture, forestry, food, and land use (AFOLU) can impact biodiversity protection. Deals that support a variety of crops encourage a systemic shift away from monocultures and allow for diversification in crop genes, encouraging greater wildlife presence, better resilience in the face of climate change, and better protection against soil degradation.

Proceeds were also earmarked for aquatic and marine protection, reducing overfishing and healing fish stock numbers to aid marine recovery and improve diversity of aquatic life. Marine forests are highly efficient at storing carbon, and preservation of these areas is therefore crucial.

Deals from Asia-Pacific allocated UoP to general biodiversity protection, habitat enhancement, nature corridors and wetland recovery as part of action to protect natural areas. This included a CNY1bn (USD139.5m) 2025 maturity non-financial issue from China Tiegong Investment & Construction Group, with 100% of UoP going to restoration of biodiversity, and two sovereign green bonds from Hong Kong SAR (HKD20bn; USD2.5bn) and Singapore (SGD2.4bn; USD1.8bn).

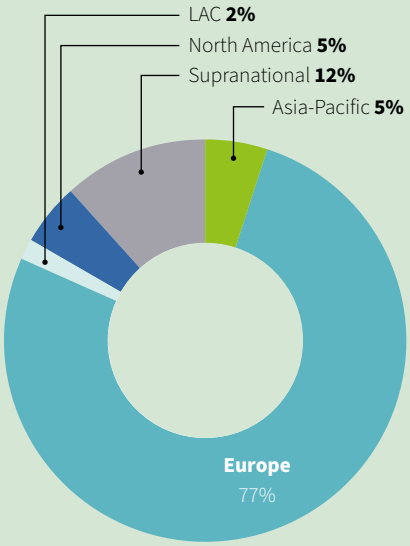
Globally, 45 sovereign and government-backed deals have indicated national-level interest in biodiversity protection in line with international agreements, such as the GBF and SDGs. This included sovereign issuance from Hungary with expenditures earmarked for improving national biodiversity; and the UK UoP for the Future Farm and Countryside Programme, which aims to improve terrestrial and marine biodiversity. The EU earmarked UoP for protection of Natura 2000 sites. Among the 45 deals, 36 included agricultural UoP for projects such as certified organic agriculture, soil restoration, low-impact agriculture and sustainable fisheries, making the critical link between biodiversity and agriculture.

Issuance with 'biodiversity' mention within agriculture and land use bonds globally in 2022



Source: Climate Bonds Initiative 2022

Issuance with 'biodiversity' mention within agriculture and land use bonds in 2022 by region



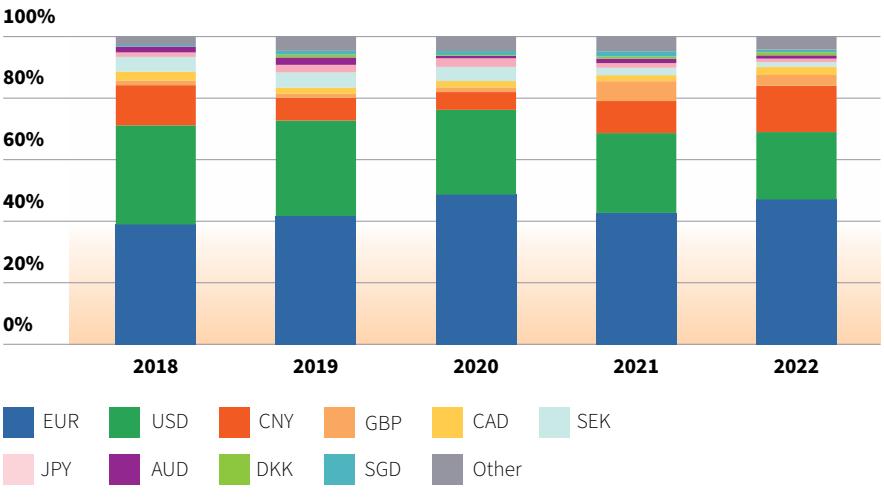
Source: Climate Bonds Initiative

EUR is the preferred currency

In 2022, hard currencies were the source of 79% of green bond issuance. CAD and NZD were the only currencies to experience an upward trend, by 10% and 153% respectively. Both Canada and New Zealand priced debut sovereign green deals in their respective local currencies in 2022.

EUR was the preferred currency for the fifth year in a row. The 357 EUR-denominated deals from 170 issuers in 2022 lifted the currency's cumulative volume to USD922.1bn. Europe is the source of the most advanced policy measures and largest number of dedicated investment mandates, hence the region has dominated green bond issuance. Issuers bringing EUR-denominated debt can maximise exposure and investor diversification.

Top 10 currencies in 2022: CNY increases share



Source: Climate Bonds Initiative

The Asia-Pacific market share increased YOY driven by Chinese issuers, reflected in a 21% uptick in CNY-denominated issuance to USD73.3bn in 2022.

Average deal size grew

Benchmark-sized deals (USD500m and above) accounted for 69% of the volumes in 2022, slightly up from 67% the prior year. Small deals are the most frequent by number, with 88% of green bonds below benchmark size and over two-thirds falling into the <USD100m bucket. The average size of green bonds increased to USD140m from USD124m in 2021.

More shorter tenor deals

Short-to-medium tenors prevailed among green bonds, as one would expect in a rising rate environment. YOY contribution from this segment increased slightly from 64% to 66%. The largest tenor category in 2022 comprised bonds maturing within five years (38% of volumes), followed by 28% falling into the 5-10-year bucket. The public sector accounted for 80% of the longest tenor bucket (20-years and above), with sovereigns making up 39%.

Issuance from Asia-Pacific was dominated by short-dated bonds (up to five years), while DM volumes were more skewed towards longer tenors. Saudi Arabia's Public Investment Fund priced the first century green bond in October. The USD500m 2122 maturity was part of a three-tranche deal including USD1.25bn maturing in 2027, and the same amount in 2032.

External reviews

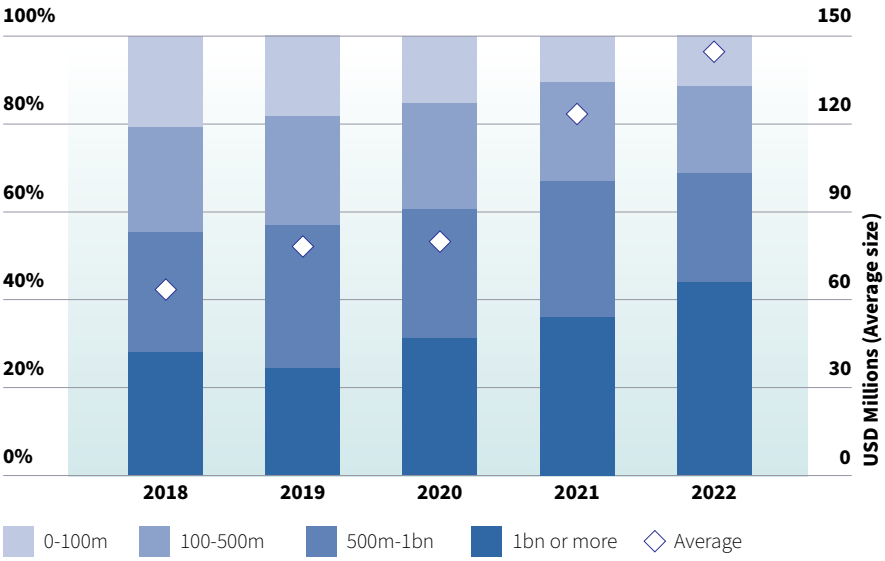
Second party opinions (SPO) remain the preferred option, with Certification under the CBS being the second-largest category.

Certification under the CBS ensures that assets, projects and expenditures financed by the verified green bonds are compliant with the Paris Agreement. The number of Certified Climate Bonds declined to 88 from 105 in the prior year. While the number of corporates seeking Certification decreased YOY, the number of Certified deals from government-backed entities was up 47%. Most of the 2022 Certified Climate Bonds volume came from issuers in Asia-Pacific (45%), followed by European issuers (37%).

Notable Certifications included:

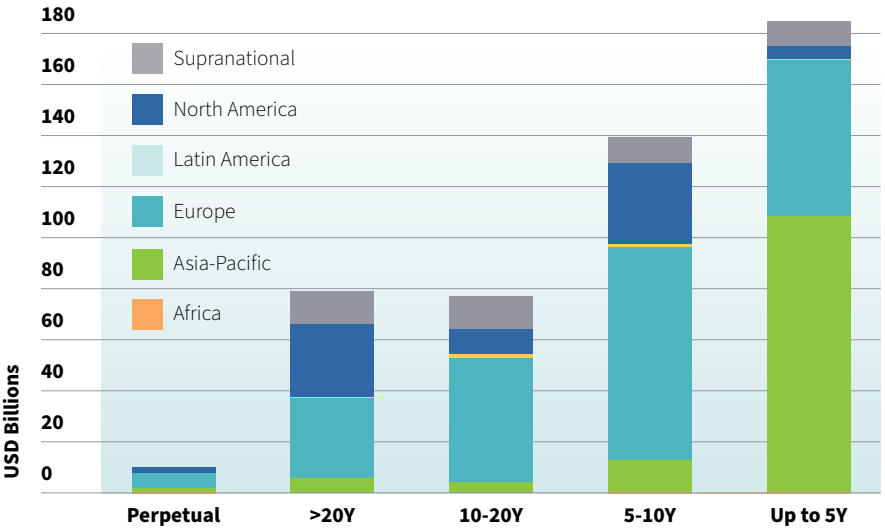
- **The Dutch State Treasury Agency (DSTA)** issued the first European sovereign green bond to obtain Certification under the CBS when it was originally priced in 2019, subsequently extended to reopenings including a EUR5bn tap in 2022. The deal was Certified under multiple Climate Bonds Criteria, i.e., Solar, Marine Renewables, Low-Carbon Buildings (Upgrades), Low-Carbon Transport, and Water Infrastructure.

Preference for benchmark-sized deals



Source: Climate Bonds Initiative

Short-dated bonds prevail



Source: Climate Bonds Initiative

- Large Certified deals included **China Development Bank** (USD4.3bn) and **Agricultural Bank of China** (USD2.8bn).
- **Calpine Corporation** (USD1.8bn) was the largest Certified green loan, under Climate Bonds' Geothermal Criteria.

Some issuers sought external reviews from multiple sources, hence the sum of external review volumes is greater than the total amount of green bonds issued.

Largest Verifier for Certified Climate Bonds

Sustainalytics

Amount: USD11.5bn

Largest External Review Provider

CICERO

Number of deals: 563

5. Social and Sustainability

Introduction

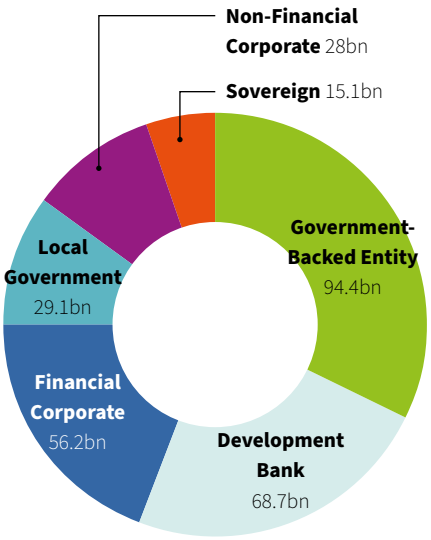
S&S bonds captured by Climate Bonds dropped by 31% YOY to USD291.5bn (versus USD423.7bn in 2021).

The drop in overall S&S issuance was due to a decline in COVID-19 related activities, which particularly hit volumes in the social theme.

Social bonds fell by 41% YOY to USD130.2bn while issuance under the sustainability theme declined 21% to USD161.3bn.

Government-backed entities made the largest contribution (32%) with USD94.1bn. Development banks placed second with USD68.7bn or 24% of the 2022 total.

The public sector dominated S&S issuance in 2022



Source: Climate Bonds Initiative

SUSTAINABILITY

Introduction

The volume of bonds issued under the sustainability theme declined by 21% YOY in 2022. This reflected prevailing market conditions, but sustainability bonds maintained their contribution of 1.2% to total issuance.[7]

The market was supported by deals from SNAT issuers, responsible for USD52.3bn or 32% of the volumes.

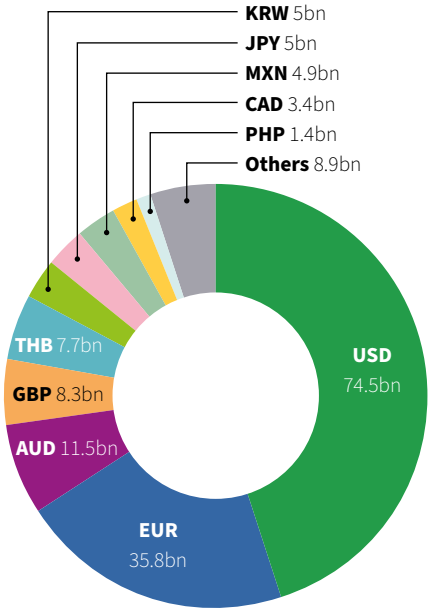
65 new issuers entered the sustainability bond market, increasing the total number by 6% to 1223.

Sustainability issuers like USD

USD was the dominant currency, representing 45% of total issuance. Most EM issuers prefer USD over their national currency as it is a stable hard currency with global acceptance for trade, enabling issuers to access international markets. EUR and AUD took the second and third spots, with 21% and 7% respectively.

Hard currencies made up 84% of issuance although nothing was priced in CHF in 2022. By the end of 2022, sustainability bonds had been issued in 41 different currencies, 28 of which were used during the year.

USD dominated sustainability bonds



Source: Climate Bonds Initiative

Sustainability sources diversify

Sustainability deals originated from 38 countries in 2022, a decline from 47 in 2021. Six newcomers joined the sustainability bond market in 2022:

- **Croatia** (USD200m)
- **El Salvador** (USD100m)
- **Romania** (USD247m)
- **Saudi Arabia** (USD750m)
- **South Africa** (USD134m)

Supranationals (USD53.2bn), USA (USD21.5bn), South Korea (USD12.4bn) and France (USD10.2bn) continued to be responsible for the largest volumes in 2022, unchanged from 2021.

The 2022 sustainability bond market in numbers

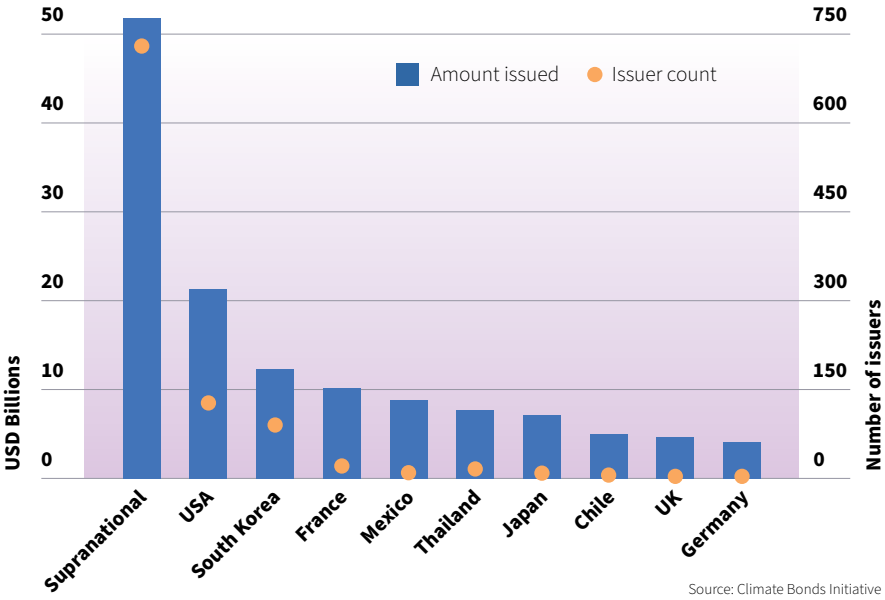
TOP 3 REGIONS

1. **Supranational** USD52.3bn (32%)
2. **Europe** USD33.6bn (21%)
3. **Asia-Pacific** USD32.6bn (20%)

TOP 3 SOURCES

1. **Supranational** USD52.3bn (32%)
2. **USA** USD21.5bn (13%)
3. **South Korea** USD12.4bn (8%)

USA, South Korea and France topped country issuance in 2022



Source: Climate Bonds Initiative

Policymakers must boost Africa's transition prospects

Africa is one region with an abundance of projects which could be funded by thematic debt. According to FSD Africa, the continent requires almost USD2.8tn by 2030 to achieve its net-zero goals, while only 12% of this need is currently being met.[9] The persistent problem is a mismatch between risk appetite of investors and the risks inherent in the available projects, which include but are not limited to country and regulatory risks, and the credit risk of available projects. Policymakers need to step in with de-risking tools to make investment possible.

Climate Bonds has published *101 Sustainable Finance Policies for 1.5°C*, which includes multiple suggestions to address this issue. Some examples are summarised below.[10]

How DM and development banks can help:

- **Policy 13: DM to EM sovereign-to-sovereign guarantees can de-risk local currency sovereign issuance.** The high investment risk and low credit ratings of some sovereign issuance can be addressed by sovereign-to-sovereign green guarantees, provided by DM governments on EM green sovereign issuance. These could follow the model of multilateral development bank (MDB) guarantees on sovereign issuance.
- **Policy 19: Increase blended finance provision.** Blended finance works by isolating the riskiest portion of a project into a separate investment. This junior capital tranche (so named because it would absorb the first losses in the event of bankruptcy) can then be bought by the public sector. The remaining lower risk (senior capital) could be offered to private investors with more conservative risk profiles in blended finance deals. Including other de-risking facilities such as policy risk hedging can protect from negative market fluctuations and can further increase financing flows, especially important in EM where access to long-term capital is limited.
- **Policy 23: Green export finance.** Export finance and development finance are key to addressing market gaps by financing less commercially attractive investments such as long-term infrastructure. Export credit agencies facilitate domestic companies' access to international markets by providing loans, guarantees and other instruments to reduce the risk of exporting goods and services. A government can exclude fossil fuel activities from trade finance instruments and end related overseas export credit.

What EM nations can do:

- **Policy 10: Encourage the use of green and sustainable finance instruments through subsidies and incentives which reduce the cost of green capital and ensure attractive returns.** Tax incentives can be used to increase green and sustainable investment. For example, by making the interest from green bond holdings tax-exempt. This could follow the model of tax exemption for US municipal bonds. Tax credit bonds could also be used; bond investors receive tax credits instead of interest payments, so issuers do not have to pay interest on their green bond issuances. These incentives can help tilt investment to green activities and the resulting increase in investor interest and demand will encourage issuers to issue green bonds.
- **Policy 12: Green finance subsidies.** The government can also provide subsidies to green bond issuers. Interest rate subsidies, or stamp duty exemptions could be applied to green bond issuance. However, such a policy faces a risk of subsidy allocation being dominated by large corporates which do not require subsidies. Reserving such polices for where it is most needed, i.e., small and medium-sized enterprises (SMEs), ensures the efficacy of such spending. Subsidies can also cover the cost of verification and external review.
- **Policy 34: Distributed renewable energy standards.** For many EM economies, the energy transition will consist of decarbonising local energy production and addressing energy poverty. This requires investment in distributed renewable energy (DRE). Financial aggregation can enable private investment in these projects, providing capital for DRE and enabling investor portfolio diversification. Establishing asset-backed securities (ABS) markets in EM would help with this. Aggregation may need to be combined with other de-risking mechanisms such as concessional financing, guarantees and subsidies to de-risk fully.

Several policies covered in the 101 Policies paper refer to green finance but in many cases could also be applied to S&S or other thematic issuance.

The 2022 sustainability bond market in numbers

LARGEST ISSUER

By volume: International Bank for Reconstruction & Development (IBRD), USD30.7bn

By deal count: New York City Housing Development Corporation, 164 deals amounting to USD1.65bn

DEAL CURRENCY

- **84%** of issuance in hard currency
- Deals issued in **28 currencies**
- Top 3 currencies: **USD**, **EUR**, and **AUD**

Sustainable affordable housing in Japan

Japan was a source of sustainable affordable housing bonds to the tune of USD7.1bn in 2022, issued mainly by GLP-J REIT (real estate investment trust), the Development Bank of Japan, and Toyota Motor Corp. The bonds combine affordable housing UoP with other sustainable purposes, such as employment, social resilience, education, healthcare, and equality. Japan's deregulated housing policy has ensured a supply/demand balance and kept price rises to a minimum, and similar to those of the last decade.[8]

Supranationals issued most sustainability volume

Issuers from seven regions priced sustainability bonds in 2022. In January, the first Middle Eastern issuer, Saudi National Bank, came to the market with its debut sustainability Sukuk, a USD750m deal maturing in 2027. Its UoP was earmarked for renewable energy projects, the management of living natural resources, and land use.

Supranational issuers topped regional rankings with USD52.3bn, followed by Europe and Asia-Pacific, which contributed USD33.6bn and USD32.6bn respectively. Issuance under the sustainability theme in Africa amounted to just USD134m, a 90% YOY decline. Latin America and the Caribbean (LAC), on the other hand, reported a slight increase of 5% YOY, to USD16.4bn. Sustainability bonds originating from the LAC region in 2022 were priced in five currencies: USD, MXN, JPY, CLP, and BRL. The development of local currency markets is critical to unlocking pension fund investment.

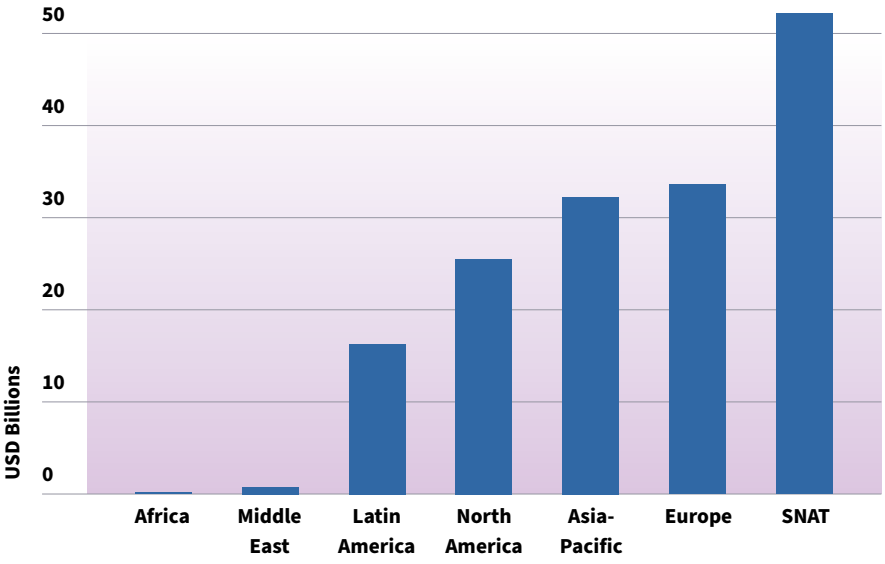
Just Transition supports sustainability issuance

The social component of sustainability bonds makes them an ideal instrument for the public sector where the focus is rightly on the Just Transition. In 2022, development banks made the largest contribution to the sustainability theme with USD58.9bn, followed by financial corporates and non-financial corporates with USD34.7bn and USD22.3bn respectively.

Sovereign issuers continued to be prolific, contributing USD20.1bn, up from 2021 levels (USD16.6bn). Chile contributed USD5bn, with three USD deals and one CLP, the largest among the sovereigns.

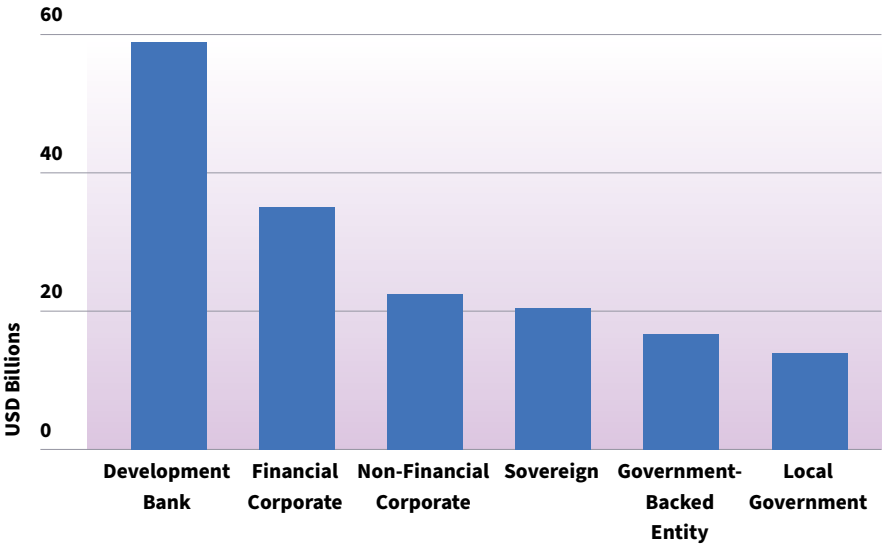
IBRD, the financing arm of the World Bank, retained the tag of the largest development bank issuer in 2022 with total issuance of USD30.7bn.

Latin America not far behind more developed regions in 2022



Source: Climate Bonds Initiative 2022

Development banks dominated sustainability bond issuance in 2022



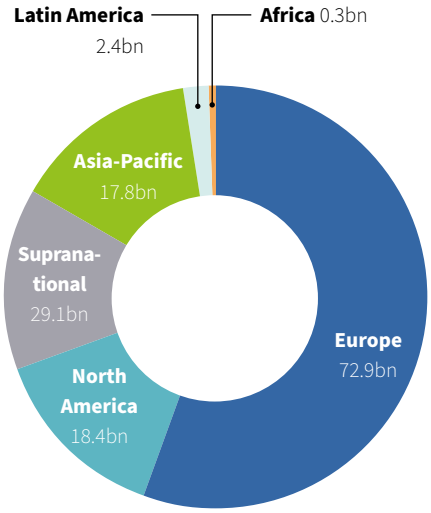
Source: Climate Bonds Initiative 2022

SOCIAL

Introduction

- At USD130.2bn, the social theme contributed 15% of GSS+ volumes in 2022.
- Issuance declined by 41% YOY, the most dramatic drop among all themes as issuance to support the ramifications of the COVID-19 pandemic tailed off.
- CADES was the largest issuer of social bonds, with USD50.6bn or 39% and UoP supporting France's comprehensive social security system. The magnitude of CADES' presence in the social bond market impacted Europe's position as the largest region, France as the top country source, and EUR as the preferred currency.

Europe led social issuance in 2022



Source: Climate Bonds Initiative

The 2022 social bond market in numbers

TOP 3 REGIONS

1. **Europe** USD72.9bn (56%)
2. **Supernational** USD18.3bn (14%)
3. **North America** USD8.4bn (6%)

TOP 3 COUNTRIES

1. **France** USD54.5bn (42%)
2. **Supranational** USD18.5bn (14%)
3. **USA** USD18.4bn (14%)

TOP 3 ISSUERS (VOLUME)

1. **Caisse d'Amortissement de la Dette Sociale (CADES)** USD50.6bn
2. **European Union** USD9.3bn
3. **Asian Development Bank** USD4.3bn

Europe ruled social

Europe was the dominant region with social-themed volumes of USD72.9bn (56%), reflecting the origin of CADES, the largest issuer in the space. This was followed by North America, Supranational, and Asia-Pacific, each representing 14% of the market. Just seven social bonds have originated from Africa, including three in 2022. Mauritius-based consumer lending company Bayport Management issued the largest 2022 social bond in the region, worth USD250m. The USD-denominated deal, maturing in May 2025, was priced together with a subordinated USD50m clip, maturing in November 2025. The UoP of both deals was earmarked for socioeconomic advancement and empowerment of underserved populations in EM, particularly low-income countries including Ghana, Mozambique, Tanzania, Uganda, Zambia, Botswana, Colombia and Mexico.

The 2022 social bond market in numbers

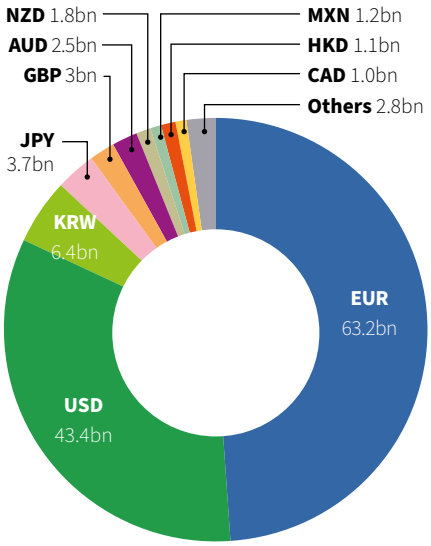
TOP 3 ISSUERS (DEAL COUNT)

1. **Minnesota Housing Finance Agency** 221 deals (USD800m)
2. **Colorado Housing and Finance Authority** 103 deals (USD300m)
3. **Illinois Housing Development Authority** 102 deals (USD700m)

TOP 3 CURRENCIES

1. **EUR** USD63.2bn (49%)
2. **USD** USD43.4bn (33%)
3. **KRW** USD6.4bn (5%)

Top 10 currencies in 2022



Source: Climate Bonds Initiative

Social issuers preferenced EUR

Hard currencies comprised 90% of the social volume in 2022. The top two currencies were responsible for 82% of the volumes. EUR dominated with volumes of USD63.2bn (49%), again, given the domicile of CADES, the largest issuer. USD supported USD43.4bn (33%) of issuance.

Cumulative regional social bond issuance since 2006

Region	Green bond markets	Issuers	Amount issued (USDbn)	Change 2021-2022
Africa	3	3	659m	↓
Asia-Pacific	10	515	134.1bn	↓
Europe	18	88	287.7bn	↓
Supranationals	-	13	160.5bn	↑
Latin America	9	33	21.1bn	↓
North America	2	120	56.6bn	↓

CADES boosted France's social presence

France was the largest source of social bonds in 2022, with participation from 24 issuers. CADES made the largest contribution of USD50.6bn with UoP earmarked for French social security. Supranationals ranked second followed by the USA and South Korea. The USA was the most diverse, with 64 issuers, mostly municipals.

Hong Kong SAR and Tanzania recorded their first-ever social bonds. The Hong Kong Mortgage Corp. priced a USD1.4bn deal split between an HKD 2024 maturity, and a CNY bond maturing in 2025.

Tanzanian NMB Bank issued a 2025 bond in March 2022. The TZS25bn (USD10m) deal had a framework which adhered to ICMA's Social Bond Principles (SBP), with eligible project categories stated as access to essential services, employment generation, socioeconomic empowerment, gender inclusion, and food security and sustainable food systems.

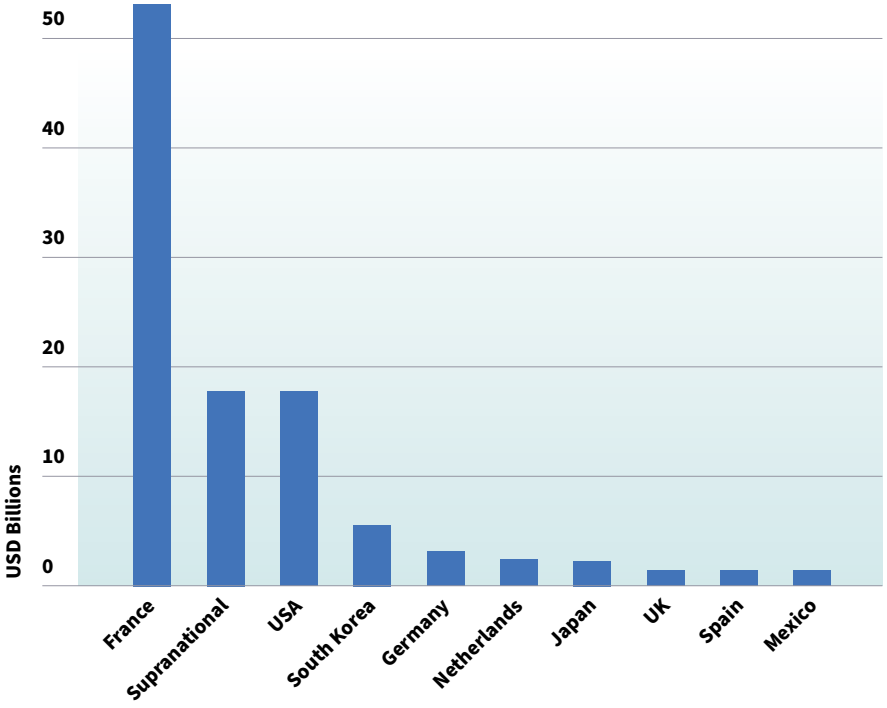
France dominated social-themed issuance volume in 2022, with USD54.5bn or 42% of the total.

South Korea led social bond issuance in the Asia-Pacific market with USD11.5bn (65%). Climate Bonds recorded 17 social bond issuers from South Korea in 2022. Korea Housing Finance Corp (KHFC) was the largest of those, pricing ten deals in CHF, EUR, KRW and USD with combined volumes of USD3.3bn.

Government-backed entities drive social volume

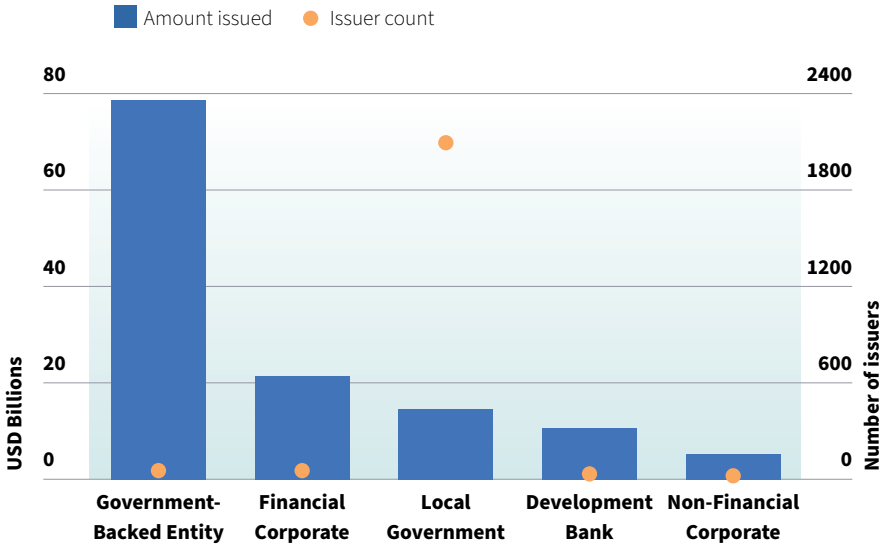
Government-backed entities topped 2022 rankings by issuer type with USD77.7bn, still experiencing a sharp drop (47%) YOY. In the local government category, 59 entities priced a total of USD15.2bn in 2022. This category of issuer included lots of US municipals (munis), many of which priced multi-tranche deals. Five issuers priced a single deal, the rest priced more, ranging from two (State of New York Mortgage Agency and City of Dallas Housing Finance Corporation) to 221 (Minnesota Housing Finance Agency). The US muni market is popular with retail (individual) investors because of the tax advantages, and the relatability. These instruments provide a very effective way of introducing another source of investment into the thematic debt markets. No sovereigns priced social deals in 2022.

41% of social volumes originated from France



Source: Climate Bonds Initiative

Government-backed entities priced most of the social volume



Largest social bond issuers in each issuer type, 2022

Issuer type	Issuer	USDbn
Development bank	Asian Development Bank	4.3
Financial corporate	Citigroup Inc	3.1
Government-backed entity	CADES	50.6
Local government	The Commonwealth of Massachusetts	2.7
Non-financial corporate	Vonovia SE	2.6

6. Sustainability-linked bonds

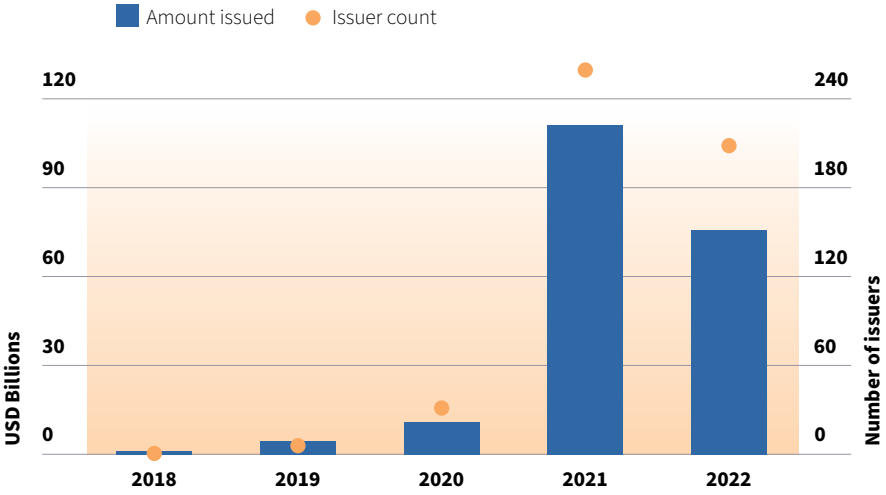
SLBs are forward-looking, performance-based debt instruments with progress towards entity-level KPIs (e.g., GHG emission reductions) measured by SPTs (e.g., the target reduction by a specific date). Used credibly and ambitiously, SLBs can be a powerful transition finance instrument for issuers to demonstrate to investors their commitment to their transition plans.

However, issuers and investors should be mindful of common pitfalls around issuing credible SLBs: they need to have credible SPTs, be calibrated in line with 1.5-degree pathways, and provide meaningful financial mechanisms and bond structures that hold issuers accountable to their targets.

It should be noted that comparing market volumes of SLB debt with other UoP thematic debt is not relevant per se, because SLBs are mostly general-purpose financing, with unspecified UoP. At present, issuers without specific projects, assets, or expenditures can issue SLBs if they have sustainability targets in place, irrespective of the quality of those targets.

The forthcoming CBS v4 will offer non-financial corporate entities the opportunity to obtain Climate Bonds Certification for SLBs. This level of integrity will reassure investors of the credibility of the targets and ambitions.

SLB volumes reached USD76.4bn in 2022



Source: Climate Bonds Initiative

SLB issuance declined 32% YOY in 2022, while deal count dipped 20%. Prevailing market conditions coupled with increased scrutiny of SLB structures have contributed to this decline. During the year, SLBs maintained 0.4% share of total bond market issuance but the segment matured, with novel and innovative public sector issuance, diversification in regional issuance, and centralisation around GHG target use.

Sovereigns and local governments joined the SLB market in 2022

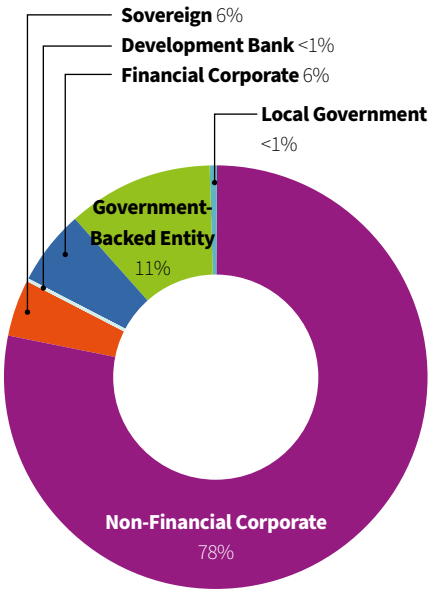
Non-financial corporates continued to dominate SLB issuance, making up some 82% of 2022 volumes as issuers choose to demonstrate their commitment to transition through this structure. The largest SLB non-financial corporate and overall issuer continued to be **Enel**, printing USD11.6bn worth of debt across 13 deals, all of which were tied to GHG scope 1 targets between 2024 and 2040. The second-largest non-financial corporate issuer was Dutch telecom **VodafoneZiggo**, with USD2.4bn across two deals, one USD and one EUR. VodafoneZiggo is the largest issuer to tie all three scopes of emissions to its SLBs, targeting a 50% reduction across all three by 2025.

Financial corporates maintained their share of the SLB market. The largest deal from this issuer type was a EUR1.5bn (USD1.7bn) from private equity fund **EQT AB**. Investment conglomerate **JAB Holdings** had the most ambitious targets with a USD500m and a EUR500m (USD525.9m) SLB tied to reducing scope 1 and 2 GHG emissions by 46.2% by 2030, increasing the SBTi-validated share of its portfolio to 80% by 2025 and 95% by 2030, and 100% female board representation in portfolio companies by 2025.

The most exciting development in 2022, however, was the arrival of sovereign and local-government issuers to the SLB market. This began with an SEK500m (USD55m) SLB from Swedish **City of Helsingborg** with a target to reduce its emission footprint by 61% by 2024 (against a 1990 baseline). This was joined by **Arizona Industrial Development Authority** (USD200m) and Japanese **Shiga Prefecture** (JPY5bn, USD38.4m), with the former attached to targets for a local forest resilience business the bond financed, and the latter with a 50% reduction in GHG emissions by 2030.

Sovereign SLBs launched to much fanfare in 2022 with two deals, one from **Chile** and one from **Uruguay**. Both were benchmark-sized SLBs worth USD2bn and USD1.5bn respectively. With both tying their debt to GHG reduction targets as well as against relevant secondary KPIs and targets, a strong precedent has been set for future sovereign SLB deals to serve as transition finance instruments. In addition, the use of the step-down mechanism alongside the step-up provides a powerful example for sovereign issuers to have a financial incentive to overachieve on their GHG reduction targets (see page 25).

Non-financials dominate



Source: Climate Bonds Initiative

CNY and JPY eat into EUR's dominance

EUR-denominated SLBs continued to lead in 2022, reaching 39% of volumes. This included issuers based outside of the eurozone tapping into the currency to attract the attention of EUR-focused sustainable investors, with such issuers comprising 17% of the amount raised through SLBs.

USD remained the currency of choice for issuers choosing foreign currency, however, with the majority (66%) of USD issuance coming from those based outside the USA. Most of this came from DM issuers, with 41% from EM.

CNY and JPY were the fastest-growing currencies for SLBs in 2022, with the share of each supported by regulator- or government-led transition finance programmes. The single-largest issuer of CNY-denominated SLBs was **China Construction Bank Corp**, which priced a hybrid CNY10bn (USD1.5bn) green and sustainability-linked bond. This meant that not only were there UoP restrictions on the capital raised, but the coupon rate is exposed to a 25bps step-up if the issuer fails to meet the targeted 11.5% proportion of green loans to non-green loans by 2024. Hybrid green-SLB bonds like this are assessed by Climate Bonds against both the GBDB and the SLB Database methodologies.

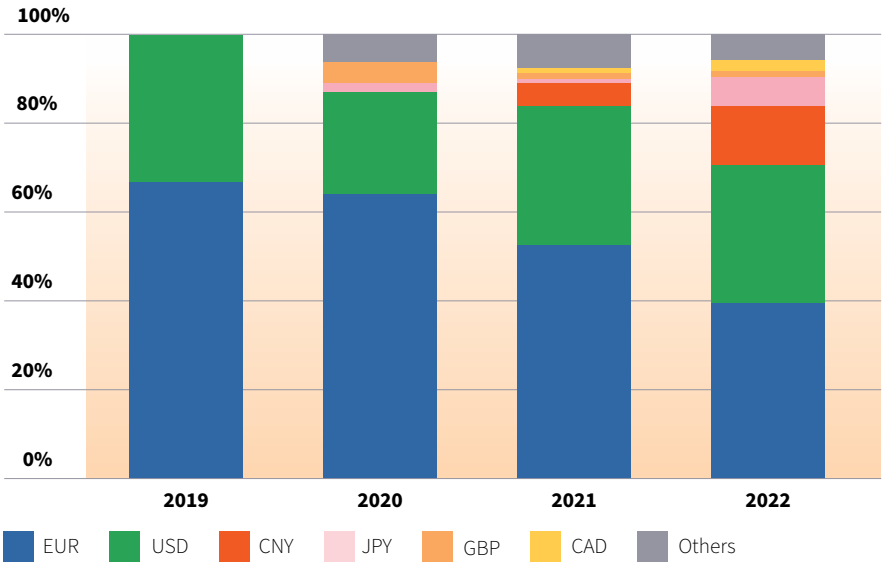
The share of hard vs. soft currency issuance continued tilting towards the latter, with some 17% of SLB issuance coming in soft currencies in 2022. This was supported by the growth of local currency deals, with 70% of issuance denominated in issuers' home currencies.

Geographical contribution

In 2022, Italy and France retained their 2021 titles of largest and second-largest issuer countries by volume, with Enel alone making up some 86% of Italy's SLB debt in the year, having issued USD12.6bn cumulatively. Supermarket chain Carrefour was the largest French issuer, with EUR2bn (USD2.1bn) of SLB issuance in 2022.

China ranked fourth in volumes but first in both deal and issuer count (48 and 28 respectively), with an average size of CNY1.3bn (USD195.2m) and and just one benchmark-sized deal in 2022 from China Construction Bank Corp worth CNY10tn (USD1.5bn), utilising the Green UoP and SLB format, tied to a target about the balance of green loans to gross loans. China Gezhouba Group Corp was the largest and most frequent issuer, with CNY6bn (USD860m) tied to energy consumption intensity targets.

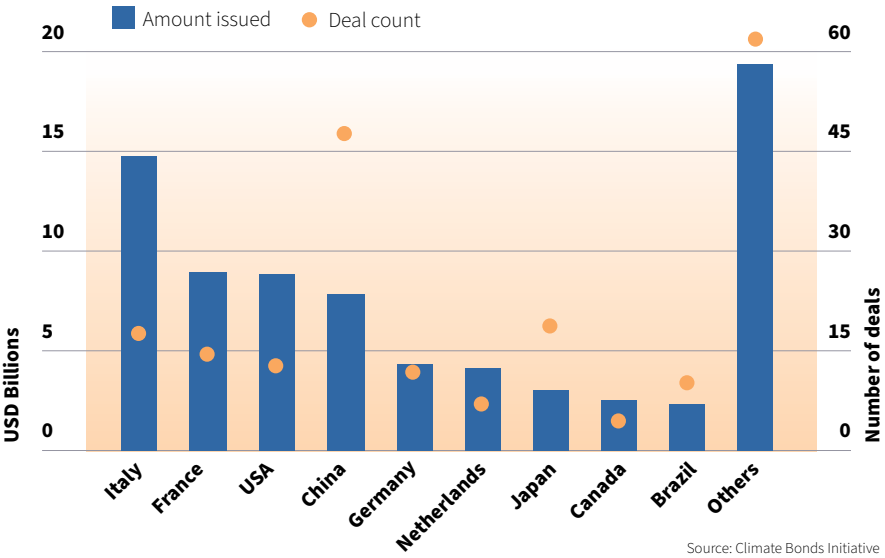
EUR share of the SLB market is diminishing



Note: 'Others' includes 15 currencies, of which CHF, COP, and NZD saw their first SLBs in 2022.

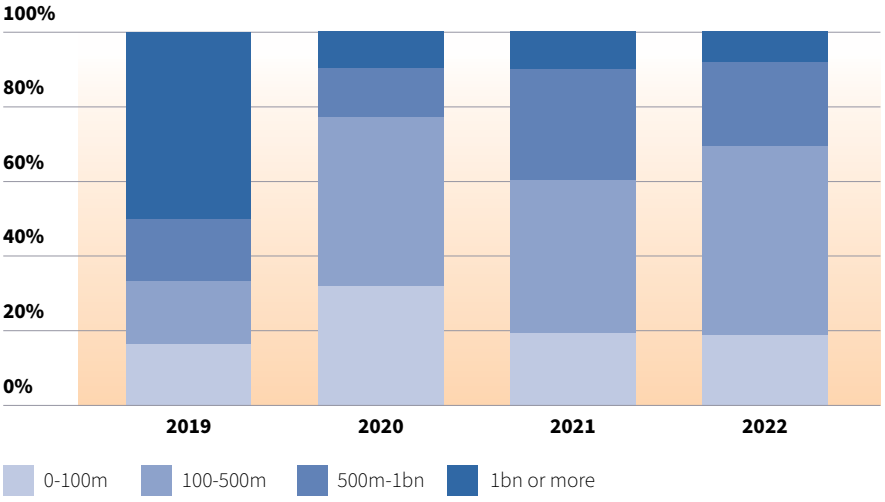
Source: Climate Bonds Initiative

Italy and France remain the largest sources of SLB volume; Chinese most frequent issuer



Source: Climate Bonds Initiative

Higher share of small SLBs in 2022



Source: Climate Bonds Initiative

SLBs were shorter-dated and smaller in 2022

The share of benchmark-sized deals fell to 30%, down from around 40% in 2021. This reflects the growing share of deals originating from Asia-Pacific, which tends towards smaller, shorter-dated deal sizes. Asian issuers had the largest share of both the sub-USD100m and USD100m-USD500m categories, with 53% of each category. Meanwhile, European issuers had the largest share of benchmark deals (67%), followed by North American issuers (19%).

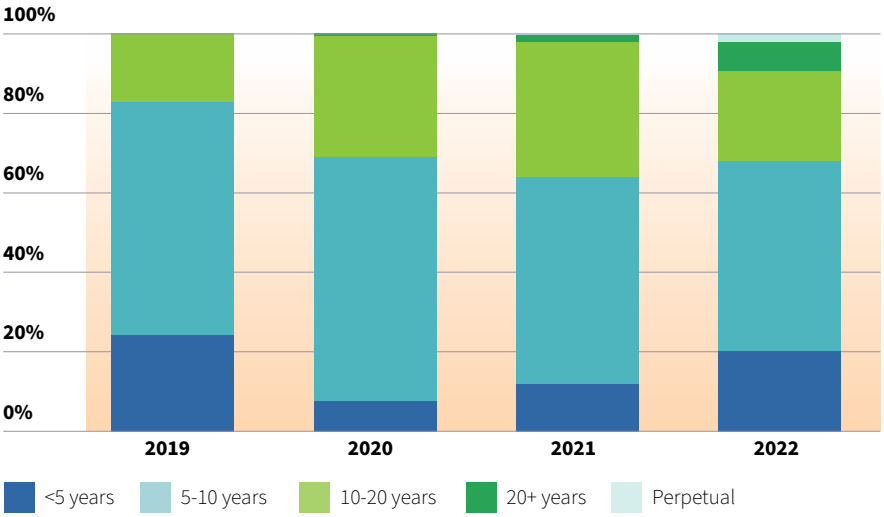
Deals with a tenor of 10+ years shrunk in 2022 to 30%, from 36% in 2021. Deals with a maturity of less than five years grew, making up 20% of the volume, while tenors of 5-10 years remained the most popular choice, representing 48% of SLB debt. As with deal size, this was driven by increased issuance in Asia-Pacific, with 74.5% of debt from the region having a tenor of less than 10 years. North America had almost the opposite split, with 53% of its debt having a tenor of 10 years or above. Notably, 2022 saw 11 perpetual deals worth USD2bn, all from Chinese issuers, with the largest coming from China Railway Construction Corp who issued a dual-tranche CNY3bn (USD443.8m) SLB tied to energy consumption targets and a 10bps step-up on each tranche.

GHG targets are the KPI of choice for issuers; most include at least two scopes of emissions

GHG emission targets continued to be the most popular KPI choice in 2022, with more than half of issuers including some kind of decarbonisation target. Renewable energy and energy efficiency targets were the next most popular, with 13.5% of deals linked to driving down energy-related emissions. Some USD4.8bn of debt was tied to undisclosed KPIs and targets, which lack transparency and accountability, and 5% to ESG score performance, which is less material to the climate transition.

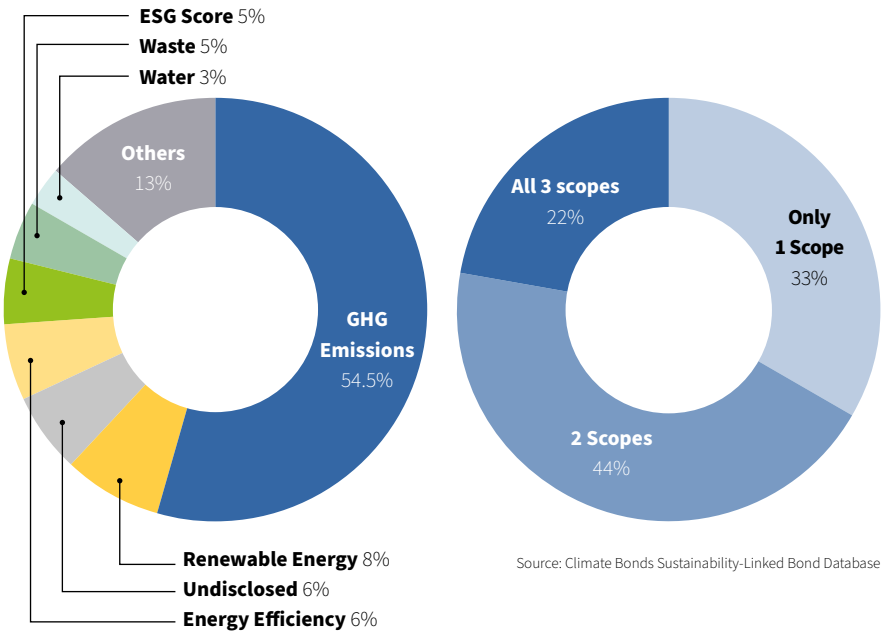
Among SLBs with emission targets, roughly 67% covered all direct emissions of issuers, demonstrating their commitments and ongoing transition activities to decarbonise within their own operations and energy sources. However, the materiality of all three scopes varies by sector. For some sectors most of the emission footprint is accounted within scope 1 and 2, like cement, steel, and transport services. For other sectors the footprint mostly comes from scope 3, including oil and gas, agri-food, or finance. These sectors must drive upstream and/or downstream decarbonisation through supply chain engagement, diversifying investments to low-carbon business, and decarbonising transport networks.

Shorter-dated paper prevailed in 2022, but longer-dated increased share



Source: Climate Bonds Initiative

GHG targets are the KPI of choice for issuers; most include at least two scopes of emissions



Source: Climate Bonds Sustainability-Linked Bond Database

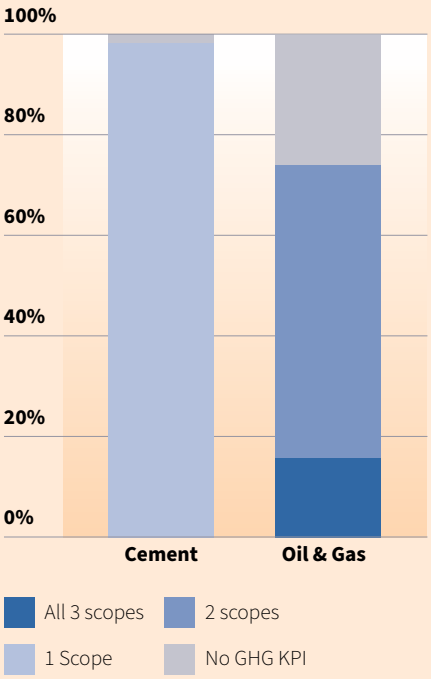
SLB targets need to cover all material emission sources

Most cement emissions come from raw mill grinding, up until blending/grinding the material onsite. Accordingly, some 98% of cement SLB issuance includes scope 1 GHG targets, with companies like **Holcim**, **GCC SAB**, and **Huaxin Cement** selling such bonds in 2022.

Scope 3 emissions dominate for oil & gas (O&G) issuers, either from the purchase of oil and other products upstream, or the combustion of their products downstream. While 84% of O&G SLB issuance has not included scope 3 targets, issuers **Hera** and **Repsol** included scope 3 targets in their 2021 deals. Unfortunately, none of the USD5.4bn of SLBs priced by O&G issuers in 2022 included scope 3 targets.

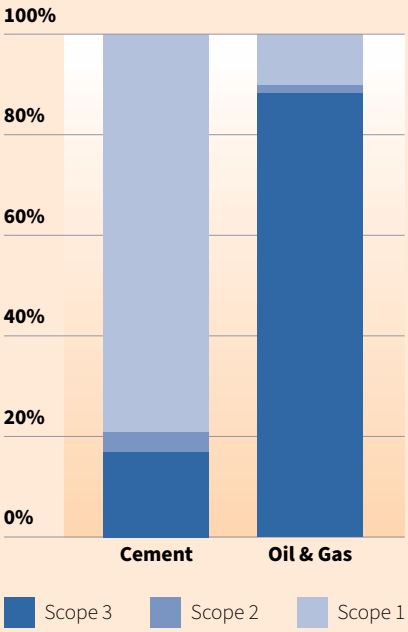
Climate Bonds invites issuers to include material and ambitious emission targets, demonstrating to investors the commitment to their transition plan and speed of their decarbonisation journey. This is particularly pertinent for hard-to-abate sectors, given the scale of their challenge and the contribution required from them for the global climate transition.

Number of scopes in SLBs, by sector



Source: Climate Bonds Sustainability-Linked Bond Database

Scope 1, 2, and 3 emissions by sector



Source: CDP Technical Note11

7. Transition bonds

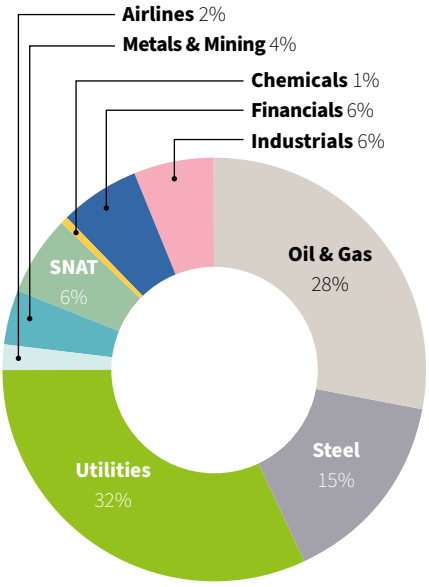
Issuance and issuer count rise as Chinese and Japanese transition finance programmes take off

While issuance volumes of transition bonds grew a modest 5% to USD3.5bn, the deal and issuer count surged in 2022, driven by a diverse range of Chinese and Japanese heavy industry issuers coming to the market to raise funds under their respective national transition finance programmes. The number of deals grew from 12 in 2020 and 2021 to 35 in 2022, while the number of issuers rose from seven and nine in 2020 and 2021 respectively, to 25 in 2022.

2022 transition issuance driven by heavy industry players

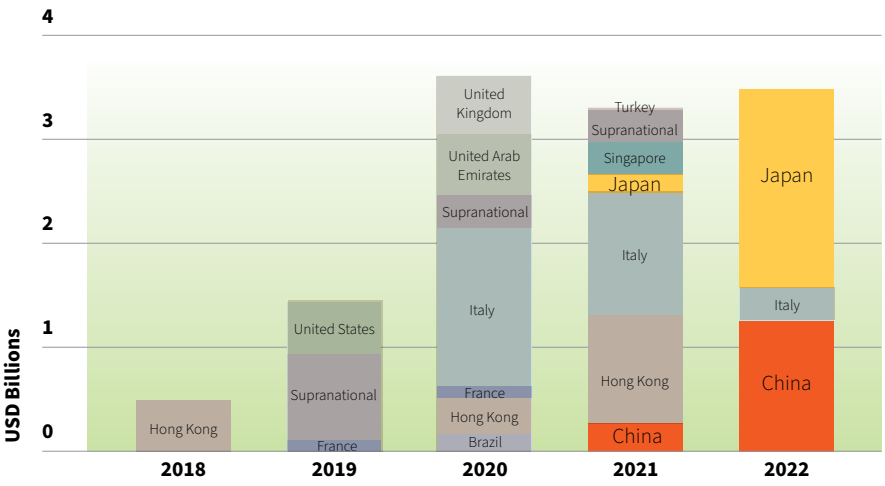
Transition bond deals came almost exclusively from heavy industry players in China and Japan, with those operating in the utility, oil and gas, and steel sectors dominating issuance volumes with a combined 76%. In Japan the largest deals came from Kyushu Electric Power Co and Tokyo Gas Co, with JPY55bn (USD429m) and JPY39.8bn (USD323.3m) raised respectively. The largest Chinese deal came from utility company Huadian Power International Corp, which raised CNY1.5bn (USD214m) in September. The only issuers outside China or Japan this year were EBRD and Snam SpA, both repeat transition bond issuers, raising SEK1.9bn (USD209m) and EUR300m (USD317.6m) in one deal each.

76% from utilities, O&G and steel



Source: Climate Bonds Initiative

China and Japan receive transition bond policy boost



Source: Climate Bonds Initiative

Analysis of two transition deals priced in 2022

Issuer	Deal	Motivation for transition label	Five Hallmarks alignment
Daido Steel Co.	**Amount issued:** JPY27bn (USD191.7m) **Coupon:** 0.529% **Maturity:** 2032	UoP includes financing for various green projects, as well as projects labelled as transition including electric-arc furnaces, casting and rolling equipment energy-efficiency measures, amongst others. Some of these measures would be considered ineligible by Climate Bonds, such as financing for converting energy sources to fossil gas.	**Hallmark 1:** Daido has mid- and long-term scope 1 and 2 emission reduction targets, in line with Climate Bond's Steel pathway. **Hallmark 2:** Daido has identified key assets and activities for decarbonisation, as well as an investment plan and governance mechanisms to drive the transition. **Hallmark 3:** Daido reduced its emissions 4% between 2013 and 2021 but plans an almost 35% reduction between 2021 and 2025. **Hallmark 4 & 5:** Daido has committed to reporting on relevant KPIs and UoP, internally and externally.
Pangang Group Co.	**Amount issued:** CNY200m (USD30m) **Coupon:** 3.33% **Maturity:** 2025	UoP includes financing for a waste heat-to-energy power plant on a steel manufacturing site, and a centralised control centre for the same steel plant. The power plant can be aligned with Climate Bonds' criteria based on its (undisclosed) emission reduction potential, but the centralised control centre would be considered out of scope.	**Hallmark 1:** Pangang has yet to set GHG targets of its own but has conducted scope 1 and 2 emission accounting. Its parent company (AnSteel) has set emission targets, aiming to peak in emissions by 2025 and reduce emissions 35% against peak by 2035. **Hallmark 2:** Pangang has identified some key assets and activities for decarbonisation but lacks a comprehensive transition plan. However, it has allocated investment for R&D related to decarbonisation, as well as some governance mechanisms to drive the transition. **Hallmark 3:** Pangang has not disclosed its emission reduction progress yet. **Hallmark 4 & 5:** Pangang has committed to reporting on relevant KPIs and UoP post-issuance, internally and externally.

8. The Sovereign GSS+ Bond Club

Introduction

By the end of 2022, Climate Bonds had recorded sovereign GSS+ deals with cumulative volumes of USD324.2bn from 43 countries, 25 of which are repeat issuers. Three-quarters of the volume (USD240.6bn) originated from 17 DM countries with the remainder (USD83.6bn) coming from 26 EM countries. The green theme was responsible for 81% of this (USD263.3bn), with social and sustainability taking 5% (USD18.3bn) and 12% (USD39.1bn) respectively and the final 1% (USD3.5bn) coming from SLBs, a new sovereign theme in 2022.

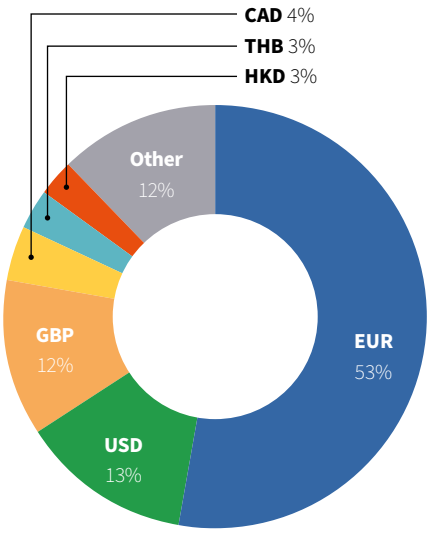
Overall, sovereign GSS+ bonds captured by Climate Bonds declined by 20% YOY. Volumes were split between new bonds amounting to USD51bn and taps worth USD48.3bn, and originated from 14 DM and nine EM countries. The Sovereign GSS+ Bond Club continues to expand its reach, welcoming eight new members in 2022. These included DM issuers like Canada and New Zealand, which issued in their local currency; as a result, the share of volumes issued in EUR dropped to 53% compared to 71% in 2021.

As the source of nearly three-quarters (73%) of cumulative volumes, Europe is the region making the largest contribution to the Sovereign GSS+ Bond Club. Demonstrating strong support for climate and social issues, and a commitment to develop relevant debt markets, sixteen members of the EU27 have priced GSS+ bonds to date, worth USD197bn. France remains the largest single issuer by volume, and its green liabilities had reached EUR52bn (USD58.8bn) by the end of 2022.

Sovereign scorecard

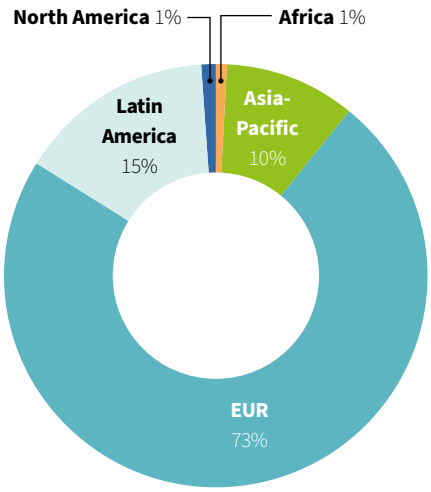
	Green	SLB	Social	Sustainability
Total market size (USDbn)	263.3	3.5	18.3	39.1
Number of issuers	28	2	2	16
Number of currencies	16	1	4	8
2022				
Market size (USDbn)	80.8	3.5	N/A	15.1
Number of issuers	17	2	0	5
Number of currencies	13	1	0	6

EUR accounted for 53% of 2022 issuance



Source: Climate Bonds Initiative

Nearly 3/4 of cumulative GSS+ sovereign volumes come from Europe



Source: Climate Bonds Initiative

Sovereign Green Bonds

Theme	Market	Country	USDbn as of 31/12/2022	Year of first GSS+ bond	Repeat issuer
Green	DM	Austria	5.3	2022	✓
	DM	Canada	4	2022	✗
	DM	Denmark	2.3	2022	✓
	DM	New Zealand	1.8	2022	✗
	DM	Singapore	1.8	2022	✗
	DM	Switzerland	1.1	2022	✗
	DM	Italy	24.4	2021	✓
	DM	Spain	9.3	2021	✓
	DM	UK	33.7	2021	✓
	DM	Germany	42.7	2020	✓
	DM	Hong Kong	9.8	2019	✓
	DM	Netherlands	17.3	2019	✓
	DM	Belgium	17.1	2018	✓
	DM	Ireland	7.8	2018	✓
	DM	France	58.8	2017	✓
	EM	Colombia	0.5	2021	✓
	EM	Serbia	1.2	2021	✗
	EM	Egypt	0.8	2020	✗
	EM	Ghana	0	2020	✗
	EM	Hungary	4.8	2020	✓
	EM	Chile	8.3	2019	✓
	EM	South Korea	1.3	2019	✓
	EM	Indonesia	6.1	2018	✓
	EM	Lithuania	0.1	2018	✓
	EM	Seychelles	0	2018	✗
	EM	Fiji	0	2017	✓
	EM	Nigeria	0.1	2017	✓
	EM	Poland	4.3	2016	✓
Social	EM	Guatemala	1.7	2020	✗
	EM	Chile	16.6	2019	✓
Sustainability	DM	Isle of Man	0.8	2021	✗
	DM	Luxembourg	1.8	2020	✗
	EM	Philippines	2.3	2022	✓
	EM	Andorra	1.2	2021	✓
	EM	Benin	0.7	2021	✗
	EM	Latvia	0.7	2021	✗
	EM	Malaysia	0.8	2021	✗
	EM	Peru	4.4	2021	✓
	EM	Slovenia	1.4	2021	✗
	EM	Uzbekistan	0.2	2021	✗
	EM	Ecuador	0.4	2020	✗
	EM	Mexico	7.1	2020	✓
	EM	Thailand	7.7	2020	✓
	EM	Chile	8.5	2019	✓
	EM	South Korea	1.3	2019	✓
SLB	EM	Chile	2.0	2022	✓
	EM	Uruguay	1.5	2022	✗

Membership of the Sovereign Green Bond Club swells

Green

Reflecting the overall sovereign GSS+ market composition, 81% (USD80.8bn) of the 2022 sovereign volume was labelled green. Twelve countries priced new green bonds, while existing deals were tapped by ten. Six debut issuers all originated from DM: Austria, Canada, Denmark, New Zealand, Singapore, and Switzerland, amounting to USD16.8bn. Among these, Austria made the biggest contribution with a pair of bonds worth EUR5bn (USD5.3bn). The largest sovereign green issuer in 2022 was Germany, pricing USD14.8bn split between a new five-year, and multiple taps.

Social

Climate Bonds did not record any sovereign social bonds in 2022. The immediate consequences of the COVID-19 pandemic have been addressed, and those earmarking expenditures to deal with the recovery or other social issues combined them with environmental expenditures in 2022 (under the sustainability theme).

Sustainability

The sustainability label was applied to 15% (USD15.1bn) of the sovereign debt priced in 2022. The Philippines was the only debut issuer in this space (addressed below) with repeat deals coming from Andorra, Chile, Mexico, and Thailand, which also tapped an existing deal. Having priced two sustainability bonds in 2021, Chile was the largest issuer in the 2022 sovereign space with three USD deals and one CLP and combined volumes of USD5bn. Overall, a greater share of sustainability versus green sovereign issuance is from EM.

Sustainability-Linked Bonds

SLBs emerged as a sovereign instrument for the first time in 2022 (addressed below). Chile and Uruguay brought one deal each, with a combined volume of USD3.5bn, contributing 4% to 2022 sovereign volumes.

Spotlight DM issuer: New Zealand

New Zealand is vulnerable to floods, droughts, and wildfires. The government has an Emissions Reduction Plan and a National Adaptation Plan in place and has committed to achieving net zero long-life GHG emissions by 2050. By 2022, 82% of the country's electricity generation was generated by renewables, among the highest globally.[12]

The government published its green bond framework in August 2022 which stated its climate objectives as tackling climate change, protecting, and restoring the environment and indigenous biodiversity, and building a more productive, sustainable, and inclusive economy.[13] The framework described eight eligible categories of expenditure: clean transport, energy efficiency and renewable energy, green buildings, living and natural resources and land use, terrestrial and aquatic biodiversity, climate change adaptation, sustainable water and wastewater management, and pollution prevention and control.

In mid-November, New Zealand priced its inaugural green bond via syndicate. Demand for the NZD3bn (USD1.8bn) 2034 maturity deal reached NZD7.5bn, covering the book two and a half times. The Treasury remarked that it saw participation from new names as well as some investors who had not participated in its syndications for several years. They were very pleased with the transaction overall as well as the positive response to the framework.

Spotlight EM issuer: The Philippines

The Philippines comprises more than 7100 islands, and its geographic location means that it is exposed to multiple climate vulnerabilities. These include frequent and increasingly intense cyclones leading to flooding, rising sea levels, and rising sea temperatures and oceanic acidification. Under its commitment to the Paris Agreement, the Philippines is pursuing an ambitious target to cut GHG emissions by 75% by 2030. The achievement of close to 73% of that relies heavily on DM to provide climate finance, technologies, and capacity development, with the remainder coming from domestic resources. In addition to its climate challenges, the COVID-19 pandemic hit the country hard, reversing social developments and economic progress.

To address these issues, the Philippines published its Sustainable Financing Framework in November 2021.[14] The framework included seven categories of social expenditures, and four environmental: access to essential services, affordable basic infrastructure, food security, employment generation, socioeconomic advancement and empowerment, affordable housing, COVID-19 expenditures, clean transportation, climate change adaptation, management of biodiversity and land use, and renewable energy.

The Philippines issued against this framework three times in 2022.

March: Part of a USD2.25bn three-tranche deal, the USD1bn 25-year sustainability clip attracted the strongest demand, and achieved spread compression of 50bps in primary, pricing with a small new issue premium.

April: The Philippines has sold Samurai bonds annually since 2018 (except 2020) and became the second sovereign to price GSS+ debt in JPY (Hungary priced multiple green JPY deals in 2020 and early 2022, and Mexico became the third when it priced sustainability deals in August 2022). The JPY70.1bn (USD553m) four-tranche deal was spread over 2027, 2029, 2032, and 2042 maturities. The two shorter tranches priced with a clear greenium, while the longer tranches exceeded the length of the existing JPY yield curve, hence the presence of a greenium could not be determined by Climate Bonds.

October: A USD2bn deal included a USD750m 25-year sustainability tranche. Rising interest rates in the US had discouraged issuers in the Asian markets so investor interest was strong, and the deal achieved book cover of five times, allowing spread revision of 45bps. The deal priced outside its yield curve but tightened in the secondary market.

These efforts are expected to contribute to sustainable market creation in the country and attract private sector crowding in.

Three 2022 innovations from GSS+ issuing nations

In 2022 three developments contributed to a more inclusive sovereign GSS+ debt market. A variety of structures can cater to different investment preferences and hence increase investor participation. The SLB structure can support a broad range of issuers and provide a further source of capital for sustainable sovereign issuers to complement thematic issuance under the UoP (GSS) format.

1. Short-dated paper: Austria

According to Bloomberg, the sovereign short-term debt market, comprising instruments with a residual maturity of one year or less at issuance, stood at USD14.5tn in mid-March 2023.[15] Climate Bonds published **A Discussion Paper: Certification of Short-Term Debt** in June 2022, describing how whole entity Certification could increase the variety and scope of green instruments available to investors while maintaining the integrity of the green label.[16]

Having published its Green Financing Framework in April 2022, **Austria** became the first country to issue a green Treasury Bill when it priced a EUR1bn (USD973.9m) 126-day maturity deal via auction in October.[17] The transaction attracted a bid/cover ratio of 2.69 times, which is more than the 2.12 times average for other Austrian T-bills priced in 2022. Investors describing themselves as green comprised 85% of the book, mainly central banks and money market funds. The deal obtained a greenium of 2bps according to the Austrian Treasury. The instrument was rolled when it matured in February 2023.

2. Index-linked bonds: Hong Kong SAR and France

Green index-linked bonds can offer protection from rising inflation, while addressing investor concerns over the green transition.

An established repeat issuer of sovereign green bonds, **Hong Kong SAR** priced the first inflation-linked sovereign green bond in early May. The HKD20bn (USD2.55bn) three-year green retail bond had a coupon linked to the Hong Kong Consumer Price Index (HKCPI).

Later that month, **France** followed suit with a EUR4bn (USD4.2bn) 2038 maturity deal with a coupon linked to the European Consumer Price Index (ECPI).[18] The deal was priced via syndicate and attracted an order book of EUR27.5bn, enabling price revision of 3bps. The bond priced slightly outside the FRTR inflation-linked curve. The order book included around 230 names, and more than half of the bond was allocated to green investors. The deal stood at EUR4.5bn (USD4.8bn) by the end of 2022 following a September tap, at which point it was inside its yield curve, thus achieving a pricing benefit.

3. Sustainability-linked bonds: Chile and Uruguay

Sovereign SLBs encourage accountability, linking the servicing cost of liabilities to the achievement of national climate and environmental commitments. In November 2021, the World Bank published *Striking the Right Note: Key Performance Indicators for Sovereign Sustainability-Linked Bonds*, which listed appropriate KPIs for inclusion in sovereign SLBs.[19]

The **Chilean Ministry of Finance** referenced the World Bank's suggested KPIs in its February 2022 SLB framework which complied with ICMA's SLB Principles.[20] A month later, Chile priced the first sovereign SLB. The USD2bn 2042 maturity deal incorporated coupon step-ups of up to 25bps total, arranged as follows:

1. Failure to cut GHG emissions by 15.4% by 2030 would incur a coupon step-up of 6.25bps.

2. Failure to reach peak emissions between 2020 and 2030 would incur a coupon step-up of 6.25bps.

3. Failure to increase renewables installed capacity by 60% by 2032 would incur a coupon step-up of 12.5bps.

The deal achieved an order book 5.75 times the deal size, and primary market spread compression was reported as 40bps. Climate Bonds observed a normal new issue premium. Investors describing themselves as green or socially responsible were allocated 68% of the deal, and the order book included a broad range of international accounts, diversifying the investor base.

KPI commitments of Uruguay's SLB

	Metric	SPT	SPT deadline	Coupon change
KPI 1.1	GHG emission reduction	-50% (NDC aligned)	31/12/2025	+15bps
KPI 1.2		-52%		-15bps
KPI 2.1	Forest conservation	100%		+15bps
KPI 2.2		103%		-15bps

Chile has suffered from over a decade of drought and is acutely vulnerable to rising sea levels, which have the potential to severely impact the country's agricultural resources. However, the Ministry of Finance is firmly behind the efforts to address environmental and social challenges. The nation is the only one to have issued green, social, sustainable, and sustainability-linked bonds. These deals together accounted for almost USD35.4bn, equivalent to 35% of Chile's outstanding liabilities.[21]

In October 2022, **Uruguay** issued its first GSS+ bond, an SLB, with support from the Inter-American Development Bank (IDB). The USD1.5bn 2034 maturity deal had a unique structure incorporating both step-up penalties and step-down rewards according to whether the SPTs are exceeded by 2025.

This model could incentivise EM climate progress by reducing debt-servicing costs for those that hit climate or nature-based goals. If Uruguay overshot its GHG emission NDC (-3.2%/year) it would save around USD33.7m in borrowing costs. If both targets were achieved, the potential saving would be around USD67.1m.

The deal attracted a reconciled order book of 2.6 times the deal size, from 188 accounts from the USA, Europe, Asia, Uruguay, and other Latin American countries. Among these were 40 accounts participating in a Uruguay USD deal for the first time, many with a sustainability focus. This interest enabled spread compression of 25bps, and the Ministry of Economics and Finance reported a greenium. The deal moved further inside the curve in the secondary market.

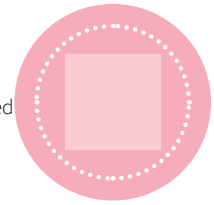
The sovereign SLB market is at its infancy but is expected to grow considerably. Work is needed to support this expansion in a credible and successful way. A useful resource is the recently created Sustainability-Linked Sovereign Debt Hub.

The biggest issuers are yet to come

Climate Bonds expects the total number of sovereign GSS+ issuers to top 50 before the end of 2023. Bloomberg currently records sovereign debt from 168 country issuers, hence there are still plenty which have not come to the market, including the three sovereign issuers with the largest outstanding volumes: the **USA**, **Japan**, and **Mainland China**.[22]

9. Building resilience through sustainable finance

Introduction



Climate Bonds research suggests that bonds with UoP contributing to A&R are already being financed under various labels. While green continues to be the dominant theme, the market remains largely focused on mitigation. As mechanisms are developed to identify, label, and therefore prioritise A&R investments, the market is expected to grow rapidly. Climate Bonds is launching a Global Resilience Programme, which will include the development of a Climate Resilience Taxonomy to expand the universe of investable opportunities and strengthen investor support for the sector.

Climate change impacts are manifesting more frequently and with greater intensity, and the window of opportunity to address them is shrinking. GSS+ bonds can channel capital towards adapting human and ecological systems and strengthening their capacity to cope with and recover from climate shocks.

Resilience is already being financed in the GSS+ debt market. However, financial instruments clearly designed and labelled to support resilient investments remain scarce. A major barrier is the absence of a pipeline of investible projects, because of a lack of clear, evidence-based definitions of what constitutes a resilience investment.

By providing the market with clear definitions and rulesets, the current universe of investments that can legitimately be financed through GSS+ instruments can be expanded to include those that build resilience. This expansion will include not only investments that reduce the direct physical impacts of climate change (e.g., flood barriers, early warning systems, etc.) but also investments that address the underlying vulnerability of people and ecosystems to climate change (e.g., healthcare, housing, gender equity, deforestation, etc.).

Climate Bonds is launching a Global Climate Resilience Programme to drive market ambition and facilitate the rapid mobilisation of global capital for investments in resilience of physical, social, ecological, and financial systems.

Climate Bonds has set out two goals for the programme:

1. Catalyse USD1.5tn within the thematic bond market to be dedicated to resilience investments by 2025;

2. Influence the public sector in key geographies to put in place policy and regulatory measures that incentivise investments in and reduce the cost of capital for projects that enhance systemic and transformative resilience.

Climate Bonds will achieve these goals through supporting: (i) the identification of credible, science-based investment opportunities that build resilience (including the development of a Climate Resilience Taxonomy), (ii) mobilisation of finance towards credible resilience measures, and (iii) acceleration of growth of resilience investments through a supportive policy and regulatory environment.

At the start of 2023, Climate Bonds started the development of the Climate Resilience Taxonomy. This will provide a common framework for issuers, investors, market regulators, observers, and policymakers to identify and prioritise expenditures, projects, assets, activities, and entities that make meaningful contributions towards climate resilience.

The Resilience Taxonomy will be comprehensive, holistic, and inclusive, reflecting the fact that climate resilience cuts across all sectors and activities. This breadth will create opportunities and promote innovation in areas where resilience needs and investment opportunities are substantial but often overlooked, such as healthcare, social protection, and natural capital, among others.

Limitations and scope of the analysis

The methodological approach for this research consists of data analysis of GSS+ bonds recorded in Climate Bonds' three databases:

1. GBDB

2. SSBDB

3. SLB and Transition Bond Database

The research criteria applied to map GSS+ bonds with A&R UoP are primarily adapted from the framing paper on Green Bonds for Climate Resilience prepared by Climate Bonds for the Global Center on Adaptation in cooperation with the EBRD, and include:[27]

- A keyword search of A&R terms in the UoP description (see Appendix 2 for a list of screening keywords);
- Value-returning standalone A&R-related UoP ('unspecified A&R');[28]
- Manual addition of SLBs tied to resilience KPIs.

Eligibility of UoP categories is determined based on information made public through an issuance's framework, final terms, or prospectus. The total capital flows towards climate resilience are difficult to map accurately because issuers do not commonly report the specific allocation of proceeds to different project categories.

If public disclosure of the UoP is inadequate, or not explicitly defined as adaptation or resilience, bonds can be missed from the screening process. Moreover, Climate Bonds' databases do not track post-issuance proceeds allocations but record flat allocations (i.e., equal amounts in each category), unless relevant data is made available when the instrument is issued. Lastly, since resilience investments can be allocated to broader UoP categories (e.g., Water), an indication of the size of such flows is not currently provided by Climate Bonds databases, so allocation volumes were not included.

Therefore, the results of this mapping are estimates and do not reflect the actual capital flows being directed to A&R investments through GSS+ bond instruments. Disclosure and tagging practices must evolve before Climate Bonds can accurately capture and track A&R-related finance in the global thematic debt market.

Mapping the A&R GSS+ universe

Market highlights

- Of the 33,849 GSS+ debt instruments recorded by Climate Bonds at the end of 2022, 6,494 (19%) were identified as having some degree of resilience-related UoP. In 2022, the share was 13% (949).
- Across the global thematic debt market, 845 issuers priced instruments with a resilience component (23%). The number of issuers in 2022 was 277.
- Just under two-thirds of 2022 GSS+ bonds with resilience UoP originated from DM, while 26% came from EM and 11% was issued by SNAT entities. The majority originated in North America, which contributed 41% to the total, with virtually the whole volume originating from the United States (96%). Asia-Pacific was the second most prolific region (26%), with 244 bonds issued in 2022 bringing its cumulative total to 883. Europe followed closely, with 21% of the market share and 195 bonds.
- Historically, thematic issuance with resilience UoP has been dominated by local governments. Of the 145 different local governments that issued resilience GSS+ debt since 2012, a large portion were US municipalities or state authorities (39% of cumulative bonds). In 2022, the private sector was particularly prolific, with financial corporate and non-financial corporate issuers together representing 35% of the total. **Indiana Finance Authority** made the largest contribution (32 bonds or 3% of the total). With respect to corporate issuers, **Standard Chartered Bank** placed first by number of bonds, with 22 or 2% of the market.
- The latest mapping confirmed the findings of a prior analysis conducted by Climate Bonds.[23] First, resilience does not feature prominently in GSS+ deals despite the existence of mature and well-established markets like that of green bonds, which are currently serving low-carbon rather than climate-resilient investment. Second, there is a hidden market for resilience which is not being labelled and is difficult to map due to the complexities of data collection and interpretation.
- Resilience-related UoP goes beyond climate-centric activities. Thematic bonds can also serve social resilience, which is an essential need for communities, entities, and countries in the context of post-pandemic life, geopolitical instability, rising energy costs and soaring housing prices. An area of the market to watch is the sustainability label. Due to their hybrid nature, sustainability bonds combine UoP to address green and societal needs, presenting potential for a resilient approach.

GSS+ bonds for climate resilience: Scorecard

	Green	Sustainability	Social	SLB	Transition
Number of instruments	3988	1309	1195	2	N/A.
Number of issuers	415	282	186	1	N/A
Number of countries	44	34	20	1	N/A.
Number of currencies	25	22	17	1	N/A.

Green bonds for climate resilience: Scorecard

	2022	2021	Change YOY
Number of instruments	507	676	-25%
Number of issuers	137	160	-14%
Number of countries	25	29	-14%
Number of currencies	13	18	-28%

A peek into A&R issuance in 2022

1. New Zealand's sovereign green bond

Amount: NZD3bn/USD1.8bn

Maturity: 2034

Eligible UoP categories (GBP): (i) Clean transport; (ii) Energy efficiency & renewable energy; (iii) Green buildings; (iv) Living and natural resources and land use; (v) Terrestrial & aquatic biodiversity; (vi) Climate change adaptation; (vii) Sustainable water & wastewater management; (viii) Pollution prevention and control.

Eligible projects under New Zealand's inaugural green sovereign bond are expected to facilitate the country's transition to a low-carbon economy and contribute to the government's climate-related, biodiversity conservation and environmental goals.

Under the climate change adaptation category, the government has the three-fold objective of (i) reducing the physical climate vulnerability of the country's infrastructure, (ii) helping regional communities and Māori to make better risk-informed decisions to prepare for and respond to climate change and climate-related disasters, and (iii) supporting other countries to enhance their resilience to climate change.[24] Projects range between local flood protection, mitigation and control schemes, solutions to tackle water scarcity and avert water-related emergencies, building systemic resilience such as via monitoring and warning systems, and climate projection data tools and climate adaptation information portals to reach at-risk communities in a timely manner and allow for anticipatory and risk-informed action.

While the framework has a standalone UoP category for A&R-related expenditures, many other relevant projects fall under broader sectors that are well-established in the green bond market. For example, water storage, irrigation infrastructure and water assessment projects to improve the resilience of New Zealand's regions to drought and water shortages are included under the sustainable water & wastewater management category. This indicates that the size of capital flows towards resilience-related investments might be greater than at first glance, as many expenditures do not hold a specific resilience tag but are allocated to broader UoP categories with resilience benefits.

2. Citigroup's social bond

Amount: USD2.5bn

Maturity: 2026

Eligible UoP categories (SBP): (i) Access to essential services – Financing and financial services/ financial inclusion; (ii) Affordable housing; (iii) Affordable basic infrastructure; (iv) Access to essential services – healthcare; (v) Access to essential services – education; (vi) Access to essential services – smallholder farmer finance.

Citigroup's social bond supports lending to inclusive businesses in EM. Proceeds were earmarked to invest in raising productivity of small-farm agriculture, build resilience to climate change, improve access to markets, and strengthen capacity. Projects include the provision of agricultural inputs and credit, expanding access to markets of agricultural products, training and other extension services.[25] These contribute to building resilient societies.

3. True Securitizadora (Oakberry)'s sustainability bond

Amount: BRL50m/USD9.3m

Maturity: 2027

Eligible UoP categories (GBP and SBP):
(i) Environmentally sustainable management of living natural resources and land use, and Agriculture and forestry, i.e., activities that reduce carbon loss or increase forest stock (Climate Bonds); (ii) Food security and sustainable food systems, and Socioeconomic advancement and empowerment.

Oakberry is a Brazilian food processing company which produces healthy fast-food options with Brazilian-sourced products. Projects with intended resilience outcomes mainly fit within the category of social A&R, i.e., creating more robust social systems. The issuer aims to use sustainability bonds for agriculture and sustainable production that support small farmers and family farming in the riverside community of the Amazon region where the company will purchase açaí. In addition to sustainable harvesting, the issuer aims to promote and invest in education infrastructure and create access to other basic services to guarantee the human rights of the local population, including healthcare, clean and safe water, access to financial services, and the inclusion of women in training and decision-making programmes.[26]

This bond is a good example of an innovative securitised deal by a non-financial corporate in the region, in a category where there are few. Green and social UoP are complementary.

4. Arizona Industrial Development Authority's SLB

Amount: USD112.9m, USD86.8m (two tranches)

Maturity: 2028, 2047

The Arizona Industrial Development Authority issued the first ever US municipality (muni) SLB in February 2022, in the form of a revenue bond for a local company called NewLife Forest Restoration LLC. The full proceeds of the bond are loaned to the relevant company, with the expectation that the ensuing revenue generated will finance the redemption for the bond.

The activities of NewLife pose an exciting example of adaptation finance through SLBs. The company's business model is in response to the catastrophic wildfires in Arizona, in large part caused by small-scale, natural wildfires (which are often good for the eco-system) being extinguished by local communities, which view them as a threat to their livelihoods.

The unfortunate consequence of this practice is that the undergrowth in these forests then over-grows, creating a dangerous fuel for devastating forest fires. Abundance of undergrowth is conducive to crown fires through a phenomenon known as the ladder effect, making large-scale forest fires even more difficult and dangerous to control.

In the last two decades, Arizona has experienced multiple mass-scale catastrophic wildfires caused by climate change-induced weather systems, as well as the aforementioned forest mismanagement.

NewLife has been contracted by the US Forest Service to mechanically thin the forests to remove dangerous levels of undergrowth, making them more resilient against naturally occurring fire regimes, and in turn, generating low-grade wood fibre and biomass to be used for commercial production.

The underlying loan from this SLB will help NewLife continue the delivery of its manufacturing solution, helping it more efficiently produce forest products. This is expected to increase its margins, which will help finance the less economical parts of its operations, including its forest undergrowth-thinning operations.

The two KPIs used for this SLB tie the interest rate of the bond to the successful achievements of NewLife in its main business operation: the restoration of forestland and the use of related products in its commercial operations. If NewLife fails to achieve both targets, a step-up of 150bps (100bps for KPI1, 50bps for KPI2) would be applied to the existing 9% and 11% respective coupon rates.

Arizona Industrial Development Authority / NewLife Forest Restoration KPIs and SPTs

Key Performance Indicator (KPI) 1	Forestland restored	Measured # of acres restored	
Sustainability Performance Target (SPT) 1	36,000 acres	**Observation date**	31 December 2024
KPI 2	% of logs processed as restoration logs	Measured in %	
SPT 2	80%	**Observation date**	31 December 2024

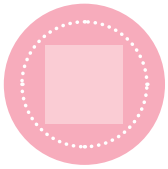
10. Outlook

Climate Bonds recorded GSS+ deals worth a combined USD858.5bn in 2022, bringing the cumulative total to USD3.7tn. The development of the thematic debt market continued, with new issuers joining, instrument innovation, and regulation in multiple regions gathering pace. While GSS+ volumes dropped YOY for the first time in a decade, its 5% contribution to global bond market issuance was maintained. Green bonds were responsible for over half (57%) of the new volumes with USD487.1bn being added to the market, social bond issuance reached USD130.2bn (15%), sustainability USD161.3bn (19%), SLBs saw USD76.4bn (9%), and USD3.5bn was issued under the transition label (0.4%), the only one to experience growth on the year.

The thematic debt market has persistently suffered from a lack of supply. The push and pull of the supply and demand dynamic was felt even more acutely in 2022, as sentiment and, in some regions, regulation tilted investors towards sustainable investments, while lenders were anxious to tap the market at the right point given rising rates and the challenging macroeconomic landscape.

Looking ahead to 2023, Climate Bonds expects five developments to push the GSS+ market forward:

1. Resilience deals can contribute to annual USD5tn by 2025



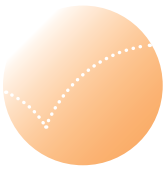
Cumulative green bond issuance reached USD2.2tn by the end of 2022, but Climate Bonds is pushing for at least USD5tn in annual issuance by 2025.

The persistent lack of supply has been a key obstacle to reaching this target. There is a tremendous opportunity to tap unmet demand by scaling-up capital flows towards investments in resilience. By providing the market with clear rules and definitions, the current universe of green investment can be expanded to include those that build resilience.

This expansion will move beyond investments that reduce direct physical impacts of extreme weather and include those that address the underlying vulnerability of people and ecosystems to climate change.

Climate Bonds is committed to developing this market, as described in section 9 of this report.

2. Climate Bonds Standard v4 will bring rigour to SLBs



SLBs emerged in 2018, and by the end of 2022, Climate Bonds had recorded deals with a cumulative volume of USD204bn.

The popularity of the instrument stems from the innovative structure. Investors can contribute to real impact on climate performance at the company level, and issuers in all sectors can participate in the thematic debt market and be rewarded for delivering on their sustainability goals.

As with any nascent market, legitimate concerns over the credibility of SLBs have been raised due to varying ambition levels of the KPIs. The expansion of the Climate Bonds Standard and Certification Scheme to include SLBs will address this issue. These efforts will offer rigour, and signal to prospective investors and regulators the SLBs that meet best practice against an internationally recognised standard.

Climate Bonds is expecting the first Climate Bonds Certified SLB to appear later in 2023. This will be a catalysing moment for SLB credibility, enabling the market to contribute meaningfully to the 2025 target of USD5tn in annual thematic debt issuance.

3. Government support to green industry grows

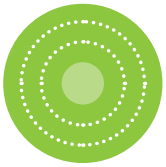
Subsidies, credit guarantees, tax offsets or other financial incentives will finance discoveries that enable the rapid scaling up of climate change solutions, through the large, transparent deals that investors in the GSS+ market are so keen to see more of.

Climate forecasting group Inevitable Policy Response (IPR) calculates the combined total of public money now available in the US for clean energy and climate investment via the Inflation Reduction Act (IRA), Infrastructure and Investment Jobs Act (IIJA) and the CHIPS & Science Act to be almost USD1tn.[29]

This is being supplemented by the Bipartisan Infrastructure Laws (BILs), which will provide tax cuts and grants for clean energy. The BILs represent a government-enabled but private sector-led tool to facilitate a new raft of investment to green projects.

Across the Atlantic, Europe is responding with EU Commission President Ursula von der Leyen announcing the Green Deal Industrial Plan at Davos, which includes the Net Zero Industry Act.[30] The aim is to increase the funding of clean energy technologies.

4. Tipping point for transition finance



Climate Bonds expects that 2023 will offer a crucial tipping point for transition, greening the hard-to-abate sectors and aligning heavy industry with global efforts towards net zero. The nascent transition bond market has trailed in volumes when compared to other labels but there are signs of change as it was the only segment of the thematic debt market to chalk up a YOY increase in 2022.

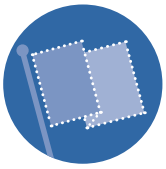
The Japanese market, the largest source of transition volumes in 2022, has been encouraged by the Ministry of Economy, Trade, and Industry (METI), which published Basic Guidelines on Climate Transition Finance in May 2021.[31]

However, if other nations adopt similar frameworks endorsing credible transition financing, the tipping point could soon become a reality. Encouragingly, the UK's Financial Conduct Authority (FCA) mandated a Transition Plan Taskforce (TPT) to work on a gold-standard transition framework, now open for public consultation.

The EU supporting transition finance with a framework of its own could facilitate the principles of the European Green Deal, which currently loosely nods to transition amidst its climate principles.

Meanwhile, Climate Bonds is developing its own transition standards to help these efforts and inform future frameworks.[32]

5. Sovereigns must use their power to wield influence



Climate Bonds expects the Sovereign GSS+ Bond Club to reach 50 members in 2023. In late 2021, Climate Bonds called for the number of issuers to double from 20 to at least 40 nations. By the end of 2022, that number was 43.

By committing to the GSS+ market, sovereigns send a powerful signal of intent around climate action and sustainable developments to regulators and the private sector. The activity of issuing a sovereign deal can catalyse domestic market development by unlocking additional sources of investment and encouraging more issuers to leverage the market to finance assets, projects, and expenditures contributing to net zero and a sustainable future.

Appendix 1: Examples of labels in each theme

Green	Sustainability	Social	SLB	Transition
Blue	ESG	Affordable housing	Sustainability-linked	Transition
Climate	Positive impact	Education	ESG-linked	Blue transition
Green	Sustainability	Equality	SDG-linked	Green transition
Green (carbon neutrality)	Sustainability awareness	Gender	Social impact-linked	Low-carbon transition
Renewable energy	SDG	Healthcare	Social- and sustainability-linked	
Solar	Socially responsible investing (SRI)	SDG housing		
Environmental	Sustainable development	Town revitalisation		
Water	Green innovation	Youth		
PACE	Impact	Employment		
Sustainability		Impact		
SDG				
Climate resilience				
Impact				

Appendix 2: List of A&R keywords for screening of Climate Bonds databases

Sector	Keywords/Terms
General A&R terms	Adaptation Resilience AnR A&R Adaptive Resilient Climate risk Exposure Hardening Hazard Climate proofing Vulnerability Redundancy Redundant TCFD
Social resilience and well-being	Social protection Welfare Livelihoods Disease surveillance systems E-Health Rapid diagnostic tests
Disaster risk management and insurance	Early warning system Weather monitoring Weather forecast Flood forecasting Drought monitoring Climate monitoring Climate modelling Relocation Managed retreat Climate Information System Parametric insurance Index insurance Catastrophe insurance
Water	Drinking water Stormwater drainage Water treatment Water loss reduction Water conservation Hydro-meteorological monitoring Rainwater harvesting Wastewater treatment Desalination Flood control Irrigation efficiency Leakage management Water efficiency Wetland degradation

Sector	Keywords/Terms
Energy	Distributed Generation Distributed PV Microgrids Minigrids Energy Storage Underground cabling Structural Strengthening
Agriculture, forestry, land use, and natural resource management	Soil conservation Climate-smart agriculture Agricultural insurance Climate-resilient rural infrastructure Drought resistant crops Non-perennial crops Regenerative agriculture Soil sequestration Wild brush clearing Species diversification Afforestation Reforestation Mangrove conservation and replanting Restoration of natural habitats Pest control measures Regeneration or extension of natural forests Sustainable aquaculture Ecosystem-based adaptation Integrated water resources management Ecosystem Services Soil Erosion Biodiversity Evapotranspiration Land degradation

Sector	Keywords/Terms
Infrastructure and built environment	Green roofs and walls Water retention gardens Porous pavements Reduce urban heat zones Grid resilience Back-up generation and storage Increased cooling requirement Urban flood protection Climate-resilient urban infrastructure Resilient shelters Natural infrastructure Green infrastructure Natural assets Wildlife buffer zone
Coasts	Coastal natural buffer zones Flood warning systems Coastal Setbacks Managed realignment Flood shelter Cyclone shelter Slope management Coastal protection Wetland protection Marine protected area Artificial reef
Industry	Supply chain resilience Business continuity planning Climate-related physical risk assessment Climate-related transition risk assessment

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Prepared by Climate Bonds Initiative.

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