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Sovereign green bond reporting practices in the EU: A harmonised or a fragmented landscape?

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Abstract
In order to meet the growing funding needs of green transition in the European Union, member states started issuing green bonds. On the green bond market, sovereigns are expected to report on the use of the green bond proceeds and their impact. Several voluntary guidelines are available for green bond reporting on the market, including the International Capital Market Association Green Bond Principles (ICMA GBP) or the European Union Green Bond Standard (EuGBS), which is based on the EU Taxonomy. This study provides an overview on the current sovereign green bond reporting practices in the EU, taking into account their most recent green bond reports and related documents (green bond frameworks, external reviews etc.). The results show that all sovereigns in the EU implement the ICMA GBP, while many strive to comply with the criteria of the EU Taxonomy and EuGBS on a best effort basis. Due to the voluntary use of the standards, the reporting practices among sovereigns greatly vary: each country uses its own approach for EU Taxonomy assessment, allocation and impact reporting, which leads to market fragmentation and limited comparability of the sovereign green bonds. The EuGBS could create a common ground for reporting requirements by strengthening comparability and credibility and improving the transparency on the market. However, due to its strict requirements such as the alignment with the EU Taxonomy, it is complicated for sovereigns to comply with the standard.

Keywords
Sustainable finance, reporting, green bond, net zero

1. Introduction

Climate change, environmental degradation, biodiversity loss, drought are only some of the key challenges the world is facing these days (UN, 2025). Mitigating these challenges and ensuring a sustainable future is a key priority in the European Union (EU). The EU has signed and ratified the Paris Agreement and supports the UN Agenda 2030 for Sustainable Development (European Commission, 2025a; European Council, 2025a). It introduced the EU Green Deal with the long-term goal of becoming the world's first climate neutral continent by 2050 and announced the Fit for 55 package, aiming to reduce the EU's greenhouse gas emission at least by 55% compared with 1990 levels (European Commission, 2025b; European Council, 2025b). The EU is also creating strategies in order to protect the climate and environment. It published – among others – the EU Adaptation Strategy, which outlines a vision to become a climate-resilient society or the biodiversity strategy for 2030 to protect the nature and reserve the degradation of ecosystems (European Commission, 2025c, European Commission, 2025d).

Achieving the EU's ambitious commitments require an enormous amount of funding provided by both the private and public sector (Andersson et al., 2025). The role of the sovereigns is crucial, as they can incentivize investments, provide subsidies or state guarantees etc. The EU is providing funding for the member states, e.g. through the Recovery and Resilience Facility, the Common Agriculture Policy or the Cohesion policy for the 2021–2027 period, to support a greener, net zero-carbon economy (European Commission, 2025e; European Commission, 2025f; Christou et al., 2025).

Despite the support of the EU, the current amount of funding is not likely to be enough to reach the decarbonisation targets (Andersson et al., 2025). Therefore, many member states opt for raising funds by issuing green bonds. Green bonds are debt instruments supporting projects with environmental and sustainability aspects (Bécsi et al., 2022). On the green bond market, it is expected from the sovereigns to publish pre-issuance and post-issuance documents, including allocation and impact reports on the use of the green bond proceeds and their impact. Due to the lack of mandatory, binding regulations, reporting can lead to market fragmentation and data inconsistency (Manasses et al., 2022). This can effect the attractiveness of the green bonds and hamper the green bond issuance. In the Action Plan: Financing Sustainable Growth, the EU recognized the importance of establishing unified definitions and providing comparable information in sustainable finance

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(COM/2018/097). As a result, the Union created the EU Taxonomy, a unified classification system for sustainable activities and published the EU Green Bond Standard (EuGBS), a common framework for issuing green bonds in the EU (EU 2020/852; EU 2023/2631). These initiatives are primarily targeted at the private sector and the use of EuGBS still remains voluntary for green bond issuances. Therefore, fragmentation is expected to persist among sovereigns.

1.1. The green bond market in the EU

Since the first green bond was issued by the European Investment Bank (Climate Awareness Bond – CAB), the market has grown rapidly (Cortellini and Panetta, 2021). According to the International Capital Market Association (ICMA) Database, as of September 2025, the total outstanding amount of green bonds has almost reached USD 3,000 billion, of which sovereign green bonds account for approximately USD 500 billion (ICMA 2025a) (Figure 1).

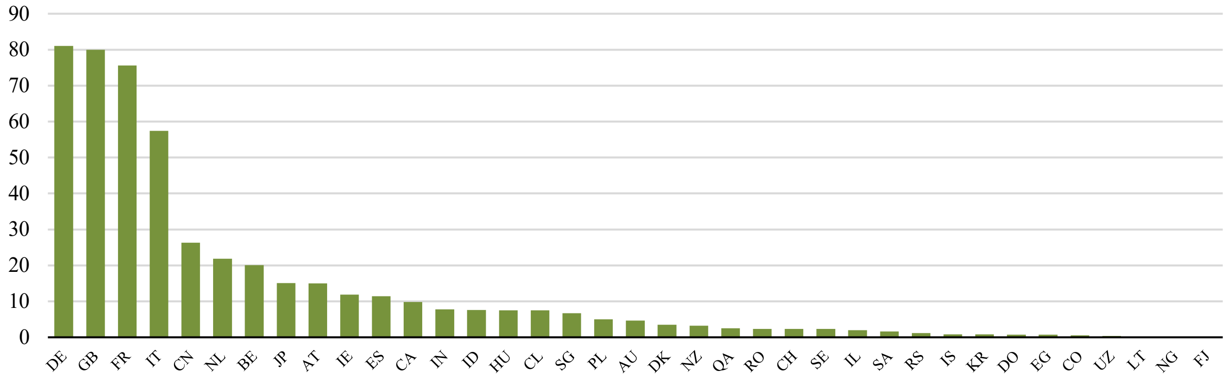

Figure 1. Global sovereign green bonds issuance (billion, as of September 2025)
Source: own editing based on ICMA (2025a)

In the EU, between 2014 and 2024, there have been a significant increase of green bond issuances by corporations and sovereigns, leading to a growing share of 0.1% to 6.9% in the total bond issuance. The share of sovereign green bonds in the total bonds issued also increased from 3.3% in 2020 to 4.2% in 2024. Sovereign green bond issuance is expected to continue, e.g. Hungary, Germany, Austria, Belgium also consider green bonds as a financing tool for reaching the climate targets in their National Energy and Climate Plans (European Environment Agency, 2025; European Commission, 2025g).

As of September 2025, 14 member states (Austria, Belgium, Denmark, France, Germany, Hungary, Ireland, Italy, Lithuania, the Netherlands, Poland, Romania, Spain, Sweden) have issued green bonds. As a result, at a global level, more than 60% of the outstanding amount of sovereign green bonds are from the EU member states, which also reflects the leadership of the EU on the green bond market (ICMA, 2025a).

1.2. Disclosures on the green bond market

On the green bond market, transparency and disclosure of information are essential. Investors rely on voluntary published pre-issuance documents (e.g. Green Bond Framework, EU Green Bond Factsheet) and post-issuance documents (e.g. green bond allocation and impact reports) or other materials (investor presentations, government policies, strategies). For example, to further improve the transparency and the communication with the investors in Hungary, the Government Debt Management Agency Private Company Limited by Shares (ÁKK) published a comprehensive Environmental, Social and Governance (ESG) profile document besides regularly publishing green bond reports. The material merges environmental, social and governance aspects and introduces the country's main ESG-related objectives, strategies, targets, challenges and achievements (ÁKK, 2025a). The role of external review providers is also significant, as they can enhance the credibility and consistency of the disclosed information by providing reviews and verification to ensure that issuers comply with best market practices and standards (Simeth, 2022).

Over the past few years, several voluntary guidelines and standards were published in order to improve the transparency of, strengthen investor confidence in and foster the issuance of green bonds. These include the ICMA Green Bond Principles (GBP) – which is currently the global standard for green bond issuances –, the Climate Bonds Standard from the Climate Bonds Initiative or the European Green Bond Standard (EuGBS), which defines the requirements for issuing the so-called "European Green Bond" (EuGB) by relying heavily on the EU Taxonomy Regulation (Brückbauer et al. 2023; Regulation

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(EU) 2020/852 and 2023/2631). As of September 2025, according to the ICMA database, 97% of the entire sustainable bond market is in alignment with the ICMA Principles.

The EU Taxonomy provides a classification system to define environmentally sustainable economic activities with regard to six environmental objectives. These objectives are: 1. Climate change mitigation 2. Climate change adaptation 3. The sustainable use and protection of water and marine resources 4. The transition to a circular economy 5. Pollution prevention and control 6. The protection and restoration of biodiversity and ecosystems. An economic activity is considered taxonomy-eligible if it has a description and a technical screening criteria set out in the Delegated Regulations of the EU Taxonomy. Current delegated regulations include: Climate Delegated Act – EU 2021/2139; EU 2022/1214; EU 2023/2485, Environmental Delegated Act – EU 2023/2486. An economic activity is taxonomy-aligned if it is taxonomy-eligible, fulfils the technical screening criteria in the relevant Delegated Regulation, and complies with the minimum safeguards criteria introduced in the EU Taxonomy Regulation. Under the technical screening criteria, the activity must contribute substantially to meeting at least one of the six environmental objectives (substantial contribution criteria – SC) while not causing harm in any of the other environmental objectives (do no significant harm criteria – DNSH) (Hummel and Bauernhofer, 2024; EU 2020/852).

Although, there are some similar features between the EuGBS and the ICMA GBP (both standards aim to regulate the use and the management of the green bond proceeds, the reporting practice etc.), significant differences between the two documents can also be observed (Table 1). First, the ICMA GBP is not based on any taxonomy, while the EuGBS relies on the EU Taxonomy. Second, the ICMA GBP recommends setting up a Green Bond Framework before the issuance, while the EuGBS requires issuers to publish the European Green Bond Factsheet. The ICMA GBP recommends an external reviewer to verify the Green Bond Framework and allocation reporting. In contrast with the ICMA GBP, the EuGBS requires an external reviewer, registered and supervised by ESMA (European Securities and Markets Authority), to verify the EU Green Bond Factsheet and the allocation report (Brückbauer, 2023; EU 2023/2631; ICMA, 2025b; ESMA, 2025).

In September 2025, Denmark became the first sovereign to issue a European Green Bond (Danmarks Nationalbank, 2025; Danish Ministry of Finance, 2025a). Apart from Denmark, the majority of the sovereigns in the EU issuing a green bond strive to implement the EU Taxonomy and the EuGBS on a best effort basis (Lukács and Bebes, 2025). Additionally, all member states apply the ICMA GBP, while for reporting purposes, some sovereigns also consider the ICMA's Handbook Harmonised Framework for Impact Reporting guideline (ICMA, 2024, henceforth ICMA Handbook).

As many sovereigns seek alignment with the EuGBS and the EU Taxonomy, and also adhere to the ICMA GBP while implementing elements from ICMA Handbook, the reporting practices and approaches greatly vary among sovereigns, which causes market fragmentation and hampers the comparability of sovereign green bonds. Therefore, understanding the market mechanisms and current disclosure practices is essential for the future development of the green bond market.

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Table 1. High-level comparison of the main elements of ICMA GBP June 2025 (latest updated version) and the EuGBS

Element	ICMA Green Bond Principles (version 2025)	EU Green Bond Standard 2025
Green Bond Framework/ EU Green Bond Factsheet	Pre-issuance, it is recommended to set up a Green Bond Framework. The framework demonstrates how the issuer aligns with the ICMA four core principles (Use of the Proceed, Process for Projects Evaluation and Selection, Management of Proceeds and Reporting) and introduces the issuer's overarching sustainability strategy.	Pre-issuance, it is required to fill and publish the EU Green Bond Factsheet, using the specific template in the standard. On the factsheet, several types of information need to be disclosed, including how the bond will contribute to the issuer's environmental strategy, the intended allocation of bond proceeds, allocation to taxonomy-aligned activities, estimated impact, process and timeline for allocation, information on reporting etc.
Use of Proceeds	The green bond proceeds should be used for projects promoting environmental benefits. An indicative list of project categories[1] is showcased in the GBP. The principles do not require the use of any taxonomy or threshold criteria, allowing a broader space for financing.	Green bond proceeds must be aligned with the EU Taxonomy and the relevant technical screening criteria. The so-called flexibility pocket allows an allocation up to 15% of proceeds to activities not aligned with the technical screening criteria.[2]
Reporting	The issuer should report on the use of proceeds annually until full allocation. The report should include a list of projects, the amount and their expected impact. It is recommended to use the ICMA Handbook, which outlines sector specific guidance and reporting metrics.	Issuers must prepare and publish allocation reports for every 12-month period (beginning on the issue date) until full allocation of proceeds. The allocation report must be made public within 270 days of the end of each 12-month period. The issuer must produce an impact report after the full allocation of the proceeds (or at least once during the lifetime of the bond). For allocation and impact reporting, the standard provides templates.
External Review	Pre-issuance (framework) and post-issuance (allocation) review is recommended. Pre-issuance: the Green Bond Framework alignment with the Green Bond Principle's components should be reviewed. Post-issuance: recommended to use an external auditor or third party to verify internal tracking and allocation of the funds.	Pre-issuance (factsheet) and post-issuance (allocation report) review by an external reviewer is mandatory, impact report review is recommended. Sovereigns have two options to receive a post-issuance review: 1. from an external reviewer, 2. from an external reviewer and a State auditor.[3]

Source: own editing based on ICMA (2025b), EU 2023/2631, Clifford Chance (2023)

2. Data and methods

The article provides a comprehensive overview on the recent sovereign green bond reporting practices in the EU by highlighting key areas: the EU Taxonomy assessment, allocation and impact reporting and external review received on the reports. Since the study focuses on the current reporting practices and related disclosures, publicly available documents published between January 2024 and December 2025 were taken into account. As a result, documents from the following countries were analysed: Austria, Belgium, Denmark, France, Germany, Hungary, Ireland, Italy, Spain, the Netherlands and Romania.

Several disclosures have been reviewed, including green bond reports and additional documents complementing the reports such as green bond frameworks, Excel files (the summary of the studied materials is in Appendix 1, Table 4). Note that in some cases it was difficult to interpret the EU Taxonomy assessment and/or the allocation and impact reports due to ambiguous definitions, wording and incoherent data.

3. Results and discussion

The European Union has established the EU Taxonomy as a classification system to define environmentally sustainable economic activities, forming the backbone of its sustainable finance framework. This taxonomy underpins the EU Green Bond Standard (EuGBS), which sets voluntary guidelines for green bond issuance and reporting. EU Taxonomy assessment involves determining the eligibility and alignment of financed activities with technical screening criteria, minimum safeguards, and "do no significant harm" principles across six environmental objectives. Reporting under this framework aims to enhance transparency and comparability by requiring issuers to disclose allocation and impact data, often complemented by external reviews. Despite these efforts, current practices among sovereign issuers remain fragmented, as alignment with the EU Taxonomy and EuGBS is largely voluntary, leading to diverse methodologies and limited harmonization across member states.

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[1] Renewable energy; energy efficiency; pollution prevention and control; environmentally sustainable management of living natural resources and land use; terrestrial and aquatic biodiversity; clean transportation; sustainable water and wastewater management; climate change adaptation; circular economy adapted products, production technologies and processes and green buildings.

[2] These activities might include: 1. economic activities where technical screening criteria is not available (these need to meet, where applicable, the generic criteria for 'do no significant harm' set out in the Taxonomy Regulation (EU 2021/2139); 2. activities in the context of international support reported in accordance with internationally agreed guidelines.

[3] In the case of the second option, the State auditor's task shall be limited to review the allocation of the bonds proceeds while the external reviewer shall verify the taxonomy-alignment of the expenditures.

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3.1. EU Taxonomy assessment

While sovereigns are not obliged to report on the eligibility and alignment of their expenditures with the EU Taxonomy, as a response to the market developments and the increasing expectations of the investors, many sovereigns started integrating elements from the taxonomy (EU 2021/2178). From September 2025, Denmark will adhere to the EU Green Bond Standard, while also align with the ICMA GBP. According to the country's EU Green Bond Factsheet, the green bond proceeds will be allocated exclusively to taxonomy-aligned activities (Danish Ministry of Finance, 2025a).

Although the other EU countries have not published an EU Green Bond Factsheet yet, the findings show that most of them seek alignment with the EU Taxonomy on a best effort basis, for example by mapping their eligible green expenditures to the 6 objectives of the EU Taxonomy. Some sovereigns also assess their green expenditures considering the EU Taxonomy technical screening (substantial contribution, do no significant harm) and minimum safeguards criteria. These countries strive to showcase the eligibility and alignment of their expenditures in their Green Bond Framework and/or green bond reports (Table 2). Each country has its own approach for showcasing taxonomy-alignment, which limits comparability.

Table 2. Examples of the EU Taxonomy assessment practices in the EU (cc = country code)

CC	High level summary of the assessment practice
NL	12 economic activities were identified and analysed by Moody's, of which eleven was found to be aligned with the EU Taxonomy under the Climate and Environmental Delegated Act (EU 2021/2139; EU 2023/2486). In the green bond report, the country does not visualise the share of green bond expenditures aligning with the EU Taxonomy, although it confirms that the allocated expenditures are aligned with the substantial contribution criteria and do no significant harm criteria except for one activity, which is the tax relief and subsidies for electric and plug-in hybrid electric vehicles (Dutch State Treasury Agency, 2023, 2025a; Moody's Ratings, 2025).
BE	When updating the Green Bond Framework in 2022, Moody's assessed the eligible expenditures of the country. Two taxonomy activities related to railway were identified and deemed to be aligned with the Climate Delegated Act (EU 2021/2139) in force at the time of assessment. In the green bond report, the country allocates the majority of its green bond proceeds to these taxonomy-aligned railway activities. Belgium also examines the taxonomy-eligibility of expenditures not assessed by Moody's at the time of updating the framework. Overall, in the green bond report, the country displays the share of taxonomy-aligned, taxonomy-eligible and non-verifiable expenditures (Belgian Debt Agency, 2022, 2025a; Moody's ESG Solutions, 2022).
HU	When Hungary was updating its Green Bond Framework, Morningstar Sustainalytics assessed the technical screening criteria for several activities under the Climate Delegated Act (EU 2021/2139). According to the country's latest report, it reassesses the available expenditures during the reporting period based on all the current Delegated Acts (Environmental Delegated Act – EU 2023/2486 and Delegated Acts amending the Climate Delegated Act – EU 2022/1214, EU 2023/2485). First, the taxonomy-eligibility of the expenditures was identified. In case of eligibility, as a next step, the country assesses the alignment of the expenditures with the technical screening criteria of the Delegated Acts. This exercise is based on interviews, consultations with the ministries, beneficiaries and EU Taxonomy questionnaires. In the report, the sovereign dedicates a separate EU Taxonomy assessment section with a detailed breakdown of the expenditures and the results of the assessment. The country also provides an overview on the share of taxonomy-aligned and partially-aligned (fulfilling the substantial contribution criteria, but not or partially fulfilling the do no significant harm criteria) expenditures and a case study to demonstrate its assessment approach (ÁKK, 2023, 2025b; Morningstar Sustainalytics, 2023).
FR	Although France's latest green bond report (published in 2025) is based on the country's Green Bond Framework 2017 (which did not incorporate the EU Taxonomy, since there was no taxonomy regulation at that time), the country conducts an EU Taxonomy assessment and displays the share of taxonomy-eligible, non-eligible and not analysed expenditures. Furthermore, the country breaks down the taxonomy-eligible expenditures, showcasing the share of expenditures fulfilling the substantial contribution and do no significant harm criteria. The country also presents some case studies on the selected expenditures, summarising the taxonomy assessment results (Agence France Trésor, 2025a). In its updated Green Bond Framework (published in 2025), the country obliges itself to continue the taxonomy assessment process and display the results in each upcoming green bond report. According to the updated Framework, the country will also publish an ad hoc document with a detailed mapping of environmental, social laws and regulations in force in the country and the internal processes to meet the do no significant harm and minimum social safeguards criteria set out in the Delegated Acts (Agence France Trésor, 2025b).
IT	The country has a specific, detailed process in place to assess the allocated expenditures in the green bond report. The assessment is based on the COFOG (classification of the functions of government), ISIC (International Standard Industrial Classifications), NACE Rev.2 and Taxonomy Compass (Ministero dell'Economia e delle Finanze, 2025a). In the updated Green Bond Framework (published in 2025), the country commits to aligning certain activities with the substantial contribution criteria under the Climate and Environmental Delegated Act (EU 2021/2139; EU 2023/2486), meanwhile also considering the DNSH criteria where feasible. The framework also highlights, that in the upcoming green bond reports a section will be dedicated to the EU Taxonomy (Ministero dell'Economia e delle Finanze, 2025b).
ES	In the latest green bond report, the country provides qualitative information on the EU Taxonomy alignment of certain expenditures. For expenditures under clean transport category, according to the country, the selection criteria takes into account the technical screening criteria related to climate change mitigation objective defined in the EU Taxonomy on a certain level. However, information on the assessment process for such projects is not available in the report. As for the expenditures related to agricultural insurance, Spain describes the expenditure's alignment with the "Non-life insurance: insurance against climate-related risks" taxonomy activity (Tesoro Público, 2025).

Source: own editing based on the sovereigns' most recent Green Bond Reports and related materials such as Green Bond Framework, External Reviews

Some countries like Romania do not provide information on the taxonomy-alignment of green expenditures in the reporting but integrate certain elements from the regulation. For example, according to the criteria of the Clean Transportation project category under the country's Green Bond Framework, until the end of 2025, low-carbon passenger

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vehicles with a tailpipe emissions intensity of maximum 50 g CO_2/km, from 2026 onwards, only vehicles with emissions intensity of 0 g CO_2/km are eligible for financing. This criteria is adopted from the technical screening criteria of the EU Taxonomy's Climate Delegated Act (Government of Romania, 2023; EU 2021/2139).

In many cases, the misuse of wording, phrasing and inconsistency in the documents (Green Bond Framework, external review, green bond report) can potentially lead to a misunderstanding and an assumption on what extent the issuer aligns with the taxonomy, how the taxonomy assessment is executed and which Delegated Acts and technical screening criteria the issuer considers for the taxonomy assessment. These include wording such as "eligible to be Taxonomy-aligned", "likely aligned", "likely partly aligned", "potentially environmentally sustainable sectors, in line with the objectives of the EU Taxonomy". This practice also demonstrates how diversified the market is when it comes to EU Taxonomy assessment.

3.2. Reporting

Both the ICMA GBP and EuGBS require issuers to report on the allocation and impact of the green bond proceeds after the issuance. While the EuGBS contains separate allocation and impact reporting templates that are mandatory to use, the ICMA GBP does not include any templates for reporting purposes. Instead, the ICMA GBP recommends adopting the ICMA Handbook, which outlines core principles, recommendations, while providing sector specific guidance, reporting metrics and templates for impact reporting (ICMA, 2024, 2025b; Regulation (EU) 2023/2631). Since the latest green bond reports published by sovereigns are based on ICMA GBP, issuers had more freedom in creating their own reporting structure, having unique approaches for designing and highlighting certain content.

The findings show that some countries (Austria, Belgium, France, Hungary, Italy, the Netherlands) publish an integrated report, which combines the allocation and impact of the green bond proceeds. It must be noted that France's annual green bond report contains both allocation data and performance indicators (indicators, which are used for the state's budgetary procedure) Meanwhile other countries (Denmark, Germany, Ireland, Romania, Spain) publish allocation and impact reports separately. In general, allocation reports are published annually (until the full allocation of green bond proceeds) followed by an impact report with a time lag. The only exception is Spain, since the country discloses the allocation and impact report at the same time.

Publishing an integrated report may increase the transparency and clarity, as all information is available in one document, the connections and synergies between the allocation and the impact are clearly outlined. Since all the information is disclosed related to the projects, investors do not have to wait months or years for an impact report to be published. On the other hand, publishing the impact report following the allocation report allows more time for sovereigns for developing the content of the report and display the project's achieved impact – which might not be available or measurable at the time of the allocation. Overall, the choice of the reporting structure, the publication date of the allocation and impact report might depend on the investors' preferences, the country's capacities, the data availability of the projects or the management related to the state budget and final accounting process.

It is worth mentioning that some sovereigns like Belgium, the Netherlands, Ireland, Austria and Romania also publish additional documents, such as Excel files together with the green bond report. These Excel files summarise the allocation and/or impact data or even complement the green bond report with additional data. For example, Romania published an Excel document as an Annex to its green bond allocation report, where it details the name of the projects, their brief description, location, beneficiaries and allocated amount (Romanian Ministry of Finance, 2025). In the Austria's Green Investor Report Spreadsheet 2024 Excel document, the country provides all the allocation and impact data, a detailed overview of the green expenditures from the latest green bond report as well as historical data regarding the green bond issuances (OeBFA Austria Treasury, 2025).

In France, the Green OATs Evaluation Council is an independent body that was set up in 2017 with internationally recognised experts. The council is mandated to analyse the impact of the selected green expenditures financed by the country's green bond. Since 2017, evaluation reports are published annually and separately from the country's green bond reports. The results of these evaluation reports are highlighted in France's annual green bond reports (Agence France Trésor, 2025a).

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3.2.1. Allocation Reporting

The ICMA GBP provides an indicative project category list for eligible green expenditures. The EuGBS does not include a similar categorization to the ICMA GBP, but obliges issuers to display the share of the taxonomy-aligned expenditures and economic activities listed in the Delegated Regulations (e.g. afforestation, infrastructure for rail transport, construction of new buildings) on the Green Bond Factsheet and reporting templates (ICMA, 2025b; EU 2023/2631).

The findings show that issuers take into account the indicative project categories from the ICMA GBP in their Green Bond Framework and green bond reporting. While some sovereigns use the same project categories from the ICMA GBP, others modify the titles or even create new ones. The study also reveals that each sovereign allocated most of its green bond proceeds to projects under the Transport/Clean Transportation category, except for Romania and France (Table 3). While Romania allocated the majority of the proceeds to projects under the "Sustainable Water and Wastewater Management" category (projects related to the construction of water supply and wastewater infrastructure), France used most of the green bond funds on the "Multi-sector" category, which relates essentially to research funding covering several economic sectors.

Table 3. Top three allocation category in the latest sovereign green bond reports (cc = country code)

CC	Green category with the highest allocation	Share in total allocation (%)	Green category with the second highest allocation	Share in total allocation (%)	Green category with the third highest allocation	Share in total allocation (%)
AU	Clean transportation	**58.8%**	Renewable Energy	**16.9%**	Energy Efficiency	**8.6%**
BE	Clean transportation	**87.4%**	Living Resources and Land Use	**7.0%**	Renewable Energy	**2.7%**
DE	Transport	**50.7%**	International cooperation	**22.1%**	Energy and industry	**13.4%**
DK	Clean transportation	**93.8%**	Renewable energy	**6.2%**	-	
ES	Clean transport	**67.5%**	Sustainable water and wastewater management	**20.0%**	Adaptation to climate change	**12.5%**
FR	Multi-sector	**26.3%**	Energy	**20.3%**	Building	**19.1%**
HU	Clean transportation	**89.2%**	Land use & living natural resources	**9.7%**	Pollution prevention & control	**0.6%**
IE	Clean transportation	**57.7%**	Sustainable water and wastewater management	**29.1%**	Environmentally Sustainable Management of Living Natural Resources and Land Use	**6.2%**
IT	Transport	**40.5%**	Energy efficiency	**34.9%**	Protection of the environment and biological diversity	**9.1%**
NL	Clean Transportation	**51.0%**	Renewable energy	**28.7%**	Climate Change Adaptation & Sustainable Water Management	**20.3%**
RO	Sustainable Water and Wastewater Management	**42.5%**	Ecologically sustainable management of living natural resources and land use	**21.5%**	Climate change adaptation	**18.8%**

Source: own editing based on the sovereigns' most recent Green Bond Reports

Under the Transport/Clean Transportation category, a significant amount of the funds were allocated to projects related to railway infrastructure and operation, while proceeds were also used for supporting low or zero-carbon transport (e.g. hybrid cars, pure electric vehicles), public transport (including bus, metro etc.), cycling or waterway freight. In the EU, usually the state owns the national railway company and is responsible for its operation and maintenance, which may be one of the reasons behind the high allocation towards railway (Bulková et al., 2024). Another motive can be that the transport sector is one of the highest greenhouse gas (GHG) emitters among the sovereigns – according to the latest EU Climate Action Progress Reports (European Commission, 2025h). Therefore, operating and maintaining the railways can encourage the modal shift from road to a more sustainable transport, lowering the GHG emissions of the country, especially if the railway is electrified (European Commission, 2025h). For example, when it comes to railway allocation, Hungary supports only the electrified railway network with the green bond proceeds (ÁKK, 2025b).

3.2.2. Impact reporting

Both the EuGBS and ICMA Handbook expects issuers to report on the environmental impact and the related methodology behind the evaluation (ICMA, 2024, EUR-Lex, 2023). Since projects may have other sustainability impact too, the two guidelines also encourage to disclose the social benefits of the projects. Although there are similar elements in the EuGBS and ICMA Handbook, the overall requirements are different. For example the ICMA Handbook recommends to report on the estimated lifetime results of the projects or the project's economic life (in years), while the EuGBS requires to showcase

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an estimate of the project's adverse (negative) environmental impact. The ICMA Handbook includes a list of indicators (core, other, other sustainability) under each green sector and recommends to report on at least a limited number of sector specific core indicators, while the EuGBS does not contain a list of indicators that could be used by the issuers (ICMA, 2024; EU 2023/2631).

Since sovereigns are not restricted to use specific indicators for reporting, the impact indicators showcased in the green bond reports greatly vary among sovereigns. Based on the findings, each country discloses environmental impact indicators in their green bond report. The reduced/avoided greenhouse gas emission appears to be the most widely used indicator, followed by other commonly used indicators like the production of renewable energy (or energy generated from renewable sources) and energy saved. Besides impact indicators, outcome or output indicators are also reported. For example for railway transport, the length of railway lines renovated/maintained/electrified or the passenger kilometres are often presented.

For calculating the impact of certain projects, several methodologies are available (both nationally and globally). The findings show that sovereigns use different methodologies, which may not be consistent and comparable with each other. Therefore, providing a detailed description of the methodology and the evaluation is crucial. Most sovereigns include a methodology chapter or Annex in their green bond report, where information is provided on the calculation behind the impact numbers. Sovereigns like Germany also highlight the assumptions and limitations considered for calculating the impact (Federal Ministry of Finance, 2024). Belgium also publishes a methodology annex together with the green bond report, presenting the impact methodologies in details and with flowcharts (Belgian Debt Agency, 2025b).

Some sovereigns also report on other type of sustainability indicators (e.g. social, socio-economic, adverse), although it is not a common practice in the EU. The Netherlands includes a brief social indicator section in its green bond report, where information is provided on three selected social indicators: rail mobility, people protected by flood defence work and grid availability. The country also presents two adverse indicators: the use of space by offshore wind parks (in square kilometres) and the noise pollution of rail traffic (reference points, where noise level exceeded the maximum allowed limit) (Dutch State Treasury Agency, 2025a). Hungary presents the low-carbon GDP and low-carbon employment effect of the expenditures based on a model developed by ÁKK and also highlights the social co-benefit of relevant projects (ÁKK, 2025b). Italy calculates the socio-economic impact of the projects, based on the so-called SAM (Social Accountability Matrix) model. This way, the country is able to showcase the contribution of the financed projects to the GDP growth (induced Gross Domestic Product) and their impact on labour demand (as workers needs to meet induced production) (Ministero dell'Economia e delle Finanze, 2025a).

It is important to note, that impact of certain projects can occur during their entire lifetime (energy efficiency renovation, installation of renewable energy capacities such as solar panels, the upgrade or electrification of railway lines etc.). Where possible, sovereigns strive to disclose the accumulated impact over the lifespan of the financed projects (lifetime impact). Hungary reports on the GHG emissions avoidance of metro M3 reconstruction with the expected lifetime of 30 years based on a climate benefit analysis prepared for the project (ÁKK, 2025b). Italy presents the GHG savings over the entire lifetime of the financed interventions using the CO_2mpare Evolution model and also takes into account external studies relating to the useful life of the projects (lifetime ranges from a minimum of 27 years to maximum 37 years) (Ministero dell'Economia e delle Finanze, 2025a). Germany applies an eight-year lifetime for calculating the impact of energy efficiency projects in industry and businesses (Federal Ministry of Finance, 2024). For evaluating the GHG emission avoidance, Belgium considers a 45 years lifetime of the purchased rolling stock, and a 40 years lifetime for railway maintenance investment (Belgian Debt Agency, 2025a). Denmark considers the accumulated CO_2 emission avoidance for a 15-year lifespan of the financed zero- and low-emissions vehicles (Danish Ministry of Finance, 2025b).

3.3. External Review

The role of external reviewers is significant on the market as they provide independent review on pre-issuance (Green Bond Framework, EU Green Bond Factsheet) and post-issuance documents (green bond reports), boosting the credibility and transparency on the market. Currently, there are several service providers including Morningstar Sustainalytics, Moody's Ratings, ISS-Corporate, S&P Global Shades of Green, Sustainable Fitch etc. that issue external reviews. There are also service providers, offering external audit and limited assurance services like KPMG or Deloitte on the verification of the green bond allocation. According to the EuGBS, only external reviewers registered by the ESMA will be able to provide an

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external review on the EU Green Bond documents (registration required form 1 January 2026), meanwhile the ICMA GBP does not define any requirement for external review providers (ESMA, 2025; ICMA 2025b).

Despite being only recommended by the ICMA GBP, all member states received at least one type of an external review on their green bond reports (Figure 2).

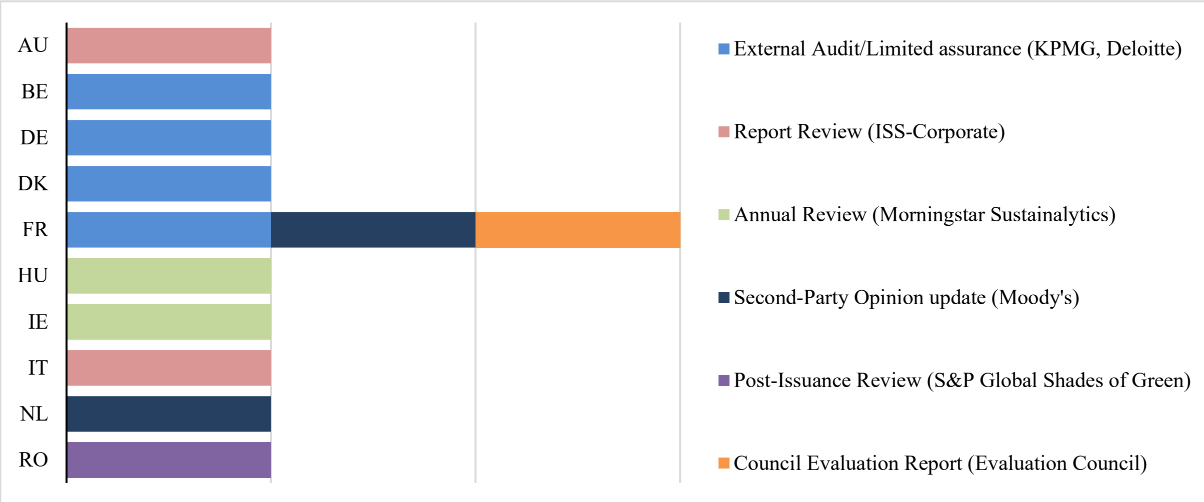

Figure 2. External Reviews provided for the most recent Green Bond Reports published by the sovereigns (cc = country code)
Source: own editing based on the sovereigns' most recent Green Bond Reports and External Reviews
Note: State audit is not indicated on the Figure.

For post-issuance review, countries engage several external reviewers, who apply different approaches and methodologies when providing an opinion on the reports. Some countries opt for an external audit/limited assurance service. There are countries also highlighting that their allocation is verified by state audit. For example, the Netherlands notes that the Central Government Audit Service (Auditdienst Rijk) has also audited the allocation in its latest green bond report (Dutch State Treasury Agency, 2025b). Spain's allocation report is verified by the General Comptroller of the State Administration (Oficina Nacional de Auditoría, 2025). In France, the Council Evaluation Reports can also be considered as a form of an external review, since the Green OATs Evaluation Council is an independent body and provides detailed analyses on the quality of the eligible green expenditures (Agence France Trésor, 2025a).

4. Conclusion

To reach the sustainability goals of the EU, a substantial amount of funding is required. Sovereigns play a crucial role in financing the green transition and building a sustainable future. Besides receiving EU funding for the aforementioned purposes, sovereigns also choose alternative ways to raise funds, for example by issuing green bonds. Currently, the issuance of the green bonds is regulated by voluntary standards and principles, such as the ICMA GBP, the ICMA Handbook or the EuGBS, which is based on the EU Taxonomy.

In order to be credible and transparent, issuers are expected to integrate the voluntary standards and principles for green bond issuances and reporting. In the EU, each of the member states use the ICMA GBP, while some countries also take into account elements from the ICMA Handbook. Additionally, sovereigns started to seek alignment on a best effort basis with the EuGBS and the EU Taxonomy. So far, Denmark is the only country in the EU that published the EU Green Bond Factsheet and issued an European Green Bond.

The study provides an overview on the green bond reporting practices in the EU based on the recent sovereign green bond reports and related disclosures. The article focuses on three key areas: EU Taxonomy assessment, allocation and impact reporting, and external verification practices.

An increasing number of countries started to assess their green expenditures based on the EU Taxonomy, presenting their taxonomy-alignment in the Green Bond Framework and/or green bond report. The taxonomy assessment practice used by sovereigns is different, with each country applying its own methodology and approach. Some countries do not assess the expenditures, but implement some elements – such as threshold criteria – form the taxonomy in their Green Bond

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Framework. Sometimes, it is not possible to determine on what extent the issuer aligns with the EU Taxonomy due to the ambiguous wording, the lack of details or the inconsistent information between the Green Bond Framework, the green bond report and an external review.

Many sovereigns publish an integrated report, which combines the allocation and impact data, while others publish a separate allocation and impact report. Some sovereigns also issue other documents together with the green bond reports in the form of Excel files. As for the allocation of the green bond proceeds, in general, the Clean Transportation/Transport goal is the most allocated green bond category with railway receiving a significant amount of the funds. Regarding impact reporting, the GHG emission avoidance is the most commonly used indicator, while the use of other type of sustainability indicators such as social, socio-economic or adverse indicators is not common.

While the ICMA GBP only recommends, the EuGBS requires issuers to engage an external reviewer in order to provide a review on the pre-issuance and post-issuance documents. All the analysed sovereigns received at least one type of an external review on their green bond report from third parties or audit service providers. These practices boost the transparency and the credibility of the disclosed information and seek alignment with the EuGBS.

The article demonstrates that fragmentation still remains a challenge on the green bond market as sovereigns use multiple voluntary documents for reporting. Each of the latest green bond reports analysed in the article has its own structure, content, design, methodologies for allocation, impact and EU Taxonomy assessment, therefore comparability is limited. The EU recognised that the absence of common standards, the diverging measures and approaches can lead to market fragmentation, uneven market conditions, limited comparability and hinder the fundraising for sustainability purposes. Therefore, the EU established the voluntary EuGBS, which regulates the green bond issuance, the reporting practice and ensures that external reviewers are registered and supervised by ESMA. The creation of a common and reliable label can build trust and help to channel more investment into green finance.

Despite these initiatives, issuing sovereign European Green Bonds as a common practice in the EU is hardly expected within a reasonable time, due to the voluntary use of the principles and standards. Another reason is that the EU Taxonomy is primarily designed for the private sector without considering some of the specific features and scopes of public financing. Some sectors being crucial for sovereigns in the green transition – such as agriculture – are not covered by the EU Taxonomy, creating a barrier for aligning certain expenditures.

Disclaimer

The views expressed in the article are those of the author and do not necessarily represent the views of Government Debt Management Agency Private Company Limited by Shares.

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Appendix

Table 4. Documents reviewed for the Results and Discussion (section 3) (cc = country code)

CC	Green Bond Framework (GBF) or EU Green Bond Factsheet (EUF) and publication year	Pre-issuance review on the Framework/ Factsheet (yes/no)	Latest Green Bond Report (A = Allocation, I = Impact, IN = Integrated) and publication year	Post-issuance review on the report[1] (yes/no)	Other documents related to post-issuance[2] (yes/no)	Website
INCLUDED IN THE ANALYSES: countries that published a green bond report between January 2024 – December 2025						
AU	GBF – 2022	Yes	IN – 2025	Yes	Yes	https://www.oebfa.at/en/financing-instruments/green-securities.html
BE	GBF – 2022	Yes	IN – 2025	Yes	Yes	https://www.debtagency.be/en/green-olo
DE	GBF – 2020	Yes	A – 2025 I – 2024	Yes	No	https://www.deutsche-finanzagentur.de/en/federal-securities/types-of-federal-securities/green-federal-securities
DK	GBF – 2021 EUGBF - 2025	Yes	A – 2024 I – 2025	Yes	Yes	https://www.nationalbanken.dk/en/government-debt/funding-strategy/green-bonds
ES	GBF – 2021	Yes	A – 2025 I – 2025	Yes	No	https://www.tesoro.es/en/deuda-publica/el-programa-de-bonos-verdes-soberanos https://www.tesoro.es/en/deuda-publica/informacion-para-inversores
FR	GBF – 2017 GBF – 2025	Yes	IN – 2025	Yes	Yes	https://www.aft.gouv.fr/en/framework-and-second-party-opinion https://www.aft.gouv.fr/en/allocation-and-performance-report
HU	GBF – 2023	Yes	IN – 2025	Yes	No	https://www.akk.hu/green-bond/green-bondFramework-2023-en
IE	GBF – 2018	Yes	A – 2025 I – 2025	Yes	Yes	https://www.ntma.ie/business-areas/funding-and-debt-management/government-securities/irish-sovereign-green-bond-documents
IT	GBF – 2021 GBF – 2025	Yes	IN – 2025	Yes	Yes	https://www.dt.mef.gov.it/en/debito_pubblico/titoli_di_stato/quali_sono_titoli/btp_green/#car3 https://www.dt.mef.gov.it/en/debito_pubblico/emissioni_titoli_di_stato_interni/comunicazioni_emissioni_btp_green/post_emissioni/
NL	GBF – 2023	Yes	IN - 2025	Yes	Yes	https://english.dsta.nl/subjects/g/green-bonds
RO	GBF – 2023	Yes	A – 2025 I – not published yet	Yes	Yes	https://mfinante.gov.ro/en/web/trezor/obligatiuni-verzi
EXCLUDED FROM THE ANALYSES: countries that did not publish a green bond report after January 2024						
LT	GBF – 2018	Yes	IN – 2023	No	No	https://finmin.lrv.lt/en/competence-areas/state-debt-management/government-securities/government-securities-auctions/green-bonds/
PL	GBF – 2016 GBF – 2025	Yes	IN – 2022	Yes	No	https://www.gov.pl/web/finance/issues-international-bonds
SE	GBF – 2020	Yes	IN – 2021	No	No	https://www.riksgalden.se/en/our-operations/central-government-borrowing/issuance/green-bonds/

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EU 2020/852 – Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088. URL: http://data.europa.eu/eli/reg/2020/852/oj

EU 2021/2139 – Commission Delegated Regulation (EU) 2021/2139 of 4 June 2021 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation or climate change adaptation and for determining whether that economic activity causes no significant harm to any of the other environmental objectives. URL: http://data.europa.eu/eli/reg_del/2021/2139/oj

EU 2021/2178 – Commission Delegated Regulation (EU) 2021/2178 of 6 July 2021 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by specifying the content and presentation of information to be disclosed by undertakings subject to Articles 19a or 29a of Directive 2013/34/EU concerning environmentally sustainable economic activities, and specifying the methodology to comply with that disclosure obligation. URL: http://data.europa.eu/eli/reg_del/2021/2178/oj

EU 2022/1214 – Commission Delegated Regulation (EU) 2022/1214 of 9 March 2022 amending Delegated Regulation (EU) 2021/2139 as regards economic activities in certain energy sectors and Delegated Regulation (EU) 2021/2178 as regards specific public disclosures for those economic activities URL: https://eur-lex.europa.eu/eli/reg_del/2022/1214/oj/eng

EU 2023/2485 – Commission Delegated Regulation (EU) 2023/2485 of 27 June 2023 amending Delegated Regulation (EU) 2021/2139 establishing additional technical screening criteria for determining the conditions under which certain economic activities qualify as contributing substantially to climate change mitigation or climate change adaptation and for determining whether those activities cause no significant harm to any of the other environmental objectives URL: https://eur-lex.europa.eu/eli/reg_del/2023/2485/oj/eng

EU 2023/2486 – Commission Delegated Regulation (EU) 2023/2486 of 27 June 2023 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to the sustainable use and protection of water and marine resources, to the transition to a circular economy, to pollution prevention and control, or to the protection and restoration of biodiversity and ecosystems and for determining whether that economic activity causes no significant harm to any of the other environmental objectives and amending Commission Delegated Regulation (EU) 2021/2178 as regards specific public disclosures for those economic activities URL: https://eur-lex.europa.eu/eli/reg_del/2023/2486/oj/eng

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